

ENDOPARASITES OF *POLYGENIS TRIPUS* (SIPHONAPTERA:
RHOPALOPSYLLIDAE) OF WILD RODENTS FROM BELO HORIZONTE,
MINAS GERAIS, BRAZIL

JOSÉ RAMIRO BOTELHO & PEDRO MARCOS LINARDI

Departamento de Parasitologia, ICB, Universidade Federal de Minas Gerais, Caixa Postal 2486, 31270-901
Belo Horizonte, MG, Brasil

The importance of the Siphonaptera as vectors of murine typhus, tripanosomiasis, helminthic diseases caused by cestodes, filarial worms and allantonematid nematodes, and in particular bubonic plague is well known with respect to the flea species of the Pulicidae family. In Brazil, the Rhopalopsyllidae family, which is essentially Neotropical, is distinct among the Siphonaptera in terms of its geographic distribution and the number of known species. The principal genus is *Polygenis* Jordan, 1939 (P. M. Linardi, 1987, *Rev. Brasil. Biol.*, 47: 397-407).

In view of the geographical limits of the taxa of this family, the centers of origin and/or dispersion of species which are situated in the South American continent, work in this area is still concerned with taxonomic questions. Consequently, there are no studies that focus on these Siphonaptera as parasite vectors, except that of P. M. Linardi et al. (1981, *J. Med. Entomol.*, 18: 41-43) and the more in depth investigations undertaken by J. R. Botelho (1990, Thesis, Universidade Federal de Minas Gerais, Belo Horizonte, 143 p.).

Rodents and fleas were captured monthly from October 1984 to September 1985 within the Ecological Station of the Federal University of Minas Gerais, where the predominant vegetation is scrub, secondary forest and grassland. The fleas were removed from the hosts fur at the site of capture and later taken to the laboratory where they were dissected and stained with Giemsa. Observations were made using fresh and stained specimens and concen-

trated on the general cavity of the insect, the digestive tube and the genital system.

Of the 268 specimens of wild rodent captured (186 *Bolomys lasiurus*, 76 *Oryzomys subflavus* and 60. *nigripes*), 93 were infested by *P. tripus* (79 *B. lasiurus* and 14 *O. subflavus*). Previous studies have indicated that *B. lasiurus* is the true host for *P. tripus* in this region (P. M. Linardi et al., 1984, *Rev. Brasil. Biol.*, 44: 215-219). Of the 235 fleas dissected, 79 (33.6%) contained endoparasites; 74 of the fleas were found infesting *B. lasiurus* and 5 *O. subflavus*. This information could aid future investigations of vertebrate hosts that contain the complementary or adult stages of the parasites.

The groups of endoparasites found and their respective frequencies are shown in Table. Differences in infection rate in terms of sex of the fleas were not significant. The number of single endoparasite infections was almost eight times greater than the number of double infections. The number and percentage of each group of endoparasites found in single and multiple infections in specimens of *P. tripus* captured were: Allantonematids – single: 18/22 (81.8%); multiple: 4/22 (18.2%); Hymenolepedes – single: 24/32 (75.0%); multiple: 8/32 (25.0%); Trypanosomatids – single: 27/36 (75.0%); multiple: 9/36 (25%). However, among the endoparasites observed in overall infections, the trypanosomatids were the most prevalent: 36/90 (40.0%).

Genera and species of Allantonematids and Cestodes are identified by the adult stages. These are not observed in the ectoparasites. Allantonematis in fleas of the Rhopalopsyllidae family were recorded for the first time by P. M. Linardi et al., (*loc. cit.*) in *P. tripus*. In that case, the incidence of infection of 11.2% was

TABLE

Frequencies of natural infections of *P. tripus* by groups of endoparasites in Belo Horizonte, MG

