Are Geckos Paratenic Hosts for Caribbean Island Acanthocephalans? Evidence from *Gonatodes antillensis* and a Global Review of Squamate Reptiles Acting as Transport Hosts

Alex Dornburg[1], April D. Lamb[1,2], Dan Warren[3], Gregory J. Watkins-Colwell[4], Gregory A. Lewbart[5], and James Flowers[5]

[1] *Corresponding author:* North Carolina Museum of Natural Sciences, Raleigh, NC 27601 USA —*email:* alex.dornburg@naturalsciences.org

[2] Department of Applied Ecology, North Carolina State University, Raleigh, NC 27695 USA

[3] Senckenberg Biodiversity and Climate Research Institute, Frankfurt am Main 60325 Germany

[4] Division of Vertebrate Zoology, Peabody Museum of Natural History, Yale University, New Haven, CT 06520 USA

[5] College of Veterinary Medicine, North Carolina State University, Raleigh, NC 27607 USA

ABSTRACT

It is well known that reptiles can act as paratenic hosts for parasites that use mammals as their definitive hosts. However, studies of potential paratenic hosts in the Caribbean have been temporally restricted to only diurnal species of lizards, thereby neglecting a dominant component of the nocturnal reptilian community: geckos. Many gecko species are human commensals with activity periods that overlap temporally with those of domestic cats, making them prime candidates as potential transport hosts for cat parasites. However, no studies have reported geckos as paratenic hosts for felid parasites on any Caribbean island. Here we report the first records of subcutaneous oligacanthorhynchid cystacanths on the Venezuelan Coastal Clawed Gecko (*Gonatodes antillensis*) based on specimens collected in Curaçao and Bonaire. The cysts were identified as belonging to the genus *Oncicola*, likely those of *Oncicola venezuelensis.* This study reports these geckos as a new host record for oligacanthorhynchid cystacanths, as well as Curaçao and Bonaire as new geographic locales for these acanthocephalan parasites. We additionally provide a review of saurian cystacanths, comparing the restricted taxonomic focus of transport hosts in Caribbean islands to the distribution of paratenic squamate hosts both in the Neotropics and globally. We find evidence that the ability of squamate reptiles to act as transport hosts is a pervasive feature across their Tree of Life, suggesting that these animals may serve as important vectors for transporting parasites between intermediate and definitive hosts.

KEYWORDS

Acanthocephala, intestinal helminths, cats, parasite, trophic transmission, mammals, birds, host–parasite interactions, vector species

Introduction

The transport of parasites by non-definitive transport, or paratenic, hosts creates an opportunity for parasitic organisms to utilize and potentially establish novel transmission pathways (Marcogliese 2007; Parker et al. 2015; Cable et al. 2017). Although it is well established that nonmammalian vertebrates often act as paratenic hosts for a variety of mammalian parasites (Bolt et al. 1993; Anderson 2000; Strube et al. 2013), baseline data associating these species and the parasites they are transporting are uncommon across the Caribbean. This lack of data creates a knowledge gap that challenges our ability to accurately forecast the spread of internal parasites to both domestic animals and wildlife. In particular, despite the high potential of reptiles acting as paratenic hosts to the acanthocephalan parasites of cats and dogs, these potential transmission vectors have received little attention. To date, studies of lizards as paratenic hosts in the Caribbean have been restricted to

TABLE 1. Institution and catalog numbers of *Gonatodes antillensis* specimens examined in this study. *Abbreviations:* CAS, California Academy of Sciences; LACM, Natural History Museum of Los Angeles County; MCZ, Museum of Comparative Zoology; NCMNS, North Carolina Museum of Natural Sciences; RMNH, Naturalis Biodiversity Center (former Rijksmuseum voor Natuurlijke Historie); UMMZ, University of Michigan Museum of Zoology; USNM, National Museum of Natural History, Smithsonian Institution; YPM HERR, Division of Vertebrate Zoology Herpetology Reptile Collection, Peabody Museum of Natural History, Yale University.

Institution code	Specimen numbers
CAS	113319–113345
LACM	126062–126078
MCZ	R-141593, R-141600, R-149268, R-149349, R-149351, R-149367, R-149369–R-149371, R-27548, R-60579, R-69577, R-69580, R-69581, R-69583, R-69584, R-69586, R-69587, R-69592, R-69596, R-69597, R-81514, R-82968, R-82969, R-82971, R-82973, R-82974, R-82976, R-82978, R-82979
NCMNS	89384–89387, 89390, 89392–89412, 89419–89443, 89445–89448, 89452, 89491
RMNH	13421, 14742A–B, 16682A–B, 18000, 18001A–C, 18002, 18004, 18008
UMMZ	57317–57345, 127795, 127796, 142675, 151501, 179309–179314
USNM	79231, 94980
YPM	YPM HERR 017579–017584, YPM HERR 018188–018199, YPM HERR 018438–018449, YPM HERR 018451–018460, YPM HERR 018603–018606, YPM HERR 018640–018644

diurnal species such as various species of *Anolis* or *Ameiva* (Dobson et al. 1992; Goldberg et al. 1998a; Nickol et al. 2006). This temporal bias neglects an important nocturnal component of Caribbean lizard communities: geckos.

With more than 1,600 species, geckos represent one of the most successful radiations of lizards and are common commensal organisms in urban and suburban landscapes worldwide (Gamble et al. 2012). Although several studies have found geckos to harbor cystacanths of acanthocephalans in Southeast Asia (Saehoong and Wongsawad 1997; Mahagedara and Rajakaruna 2015), Africa (Oluwafemi et al. 2017), Australia (Barton 2015), South America (Anjos et al. 2005), or Central America (Goldberg and Bursey 2004a; Bursey et al. 2007), no studies have investigated whether Caribbean island species act as paratenic hosts. Given both the spatial and temporal overlap of many Caribbean species with domestic and feral cats, geckos make likely paratenic host candidates. Ground-dwelling species may be particularly vulnerable to felid predation, making an assessment of their parasite transmission potential of high utility for veterinary and wildlife medicine. Herein we examine whether the ground-dwelling Venezuelan Coastal Clawed Gecko (*Gonatodes antillensis*; Lidth de Jeude 1887) acts as paratenic host for acanthocephalan parasites by using a combination of field-collected and museum specimens. To place our findings into a broader context, we provide a review of all known Caribbean island squamates as well a global survey of squamates that have been found to act as paratenic hosts for acanthocephalans.

Methods

As part of an ongoing study of the ecology and evolutionary biology of geckos on the southern Caribbean island of Curaçao (Dornburg et al. 2011, 2016; Lamb et al. 2017), we collected a total of 140 *Gonatodes antillensis* between 2011 and 2017 from 10 locales across Curaçao, which were deposited in the Peabody Museum of Natural History, Yale University, New Haven, Connecticut, USA, and the North Carolina Museum of Natural Sciences, Raleigh, North Carolina, USA (Table 1). All specimens were visually inspected on collection, and those containing subcutaneous cysts were documented (Figure 1). To determine the historic prevalence of similar subcutaneous cysts, we were aided by collection staff who collectively visually inspected the specimen holdings of the Division of Vertebrate Zoology Herpetology Reptile Collection, Yale Peabody Museum of Natural History; the Museum of Comparative Zoology, Harvard University,

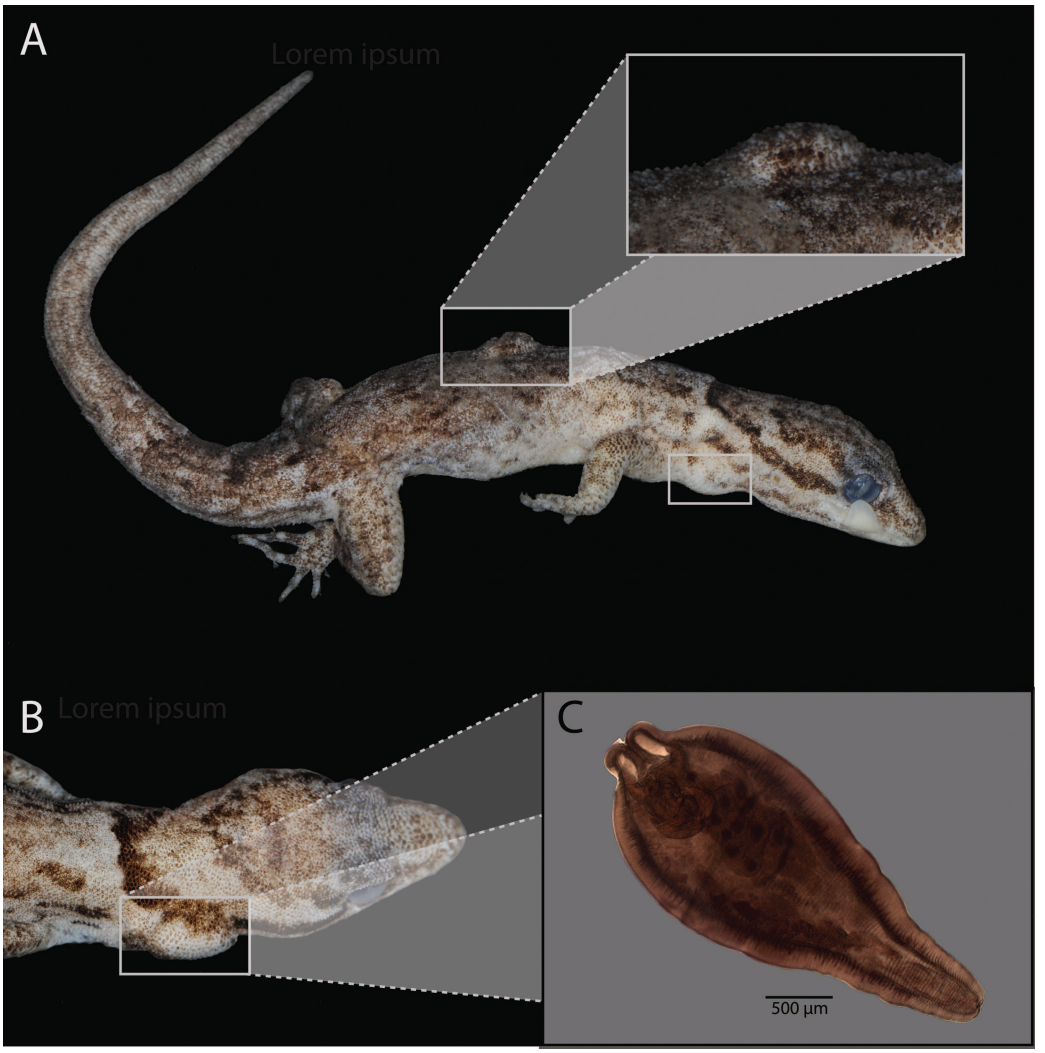

FIGURE 1. *Oncicola* cystacanths in *Gonatodes antillensis*. **A.** Individual *G. antillensis* with visible subcutaneous cystacanths highlighted. **B.** Dorsal view of *G. antillensis*. **C.** Slide of *Oncicola* cystacanth extracted from a cyst.

