ECTO AND GUT PARASITIC FAUNA OF THE AFRICAN GIANT RAT *Cricetomys gambianus* IN A SEMI-URBAN TROPICAL COMMUNITY

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ABSTRACT

An investigation of ecto and gut parasitic fauna of African giant rat Cricetomys gambianus was carried out to determine the composition and prevalence of ecto and gut parasites in the giant rat. Fifteen giant rats, C. gambianus were caught from different locations in the University of Nigeria, Nsukka and some other villages in Nsukka. They were all examined for ecto and gut parasites. A total of 2503 gut parasites and 27 ectoparasites were recovered. Considering the gut parasitic worms, nematodes were the most prevalent (87.4%) and included species such as Nippostrongylus braziliensis, Capillaria columbae and Strongyloides ophidae. Hymenolepis diminuta (cestode) (12.6%) was the least in prevalence. All recovered ectoparasites were fleas – Leptopsylla segnis. The health significances of these parasites along with control and management measures are discussed.

Keywords: Ectoparasite, Gut parasites, African giant rat, *Cricetomys gambianus,* Semi-urban tropical community

INTRODUCTION

The giant rat *Cricetomys gambianus* is one of the wild rodents found inhabiting different places in Africa. *C. gambianus* is a source of food in Africa and it has been known to be a cheap source of protein for the common man. C. gambianus mainly lives in the savanna around the edges of forest and in the mountain up to 3,500m above the sea level. It can also be found in sub- Saharan Africa and north eastern region of South African.

C. gambianus is a solitary animal, with nocturnal habits and prefers to live in burrows. It feeds on large varieties of plant and animal foods, such as tubers, grains and nuts. In its natural habit, it is a very prolific breeder. The duration of gestation is approximately one month; a female Gambian rat can reproduce six times in one year.

Parasitism has evolved independently several times in many different animal lineages. Observations made on distantly related parasites have revealed a variety of adaptations to parasitism including changes in physiology, morphology and life history traits. Parasites such as ectoparasite, endoparasite and blood parasite, has been reported to be associated with this giant rat. These animals because of its close association with man can transmit pathogens to man and may also be an intermediate of some important human diseases and those of domestic and farm animals. Work has been done on parasitic fauna of wild rat, giant rat etc. Smith (1955) reported the abundance and distribution of ectoparasites of the giant rat, where he found 49 species of fleas and 15 species of mites, also Sharif (1937) carried out a survey on arthropod ectoparasite of rat *Nosopsyllus fasciatus* seen in the nest of the host, while Mettrick and Podesta (1974) recovered intestinal parasites such as tapeworm *Hymenolepis* sp. Ajayi *et al.* (2007) investigated four groups of helminth; trematode cestode, nematode and acanthocephala. Others that worked on intestinal helminth of *Cricetomys gambianus* included Winfield, (1933), Gaursch, (1949), Prince, (1950), Yorke and Maplestone, (1963), Owen, (1972) and Dipeolu and Ajayi, (1976), who discovered *Nematosproides dubrius* in duodenum and scantly on lower small intestine amongst others. But not much work has been done on combination of ecto and gut parasite of this giant rat. The present paper seeks to fill this information gap and focuses on prevalence of this ecto and gut parasites, the composition of the parasites and rate of multiplication of these parasites.

MATERIALS AND METHODS

Nsukka is located in the northern part of Enugu state and lies on latitude 70 south of equator and between 70 and 80 east of Greenwich meridian. The area is intersected by numerous green hill and valleys. The soil consists of humus, though relatively not rich in nutrient as it appears to be interlocked in clay particles. Tall trees are scarcely found and vegetation

consisting chiefly of grasses. The giant rats collected were mainly from abandoned farm land, grass land and deciduous forest in Nsukka and its environs. The study area have similar vegetation but the habitats occupied by the giant rat *C. gambianus* were different in terms of burrow patterns, location of burrows in relation to trees, topography etc. The vegetation arena descanted are rich in important plants such as cassava *Manihot* sp, oil palm, *Elaeis guineensis* and various shrubs such as *Pennicetum maximum* and *Emelia sonchiofola.*

A total of 15 giant rats *C. gambianus* were collected from different places in Nsukka. Animals were trapped and taken to the Laboratory for immediate experimental exercise which involves the survey and study of both ecto and gut parasites of *C. gambianus.* Various methods were applied to catch these animals while most of them were caught alive using the unbaited snap trap. Sometimes the baited methods were used by setting up traps with cassava slices, food and fruits as baits, near houses and farm land during the evening or at night. Traps were inspected twice daily and recovered giant rats were transported to Zoological Garden where they were kept and fed for sometimes before the commencement of work.

The sex of these animals was determined by examining the reproduction organism which was easily determined externally. The length and weight of the rats were taken using meter rule to the nearest 0. 00cm and beam balance to the nearest 0. 1 gram respectively. The rats were anasthesized using chloroform; the rats remained unconscious after 3 minutes and were examined externally for ectoparasites and dissected for gut parasites.

Ectoparasites: All the ectoparasites found on these animals were collected, with the use of fine brush, Hand lens and dissecting needle and preserved in 70% alcohol for identification (Sharif, 1937).

Gut parasites: The entire guts of each of freshly dissected *C. gambianus* were carefully removed to obtain the gut region namely; buccal cavity, oesophagus, stomach, intestine, caecum, rectum and lungs separately into Petri dishes containing physiological saline (0.85 % NaCl) and examined under the microscope. The worms were sorted out, washed and left in tap water for sometimes to relax the muscles (particularly cestodes) or put in 10 % formalin for few hours before fixing. Some of the worms (particularly nematodes) were stained in acetocamine for easy vision through the internal structures, permanent preparations were made and microphotographs taken. All recovered gut parasites were identified to species level (Owen, 1972; Ajayi *et al.,* 2007).

