DESCRIPTION OF CATTLE—*cont.*

Black with white on sides, *Kepe.*
Black with white head, *Lelkut.*
White, *Sirue* or *Lelel.*
White with black head, *Toimet.*
White with red head, *Pirirmet.*
With white mark on forehead and black, *Kimnaria.*
White round eyes, *Komarkong.*
Red brown, *Sitye.*
Reddish, *Mukye.*
Black with red on legs and belly, *Seroi.*
Spotted, *Samo.*
Light grey, *Porus.*
Hornless, *Karoi.*
With erect horns, *Ngatimet.*
With horns pointing in front, *Puruk.*
With crumpled horns, *Seta* or *Ngelech.*
Horns pointing inwards to meet, *Kulunymet.*
One eyed, *Makong.*
Timid, *Ngosos.*
Thin, *Tenden.*
Fat, *Sambururut.*

NOTES ON THE PREVALENCE OF INTESTINAL PARASITES IN EAST AFRICA

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During the last quarter of 1914, a short series of microscopic examinations of the fæces of natives, complaining of intestinal troubles, admitted into or attending at the Native Hospital, Mombasa, were undertaken.

Of 100 examinations, 83 per cent. were positive, 17 per cent. negative. The percentage of the different ova present was as follows :—

	Per cent.
Ankylostoma duodenale	46
Ascaris lumbricoides	44
Trichocephalus dispar	43
Tænia saginata	29
Schistosoma Mansoni	5
Oxyuris vermicularis	2
Strongyloides stercoralis	3

On further investigation, during part of 1915 and 1916, a total of 1500 examinations were made not only of African natives, but of Indians of the Expeditionary Forces and Washihira Arabs of the Arab Rifles.

		Positive. Per cent.	Negative. Per cent.
Total No. of Observations	1500	51·8	48·1
,, ,, Indians	728	31·7	68·2
,, ,, Arabs	83	62·6	37·3
,, ,, African	689	71·8	28·1

It is necessary to state at the outset that all the subjects examined—Indians, Arabs, and Africans—were, as a whole, under conditions inseparable from active service. The percentages of infections may, with certain reservations, therefore be considered to be somewhat higher than they would be under ordinary conditions of life for each of the above races.

No special distinction was drawn in the selection of patients for examination, as was for those shown in the first table, but cases admitted for all diseases were included.

Considering the Indians of the civilian class following occupations such as those of clerks, railway-men, merchants, traders, and shop-keepers, it may be said that they rarely suffer from intestinal parasites.

What the figures for these may be it is impossible to say; but one cannot recollect having seen more than three cases, during a period extending over two years, at Mombasa.

The factors governing this are cleanly habits, thorough cooking of food, protection of the feet by boots; latrines, and a sanitary use of them.

The comparatively high degree of infections among the Indian troops is, without doubt, due to the converse of these conditions holding in the field; and although the different infections were more or less evenly distributed for most areas and seasons of the year, the sick sent in from one area in particular, during the latter half of 1915, infected with ankylostomiasis, contributed materially towards raising the total percentage.

The Arab and African—for the class of native admitted—fighting-men, followers, and carriers, cannot be regarded as abnormally high when compared with work done elsewhere on institutional and village infection under similar sanitary or climatic conditions, or both. African troops, police, and domestic servants, suffer far less from helminthic invasion than the villager, whose infection is due to promiscuous defæcation in any patch of scrub he finds convenient. This habit is universal, and, probably, more than any other factor, accounts for the wide-spread distribution of ankylostomiasis. It is not in any way unlikely that in this manner the fæces of one or two infected individuals may, in a very short time, be the cause of the infection of the inhabitants of a whole village or series of villages.

