SHORT COMMUNICATION

ON THE HELMINTH PARASITES OF THE GENUS *JACULUS* (RODENTIA: DIPODIDAE) IN TUNISIA: A PRELIMINARY SURVEY STUDY

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ABSTRACT

A total of 149 specimens of jerboas from different localities in Tunisia were surveyed for helminth parasites. The host species were Jaculus jaculus (n = 50), J. orientalis (n = 50) and J. deserti (n = 49). Jerboas examined herein were characterized by a poor richness of parasites where a total of three cestodes and none of nematodes and trematodes were found. The helminth cestodes recovered here were Raillietina trapezoides (Janicki, 1904), Catenotaeniidae and Inermicapsifer sp. This study was the first report on helminths of J. deserti.

Keywords: jerboas, *Raillietina trapezoids,* Catenotaeniidae, *Inermicapsifer* sp., helminths, *Jaculus,* parasites

INTRODUCTION

In the genus *Jaculus* (Erxleben, 1777), two morphologically different species *J. jaculus* (lesser jerboa, Linnaeus, 1758) and *J. orientalis* (greater jerboa, Erxleben, 1777) have long been identified. These jerboa species are found in very diverse habitats extending throughout the sub-Saharan and deserts of North Africa, Asia, and Arab countries, like Egypt, Sudan, Palestine and Morocco (Osborn & Helmy, 1980; Aulagnier & Thévenot, 1986; Brown, 1994; Kingdon, 1997; Aulagnier *et al.,* 2009). Of these species, *J. jaculus* occupies deserts and semi-deserts, with burrows either in the sand or in more compact soil, while *J. orientalis* is more common in open landscapes such as steppe-like habitats with sandy or clayey soil, as well as coastal dunes and grassland or cultivated areas, rarely found in forests, but sometimes found at altitude in the Middle Atlas Mountains (Morocco).

In this study, the lesser jerboa *J. jaculus* was trapped in the desert areas, while the greater jerboa *J. orientalis* was found in the semiarid regions in the North (Ben Faleh *et al.,* 2009) and *Jaculus deserti* (Loche, 1867) was scored in the center and south of Tunisia (Ben Faleh *et al.,* 2010).

Previous studies on helminths in *J. jaculus* and *J. orientalis* are limited, where two nematodes *Dipetalonema viteae* (Krepkogorski, 1933) and *Syphacia obvelata* (Rudolphi, 1802) were scored in *J. orientalis* and one *S. obvelata* was described in *J. jaculus* (Bernard, 1987). The third host species *J. deserti* has not been previously studied from a helminthological point of view, as it is a recently described species (Ben Faleh *et al.,* 2010).

Generally, little is known of helminths from the dipodid group. So the aim of the present study is to shed some light on the helminth parasites common in the jerboa occurring in Tunisia and comparing their data with that of other common species elsewhere.

MATERIAL AND METHODS

In this study, 149 specimens from a total of three species of jerboa: *Jaculus jaculus* (Linnaeus, 1758) (n=50), *J. orientalis* (Erxleben, 1777) (n= 50) and *Jaculus deserti* (Loche, 1867) (n= 49) were surveyed for helminth parasites in Tunisia between 2005 and 2007 (Fig. 1). The jerboas examined were collected from all currently known localities of their distribution as previously described (Gharaibeh, 1997; Ben Faleh *et al.,* 2010). Jerboas were preserved in 70% ethanol. Their digestive tract was removed and dissected in the laboratory of Parasitology, University of Barcelona. Recovered helminths were stained with Semichon acetocarmine, dehydrated in alcohol, cleared in xylene and mounted in Canada balsam. All helminths were specifically identified based on their morphology and morphometry, according to literature (Quentin, 1989).

