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Polygenis (*Polygenis*) *platensis* (Jordan & Rothschild) (Siphonaptera: Rhopalopsyllidae, Rhopalopsyllinae), a New Record in Brazil

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Polygenis (*Polygenis*) *platensis* (Jordan & Rothschild) (Siphonaptera: Rhopalopsyllidae, Rhopalopsyllinae), um Novo Registro no Brasil

RESUMO - *Polygenis* (*Polygenis*) *platensis s. l.* (Jordan & Rothschild) foi assinalada pela primeira vez no Brasil nos municípios de Capão da Canoa, Tramandaí e Osório, RS. Novos registros de hospedeiros são dados para a espécie, com a inclusão de *Ctenomys flamarioni* (Travi) e *Ctenomys minutus* (De Blainville). Variações morfológicas foram também observadas entre os espécimes coletados sobre mesma espécie de hospedeiro e em mesma localidade, evidenciando alguma hibridização entre as duas subspécies e impossibilitando a determinação do *status* subespecífico. O número de espécies de pulgas conhecidas para o Brasil é aumentado para 60.

PALAVRAS-CHAVE: Pulga, ectoparasito, taxonomia, distribuição geográfica

ABSTRACT - *Polygenis* (*Polygenis*) *platensis s. l.* (Jordan & Rothschild) is recorded for the first time from Brazil in the municipalities of Capão da Canoa, Tramandaí and Osório, RS. New host records for this flea include *Ctenomys flamarioni* (Travi) and *Ctenomys minutus* (De Blainville). Morphological variations were also observed among the flea specimens collected on the same species of host at the same municipality, evidencing some hybridization between the two subspecies and disabling the determination of the subspecific status. The number of known species of Brazilian Siphonaptera is now 60.

KEY WORDS: Flea, ectoparasite, taxonomy, geographical distribution

Among the genera of Siphonaptera included into the family Rhopalopsyllidae, *Polygenis* Jordan is the largest and most widely distributed, parasitizing a broad range of rodents (Linardi & Guimarães 1993). Currently, the genus includes two subgenera: *Neopolygenis* Linardi & Guimarães, restricted to Neotropical Region and comprising eight species, and *Polygenis*, whose 35 species and subspecies are spread from southern South America through Central America and Mexico, with only three species in the southern United States. Some members of the subgenus *Polygenis* are implicated in the maintenance of sylvatic plague among rodents (Holdenried 1952, Pollitzer 1954, Karimi *et al.* 1974) and some species to act as parasite vectors for allantonematids (Linardi *et al.* 1981), hymenolepedes and trypanosomatids (Botelho & Linardi 1992).

Jordan & Rothschild (1908) described *P. platensis* from a single female collected on *Ctenomys* sp. from La Plata, Buenos Aires Province, Argentina. The male was further described from a long series collected on different hosts, mainly *Ctenomys talarum* Thomas from several localities in Buenos Aires Province, Argentina and Montevideo, Uruguay (Jordan & Rothschild 1923). Later, based on morphological differences in the number of bristles between specimens collected from localities in Buenos Aires Province and those from the foothills of the Andes in Mendoza and La Pampa Provinces, Argentina, Jordan (1939) divided the species into two subspecies, *Polygenis platensis platensis*

and *Polygenis platensis cisandinus* to include representatives from eastern and western areas of Argentina, respectively. Del Ponte (1963) recognized the two subspecies in several Argentinean localities, although pointing out morphological variations in relation to the number of setae on the basal abdominal sternum and shape of spermathecae. Subsequently, they were recognized by Smit (1987) as *Polygenis* (*Polygenis*) *platensis platensis* and *Polygenis* (*Polygenis*) *platensis cisandinus* and the subgeneric status confirmed by phenetic and cladistic methods (Linardi & Guimarães 1993). Up to now, both subspecies have been recorded from Argentina and Chile, with *P. p. platensis* also occurring in Uruguay and *P. platensis cisandinus* in Bolivia. The latter subspecies has the broadest distribution in Argentina, since it has been recorded in 10 provinces and *P. p. platensis* only in three provinces (Smit 1987, Autino & Lareschi 1998).

