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ECTOPARASITES IXODIDA LEACH, 1817 ON WILD MAMMALS IN THE STATE OF PARANÁ, BRAZIL

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A taxonomical and ecological study was made on 264 samples of 12 species of ectoparasite ixodides collected on wild mammals from several natural regions of Paraná state, Brazil. These species of ticks as their hosts are listed by their identified evolutive forms and capture locations. A review of the early studies on the Ixodida from South Brazil is made considering the frequency of the parasite species on each host concerning the geographic distribution of such species. This paper is a contribution to the knowledge of the Ixodidae ectoparasites species of wild mammals in Brazil.

Key words: ixodides – Ixodida – tick – ectoparasites

The Ixodida Leach, 1817 are frequently givers of pathogenic agents among the animals (Flechtman, 1977) and their studies on wild mammals in Brazil are limited to a few quotation of occurrence in some states of the northeastern and south regions (Aragão, 1936).

Pinto (1930) has listed a geographic distribution of these ectoparasites throughout Central and South America. In Brazil, the Paraná state was timidly outstanding with the presence of: *Boophilus microplus* Canestrini, 1887 and *Amblyomma ovale* Koch, 1844 without mentioning their hosts and localities.

When Aragão (1936) referred to Paraná, he cited occurrences of: *Argas miniatus* Koch, 1844; *B. microplus* and *Amblyomma cajennense* Fabricius, 1787 in Paranaguá district; *Rhipicephalus sanguineos* Latreille, 1806; *B. microplus, A. ovale* and *A. cooperi* Nuttall & Warburton, 1908 in Curitiba; *B. microplus* and *A. cajennense* nearby Ipiranga and Salto Iguaçu and *B. microplus* in the region of Conchas (Ponta Grossa district), Caxambu (Castro district), Pacau (?), Bonjardim (?) and also Raul Soares and Jacarezinho districts. There is no register of hosts.

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Guimarães (1945) has described a little collection of ectoparasites of birds and mammals in Paraná coast. Among them, he has cited *Amblyomma striatum* (= *aureolatum*) Koch, 1844 collected from *Cerdocyon thous* (Carnivora – Canidae) and *Ixodes loricatus* Neumann, 1899 from *Philander opossum* (Marsupialia – Didelphidae).

The Brazilian Ixodida fauna has not been reviewed since the publication of Aragão & Fonseca (1961). There are only isolated references such as from Freitas et al. (1971) concerning the presence of the *Ornithodoros talaje* Guérin Méneville, 1849 in Ceará, Piauí, Paraíba, Pernambuco, Goiás, Minas Gerais, Mato Grosso and Rio de Janeiro states and Oba & Baggio (1977) concerning the occurrence of *O. talaje* in Santo Inácio, Bahia.

This paper aims an updating of the knowledge about the Ixodida fauna in wild mammals from some regions in the state of Paraná, a new list of species and their hosts and the geographic distribution of such ectoparasites due to their great importance in transmitting diseases among animals and men.

MATERIALS AND METHODS

The majority of ixodides here studied were gathered from the fur and skin of the mammals during the taxidermy made for collec-

TABLE I

Ectoparasite Ixodidae of wild mammals in Paraná

Ixodidae	♂	♀	Colection number	Mammal	Colection number
Amblyomma aureolatum (Pallas, 1772)	5	1	30	*Cerdocyon thous* (Carnivora-Canidae)	1293
	1	–	43	*Galictis cuja* (Carnivora-Mustelidae)	1102
A. geayi Neumann, 1899	1	–	16	*Sphiggurus spinosus* (Rodentia-Erethizontidae)	fragment
	2	–	39	*S. spinosus*	1295
	1	1	48	*S. spinosus*	1298
A. incisum Neumann, 1906	2	1	50	*Tapirus terrestris* (Perissodactyla-Tapiridae)	captivity
	1	nymph			
A. longirostre Koch, 1844	1	1	07	*Sphiggurus villosus* (Rodentia-Erethizontidae)	1099
	1	nymph	14	*Felis tigrina* (Carnivora-Felidae)	1098
	5	3	17	*S. spinosus*	free
	1	1	31	*S. spinosus*	1294
	1	–	49	*S. spinosus*	1296
	2	2	52	*S. villosus*	1297
A. mantiquirense Aragão, 1908	–	19	55	*Tapirus terrestris*	(*)
A. ovale Koch, 1844	1	1	05	*Galictis cuja* (the same host from 43 colection)	1102
	13	4	13	*Nasua nasua* (Carnivora-Procyonidae)	free
	68	34	20	*Lutra longicaudis* (Carnivora-Mustelidae)	1292
	–	1	46	*Felis yagouaroundi* (Carnivora-Felidae)	1250
	–	1	53	*Cebus apella* (Primata-Cebidae)	free
A. rotundatum Koch, 1844	–	1	51	*Tamandua tetradactyla* (Edentata-Myrmecophagidae)	1299
A. tigrinum Koch, 1844	7	–	76	*Dusicyon gymnocercus* (Carnivora-Canidae)	(**)
	1	nymph			
	1	–	77	*D. gymnocercus*	(**)
Amblyomma sp. Koch, 1844	1	nymph	65	*Didelphis albiventris* (Marsupialia-Didelphidae)	(**)
	1	nymph	67	*D. albiventris* (the same host from 65 colection)	(**)
	1	nymph	74	*Nasua nasua*	(**)
	3	nymph	75	*N. nasua*	(**)
Anocentor nitens (Neumann, 1897)	–	1	60	Dog? (Carnivora-Canidae)	(.)
Haemaphysalis kohlsi Aragão et Fonseca, 1951	–	1	59	*Mazama gouazoubira* (Artiodactyla-Cervidae)	(*) 152
	–	3	54	*Tapirus terrestris* (the same host from 50 colection)	captivity

