

New host records for *Amblyomma rotundatum* (Acari: Ixodidae) from Grussaí restinga, Rio de Janeiro, Brazil

Novos registros de hospedeiros para *Amblyomma rotundatum* (Acari: Ixodidae) da restinga de Grussaí, Rio de Janeiro, Brasil

Lúcio André Viana^{1*}; Gisele Regina Winck¹; Marlon Almeida-Santos¹; Felipe Bottona da Silva Telles¹; Gilberto Salles Gazêta²; Carlos Frederico Duarte Rocha¹

¹Laboratório de Ecologia de Vertebrados, Departamento de Ecologia, Universidade do Estado do Rio de Janeiro – UERJ, Rio de Janeiro, RJ, Brasil

²Laboratório de Referência Nacional em Vetores das Riquetsioses – LIRN, Instituto Oswaldo Cruz – FIOCRUZ, Rio de Janeiro, RJ, Brasil

Received September 27, 2012

Accepted June 11, 2012

Abstract

Amblyomma rotundatum Koch is a parthenogenetic tick usually associated with reptiles and amphibians. However, relatively few studies on occurrences of ticks in wild reptile populations in Brazil have been produced. The aim of this study was to analyze the presence of ticks associated with reptile species in the Grussaí restinga, in the municipality of São João da Barra, state of Rio de Janeiro, Brazil. Between December 2010 and January 2011, 131 individuals belonging to nine species of reptiles of the order Squamata were sampled: the lizards *Tropidurus torquatus* (n = 51), *Hemidactylus mabouia* (n = 25), *Mabuya agilis* (n = 30), *Mabuya macrorhyncha* (n = 6), *Cnemidophorus littoralis* (n = 5) and *Ameiva ameiva* (n = 10); and the snakes *Philodryas olfersii* (n = 2), *Oxyrhopus rhombifer* (n = 1) and *Micrurus corallinus* (n = 1). The only tick species found to be associated with any of the reptiles sampled was *A. rotundatum*. One adult female was detected on one individual of the lizard *A. ameiva*, one nymph on one individual of the lizard *T. torquatus* and four nymphs on one individual of the snake *P. olfersii*. This study is the first record of parasitism of *A. rotundatum* involving the reptiles *T. torquatus* and *P. olfersii* as hosts. Our results suggest that in the Grussaí restinga habitat, *A. rotundatum* may use different species of reptiles to complete its life cycle.

Keywords: Ectoparasites, ticks, reptiles, lizards, snakes, *Amblyomma rotundatum*.

Resumo

Amblyomma rotundatum Koch é um carrapato partenogenético geralmente associado a répteis e anfíbios. Entretanto existem relativamente poucos estudos sobre a ocorrência de carrapatos em populações silvestres de répteis no Brasil. O objetivo deste estudo foi analisar a presença de carrapatos associados às espécies de répteis em uma comunidade na restinga de Grussaí, município de São João da Barra, Estado do Rio de Janeiro, Brasil. Foram amostradas, entre os meses de dezembro de 2010 e janeiro de 2011, 131 indivíduos pertencentes a nove espécies de répteis da ordem Squamata: lagartos *Tropidurus torquatus* (n = 51); *Hemidactylus mabouia* (n = 25), *Mabuya agilis* (n = 30), *Mabuya macrorhyncha* (n = 6), *Cnemidophorus littoralis* (n = 5) e *Ameiva ameiva* (n = 10), e serpentes *Philodryas olfersii* (n = 2), *Oxyrhopus rhombifer* (n = 1) e *Micrurus corallinus* (n = 1). A única espécie de carrapato encontrada associada a espécimes de répteis foi *A. rotundatum*, tendo sido encontrada uma fêmea adulta em um indivíduo do lagarto *A. ameiva*, uma ninfa em um *T. torquatus* e quatro ninfas em uma serpente *P. olfersii*. O presente estudo constitui o primeiro registro do parasitismo de *A. rotundatum* nos répteis *T. torquatus* e *P. olfersii* como hospedeiros. Nossos resultados sugerem que no *habitat* da restinga de Grussaí, *A. rotundatum* pode utilizar diferentes espécies de répteis para a realização do seu ciclo de vida.

Palavras-chave: Ectoparasitas, carrapatos, répteis, lagartos, serpentes, *Amblyomma rotundatum*.

