

Original Research Article

URINARY SCHISTOSOMIASIS AMONG FULANI PASTORALISTS IN RIVERS STATE

ABSTRACT

Aims: To determine the distribution and endemicity of urinary schistosomiasis infection among Fulani Pastoralists in their various bush encampments in Rivers State, Nigeria.

Study Design: Cross –sectional, descriptive study.

Place and Duration of Study: Rivers State, Nigeria, between November 2009 and January 2011.

Methodology:

Urine samples were collected from 593 Fulani pastoralists from six bush encampments and examined for schistosome eggs using centrifugation method. The number of eggs obtained per 10ml of urine specimen was counted and quantified as intensity of infection. Egg counts were reported according to the following categories. Light infection -<50 eggs/10ml of urine, Heavy infection- >50 <100 eggs/10ml of urine, Very heavy infection- >100 eggs/10ml of urine. Urine samples were tested for proteinuria and haematuria using commercial reagent strips capable of detecting urinary blood, protein and other parameters. Data was analyzed statistically using ANOVA to test for significance and a *P*- value less than 0.05 was considered statistically significant.

Results: Of the 593 Fulani pastoralist who were investigated, 394(66.4%) were infected with a mean overall intensity of 86.60 eggs/10ml of urine. The herdsmen in Eleme and Oyigbo bush encampments had the highest prevalence of 91(81.3%) and 77(76.2%) respectively with a mean intensity of 96.12 and 93.05 eggs/10ml urine. There were significantly more infected males than the females (*p*<0.05). The subjects aged 21-30 years had the highest prevalence 92 (76.0%) with very heavy intensity of infection (25.0%). About 169(42.9%) of infected Fulani's excreted >50<100eggs /10ml of urine while 132(33.5%) excreted >100 egg/10ml of urine. Haematuria was recorded in 444(74.9%) with majority observed in 31-40 years age group while 427(72.0%) tested positive for proteinuria.

Conclusion: The results of this study have shown that Fulani herdsmen harbour infection and are a source of transmission of urinary schistosomiasis in their settled communities. There is need to intensify integrated control measures to reduce or completely eradicate the disease.

Keywords: Urinary schistosomiasis, proteinuria, prevalence, haematuria, encampments

1. INTRODUCTION

Schistosomiasis is water borne parasitic disease; it is a disease of poverty that leads to chronic ill-health (WHO). The disease is characterized by haematuria and transmitted by particular fresh water snails [1] Reports have established that both natural [2] and artificial water bodies [3] are transmission foci of the parasite. Schistosomiasis is considered by the World Health Organization as the second most socio-economically devastating parasitic disease, next only to malaria. More than 207 million people are infected worldwide; most live in poor communities without access to safe drinking water and adequate

sanitation [4]. The number of people reported to have been treated for schistosomiasis in 2011 was 28.1 million [5]. People are at risk of infection due to agricultural, domestic and recreation/activities which expose them to infested water [5]. Lack of hygiene and play habits make children especially vulnerable to infection. Of the 207 million people with schistosomiasis, 85% live in Africa. Extreme poverty, unawareness of the risk, inadequacy or total lack of public health facilities and the unsanitary conditions in which millions of people live are all factors contributing to the risk of infection particularly in developing tropical countries [6]. Urinary schistosomiasis is widespread in both rural and urban communities in Nigeria, with prevalence ranging between 2% and 90% and the vast majority of cases occurring among the poor and marginalized [7,8]. In Nigeria, schistosomiasis due to *S. haematobium* is widespread constituting a public health problem particularly in children [9,10,11]. The distribution of the disease is focal, aggregated and usually related to water resources and development schemes such as irrigation projects, rice/fish farming and dams. It is estimated that 11 million Nigerians are infected with schistosomiasis especially in the dry Northern areas where *Schistosoma haematobium* is focal and acquired in seasonal pools [12].

2. Materials and Methods

2.1 Study area, Study Subjects and Criteria for Eligibility

The study was conducted in six bush encampments in six communities of Rivers State, Ahoada, Bori, Elele, Eleme, Elenwo and Oyigbo where large population of Fulani herdsmen are settled with their families. Rivers State lies at latitude 4°45' north and longitude 6°50' east and lies along Bonny River in the Niger Delta. Rivers State has tropical rainforests as well as mangrove and salt water swamps with an average rainfall of 2,500cm³. Temperature ranges between 28°C to 33°C which supports the rainforest type of vegetation and relative humidity is high in the State throughout the year and decreases slightly in the dry season.

