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Short communication

SOME HELMINTHS OF THE ETHIOPIAN WOLF (CANIS SIMENSIS RÜPELL 1840, CANIDAE) AND ITS PREY IN THE BALE MOUNTAINS NATIONAL PARK

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ABSTRACT: Eggs of *Trichuris vulpis* were found in all fecal samples of *Canis simensis* and one had unfertilized *Ascaris lumbricoides* egg. Adult specimens of *Echinococcus granulosus* were observed once in a fecal sample of *Canis simensis*. Examination of additional fecal samples failed to reveal the adult parasite. However, unidentified *Taenia* species eggs were found in all of the fecal samples. Examination of liver of some rodents revealed an encysted Ascaris larva in *Arvicanthis blicki*.

Key words/phrases: Bale Mountains National Park, *Canis simensis*, *Echinococcus*, encysted ascaris larva, *Trichuris vulpis*

INTRODUCTION

Helminths are one of the most ubiquitous parasites among wild and domestic animals throughout the world (Tiner, 1953; Eckert *et al.,* 2001**;** Grikienienė and Žąsitytė, 2002; Morand *et al.,* 2006).

Canid species are often involved as definitive hosts of helminth parasites of public health and veterinary importance (Eckert *et al.,* 2001). One of the helminth parasites of public health and veterinary importance is *Echinococcus granulosus,* and this helminth is endemic in the lands of Southern Ethiopia (Fuller and Fuller, 1981; Lindtjorn *et al.,* 1982; Klungsoyr *et al.,* 1993).

The Bale Mountains National Park is home to hundreds of resident pastoralists and transhumant nomads from lowland regions of Southern Ethiopia. Presently, the number of livestock in the Bale Mountains National Park is estimated to be 135,000 heads with 35,000 people living in 4000 households (personal communication with Addisu Asefa, Park Warden). The Bale Mountains National Park is also a home to several species of rodents and their predators including the Ethiopian wolf (Sillero-Zubiri *et al.,* 1996).

Researchers who often appreciate the biodiversity within the Bale Mountains have not considered helminth parasites of mammals of the plateau. Rodents contribute to the large part of the mammal community of the Bale Mountains National Park. At the same time, rodents are found to be infested with several species of helminth parasites throughout the world (Eckert *et al.,* 2001; WHO, 2001; Morand *et al.,* 2006).

Rodents are favourable intermediate hosts of helminth parasites, particularly, *Taenia* species (Thompson and McManus, 2001). The discovery of *E. granulosus* in *C. simenis* indicates that the wolves' preys could be the intermediate hosts. In such an environment where humans, livestock, and wild life dwell together, complicated life cycle patterns including both domestic and sylvatic cycles may occur.

The proper conservation of *C. simensis* should have involved not only the health of the wolves but also the health of their diet.

The purpose of this study is to find out presence of helminth parasites in *C. simensis* and its diet, the rodents, and forward some recommendations for future detailed and quantitative research.

MATERIALS AND METHODS

Study site

The study site was selected based on extensive studies of ecology and biomass of the rodent population by Sillero-Zubiri and Gottelli (1995a) which showed that rodent population density was very high in the Web Valley compared to the Sanetti Plateau. Such a population will provide a better opportunity for the appreciation of the helminth fauna therein.

Fecal sample collection and analysis

Eight fecal samples from *C. simensis* were collected by detecting the animal and following it until it defecates.

Few grams of fecal samples were put in small plastic bottles and preserved in neutral saline formaldehyde. Neutral saline formaldehyde was prepared in the laboratory by adding 8.5 g/l NaCl to commercial formaldehyde (37%) then neutralizing the solution by few drops of Sodium Carbonate solution (50g/l). This solution was a preferred preservative in such a study since it preserves helminth eggs and adults alike (WHO, 1991). The pH was measured using a litmus paper. Samples were stored in the shade in cooling box until they were transported to the laboratory within a week. Native samples were directly analyzed under compound microscope and pictures of the eggs were taken by computer-connected microscope. Parasite eggs were identified microscopically using parasite identification key (WHO, 1991; 2003).