cont.

Ixodidae	♂	♀	Colection number	Mammal	Colection number
Ixodes loricatus	–	1	57	*Philander opossum*	(. .)
Neumann, 1899	1	nymph		(Marsupialia-Didelphidae)	
	1	1	58	*Didelphis* sp	(*)
	2	2	61	*D. marsupialis*	(**)
	1	nymph			652
	–	11	62	*D. marsupialis*	(**)
	5	nymph			
	–	1	63	*D. marsupialis*	(**)
	2	nymph	64	*D. albiventris*	(**)
	2	–	66	*D. albiventris*	(**)
				the same-recapture	
			68	the same-recapture	(**)
	3	nymph			
	9	7	69	the same-recapture	(**)
	1	nymph			
	–	1	70	the same-recapture	(**)
	1	–	71	the same-recapture	(**)
	1	1	72	the same-recapture	(**)
	–	1	73	*Nasua nasua*	(**)
	–	1	78	*Lutreolina crassicaudata*	685
				(Marsupialia-Didelphidae)	
	2	nymph	79	*L. crassicaudata*	(**)
	–	1	80	*L. crassicaudata*	(**)
	2	nymph	81	*L. crassicaudata*	(**)

(*) collections made by André Mayer in some regions of the state of Paraná.
(.) Curitiba, 1951, Huster leg. Collected on dog (?).
(**) collections made at Parque Estadual de Vila Velha.
(. .) Caiobá, Matinhos district, 1945, Rudolph Lange leg.
Collected on *Philander opossum*.

tions of the "Museu de História Natural Capão da Imbuia" (MHNCI) Curitiba, PR.

Some others were collected in field phases while the hosts were being marked, sexed, weighed, measured to afterwards being freed back to their environment.

The taxidermized mammals, in the majority, were found dead, overrunned on the roadside. Some of them could not even be used for their advanced decomposition and bones fragmentation.

We also add some ectoparasites collected from wild mammals, by André Mayer, a German naturalist who worked at the MHNCI, mainly during the 30's to 50's, and a few samples which were in the same collection although were gathered by different people.

The ticks collected by us were taken from the hosts with the help of tweezers, then fixed in 70% alcohol and after a year in Oudemans liquid.

For taxonomical identification of the ectoparasites the keys of Aragão & Fonseca (1961) and Jones et al. (1972) were used.

The taxonomical identification of the host was made by Mastozoologists of MHNCI following the nomenclature used in Honacki et al. (1982).

All the Ixodida as well as those mammals which could be taxidermized, can be found registered in the collections of Parasitology and Mastozoology respectively of the MHNCI.

RESULTS

In 35 wild mammals, 264 samples of Ixodidae were gathered up, among them 129 males, 106 females and 29 nymphs.

The species related to their hosts are shown on Table I.

The locality and the geographic co-ordinates where the mammals were captured or gathered from roadsides are indicated on Table II.