Fulani's are the largest migratory ethnic group in the world. They are among 'super' ethnic groups of Africa with members numbering 15.3 million in Nigeria. Settled Fulani's live in villages, towns, cities permanently and have given up nomadic life completely, in favour of an urban one. Fulani's are primarily pastoralists and they spend long times alone on foot, they can be seen very frequently in Rivers State parading with their cattle. In this study, source population consisted of Fulani pastoralists who have migrated to and settled in Rivers State for the past six months before this study between November 2009 and January 2011. The Fulani herdsmen were selected randomly (systematic random sampling). Fulani pastoralists live with their families in the bush camps from where they herd their animals in search of green pasture. The bush encampments lack modern infrastructural facilities such as pipe-borne water, adequate waste disposal system, electricity and health facilities. Most bush encampments in the study areas depend on pond, water bodies, and shallow wells, seasonal streams for drinking and domestic water supply. Most of the swampy water bodies are not protected.

Pre-survey contact and mobilization

Before the commencement of the survey, advocacy visits were made to the Fulani heads called Seriki in all the bush encampments chosen for the study. They were duly consulted and this was necessary to ensure maximum co-operation from the Fulani's. Considering the strict socio-cultural and religious observances peculiar to the Fulani's, this preceded actual data collection.

2.2 Data Collection

Oral consent was given by each Fulani before commencing this study. Each participant was given a clean dry screw capped 20ml universal bottle to provide terminal urine between 10.00am and 2.00pm. Personal data (i.e. age and sex in particular) were recorded and completed with the aid of an interpreter and labeled accordingly as recommended by Cheesbrough. Urine samples were tested for proteinuria and haematuria using commercial reagent strips capable of detecting urinary blood, protein and other parameters. (Medi-Test 'Combi-9' reagent; Analyticon Biotechnologies, Lichtenfels, Germany) in accordance with the manufacturers' instructions.

2.3 Microscopic Examination

The sedimentation method described by Cheesbrough [13] was used. Each urine sample was thoroughly mixed after which a 10ml aliquot was transferred into a centrifuge tube and spun at 5000rp for 5min. The supernatant was decanted while a drop of the sediment was placed on a clean grease free slide, stained with drops of Lugol's iodine solution and covered with a cover slip after which it was examined under the microscope using the x10 and x 40 objectives. A sample was recorded as positive were the presence of terminal spine eggs, characteristics of *S. haematobium* is established. The number of eggs obtained per 10ml of urine specimen was counted and quantified as intensity of infection. Egg counts were reported according to the following categories. Light infection - <50 eggs/10ml of urine, Heavy infection > 50 <100 eggs/10ml of urine, Very heavy infection > 100 eggs/10ml of urine.

2.4 Data Analysis

Urine specimens were stratified according to age, sex and various bush encampments. Data was analysed statistically using ANOVA. Values were considered statistically significant at $P < 0.05$

Results

3.1. Prevalence and Intensity of *S. haematobium* infection by bush encampments

Of the 593 Fulani pastoralists urine samples examined from six bush encampments for *S. haematobium* 394 (66.4%) were infected with mean intensity of 86.60 eggs/10ml of urine, while 199 (33.6%) were uninfected with *S. haematobium*. The Fulani's in Eleme bush encampment had the highest prevalence of infection 91 (81.3%) with mean intensity of 96.12 eggs/10ml urine followed by Oyigbo bush encampment with prevalence of 77 (76.2%) with mean intensity of 93.05 eggs/10ml urine. Least prevalence of 46.5% with intensity of 60.27 eggs/10ml urine was recorded among the Fulani's in Bori bush encampments. There was no significant difference ($\chi^2 = 4.78, p > 0.05$) in the prevalence of *S. haematobium* between the six bush encampments. However, of the 394 positive samples 169 (42.9%) Fulanis had heavy infection with Elele bush encampment having the highest prevalence of 37 (21.9%) followed by Eleme 35 (20.7%). A total of 132 (33.5%) had very heavy infection with Eleme and Oyigbo bush encampment having the highest prevalence of 41 (31.1%) prevalence and (25.0%) respectively, while 93 (23.6%) of the Fulanis had light infections. However, there was no significant difference in the intensity of infections ($p > 0.05$).

