



Hosts of *Amblyomma dissimile* Koch, 1844 and *Amblyomma rotundatum* Koch, 1844 (Acari: Ixodidae)

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Abstract

Host records of *Amblyomma dissimile* Koch, 1844 and *Amblyomma rotundatum* Koch, 1844 from the literature were critically reviewed. A total of 417 records on 101 species of tetrapods, and 193 records in 74 species of tetrapods were determined for *A. dissimile* and *A. rotundatum*, respectively. Aves have been found only once infested with *A. dissimile*. This tick has been detected on four species of Bufonidae, while *A. rotundatum* has been recorded on 13 species from six families of Anura. Crocodylia has been recorded infested by *A. rotundatum* (captive host, one species) and *A. dissimile* (two species). Sixteen species of Mammalia from ten families and eight species from eight families have been found infested with *A. dissimile* and *A. rotundatum*, including humans, respectively. A total of 63 species of Squamata (10 families) were found infested with *A. dissimile*, while the corresponding numbers for *A. rotundatum* are 45 species in nine families. A total of 15 species of Testudines (four families) and nine species (three families) have been found infested with *A. dissimile* and *A. rotundatum*, respectively. When infestation on captive and laboratory hosts were excluded from the analysis the number of species naturally infested with *A. dissimile* diminished to 88 and 58 for *A. rotundatum*. However, natural hosts infested with larvae, nymphs and adults of *A. dissimile* are *Bufo marinus* (Linnaeus), *Bufo peltocephalus* Tschudi, *Proechimys semispinosus* (Tomes), *Boa constrictor* Linnaeus, *Epicrates striatus* (Fischer), *Oxybelis aeneus* (Wagler), *Cyclura cyclura* (Cuvier), *Iguana iguana* (Linnaeus), *Tupinambis teguixin* (Linnaeus) and *Trachemys scripta* (Thunberg), but the commonest hosts harbouring all parasitic stages are *B. marinus*, *B. constrictor* and *I. iguana*. Hosts for all parasitic stages of *A. rotundatum* are *B. marinus*, *Bufo schneideri* Werner and *B. constrictor*, although records on *B. marinus* are considerably higher than the records on the other two hosts. The contribution of sheep and *Hydrochoerus hydrochaeris* (Linnaeus) as hosts of *A. dissimile*, and *Dasyus novemcinctus* Linnaeus as host of *A. rotundatum*, were overestimated in previous studies. The ample host-range of these tick species may partly explain their wide distribution from southern U.S.A. to northern Argentina, but there are also chances that more than one species are represented under the names *A. dissimile* and *A. rotundatum*.

Key words: Anura, Aves, Crocodylia, Mammalia, Squamata, Testudines, food source, Prostriata, Nearctic, Neotropical

Introduction

Amblyomma dissimile Koch, 1844 and *Amblyomma rotundatum* Koch, 1844 are species considered of importance in tick evolution because of their unique relationship with Amphibia. Oliver (1989) even found the feeding of *A. rotundatum* on *Bufo marinus* as an indication of a Devonian origin of ticks without any further elaboration apart from noting that a great variety of Amphibia were present at that historical time. Hoogstraal and Aeschlimann (1982) consider both species of ticks feeding on reptile and amphibian hosts, but BurrIDGE and Simmons (2003) and BurrIDGE (2010) presented more detailed information on hosts of *A. dissimile* and *A. rotundatum* showing a quite ample range of hosts with an unexpected contribution of mammals.

Amblyomma rotundatum is a parthenogenetic species, but there is a description of one male obtained from a natural infestation in Labruna *et al.* (2005b) and a gynander male reared in the laboratory (Keirans & Oliver 1993). The females of these species have morphological similarities and authors such as Morel (1967) stress

difficulties regarding the separation of both species. On the other hand, Lampo *et al.* (1997) also acknowledge the difficulties for their diagnosis, but show differences in the spurring of coxae I to IV and in scutal punctations between *A. dissimile* and *A. rotundatum* females. Authors such as Bodkin (1918) regarded *A. dissimile* as parthenogenetic because of an apparent confusion with *A. rotundatum*.

These species of ticks are established in the Nearctic and Neotropical Zoogeographic Regions from northern Argentina to southern U.S.A. There are records of *A. dissimile* from the Philippines and India in Neumann (1899) and Keirans (1985) that are considered more likely a result of incorrect labeling or accidental introduction that did not result in colonization of new habitats. Pietzsch *et al.* (2006) register the introduction of *A. dissimile* and *A. rotundatum* into the Palearctic Region, but again there is no evidence of these species of ticks becoming established there. Nevertheless, Burridge (2010) stresses the capacity of both tick species to infest numerous host species introduced into the Nearctic regions, implying that these species have the capacity to colonize other Zoogeographic Regions.

The validity of the name *A. rotundatum* has not been questioned, but the situation with *A. dissimile* is different. Guglielmone *et al.* (2009) detailed this problem as follows: Santos Dias (1958c) and Camicas *et al.* (1998) considered *A. dissimile* Koch, 1844 a synonym of *A. bibroni*—originally *Ixodes bibronii*—but no type comparison was attempted. Moreover, Estrada-Peña and Castellá (1994) stated that *I. bibroni* Gervais, 1842 is a name lacking a formal description. And while Gervais (1844) briefly summarized this species, he confused the issue by stating that his specimens were collected in 1843 (page 249). This lack of clarity or any subsequent redescription of the type material has led us to doubt the validity of *A. bibroni*. Still authors such as Teixeira *et al.* (2003) use the name *A. bibroni* instead of *A. dissimile*. Barker and Murrell (2004, 2008) incorrectly listed both *A. bibroni* and *A. dissimile* as valid names. There are several synonymies for *A. dissimile*; they will be indicated below when relevant to this study.

While the name *A. rotundatum* has fewer synonyms than *A. dissimile* there is confusion with the female of *Amblyomma goeldii* Neumann, 1899. According to Guglielmone *et al.* (2003), Neumann (1899) apparently confused the female of *A. rotundatum* with the female of *A. goeldii* and the first description of the female of this species was published by Floch and Abonnenc (1941) under the name *A. inini* Floch and Abonnenc, 1941. However, Bequaert (1926) and Aragão (1936) were aware about the similarities of the females of the two species. Aragão (1936) rectified his previous diagnosis of *A. goeldii* to *A. rotundatum*. Floch and Fauran (1958) affirm that the females of *A. goeldii* used by Neumann (1899) were in fact *A. rotundatum* females. Finally, Keirans (1985) examined a female of the syntype series of *A. goeldii* to confirm that it was in fact a female of *A. rotundatum*. However, Santos Dias (1985c) compared the syntypes (all females) of *Ixodes fuscomaculatum* Lucas, 1873 with the syntypes females of *A. goeldii* to conclude that they belong to the same species; therefore the name *Amblyomma fuscomaculatum* (Lucas, 1873) has priority over *A. goeldii*. This opinion was repeated in Santos Dias (1986b) without discussing the opinion of Floch and Fauran (1958) and Keirans (1985) (see above) that consider the female of *A. goeldii* in Neumann (1899) a synonym of *A. rotundatum* and, conversely, *A. fuscomaculatum* become a junior synonym of *A. rotundatum*. We agree with this synonymy. Indeed, some findings of *A. rotundatum* were made under the name *A. goeldii* and this will be indicated in the corresponding section.

An additional problem to evaluate hosts of *A. dissimile* and *A. rotundatum* is the numerous records from the end of the 19th century to the mid 20th century on hosts quite different to actual nomenclature. There are also several typing errors of scientific names; these errors were adjusted, when possible, to the closest names of known hosts, i.e., *Leptodira annulata* in Neumann (1899) was considered to be *Leptodeira annulata* Linnaeus, *Iguaria* sp. in Aragão (1918) was considered to be *Iguana* sp., just to mention two examples. Besides, many records in the literature are in fact repetitions of previous findings and they were not included in our analysis of records of these ticks (see Materials and Methods).

Here historical information on hosts of *A. dissimile* and *A. rotundatum* are presented. Data were obtained from literature and analyzed to provide records of both species relevant for ecological knowledge of these species of ticks.

Material and methods

Literature records for hosts of *A. dissimile* and *A. rotundatum* were analyzed to discern hosts from natural or captive infestations and laboratory breeding. The use of other names to identify either species of tick are indicated. Numbers of records are given: a record is defined as the finding of the tick species on a determined host for a particular locality; findings on the same species of host and locality on several dates are each considered a record when dates are clearly indicated. References to these tick species from authors that do not indicate locality and hosts, or presenting hosts already found in previous studies with no indication of new locality, are considered repetitions and not included to build up the number of records.