Cambridge, Massachusetts, USA; National Museum of Natural History, Smithsonian Institution, Washington, DC, USA; the Natural History Museum of Los Angeles County, Los Angeles, California, USA; the Naturalis Biodiversity Center (former Rijksmuseum voor Natuurlijke Historie), Leiden, Netherlands; the California Academy of Sciences, San Francisco, California, USA; and the University of Michigan Museum of Zoology, Ann Arbor, Michigan, USA, for specimens with similar subcutaneous cysts (Table 1). Subcutaneous cysts found in any samples were excised and sent to the parasitology laboratory at the College of Veterinary Medicine at North Carolina State University, Raleigh, North Carolina, USA, for identification. Larval acanthocephalans (cystacanths) were extracted from cysts with the aid of a dissecting microscope. Cystacanths were stained with Semichon's carmine, dehydrated in an ethanol series, cleared in xylene and mounted in balsam for identification. Identifications were based on taxonomic keys and descriptions (Schmidt 1972, 1985; Nickol and Dunagan 1989; Smales 1997; Nickol et al. 2006; Santos et al. 2017). Comparative voucher specimens (HWML 48252, 48254, 48256, 48257, 48258, 49710) were borrowed from the Harold W. Manter Laboratory for

Parasitology, University of Nebraska State Museum, Lincoln, Nebraska, USA (HWML).

To place our results into context, we compiled a list of all known paratenic saurian hosts for oligacanthorhynchid and centrorhynchid cystacanths across all Caribbean islands. These two groups represent two major radiations of acanthocephalans infecting terrestrial vertebrates that prey on squamates (mammals and birds; Petrochenko 1956), and would therefore be likely to co-opt squamates as transport hosts. Searches were conducted using Google Scholar and ISI Web of Knowledge using the following key terms: lizard, cystacanth, Caribbean, transport host, paratenic, saurian, gecko, *Anolis*, Iguanidae, snake, helminth, squamate, reptile, Acanthocephala, Oligantho-hynchidae and *Centrorhynchus*. Additionally, references within each found document were checked for additional publications not captured by our key terms. Although additional key search terms are certainly possible, no additional terms we attempted yielded new reports. We further searched the Harold W. Manter Laboratory of Parasitology and the United States National Parasite Collection, National Museum of Natural History, Smithsonian Institution, for records not reported in the primary literature. This search was then expanded to compare Caribbean records to all records of these parasites in squamate reptiles globally.

Results

Across our survey of the 140 Venezuelan Coastal Clawed Geckos collected from Curaçao, only specimens (6 of 22) from one locale, Director's Bay, possessed subcutaneous cysts (Figure 2). Cysts were primarily located below the anterior surface of the neck and laterally along the main body, with several specimens also exhibiting cysts near the posterior insertion of the humerus with the scapula. Visual inspections of museum specimens for geckos that possessed subcutaneous cysts (Table 1) yielded only one specimen from the University of Michigan Museum of Zoology, Ann Arbor, Michigan, USA (UMMZ 179309). That gecko had been collected in 1984 from Bonaire, Netherlands Antilles, and we found it to contain three previously undocumented subcutaneous cysts. Morphological characteristics (i.e., size, shape, proboscis hooks) of extracted cystacanths indicate inclusion in the family Oligacanthorhynchidae and the genus *Oncicola*. The long length of the lemnisci (Nickol et al. 2006) and the subcutaneous site of infection in Caribbean saurian hosts are suggestive of *Oncicola venezuelensis* (Marteau 1977). Unfortunately, the proboscis of our cystacanth specimens remained inverted, preventing a definitive species diagnosis. All cystacanth specimens were deposited in the Division of Invertebrate Zoology, Yale Peabody Museum of Natural History (YPM IZ 102933–102938).

Results of our literature and database survey yielded 15 publications and 4 museum records containing information on paratenic saurian hosts on Caribbean islands (Table 2). *Anolis* was the most frequently represented genus, with 21 species reported as paratenic hosts. Of these, only three species were reported with oligacanthorhynchid cystacanths, whereas all 21 *Anolis* species as well as a species of *Ameiva* and the snake *Leimadophis reginae* were reported with centrorhynchid cystacanths (Table 2). No subcutaneous centrorhynchid infections were reported. In contrast, both our findings for *Gonatodes antillensis* and prior work in *Anolis cristatellus* and *Anolis stratulus* reported subcutaneous infections (Table 2).

The results of our search of paratenic hosts globally yielded 202 records that spanned 35 countries and 184 species (Appendix). The United States was the most represented country with 36 records, followed by Costa Rica with 33 (Appendix). We found records of 119 species possessing oligacanthorhynchid and 75 species possessing *Centrorhynchus* infections (Appendix). Infections in the body cavity (coelom) were most common in both oligacanthorhynchid and centrorhynchid infections, respectively representing 60% and 50% of the reported records. Ophidians were the most reported group of squamates (56%), followed by iguanians (19%) and lacertoids (13%). Only a single record of a centrorhynchid cyst was found for another *Gonatodes*, with *Hemidactylus* the most frequently represented (54%) gecko genus (Appendix).

Discussion

Understanding the transmission pathways that parasites can utilize to move between hosts at

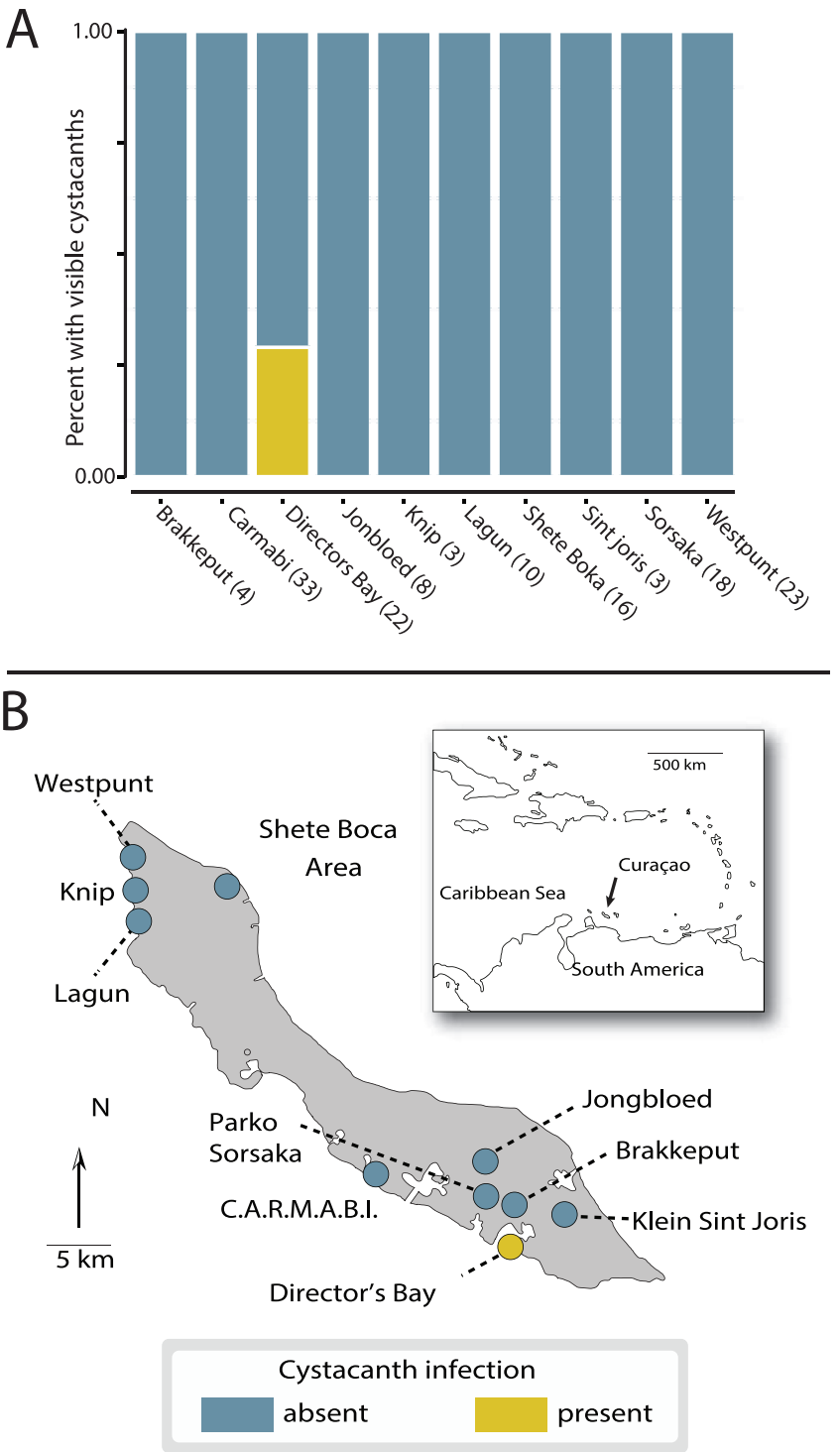

FIGURE 2. Frequency and spatial distribution of *Oncicola* cystacanths in Curaçao detected from our surveys and museum specimens. **A.** Frequency of cystacanths per site. **B.** Location of sites on the island. Blue indicates absence of cystacanths and yellow indicates presence of cystacanths. *Abbreviation:* CARMABI, Caribbean Research and Management of Biodiversity.

TABLE 2. Cystacanths found in squamate hosts on Caribbean islands. The abbreviations used indicate records from the Harold W. Manter Laboratory for Parasitology (HWML) and United States National Parasite Collection (USNPM). Rows with boldface text indicate records from present study.

Cystacanth	Host	Site of infection	Island	Reference
Oligacanthorhynchid	*Anolis acutus*	Coelom	St. Croix, U.S. Virgin Islands	Goldberg et al. 1997a
	Anolis cristatellus	Subcutaneous	St. Thomas and St. John, U.S. Virgin Islands	Fuller et al. 2003; Nickol et al. 2006
		Peritoneum	British Virgin Islands	Goldberg et al. 1998a
	Anolis stratulus	Subcutaneous	St. Thomas and St. John, U.S. Virgin Islands	Fuller et al. 2003; Nickol et al. 2006
	Gonatodes antillensis	**Subcutaneous**	**Curaçao**	**Present study**
	Gonatodes antillensis	**Subcutaneous**	**Bonaire**	**Present study**
Centrorhynchid	*Ameiva ameiva*		Trinidad, Bahamas	Everard 1975; HWML 34618
	Anolis acutus	Coelom	St. Croix, U.S. Virgin Islands	Goldberg et al. 1997a
	Anolis aeneus	Coelom	Grenada	Goldberg et al. 1997b
	Anolis armouri	Coelom	Haiti	Goldberg, Bursey and Cheam 1996
	Anolis bahorucoensis	Coelom	Dominican Republic	Goldberg, Bursey and Cheam 1996
	Anolis bimaculatus	Intestine	St. Eustatius	Dobson et al. 1992; Dobson and Pacala 1992
	Anolis cristatellus	Body cavity	Puerto Rico	Acholonu 1976
		Peritoneum	British Virgin Islands	Goldberg et al. 1998a
		Body cavity	Hispaniola	Goldberg et al. 1998b
		Body cavity	Dominican Republic	USNPM 087547
	Anolis etheridgei	Body cavity	Hispaniola	Goldberg et al. 1998b
		Coelom	Dominican Republic	USNPM 087349
	Anolis eugenegrahami	Body cavity	Hispaniola	Goldberg et al. 1998b
	Anolis garmani	Coelom	Jamaica	Bundy et al. 1987
	Anolis gingivinus	Coelom	Anguilla	Goldberg et al. 1997b
	Anolis grahami	Coelom	Jamaica	Bundy et al. 1987
	Anolis leachii	Intestine	Antigua	Dobson et al. 1992; Dobson and Pacala 1992
	Anolis lineatopus	Coelom	Jamaica	Bundy et al. 1987; Vogel and Bundy 1987
	Anolis lividus	Intestine	Montserrat	Dobson et al. 1992; Dobson and Pacala 1992
	Anolis monticola	Body cavity	Hispaniola	Goldberg et al. 1998b
	Anolis oculatus	Body cavity	Dominica	Goldberg and Bursey 1996; Goldberg et al. 1997b
	Anolis richardii	Coelom	Grenada	Goldberg et al. 1997b

Continued

Table 2 continued.