*Corresponding author: Lúcio André Viana

Laboratório de Ecologia de Vertebrados, Departamento de Ecologia, Universidade do Estado do Rio de Janeiro – UERJ, Rua São Francisco Xavier, 524, Maracanã, CEP 20550-019, Rio de Janeiro, RJ, Brasil
 e-mail: lucviana74@gmail.com

Amblyomma rotundatum Koch is a parthenogenetic tick (ARAGÃO, 1912; OBA; SCHUMAKER, 1983) commonly associated with species of reptiles and amphibians (DURDEN; KNAPP, 2005; PONTES et al., 2009; GUGLIELMONE; NAVA, 2010). Experimental studies have shown that during its life cycle, this species uses two or three different host species (OBA; SCHUMAKER, 1983; RODRIGUES et al., 2010). In addition, ticks can act as vectors of hemoparasites of the genera *Hemolivia* and *Hepatozoon* for frogs (PETIT et al., 1990; LAINSON et al., 2007), lizards (SMALLRIDGE; PAPERNA, 1997; PAPERNA et al., 2002) and turtles (PAPERNA, 2006; SIROKÝ et al., 2009).

In Brazil, except for the broad study by Pontes et al. (2009) involving ticks associated with a community of snakes in the Atlantic Forest, most studies have been limited to recording parasitism of reptiles by ticks in random samples, usually restricted to a few individual specimens (LABRUNA et al., 2002, 2005; DANTAS-TORRES et al., 2005, 2008; MARTINS et al., 2007; LOPES et al., 2010), studies involving captive hosts (see review in GUGLIELMONE; NAVA, 2010), or characterization of the life cycle of ticks *Amblyomma dissimile* or *A. rotundatum* under experimental conditions (ARAGÃO, 1912; OBA; SCHUMAKER 1983; FREITAS et al., 2004; RODRIGUES et al., 2010).

Current knowledge concerning infestation by *Amblyomma* in wild reptiles is still limited, and thus, the present study makes a contribution through recording parasitism by the tick *A. rotundatum* on reptiles in a restinga habitat, the Grussaí restinga, in the northern region of the state of Rio de Janeiro.

The study was conducted during December 2010 and January 2011, in a restinga remnant in the municipality of São João da Barra (21° 44' 10.20" S and 41° 1' 53.39" W), state of Rio de Janeiro, Brazil. Restingas are habitats consisting of dunes and sandy plains covered with xerophytic herbaceous vegetation and shrubs that occur along the coast of Brazil (EITEN, 1992). The climate is tropical subhumid and semi-arid, with a mean annual rainfall ranging from 800 to 1,200 mm and higher incidence of rainfall during the summer months and lower in winter (BRASIL, 1983).

The lizards were caught with the aid of compressed air rifles, while the snakes were caught manually. Animals that were still alive were euthanized by means of ethyl ether inhalation and were carefully examined for the presence of ticks on every part of the body.

All the ticks detected were collected manually or with forceps, stored in alcohol (70° GL), identified and deposited in the collection of the National Reference Laboratory of Vectors of Rickettsial diseases, FIOCRUZ, under access numbers Ixo 1482, Ixo 1483 and Ixo 1484, for the specimens collected from *Philodryas olfersii*, *Ameiva ameiva* and *Tropidurus torquatus*, respectively. The keys developed by Aragão and Fonseca (1961) and Martins et al. (2010) were used to identify adults and nymphs, respectively.

A total of 131 individual specimens from nine reptiles species were sampled (Table 1). The only tick species identified was *A. rotundatum*, at low intensities. One adult female was found on the ventral region of the lizard *A. ameiva* (frequency = 10%, n = 10) (Figure 1b) and one nymph on the lizard *T. torquatus* (frequency = 2%, n = 51). Four nymphs was detected on one specimen of the snake *P. olfersii* (established under its scales), corresponding to a frequency of 50%, although this value was based on only two individuals of this snake species (Figure 1a, Table 1).

Table 1. Parasitism of different species of reptiles by the tick *Amblyomma rotundatum* in the Grussaí restinga, state of Rio de Janeiro, Brazil.

