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Species composition and seasonal dynamics of the helminth community parasitizing *Didelphis albiventris* (Marsupialia: didelphidae) in savannas of central Argentina

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Resumen. *Se estudió la composición taxonómica y la organización comunitaria de los helmintos parasitos de 42 individuos de* Didelphis albiventris *en la localidad de Moreno, Provincia de Santiago del Estero, Argentina (Provincia Biogeográfica Chaqueña). Se determinaron los valores de prevalencia, intensidad media, densidad relativa y frecuencia de los parasitos entre julio de 1988 y mayo de 1989. Se infirieron las relaciones existentes entre el ciclo de los parasitos y la dieta del hospedador. Se determinaron los procesos de interacción de algunos parasitos en el interior del tubo digestivo. Los resultados mostraron que 1) la fauna de helmintos hallada en el tubo digestivo estd representada por nematodes (*Turgida turgida*,* Pterygodermatites (Paucipectines) kozeki*,* Aspidodera raillieti*;* cestodes (Mathevotaenia *sp*.) *y* acanthocephalae *(*Hamanniella microcephala*); 2)* Didelphis albiventris *esta altamente parasitada durante todo el alto; 3)* T. turgida *es la especie central de mayor frecuencia;* P. (P) kozeki *y* H. microcephala *sort las especies satélites (de menor frecuencia) y* Mathevotaenia *sp. y* A. raillieti *son las especies secundarias (de frecuencias intermedias) y 4)* H. microcephala *es generalista y* P. (P) kozeki *es especialista.*

Abstract. *The taxonomic composition and the community structure of the parasites of 42 indivuals of* Didelphis albiventris *in Moreno District, Santiago del Estero Province, Argentina (Chaqueta Biogeographic Province) was studied. The prevalence, mean intensity, relative density and frequency values were determined between July 1988 and May 1989. The relationship between the parasite cycle and the diet of the host was inferred. The interaction among parasites in the intestine was evaluated. The results showed that: 1) the helminths parasitizing* D. albiventris *are nematodes (*Turgida turgida*,* Pterygodermatites (Paucipectines) kozeki *and* Aspidodera raillieti*), cestodes (*Mathevotaenia *sp.) and* acanthocephalans (Hamanniella microcephala)*; 2)* D. albiventris *is highly parasitized all year round; 3)* T. turgida *is the central species (highest frequency);* P.(P) kozeki *and* H. microcephala *are the satellite species (least frequency) and* Mathevotaenia *sp. and* A. raillieti *are the secondary species (intermediate frequency); 4)* H. microcephala *is a generalist and* P.(P) kozeki *is a specialist. Nevertheless,* H. microcephala *is forced to the middle and posterior sections of the small intestine when* P. (P) kozeki *is present.*

Introduction

D. albiventris is widely distributed in the American continent from eastern North America throughout southern Argentina, at 47° S latitude. Its members live as a rule in isolated burrows and are mainly insectivores, although they may adopt omnivorous feeding habits. Their biological and physiological features are well known. Their parasites have been described in reports devoted to helminths by