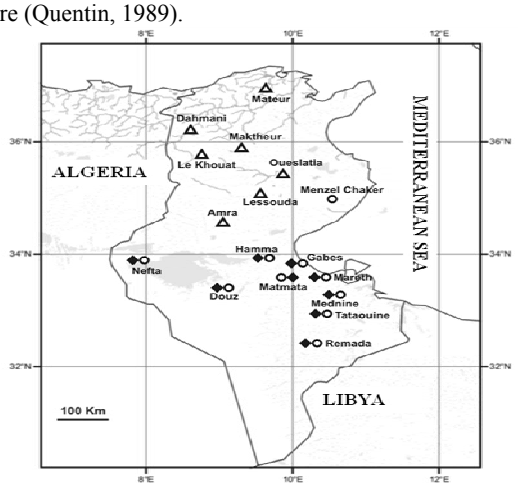

Figure 1. A map showing sampling localities from which the three species of jerboas were collected (▲: *J. orientalis;* ● *: J. jaculus;* ◆ *: J. deserti*).

RESULTS

Three species of helminths were found in the jerboas examined. *Raillietina trapezoides* (Janicki, 1904) and *Catenotaeniidae* were scored in both of *Jaculus jaculus*, *J. orientalis* and *Jaculus deserti*, while *Inermicapsifer* sp. was found only in *J. deserti* (Table 1). Of the three helminth species, the last two species were not identified in all jerboas probably due to the fact that helminths were not isolated in field.

TABLE 1

Some Statistics from the Jerboa Analyzed in the General Sample

Host	Helminths	Nº Hosts Total	Prevalence	Mean intensity	Mean abundance (SE)	Range
J. jaculus						
	Raillietina trapezoides	50	30,0%	3,73	1,12	1-14
	Catenotaeniidae	50	6,0%	2,66	0,16	1-2
J. orientalis						
	Raillietina trapezoides	50	36,0%	7,05	2,54	1-45
	Catenotaeniidae	50	2,0%	1,66	0,10	3-3
J. deserti						
	Raillietina trapezoides	49	32,8%	4,38	1,75	1-18
	Catenotaeniidae	49	2,0%	1,00	0,02	1-1
	Inermicapsifer sp.	49	2,0%	33,00	0,67	33-33

Details of ecological parameters are given in Table 1. The general prevalence of helminths in the three species of *Jaculus* was nearly similar: 36.0% for *J. jaculus*, 38.0% for *J. orientalis* and 36.8% for *J. deserti.* The percentage values of the three species of helminths in each of the jerboa species were as follows: for *J. jaculus* (*R. trapezoides*, 30.0%; *Catenotaeniidae,* 6.0%), for *J. orientalis* (*R. trapezoides*, 36.0%; *Catenotaeniidae,* 2.0%), and finally, for *J. deserti* (*R. trapezoides*, 32.8%; *Catenotaeniidae,* 2.0%*,* and *Inermicapsifer* sp., 2.0%). In addition, some other statistics are also shown in Table 1.

DISCUSSION

This is the first survey study on the helminth parasites of the jerboa species, particularly *Jaculus deserti*, common in Tunisia. The results showed that *J. jaculus* and *J. orientalis* were infected with *Raillietina trapezoides* (Janicki, 1904) and *Catenotaeniidae* while *J. deserti* was infected with three helminth species, namely, *Raillietina trapezoides*, *Catenotaeniidae* and *Inermicapsifer* sp. (Table 1). An earlier study on *Jaculus* spp. from Tunisia (Bernard, 1987) doesn't include an ecological study. For this reason, the general prevalence reported in present study cannot be compared with other previous studies on these jerboa species. The cestode *R. trapezoides* was originally described as *Davainea trapezoides*, in *"Mus variegatus"* (=*Arvicanthis niloticus*) from Egypt. However, the species has been found in Israel, in gerbilidae and dipodidae rodents: *Gerbillus* spp*., Meriones* spp*., Psammomys obesus* (Fichet-Calvet *et al.,* 2003) and *Jaculus jaculus* (Wertheim *et al.,* 1986). The authors added that the intermediate host(s) is unknown, but should be an arthropod according to species of the same group. In the present study, *R. trapezoides* is the dominant helminth species for the three species of jerboa studied with a general prevalence reaching between 30-36%, compared to a relatively lower prevalence percentage values for the other two reported species (Table 1), and thus confirm that this helminth parasite is a generalized species reported in several rodent hosts. The helminth fauna of *Jaculus* is very poor (only a range of 1-3 species appeared). Therefore, one assumed that the reason could be explained in view of the low diversity of parasites among populations of *Jaculus* spp. due to phylogenetic

related hosts (Klimpel *et al.,* 2007) and the habitats where they live, like desert areas or semiarid regions, but further studies are needed to support this hypothesis.