Host	Nº (hosts)	Positive	Intensity*
Lizards			
<i>Tropidurus torquatus</i>	51	1	1N
<i>Mabuya agilis</i>	29	0	0
<i>Hemidactylus mabouia</i>	25	0	0
<i>Ameiva ameiva</i>	10	1	1F
<i>Mabuya macrorhyncha</i>	7	0	0
<i>Cnemidophorus littoralis</i>	5	0	0
Snakes			
<i>Philodryas olfersii</i>	2	1	4N
<i>Micrurus corallinus</i>	1	0	0
<i>Oxyrhopus rhombifer</i>	1	0	0
Total	131	3	5

*F = female, N = nymph, N° = number.

Although the tick *A. rotundatum* is considered to be a common species on ectothermic vertebrates (GUGLIELMONE; NAVA, 2010), the present study is the first formal scientific record of this tick species parasitizing the reptiles *T. torquatus* and *P. olfersii*. Analysis on the data obtained indicated that the frequency and intensity of infestation by *A. rotundatum* in this community of reptiles sampled in the Grussaí restinga habitat was low. The only previous information available regarding infestation by *A. rotundatum* in a community of reptiles in nature comes from the study by Pontes et al. (2009), who reported comparatively higher frequency and intensity of infestation in a community of snakes in an area of dense tropical rainforest in the Atlantic Forest located in Serra do Mendanha in the state of Rio de Janeiro. The scarcity of knowledge concerning *A. rotundatum* infestation on reptiles in nature makes it difficult to determine to what extent the differences in frequency and intensity observed are due to differences in the types of environments studied (rainforest and restingas).

The only information regarding infestation by ticks of the genus *Amblyomma* on *A. ameiva* is in relation to identification of *A. dissimile* in Venezuela (DIAZ-UNGRÍA, 1957) and in Trinidad and Tobago (AITKEN et al., 1968). Recently, *A. dissimile* was also recorded infesting an individual of *A. ameiva* in the state of Maranhão, Brazil (LOPES et al., 2010). *Amblyomma rotundatum* has been reported on *A. ameiva*, but without location information (ONOFRIO, 2007). Lainson et al. (2007) demonstrated the vector function of *A. rotundatum* in relation to transmission of the protozoan hemoparasite *Hemolivia stellata* between the anuran *Rhinella marina* and the lizard *A. ameiva*.

Previous records of *A. rotundatum* parasitizing *T. torquatus* are restricted to the use of this and other species of reptiles under experimental conditions, to study the biological cycle of the tick (ARAGÃO, 1912; FREITAS et al., 2004). Labruna et al. (2005) reported an occurrence of a male *A. rotundatum* in the Amazon region parasitizing *Tropidurus* sp., probably *T. oreadicus*, since *T. torquatus* does not occur in the region (SENA et al., 2008). In the state of Pernambuco, northeastern Brazil, a lizard of the genus *Tropidurus* parasitized by two nymphs of *Amblyomma* sp. was recorded in the Dois Irmãos State Park (DANTAS-TORRES et al., 2010), and also an individual of *T. hispidus* infested by three nymphs

