

RESEARCH NOTE

Helminth parasites (Cestoidea, Nematoda, Pentastomida) of selected herpetofauna from Cameroon, West Africa

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Abstract

Twenty-nine individual amphibians (2 families, 3 species) and 12 individual reptiles (2 families, 2 species) from Douala, Cameroon (West Africa) were examined for helminths. Seventeen (59%) of the amphibians and 11 (92%) of the reptiles were found to harbor at least 1 species of helminth; 10 (34%) of the amphibians and 4 (33%) of the infected reptiles harbored multiple infections. A cestode, 6 species of nematodes, and a pentastomid were found in the herpetofauna surveyed. Nine new host and six new geographic distribution records are reported.

Keywords

Herpetofauna, helminth parasites, Cameroon, West Africa

Little is known about the helminth parasites of herpetofauna from Cameroon: Rasheed (1965) identified nematodes from amphibians and reptiles; Gassmann (1975) reported trematodes from amphibians; Fischthal (1976) listed trematodes from lizards; Durette-Desset and Vaucher (1979) studied trichostrongyloids from amphibians and reptiles; Baker (1982) described a new species of *Oswaldocruzia* from the warty toad, *Amietophrynus tuberosus* (syn. *Bufo polycercus*); McAllister *et al.* (1992) found a cestode and a nematode in the spotted night adder (*Causus maculatus*); Bursey *et al.* (1997) provided a description of a new species of *Oochoristica* from house geckoes, *Hemidactylus mabouia*; Lhermitte-Vallarino *et al.* (2008) described a new species each of *Rhabdias* from the crested chameleon, *Chamaeleo cristatus* and the four-horned chameleon, *Chamaeleo quadricornis*; and Lhermitte-Vallarino *et al.* (2009) described a new species of *Rhabdias* from the Cameroon stump-tailed chameleon, *Rhampholeon spectrum* (Lhermitte-Vallarino *et al.* 2009). However, to our knowledge, nothing else has been published on helminths of Cameroon amphibians and reptiles. There is an obvious need for further collection and documentation of Cameroon helminths as several species of amphibians and reptiles remain to be surveyed. Herein, we report nine new host and six new distributional records from a survey of 29 amphibians and reptiles from Cameroon.

During March and April 1991, two Gaboon forest frogs, *Scotobleps gabonicus* Boulenger, 1900, 14 Hallowell's toads, *Amietophrynus maculatus* (Hallowell, 1854), one Fernando Po toad, *Amietophrynus tuberosus* (Günther, 1858), nine house geckoes, *Hemidactylus mabouia* Moreau de Jonnes, 1818, and three mountain chameleons, *Chamaeleo montium* Buchholz, 1874 were collected by one of us (PSF) from the port city of Douala, Cameroon, West Africa (04°03'N, 09°42'E, elevation = 1 m) (Fig. 1). Individuals were collected by hand, placed in individual collecting bags, and returned to the field station for immediate processing and necropsy. Amphibians were killed by immersion in a 10% (w/v) chlorobutanol (chlorotone) solution and reptiles were overdosed by peritoneal injection of sodium pentobarbital (Nembutal®). Each specimen was examined for encapsulated helminths in skin and subcutaneous muscle using a dissecting microscope. A midventral incision was made and the entire gastrointestinal tract from the mouth to cloaca and other organs (lungs, liver and gonads) were placed in Petri dishes containing 0.6% (w/v) saline and examined with the dissecting microscope for helminth parasites. The nasal cavity and skull was not examined. When parasites were isolated, they were placed in individually labeled vials containing 70% ethanol and returned to the United States for further processing and specimen identification. Tapeworms were stained with Semichon's acetocarmine and mounted in