Concerning Brazilian fleas, although the world fauna Siphonaptera comprises 240 genera and approximately 3,000 species (Lewis 1998), only 20 genera and 59 species and subspecies have been recorded in Brazil, in spite of several biomes, centers of origin or dispersal and immense diversity of mammalian species. Approximately 29% of the Brazilian fleas are endemic, with 34 species and subspecies (58%) included in the family Rhopalopsyllidae (19 *Polygenis*) (Linardi & Guimarães 2000). Approximately 200 mammal species are known to harbour fleas in Brazil. Although the Pampa grassland biome, extending from Southern Brazil to Uruguay and Argentina (Hershkovitz 1969) includes the localities studied, only eight species of fleas have been recorded in Rio Grande do Sul State, with no occurrence for *Polygenis* species. Since *P. platensis* is a vector of human disease and has never been recorded in Brazil, the current study adds new information on geographical distribution, host records and morphological variation of this species.

Materials and Methods

Fleas were recovered from *Ctenomys flamarioni* (Travi) and *Ctenomys minutus* (De Blainville) trapped in the municipalities of Capão da Canoa, Tramandai and Osório, State of Rio Grande do Sul, Brazil, between November 1985 and July 2000. After preservation in 70% ethanol, the fleas were mounted in Canada balsam for taxonomic identification and morphological studies. Smit's (1987) morphological terminology is followed. Representative specimens have been deposited in the Department of Parasitology, Federal University of Minas Gerais. Skins and skulls of tuco-tucos are in the Department of Genetics, Federal University of Rio Grande do Sul, Brazil. Illustrations of the spermathecae of four females and one male (sternum IX, basimere, telomere, and aedeagus) were prepared with the aid of a camera lucida.

Results

In females of *P. platensis*, the number of lateral setae observed on each side of abdominal sterna II-VII are indicated in Table 1 and the spermathecae of specimens from different localities are shown in Figs. 1-4. Modified segments of a male collected on *C. flamarioni* from Tramandai are seen in Figs. 5-7.

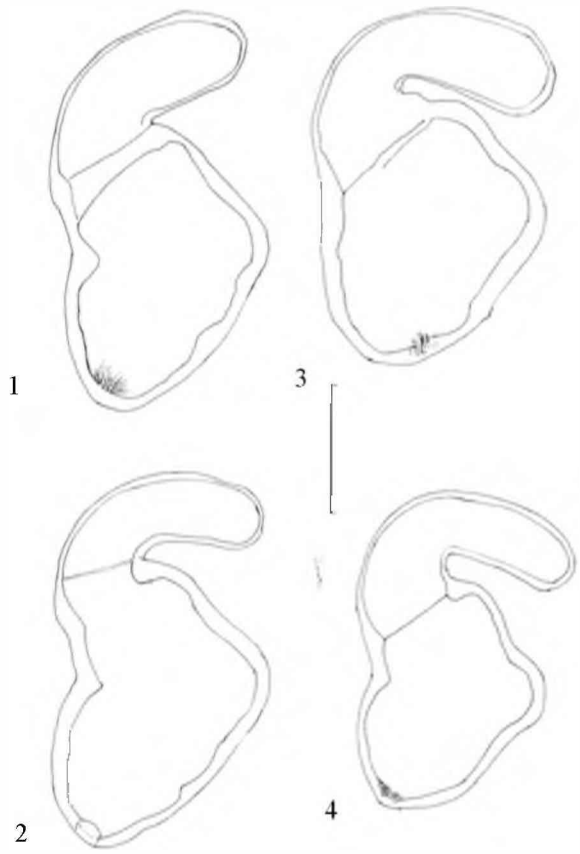
The occurrence of *P. platensis* in three municipalities of the State of Rio Grande do Sul, located at the Pampa grassland, the number of known species of Brazilian Siphonaptera is 60. The number of valid species, documented in Central and South America are presented in Table 2 [Argentina: Autino & Lareschi (1998), Chile: Hastriter (2001), Colombia: Méndez (1977), French Guiana: Beaucournu *et al.* (1998), México: Morales-Muciño & Llorente-Bousquets (1986), Panama: Tipton & Méndez (1966), Peru: Hastriter *et al.* (2002), Venezuela: Tipton & Machado-Allison (1972)]. The data were complemented according to Johnson (1957), Hopkins & Rothschild (1962, 1966) and Smit (1987) for other South American countries.

Discussion

With the exception of the abdominal sterna IV-VI, the number of setae observed on other sterna was markedly variable in female specimens (Table 1), ranging from 15 to 30 (sternum II), 4 to 12 (sternum III) and 12 to 20 (sternum VII). When describing *P. cisandinus*, Jordan (1939) pointed out "a western modification of *R. platensis* Jord. & Rohs. 1908, distinguished by the reduction in the number of bristles on the thorax, abdomen and legs". The number of setae found on the sterna II and VII has been the most important criteria to separate subspecies. The number of these setae presented by Jordan & Rothschild (1923) and Jordan (1939) for female specimens were respectively: basal sternum: 20 or more in *P. p. platensis* and 17 to 24 in *P. p. cisandinus*;

Table 1. Number of setae on sterna II-VII of female specimens of *Polygenis* (*P.*) *platensis* from the State of Rio Grande do Sul, Brazil.