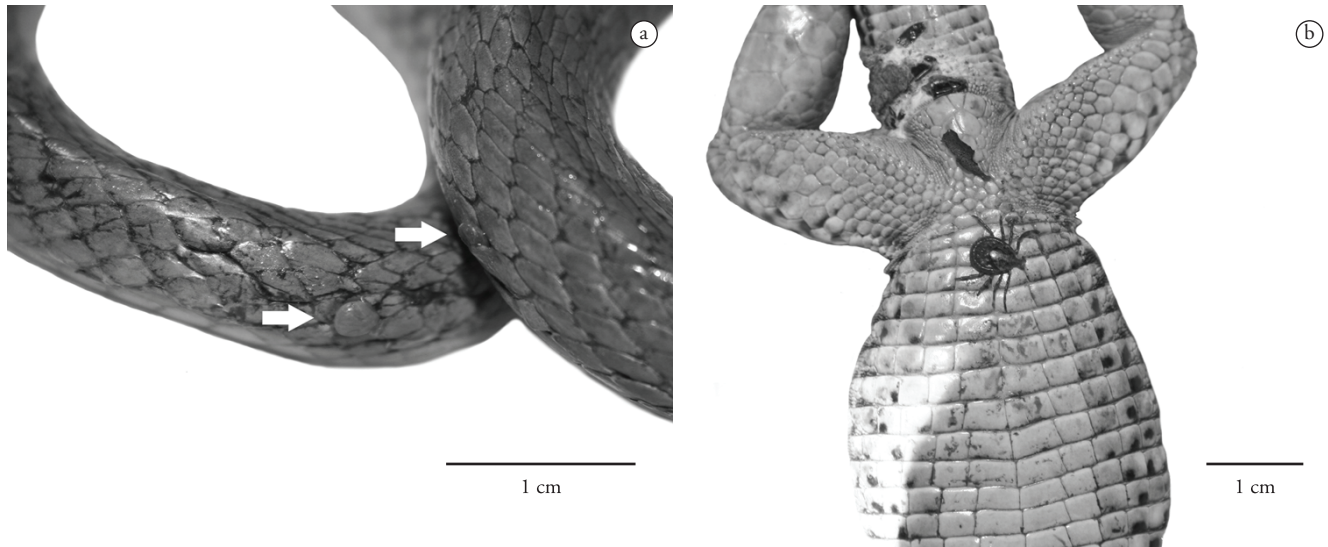


Figure 1. *Amblyomma rotundatum* ticks detected on reptiles in the Grussaí restinga, Campos dos Goytacazes, state of Rio de Janeiro, Brazil. a) Nymphs (arrows) under the scales of the colubrid snake *Philodryas olfersii*; b) female adult (arrow) on the lizard *Ameiva ameiva*.

of *A. dissimile* (DANTAS-TORRES et al., 2008). *Tropidurus hispidus* was also found infested by *Amblyomma* sp. in Venezuela (PRIETO, 1980).

The only record of parasitism by ticks on the snake *P. olfersii* was reported by Lizaso (1984). This author observed infestation by *Amblyomma* sp. during fauna rescue at the Água Vermelha hydroelectric plant, on the borders of the states of São Paulo and Minas Gerais, Brazil. During a study to determine occurrences of ticks on snakes in the Serra do Mendanha, state of Rio de Janeiro, two individuals of *P. olfersii* were found to be negative for the presence of ticks (PONTES et al., 2009). However, in the same study, individuals of the sympatric snakes *Chironius laevicollis*, *Spilotes pullatus* and *Xenodon neuwiedii* presented infestation by *A. rotundatum*. Dantas-Torres et al. (2010) reported parasitism of a snake of the genus *Philodryas* by a nymph of *Amblyomma* sp. collected in the Dois Irmãos State Park in the state of Pernambuco.

In conclusion, this study extends the list of reptilian hosts for the tick *A. rotundatum*. Analysis of the results obtained suggests that in the Grussaí restinga habitat, *A. rotundatum* uses different species of reptiles to complete its life cycle. Considering the biological capacity of *A. rotundatum* to transmit blood-borne protozoa to reptiles and amphibians, and the previous findings of natural infection by *Rickettsia bellii* in the state of Rondonia (LABRUNA et al., 2004), additional studies in the Grussaí restinga could provide an important opportunity to elucidate the parasite ecology of the wildlife community in this region.

Acknowledgements

This study was supported by grants from the Fundação Carlos Chagas Filho de Amparo a Pesquisa do Estado do Rio de Janeiro (FAPERJ) to LAV (procedural no. E-26/102.498/2010), to GRW (E-26/100.769/2008 and E-26/100.477/2011), and CNPq to CFDR (304791/2010-5 and 470265/2010-8). This study was approved by the Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis (IBAMA), Brazilian Ministry of the Environment (authorization no. 15322-2).