Table.1 Prevalence and Intensity of *S. haematobium* infection by bush encampment among Fulani Pastoralists in Rivers State

Bush Encampment	NE	NI (%)	NNI	Light	Heavy	V. Heavy	Mean Intensity
Ahoda	89	47(52.8%)	42(47.2)	3(3.2%)	24(14.2%)	20(15.2%)	86.09
Bori	71	33(46.5%)	38(53.5)	12(12.9%)	19(11.2%)	2(1.5%)	60.27

Elele	105	74(70.5%)	31(29.5)	31(33.3%)	37(21.9%)	6(4.5%)	58.08
Eleme	112	91(81.3%)	21(18.7)	15(16.1%)	35(20.7%)	41(31.1%)	96.12
Elelenwo	115	72(62.6%)	43(37.4)	14(15.1%)	28(16.6%)	30(22.7%)	91.7
Oyigbo	101	77(76.2%)	24(23.8)	18(19.4%)	26(15.4%)	33(25.0%)	93.05
Total	593	394(66.4)	199(33.6)	93(23.6%)	169(42.9%)	132(33.5)	86.60

NE= Number Examined; NI= Number Infected; NNI= Number not infected; <50eggs/10ml of urine=Light infection; >50
<100eggs/10ml of urine = Heavy infection; >100eggs/10ml of urine = Very heavy infection

3.2 Prevalence of *S. haematobium* infection in relation to sex

Of the 394 Fulani pastoralists infected 68.0% and 63.8% were males and females respectively, the highest prevalence of infection was observed among the males in Eleme 83.6% and the least 12 (45.5%) among the females in Bori ($p<0.05$) **Figure 1**. Of the infected female 36.6% had a low infection while 40.2%, 31.9% had heavy and very heavy infection respectively. More so, 68.9% of the male had a very high infection while 63.4% and 59.8% had low and heavy infection (Table 2).