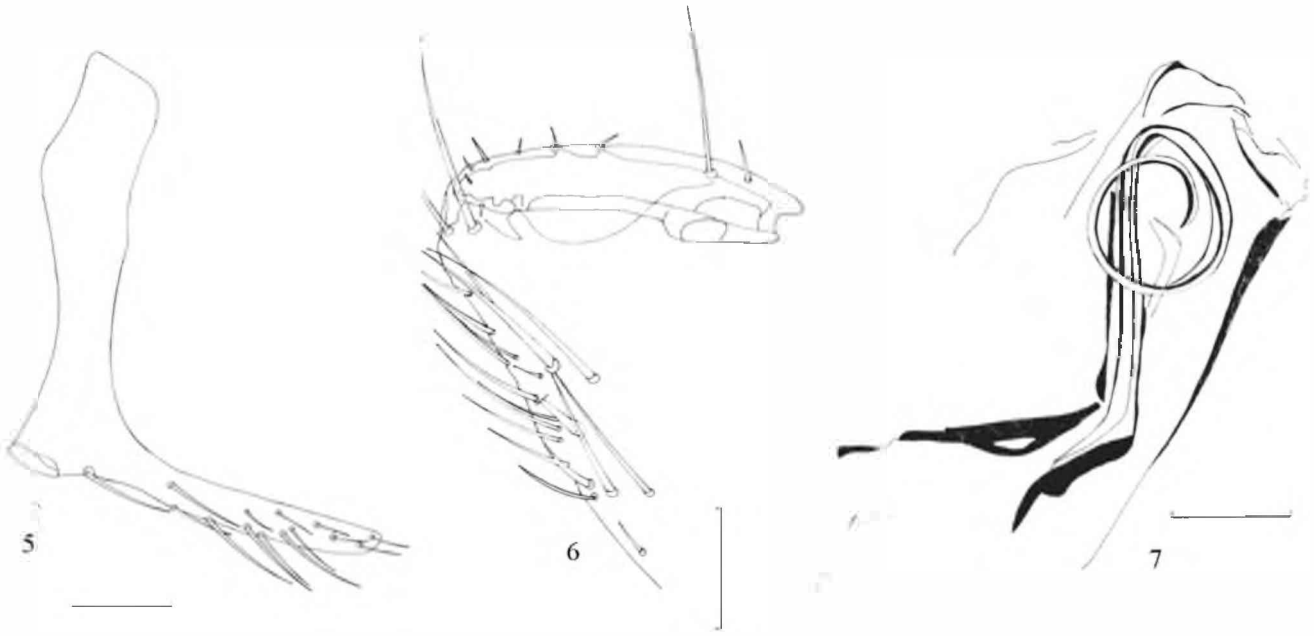
Number and origin of specimen	Abdominal sterna					
	II	III	IV	V	VI	VII
CF 049-1: Tramandaí RS	18/16	4/7	9/6	5/5	7/7	19/18
CF 049-2: Tramandaí RS	27/19	12/9	6/6	5/6	8/7	20/18
V 26: Osório RS	30/23	5/5	7/7	7/7	8/8	15/16
V 225: Osório RS	15/16	7/9	6/8	6/6	7/7	14/12



Figures 1-4. *Polygenis* (*Polygenis*) *platensis* ssp., female spermathecae. 1. CF 049-1 Tramandaí, RS. 2. CF 049-2 Tramandaí, RS. 3. V 26 Osório, Rs. 4. v 225 Osório, RS.

sternum VII: 22 to 25 in *P. p. platensis* and 8 to 10 in *P. platensis cisandinus*. Data in Table 1 would suggest that the chaetotaxy of sterna II and VII numerically overlap [especially the basal sterna noted in specimens from the same municipalities (CF 049:Tramandaí; V 26 and V 225: Osório) or collected on the same host: *C. flamarioni* (CF 049)] largely invalidates the use of these characters to distinguish these two subspecies.