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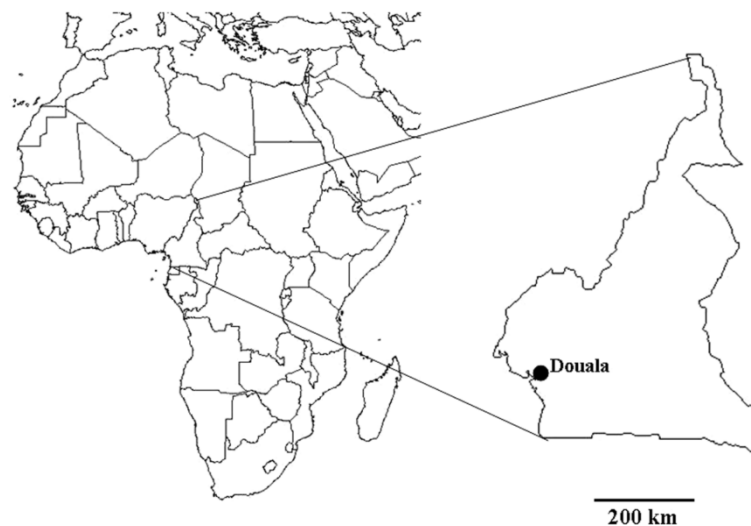


Fig. 1. Map showing location of study site in southwestern Cameroon (Douala)

Damar. Nematodes were cleared on glass slides with undiluted glycerol and identified with the use of a compound microscope. Pentastomids were processed according to Riley *et al.* (1988); methods for measuring the various pentastomid characters are provided in Ali *et al.* (1985). Prevalence, mean intensity and range of infection (where noted) are provided and are in accordance with terminology provided by Bush *et al.* (1997).

Specimens of hosts were deposited in the Carnegie Museum of Natural History (CM), Pittsburgh, Pennsylvania, USA. Specimens of helminths were deposited in the U.S. National Parasite Collection (USNPC), Beltsville, Maryland, USA. Voucher specimens of pentastomids were retained by J. Riley to be eventually deposited in The Natural History Museum (NHM), London. Frog taxonomy follows Frost (2009); reptile taxonomy follows The TIGR reptile database (Uetz and Hallermann 2009).

Eight species of helminths, including a single tapeworm species, six species of nematodes within five families, and a pentastomid species was recovered from hosts (Table I). Seventeen (59%) of the amphibians and 11 (92%) of the reptiles were found to harbor at least 1 species of helminth; 10 (34%) of the amphibians and 4 (33%) of the infected reptiles harbored multiple infections. Nine new host and six new geographic distribution records are reported.

A single specimen of the cyclophyllidean tapeworm, *Cylindrotaenia jaegerskioeldi* Janicki, 1926 was found in the small intestine of *Amietophrynus maculatus*. This cestode was reported recently by Aisien *et al.* (2009) from the brown ball frog (*Aubria subsigillata*) and snouted grassland frog (*Ptychadena longirostris*) from southwestern Nigeria. It has also been reported in amphibians from different bioclimatic zones of Nigeria (see Aisien *et al.* 2001, 2003, 2004). We document a new host and distributional record for *C. jaegerskioeldi*.

Table I. Helminths recovered from amphibians and reptiles of Douala, Cameroon, West Africa