There are several records of *A. dissimile* and *A. rotundatum* on hosts imported into different countries. Their infestations with these species of ticks are considered to be a natural event when they were still free-range hosts unless the hosts are naturally established in areas allopatric to the distribution of *A. dissimile* and *A. rotundatum*. Therefore records of these ticks on *Chamaeleo dilepis* Leach, *Ophiophagus hannah* Cantor, *Tropidolaemus wagleri* (Boie), *Mauremys leprosa* (Schweigger), *Geochelone pardalis* (Bell) and Boidae from the genus *Python* (all naturally established out of the Nearctic and Neotropical Zoogeographic Regions) are considered to have occurred under captivity even if the corresponding author does not mention this circumstance.

Records on hosts not clearly identified (i.e., “alligators”, “toads”, “lizards”, “snakes”, “tortoises”, “turtles”) and scientific names of hosts considered uncertain by the authors of articles in Neumann (1899, 1902, 1913), Ribaga (1902), Rohr (1909), Aragão (1911, 1912, 1936), Bodkin and Cleare (1916), Dunn (1918, 1923), Macías Valadez (1923), Robinson (1926), Bequaert (1932, 1938), Floch and Abonnenc (1940, 1942), Turk (1948, as *Amblyomma trinitatis* Turk, 1948, a name considered to be a synonym of *A. dissimile*), Fiasson (1949), Floch and Fauran (1958), Santos Dias (1958c, 1986a), Hoffmann (1962), Fairchild *et al.* (1966), Aitken *et al.* (1968), Kohls (1969), Jones *et al.* (1972), Smith (1974), Moritz and Fischer (1981), Massi Pallarés and Benítez Usher (1982), Keirans (1982, 1985), Need *et al.* (1991), Guimaraes *et al.* (2001), Keirans and Durden (2001), Alvarez *et al.* (2005), Labruna *et al.* (2005c), Paredes-León (2008), Quintero *et al.* (2008) and Smith *et al.* (2008) are not listed below. Tick stages from the different hosts were registered when authors clearly stated them.

Several names of hosts used by different authors were synonymized as presented below. There are major differences in nomenclature of hosts among different workers, but we have insufficient knowledge to adhere to any school. Therefore, the synonymies are presented as an aid for readers to identify the host beyond any controversial taxonomical issue.

Boa enydris (Linnaeus) = *Corallus hortulanus* Linnaeus

Boa imperator Daudin = *Boa constrictor* Linnaeus

Bombinator pachypus Bonaparte = *Bombina pachypus* (Bonaparte)

Bufo aqua Latreille = *Bufo marinus* (Linnaeus)

Bufo calamita Laurenti = *Epidalea calamita* (Laurenti)

Bufo paracnemis Lutz = *Bufo schneideri* Werner

Buffo (sic) *paranaensis* ¿? = *Bufo schneideri* because the reference for this name (Ivancovich & Luciani, 1992) considers *B. paranaensis* = *B. paracnemis*

Bufo peltacephalus fustiger Schwartz = *Bufo fustiger* Schwartz

Bufo viridis Laurenti = *Seudepidalea viridis* (Laurenti)

Callopsis areolata (Duméril, Bibron & Duméril) = *Rhinoclemmys areolata* (Duméril, Bibron & Duméril)

Callopsis pulcherrima (Gray) = *Rhinoclemmys pulcherrima* (Gray)

Callopsis rubida (Cope) = *Rhinoclemmys rubida* (Cope)

Chaunus granulatus (Spyx) = *Bufo granulatus* Spyx

Chaunus schneideri (Werner) = *Bufo schneideri*

Constrictor sp. = *Boa* sp.

Constrictor constrictor Ihering = *Boa constrictor*

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Constrictor occidentalis Serié= *Boa constrictor*
Crotalus terrificus (Laurenti)= *Crotalus durissus* Linnaeus
Cyclagras gigas (Duméril, Bibron & Duméril)= *Hydrodynastes gigas* (Duméril, Bibron & Duméril)
Drymobius bifossatus Raddi= *Mastigodryas bifossatus* (Raddi)
Elaps sp.= *Micrurus* sp.
Emys leprosa Schweigger= *Mauremys leprosa*
Enyaliosaurus quinquecarinatus (Gray)= *Ctenosaura quinquecarinata* (Gray)
Geochelone carbonaria (Spix)= *Chelonoidis carbonaria* (Spix)
Geochelone denticulata (Linnaeus)= *Chelonoidis denticulada* (Linnaeus)
Geoemyda punctularia (Daudin)= *Rhinoclemmys punctularia* (Daudin)
Geoemyda punctularia areolata in Pearse (1936) is considered= *Rhinoclemmys areolata*
Heosemys annandalii (Boulenger)= *Hieremys annandalii* (Boulenger)
Iguana rhynolopha (Duméril & Bibron)= *Iguana iguana* (Linnaeus)
Iguana tuberculata Laurenti = *Iguana iguana*
Lacerta ocellata Daudin= *Timon lepidus* (Daudin)
Lachesis alternatus (Duméril, Bibron & Duméril)= *Bothrops alternatus* Duméril, Bibron and Duméril
Lachesis lanceolatus (Bonnaterre)= *Bothrops lanceolatus* (Bonnaterre)
Lachesis wagleri (Boie)= *Tropidolaemus wagleri* Boie
Metopocerus cornutus (Bonnaterre)= *Cyclura cornuta* (Bonnaterre)
Molge palmata Merrem= *Lissotriton helveticus* (Razoumowsky)
Oxybelis acuminatus (Wied) = *Oxybelis aeneus* (Wagler)
Pseudemys scripta (Thunberg)= *Trachemys scripta* (Thunberg)
Python schneideri Merrem= *Python reticulatus* (Schneider)
Rhinella marina (Linnaeus)= *Bufo marinus*
Scytale coronatum (Schneider)= *Pseudoboa coronata* Schneider
Spilotes corais (Boie)= *Drymarchon corais* (Boie)
Spilotes maculatus Amaral= *Spilotes pullatus* (Linnaeus)
Spilotes variabilis (Merrem)= *Spilotes pullatus*
Stigmochelys pardalis (Bell)= *Geochelone pardalis* (Bell)
Tejus sp.= *Tupinambis* sp.
Terrapene mexicana (Gray)= *Terrapene carolina* (Linnaeus)
Testudo chilensis (Gray)= *Chelonoidis chilensis* (Gray)
Testudo tabulata Schoepff= *Chelonoidis denticulata* (Linnaeus)
Trionocephalus jararaca (Wied)= *Bothrops jararaca* (Wied)
Tropidonotus natrix (Linnaeus)= *Natrix natrix* (Linnaeus)
Xenodon merremi (Wagler)= *Waglerophis merremi* (Wagler)
Zamenis viridiflavus (Lacépède)= *Hierophis viridiflavus* (Lacépède)

Common names for authors who did not include scientific nominations have been given these definitions:

Anaconda= *Eunectes* sp.
Black iguana: *Ctenosaura similis* (Gray)
Box turtle= *Terrapene carolina*
Green iguana= *Iguana iguana*
Capybara= *Hydrochoerus hydrochaeris* (Linnaeus)
Rainbow boa= *Epicrates cenchria* (Linnaeus)
Rat snake= *Elaphe obsoleta* (Say)
Rattlesnake= *Crotalus* sp.
Tegu lizard= *Tupinambis* sp.
Yarará= *Bothrops* sp.

We were unable to find synonyms or were uncertain about the real meaning for the following vulgar or scientific names that were not included in the lists of hosts for *A. dissimile* and *A. rotundatum*:

Chicken snake in Burrige (2010)

Cobra in Keirans & Durden (2001)

Cistudo lotaria cited in Brumpt (1924)

Elaps maregravi in Dios & Knoppoff (1930)

Mazacuata in Paredes León *et al.* (2008)

Rhadinea sp. in Vogelsang (1928)

Salapenter in Robinson (1926)

Siphonops norantzowi in Onofrio *et al.* (2002)

Taequ in Jones *et al.* (1972)

Tapayatzin in Macías Valadez (1923). Some authors consider that this name represents *Phrynosoma* sp., but Hoffmann (1962) has doubts about its spelling in Macías Valadez (1923).