Cystacanth	Host	Site of infection	Island	Reference
Centrorhynchid	*Anolis sagrei*	Coelom	Jamaica	Bundy et al. 1987
		Body cavity	Andros Island, Bahamas	Goldberg et al. 1994
	Anolis schwartzi	Intestine	St. Eustatius	Dobson et al. 1992; Dobson and Pacala 1992
	Anolis valencienni	Coelom	Jamaica	Bundy et al. 1987
	Anolis wattsii	Intestine	Antigua	Dobson et al. 1992; Dobson and Pacala 1992
	Leimadophis reginae		Trinidad and Tobago	HWML 33903

different life stages is a fundamental component of both veterinary and human medicine. Our study represents the first documentation of *Oncicola* in *Gonatodes antillensis* and the first record of a Caribbean island gecko acting as a paratenic host for acanthocephalans. While definitive hosts of *Oncicola* species include felids and birds, *Oncicola venezuelensis* is known only from felids, specifically domestic cats and ocelots (*Leopardus pardalis*) (Marteau 1977; Patton et al. 1986; Fuller and Nickol 2011; Santos et al. 2017). Rep (1975) reported *Oncicola* from cats in the Leeward Antilles, providing evidence that this parasite has likely been on the islands for at least four decades. Our finding of an additional *Oncicola* cystacanth from a specimen collected in 1984 from the island of Bonaire provides additional evidence that the Venezuelan Coastal Clawed Gecko has been acting as a paratenic host for nearly as long. However, this raises the question of the role *G. antillensis* plays in the life cycle of *Oncicola*.

Oncicola venezuelensis utilizes termites of the genus *Nasutitermes* as intermediate hosts, with transmission facilitated through the encounter of infected fecal matter (Fuller and Nickol 2011). Parasitized termites have been found to be more vulnerable to lizard predation (Fuller et al. 2003), and laboratory studies have demonstrated that ingestion of infected termites by lizards will result in transmission (Nickol et al. 2006). Unfortunately, the natural history of *Gonatodes antillensis* has received little attention outside of a few studies of basic ecology and reproductive biology (Bennett and Gorman 1979; Van Buurt 2005; Lamb et al. 2017), and resolution of the feeding ecology of *G. antillensis* is broadly classified as comprising small invertebrates (Van Buurt 2005). Although diets of *G. antillensis* have not been studied explicitly, termites of the genus *Nasutitermes* are considered native to Curaçao (Van Buurt and Debrot 2012) and species of *Gonatodes* for which diets are known have all been documented to eat termites (Quesnel 1957; Vitt et al. 2000; Miranda and Andrade 2003). This suggests that the feeding ecology of *G. antillensis* may predispose this species as a transmission vector for *O. venezuelensis*. Further studies of the feeding ecology of this gecko are needed to test this hypothesis.

Given that no native felid species occur in the Leeward Antilles, domestic cats likely represent the only definitive host of *Oncicola venezuelensis*

on these islands. This suggests a life cycle of *O. venezuelensis* beginning in a termite that has encountered infected fecal matter. Infected termites are then ingested by *Gonatodes antillensis,* which acts as a paratenic host, and the parasite is ultimately transmitted to domestic cats to restart the cycle. This intermediate termite to paratenic lizard to definitive cat host life cycle has been proposed for *Oncicola* on other Caribbean islands (Fuller and Nickol 2011), adding a veterinary health concern to the global conservation concern of predation by feral cats driving reptile extirpation (Gibbon et al. 2000; Medina et al. 2011). Although cat predation on *G. antillensis* has not been reported, many studies have described feral cat predation on geckos (Bonnaud et al. 2011; Kutt 2011), including other species of *Gonatodes* (Alonso et al. 2009). As such, the likelihood of at least some felid predation events is certainly not negligible. Additionally, we observed a high frequency of feral cats at the Director's Bay site where all cystacanth-containing *G. antillensis* specimens were collected. Although cat frequencies and habitat characteristics were not quantified, this was by far the most ecologically degraded site of all sampling locations, with large amounts of trash and debris scattered throughout. Large quantities of garbage are known to attract cats by providing food resources, thereby increasing the risk of pathogen infections (Plaza and Lambertucci 2017). The condition of this site could explain the high frequency of infection as the harsh arid conditions of the island might prevent aggregations of feral cats in nonurbanized settings. Further, *Nasutitermes* termites have repeatedly been found to be among the most common termites in highly disturbed or degraded habitats worldwide (de Souza and Brown 1994; Eggleton et al. 1995; Bandeira et al. 2003), suggesting that this site could constitute a perfect storm for acanthocephalan transmission potential.

Paratenic Parasitism of Squamates and the Helminth Life Cycle

The results of our literature and database survey suggest squamates to represent an underappreciated component of the ecology and life cycle of acanthocephalans (Appendix). We found records from 184 species of squamates acting as potential transmission vectors in 35 countries (Appendix). These species span the squamate Tree of Life, further suggesting that this mode of transmission may be a pervasive squamate-wide phenomenon. Of all squamate groups, snakes were the most frequently represented. However, this should not be taken to imply that snakes are particularly prone to acting as paratenic hosts, as a survey based on the combined pool of natural history notes and museum records cannot account for sampling biases (Dornburg et al. 2017). Further work is needed to discern geographic, taxonomic and life history-based biases in sampling efforts and complete a more robust understanding of patterns in paratenic parasitism in squamates globally. However, comparing the restricted taxonomic focus of transport hosts in Caribbean islands to the distribution of paratenic hosts both in the Neotropics and globally (Appendix) strongly suggests a significant knowledge gap in the region.

To date, our knowledge of squamates acting as paratenic hosts on Caribbean islands has been limited to records from *Anolis* and a single lacertoid and ophidian (Table 2). Our study expands the reservoir of potential Caribbean transport hosts to include geckos of the genus *Gonatodes*. Cystacanths of *Centrorhynchus* have previously been found in *Gonatodes albogularis* in Panama; however, our record is the first instance of *Oncicola*. Further, *G. albogularis* is diurnal whereas *G. antillensis* is nocturnal (Van Buurt 2005), thereby overlapping in diel activity with the other geckos found in our survey (Appendix). Of the other nocturnal geckos encountered in our survey, geckos of the genus *Hemidactylus* are of particular note as potential transmission vectors. *Hemidactylus* geckos have invaded tropical ecosystems worldwide and have been documented to prey on other geckos (Bolger and Case 1992; Dornburg et al. 2011, 2016), including *G. antillensis* in Curaçao (Dornburg et al. 2011), making this an additional prime candidate for investigation. More broadly, our survey of paratenic squamate hosts undoubtedly underestimates the extent to which squamates act as paratenic hosts.

The ability of acanthocephalan species to infect nondefinitive hosts while remaining transmittable offers a solution to the ecological problem of transitioning between different feeding guilds at different trophic levels between life stages. Many acanthocephalans such as *Oncicola* begin their life cycle in arthropod intermediate

hosts, yet require birds or mammals feeding at higher trophic levels for their adult stage (Schmidt 1985). The results of our survey and instances of paratenic parasitism by other parasites with similar complex life histories (e.g., Marcogleise 2002; Choisy et al. 2003; Cirtwill et al. 2017) reiterates a question: When do parasitic lineages evolve to co-opt pathways of energy flow across community food webs to reach their target definitive hosts? It should not be surprising that squamates are broadly used as transport hosts, as these often represent direct links between lower trophic level consumers (e.g., arthropods) and higher level vertebrate predators (Watkins-Colwell et al. 2006). Given that we found documented instances of squamate paratenic parasitism that span the globe, we suggest that investigating the ecology and evolution of paratenic parasitism in squamates represents a potentially rich area of research in the evolution of parasite transmission pathways of high importance to both wildlife and human medicine.

Acknowledgments

We thank Mark Vermeij and the staff of CARMABI for facilitating collecting and permitting, the Westpunt syndicate for help with fieldwork, Bryan Stuart for help with specimen curation and imaging of *Gonatodes antillensis* specimens and Gregory Schneider at the University of Michigan, College of Literature, Science, and the Arts, Museum of Zoology, for his aid with specimen loans. We additionally thank Lauren Scheinberg at the California Academy of Sciences, Neftali Camacho at the Los Angeles County Museum and Rayna Bell of the Smithsonian Institution for checking specimens of *G. antillensis* for external cysts. Also, Gabor Racz and Scott Gardener of the Harold W. Manter Laboratory of Parasitology for the loan of *Oncicola venezuelensis* specimens.

Received 16 May 2018; revised and accepted 26 September 2018.

Appendix

Oligacanthorhynchid, centrorhynchid and unknown cystacanths from paratenic squamate hosts outside of the Caribbean. A dagger (†) indicates reference listed in Schmidt (1985). The abbreviations used indicate records from the Harold W. Manter Laboratory for Parasitology (HWML) and United States National Parasite Collection (USNPM); HWML or USNPM with referenced studies indicate linked specimens.

Cystacanth	Clade	Host species	Site of infection	Location	Reference
Unknown	Gekkota	*Hemidactylus frenatus*	Intestine	Australia	Barton 2015
		Hemidactylus mabouia	Intestine	Tanzania	Simonsen and Sarda 1985
	Iguania	*Sceloperus grammicus*	Muscle	USA, Texas	Goldberg et al. 1995
		Sceloperus merriami	Small intestine	USA, Texas	Goldberg et al. 1995
		Urosaurus auriculatus	Body cavity	Mexico	Goldberg and Bursey 2012a
		Uta stansburiana	Body cavity	USA, California	Goldberg et al. 1999
	Lacertoidea	*Aspidoscelis dixoni*	Mesentery/muscle	USA, Texas	McAllister et al. 1991
		Aspidoscelis gularis	Body cavity	USA, Texas	McAllister 1990a
		Aspidoscelis neomexicanus	Muscle fascia	USA, New Mexico	McAllister 1990b
		Aspidoscelis septemvittatus	Muscle fascia	USA, Texas	McAllister et al. 1995
		Aspidoscelis tigris	Coelom	USA, Arizona	Benes 1985
		Eremias pleskei		Turkey	Düşen et al. 2013
	Ophidia	*Bothrops moojeni*	Small intestine	Brazil	Silva 2014
		Crotalus atrox	Mesentery	USA, New Mexico	Goldberg et al. 2002
		Chironius quadricarinatus	Small intestine	Brazil	Silva 2014
		Erythrolamprus poecilogyrus	Body cavity	Brazil	Silva 2014
		Mimophis mahfalensis	Mesenteries	Madagascar	McAllister et al. 1993
		Pseudoboa nigra	Small intestine	Brazil	Silva 2014
		Thamnodynastes hypoconia	Small intestine	Brazil	Silva 2014
	Scincomorpha	*Acontias kgalagadi*		Southern Africa	Bursey and Goldberg 2007
		Scincella lateralis	Intestine	USA, Florida	Brooks 1972
		Sphenomorphus simus		Papua New Guinea	Goldberg et al. 2009

Continued

Appendix continued.