Helminth	(USNPC no.)	Host	Intensity*	Prevalence†
Cestoidea				
<i>Cylindrotaenia jaegerskioeldi</i> ‡	(85321)	<i>Amietophrynus maculatus</i> §	1	1/14 (7%)
Nematoda				
<i>Aplectana chamaeleonis</i> ‡	(85320)	<i>Scotobleps gabonicus</i> §	20	1/2 (50%)
<i>Aplectana macintoshii</i>	(85319)	<i>S. gabonicus</i> §	7	1/2 (50%)
	(85322)	<i>A. maculatus</i>	14.3 ± 14.5 (2–47)	13/14 (93%)
	(85325)	<i>Amietophrynus tuberosus</i> §	6	1/1 (100%)
<i>Orneoascaris chrysanthemoides</i>	(85323)	<i>A. maculatus</i>	2.5 ± 0.9 (1–5)	11/14 (79%)
<i>Parapharyngodon awokayai</i> ‡	(85327)	<i>Chamaeleo montium</i> §	5	1/3 (33%)
	(85328)	<i>Hemidactylus mabouia</i> §	1.8 ± 0.8 (1–3)	6/9 (67%)
<i>Rhabdias</i> sp.‡	(85324)	<i>A. maculatus</i> §	2.0 ± 0.0 (2)	2/14 (14%)
<i>Strongylurus media</i> ‡	(85326)	<i>C. montium</i> §	38	1/3 (33%)
Pentastomida				
<i>Raillietiella teagueselfi</i> ?‡	(NHM)¶	<i>H. mabouia</i> §	4.0 ± 3.5 (2–9)	4/9 (44%)

*Mean ± 1 SE (range); †no. infected/no. examined (%); ‡new geographic distribution record; §new host record; ¶specimens to be deposited in the Natural History Museum, London.

Aplectana chamaeleonis (Baylis, 1929) Travassos, 1931 has been reported from various hosts in continental Africa, including Algeria, Ethiopia, Ivory Coast, Kenya, South Africa, Tanzania, Tunisia, and West Africa (see Baker 1987a). We report this nematode from the rectum of *Scotobleps gabonicus* (new host) and from Cameroon for the first time.

Aplectana macintoshii (Stewart, 1914) Travassos, 1931 (syn. *Oxysomatium minutum* Rasheed, 1965) was reported by Rasheed (1965) from the Mascarene grassland frog, *Ptychadena mascareniensis* (= *Rana ptychadena mascareniensis*) in Cameroon. This nematode is also widely distributed in amphibians and reptiles of both North and South Africa (Baker 1987a). We report a new host (*S. gabonicus*) for this cosmoceroid nematode.

Orneoascaris chrysanthemoides Skryabin, 1916 is a common ascaroid nematode of various amphibians and reptiles of east, west, and central Africa (Baker 1987a). Rasheed (1965) reported *O. chrysanthemoides* (syn. *Amplicaecum involutum*) from the crested chameleon, *Chamaeleo cristatus* and Zaire toad, *Amietophrynus superciliaris* (syn. *Bufo superciliaris*) from Cameroon.

Parapharyngodon awokayai Babero et Okpala, 1962 was described from the common agama, *Agama agama* (Agamidae) from Lagos, Nigeria (Babero and Okpala 1962). We are not aware of reports of this parasite in additional hosts. We document two new hosts, *Chamaeleo montium* and *Hemidactylus mabouia* (families Chamaeleonidae and Gekkonidae, respectively) and a new geographic locale for *P. awokayai*.

A total of four female *Rhabdias* sp. was found in the lungs of two *Amietophrynus maculatus*. At least 11 species have been reported from continental African amphibians and reptiles: namely, *R. africanus* Kuzmin, 2001 from *A. maculatus* (syn. *Bufo maculatus*) and *Amietophrynus garmani* (syn. *Bufo garmani*) of South Africa (Kuzmin 2001); *R. bdellophus* Baylis, 1929 from the ribbon caecilian, *Scolecophorus vittatus* from Tanzania (Baylis 1929); *Rhabdias bufonis* (Schränk, 1788) Stiles et Hassall, 1905 from *A. maculatus* and *Amietophrynus regularis* (syn. *Bufo regularis*) of Nigeria (Aisien *et al.* 2003), also a common Palearctic species (Baker 1987a); *R. chamaeleonis* (Skryabin, 1916) Semonov, 1929 from several species of *Chamaeleo* from East Africa (Baylis 1937); *R. collaris* from the vermiculated tree frog, *Leptopelis vermiculatus* and an unidentified species of reed frog, *Hyporolius* sp. of Tanzania (Baker 1987b); *R. cristati* Lhermitte-Vallarino, Barbuto, Ineich, Wanji, Lebreton, Chirio et Bain, 2008 from the crested chameleon, *Chamaeleo cristatus* of Cameroon (Lhermitte-Vallarino *et al.* 2008); *R. fuscovenosa* (Railliet, 1899) Goodey, 1924 from snakes of South Africa (Fantham and Porter 1950); *R. jarki* Lhermitte-Vallarino et Bain, 2004 from Johnston's chameleon, *Chamaeleo johnstoni* and high-casqued chameleon, *Chamaeleo hoevnelii* from Burundi (Lhermitte-Vallarino and Bain 2004); *R. mariauxi* Lhermitte-Vallarino, Barbuto, Junker, Boistel, Ineich, Wanji et Bain, 2009 from the bearded pygmy chameleon, *Rieppeleon brevicaudatus* from Tanzania (Lhermitte-Vallarino *et al.*