Results

Tables 1 and 2 contain records, known stages for different hosts and the corresponding references for *A. dissimile* and *A. rotundatum*, respectively. Records of *A. dissimile* (417) were more abundant than records of *A. rotundatum* (193). Total number of species of vertebrates found infested with *A. dissimile* was 101, while *A. rotundatum* has been found infesting 74 species of vertebrates. Both species were found on Anura, Crocodylia, Mammalia, Squamata and Testudines. Aves (Ardeidae) were found only as a host of *A. dissimile* with just one record on a bird naturally infested.

TABLE 1. List of *Amblyomma dissimile* found on different hosts. In brackets under “Hosts” heading are the tick stages found: A= adult ticks, N= nymph, L= larva, x= unknown stage. In brackets under “N° of records” heading the summary of records for the corresponding host classification. In brackets under “References” heading the number of records included in the corresponding references.

Hosts	N° of records	References
Anura (ANL)	69	
Bufoidea (ANL)	69	
<i>Bufo</i> sp. (ANL)	8	Aragão 1912 (1), Díaz Ungría 1957 (1), Hoffmann 1962 (1), Jones <i>et al.</i> 1972 (1), Ivancovich 1973 (1), Alvarez <i>et al.</i> 2005 (1), Paredes León <i>et al.</i> 2008 (2)
<i>Bufo fustiger</i> (AL)	1	Černý 1969 (1)
<i>Bufo marinus</i> (ANL)	52	Lucas 1846 (1) ¹ , Neumann 1899 (1), Newstead 1909 (5), Bodkin & Cleare 1916 (1), Dunn 1923 (1), Joan 1930 (1), Bequaert 1932 (1), Pearse 1936 (2), Tate 1941 (1), Osorno Mesa 1942 (1), Evans 1947 (1), Floch & Fauran 1958 (1), Santos Dias 1958b (1) ² , Stebbins & Hendrickson 1959 (2), Herber 1961 (1), Santos Dias 1986a (1) ³ , Aitken <i>et al.</i> 1968 (1), Kohls 1969 (2), Jakowska 1972 (1), Schumaker & Barros 1994 (1) ⁴ , Clark & Doten 1995 (1), Lampo & Bayliss 1996 (12), Lampo <i>et al.</i> 1997 (1), 1998 (4), Kabisch 1998 (1), Paredes León <i>et al.</i> 2008 (6)
<i>Bufo peltoccephalus</i> (ANL)	3	Santos Dias 1958a (2) ⁵ , Černý 1969 (1)
<i>Bufo schneideri</i> (A)	5	Dios & Knoppoff 1934 (1), Ivancovich & Luciani 1992 (4)
Aves (A)	1	
Ciconiiformes (A)	1	
Ardeidae (A)	1	
<i>Cochleaurius cochleaurius</i> (A)	1	Fairchild <i>et al.</i> 1966 (1)
Crocodylia (A)	4	

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TABLE 1. (continued)

Hosts	Nº of records	References
Crocodylidae (A)	4	
Caiman (A)	1	Aitken <i>et al.</i> 1968 (1)
<i>Caiman crocodilus</i> (A)	2	Serra Freire & Peralta 1993 (1) ⁶ , Pietzch <i>et al.</i> 2006 (1)
<i>Crocodylus moreletti</i> (A)	1	Rainwater <i>et al.</i> 2000 (1)
Mammalia (ANL)	23	
Artiodactyla (ANL)	8	
Bovidae (ANL)	7	
Cattle (ANL)	5	Packard 1869 (1) ⁷ , Hooker <i>et al.</i> 1912 (1) ⁸ , Floch & Fauran 1958 (1), Hoffmann 1962 (1), Keirans 1985 (1)
Goat (NL)	1	Jongejan 1992 (1) ⁴
Sheep (A)	1	Robinson 1926 (1)
Tayassuidae (x)	1	
Pecary (x)	1	Hoffmann 1962 (1)
Didelphimorphia (N)	2	
Didelphidae (N)	2	
<i>Didelphis albiventris</i> (N)	1	Botelho <i>et al.</i> 2002 (1)
<i>Monodelphis domestica</i> (N)	1	Botelho <i>et al.</i> 2002 (1)
Primates (AN)	4	
Hominidae (AN)	4	
Man (AN)	4	Galli Valerio 1909 (1), Koch 1844 (1) ⁹ , Guglielmo <i>et al.</i> 2006 (1), Quintero & Ramírez 2008 (1)
Lagomorpha (L)	1	
Leporidae (L)	1	
Domestic rabbit (L)	1	Freitas <i>et al.</i> 2004 (1) ⁴
Rodentia (ANL)	7	
Capromyidae (x)	1	
<i>Capromys pilorides</i> (x)	1	Barros-Battesti <i>et al.</i> 2009 (1)
Caviidae (AN)	2	
<i>Cavia aperea</i> (N)	1	Botelho <i>et al.</i> 2002 (1)
<i>Hydrochoerus hydrochaeris</i> (AN)	1	Joan 1930 (1)
Cricetidae (NL)	2	
<i>Oryzomys subflavus</i> (L)	1	Botelho <i>et al.</i> 2002 (1)
<i>Peromyscus gossypinus</i> (N)	1	Durden <i>et al.</i> 1993 (1)
Dasyproctidae (A)	1	
<i>Dasyprocta</i> sp. (A)	1	Packard 1869 (1) ⁷
Echimyidae (ANL)	2	
<i>Proechimys semispinosus</i> (ANL)	1	Jones <i>et al.</i> 1972 (1) ¹⁰
<i>Thrichomys apereoides</i> (N)	1	Botelho <i>et al.</i> 2002 (1)
Squamata	298	
Boidae (ANL)	104	
<i>Boa</i> sp. (AN)	26	Gervais 1844 (1) ⁷ , Packard 1869 (2) ⁷ , Bishopp & Trembley 1945 (1), Santos Dias 1958c (1) ³ , Snetsinger 1968 (1), Jones <i>et al.</i> 1972 (1), Ramírez 1980 (1), Keirans 1985 (8), Keirans & Durden 2001 (9), Alvarez <i>et al.</i> 2005 (1)

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TABLE 1. (continued)