Cystacanth	Clade	Host species	Site of infection	Location	Reference
Oligacanthorhynchid	Anguimorpha	*Mesapis monticola*	Coelom	Costa Rica	Bursey and Goldberg 2006
		Pseudopus apodus		Azerbaijan	†Farzaliev and Petrochenko 1980
	Iguania	*Anolis acutus*	Coelom	St. Croix	USNPM 086637
		Anolis auratus	Cysts in body cavity	Panama	Bursey et al. 2012
		Anolis carolinensis	Subcutaneous	Louisiana	USNPM 090331
		Anolis cristatellus	Body cavity	U.S. Virgin Islands	USNPM 087542
		Anolis humilis	Cysts in body cavity	Costa Rica	Bursey et al. 2012
		Anolis tropidogaster	Cysts in body cavity	Panama	Bursey et al. 2012
		Anolis tropidolepis	Coelom	Costa Rica	USNPM 093528
		Chamaeleo namaquensis	Body wall, attached to various organs	Southern Africa	Prudhoe and Harris 1971
		Enyalius bilineatus		Brazil	Vrcibradic et al. 2007
		Gambelia wislizenii	Coelom, encapsulated in thoracic and abdominal integument and musculature	USA, Texas	McAllister and Bursey 2007
		Norops tropidolepis	Body cavity	Costa Rica	Bursey et al. 2004
		Paralaudakia caucasia		Azerbaijan	†Farzaliev and Petrochenko 1980
		Paralaudakia caucasia		Georgia	Sharpilo 1976; Murvanidze et al. 2008
		Paralaudakia lehmanni		Kazakhstan	Andrushko and Markov 1956
		Phrynosoma ditmarsi		Mexico	Goldberg and Bursey 2000a
		Saara hardwickii		Afghanistan	†Barus and Tenora 1976
		Stellagama stellio		Egypt	USNPM 063106
		Trapelus sanguinolentus		Kazakhstan	Andrushko and Markov 1956
		Tropidurus hispidus		Brazil	Brito et al. 2014
		Tropidurus semitaeniatus		Brazil	Brito et al. 2014

Continued

Appendix continued.

Cystacanth	Clade	Host species	Site of infection	Location	Reference
		Tropidurus torquatus	Body cavity	Brazil	USNPM 089091
		Urosaurus nigricaudus	Body cavity	Mexico	Goldberg, Bursey and Beaman 2003
		Uta stansburiana	Body cavity	USA, California	USNPM 087283
	Gekkota	*Hemidactylus frenatus*		Thailand	Saehoong and Wongsawad 1997
		Hemidactylus platyurus		Thailand	Saehoong and Wongsawad 1997
		Hemidactylus turcicus	Subcutaneous	USA, Louisiana	Criscione and Font 2001
		Hemidactylus turcicus	Body cavity	Turkey	Yildirimhan et al. 2008
		Lepidoblepharis xanthostigma	Stomach	Costa Rica	Goldberg and Bursey 2004a
	Lacertoidea	*Acanthodactylus beershebensis*	Body cavity	Israel	USNPM 108056
		Ameiva ameiva		Paraguay	Ávila and Silva 2010; Smales 2007
		Ameiva bifrontata	Small intestine	Peru	Ávila and Silva 2010; Smales 2007; Goldberg and Bursey 2012b
		Ameiva festiva	Coelom	Nicaragua	Bursey et al. 2006
		Ameiva leptophrys	Body Cavity	Costa Rica	Goldberg and Bursey 2011
		Ameiva undulata		Costa Rica	Goldberg and Bursey 2009a
		Aspidoscelis tigris	Intestine	USA, Arizona	Goldberg et al. 1997c
		Cnemidophorus septemvittatus		USA, Texas	USNPM 083365
		Eremias pleskei		Azerbaijan	†Farzaliev and Petrochenko 1980
		Holcosus leptophrys	Body cavity	Costa Rica	USNPM 103863
		Holcosus undulatus	Body cavity	Costa Rica	USNPM 101074
		Lacerta strigata		Azerbaijan	†Farzaliev and Petrochenko 1980
		Lacerta strigata		Georgia	Sharpilo 1976; Murvanidze et al. 2008
	Ophidia	*Agkistrodon bilineatus*		Mexico	USNPM 102286
		Agkistrodon contortrix		USA, North Carolina	Davis et al. 2016
		Agkistrodon piscivorous		USA, Louisiana	Elkins and Nickol 1983
		Boa constrictor		Brazil	Travassos 1917

Continued

Appendix continued.

Cystacanth	Clade	Host species	Site of infection	Location	Reference
		Bothrops jararaca		Brazil	Travassos 1917
		Bothrops neuwiedi		Brazil	Travassos 1917
		Cerastes vipera	Body cavity	Egypt	HWML 35414
		Chilomeniscus stramineus	Body cavity	Mexico	USNPM 106939
		Chironius carinatus	Coelom	Costa Rica	Goldberg and Bursey 2004b
		Chironius exoletus	Coelom	Costa Rica	Goldberg and Bursey 2004b
		Chironius fuscus	Mesenteries	Brazil	USNPM 095379
		Chironius grandisquamis	Coelom	Costa Rica	Goldberg and Bursey 2004b
		Clelia clelia		Brazil	Travassos 1917
		Coluber constrictor	Mesenteries	USA, Pennsylvania	Bolette 1998a
		Coluber mentovarius		Mexico	Goldberg and Bursey 2004c
		Coniophanes fissidens	Coelom	Costa Rica	Goldberg and Bursey 2007
		Conopsis lineata		Mexico	Goldberg and Bursey 2004d
		Crotalus atrox	Subcutaneous	USA, Arizona	USNPM 096557
		Crotalus atrox	Mesenteries	USA, Texas	Bolette 1997a
		Crotalus basiliscus	Body cavity	Mexico	USNPM 095372
		Crotalus cerastes		USA, Arizona	USNPM 091080
		Crotalus cerberus	Body cavity	USA, Arizona	USNPM 094152
		Crotalus enyo	Mesenteries	Mexico	USNPM 092196
		Crotalus lepidus		Mexico	Goldberg and Bursey 1999 (USNPM 087642)
		Crotalus lepidus		USA, Texas	McAllister et al. 2004 (USNPM 92421)
		Crotalus mitchellii		USA, California	USNPM 088617
		Crotalus scutulatus	Subcutaneous	USA, Arizona	Bolette 1997b
		Crotalus tigris		USA, Arizona	Goldberg and Bursey 1999 (USNPM 087643)
		Crotalus viridis	Subcutaneous	USA, South Dakota	Bolette 1998b
		Crotalus willardi		Mexico	Goldberg and Bursey 2000b

Continued

Appendix continued.

Cystacanth	Clade	Host species	Site of infection	Location	Reference
		Dendrophidion pericarinatum	Coelom	Costa Rica	Goldberg and Bursey 2004b
		Dendrophidion vinitor	Coelom	Costa Rica	Goldberg and Bursey 2004b
		Diadophis punctatus	Mesenteries	USA, Arizona	Goldberg and Bursey 2004e (USNPM 092282)
		Dolichophis jugularis		Azerbaijan	†Farzaliev and Petrochenko 1980
		Drymarchon couperi	Mesenteries around small intestine	USA, Florida	Foster et al. 2000
		Drymobius margaritiferus	Coelom	Costa Rica	Goldberg and Bursey 2005 (USNPM 095055)
		Elaphe quatuorlineata		Europe	Travassos 1917
		Erythrolampus aesculapii		Brazil	Travassos 1917
		Erythrolampus bizona	Coelom	Costa Rica	Goldberg and Bursey 2004b
		Erythrolampus miliaris	Peritoneum	Brazil	Pizzatto and Marques 2006; Travassos 1917
		Hypsiglena torquata	Body cavity	USA, Arizona	USNPM 090584
		Imantodes cenchoa	Body cavity	Costa Rica	USNPM 101519
		Imantodes gemmistratus	Body cavity	Costa Rica	Goldberg and Bursey 2009b
		Imantodes inornatus	Body cavity	Costa Rica	USNPM 101522
		Lampropeltis getula	Mesenteries	USA, Louisiana	Elkins and Nickol 1983
		Leptodeira maculata		Mexico	Goldberg and Bursey 2004b
		Leptodeira septentrionalis	Coelom	Costa Rica	USNPM 101174
		Leptophis ahaetulla	Coelom	Costa Rica	Goldberg and Bursey 2004b
		Erythrolamprus epinephelus	Coelom	Costa Rica	Goldberg and Bursey 2004b
		Macrovipera lebetina		Uzbekistan	†Markov et al. 1967
		Malpolon monspessulanus	Intestines	Egypt	HWML 35417
		Mastigodryas bifossatus		Brazil	Travassos 1917
		Micruroides euryxanthus	Mesenteries	USA, Arizona	Goldberg and Bursey 2000c (USNPM 088779)
		Micrurus corrallinus			Pizzatto and Madi 2002
		Micrurus nigrocinctus	Coelom	Costa Rica	Goldberg and Bursey 2004b

Continued

Appendix continued.

Cystacanth	Clade	Host species	Site of infection	Location	Reference
		Naja oxiana		Turkmenistan and Tajikistan	†Markov et al. 1968
		Nerodia cyclopion	Mesenteries	USA, Louisiana	Elkins and Nickol 1983
		Nerodia fasciata	Mesenteries	USA, Louisiana	Elkins and Nickol 1983
		Oxybelis aeneus		Mexico	Goldberg and Bursey 2001
		Oxybelis aeneus	Coelom	Costa Rica	Goldberg and Bursey 2004b
		Oxybelis fulgidus	Coelom	Costa Rica	Goldberg and Bursey 2004b
		Psammophis schokari	Body cavity	Egypt	HWML 35427
		Psammophis sibilans	Body cavity	Egypt	HWML 35426
		Philodryas olfersii		Brazil	Travassos 1917
		Philodryas patagoniensis	Body cavity	Paraguay	Smales 2007
		Pliocercus euryzonus	Body cavity	Costa Rica	USNPM 099526
		Pseustes poecilonotus	Coelom	Costa Rica	Goldberg and Bursey 2004b
		Ptyas mucosa		India	Rengaraju and Das 1981
		Rhinocheilus lecontei	Subcutaneous	Mexico and USA, Arizona, California, Texas	Bolette 1997b; Goldberg, Bursey and Holshuh 1998
		Salvadora grahamiae	Abdominal integument	USA, Texas	McAllister et al. 2017
		Salvadora mexicana		Mexico	Goldberg and Bursey 2004c
		Tantilla yaquia	Coelom	USA, Arizona	Goldberg and Bursey 2004f
		Thamnodynastes strigatus	Body cavity	Paraguay	Smales 2007
		Trimorphodon tau	Coelom	Mexico	Goldberg and Bursey 2004c
		Urotheca euryzona	Coelom	Costa Rica	Goldberg and Bursey 2007
		Walterinnesia aegyptia	Intestine	Egypt	HWML 35418
		Xenodon histricus		Brazil	Travassos 1917
		Xenodon merremii		Brazil	Travassos 1917
		Xenodon rabdocephalus	Coelom	Costa Rica	Goldberg and Bursey 2007
	Scincomorpha	*Brasiliscincus agilis*	Body cavity	Brazil	USNPM 089079
		Eumeces schneideri		Azerbaijan	†Farzaliev and Petrochenko 1980
		Plestiodon multivirgatus	Body cavity	USA, New Mexico	Goldberg and Bursey 2012c
		Scincella lateralis	Body cavity	USA, Arizona	USNPM 106913

Continued

Appendix continued.