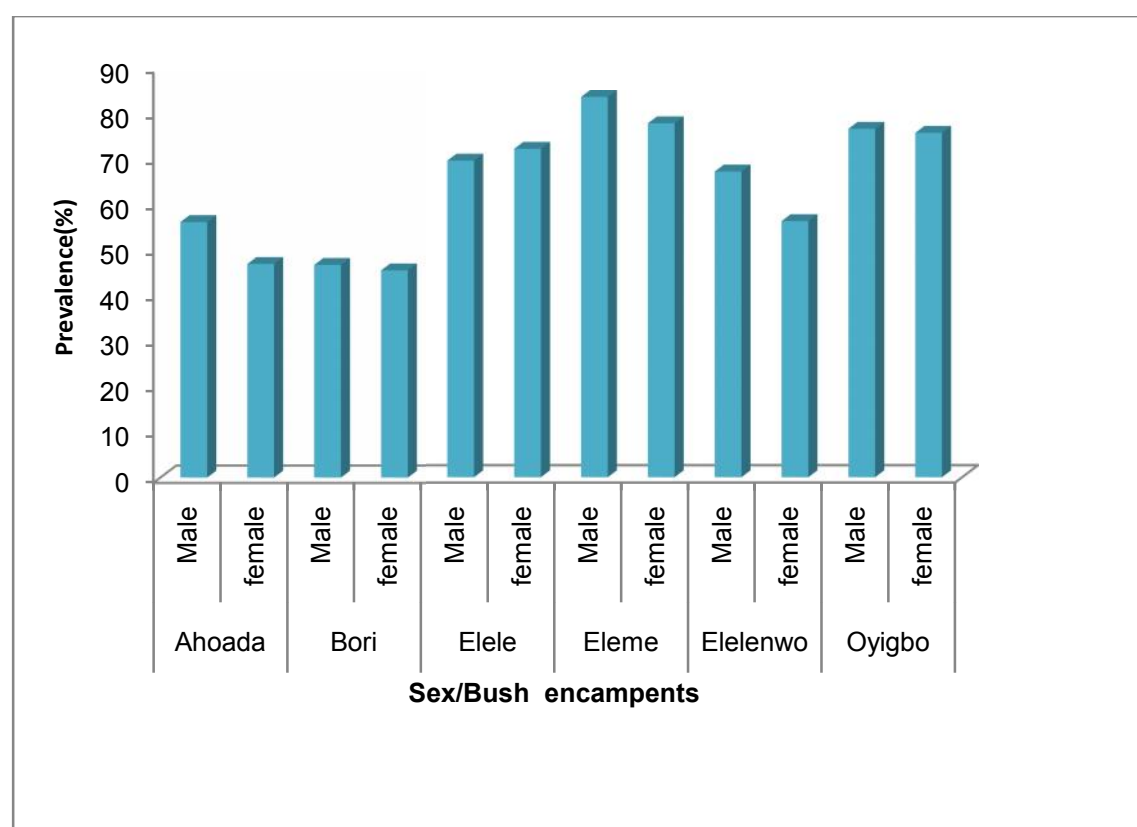


Figure 1: Prevalence of *S. haematobium* infection in relation to sex

Table 2. Sex- related egg count in *S.haematobium* in infection among Fulani herdsmen.

Egg/10ml of urine	Males	Females	Total
<50eggs/10ml	59 (63.4%)	34 (36.6%)	93 (23.6%)
>50<100 eggs/10ml of urine	101 (59.8%)	68 (40.2%)	169 (42.9%)
>100 eggs/10ml of urine	91 (68.9%)	41(31.1%)	132 (33.5%)

Total	251 (63.7%)	143 (36.3%)	394
<50eggs/10ml of urine=Light infection; >50 <100eggs/10ml of urine = Heavy infection; >100eggs/10ml of urine = Very heavy infection			

3.3 Prevalence of *S. haematobium* infection in relation to age

There was a statistical difference in the rate of infection in the different age groups within the six bush encampments ($p=0.007$). The age group 21-30 years had the highest prevalence 92 (72.0%) followed by 109 (76.0%) while the least prevalence of 67.8% occurred within the age group 50 years and above. The age group 11-20 years in Eleme bush encampment has the highest prevalence of 86.4% while the least 20.0% was recorded among 1-10 years age group in Bori bush encampment.