References

- Aitken THG, Worth CB, Tikasingh ES. Arbovirus studies in Bush Bush Forest, Trinidad, W. I., September 1959 – December 1964. III. Entomologic Studies. *Am J Trop Med Hyg* 1968; 17(2): 253-268. PMID:4384665.
- Aragão HB. Contribuição para a sistemática e biologia dos ixodídeos: Partenogenez em carrapatos. *Mem Inst Oswaldo Cruz* 1912; 4(1): 96-119.
- Aragão HB, Fonseca F. Notas de Ixodologia. VIII. Lista e chave para os representantes da fauna ixodológica brasileira. *Mem Inst Oswaldo Cruz* 1961; 59(2): 115-130. PMID:13861962.
- Brasil. Ministério das Minas e Energia. Secretária Geral. Projeto RADAMBRASIL. *Rio de Janeiro/Vitória; Geologia, Geomorfologia, Pedologia, Vegetação e Uso Potencial da Terra*. Rio de Janeiro: Ministério das Minas e Energia; 1983. 780 p. Folha SF. 23/24.
- Dantas-Torres F, Ferreira DR, Melo LM, Lima PA, Siqueira DB, Rameh-de-Albuquerque LC, et al. Ticks on captive and free-living wild animals in northeastern Brazil. *Exp Appl Acarol* 2010; 50(2): 181-189. <http://dx.doi.org/10.1007/s10493-009-9296-5>
- Dantas-Torres F, Oliveira-Filho EF, Soares FA, Souza BO, Valença RB, Sá FB. Ticks infesting amphibians and reptiles in Pernambuco, Northeastern Brazil. *Rev Bras Parasitol Vet* 2008; 17(4): 218-221. PMID:19265581.
- Dantas-Torres F, Oliveira-Filho EF, Souza BOF, Sá FB. First Record of *Amblyomma rotundatum* Koch, 1844 (Acari: Ixodidae) parasitizing *Crotalus durissus cascavella* (Wagler, 1824) (Squamata: Viperidae) in the state of Pernambuco, Brazil. *Arq Inst Biol* 2005; 72(3): 389-390.
- Diaz-Ungria C. Nota sobre las especies de acarina de Venezuela. *Rev Sanidad Asist Soc* 1957; 22(5): 457-467.
- Durden LA, Knapp CR. Ticks parasitizing reptiles in the Bahamas. *Med Vet Entomol* 2005; 19(3): 326-328. <http://dx.doi.org/10.1111/j.1365-2915.2005.00567.x>
- Eiten G. Natural Brazilian vegetation types and their causes. *An Acad Bras Ciênc* 1992; 64(S1): 35-65.