Cystacanth	Clade	Host species	Site of infection	Location	Reference
	Varanoidea	*Varanus bengalensis*		Afghanistan	†Barus and Tenora 1976
		Varanus griseus		Egypt	USNPM 063105
Centrorhynchid	Gekkota	*Eublepharis macularius*	Body cavity, small intestine	Pakistan	Goldberg, Bursey and Telford 2003
		Gonatodes albogularis	Stomach wall	Panama	Bursey et al. 2007
		Hemidactylus agrius	Body cavity	Brazil	Anjos et al. 2011
		Hemidactylus mabouia	Small intestine; stomach wall; intestinal wall, mesenteries	Brazil	Rodrigues 1970; Anjos et al. 2005
		Phyllodactylus lanei		Mexico	Mayén-Peña and Salgado-Maldonado 1998
		Tarentola gomerensis	Body cavity	Canary Islands	Roca et al. 1999
	Iguania	*Anolis auratus*	Body cavity	Panama	Bursey et al. 2012
		Anolis limifrons	Body cavity	Panama	Bursey et al. 2012
		Anolis nebulosus		Mexico	Mayén-Peña and Salgado-Maldonado 1998
		Anolis poecilopus	Body cavity	Panama	Bursey et al. 2012
		Anolis tropidogaster	Body cavity	Panama	Bursey et al. 2012
		Anolis uniformis		Mexico	Cabrera-Guzmán and Garrido-Olvera 2014
		Ctenosaura pectinata		Mexico	Mayén-Peña and Salgado-Maldonado 1998
		Enyalius bilineatus	Stomach wall	Brazil	Vrcibradic et al. 2007
		Enyalius perditus	Small intestine, stomach	Brazil	Vrcibradic et al. 2008
		Norops limifrons	Small intestine	Costa Rica	Bursey and Goldberg 2003
		Norops tropidolepis	Body cavity	Costa Rica	Bursey et al. 2004
		Phrynocephalus interscapularis		Turkmenistan	Velikanov 1989
		Sceloporus jarrovii	Coelom	Mexico	Goldberg, Bursey and Bezy 1996

Continued

Appendix continued.

Cystacanth	Clade	Host species	Site of infection	Location	Reference
		Sceloporus nelsoni		Mexico	Mayén-Peña and Salgado-Maldonado 1998
		Stenocercus guentheri	Mesenteries	Ecuador	USNPM 103202
		Tropidurus torquatus	Stomach wall	Argentina	Vicente 1978; Ávila and Silva 2010; Lamas and Zaracho 2006
	Lacertoidea	*Apathya cappadocica*	Stomach wall	Turkey	Birlik et al. 2015
		Darevskia rudis	Small intestine	Turkey	Birlik et al. 2018
		Gallotia caesaris	Body cavity	Canary Islands	Roca et al. 2012
		Gymnophthalmus speciosus	Stomach wall	Panama	Bursey et al. 2007
		Lacerta agilis	Intestinal wall	Laboratory	Krasnoshchekov and Lisitsyna 2009
		Lacerta agilis		Ukraine	Sharpilo et al. 2001
		Lacerta strigata		Georgia	Sharpilo 1976; Murvanidze et al. 2008
		Leposoma rugiceps	Stomach wall	Panama	Bursey et al. 2007
		Podarcis lilfordi	Body cavity	Spain, Balearic Islands	Roca 1995
		Podarcis milensis	Body cavity	Greece, Milos Island	Roca 1995
		Podarcis pityusensis	Body cavity	Spain, Balearic Islands	Roca 1995
		Takydromus tachydromoides		Japan	Telford 1997
		Tupinambis teguixin	Body cavity	Paraguay	Smales 2007
	Ophidia	*Agkistrodon piscivorous*		USA, North Carolina	Collins 1968, 1969
		Amphiesma stolatum	Small intestine	Taiwan	†Schmidt and Kuntz 1969
		Coluber constrictor	Coelom	USA, Oklahoma	McAllister et al. 2015
		Coniophanes fissidens	Coelom	Costa Rica	Goldberg and Bursey 2007
		Drymarchon couperi	Mesenteries around small intestine	USA, Florida	Foster et al. 2000
		Deinagkistrodon acutus	Small intestine	Taiwan	†Schmidt and Kuntz 1969
		Echinanthera undulata	Body cavity	Brazil	Smales 2007

Continued

Appendix continued.

Cystacanth	Clade	Host species	Site of infection	Location	Reference
		Echis carinatus		Turkmenistan	Markov et al. 1970
		Elaphe sp.		China	USNPM 052195
		Elaphe carinata		China	USNPM 052197, 052198
		Erythrolamprus viridis		Brazil	Quirino et al. 2018
		Helicops leopardinus	Body cavity	Paraguay	Smales 2007
		Leptophis ahaetulla	Body cavity	Paraguay	Smales 2007
		Liophis lineatus	Body cavity	Paraguay	Smales 2007
		Liophis poecilogyrus	Body cavity	Paraguay	Smales 2007
		Lycodon sp.		India	†Das 1950
		Lycodon semicarinatus		China	USNPM 052221
		Lycodon subcinctus	Small intestine	Taiwan	†Schmidt and Kuntz 1969
		Malpolon monspessulanus	Body cavity	Egypt	HWML 35428
		Naja hannah		USA, Washington, DC (Zoo)	USNPM 056852
		Naja naja		India	†Das 1950
		Naja naja		Pakistan	Heckmann et al. 2011
		Nerodia erythrogaster		USA, North Carolina	Collins 1968, 1969
		Nerodia sipedon	Intestinal wall	USA, Kentucky	Ward 1940
		Nerodia sipedon		USA, North Carolina	Collins 1968, 1969; Richardson and Nickol 1995
		Nerodia taxispilota		USA, North Carolina	Collins 1968, 1969
		Philodryas patagoniensis	Body cavity	Paraguay	Smales 2007
		Platyceps najadum		Georgia	Sharpilo 1962; Murvanidze et al. 2008
		Protobothrops mucrosquamatus	Small intestine	Taiwan	†Schmidt and Kuntz 1969
		Psammodynastes pulverulentus	Small intestine	Taiwan	†Schmidt and Kuntz 1969
		Ptyas mucosa		India	†Das 1950
		Rhabdophis tigrinus		China	USNPM 052199, 052200, 052206
		Rhadinaea calligaster	Coelom	Costa Rica	Goldberg and Bursey 2007
		Rhinocheilus lecontei		USA, Arizona	Goldberg, Bursey and Holshuh 1998 (USNPM 086194)

Continued

APPENDIX CONTINUED.

Cystacanth	Clade	Host species	Site of infection	Location	Reference
		Sinonatrix annularis	Small intestine	Taiwan	†Schmidt and Kuntz 1969
		Trimeresurus stejnegeri	Small intestine	Taiwan	†Schmidt and Kuntz 1969
	Scincomorpha	*Brasiliscincus agilis*	Stomach, intestine, lungs, liver	Brazil	Vrcibradic et al. 2002
		Emoia caeruleocauda	Body cavity	Northern Mariana Islands, Agrihan Island	USNPM 103499
		Mochlus sundevalli	Stomach wall	Kenya	USNPM 104678
		Notomabuya frenata	Stomach wall	Brazil	Anjos et al. 2005
		Plestiodon latiscutatus	Body cavity	Japan	Bursey et al. 2005
		Psychosaura macrorhyncha	Stomach, intestine, lungs, liver	Brazil	Vrcibradic et al. 2002; Vrcibradic and Rocha 2005

Literature Cited

Acholonu, A.D. 1976. Helminth fauna of saurians from Puerto Rico with observations on the life cycle of *Lueheia inscripta* (Westrumb, 1821) and description of *Allopharynx puertoricensis* sp. n. Proceedings of the Helminthological Society of Washington 43:106–116.

Alonso, M.L., J.M. Cotrina, D.A. Pardo, E. Font and M. Molina-Borja. 2009. Sex differences in antipredator tail-waving displays of the diurnal yellow-headed gecko *Gonatodes albogularis* from tropical forests of Colombia. Journal of Ethology 28:305–311.

Anderson, R.C. 2000. Nematode Parasites of Vertebrates: Their Development and Transmission. Wallingford, UK: CABI Publishing. 650 pp.

Andrushko, A.M. and G.S. Markov. 1956. The helminth fauna of lizards from the deserts of Central Asia and its ecological character. Vestnik Leningradskogo Gosudarstvennogo Universiteta, Seriya Biologii 21:61–71.

Anjos, L.A., C. Bezerra, D.C. Passos, D. Zanchi and C.A.B. Galdino. 2011. Helminth fauna of two gecko lizards, *Hemidactylus agrius* and *Lygodactylus klugei* (Gekkonidade), from Caatinga biome, northeastern Brazil. Neotropical Helminthology 5:285–290.

Anjos, L.A., C.F.D. Rocha, D. Vrcibradic and J.J. Vicente. 2005. Helminths of the exotic lizard *Hemidactylus mabouia* from a rock outcrop area in southeastern Brazil. Journal of Helminthology 79:307–313.

Ávila, R.W. and R.J. Silva. 2010. Checklist of helminths from lizards and amphisbaenians (Reptilia, Squamata) of South America. Journal of Venomous Animals and Toxins including Tropical Diseases 16:543–572.

Bandeira A.G., A. Vasconcellos, M.P. Silva and R. Constantino. 2003. Effects of habitat disturbance on the termite fauna in a highland humid forest in the Caatinga domain, Brazil. Sociobiology 42:117–128.

Barton, D.P. 2015. Helminth parasites of the introduced Asian House Gecko ('*Hemidactylus frenatus*') (Gekkonidae), in the Northern Territory, Australia. Northern Territory Naturalist 26:44–55.

Barus, V. and F. Tenora. 1976. New data on parasitic nematodes and acanthocephalans recovered from Amphibia and Reptilia from Afghanistan. Acta Universitatis Agriculturae, Brno, Facultas Agronomica 24:339–350.

Benes, E.S. 1985. Helminth parasitism in some central Arizona lizards. Southwestern Naturalist 27:467–473.

Bennett, A.F. and G.C. Gorman. 1979. Population density and energetics of lizards on a tropical island. Oecologia 42:339–358.

Birlik, S., H.S. Yildirimhan, Ç. Ilgaz and Y. Kumlutaş. 2018. Helminth fauna of Spiny Tailed Lizard, *Darevskia rudis* (Bedriaga, 1886) (Sauria: Lacertidae) from Turkey. Helminthologia 55:45–51.

Birlik, S., H.S. Yildirimhan, N. Sümer, Ç. Ilgaz, Ö. Güçlü and S.H. Durmuş. 2015. The helminth fauna of *Apathya cappadocica* (Werner, 1902) (Anatolian Lizard) (Squamata: Lacertidae) from Turkey. Helminthologia 52:310–315.

Bolette, D.P. 1997a. First record of *Pachysentis canicola* (Acanthocephala: Oligacanthorhynchida) and the occurrence of *Mesocestoides* sp. Tetrathyridia (Cestoidea: Cyclophyllidea) in the Western Diamondback Rattlesnake, *Crotalus atrox* (Serpentes: Viperidae). Journal of Parasitology 83:751–752.

—1997b. Oligacanthorhynchid cystacanths (Acanthocephala) in a long-nosed snake, *Rhinocheilus lecontei lecontei* (Colubridae) and a Mojave rattlesnake, *Crotalus scutulatus scutulatus* (Viperidae) from Maricopa County, Arizona. Southwestern Naturalist 42(2):232–236.

—1998a. Natural occurrence of *Macracanthorhynchus ingens* (Acanthocephala: Oligacanthorhynchidae) in a northern black racer, *Coluber constrictor constrictor* (Serpentes: Colubridae). Texas Journal of Science 50:85–89.

—1998b. Helminths of the Prairie Rattlesnake, *Crotalus viridis viridis* (Serpentes: Viperidae), from western South Dakota. Journal of the Helminthological Society of Washington 65:105–107.