Rodent Liver collection and observation

Seven rodents were trapped either by Shearman traps or hand made snap-rope-trap, both during the day and at night. Traps were visited every 2 hours except during the night. The species which were caught were two giant mole rats (*Tachyoryctes macrocephalus* Rüppell, 1842), two *Lophuromys melanonyx* Petter, one *Arvicanthis blicki* Frick, and two *Stenocephalemys albicaudata* Frick. Giant mole rats were caught by self-made ambush snap-rope-trap. Rodent species identification was made possible by comparing each specimen with the Ethiopian Wolf Conservation Program (EWCP) specimen collection at the EWCP Head Quarter in Dinsho. Rodents were dissected using dissecting kit immediately after they were freed from traps. Before dissection, each rodent was photographed and inspected for external parasites, visible with naked eye. Livers were carefully removed and put in small plastic vials, enough to accommodate sufficient volume of preservative. Absolute alcohol was used as preservative and samples were kept in cooling box under the shade until they were transported to the laboratory. Intact livers were observed using stereo microscope. Detail observation was made after dissection of the liver samples.

RESULTS

Fecal analysis under compound microscope revealed that all the samples (100%) had *Trichuris vulpis* (Fig. 1) and unidentified *Teanea* species eggs (Fig. 2). One sample showed unfertilized *Ascaris lumbricoides* eggs. A liver sample from *Arvicanthis blicki* showed unidentified encysted larva of *Ascaris* species, which was freed from the cyst. A tick infestation was also observed on the belly of one of the two mole rats trapped.

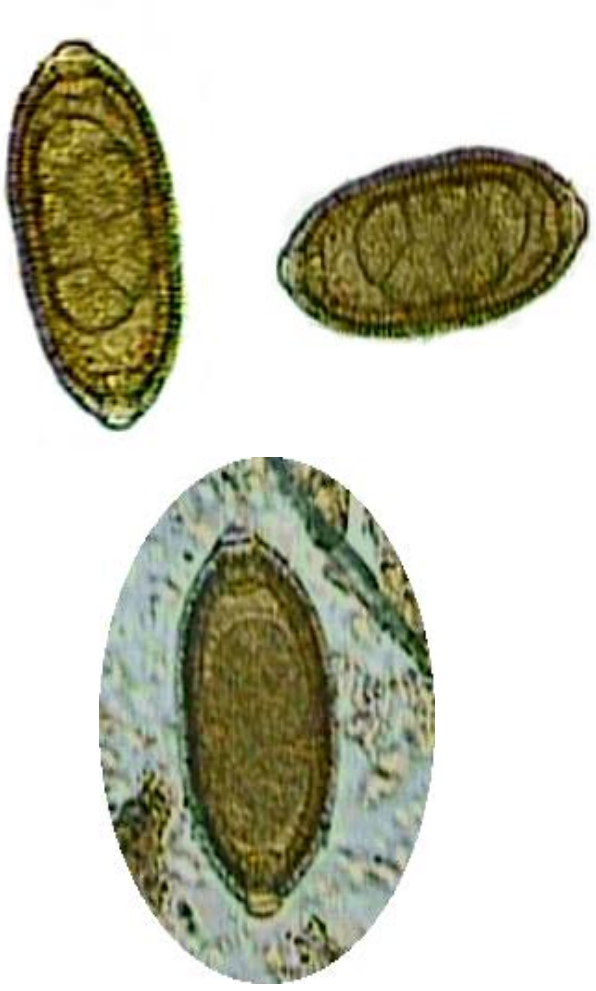

Fig. 1. Eggs of Trichuris vulpis (400X).

Fig. 2. Unidentified Taenia species egg (400X).

DISCUSSION

Among the endemic fauna of the Bale Mountains National Park are rodents and their major predator, *Canis simensis*.

Many researchers have dwelt with the Ethiopian wolf (*C. simensis*) and the rodent population at the Bale Mountains National Park (Sillero-Zubiri and Gottelli, 1995a; 1995b; Sillero-Zubiri *et al.,* 1995; Sillero-Zubiri *et al.*, 1996; Jorgelina, 2003). Rabies is taken as the major threatening zoonosis that is known to decimate the wolves' population, perhaps the cause in local extinctions from Afro-alpine Mountains, elsewhere in Northern Ethiopia (Sillero-Zubiri, 1995; Sillero-Zubiri *et al.,* 1996; Jorgelina, 2003). Except for preliminary population studies, no critical research including the health status of the rodents that make up the main food resource for the Ethiopian Wolves has been carried out to date. It is evident, however, that any disease that involves the rodent population also implicates the wolves.