Hosts	Nº of records	References
<i>Boa constrictor</i> (ANL)	56	Stoll 1894 (1) ¹¹ , Neumann 1899 (2), Rohr 1909 (1), Aragão 1911 (1), Oudemans 1912 (1), Dunn 1918 (1) ⁴ , 1923 (1), 1929 (1), Robinson 1926 (1), Bequaert 1932 (1), Vogelsang & Cordero 1940 (1) ⁶ , Evans 1947 (1), Boero 1954 (1), Eads <i>et al.</i> 1956 (1), Floch & Fauran 1958 (1), Santos Dias 1958b (1) ³ , Jones <i>et al.</i> 1972 (1), Wilson & Kale 1972 (1), Adis 1981 (1), Keirans 1985 (4), Jongejan 1992 (1) ⁶ , Serra Freire <i>et al.</i> 1993 (1) ⁴ , Schumaker & Barros 1994 (1), Clark & Doten 1995 (3), Lampo <i>et al.</i> 1997 (1), 1998 (4), Teixeira <i>et al.</i> 2003 (1) ^{3,6} , Paredes León <i>et al.</i> 2008 (3), Quintero <i>et al.</i> 2008 (1) ⁶ , Carrascal <i>et al.</i> 2009 (1), Burridge 2010 (15)
<i>Corallus hortulanus</i> (x)	1	Osorno Mesa 1942 (1)
<i>Epicrates cenchria</i> (AN)	6	Neumann 1899 (1), Dunn 1918 (1), 1923 (1), Wilson & Kale 1972 (1), Anderson <i>et al.</i> 1984 (1), Burridge 2010 (1)
<i>Epicrates striatus</i> (ANL)	2	Durden & Knapp 2005 (2)
<i>Eunectes</i> sp. (x)	4	Keirans & Durden 2001 (1), Burridge 2010 (3)
<i>Eunectes murinus</i> (AN)	2	Floch & Fauran 1958 (1), Brum & Rickes 2003 (1)
<i>Eunectes notaeus</i> (AN)	2	Burridge & Simmons 2003 (1), Teixeira <i>et al.</i> 2003 (1) ^{3,6}
<i>Python</i> sp. (x)	1	Quintero <i>et al.</i> 2008 (1) ⁶
<i>Python molurus</i> (AN)	1	Burridge 2010 (1) ⁶
<i>Python regius</i> (x)	1	Clark & Doten 1995 (1) ⁶
<i>Python reticulatus</i> (N)	1	Teixeira <i>et al.</i> 2003 (1) ^{3,6}
Chamaeleonidae (x)	1	
<i>Chamaeleo dilepis</i> (x)	1	Clark & Doten 1995 (1) ⁶
Colubridae (ANL)	23	
<i>Alsophis ater</i> (x)	1	Burridge 2010 (1)
<i>Chironius carinatus</i> (x)	1	Díaz Ungría 1957 (1)
<i>Coluber constrictor</i> (x)	1	Burridge 2010 (1)
<i>Dryadophis</i> sp (x)	1	Díaz Ungría 1957 (1)
<i>Drymarchon corais</i> (AN)	13	Bequaert 1932 (1), Wilson & Kale 1972 (10), Durden <i>et al.</i> 1993 (1), Foster <i>et al.</i> 2000 (1)
<i>Elaphe</i> sp. (A)	1	Jongejan 1992 (1)
<i>Elaphe guttata</i> (A)	1	Burridge 2010 (1)
<i>Elaphe obsoleta</i> (AN)	3	Wilson & Kale 1972 (2), Keirans & Durden 2001 (1)
<i>Hydrodynastes gigas</i> (A)	2	Vogelsang & Cordero 1939 (1) ⁶ , Heerdt <i>et al.</i> 2008 (1)
<i>Lamproptelis getula</i> (A)	1	Wilson & Kale 1972 (1)
<i>Leptodeira annulata</i> (A)	2	Neumann 1899 (1), Santos Dias 1958b (1) ³
<i>Mastigodryas bifossatus</i> (x)	1	Aragão 1936 (1)
<i>Oxybelis aeneus</i> (ANL)	1	Robinson 1926 (1)
<i>Oxybelis fulgidus</i> (ANL)	1	Dunn 1918 (1) ⁴
<i>Philodryas baroni</i> (N)	1	Burridge 2010 (1)
<i>Pituophis melanoleucus</i> (A)	3	Wilson & Kale 1972 (3)
<i>Pseudoboa</i> sp. (x)	1	Díaz Ungría 1957 (1)
<i>Pseudoboa coronata</i> (x)	1	Neumann 1899 (1)
<i>Pseudoboa newwiedii</i> (A)	2	Méndez Arocha 1956 (1) ¹² , Snetsinger 1968 (1)
<i>Pseustes poecilonotus</i> (x)	1	Burridge 2010 (1)
<i>Spilotes pullatus</i> (A)	3	Lucas 1846 (1) ^{1,6} , Lampo <i>et al.</i> 1997 (1), Paredes León <i>et al.</i> 2008 (1)

Continued next page

TABLE 1. (continued)

Hosts	Nº of records	References
<i>Waglerophis merremi</i> (A)	1	Santos Dias 1958b (1) ³
<i>Xenodon</i> sp. (A)	2	Santos Dias 1958b (1) ³ , Schumaker & Barros 1994 (1)
<i>Xenodon severus</i> (x)	1	Neumann 1899 (1)
Corytophanidae (x)	2	
<i>Basiliscus plumifrons</i> (x)	1	Clark & Doten 1995 (1)
<i>Corytophanes cristatus</i> (x)	1	Clark & Doten 1995 (1)
Elapidae (AN)	2	
<i>Micrurus</i> sp. (AN)	1	Keirans 1985 (1)
<i>Ophiophagus hannah</i> (x)	1	Burridge 2010 (1) ⁶
Iguanidae (ANL)	106	
<i>Ctenosaura acanthura</i> (A)	1	Bishopp & Trembley 1945 (1)
<i>Ctenosaura pectinata</i> (A)	7	Burridge & Simmons 2003 (1), Paredes León <i>et al.</i> 2008 (5), Burridge 2010 (1)
<i>Ctenosaura quinquecarinata</i> (x)	1	Clark & Doten 1995 (1)
<i>Ctenosaura similis</i> (x)	2	Clark & Doten 1995 (1), Quintero <i>et al.</i> 2008 (1) ⁶
<i>Cyclura</i> sp. (x)	1	Barros-Battesti <i>et al.</i> 2009 (1)
<i>Cyclura carinata</i> (A)	1	Oudemans 1912 (1)
<i>Cyclura cornuta</i> (A)	4	Santos Dias 1958b (2) ³ , Kohls 1969 (1), Jakowska 1972 (1)
<i>Cyclura cyclura</i> (ANL)	3	Durden & Knapp 2005 (3)
<i>Iguana</i> sp. (ANL)	43	Packard 1869 (1) ⁷ , Hooker <i>et al.</i> 1912 (1), Aragão 1918 (1), Robinson 1926 (4), Brumpt 1934 (1), Bishopp & Trembley 1945 (1), Hoffmann 1962 (2), Snetsinger 1968 (1), Jones <i>et al.</i> 1972 (2), Keirans 1985 (1), Maes <i>et al.</i> 1989 (1), Keirans & Durden 2001 (9), Paredes León <i>et al.</i> 2008 (3), Burridge 2010 (15)
<i>Iguana iguana</i> (ANL)	43	Neumann 1899 (1), Bodkin & Cleare 1916 (1), Dunn 1923 (1), 1929 (1), Robinson 1926 (2), Bequaert 1932 (1), Vogelsang & Cordero 1940 (1), Floch & Fauran 1958 (1), Hoffmann 1962 (3), Kohls 1969 (6), Wilson & Kale 1972 (3), Varma 1973 (1), Keirans 1985 (2), Clark & Doten 1995 (5), Tonn <i>et al.</i> 1963 (1), Lampo <i>et al.</i> 1997 (1), 1998 (3), Manzanilla & Aponte 1999 (1), Teixeira <i>et al.</i> 2003 (1) ^{3,6} , Freitas <i>et al.</i> 2004 (1) ⁶ , Alvarez <i>et al.</i> 2005 (1), Voltzit 2007 (1), Paredes León <i>et al.</i> 2008 (2), Quintero <i>et al.</i> 2008 ⁶ (1), Burridge 2010 (1)
Phrynosomatidae (NL)	3	
<i>Phrynosoma</i> sp. (x)	1	Paredes León <i>et al.</i> 2008 (1)
<i>Sceloporus malachiticus</i> (N)	1	Burridge 2010 (1)
<i>Sceloporus undulatus</i> (L)	1	Bishopp & Trembley 1945 (1)
Teiidae (ANL)	7	
<i>Ameiva ameiva</i> (x)	2	Díaz Ungría 1957 (1), Aitken <i>et al.</i> 1968 (1)
<i>Tupinambis</i> sp. (x)	1	Burridge 2010 (1)
<i>Tupinambis nigropunctatus</i> (x)	2	Bodkin & Cleare 1916 (1), Aitken <i>et al.</i> 1968 (1)
<i>Tupinambis teguixin</i> (ANL)	2	Morato de Carvalho <i>et al.</i> 1982 (1), Lampo <i>et al.</i> 1997 (1)
Tropiduridae (NL)	3	
<i>Tropidurus hispidus</i> (N)	1	Dantas Torres <i>et al.</i> 2008 (1)
<i>Tropidurus torquatus</i> (NL)	1	Freitas <i>et al.</i> 2004 (1) ⁴
<i>Leiocephalus carinatus</i> (N)	1	Durden & Knapp 2005 (1)
Viperidae (AN)	26	
<i>Agkistrodon piscivorus</i> (x)	1	Burridge 2010 (1)
<i>Bothrops</i> sp. (A)	1	Joan 1930 (1)

Continued next page

TABLE 1. (continued)