Bolger, D.T. and T.J. Case. 1992. Intra- and interspecific interference behaviour among sexual and asexual geckos. Animal Behaviour 44:21–30.

Bolt, G., J. Monrad, F. Frandsen, P. Henriksen and H.H. Dietz. 1993. The common frog (*Rana temporaria*) as a potential paratenic and intermediate host for *Angiostrongylus vasorum*. Parasitology Research 79:428–430.

Bonnaud, E., F.M. Medina, E. Vidal, M. Nogales, B. Tershy, E. Zavaleta, C.J. Donlan, B. Keitt, M. Le Corre and S.V. Horwath. 2011. The diet of feral cats on islands: A review and a call for more studies. Biological Invasions 13:581–603.

Brito, S.V., G. Corso, A.M. Almeida., F.S. Ferreira, W.O. Almeida, L.A. Anjos, D.O. Mesquita and A. Vasconcellos. 2014. Phylogeny and micro-habitats utilized by lizards determine the composition of their endoparasites in the semiarid Caatinga of Northeast Brazil. Parasitology Research 113:3963–3972.

Brooks, G.R. 1972. Intestinal parasites of the lizard *Lygosoma laterale*. Quarterly Journal of the Florida Academy of Sciences 35:8–14.

Bundy, D.A.P., P. Vogel and E.A. Harris. 1987. Helminth parasites of Jamaican anoles (Reptilian: Iguanidae): A comparison of the helminth fauna of 6 *Anolis* species. Journal of Helminthology 61:77–83.

Bursey, C.R. and S.R. Goldberg. 2003. *Acanthocephalus saurius* n. sp. (Acanthocephala: Echinorhynchidae) and other helminths from the lizard *Norops limifrons* (Sauria: Polychrotidae) from Costa Rica. Journal of Parasitology 89:573–576.

—2006. Helminths in *Mesaspis monticola* (Squamata: Anguidae) from Costa Rica, with the description of a new species of *Entomelas* (Nematoda: Rhabdiasidae) and a new species of *Skrjabinodon* (Nematoda: Pharyngodonidae). Parasite 13:183–191.

—2007. A new species of *Parapharyngodon* (Nematoda: Pharyngodonidae) and other helminths in *Typhlosaurus lineatus* (Squamata: Scincidae), from southern Africa. Onderstepoort Journal of Veterinary Research 74:143–147.

Bursey, C.R., S.R. Goldberg and C.L. Miller. 2004. Two new species of *Falcaustra* and comments on helminths of *Norops tropidolepis* (Sauria: Polychrotidae) from Costa Rica. Journal of Parasitology 90:598–603.

Bursey, C.R., S.R. Goldberg and S.R. Telford Jr. 2005. *Plagiorchis taiwanensis* (Digenea: Plagiorchiidae), *Kurilonema markovi* (Nematoda: Rhabdiasidae) and other helminths in *Eumeces latiscutatus* (Scincidae) and *Takydromus tachydro-*

moides (Lacertidae) from Japan. Comparative Parasitology 72:234–240.

—2007. Gastrointestinal helminths of 14 species of lizards from Panama with descriptions of five new species. Comparative Parasitology 74:108–140.

Bursey, C.R., S.R. Goldberg, S.R. Telford Jr. and L.J. Vitt. 2012. Metazoan endoparasites of 13 species of Central American anoles (Sauria: Polychrotidae: *Anolis*) with a review of the helminth communities of Caribbean, Mexican, North American, and South American anoles. Comparative Parasitology 79:75–132.

Bursey, C.R., S.R. Goldberg and L.J. Vitt. 2006. New species of *Oswaldocruzia* (Nematoda: Molineidae) in *Ameiva festiva* (Squamata: Teiidae) from Nicaragua. Journal of Parasitology 92:350–352.

Cable, J., I. Barber, B. Boag, A.R. Ellison, E.R. Morgan, K. Murray, E.L. Pascoe, S.M. Sait, A.J. Wilson and M. Booth. 2017. Global change, parasite transmission and disease control: Lessons from ecology. Philosophical Transactions of the Royal Society B: Biological Sciences 372:20160088.

Cabrera-Guzmán, E. and L. Garrido-Olvera. 2014. Helminth parasites of the lesser scaly anole, *Anolis uniformis* (Squamata: Dactyloidae), from Los Tuxtlas, Southern Mexico: Evidence of diet and habitat use. South American Journal of Herpetology 9:183–189.

Choisy, M., S.P. Brown, K.D. Lafferty and F. Thomas. 2003. Evolution of trophic transmission in parasites: Why add intermediate hosts? American Naturalist 162:172–181.

Cirtwill A.R., C. Lagrue, R. Poulin and D.B. Stouffer. 2017. Host taxonomy constrains the properties of trophic transmission routes for parasites in lake food webs. Ecology 98:2401–2412.

Collins, R.F. 1968. The helminths of *Natrix* spp. and *Agkistrodon piscivorus piscivorus* (Reptilia: Ophidia) in eastern North Carolina [master's thesis]. Winston-Salem, NC: Wake Forest University.

—1969. The helminths of *Natrix* spp. and *Agkistrodon piscivorus piscivorus* (Reptilia: Ophidia) in eastern North Carolina. Journal of the Elisha Mitchell Scientific Society 85:141–144.

Criscione, C.D. and W.F. Font. 2001. The guest playing host: Colonization of the introduced Mediterranean gecko, *Hemidactylus turcicus*, by helminth parasites in southeastern Louisiana. Journal of Parasitology 87:1273–1278.

Das, E.N. 1950. On some juvenile forms of Acanthocephala of the genus *Centrorhynchas* from India. Indian Journal of Helminthology 2:49–56.

Davis, E., J.C. Beane and J.R. Flowers. 2016. Helminth parasites of pit vipers from North Carolina. Southeastern Naturalist 15:729–741.

Dobson, A.P. and S.W. Pacala. 1992. The parasites of *Anolis* lizards in the northern Lesser Antilles. II. The structure of the parasite community. Oecologia 91:118–125.

Dobson, A.P., S.V. Pacala, J.D. Roughgarden, E.R. Carper and E.A. Harris. 1992. The parasites of *Anolis* lizards in the northern Lesser Antilles. Oecologia 91:110–117.

Dornburg, A., E. Forrestel, J. Moore, T. Iglesias, A. Jones, L. Rao and D. Warren. 2017. An assessment of sampling biases across studies of diel activity patterns in marine ray-finned fishes (Actinopterygii). Bulletin of Marine Science 93:611–639.

Dornburg, A., C. Lippi, S. Federman, J.A. Moore, D.L. Warren, T.L. Iglesias, M.C. Brandley, G.J. Watkins-Colwell, A.D. Lamb and A. Jones. 2016. Disentangling the influence of urbanization and invasion on endemic geckos in tropical biodiversity hot spots: A case study of *Phyllodactylus martini* (Squamata: Phyllodactylidae) along an urban gradient in Curaçao. Bulletin of the Peabody Museum of Natural History 57:147–164.

Dornburg, A., D.L. Warren, T. Iglesias and M.C. Brandley. 2011. Natural history observations of the ichthyological and herpetological fauna on the island of Curaçao (Netherlands). Bulletin of the Peabody Museum of Natural History 52:181–186.

Düsen, S., Y. Kumlutaş, Ç. Ilgaz, H. Yaka and F. Karadayi. 2013. Helminth parasites of the three racerunner lizards: *Eremias pleskei* Nikolsky, 1905 (Pleske's Racerunner–Transcaucasian Racerunner), *Eremias strauchi* Kessler, 1878 (Strauch's Racerunner) and *Eremias suphani* Basoglu & Hellmich, 1968 (Suphan Racerunner) collected from eastern part of Turkey. Helminthologia 50:108–111.

Eggleton, P., D.E. Bignell, W.A. Sands, B. Waite, T.G. Wood and J.H. Lawton. 1995. The species richness of termites (Isoptera) under differing levels of forest disturbance in the Mbalmayo Forest Reserve, southern Cameroon. Journal of Tropical Ecology 11:85–98.

Elkins, C.A. and B.B. Nickol. 1983. The epizootiology of *Macracanthorhynchus ingens* in Louisiana. Journal of Parasitology 69:951–956.

Everard, C.O.R. 1975. Endoparasites of some amphibia, reptiles and small mammals from Trinidad. Living World: Journal of the Trinidad and Tobago Field Naturalists' Club 1975:72–79.

Farzaliev, A.M. and V.I. Petrochenko. 1980. New data on the life-cycle of the acanthocephalan *Macracanthorhynchus catulinus* Kostylew, 1927 (Acanthocephala), a parasite of carnivores. Trudy Vsesoyuznogo Instituta Gel'mintologii 25:140–144. (in Russian)

Foster, G.W., P.E. Moler, J.M. Kinsella, S.P. Terrell and D.J. Forrester. 2000. Parasites of eastern indigo snakes (*Drymarchon corais couperi*) from Florida, USA. Comparative Parasitology 67:124–128.

Fuller, C.A. and B.B. Nickol. 2011. A description of mature *Oncicola venezuelensis* (Acanthocephala: Oligacanthorhynchidae) from a feral house cat in the U. S. Virgin Islands. Journal of Parasitology 97:1099–1100.

Fuller, C.A., P. Rock and T. Philips. 2003. Behavior, color changes, and predation risk induced by acanthocephalan parasitism in the Caribbean termite *Nasutitermes acajutlae*. Caribbean Journal of Science 39:128–135.

Gamble, T., E. Greenbaum, T.R. Jackman, A.P. Russell and A.M. Bauer. 2012. Repeated origin and loss of adhesive toepads in geckos. PLoS One 7:e39429.

Gibbon, J.W., D.E. Scott, T.J. Ryan, K.A. Buhlmann, T.D. Tuberville, B.S. Metts, J.L. Greene, T. Mills, Y. Leiden, S. Poppy et al. 2000. The Global Decline of Reptiles, Déjà Vu Amphibians: Reptile species are declining on a global scale. Six significant threats to reptile populations are habitat loss and degradation, introduced invasive species, environmental pollution, disease, unsustainable use, and global climate change. BioScience 50: 653–666.

Goldberg, S.R. and C.R. Bursey. 1996. Gastrointestinal helminths of the anole *Anolis oculatus* (Polychridae) from Dominica, Lesser Antilles. Journal of the Helminthological Society of Washington 63:125–128.

—1999. *Crotalus lepidus* (Rock Rattlesnake), *Crotalus molossus* (Blacktail Rattlesnake), *Crotalus pricei* (Twin-spotted Rattlesnake), *Crotalus tigris* (Tiger Rattlesnake). Endoparasites. Herpetological Review 30:44–45.

—2000a. *Phrynosoma ditmarsi* (Rock Horned Lizard). Endoparasites. Herpetological Review 31:242.

—2000b. *Crotalus mitchellii* (Speckled Rattlesnake) and *Crotalus willardi* (Ridgenose Rattlesnake). Endoparasites. Herpetological Review 31:104.

—2000c. *Micruroides euryxanthus* (Western Coral Snake). Endoparasites. Herpetological Review 31:105–106.

—2001. *Hypsiglena torquata* (Night Snake) and *Oxybelis aeneus* (Brown Vine Snake). Endoparasites. Herpetological Review 32:263.

—2004a. *Lepidoblepharis xanthostigma* (Orange-tailed Gecko). Endoparasites. Herpetological Review 35:268.

—2004b. Coelomic metazoan endoparasites of 15 colubrid and two elapid snake species from Costa Rica. Caribbean Journal of Science 40:62–69.