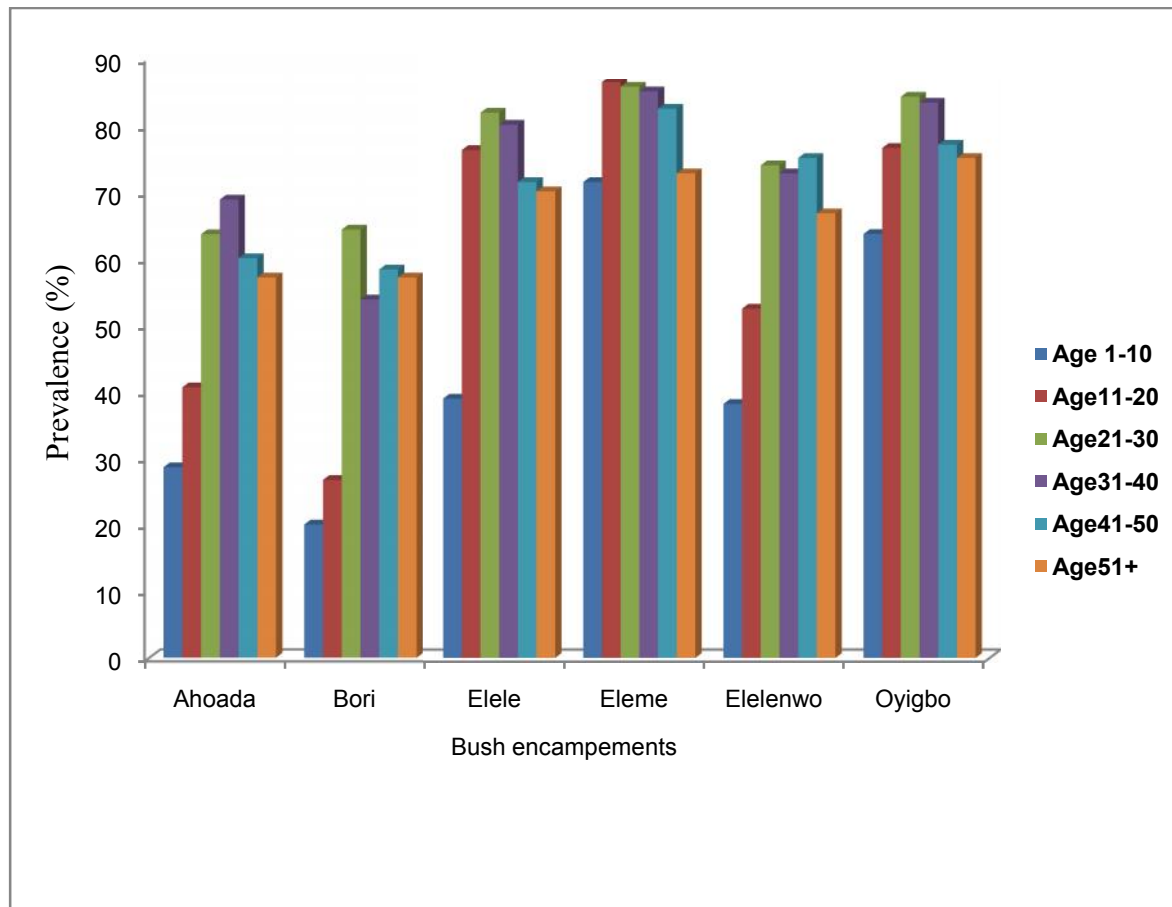


Figure 2: Prevalence of *S. haematobium* infection in relation to age

3.4 A total of three hundred and ninety four Fulani pastoralist were infected. Of these, ninety-two were with the age group 21-30 years, out of which 28(30.1%) had a light infection, 31 (18.3%) had heavy infection and 33(25.0%) had very heavy infection. However, fifty infected children were within the age group 1-10years and of these 13(13.9%) (11.8%) and 17(12.9%) were presented with light, heavy and very heavy infections respectively. The intensity of infection and age is significant at 5% significant level. Since p-value (0.001 and .004) is <0.05 respectively.

Table 3: Intensity of infection by age

Age group	Light	Heavy	Very heavy	Total
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1-10	13(13.9%)	20(11.8%)	17(12.9%)	50(7.2%)
11-20	14(15.1%)	33(19.5%)	24(18.250)	71(61.2%)
21-30	28(30.1%)	31(18.3%)	33(25.0%)	92(76.0%)
31-40	21(22.6%)	39(23.1%)	22(16.7%)	82(72.2%)
41-50	12(12.9%)	24(14.2%)	23(17.4%)	59(72.0%)
51-60	5(5.4%)	22(13.0%)	13(9.8%)	40(67.8%)
Total	93(23.6%)	169(42.9%)	132(33.5%)	394(66.4%)

<50eggs/10ml of urine=Light infection; >50 <100eggs/10ml of urine = Heavy infection; >100eggs/10ml of urine = Very heavy infection

3.5. Prevalence of haematuria and proteinuria by age showed

A total of 444 (74.9%) and 427 (72.0%) respondents tested positive for haematuria and proteinuria in their urine of which 31-40 years had the highest prevalence of haematuria 96 (88.1%) and 69(59.5%) proteinuria followed by 21-30years with 83.5% haematuria and 106 (87.6%) while the least was 1-10 years with 50.9% and 41.5% proteinuria and haematuria respectively. However, there was no significant difference between haematuria, proteinuria and age ($p>0.502$).

Table 4: Age – related result of urinalysis showing number of proteinuria and haematuria

Age grade years	No. examined	Ova +ve %	No. positive for haematuria	No. positive for proteinuria
1-10	106	50(47.2%)	54(50.9%)	44(41.5%)
11-20	116	71(61.2%)	78(67.2%)	69(59.5%)
21-30	121	92(76.0%)	101(85.5%)	106(87.6%)
31-40	109	82(75.2%)	96(88.1%)	98(89.9%)
41-50	82	59(72.0%)	67(81.7%)	64(78.0)
50+	59	40(67.8%)	48(81.4%)	46(77.9%)
Total	593	394(66.4%)	444(74.9%)	427(72.0%)