Hosts	Nº of records	References
<i>Bothrops alternatus</i> (A)	1	Dios & Knopoff 1930 (1) ⁶
<i>Bothrops asper</i> (x)	1	Alvarez <i>et al.</i> 2005 (1)
<i>Bothrops atrox</i> (x)	1	Fairchild <i>et al.</i> 1966 (1)
<i>Bothrops jararaca</i> (A)	3	Neumann 1911 (1), Morel 1967 (1), Serra Freire <i>et al.</i> 1993 (1) ⁴
<i>Bothrops lanceolatus</i> (A)	1	Keirans 1985 (1)
<i>Crotalus</i> sp. (A)	2	Packard 1869 (1) ⁷ , Jones <i>et al.</i> 1972 (1)
<i>Crotalus adamanteus</i> (AN)	1	Bishopp & Trembley 1945 (1)
<i>Crotalus durissus</i> (x)	6	Neumann 1911 (1), Dios & Knopoff 1930 (1) ⁶ , Vogelsang & Cordero 1940 (1), Serra Freire <i>et al.</i> 1993 (1) ⁴ , Alvarez <i>et al.</i> 2005 (1), Paredes León <i>et al.</i> 2008 (1)
<i>Lachesis</i> sp. (x)	1	Alvarez <i>et al.</i> 2005 (1)
<i>Lachesis muta</i> (A)	5	Neumann 1911 (1), Robinson 1926 (2), Floch & Fauran 1958 (1), Morel 1967 (1)
<i>Sistrurus miliaris</i> (A)	1	Bequaert 1932 (1)
<i>Tropidolaemus wagleri</i> (A)	1	Santos Dias 1958b (1) ^{3,6}
Testudines (ANL)	23	
Emydidae (ANL)	13	
<i>Graptemys geographica</i> (A)	1	Joyce 1971 (1)
<i>Mauremys leprosa</i> (A)	1	Brumpt 1934 (1) ⁴
<i>Rhinoclemmys areolata</i> (A)	2	Pearse 1936 (1), Ernst & Ernst 1977 (1)
<i>Rhinoclemmys pulcherrima</i> (A)	2	Ernst & Ernst 1977 (1), Clarke & Doten 1995 (1)
<i>Rhinoclemmys punctularia</i> (A)	1	Amorim <i>et al.</i> 1999 (1) ⁶
<i>Rhinoclemmys rubida</i> (A)	2	Ernst & Ernst 1977 (2)
<i>Terrapene carolina</i> (ANL)	2	Hooker <i>et al.</i> 1912 (1) ⁴ , Pearse 1936 (1)
<i>Trachemys scripta</i> (ANL)	2	Fairchild <i>et al.</i> 1966 (1), Teixeira <i>et al.</i> 2003 (1) ^{3,6}
Kinosternidae (AN)	4	
<i>Kinosternon agustipons</i> (x)	1	Clarke & Doten 1995 (1)
<i>Kinosternon leucostomum</i> (A)	1	Pearse 1936 (1)
<i>Kinosternon scorpiodes</i> (AN)	3	Amorim <i>et al.</i> 1999 (1) ⁶ , Teixeira <i>et al.</i> 2003 (1) ^{3,6} , Burridge & Simmons 2003 (1)
Pelomedusidae (x)	1	
<i>Podocnemis</i> sp. (x)	1	Rohr 1909 (1)
Testudinidae (x)	4	
<i>Chelonoidis denticulata</i> (x)	1	Floch & Fauran 1958 (1)
<i>Geochelone pardalis</i> (x)	1	Burridge 2010 (1) ⁶
<i>Gopherus polyphemus</i> (x)	1	Foster <i>et al.</i> 2000 (1)

¹This author uses the name *Ixodes pulchellus* instead of *A. dissimile*²This record is considered tentatively valid. The authors named this species as *Amblyomma testudinis* (Conil, 1877) (= *Amblyomma argentinae* Neumann, 1905) because Santos Dias (1958a) considers *Amblyomma cubanum* Schulze, 1941 and *Aponomma thumbi* Schulze, 1941 synonyms of *A. testudinis*. Nevertheless, according with Guglielmone *et al.* (2001) these species are currently regarded as synonyms of *A. dissimile*.³The authors use the name *A. bibroni* instead of *A. dissimile*⁴Hosts for laboratory breeding⁵The author named this species either as *Amblyomma cubanum* or *Amblyomma thumbi*. See footnote 2.⁶Records on hosts maintained in different forms of captivity⁷These authors use the name *Ixodes bibronii* instead of *A. dissimile*⁸This author bred larvae and nymphs of *A. dissimile* on cattle⁹This author uses the name *Ixodes humanus* instead of *A. dissimile*

¹⁰The authors have some doubts about host identification. We consider this record tentatively valid

¹¹The author uses the name *Ixodes boarum* instead of *A. dissimile*

¹²The author uses the name *Amblyomma margaritae* instead of *A. dissimile*

TABLE 2. List of *Amblyomma rotundatum* found on different hosts. In brackets under “Hosts” heading the tick stages found: A= adult ticks, N= nymph, L= larva, x= unknown stage. In brackets under “N° of records” heading the summary of records for the corresponding host classification. In brackets under “References” heading the number of records included in the corresponding references.

Hosts	N° of records	References
Anura (ANL)	72	
Bufo ^{nidae} (ANL)	68	
<i>Bufo</i> sp. (A)	10	Aragão 1912 (1) ¹ , 1936 (1), Ivancovich 1973 (1), Horta <i>et al.</i> 1999 (1) ⁵ , Labruna <i>et al.</i> , 2004 (1), 2005c (1), Onofrio <i>et al.</i> 2002 (1), Santos <i>et al.</i> 2005 (1), Barbieri <i>et al.</i> 2007 (1), Paredes León <i>et al.</i> 2008 (1)
<i>Bufo arenarum</i> (x)	2	Díaz Ungría 1957 (2)
<i>Bufo crucifer</i> (A)	1	Santos <i>et al.</i> 2002 (1)
<i>Bufo granulosus</i> (A)	5	Vogelsang & Cordero 1940 (1) ² , Kohls 1969 (1), Onofrio <i>et al.</i> 2002 (1), Santos <i>et al.</i> 2002 (1), Smith <i>et al.</i> 2008 (1)
<i>Bufo ictericus</i> (AN)	7	Bequaert 1926 (1) ³ , Woehl 2002 (4), Onofrio <i>et al.</i> 2002 (1), Luque <i>et al.</i> 2005 (1)
<i>Bufo marinus</i> (ANL)	34	Neumann 1899 (1) ³ , Bodkin 1918 (1) ⁴ , Aragón 1936 (1), Bequaert 1938 (3), Floch & Fauran 1958 (2), Hoffmann 1962 (1), Morel 1967 (1), Kohls 1969 (1), Jones <i>et al.</i> 1972 (1), Oba & Schumaker 1983-1984 (1) ² , Keirans 1985 (1), Barré <i>et al.</i> 1988 (1), Oliver <i>et al.</i> 1993 (11), Lampo <i>et al.</i> 1997 (1), Onofrio <i>et al.</i> 2002 (1), Labruna <i>et al.</i> 2005c (1), Pietzsch <i>et al.</i> 2006 (1), Nava <i>et al.</i> 2007 (2), Voltzit 2007 (1)
<i>Bufo peltoccephalus</i> (x)	1	Burridge 2010 (1)
<i>Bufo schneideri</i> (ANL)	7	Ivancovich & Luciani 1992 (2), Onofrio <i>et al.</i> 2002 (1), Santos <i>et al.</i> 2002 (1), Szabó <i>et al.</i> 2007 (1), Smith <i>et al.</i> 2008 (2)
<i>Bufo terrestris</i> (L)	1	Oliver <i>et al.</i> 1993 (1) ⁵
Discoglossidae (x)	1	
<i>Discoglossus pictus</i> (x)	1	Brumpt 1924 (1) ⁵
Pelobatidae (AN)	1	
<i>Spea bombrifons</i> (AN)	1	Brumpt 1924 (1) ⁵
Pipidae (A)	1	
<i>Pipa pipa</i> (A)	1	Burridge 2010 (1)
Ranidae (x)	1	
<i>Rana esculenta</i> (x)	1	Brumpt 1924 (1) ⁵
Crocodylia (A)	1	
<i>Paleosuchus trigonatus</i> (A)	1	Peralta <i>et al.</i> 1995 (1) ²
Mammalia (A)	8	
Artiodactyla (A)	1	
Suidae (A)	1	
Domestic pig (A)	1	Bequaert 1926 (1) ³
Carnivora	1	
Procyonidae	1	
<i>Nasua nasua</i> (A)	1	Labruna <i>et al.</i> 2005a (1)
Chiroptera (A)	1	
Phyllostomidae (A)	1	

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TABLE 2. (continued)