TABLE II

Capture location of Ixodidae parasitic mammals

Mammals/ Ectoparasite Colection number	Colection number/ mammals	Localities/ Geographic Co-ordinates	District
Philander opossum MHNCI 57	(. .)	Caiobá (25° 40' S-48° 35' W)	Matinhos
Didelphis sp MHNCI 58	(*)	Rio Ivaí	
D. marsupialis MHNCI 61	(**) 652	Parque Estadual de Vila Velha (25° 15' S-50° W)	Ponta Grossa
D. marsupialis MHNCI 62	free (**)	the same above	the same above
D. albiventris MHNCI 63	free (**)	the same above	the same
D. albiventris MHNCI 64 e 65 The same-recapture MHNCI 66, 67, 68, 69, 70, 71 e 72	free (**)	the same	the same
Lutreolina crassicaudata MHNCI 78	(**) 685	the same	the same
L. crassicaudata MHNCI 79	free (**)	the same	the same
L. crassicaudata MHNCI 80	free (**)	the same	the same
L. crassicaudata MHNCI 81	free (**)	the same	the same
Cebus apella MHNCI 53	free	Refúgio Biológico Bela Vista-Itaipu (25° 30' S-54° 30' W)	Foz do Iguaçu
Tamandua tetradactyla MHNCI 51	1299	Estrada Alexandra/Matinhos – PR 508 (25° 40' S -48° 39' W)	Paranaguá
Sphiggurus villosus MHNCI 07	1099	Represa Guaricana (25° 42' S-49° 05' W)	São José dos Pinhais
S. spinosus MHNCI 16	fragment	Beira de Estrada (25° 55' S-52° 10' W)	Mangueirinha
S. spinosus MHNCI 17	free	Fazenda Barra Mansa (24° 08' S-49° 48' W)	Arapoti
S. spinosus MHNCI 31	1294	Chácara Irati Timbu Velho (25° 22' S-49° 12' W)	Campina Grande do Sul
S. spinosus MHNCI 39	1295	Tunas (25° S-49° 08' W)	Bocaiúva do Sul
S. spinosus MHNCI 48	1298	Cidade Industrial (25° 37' S-49° 25' W)	Araucária
S. spinosus MHNCI 49	1296	Bairro Mercês (25° 20' S-49° 20' W	Curitiba
S. villosus MHNCI 52	1297	Represa Capivari (25° 20' S-48° 53' W)	Campina Grande do Sul
Cerdocyon thous MHNCI 30	1293	Roseta – Rodovia PR 151 (24° 30' S-49° 50' W)	Piraí do Sul
Dog ? MHNCI 60	(.)	Curitiba	Curitiba
Dusicyon gymnocercus MHNCI 76	free (**)	Parque Estadual de Vila Velha	Ponta Grossa
D. gymnocercus MHNCI 77	free (**)	the same above	the same above
Nasua nasua MHNCI 13	free	Refúgio Biológico Bela Vista-Itaipu	Foz do Iguaçu
N. nasua MHNCI 73	free (**)	Parque Estadual Vila Velha	Ponta Grossa
N. nasua MHNCI 74	free (**)	the same above	the same above

cont.

Mammals/ Ectoparasite Colection number	Colection number/ mammals	Localities/ Geographic Co-ordinates	District
N. nasua	free	the same	the same
MHNCI 75	(**)		
Galictis cuja	1102	Estrada das Praias PR 407	Paranaguá
MHNCI 05 e 43		(25° 40' S-48° 35' W)	
Lutra longicaudis	1292	Rio Boguaçu	Guaratuba
MHNCI 20		(20° 55' S-48° 40' W)	
Felis tigrina	1098	América de Cima	Morretes
MHNCI 14		(25° 29' S-48° 52' W)	
Felis yagouaroundi	1250	Região Metropolitana	Almirante Tamandaré
MHNCI 46		(25° 20' S-49° 20' W)	
Tapirus terrestris	captivity	Refúgio Biológico Bela Vista-Itaipu	Foz do Iguaçu
MHNCI 50 e 54			
Tapirus terrestris	(*)	Vale do Rio Paraná	
MHNCI 55	514		
Mazama gouazoubira	(*)	Vale do Rio Ivaí	
MHNCI 59	152		

(*) Collection made by André Mayer in Vale do Rio Paraná, Vale do Rio Ivaí and Rio Ivaí from 1940 to 1961.
(.) Collection made by Huster in Curitiba in 1951.
(. .) Collection made by Rudolph Lange in Caiobá, Matinhos district in 1945.
(**) Collection made by Clovis Borges at Parque Estadual de Vila Velha from 1983 to 1984.

DISCUSSION

All the registers of ectoparasites, host, localities, herein presented shall be considered news ones to Paraná, except *A. ovale* that had already been cited by Aragão (1936) although it had not any register for host, *Ixodes loricatus* on *Philander opossum* and *A. striatum* (= *aureolatum*) on *Cerdocyon thous* described by Guimarães (1945).