- Freitas LHT, Faccini JLH, Daemon E, Prata MCA, Barros-Battesti DM. Experimental infestation with the immatures of *Amblyomma dissimile* Koch, 1844 (Acari: Ixodidae) on *Tropidurus torquatus* (Lacertilia: Iguanidae) and *Oryctolagus cuniculus*. *Arq Bras Med Vet Zootec* 2004; 56(1): 126-129. <http://dx.doi.org/10.1590/S0102-09352004000100021>
- Guglielmone AA, Nava S. Hosts of *Amblyomma dissimile* Koch, 1844 and *Amblyomma rotundatum* Koch, 1844 (Acari: Ixodidae). *Zootaxa* 2010; 2541: 27-49.
- Labruna MB, Paula CD, Lima TF, Sana DA. Ticks (Acari: Ixodidae) on wild animals from the Porto Primavera Hydroelectric power station area, Brazil. *Mem Inst Oswaldo Cruz* 2002; 97(8): 1133-1136. <http://dx.doi.org/10.1590/S0074-02762002000800012>
- Labruna MB, Whitworth T, Bouyer DH, McBride J, Camargo LMA, Camargo EP, et al. *Rickettsia bellii* and *Rickettsia amblyommii* in *Amblyomma* Ticks from the State of Rondônia, Western Amazon, Brazil. *J Med Entomol* 2004; 41(6): 1073-1081. <http://dx.doi.org/10.1603/0022-2585-41.6.1073>
- Labruna MB, Terassini FA, Camargo LM. First report of the male of *Amblyomma rotundatum* (Acari: Ixodidae) from a field-collected host. *J Med Entomol* 2005; 42(6): 945-947. [http://dx.doi.org/10.1603/0022-2585\(2005\)042\[0945:FROTMO\]2.0.CO;2](http://dx.doi.org/10.1603/0022-2585(2005)042[0945:FROTMO]2.0.CO;2)
- Lainson R, Souza MC, Franco CM. Natural and experimental infection of the lizard *Ameiva ameiva* with *Hemolivia stellata* (Adeleina: Haemogregarinidae) on the toad *Bufo marinus*. *Parasite* 2007; 14(4): 323-328. PMID:18225421.
- Lizaso NM. Fauna acarológica ectoparasita de serpentes não venenosas da região de construção de hidrelétricas (Sudeste, Centro-Oeste e Sul) do Brasil. *Rev Bras Zool* 1984; 2(2): 77-84.
- Lopes SG, Andrade GC, Costa-Júnior LM. A first record of *Amblyomma dissimile* (Acari: Ixodidae) parasitizing the lizard *Ameiva ameiva* (Teiidae) in Brazil. *Rev Bras Parasitol Vet* 2010; 19(4): 262-264. <http://dx.doi.org/10.1590/S1984-29612010000400015>
- Martins TF, Onofrio VC, Barros-Battesti DM, Labruna MB. Nymphs of the genus *Amblyomma* (Acari: Ixodidae) of Brazil: descriptions, redescription, and identification key. *Ticks Tick-borne Dis* 2010; 1(2): 75-99. <http://dx.doi.org/10.1016/j.ttbdis.2010.03.002>
- Martins JR, Monticelli EC, Onofrio VC, Barros-Battesti DM, Doyle RL. Primeiro relato de *Amblyomma fuscum* Neumann, 1907 (Acari: Ixodidae) parasitando lagarto da espécie *Tupinambis teguixin* (L.), no Município de Glorinha, Estado do Rio Grande do Sul, Brasil. *Rev Bras Parasitol Vet* 2007; 16(4): 246-247. PMID:18373904.
- Oba MSP, Schumaker TTS. Estudo da biologia de *Amblyomma rotundatum* (Koch, 1844), em infestações experimentais de *Bufo marinus* (L., 1758) sob condições variadas de umidade relativa e de temperatura do ar. *Mem Inst Butantan* 1983-1984; 47-48(2): 195-204.
- Onofrio VC. *Revisão do gênero Amblyomma Koch, 1844 (Acari: Ixodidae) no Brasil* [Tese]. Rio de Janeiro: Universidade Federal Rural do Rio de Janeiro; 2007. Available from: http://www.dominiopublico.gov.br/pesquisa/DetalheObraForm.do?select_action=&co_obra=80113.
- Paperna I. *Hemolivia mauritanica* (Haemogregarinidae: Apicomplexa) infection in the tortoise *Testudo graeca* in the Near East with data on sporogonous development in the tick vector *Hyalomma aegyptium*. *Parasite* 2006; 13(4): 267-273. PMID:17285846.
- Paperna I, Kremer-Mecabell T, Finkelman S. *Hepatozoon kisrae* n. sp. infecting the lizard *Agama stellio* is transmitted by the tick *Hyalomma cf. aegyptium*. *Parasite* 2002; 9(1): 17-27. PMID:11938691.
- Petit G, Landau I, Baccam D, Lainson R. Description et cycle biologique d'*Hemolivia stellata* n. g., n. sp., hémogregarine de crapauds brésiliens. *Ann Parasitol Hum Comp* 1990; 65(1): 3-15.
- Pontes JAL, Gazêta GS, Vrcibradic D, Rocha CFD. Ecology of ticks in a taxocenosis of snakes from the Serra do Mendanha, Rio de Janeiro, Brazil, with new host records. *Zoologia* 2009; 26(2): 328-333.
- Prieto AS. Note on parasites of the tropical lizard *Tropidurus hispidus*. *J Herpetol* 1980; 14(2): 190-192. <http://dx.doi.org/10.2307/1563856>
- Rodrigues DS, Maciel R, Cunha LM, Leite RC, Oliveira PR. *Amblyomma rotundatum* (Koch, 1844) (Acari: Ixodidae) two-host life-cycle on Viperidae snakes. *Rev Bras Parasitol Vet* 2010; 19(3): 174-178. <http://dx.doi.org/10.1590/S1984-29612010000300009>
- Sena MA, Silva JG, Nunes MS. *Tropidurus torquatus* (Calango, Collared Lizard). *Herpetologic Rev* 2008; 39(3): 369.
- Siroký P, Mikulíček P, Jandzík D, Kami H, Mihalca AD, Rouag R, et al. Co-distribution pattern of a haemogregarine *Hemolivia mauritanica* (Apicomplexa: Haemogregarinidae) and its vector *Hyalomma aegyptium* (Metastigmata: Ixodidae). *J Parasitol* 2009; 95(3): 728-733. <http://dx.doi.org/10.1645/GE-1842.1>
- Smallridge C, Paperna I. The tick-transmitted haemogregarinid of the Australian sleepy lizard *Tiliqua rugosa* belongs to the genus *Hemolivia*. *Parasite* 1997; 4(4): 359-363.