Hosts	Nº of records	References
<i>Choerioniscus minor</i> (A)	1	Jones <i>et al.</i> 1972 (1)
Cingulata (A)	1	
Dasypodidae (A)	1	
<i>Dasypus novemcinctus</i> (A)	1	Floch & Fauran 1958 (1)
Pilosa (A)	1	
Bradypodidae (A)	1	
<i>Bradypus variegatus</i> (A)	1	Dantas Torres <i>et al.</i> 2010 (1)
Myrmecophagidae (A)	1	
<i>Tamandua tetradactyla</i> (A)	1	Neumann 1911 (1) ³
Primates (A)	1	
Hominidae (A)	1	
Man (A)	1	Serra Freire <i>et al.</i> 1995 (1)
Rodentia (x)	1	
Caviidae (x)	1	
<i>Hydrochoerus hydrochoeris</i> (x)	1	Wells <i>et al.</i> 1981 (1)
Squamata	90	
Boidae	31	
<i>Boa</i> sp. (A)	2	Keirans 1985 (1), Labruna <i>et al.</i> 2005c (1)
<i>Boa constrictor</i> (ANL)	18	Lucas 1873 (1) ^{2,6} , Rohr 1909 (1) ³ , Aragão 1912 (1) ¹ , 1918 (1) ¹ , Boero 1954 (1), Knight 1992 (1), Keirans & Oliver 1993 (1), Lampo <i>et al.</i> 1997 (1), Evans <i>et al.</i> 2000 (1), Labruna <i>et al.</i> 2002 (1), 2005c (1), 2007 (1), Onofrio <i>et al.</i> 2002 (1), Ahid <i>et al.</i> 2003 (1), Cunha <i>et al.</i> 2003 (1) ³ , Dantas Torres <i>et al.</i> 2008 (2), Danta Torres <i>et al.</i> 2010 (1)
<i>Corallus caninus</i> (x)	1	Teixeira <i>et al.</i> 2003 (1) ³
<i>Corallus hortulanus</i> (ANL)	1	Cunha <i>et al.</i> 2003 (1) ³
<i>Epicrates cenchria</i> (ANL)	3	Onofrio <i>et al.</i> 2002 (1), Cunha <i>et al.</i> 2003 (1) ³ , Teixeira <i>et al.</i> 2003 (1) ³
<i>Eunectes</i> sp. (x)	1	Onofrio <i>et al.</i> 2002 (1)
<i>Eunectes murinus</i> (ANL)	2	Aragão 1912 (1) ^{1,5} , Onofrio <i>et al.</i> 2002 (1)
<i>Python</i> sp. (x)	1	Aragão 1936 (1) ²
<i>Python molurus</i> (A)	1	Danta Torres <i>et al.</i> 2010 (1) ²
<i>Python reticulatus</i> (A)	1	Oudemans 1927 (1) ⁷
Colubridae (AN)	24	
<i>Chironius fuscus</i> (x)	1	Pontes <i>et al.</i> 2009 (1)
<i>Chironius laevicollis</i> (x)	1	Pontes <i>et al.</i> 2009 (1)
<i>Chironius quadricarinatus</i> (x)	1	Onofrio <i>et al.</i> 2002 (1)
<i>Coluber constrictor</i> (A)	1	Hanson <i>et al.</i> 2007 (1)
<i>Erythrolampus aesculapii</i> (x)	1	Onofrio <i>et al.</i> 2002 (1)
<i>Hydrodynates bicinctus</i> (x)	1	Onofrio <i>et al.</i> 2002 (1)
<i>Hyperolius marmoratus</i> (AN)	1	Dios & Knopoff 1934 (1) ⁵
<i>Lystrophis</i> sp. (A)	1	Dios & Knopoff 1934 (1) ²
<i>Mastigodryas bifossulatus</i> (x)	2	Aragão 1936 (1), Onofrio <i>et al.</i> 2002 (1)
<i>Natrix natrix</i> (x)	1	Brumpt 1924 (1) ⁵
<i>Pseudoeryx plicatilis</i> (x)	1	Onofrio <i>et al.</i> 2002 (1)

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TABLE 2. (continued)

Hosts	N° of records	References
<i>Spilotes</i> sp. (AN)	2	Hoffmann 1962 (2)
<i>Spilotes pullatus</i> (A)	3	Onofrio <i>et al.</i> 2002 (1), Paredes León <i>et al.</i> 2008 (1), Pontes <i>et al.</i> 2009 (1)
<i>Waglerophis merremi</i> (A)	5	Barbará & Dios 1918 (1) ¹ , Brumt 1924 (1) ¹ , Dios & Knoppoff 1930 (1) ¹ , Oba & Schumaker 1983-1984 (1), Onofrio <i>et al.</i> 2002 (1)
<i>Xenodon</i> sp. (x)	1	Dios & Knoppoff 1934 (1) ²
<i>Xenodon newiedii</i> (x)	1	Pontes <i>et al.</i> 2009 (1)
Elapidae (ANL)	5	
<i>Micrurus</i> sp. (ANL)	2	Aragão 1912 (1) ^{1,5} , Onofrio <i>et al.</i> 2002 (1)
<i>Micrurus frontalis</i> (x)	1	Dios & Knoppoff 1930 (1) ¹
<i>Micrurus ibiboboca</i> (A)	1	Dantas Torres <i>et al.</i> 2010 (1)
<i>Micrurus surinamensis</i> (x)	1	Need <i>et al.</i> 1991 (1)
Iguanidae (AN)	7	
<i>Ctenosaura acanthura</i> (x)	1	Paredes León <i>et al.</i> 2008 (1)
<i>Ctenosaura similis</i> (x)	1	Paredes León <i>et al.</i> 2008 (1)
<i>Cyclura nubila</i> (x)	1	Burridge 2010 (1)
<i>Iguana</i> sp. (x)	1	Dios & Knoppoff 1930 (1)
<i>Iguana iguana</i> (AN)	3	Peralta <i>et al.</i> 1995 (1) ² , Dantas Torres <i>et al.</i> 2008 (1), 2010 (1)
Lacertidae (x)	2	
<i>Lacerta viridis</i> (x)	1	Brumt 1924 (1) ⁵
<i>Timon lepidus</i> (x)	1	Brumt 1924 (1) ⁵
Phrynosomatidae (AN)	1	
<i>Phrynosoma</i> sp. (AN)	1	Hoffmann 1962 (1)
Teiidae (N)	3	
<i>Ameiva ameiva</i> (x)	1	Onofrio <i>et al.</i> 2002 (1)
<i>Tupinambis teguixin</i> (N)	2	Aragão 1912 (1) ^{1,5} , Onofrio <i>et al.</i> 2002 (1)
Tropiduridae (ANL)	2	
<i>Tropidurus</i> sp. (ANL)	2	Aragão 1912 (1) ^{1,5} , Labruna <i>et al.</i> 2005b (1)
Viperidae (ANL)	17	
<i>Bothriechis lateralis</i> (x)	1	Burridge 2010 (1)
<i>Bothrops alternata</i> (A)	2	Dios & Knoppoff 1930 (1) ² , Brum & Costa 2003 (1)
<i>Bothrops atrox</i> (AN)	2	Morel 1967 (1), Onofrio <i>et al.</i> 2002 (1)
<i>Bothrops insularis</i> (x)	1	Onofrio <i>et al.</i> 2002 (1)
<i>Bothrops jararaca</i> (x)	1	Pontes <i>et al.</i> 2009 (1)
<i>Bothrops jararacussu</i> (x)	2	Onofrio <i>et al.</i> 2002 (1), Pontes <i>et al.</i> 2009 (1)
<i>Bothrops lanceolatus</i> (A)	1	Aragão 1918 (1) ¹
<i>Bothrops leucurus</i> (A)	1	Arzua <i>et al.</i> 2005 (1)
<i>Bothrops moojeni</i> (A)	1	Labruna <i>et al.</i> 2002 (1)
<i>Crotalus durissus</i> (A)	5	Dios & Knoppoff 1930 (1) ² , Onofrio <i>et al.</i> 2002 (2), Dantas Torres <i>et al.</i> 2005 (1), Szabó <i>et al.</i> 2007 (1)
<i>Lachesis muta</i> (ANL)	1	Burridge 2010 (1)
Testudines (A)	22	
Emydidae (A)	3	
<i>Hieremys annandalii</i> (A)	1	Burridge 2010 (1)

Continued next page

TABLE 2. (continued)