—2004c. Coelomic endoparasites in four species of colubrid snakes, *Drymobius margaritiferus*, *Masticophis mentovarius*, *Salvadora mexicana* and *Trimorphodon tau* from Mexico. Bulletin of the Maryland Herpetological Society 40:179–183.

—2004d. *Conopsis lineata* (Lined Tolucan Ground Snake) and *Leptodeira maculata* (Southwestern Cat-eyed Snake). Endoparasites. Herpetological Review 35:59.

—2004e. *Diadophis punctatus* (Ring-necked Snake). Endoparasites. Herpetological Review 35:64.

—2004f. Oligacanthorhynchid acanthocephalan cystacanths in the Yaqui blackhead snake, *Tantilla yaquia* (Serpentes: Colubridae) from Arizona. Journal of the Arizona-Nevada Academy of Science 37:83–84.

—2005. Coelomic helminths in the Speckled Racer, *Drymobius margaritiferus* (Serpentes, Colubridae) from Central America. Texas Journal of Science 57:103–106.

—2007. Coelomic helminths of five colubrid snake species (Serpentes, Colubridae) from Costa Rica. Phyllomedusa: Journal of Herpetology 6:69–72.

—2009a. *Ameiva undulata* (Rainbow Ameiva). Endoparasites. Herpetological Review 40:82.

—2009b. *Imantodes cenchoa* (Blunt-headed Tree Snake), *Imantodes gemmistratus* (Central American Tree Snake), *Imantodes inornatus* (Western Tree Snake). Endoparasites. Herpetological Review 40:230.

—2011. *Ameiva leptophrys* (Delicate Ameiva). Endoparasites. Herpetological Review 42:271.

—2012a. Endohelminths of the Socorro Island Tree Lizard, *Urosaurus auriculatus* (Squamata: Phrynosomatidae), from Colima, Mexico. Comparative Parasitology 79:269–274.

—2012b. *Ameiva bifrontata* (Cope's Ameiva). Endoparasites. Herpetological Review 43:477.

—2012c. *Plestiodon multivirgatus* (Many-lined Skink). Endoparasites. Herpetological Review 43:4.

Goldberg, S.R., C.R. Bursey and K.M. Beaman. 2003. Gastrointestinal helminths of the black-tailed brush lizard, *Urosaurus nigricaudus* (Phrynosomatidae), from Baja California Sur, Mexico. Bulletin of the Southern California Academy of Sciences 102(3):143–147.

Goldberg, S.R., C.R. Bursey and R.L. Bezy. 1996. Gastrointestinal helminths of Yarrow's spiny lizard, *Scleroporus jarrovii* (Phrynosomatidae) in Mexico. American Midland Naturalist 135:299–309.

Goldberg, S.R., C.R. Bursey and H. Cheam. 1996. Gastrointestinal helminths of six anole species, *Anolis armouri*, *A. barahonae*, *A. bahorucoensis*, *A. brevirostris*, *A. chlorocyanus* and *A. coelestinus* (Polychrotidae) from Hispaniola. Caribbean Journal of Science 32:112–115.

—1997a. Helminths of *Anolis acutus* (Sauria: Polychrotidae) from St. Croix, U.S. Virgin Islands. Journal of Parasitology 83:530–531.

—1997b. Helminths of 12 species of *Anolis* lizards (Polychrotidae) from the Lesser Antilles, West Indies. Journal of the Helminthological Society of Washington 64:248–257.

—1997c. Helminths from the Sonoran spotted whiptail, *Cnemidophorus sonorae*, and the western whiptail, *Cnemidophorus tigris* (Sauria: Teiidae), from southern Arizona with comments on *Abbreviata terrapenis* (Nematoda: Physalopteridae). Great Basin Naturalist 57:273–277.

—1998a. Helminths of the lizard *Anolis cristatellus* (Polychrotidae) from the British Virgin Islands, West Indies. Journal of the Helminthological Society of Washington 65:259–262.

—1998b. Helminths of six species of *Anolis* lizards (Polychrotidae) from Hispaniola, West Indies. Journal of Parasitology 84:1291–1295.

—1999. Composition of the helminth community of a montane population of the side-blotched lizard, *Uta stansburiana* (Phrynosomatidae) from Los Angeles County, California. American Midland Naturalist 141:204–208.

Goldberg, S.R., C.R. Bursey and H.J. Holshuh. 1998. Prevalence and distribution of cystacanths of an oligacanthorhynchid acanthocephalan from the longnose snake, *Rhinocheilus lecontei* (Colubridae), in southwestern North America. Journal of the Helminthological Society of Washington 65:262–265.

Goldberg, S.R., C.R. Bursey and F. Kraus. 2009. Endoparasites in 12 species of *Sphenomorphus* (Squamata: Scincidae) from Papua New Guinea. Comparative Parasitology 76:58–83.

Goldberg, S.R., C.R. Bursey and C.T. McAllister. 1995. Gastrointestinal helminths of nine species of *Sceloporus* lizards (Phrynosomatidae) from Texas. Journal of the Helminthological Society of Washington 62:188–196.

Goldberg, S.R., C.R. Bursey and C.W. Painter. 2002. Helminths of the western diamondback rattlesnake, *Crotalus atrox*, from southeast New Mexico rattlesnake roundups. Southwestern Naturalist 47:307–310.

Goldberg, S.R., C.R. Bursey and R. Tawil. 1994. Helminth parasites of the bark anole, *Anolis distichus* and the brown anole, *Anolis sagrei* (Polychridae) from Florida and the Bahamas. Caribbean Journal of Science 30:275–277.

Goldberg, S.R., C.R. Bursey and S.R. Telford Jr. 2003. Metazoan endoparasites of 11 species of lizards from Pakistan. Comparative Parasitology 70:46–54.

Heckmann, R.A., A. Khan and O.M. Amin. 2011. Juveniles of genus *Oligacanthorhynchus* Travassos, 1915 (Acanthocephala: Oligacanthorhynchidae Southwell & Macfie, 1925) from snakes in Karachi, Pakistan. Pakistan Journal of Zoology 43:604–606.

Krasnoshchekov, G. and O. Lisitsyna. 2009. On the migration of cystacanths *Sphaerirostris picae* (Acanthocephala, Centrorhynchidae) in paratenic host *Lacerta agilis*, histopathology. Vestnik Zoologii 43:433–440.

Kutt, A.S. 2011. The diet of the feral cat (*Felis catus*) in north-eastern Australia. Acta Theriologica 56:157–169.

Lamas, M.F. and V.H. Zaracho. 2006. *Tropidurus torquatus* (Brown Lizard). Endoparasites. Herpetological Review 37:474–475.

Lamb, A.D., G.J. Watkins-Colwell, J.A. Moore, D.L. Warren, T.L. Iglesias, M.C. Brandley and A. Dornburg. 2017. Endolymphatic sac use and reproductive activity in the Lesser Antilles endemic gecko *Gonatodes antillensis* (Gekkota: Sphaerodactylidae). Bulletin of the Peabody Museum of Natural History 58:17–29.

Mahagedara, P.D. and R.S. Rajakaruna. 2015. Parasites of two co-occurring house gecko species, *Hemidactylus frenatus* and *Gehyra mutilata* from Central Sri Lanka. Vingnanam Journal of Science 11:32–38.

Marcogliese, D.J. 2002. Food webs and the transmission of parasites to marine fish. Parasitology 124:83–99.

—2007. Evolution of parasitic life in the ocean: Paratenic hosts enhance lateral incorporation. Trends in Parasitology 23:519–521.

Markov, G.S., O.P. Bogdanov, V.M. Makeev and A.A. Khutoryanski. 1968. New data on the helminth fauna of *Naja oxiana*. Izdatel'stvo Akademii Nauk SSSR 1968:244–248. (in Russian)

Markov, G.S., O.P. Bogdanov and L.A. Persianova. 1970. [Helminth fauna of the carpet viper]. In: Yadovitye zhivotnye srednei Azii i ikh yady. (Materialy Sredneaziatskoi Konferentsii; 1–3 Oktyabrya 1968). Tashkent, USSR: Izdat "FAN". pp. 46–60. (in Russian)

Markov, G.S., M.P. Zinyakova and A.S. Lutta. 1967. New data in the parasitology of Central Asiatic *Vipera lebetina*. Sbornik Nauchnykh Rabot Volgogradskogo Pedagogicheskogo Instituta AS Serafimovicha 1967:98–107. (in Russian)

Marteau, M. 1977. [*Oncicola venezuelensis* n. sp. (Archiacanthocephala-Oligacanthorhynchida), a parasite of the ocelot (*Felis pardalis* L.)]. Annales de Parasitologie Humaine et Comparée 52:25–33. (in French)

Mayén-Peña, E. and G. Salgado-Maldonado. 1998. Helminths of four lizards from Nayarit, México: *Anolis nebulosus* (Polychrotidae), *Ctenosaura pectinata* (Iguanidae), *Phyllodactylus lanei* (Gekkonidae), and *Sceloporus nelsoni* (Phrynosomatidae). Journal of the Helminthological Society of Washington 65:108–111.

McAllister, C.T. 1990a. Helminth parasites of unisexual and bisexual whiptail lizards (Teiidae) in North America. IV. The Texas spotted whiptail (*Cnemidophorus gularis*). Texas Journal of Science 42:381–388.

—1990b. Helminth parasites of unisexual and bisexual whiptail lizards (Teiidae) in North America. II. The New Mexico whiptail (*Cnemidophorus neomexicanus*). Journal of Wildlife Diseases 26:403–406.

McAllister, C.T. and C.R. Bursey. 2007. Some nematode and acanthocephalan parasites of the longnose leopard lizard, *Gambelia wislizenii* (Lacertilia: Crotaphytidae), from Arizona, California, and Texas, with a summary of the helminths reported from this host. Comparative Parasitology 74:179–184.

McAllister, C.T., C.R. Bursey and M.B. Connior. 2015. Helminth parasites (Trematoda, Cestoda, Nematoda, Acanthocephala) of herpetofauna from southeastern Oklahoma: New host and geographic records. Proceedings of the Oklahoma Academy of Science 95:125–134.

—2017. New host and distributional records for parasites (Apicomplexa, Trematoda, Nematoda, Acanthocephala, Acarina) of Texas herpetofauna. Comparative Parasitology 84:42–50.

McAllister, C.T., C.R. Bursey and J.F. Roberts. 2004. *Physocephalus sexalatus* (Nematoda: Spirurida: Spirocercidae) in three species of rattlesnakes, *Crotalus atrox*, *Crotalus lepidus*, and *Crotalus scutulatus*, from southwestern Texas. Journal of Herpetological Medicine and Surgery 14:10–12.

McAllister, C.T., J.E. Cordes and J.M. Walker. 1991. Helminth parasites of unisexual and bisexual whiptail lizards (Teiidae) in North America. 6. The gray checkered whiptail (*Cnemidophorus dixoni*). Texas Journal of Science 43: 309–314.

—1995. Helminth parasites of unisexual and bisexual whiptail lizards (Teiidae) in North America. IX. The plateau spotted whiptail (*Cnemidophorus gularis septemvittatus*). Texas Journal of Science 47:83–88.

McAllister, C.T., J. Riley, P.S. Freed and D.A. Freed. 1993. Endoparasites of some Malagasy colubrids (Reptilia: Serpentes), with descriptions of two new species of *Raillietiella* (Pentastomida: Cephalobaenida). Transactions of the American Microscopical Society 112:35–42.

Medina, F.M., E. Bonnaud, E. Vidal, B.R. Tershy, E.S. Zavaleta, C. Josh Donlan, B.S. Keitt, M. Corre, S.V. Horwath and M. Nogales. 2011. A global review of the impacts of invasive cats on island endangered vertebrates. Global Change Biology 17:3503–3510.