4. Discussion

Several studies on urinary schistosomiasis in Rivers State had tended to focus on school-age children and adults, with little or no emphasis on Fulani pastoralists in the State. The result of this study shows a prevalence rate of 66.4% with Fulani's in Eleme and Oyigbo bush encampments having migrated from Plateau and Ogun State in Nigeria had a prevalence of 81.3% and 76.2% respectively. This result was higher than those of Anosike [14]) who in a similar research in Eastern Nigeria reported 8.1% prevalence rate, but lower than those of Eze [15] who reported 71.1% prevalence among the Fulani dwellers in Obinze, Owerri. Endemicity of urinary schistosomiasis in the bush encampments could probably be attributed to a number of favourable factors which include availability of manmade water- bodies due to the activities of the Fulani pastoralists, low literacy, presence of infected water bodies like streams, ponds where daily chores like washing, fetching of water for domestic purposes where they settled before migrating to Rivers State. It could also be attributed to closeness to open water sources and the bush encampment being at the outskirts of the cities where some residents still disposed their stool indiscriminately. However, the high prevalence in the study could have been acquired in the waterlogged areas or infested ponds during herding. The unprecedented level of schistosomiasis recorded among this population in Rivers State could be connected with migratory habit of the individuals and probably not to the presence of intermediate snail hosts, since no snail intermediate hosts of the parasite were found in the available natural water sources in the bush encampments.

Majority of the infected population of the present study harboured heavy infection with a mean egg output of 86.60/10ml urine. This seem to be far lower than the 309.06 eggs/10ml urine reported by Ladan [16] as well as the 114.2eggs/10ml urine reported by Ugbomoiko [17] in two communities of Osogbo, Osun, Nigeria. The reason for this could be due to several factors such as density of infected snail intermediate hosts in the water bodies. However, similar trends have been observed by Kanwai [18] in sedentary Fulani settlements of Dumbi Igabi L.G.A, Kaduna State, Nigeria and Bala [19] in prevalence and intensity of urinary schistosomiasis in Abarma village, Gusan, Nigeria. This clearly results to intense transmission and high morbidity. Higher male prevalence may have resulted from their exposure to the infection sites and from the water logged areas or infected ponds during herding. The higher prevalence and intensity observed among males compared with females could be also attributed to their high involvement to male contact activities engaged which exposed them to cercariae infected water. The Fulani females were less likely to be infected because of socio-cultural restriction to water contact activities. Culturally, it is embarrassing for the young Fulani females to swim naked outside. All the ages studied had infection, showing that infection with urinary schistosomiasis among the Fulani's occurs very early in life through exposure to contaminated water bodies. The young children are often involved in more activities that bring them to infested ponds, such as watering of the cattle, washing and bathing. However, it could be the result of early exposure to infested water bodies when they are taken along with their mothers. The decrease of infection with increase in age could also be due to increased immunity with increase in age as reported by Chigozi [20,14]. The age group 21-30 years had the highest prevalence and was more heavily infected because of their high levels of water contact and exposure to cercariae for various reasons. They are also the active working force while the decreased among the elderly subjects who probably have reduced schistosome worms and less eggs [1, 21]. More so, reduced worm burden in patients of older ages 50 years and above may have resulted from the development of concomitant immunity known to occur in the infection. The high excretion of schistosomes egg among 21-30 years old could be attributed to increased worm burden and the high fecundity rate of schistosome parasites. The findings in this study suggest that most infected of the population excreted >50 <100 eggs/10mls of urine and a small proportion excreted <50 eggs/10ml. This could be due to the differences in the degree of water contact among the Fulani. High rate of haematuria and proteinuria indices in positive samples suggests heavy infections and are associated with schistosomia.

5. CONCLUSION

This study reveals that urinary schistosomiasis is highly prevalent among the Fulani Pastoralists in Rivers State. This findings support an urgent need to start an effective schistosomiasis control programme among this group. Provision of clean and safe drinking water, periodic drug distribution, health education and introduction of proper sanitation are important in order to curb this among the Fulani's. However, the government and health officials should ensure thorough check up and treatment of the Fulani's whenever they migrate to the State.

CONSENT

All authors have declared that written informed consent was obtained from the patients for publication of this case report and accompanying images

ETHICAL APPROVAL

Ethical approval was gotten from the ethical committee of the Rivers State Ministry of Health before the commencement of this research.

All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964.

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