RESULTS AND DISCUSSION

Of the 15 giant rats examined only 8 showed incidences of fleas (ectoparasite). This represents about 53.33% infection. Amongst the eight giant rats with fleas, a total of 27 fleas *Leptopsylla segnis* were recovered (Table 1). Although the t-test for significant difference between two means was not significantly different, male giant rats had numerically higher incidences of *Leptopsylla segnis* (12.95 ± 8.81) than females (12.03 ± 3.54).

Table 1: Ectoparasitic fauna of the African giant rat *Cricetomys gambianus* in a semi-urban tropical community

S/N	*Leptopsylla segnis*			
	Male		Female	
	Number per rat	% Incidence	Number per rat	% Incidence
1	1	3.7	4	14.8
2	6	22.2	3	11.1
3	5	18.5	2	7.4
4	2	7.4	4	14.8
Total	14	51.8	13	48.1
Mean	3.5	12.95	3.25	12.03
SD	2.38	8.81	0.96	3.54

A total of 2503 gut parasites were recovered, out of which nematodes had the highest prevalence (87.4%) followed by the cesodes (12.6%). No acanthocephalan was recovered. Considering the nematodes, *Nippostrongulus braziliensis* (65.9%) was most prevalent followed by *Strongyloides ophidae* (33. 8%) and *Capillaria columbae* (0.32%) was least prevalent. Cestode was less prevalent and had only one species *Hymenolepis diminuta* (12.6%) (Table 2).

Table 2: Gut parasitic fauna of the African giant rat *Cricetomys gambianus* in a semi-urban tropical community

Parasite species	Number recovered	Prevalence
Nematode	2186	87.41
Nippostrongylus braziliensis	1440	65.9
Strongyloides ophidae	739	33.8
Capillaria columbae	7	0.32
Cestode	315	12.6
Hymenolepis diminuta	315	12.6

Incidence of cestode worms were seen more on the rats measuring between 61 – 70 cm, there was even a case of complete intestine blockade with rolls of proglottides in one of the rats examined.

Table 3: Sexual prevalence of gut parasites as influence by body lengths of African giant rat *Cricetomys gambianus* in a semi-urban tropical community

Body length (cm)	Males	Females	Total
51 - 60	3 (6.43)	3 (5.63)	6 (12.06)
61 - 70	2 (4.29)	4 (7.5)	6 (11. 79)
71 - 80	1 (2.14)	1(1.88)	2 (4.02)
81 - 90	1(2.14)	0 (0)	1 (2.14)
Total	7	8	15

Number in parenthesis represents means.

Table 4: Visceral organ distribution of the helminths of African giant rat *Cricetomys gambianus* in a semi-urban tropical community

Visceral Organ	Total Number of cestodes	Total Number of nematodes	Total	% Incidence of cestodes	% Incidence of nematodes
Stomach	81	408	489	25.7	18.7
Small intestine	123	1143	1266	39.1	52.3
Large intestine	111	628	739	35.2	28.70
Lung	-	7	7	-	0.3
Total	315	2186	2503	99.9	100

Nematode worms dominated on other body lengths of 51 – 60 cm, 71 – 80 cm and 81 – 90 cm. Though there were more worms in the females than the male rats, there was no significant difference. Table 3 illustrates the sexual prevalence of gut parasites as influence by body lengths of giant rats.

Visceral organ distribution of the helminths indicated that all the helminths were more prevalent in the gut regions (small intestine, large intestine, stomach) than in any other organ. Small intestine has the highest number of nematode and cestode, followed by the large intestine and stomach. The lungs had the least number of worms.

Fleas were the least in prevalence of all the parasites recovered. The fleas are often overlooked as vectors of pathogens, but have been shown to harbour, transmit and is an important carrier of bubonic plague (Sharif, 1937). Fleas however have been recovered too from house mouse in Mississippi (Smith, 1955). However the low incidence of the ectoparasites found in this study may be due to their habit of riding themselves of this parasite by licking one another as is reported (Smith, 1955; Sharif, 1937). Fleas are controlled by destroying the adults and making breeding places unsuitable. Adult fleas are destroyed by bathing the host with strong soap and by applying insecticides or petroleum. But these agents must be properly used to avoid injury to the infected animal or the person handling it. Sanitation in the key to practical management system for controlling internal and external parasites of giant rats as well as to prevent other diseases.

A combination of good management and sanitation, plus proper use of insecticidal agents will most effectively control internal and external parasites of (giant) rats.

Nematode infection are very common in giant rats of all ages and sexes and severely infected ones may result to intestinal blockade, this is in line with work of Dipeolu and Ajayi (1976) where they recovered more nematode worms. Cestode infections are less prevalent compared to the nematode infection. Considering the individual nematode parasites, *Nippostrongylus braziliensis* was most prevalent and occurred mostly at the anterior region of the small intestine; they embedded at the mucosa of the host and sucked blood by means of armed buccal cavity. *Strongyloides ophidae* came second and were encountered mainly in the stomach and large intestine, the least was *capillaria columbae* were found mainly in the lungs. The *Hymenolepis diminuta* (cestode) were mostly seen coiled and compacted at the lumen of the small intestine which leads to intestine blockade, they were also discovered in stomach and large intestine.

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