Some variations were also noted in the spermathecae. In specimens from Tramandaí (Figs. 1 and 2) the bulgae are longer than wide; in ones from Osório (Figs. 3 and 4), they were as long as broad. Differences were also observed in the angle between axes of bulga and hilla. Contrary to specimens from Tramandaí (Figs. 1 and 2), each from Osório show the hilla reflected on the bulga (Figs. 3 and 4). Based on the angles between these axes as presented in the illustrations of Smit (1987), the specimens from Tramandaí are similar to *P. platensis*, while those from Osório were more like to *P. cisandinus*. However, only one of the specimens from Osório exhibits the apex of the hilla wider than the base (Fig. 3). With the exception of the Fig. 3, the other spermathecae present the ventral margin of the bulga markedly indented. The dorsal margin of bulga were variable between the specimens of the Figs. 2 and 4. The distal arm of sternum IX (Fig. 5) basimere and telomere (Fig. 6) are nearer to *P. platensis cisandinus* in shape and chaetotaxy when compared with the illustrations of Smit (1987). The male also differs from the two subspecies in the following characteristics of the aedeagus (Fig. 7): coiling of the tubus interior forming 1.2 turn, and the angle between the distal and proximal arms of the basal part of its tubus inner is 90°. Some females from the same host (CF 049) show characters of *platensis* and others of *cisandinus*, while the male



Figures 5-7. *Polygenis* (*Polygenis*) *platensis* ssp., modified segments of the male CF 049. 5. Sternum IX. 6. Basimere and Telomere. 7. Aedeagus.

Table 2. Distribution of species of *Polygenis* (Rhopalopsyllidae: Rhopalopsyllinae) in Central and South American countries.

Countries	No. fleas	No. Rhopalo-psyllidae	Rhopalopsyllinae			*Polygenis*	
			No.	Endemic species		No.	%
				No.	%		
Argentina	108	48	23	5	21.74	15	13.88
Bolivia	28	19	17	3	17.64	9	32.14
Brazil	59	34	34	9	26.47	19	32.20
Chile	94	25	3	-	-	2	2.12
Colombia	48	16	15	5	33.33	7	14.58
Costa Rica	12	6	6	1	16.67	1	8.33
El Salvador	15	4	4	-	-	3	20.00
Ecuador	38	8	7	-	-	4	10.53
French Guiana	12	6	6	-	-	2	16.67
Mexico	134	8	8	3	37.50	6	4.47
Panama	37	10	10	-	-	3	8.11
Paraguay	14	5	5	-	-	2	14.28
Peru	81	32	15	1	6.67	8	9.88
Surinam	4	2	2	-	-	1	25.00
Trinidad	10	6	6	-	-	3	30.00
Uruguay	2	1	1	-	-	1	50.00
Venezuela	54	16	16	2	12.50	10	18.52

specimen was nearer to *cisandinus*.

The geographical area where these specimens were collected is nearer to that of the distribution of *P. p. platensis*, situated on the confluence of the Uruguayan and Argentinean pampas. For this reason the subspecific status is undefined and more morphological data are required to determine the validity of them.

Both *C. flamarioni* and *C. minutus* are new host records for *P.* (*P.*) *platensis*.

For our knowledge, regardless of the subspecies, *P. platensis s. l.* is recorded for the first time in Brazil. Tramandaí (29°56'S) and Capão da Canoa (50°01'W) in the State of Rio Grande do Sul represent the southern and eastern limits of the distribution of this flea species, respectively.

Because of the confluence of biomes, or contiguous morphoclimatic domains between neighbouring countries, some of the species reported for other South American countries are likely to occur in Brazil. It is important to stress that in Venezuela, with a geographic area approximately nine times smaller than Brazil, Tipton & Machado-Allison (1972) recorded 54 species of Siphonaptera (Table 2), despite the country size being less important than the diversity created by altitude, i. e., lowland terraine versus hills and montane habitats. In Brazil, the majority of the flea species are found in south and southeast regions because they have been most frequently studied. Consequently, Atlantic forest appears as the biome that concentrates the highest number of known flea species, followed by *Araucaria* forest. Future studies should focus on the savanna largely unexplored and Amazon forest biomes, where the data are still being collected, as well as pampa. In fact, although essentially overgrown by pampa, only one species of Rhopalopsyllidae has been recorded from Uruguay (Table 2).

Since some species of *Polygenis* are vectors of sylvatic plague and that *P. platensis cisandinus* is known to feed on man and transmit *Yersinia pestis* (De la Barrera 1942 apud Guimarães 1972), the distribution and host/parasite relationships of *P. platensis* requires additional investigations.

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