Hosts	N° of records	References
<i>Rhinoclemmys areolata</i> (A)	1	Ernst & Ernst 1977 (1)
<i>Rhinoclemmys punctularia</i> (x)	1	Amorim <i>et al.</i> 1999 (1) ²
Kinosternidae (x)	2	
<i>Kinosternon scorpiodes</i> (x)	2	Amorim <i>et al.</i> 1999 (1) ² , Candanedo Guerra <i>et al.</i> 2000 (1)
Testudinidae (A)	17	
<i>Chelonoidis</i> sp. (A)	2	Aragão 1918 (1) ² , Santos <i>et al.</i> 2005 (1)
<i>Chelonoidis carbonaria</i> (A)	7	Szabó <i>et al.</i> 2007 (1), Dantas Torres <i>et al.</i> 2010 (6)
<i>Chelonoidis chilensis</i> (A)	3	Boero 1954 (1), Ivancovich 1973 (1), Ivancovich & Luciani 1992 (1)
<i>Chelonoidis denticulata</i> (A)	3	Aragão 1936 (1), Onofrio <i>et al.</i> 2002 (1), Dantas Torres <i>et al.</i> 2010 (1) ²
<i>Gopherus polyphemus</i> (x)	1	Foster <i>et al.</i> 2000 (1)
<i>Testudo graeca</i> (x)	1	Brumpt 1924 (1) ⁵

¹These authors use the name *Amblyomma agamum* Aragão, 1912 instead of *A. rotundatum*

²Records on hosts maintained under different forms of captivity

³These authors use the name *A. goeldii* instead of *A. rotundatum*

⁴This author uses the name *A. dissimile* instead of *A. rotundatum*

⁵Hosts for laboratory breeding

⁶This author uses the name *Ixodes flavomaculatus* instead of *A. rotundatum*

⁷This author uses the name *Aponomma kerberti* instead of *A. rotundatum*

Amblyomma dissimile has been detected in four species of Bufonidae belonging to *Bufo* while *A. rotundatum* has been recorded on 12 Anura hosts belonging to the families Bufonidae, Discoglossidae, Leptodactylidae, Pelobatidae, Pipidae and Ranidae. However, natural infestation of *A. rotundatum* was restricted to Bufonidae (seven species of *Bufo*), Leptodactylidae (one record on *Odontophrynus americanus* (Duméril & Bibron) and Pipidae for a finding on *Pipa pipa* (Linnaeus). All others records are from laboratory hosts in experiments carried out in France by Brumpt (1924) or in U.S.A. by Oliver *et al.* (1993).

Crocodylia (two species identified) has been recorded four times infested by *A. dissimile* (one record in captive conditions), whereas the only record for *A. rotundatum* on this type of host was on a captive *Paleosuchus trigonatus* (Schneider).

There are proportionally few records on Mammalia in comparison with Anura and Squamata for both tick species although the range of mammalian hosts is wide for *A. dissimile* containing Bovidae (three species), Tayassuidae (one), Didelphidae (two), Hominidae (one), Leporidae (one), Capromyidae (one), Caviidae (two), Cricetidae (two), Dasyproctidae (one), and Echimyidae (two species). Mammalian records for *A. rotundatum* are Suidae (one species), Procyonidae (one), Phyllostomidae (one), Dasypodidae (one), Hominidae (one), Bradypodidae (one), Myrmecophagidae (one) and Caviidae (one species). However, the records of *A. dissimile* on goats (Bovidae) and domestic rabbit (Leporidae) were artificially induced, while all the records of *A. rotundatum* on mammals appear to be the result of natural infestations on free ranging hosts.

Squamata has a wide representation as hosts for these species of ticks that were found on Boidae (ten and seven species for *A. dissimile* and *A. rotundatum*, respectively), Colubridae (20 and 12 species), Elapidae (two and three species), Iguanidae (eight and four species), Phrynosomatidae (three and two species), Teiidae (three and two species), Tropiduridae (three and one species) and Viperidae (11 species for each *A. dissimile* and *A. rotundatum*). Moreover, *A. dissimile* has been found on one species of Chamaeleonidae and two species of Corytophanidae, while *A. rotundatum* has been recorded on two species of Lacertidae. This totals 63 species of Squamata as hosts for *A. dissimile* and 45 species as hosts for *A. rotundatum*. However, the single records of *A. dissimile* on *Python reticulatus*, *Python molurus* (Linnaeus), *Python regius* (Shaw), *Chamaeleo dilepis*, *Oxybelis fulgidus*, *Ophiophagus hannah*, *Bothrops alternatus* and *Tropidolaemus wagleri* are from captive or laboratory hosts. The same considerations apply to the single infestation records of *A.*

rotundatum on *Corallus caninus* (Linnaeus), *Python molurus*, *Python reticulatus*, *Hierophis viridiflavus*, *Lystrophis* sp., *Natrix natrix*, *Micrurus frontalis* (Duméril, Bibron & Duméril), *Lacerta viridis* (Laurenti) and *Timon lepidus*.

A total of 15 species of Testudines of the family Emydidae (eight species), Kinosternidae (three species), Pelomedusidae (one species) and Testudinidae (three species) were found infested with *A. dissimile*, while *A. rotundatum* has been found on Emydidae (three species), Kinosternidae (one species) and Testudinidae (five species) for a total of nine species of Testudines. However, the single records of *A. dissimile* on *Mauremys leprosa*, *Rhinoclemmys punctularia* and *Geochelone pardalis* are from captive or laboratory hosts. The same considerations apply to the single infestation records of *A. rotundatum* on *Rhinoclemmys punctularia* and *Testudo graeca* Linnaeus.

Natural free-ranging hosts for *A. dissimile* encompasses 88 species (four Anura, one Aves, two Crocodylia, 14 Mammalia, 55 Squamata and 12 Testudines), while 58 species were found as natural hosts of *A. rotundatum* (nine Anura, eight Mammalia, 34 Squamata and seven Testudines).

While the host range of *A. dissimile* and *A. rotundatum* is wide and complex, the situation radically changes when considering the hosts found to be infested with larvae, nymphs and adults of these species in free-range conditions. Anura: Bufonidae (*Bufo marinus* and *Bufo peltocephalus*), Mammalia: Echimyidae (*Proechymis semispinosus* (Tomes)), Squamata: Boidae (*Boa constrictor*, *Epicrates striatus* (Fischer)) – Colubridae (*Oxybelis aeneus*) – Iguanidae (*Cyclura cychlura*, *Iguana iguana*) – Teiidae (*Tupinambis teguixin*) and Testudines: Emydidae (*Trachemys scripta* (Thunberg)) reach this condition for *A. dissimile*. All other hosts in Table 1 with recognition as hosts for larva, nymph and adult *A. dissimile* ticks are from laboratory rearing. However, the commonest hosts harbouring all parasitic stages of *A. dissimile* are just three, *Bufo marinus*, *Boa constrictor* and *Iguana iguana*.

Hosts for all parasitic stages of *A. rotundatum* are even more restricted than for *A. dissimile*. Its range is formed by Anura: Bufonidae (*Bufo marinus* and *Bufo schneideri*) and Squamata: Boidae (*Boa constrictor*), but records on *Bufo marinus* are considerably higher than the records on the other two hosts. All other host species for larval, nymphal and adult *A. rotundatum* ticks in Table 2 are from laboratory rearing experiments or hosts maintained under captive conditions.

The treatment of relationships between *Hydrochoerus hydrochaeris* and *A. dissimile* in the literature is peculiar. Neumann (1911) consider *bona fide* that relationship, but he judges *Amblyomma cooperi* Nuttall & Warburton, 1908 (= *Amblyomma dubitatum* Neumann, 1899) a synonym of *A. dissimile*. Nevertheless, *A. dubitatum* is a valid species feeding primarily on capybara as presented in Nava *et al.* (2010). Obviously, we consider the statement of Neumann (1911) naming *A. dubitatum* a synonym of *A. dissimile* an error. However, Neumann's view of *A. dissimile* as a parasite of capybaras has been repeated by many workers who present no data to support that host-parasite relationship. In fact, almost all workers consider *A. dissimile* and *A. dubitatum* as distinct species, but no amendment for capybara as a host of *A. dissimile* is presented. *Amblyomma infumatum* Koch, 1844 is considered a good species by Neumann (1899, 1911), but degraded to a synonym of *A. dissimile* by Robinson (1926) who inspected the type of *A. infumatum*. Bertkrau (1880) allegedly found males and females of *A. infumatum* (named as *A. infutum*) on capybaras in Brazil, but we find this finding doubtful considering that the male of *A. infumatum* is undescribed. There is just one record of *A. dissimile* (a male and two nymphs) found on *Hydrochoerus hydrochaeris* in Joan (1930) that we consider of value to be included in Table 1.