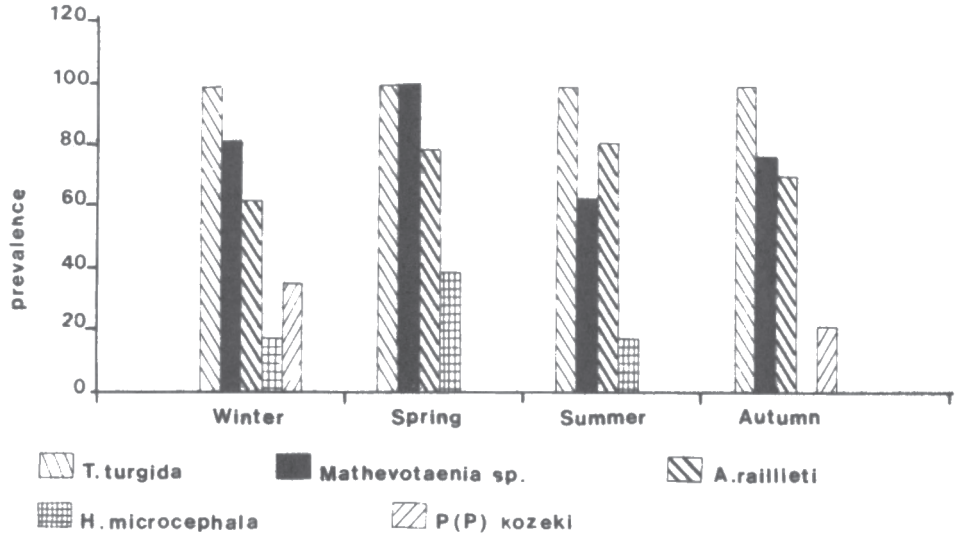

Figure 1. Seasonal prevalence of helminths parasitizing *D. albiventris* in Moreno, Santiago del Estero. Argentina.

several workers (Quentin 1969, Grey and Anderson 1982, Navone 1989). Nevertheless, the structure of its helminth parasite community was never studied. Therefore, we studied the year round dynamics of the helminths parasitizing *D. albiventris* in the above mentioned region where it is suspected of behaving as a *Trypanosoma cruzi* reservoir. This study was carried out in order to know 1) the taxonomic composition of the parasitic fauna, 2) the structure of the helminth community, 3) the central, satellite and secondary species, 4) the relationship between the parasite cycle and the diet of the host, and 5) the interaction among different species of parasites in the intestine of the host.

Materials and Methods

According to its biogeographical characteristics, Moreno localitiy in Santiago del Estero Province belongs to the Chaco Biogeographic Province (Cabrera y Willink 1973). The climate is semiarid with a marked dry season between May and October and a rainy season throughout the rest of the year. Mean annual rainfall ranges between 550-600 mm and the mean annual temperature is 21 °-22ºC with a mean of 28.5ºC in the warmest month and 5.5ºC in the coldest one. The primary forest is composed of hardwood trees (*Schinopsis* spp. and *Aspidoderma quebracho blanco*) associated with *Caesalpinia paraguarirensis* (guayacán) and different species of *Prosopis.* This region was intensively exploited for timber and cattle production at the beginning of the 20th century. The herbaceous layer was replaced by thorn shrubs, cacti, and *Bromeliaceae.*

The capture area was located at 27°12'30"S. and 63°02'30"W. From July 1988 through May 1989, 42 adult *D. albiventris* specimens were captured, four in the vecinity of human dwellings and the others in the "quebracho" (*Schinopsis* sp.) forested area. They were captured during day or night time, by hand or with the help of dogs. Out of the 42 specimens, 11 (6 males and 5 females) were captured in winter, 10 (2 males and 8 females) in spring, 10 (5 males and 5 females) in summer, and 11 (5 males and 6 females) in autumn.

Promptly after killing the specimens by ether overdose, viscera were fixed in 5 % formaline and