2009); *R. okuensis* Lhermitte-Vallarino, Barbuto, Ineich, Wanji, Lebreton, Chirio et Bain, 2008 from the four-horned chameleon, *Chamaeleo quadricornis* and Mount Lefo chameleon, *Chamaeleo wiedersheimi* of Cameroon (Lhermitte-Vallarino *et al.* 2008); and *R. rhampholeonis* Lhermitte-Vallarino, Barbuto, Junker, Boistel, Ineich, Wanji et Bain, 2009 from the Cameroon stump-tailed chameleon, *Rhampholeon spectrum* from Cameroon (Lhermitte-Vallarino *et al.* 2009). While there are similarities between our specimens and *R. bufonis*, additional collection and studies may establish a new species.

Strongylurus media Harwood, 1935 was described from the West Usambara two-horned chameleon, *Kinyongia* (= *Chamaeleo*) *multituberculata* from East Africa (Harwood 1935). To our knowledge, this nematode has not been reported in the last 75 years in additional hosts. *Chamaeleo montium* represents the second host record and Cameroon is a new locality record.

The pentastomid, *Raillietiella teagueselfi* Riley, McAllister et Freed, 1988 was described from the Mediterranean gecko, *Hemidactylus turcicus* from Texas, USA (Riley *et al.* 1988). We found pentastomids in the lungs of *H. mabouia* that could not reliably be differentiated from *R. teagueselfi*. In our specimens, adult female posterior hooks measured BC 490 µm, AB 365 µm; male posterior hooks measured BC 206 µm, AB 120 µm. The copulatory spicule was 100–110 µm across the base, 260–330 µm long. The only feature not suggestive of *R. teagueselfi* was female hooks were larger whereas male hooks were similar in size to those of male *R. teagueselfi*. Riley *et al.* (1991) also reported this enigma for specimens of what they reluctantly identified as *R. teagueselfi* from Brook's house gecko, *Hemidactylus brookii* from Lagos, Nigeria. Interestingly, *H. mabouia* and *H. brookii* are broadly sympatric over a wide range. Clearly, in our specimens, female mean hook sizes from pentastomids of *H. mabouia* are larger than that of the type series of *R. teagueselfi* from a different host and far removed geographic locale. However, since this remains the only difference between two taxa, we decline to establish a new species at this time without additional specimens. Perhaps there is a complex of species or subspecies but morphology alone will not resolve the problem and molecular analyses may be needed.

In summary, one of the greatest hotspots for amphibian diversity is in Cameroon which supports various endemic species. We therefore suggest additional studies on their helminth parasites which should lead to documentation of additional new host and distributional records and, more logically, discovery of new species.

Acknowledgements. We thank the Cameroonian authorities for issuance of collecting and export permits. P.S.F. thanks the Houston Zoological Gardens for support in this and other projects concerning conservation in Africa, and D. Achu, J. Furman, and M. Sharp for assistance in collecting. We also thank Dr. John Riley (Univ. Dundee, Scotland) for examining the pentastomids and providing important morphometric data.

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