Botelho *et al.* (2002) found nymphs of *A. dissimile* on Rodentia and Didelphimorphia. This should not be unexpected considering that other authors also found this tick on several species of mammals. However, it is surprising that the authors stated that the only tick found after two months of work and capture of 83 mammals recognized as hosts for several species of ticks (many references to be listed in the scope of this work) were exclusively *A. dissimile*. We include all those records of Botelho *et al.* (2002) in Table 1, although confirmation of their diagnosis by independent workers should be wise to assure that identification of *A. dissimile* is correct.

Burridge (2010) considers *Dicrodon heterolepis* (Tschudi) (Squamata: Teiidae) a host for *A. dissimile* backing that statement on the work of Clark and Doten (1995). However, it is not certain that Clark and Doten

(1995) consider the nymph found on *Dicrodon heterolepis* is *A. dissimile*. This record is not included in Table 1.

Floch and Fauran (1958) name *Coryphodon* sp. as host of *A. dissimile* (page 32), but this name is ignored in the lists of hosts (starting in page 79). We do not include this host in Table 1.

Morel (1967) interprets several findings of *A. dissimile* and *A. rotundatum* in disagreement with many authors who determined these ticks in the Great and Lesser Antilles, but this view was not shared by Kohls (1969). We maintain original names of species of tick records criticized by Morel (1967) with the exception of *A. dissimile* in Audebad and Cormes (1962) that was changed to *A. rotundatum* because Morel (1967) revised the specimens for his decision.

Doss *et al.* (1974) include “*Cervus paludosus?*, *Canis familiaris*, *Cerdocyon* sp., *Pseudalopex* sp., *Cavia pamparum*” (sic) as hosts for *A. dissimile* using Boero (1944) as its source. This is an incorrect statement since the only host provided by Boero (1944) for this tick belongs to Boidae. These errors were repeated totally and partially in Serra Freire and Peralta (1993) and Burrige (2010), respectively.

Dios and Knoppoff (1934) cited laboratory experiments by Brumpt (no details of publication provided) to state that nymphs of *A. rotundatum* feed on *Bombina pachypus*, *Rana temporaria* Linnaeus, *Lissotriton helveticus*, *Alytes obstetricans* (Laurenti) and *Epidalea calamita*, but Brumpt (1924) explained that the nymphs of *A. rotundatum* refused to feed on those hosts.

There is a good record of *A. rotundatum* on Myrmecophagidae by Neumann (1899), who considered that *A. goeldii* is a synonym (*pro-parte*) of *A. dissimile* and the species was described from specimens obtained on Myrmecophagidae and Anura. However, the diagnosis of this tick on Myrmecophagidae by Barros and Baggio (1992) and apparently repeated in Onofrio *et al.* (2002) was revised by Arzua *et al.* (2005) to find it a misidentification. Burrige and Simmons (2003) maintain the record of Barrios and Baggio (1992) as a good one.

Evans *et al.* (2000) consider that a record of *A. rotundatum* in southern Brazil needs to be confirmed. This confirmation was provided by Brum and Costa (2003) and we include the finding registered in Evans *et al.* (2000) in Table 2. These authors do not mention the presence of *A. dissimile* in southern Brazil, but Pontes *et al.* (2009) states that *A. dissimile* prefers higher temperatures in comparison with *A. rotundatum*, a conjecture erroneously based on data allegedly presented by Evans *et al.* (2000), but these authors do not present any. This brings doubt about the information contained in Pontes *et al.* (2009) on infestation of *A. rotundatum* on different hosts. These hosts are included in Table 2, but confirmation of tick species by independent workers would be wise.

Discussion

The host ranges of *A. dissimile* and *A. rotundatum* are wider than expected for tick species with a unique relationship with Anura. However, most records for all parasitic stages on free-ranging hosts for *A. dissimile* are related to three main hosts: *Bufo marinus*, *Boa constrictor* and *Iguana iguana*, while most common hosts for larvae, nymphs and females of *A. rotundatum* are *Bufo marinus* and to a lesser extent *Boa constrictor* and *Bufo schneideri*. Therefore, the peculiar relationship of *A. dissimile* with *Iguana iguana* constitutes the major difference in host usage for these species. Nevertheless, this descriptive analysis is based on broad host usage. Ecological studies to determine tick abundance on usual and less common hosts for these species of ticks may find differences for host usage undetermined in the current study.

The above statement does not diminish the potential importance of the many species of tetrapods found infested with *A. dissimile* and *A. rotundatum*. These hosts, generally infested with adult ticks, may constitute an alternative to maintain its establishment in a particular area if usual hosts become scarce; it may also constitute a way to colonize other habitats or even a route to speciation that could not be elucidated in the scope of this work.

Lampo *et al.* (1998) found that *A. rotundatum* has a limited distribution in comparison with *A. dissimile* and their numbers on shared hosts were lower than the numbers of *A. dissimile* with the exception of one

locality. These conditions were related to the parthenogenetic way of reproduction in *A. rotundatum*. While *A. rotundatum* may have ecological restrictions in relation to *A. dissimile* it was not an impairment for that species to colonize vast territories from southern Nearctic to northern and central Neotropics (northern Argentina to southern U.S.A.).

Lampo *et al.* (1998) also stress that the natural host range of *A. dissimile* is wider than the host range of *A. rotundatum*. The information obtained in this revision appears to be in concurrence with Lampo *et al.* (1998) because the number of species of hosts was generally greater for *A. dissimile* than for *A. rotundatum* with Anura as the major exception. Nevertheless, the natural hosts for *A. rotundatum* include 58 species representing Anura, Mammalia, Squamata and Testudines. This may be a disadvantage again in relation to *A. dissimile*, but compares well with most species of ticks with bi-sexual reproduction. This plasticity may partly explain the wide distribution of *A. rotundatum*.

Burridge and Simmons (2003) studied the host-range of *A. dissimile* and *A. rotundatum*, but presented a distorted picture for some mammal hosts for these ticks. There is just one record for *A. dissimile* feeding on *Hydrochoerus hydrochaeris* in Joan (1930), but these authors present five references to back their statement, although none of them contains *bona fide* records of capybara on *A. dissimile*. Robinson (1926) states that in the Cambridge collection there is a female of *A. dissimile* found on a sheep. This is the only documentation for this host-parasite relationship, but Burridge and Simmons (2003) have four references for sheep as host for this species of tick including Keirans (1985) who explicitly acknowledged that the specimen dealt with was the same presented on page 167 of Robinson (1926). Burridge (2010) did not amend the situation; this author considers *Hydrochoerus hydrochaeris* the fifth host of importance for *A. dissimile* because 10 reports (details not given) were found on capybaras parasitized with *A. dissimile*.

There is just one record of *A. rotundatum* feeding on Dasypodidae in Floch and Fauran (1958); all other authors that include this host-parasite relationship do not present new findings of this tick on this type of hosts. However, Burridge (2010) considers *Dasypus novemcinctus* Linnaeus, as the fourth important host for *A. rotundatum* with five reports (again details not given).

The unique relationship of Amphibia with *A. dissimile* and *A. rotundatum* has been remarked on the introduction of this article. Indeed, Bufonidae is a relevant host family for both tick species, and of special relevance for *A. rotundatum* in comparison with *A. dissimile*. Oliver (1989) found that the relationship of *Bufo marinus* with *A. rotundatum* is of evolutionary relevance. However, the ample host range of both species of ticks may also indicate a niche colonization that favours infestation of different types of vertebrates included in the niche, and probably occasional visitors. If Anura is a relevant host because of ancestral host-tick relationships or adaptation of *A. dissimile* and *A. rotundatum* to habitats previously colonized by amphibian hosts, is a matter of conjecture. In any condition, further research on tick-host relationships is of biological importance to understand tick ecology and, perhaps, may contribute to explain part of tick evolutionary history.

Finally, the distribution of both *A. dissimile* and *A. rotundatum* is vast. These species have been diagnosed under different names from specimens collected in different localities and hosts that are currently considered synonyms of *A. dissimile* and *A. rotundatum*. Indeed, the names considered synonyms of *A. dissimile* are especially abundant. There are probabilities that more than one species are represented under the names *A. dissimile* or *A. rotundatum*. Therefore, bionomics, morphological and molecular studies of tick populations covering the distribution ranges of these species will aid to confirm or not if *A. dissimile* and *A. rotundatum* as we currently know them are just two species widely distributed or represent one or two species groups.

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