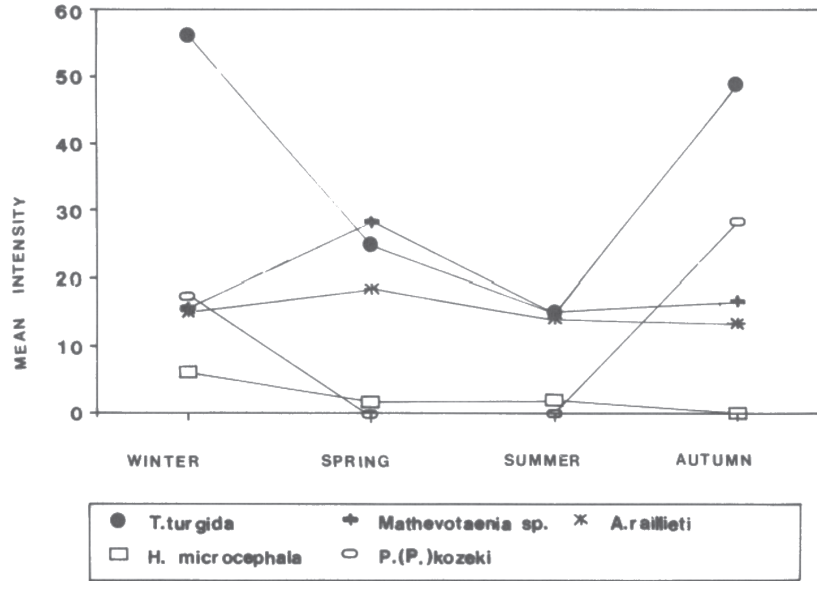

Figure 2. Mean seasonal intensity of helminths parasitizing *D. albiventris* in Moreno, Santiago del Estero, Argentina.

later processed and examined in the laboratory. The small intestine was divided into three equal portions in order to accurately determine the location of helminths. These were collected from the visceras with the help of a stereoscopic microscope, washed in ditilled water and passed to 70 etanol. Nematodes and *acanthocephalans* were cleared with lactophenol, while *cestodes* were stained with hydrochloric carmine, dehydrated, and mounted in Canada balsam. The parasites were taxonomically identified and counted. A total of 2710 helminths belonging to species already known (2040 nematodes, 642 *cestodes* and 28 acantocephalans) were collected. In order to determine the severity of the lesions caused by stomach parasites, damaged areas were fixed in 10% formaline. Histological sections 5 um thick were made and stained with hematoxylin-eosine.

Ecological terms, such as prevalence, mean intensity, abundance or relative density follow the nomenclature proposed by Margolis et al. (1982). These were defined as follows: Prevalence: number of individuals of a host species infected with a particular parasite species / number of hosts examined. Mean intensity: total number of individuals of a particular parasite species in a sample of a host species / number of infected individuals of the host species in the sample. Abundance or relative density: total number of individuals of a particular parasite species in a sample of hosts / total number of individuals of the host species in the sample (infected + uninfected).

The frequency or dominance (F) of each species of helminth parasite recovered in the survey was estimated as the percentage of the total number of helminth parasites of a given species (n) with respect to the total number of helminth parasites of all species (N) recovered from the sample of the hosts (F= n/N x 100).

Results

The prevalence of the helminths in the 42 host specimens examined during the four seasons of the period under study was 100%. We recovered 1471 *T. turgida,* from the stomach, 126 *P.* (*P*) *kozeki* and 28 *H. microcephala* from the anterior and middle portion of the small intestine, 642 *Mathevotaenia sp.* from the posterior intestinal portion, and 443 *A. raillieti* from the caecum.

Although the prevalence value of *T. turgida* remained constant throughout the study (Figure 1),