Miranda, J.P. and G.V. Andrade. 2003. Seasonality in diet, perch use, and reproduction of the gecko *Gonatodes humeralis* from Eastern Brazilian Amazon. Journal of Herpetology 37:433–438.

Murvanidze, L., T.S. Lomidze, K. Nikolaishvili and E. Jankarashvili. 2008. The annotated list of reptile helminths of Georgia. Proceedings of the Institute of Zoology (Tbilisi) 23:54–61.

Nickol, B.B. and T.T. Dunagan. 1989. Reconsideration of the acanthocephalan genus *Echinopardalis*, with a description of adult *E. atrata* and a key to genera of the Oligacanthorhynchidae. Proceedings of the Helminthological Society of Washington 56:8–13.

Nickol B.B., C.A. Fuller and P. Rock. 2006. Cystacanths of *Oncicola venezuelensis* (Acanthocephala: Oligacanthorhynchidae) in Caribbean termites and various paratenic hosts in the U.S. Virgin Islands. Journal of Parasitology 92:539–542.

Oluwafemi, T., O. Sowemimo and A. Bamidele. 2017. Parasitic infections of two species of lizard (*Hemidactylus frenatus* and *Mabuya quinquetaeniata*) from two cities in Southwest Nigeria. Annual Research & Review in Biology 18(2):1–13.

Parker, G.A., M.A. Ball and J.C. Chubb. 2015. Evolution of complex life cycles in trophically transmitted helminths. I. Host incorporation and trophic ascent. Journal of Evolutionary Biology 28:267–291.

Patton, S., A. Rabinowitz, S. Randolph and S.S. Johnson. 1986. A coprological survey of parasites of wild neotropical felidae. Journal of Parasitology 72:517–520.

Petrochenko, V.I. 1956. Acanthocephala of Domestic and Wild Animals, Volume I. Translated from Russian by Israel Program for Scientific Translations, Jerusalem, 1971. Washington, DC: U.S. Department of Agriculture and the National Science Foundation. 465 pp.

Pizzatto, L. and R.R. Madi. 2002. *Micrurus corallinus* (Coral Snake). Endoparasites. Herpetological Review 33:215.

Pizzatto, L. and O.A. Marques. 2006. Interpopulational variation in sexual dimorphism, reproductive output, and parasitism of *Liophis miliaris* (Colubridae) in the Atlantic forest of Brazil. Amphibia-Reptilia 27:37–46.

Plaza, P.I. and S.A. Lambertucci. 2017. How are garbage dumps impacting vertebrate demography, health, and conservation? Global Ecology and Conservation 12:9–20.

Prudhoe, S. and M.T. Harris. 1971. Helminths from chameleons in southern Africa. Revue de Zoologie et de Botanique Africaines 84:334–343.

Quesnel, V.C. 1957. Life history of the Streak Lizard, *Gonatodes vittatus*. Living World: Journal of the Trinidad and Tobago Field Naturalists' Club 1957:5–14.

Quirino, T.F., A.J.M.G. Ferreira, M.C. Silva, R.J. Silva, D.H. Morais and R.W. Ávila. 2018. New records of helminths in reptiles from five states of Brazil. Brazilian Journal of Biology 78:750–754.

Rengaraju, V. and E.N. Das. 1981. On a new species of the genus *Oligacanthorhynchus* Travassos, 1915 (Acanthocephala: Oligacanthorhynchidae) from India. Records of the Zoological Survey of India 78:37–40.

Rep, B.H. 1975. Intestinal helminths in dogs and cats on the Antillian Islands Aruba, Curaçao and Bonaire. Tropical and Geographical Medicine 27:317–323.

Richardson, D.J. and B.B. Nickol. 1995. The genus *Centrorhynchus* (Acanthocephala) in North America with description of *Centrorhynchus robustus* n. sp., redescription of *Centrorhynchus conspectus*, and a key to species. Journal of Parasitology 81:767–772.

Roca, V. 1995. An approach to the knowledge of the helminth infracommunities of Mediterranean insular lizards (*Podarcis* spp.). Scientia Herpetologica 1995:285–292.

Roca, V., F. Jorge and M.Á. Carretero. 2012. Synopsis of the helminth communities of the lacertid lizards from the Balearic and Canary Islands. Basic and Applied Herpetology 26:107–116.

Roca, V., J.E. Martin and E. Carbonell. 1999. Helminths parasitising endemic geckoes from Canary Islands. Miscellània Zoològica 22:101–108.

Rodrigues, H.O. 1970. Estudo da fauna helmintologica de *Hemidactylus mabouia* (M. de J.) no Estado da Guanabara. Atas da Sociedade Biologica do Rio de Janeiro 12(Suppl.): 15–23.

Saehoong, P. and C. Wongsawad. 1997. Helminths in house lizards (Reptilia: Gekkonidae). Southeast Asian Journal of Tropical Medicine and Public Health 28:184–189.

Santos, E.G.N., M. Chame, V.A. Chagas-Moutinho and C.P. Santos. 2017. Morphology and molecular analysis of *Oncicola venezuelensis* (Acanthocephala: Oligacanthorhynchidae) from the ocelot *Leopardus pardalis* in Brazil. Journal of Helminthology 91:605–612.

Schmidt, G.D. 1972. Revision of the Class Archiacanthocephala Meyer, 1931 (Phylum Acanthocephala), with emphasis on Oligacanthorhynchidae Southwell et Macfie, 1925. Journal of Parasitology 58:290–297.

—1985. Development and life cycles. In: D.W.T. Crompton and B.B. Nickol, eds. Biology of the Acanthocephala. Cambridge: Cambridge University Press. pp. 273–305.

Schmidt, G.D. and R.E. Kuntz. 1969. *Centrorhynchus spilornae* sp. n. (Acanthocephala), and other Centrorhynchidae from the Far East. Journal of Parasitology 55:329–334.

Sharpilo, V. 1962. To the study of helminthofauna of racers of Transcaucasus. Zbornik prac zoologicheskogo muzeiu AN USSR 31:63–69. (in Ukrainian)

—1976. The Parasitic Helminths of Reptiles of Fauna of USSR. Kiev: Naukova Dumka. 286 pp. (in Russian)

Sharpilo, V.P., V. Biserkov, A. Kostadinova, J.M. Behnke and Y.I. Kuzmin. 2001. Helminths of the sand lizard, *Lacerta agilis* (Reptilia, Lacertidae), in the Palaearctic: Faunal diversity and spatial patterns of variation in the composition and structure of component communities. Parasitology 23:389–400.

Silva, L.A. 2014. Helmintofauna associada a répteis provenientes da Reserva Particular do Patrimônio Natural Foz do Rio Aguapeí, Estado de São Paulo [dissertation]. Sao Paulo: Universidade Estadual Paulista–Campus de Botucatu. Available from: https://repositorio.unesp.br/bitstream/handle/11449/110418/000786523.pdf

Simonsen, P.E. and R.K. Sarda. 1985. Helminth and arthropod parasites of *Hemidactylus mabouia* from Tanzania. Journal of Herpetology 19:428–430.

Smales, L.R. 1997. A review of the helminth parasites of Australian rodents. Australian Journal of Zoology 45:505–521.

—2007. Acanthocephala in amphibians (Anura) and reptiles (Squamata) from Brazil and Paraguay with description of a new species. Journal of Parasitology 93:392–398.

de Souza, O.F.F. and V.K. Brown. 1994. Effects of habitat fragmentation on Amazonian termite communities. Journal of Tropical Ecology 10:197–206.

Strube, C., L. Heuer and E. Janecek. 2013. *Toxocara* spp. infections in paratenic hosts. Veterinary Parasitology 193:375–389.

Telford, S.R. 1997. The Ecology of a Symbiotic Community, Volume 2. The Component Symbiote Community of the Japanese Lizard *Takydromus tachydromoides* (Schlegel) (Lacertidae). Malabar, FL: Krieger Publishing Company. 153 pp.

Travassos, L. 1917. Contribuições para o conhecimento da fauna helmintolojica brazileira. Memórias do Instituto Oswaldo Cruz 9:5–62.

Van Buurt, G. 2005. Field Guide to the Amphibians and Reptiles of Aruba, Curaçao and Bonaire. Frankfurt am Main, Germany: Chimaira. 160 pp.

Van Buurt, G. and A.O. Debrot. 2012. Introduced Agricultural Pests, Plant and Animals Diseases and Vectors in the Dutch Caribbean, with an "Alert Species" List. Wageningen, Netherlands: Institute for Marine Resources & Ecosystem Studies. 35 pp. (IMARES Report C193/11.)

Velikanov, V.P. 1989. The role of amphibians and reptiles like intermediate and paratenic hosts of helminths in the conditions of the Turkmenian SSR. Izvestiya Akademii Nauk Turkmenskoi SSR Seriya Biologicheskikh Nauk 6:43–49. (in Russian)

Vicente, J.J. 1978. Helmintos de *Tropidurus* (Lacertilia: Iguanidae) da Coleço Helmintológica do Instituto Oswaldo Cruz, I. Trematoda, Cestoda, Acanthocephala, Linguatulida. Atas da Sociedade de Biologia do Rio de Janeiro 19:71–78. (in Portuguese)

Vitt, L.J., R.A. Souza, S.S. Sartorius, T.C.S. Avila-Pires and M.C. Espósito. 2000. Comparative ecology of sympatric *Gonatodes* (Squamata: Gekkonidae) in the western Amazon of Brazil. Copeia 2000:83–95.

Vogel, P. and D.A.P. Bundy. 1987. Helminth parasites of Jamaican anoles (Reptilia: Iguanidae): Variation in prevalence and intensity with host age and sex in a population of *Anolis lineatopus*. Parasitology 94:399–404.

Vrcibradic, D., L.A. Anjos, J.J. Vicente and C.R. Bursey. 2008. Helminth parasites of two sympatric lizards, *Enyalius iheringii* and *E. perditus* (Leiosauridae), from an Atlantic Rainforest area of southeastern Brazil. Acta Parasitologica 53:222–225.

Vrcibradic, D. and C.F. Rocha. 2005. Observations on the natural history of the lizard *Mabuya macrorhyncha* Hoge (Scincidae) in Queimada Grande Island, Sao Paulo, Brazil. Revista Brasileira de Zoologia 22:1185–1190.

Vrcibradic, D., C.F.D. Rocha, C.R. Bursey and J.J. Vicente. 2002. Helminth communities of two sympatric skinks (*Mabuya agilis* and *Mabuya macrorhyncha*) from two 'restinga' habitats in southeastern Brazil. Journal of Helminthology 76:355–361.

Vrcibradic, D., J.J. Vicente and C.R. Bursey. 2007. Helminths infecting the lizard *Enyalius bilineatus* (Iguanidae; Leiosaurinae) from an Atlantic Rainforest area in Espírito Santo state, southeastern Brazil. Amphibia-Reptilia 28:166–169.

Ward, H.L. 1940. Notes on juvenile Acanthocephala. Journal of Parasitology 26:191–194.

Watkins-Colwell, G.J., J. de Leon and S.B. Hochgraff. 2006. *Leptotyphlops tenellus* (Guyana Blindsnake). Predation. Herpetological Review 37:353.

Yildirimhan, H.S., N. Sümer and N. Yilmaz. 2008. The helminth fauna of *Hemidactylus turcicus* (Mediterranean Gecko) (Linnaeus, 1758) from Hatay Province. Acta Parasitologica Turcica 32:393–395.