Helminths are important parasites of mammals (Morand *et al.,* 2006). The absences of information on helminths of the rodents leave a gap in the knowledge concerning the health status of the Ethiopian Wolf, *C. simensis.* This study presents a small survey of helminth parasites of both rodents and the Ethiopian Wolf, to address this gap in a very limited way.

The rodent population remains to be the sole dietary source of *C. simensis* except occasional foraging of birds and domestic stock (sheep and goats) at the Bale Mountains National Park. Studies described the Ethiopian wolves as solitary foragers, while small packs hunted hares, young antelopes, and sheep. Rodents accounted for 96% of the prey occurrences and 97% volume in droppings.

The three commonest species of rodents endemic to the Bale Mountains National Park are *A. blicki*, *L. melanonyx* and *S. albicaudata* (Sillero-Zubiri *et al.,* 1995). They are the only small-sized rodents trapped in this study. *S. albicaudata* is a nocturnal species that has no significant contribution to the diet of *C. simensis.* The three species, which were found to constitute the diet base of *C. simensis,* are *A. blicki, L. melanonyx* and *T. macrocephalus* (Sillero-Zubiri and Gottelli, 1995a).

The helminth parasites detected from *C. simensis* feces in this study include nematode eggs of *T. vulpis, A. lumbricoides* and unidentified *Taenia* species. *T. vulpis* is found to be a parasite of dogs and wolves. Even though rare, there are reports of human infections with this parasite (Singh *et al.,* 1993).

A liver specimen from *A. blicki* contained encysted larval stage of unidentified *Ascaris* species. *Ascaris* species are not known to involve intermediate hosts. However, encystment of migratory larval stage implies that the host's defence mechanism either tried to degenerate the parasite or the parasite is adapting to a new way of life that may involve intermediate hosts. Studies revealed that migrating larvae of *A. lumbricoides* taken from the lungs of experimental rodents and fed to their proper final host were found to produce infections (Tiner, 1953). A fecal sample from *C. simensis* had *Ascaris* eggs suggesting the fact that wolves have been infected by eating encysted larval stages with their diet such as *A. blicki.*

Helminthes represent the most prevalent macroparasite group to small mammals, such as rodents (Weil *et al.* 2006). Accordingly, the most common infectious genera for small mammals include *Ascaris*, *Trichuris*, *Strongyloides*, and *Trichinella.*

An attempt to find adult *E. granulosus* in the feces of *C. simensis* was successful in one out of the eight fecal samples collected. The eggs of *Echinococcus* are morphologically indistinguishable from those of other tapeworms of the genus *Taenia* (Thompson and McManus, 2001), but the micrograph of eggs confirms that taeniid parasites are present in *C. simensis* feces.

The main intermediate hosts of taeniids are two groups of mammals: the ruminants and small mammals (mostly rodents). In a place like the Bale Mountains National Park, where the rodent population reaches such a staggering number in the order comprising *T. macrocephalus* 90 animals/ha; *A. blicki* 32–89/ha; *L. melanonyx* 3.2 – 127/ha; it is not surprising to find Taeniid parasites.

It is likely that wolves might have acquired *E. granulosus* from foraged sheep rather than rodents since dissection of seven rodents failed to result in the larval stages of *E. granulosus.* However, this fact should be sought after in future studies.

This study reports the presence of *E. granulosus, T. vulpis, A. lumbricoides* and other unidentified *Taenia* species in *C. simensis* and also the presence of unidentified encysted larva of *Ascaris* species in the liver of *A. blicki.* The study is also the first of its kind to present a report on the helminths of Ethiopian wolves and its prey, the rodents. It is recommended that a more detailed and systematic research undertaking including the sheep

population in the mountain be carried out to generate adequate information for proper conservation of this endangered wolf, *C. simensis.*

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