CONCLUSION

The jerboas examined herein were characterized by a poor richness of parasites where a total of three cestodes and none of nematodes and trematodes were found. The helminth cestodes recovered here were *Raillietina trapezoides* (Janicki, 1904), *Catenotaeniidae* and *Inermicapsifer* sp. This study was the first report on helminths of *J. deserti* and more studies on different species of jerboas from different geographical areas are needed to shed more light on helminths of these rodent species.

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REFERENCES

Aulagnier, S., Thévenot, M. 1986. Catalogue des mammifères sauvages du Maroc. Travaux de l'Institut Scientifique, *Ser. Zool.,* 41: 1-164.

Aulagnier, S., Haffner, P., Mitchell-Jones, A.J., Moutou, F., Zima, J. 2009. *Mammals of Europe, North Africa and the Middle East*. A&C Black, London, 272 p.

Ben Faleh, A.R., Shahin A.A.B., Said, K. 2009. Allozyme polymorphism and genetic differentiation among populations of *Jaculus jaculus* and *J. orientalis* (Rodentia: Dipodidae) in Tunisia. *Zool. Res.,* 30(3): 247-254.

Ben Faleh, A.R., Cosson, J. F., Tatard, C., Ben Othmen, A. B., Said, K., Granjon, L. 2010. Are there two cryptic species of the lesser Jerboa *Jaculus jaculus* (Rodentia, Dipodidae) in Tunisia? Evidence from molecular, morphometric, and cytogenetic data. *Biol. J. L. Soc*., 99: 673-686.

Bernard, J. 1987. Faune des nématodes parasites des mammifères de Tunisie et des contrées voisines. *Archives de l'Institut Pasteur de Tunis*, 64(3): 265-319.

Brown, J.S. 1994. Coexistence of Negev desert rodents. *Ecology,* 75: 2290-2297.

Gharaibeh, B.M. 1997. *Systematics, distribution, and zoogeography of mammals of Tunisia*. PhD Thesis, Texas Technical University, 372 p.

Fichet-Calvet, E., Wang, J., Jomâa, I., Ben Ismail, R., Ashford, R.W. 2003. Patterns of tapeworm *Raillietina trapezoides* infection in the fat sand rat *Psammomys obesus* in Tunisia: season, climatic conditions, host age and crowding effects. *Parasitology,* 126: 481-492.

Kingdon, J. 1997. *Kingdon field guide to African mammals*. Academic Press, London, 464 p.

Klimpel, S., Fõrster, M., Schmahl, G. 2007. Parasites of two abundant sympatric rodent species in relation to host phylogeny and ecology. *Parasitol. Res.,* 100: 867-875.

Osborn, D.J., Helmy, I. 1980. The contemporary land mammals of Egypt including Sinai. *Fieldiana Zool.,* 5: 13-213.

Quentin, J.C. 1989. Prévalence des helminthes de rongeurs myomorphes d'Afrique Centrale. Relations entre l'écologie et l'éthologie de ces rongeurs et leurs peuplements parasitaires. *Bull. Ecol.,* 20(4): 311-323.

Wertheim, G., Schmidt, G.D., Greenberg, Z. 1986. *Witenbergitaenia sinaica* gen. n., sp. n. (Anoplocephalidae) and other cestodes from small mammals in Israel and in the Sinai Peninsula. *Bulletin du Museum d'Histoire Naturelle Paris,* 8: 543-550.