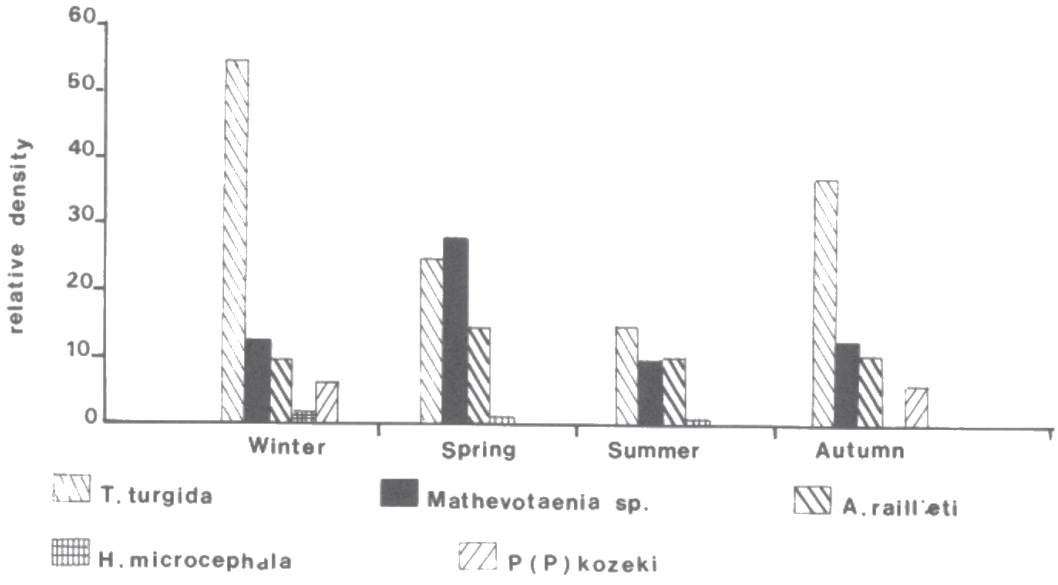

Figure 3. Seasonal density of helminths parasitizing *D. albiventris* in Moreno, Santiago del Estero, Argentina.

other in autumn. Mean intensity values were lower in spring and summer (Figure 2). Mean intensity and relative density values of *T. turgida* exhibited a similar pattern (Figure 3), which was to be expected with a 100 % prevalence and a similar number of hosts sampled each season. Juvenile forms of *T. turgida* were found in the cardias and mature forms in the pyloric region of the stomach. Adult parasites damaged the gastric wall of the stomach and the mucosa which was then infiltrated by tissular granulations. In severe infections, damage to the mucosa as well as the external muscles of the stomach were observed.

P. (*P*) *kozeki* was located in the anterior third of the small gut. The prevalence value for this species was similar in winter and in autumn, but dropped to zero during spring and summer (Figure 1). During the winter mean intensity of *P.* (*P*) *kozeki* was lower than in autumn whereas the relative density was similar in both seasons (Figures. 2 and 3).

The prevalence value of *H. microcephala* increased in spring (Figure 1), whereas mean intensity and relative density values decreased (Figures 2 and 3). During autumn the host was not parasitized by the acanthocephala. When *H. microcephala* was present there was damage ir_ the external intestinal muscle caused by the penetration of parasites' proboscis hooks.

Mathevotaenia sp. was located in the final portion of the small gut. The prevalence of this helminth was virtually the same in winter and in autumn, peaked in spring, and decreased in summer (Figure 1). Mean intensity and relative density were similar over the year (Figures 2 and 3).

A. raillieti was located in the caecum. During winter the prevalence values were lower than during the other seasons. Mean intensity and relative density values did not vary appreciably over the year.

The frequency or dominance values of each species showed that the dominant or central species was *T. turgida* (with the highest frequency: 54.3 %) whereas the satellite species (with the lowest

frequency) were *P. (P) kozeki* (4.6%) and *H. microcephala* (1.03 %);*Mathevotaenia* sp. (23.7%) and *A. raillieti* (16.35%) were the secondary species (with intermediate frequency).

Discussion

The results suggest that *D. albiventris* in the Moreno District is highly parasitized year round, as shown by the 100% prevalence value. *T. turgida, Mathevotaenia* sp.*, P. (P) kozeki* and H. *microcephala* have heteroxene life cycles. As a rule, they have insects such as Orthoptera and Dermaptera as intermediate hosts. That confirms that the *D. albiventris* diet in the studied area is predominantly insectivorous, as shown by the analysis of stomach contents (Navone, personal observation).

In the present study it was demostrated that, occupied the small intestine, when both *P. (P) kozeki* and *H. microcephala* were alone, the nematode invariably was in the first portion of the small intestine (specialist) whereas the acanthocephala was in the whole small intestine (generalist). However, the acanthocephala was forced into the middle and posterior sections of the small intestine when the nematode was present.

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