Groups of Endoparasites	<i>Polygenis tripus</i>					
	Males (84)		Females (151) ^a		Total (235)	
	No.	(%)	No.	(%)	No.	(%)
Single infections (69):						
Allantonematids	6	(7.1)	12	(7.9)	18	(7.7)
Hymenolepedes	9	(10.7)	15	(9.9)	24	(10.2)
Trypanosomatids	12	(14.3)	15	(9.9)	27	(11.5)
Total	27	(32.1)	42	(27.8)	69	(29.4)
Double infections (9):						
Allanto/Hymeno	1	(1.2)	—	—	1	(0.4)
Allanto/Trypano	—	—	2	(1.3)	2	(0.8)
Hymeno/Trypano	2	(2.4)	4	(2.7)	6	(2.6)
Total	3	(3.6)	6	(4.0)	9	(3.8)
Triple infections (1):						
Allanto/Hymeno/Trypano	—	—	1	(0.6)	1	(0.4)
Total (79)	30	(35.7)	49	(32.4) ^a	79	(33.6)

^a: $\chi^2 = 0.26$ ($p > 0.05$)

slightly higher than that observed here, 9.3%. The present record is the second for this species and family and also the second in the Neotropical region.

Hymenolepedes are common in species of fleas that parasitize domestic rodents principally *Xenopsylla cheopis* which is the intermediate host of *Hymenolepis diminuta* and *H. nana*. Six different species of *Hymenolepis* (*H. diminuta*, *H. fraterna*, *H. microstoma*, *H. murina*, *H. myoxi* and *H. acutigera*) were found by F. G. A. M. Smit (1977, *Flea News*, 11: 13-14) to be endoparasites of fleas.

Among the flea pathogens listed by M. A. Strand (1977, *Pathogens of Medically Important Arthropods*, WHO, Geneva, p. 279-287) and R. A. Daoust (1983, *Pathogens of Siphonaptera (Fleas)*, Cornell University, Ithaca, New York, p. 249-253) there are no references to the presence of tapeworms in *Polygenis*. The present record is the first of hymenolepedes in: a) *P. tripus*; b) fleas of the genus *Polygenis*; c) fleas of the Rhopalopsyllidae family; d) which indices of infection are noticed in Neotropical fleas.

Both monogenetic and digenetic flagellates infect fleas. The generic identification of digenetic trypanosomatids must also be confirmed by the observation of the blood forms which occur in vertebrate hosts. Although similar forms had been also observed in the blood of some rodents we cannot confirm them as trypanosomes in face of inadequate methodology.

Twenty seven species of trypanosomatids have previously been found in fleas, the majority (18 species) being of the genus *Trypanosoma* (F. G. A. M. Smit, *loc. cit.*). The most common species is *Trypanosoma lewisi* which parasitizes synanthropic rodents (definitive host) and has fleas of the species *X. cheopis*, *Ctenocephalides canis*, *C. felis* and *Nosopsyllus fasciatus* as invertebrate hosts. D. H. Molyneux (1969, *Parasitology*, 59: 737-744) shows the respective species of fleas and rodent host for each species of *Trypanosoma* of the *lewisi* group. Other aspects of *T. lewisi*/flea/rodent interactions are demonstrated or complemented by E. A. Minchin & J. D. Thomson (1915, *Q. J. Microsc. Sci.*, 60: 463-692), L. Kartman (1954, *J. Parasitol.*, 40: 571-579), I. De Carneri & S. Castellino (1964, *Parassitologia*, 6: 95)

and D. H. Molyneux (*loc. cit.*). The occurrence of trypanosomatids in fleas of the Rhopalopsyllidae family, genus *Polygenis*, species *P. tripus* is demonstrated here for the first time.

Since the presence of allantonematids can cause damage to the host in the form of sterilization, genital atrophy and death (G. O. Poinar Jr & B. C. Nelson, 1973, *J. Med. Entomol.*, 10: 349-354; G. O. Poinar Jr, 1975, *Entomogenous Nematodes. A Manual and Host*

List of Insect-Nematode Associations, University of California, Berkeley, p. 33-38; C. Laumond & J. C. Beaucournu, 1978, *Ann. Parasitol.*, 53: 291-302) the associated endoparasites found will exacerbate these effects with serious consequences to the parasitized fleas.

Since *P. tripus* is one of the main species of this genus in Brazil, and a potential vector of bubonic plague, the infections described could act as regulators of populations of Siphonaptera in biological control programs.