Aragão & Fonseca (1961) have listed a collection of ticks from the north of Pará where they have quoted *A. ovale* on tapir, peccaries, cougar, jaguar and pet dogs. Table I data show other hosts improving the distribution.

André Mayer had been a naturalist who has vastly contributed to the formation of vertebrate animal collections of MHNCI. The zoologic collections of Mastozoology and Ornithology were the most benefited, however other areas such as Herpetology, Paleontology, Geology and Botany had his expressive contributions (Straube & Bornschein, 1989; Bérnils & Moura Leite, 1990; Lorini & Persson, 1990). Despite being casual collections, some ectoparasites were collected on wild mammals during Mayer's expeditions through the state and are listed on Table I marked with asterisk. Mayer, at that time, had not worried about numbering the vials containing the ectoparasites with the same number as their hosts although the latter had been registered in the Mastozoological Collection. Even though, we could identify the Ixodidae and relate them to their hosts by the information given on the vial labels. However, it was not possible for us to furnish the colection number of *Didelphis* sp from Rio Ivaí because we don't know exactly which was the original sample of the collection. Besides, we were not able to quote either the localities and geographic co-ordinates for none of the hosts because Mayer had registered their procedences just as: Vale do Rio Paraná, Vale do Rio Ivaí and Rio Ivaí among others. These records are vague but Lorini & Persson (1990) have made the description of the toponyms, citing: Vale do Rio Ivaí, Sertão do Rio Ivaí, Barreiro do Vale do Rio Ivaí, Ivaí, which procedences may be comprised in the Ivaí River margin between Suruquá River and its mouth. In the same paper the authors referred to Rio Ivaí – Serra Dourados as a site between Serra dos Dourados and Rio Ivaí, in Umuarama and Jacaraíma districts. Also, related to that Vale do Rio Paraná and Sertão do Rio Paraná the collection expeditions were probably between São Pedro do Paraná and Guaíra districts.

In the ectoparasite samples, a female of *Anocentor nitens* (NHNCI 60) was found and its host had been quoted only as a dog from Curitiba which may be considered as either a *Cerdocyon* or a *Dusicyon,* or even as a pet dog. Despite of not being sure of the host and knowing the collector was not Mayer, we

judged it was important to be quoted for it a part of that time collection and this is shown on Table I with a dot. On the same Table, we have quoted two more samples of *Ixodes loricatus* (MHNCI 57) collected on *Philander opossum* which are shown with two dots, from Caiobá, Matinhos district and whose collector was Rudolph Lange, another naturalist who worked at the Museum at the same time as Mayer, sometimes going on his collection expeditions.

All the hosts which are represented by two asterisks were captured at Parque Estadual de Vila Velha. The colection number of those sacrificed animals is registered on Table I. The animals which are represented without their colection number were freed after they were marked. The ectoparasites were collected in all phases even in the cases of recapturing.

Many ticks are commonly denominated in relation to their hosts, however, more than one species may happen on the same host (Aragão, 1936). We have found *A. ovale* (MHNCI 05 being 1 ♂ and 1 ♀) and *A. aureolatum* (MHNCI 43 being 1 ♂) on the *G. cuja* (MHNCI 1102) and *A. incisum* (MHNCI 50 being 2 ♂, 1 ♀ and 1 nymph) and *Haemaphysalis kohlsi* (MHNCI 54 with 3 ♀) on *Tapirus terrestris* kept in captivity at "Refúgio Biológico Bela Vista – Itaipú" and *H. kohlsi* (MHNCI 59 with 1 ♀) on *Mazama gouazoubira* (MHNCI 152) that was collected by André Mayer in Vale do Rio Ivaí in 1945. It is a new register either for hosts or localities although this tick has already been found on wild birds, cattle and deer in the states of Pernambuco, Minas Gerais, Mato Grosso and São Paulo (Aragão & Fonseca, 1951).

The synonymous to this species are:
(= *H. justakochi* Cooley, 1946;
= *H. kochi* Aragão, 1908;
= *H. concina kochi* variety Neumann, 1905).

After the redescription by Aragão & Fonseca (1951) this is the first notification of such species.

On table II, we have listed the mammals in their evolutive order in agree with Nowak & Paradiso (1983), trying to quote exactly the collect localities, because we believe that those informations are of great importance to the geographic distribution of the Ixodidae once in literature, few papers had such worry.

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