Some points with reference to the ages of those suffering from ankylostomiasis may be of interest. Children and young adults, unless heavily infected or suffering from some intercurrent disease, do not apply for treatment as frequently as one might suppose. Of this type, those who do so, do not, as a rule, refer their symptoms to any particular system, but give vague histories of not feeling well or of vertigo; and, in the case of police *askari*, usually approach one with the idea of obtaining a change or transfer to stations in their own native districts: the reasons advanced being that the local food, water, salt breezes, or want of them—dependent on the area in which they are at the time of serving—have in some abstruse manner seriously affected their health.

These also frequently develop mental symptoms, taking the form of home sickness, melancholia, and delusional insanity. In all such instances the fæces should always be examined.

The adult coast-native possesses, as a rule, a full knowledge of the disease, and when applying for treatment states that he is suffering from ankylostomiasis, or *safura*, as he calls it, and the clinical picture is usually characteristic.

Ankylostomiasis is not uncommonly a terminal infection in the aged.

The first table, immediately below, gives details of the different causal parasites observed. The other two tables

show the percentages by classes, combined and individual, for the five chief infections :—

	Total.	Indians.	Africans.	Arabs.
Total	1500	728	689	63
Positive . . .	778	231	495	52
Negative . . .	722	497	194	31
Ankylostoma duodenale	347	110	208	29
Ascaris lumbricoides .	270	63	195	12
Trichocephalus dispar .	313	49	235	29
Tænia saginata . .	168	41	120	7
Schistosoma Mansoni .	29	1	24	4
Oxyuris vermicularis .	2	1	—	1
Hymenolepis diminuta .	1	—	—	1
Schistosoma hæmatobium	3	—	2	1
Strongylus subtilis .	4	3	1	—
Hymenolepis nana .	2	1	1 *	—
Strongyloides stercoralis .	2	—	2	—
Double Infections .	197	34	146	17
Triple Infections . .	63	3	54	6
Quadruple Infections .	10	—	9	1
Quintuple Infections .	1	—	1	—

INDIANS, ARABS, AND AFRICANS COMBINED

	Per cent.
Ankylostoma duodenale (Positive) . .	23·1
Ascaris lumbricoides	18·0
Trichocephalus dispar	20·8
Tænia saginata	11·2
Schistosoma Mansoni	1·9
Double Infections	13·1
Triple Infections	4·2
Quadruple Infections	0·6
Quintuple Infections	0·06

* This infection occurred in one of the nineteen Cape boys mentioned below.

INDIANS, ARABS, AND AFRICANS—*cont.*

	728 Indians. Per cent.	83 Arabs. Per cent.	589 Africans. Per cent.
Ankylostoma duodenale	15·1	34·9	30·1
Ascaris lumbricoides	8·6	14·4	28·3
Trichocephalus dispar	6·7	34·9	34·1
Tænia saginata	5·6	8·4	17·4
Schistosoma Mansoni	0·6	4·8	3·4
Double Infections	4·6	20·4	21·1
Triple Infections	0·4	7·2	7·8
Quadruple Infections	—	1·2	1·3
Quintuple Infections	—	—	0·1

African natives of the following tribes or sub-tribes were examined :—

Wa-Bugu	Wa-Kamba	Wa-Nandi
Wa-Bukedi	Wa-Konde	Wa-Zegua
Wa-Bajun	Wa-Kavirondo	Wa-Ziba
Wa-Barawa	Wa-Kikuyu	Wa-Nyoro
Wa-Chaga	Wa-Kisii	Wa-Nyamwezi
Wa-Dama	Wa-Lendu	Wa-Nyema
Wa-Digo	Wa-Lumbwa	Wa-Pokomo
Wa-Dengereko	Wa-Yao	Wa-Pemba
Wa-Embu	Wa-Makua	Wa-Rabai
Wa-Ganda	Wa-Masamba	Wa-Sawa
Wa-Giriama	Wa-Murua	Wa-Sagara
Wa-Swahili	Wa-Meru	Wa-Segeju
Wa-Gazija	Wa-Nubi	Wa-Sebei
Wa-Kakameka	Wa-Naauruma	Wa-Somali
Wa-Kakoa	Wa-Nyassa	
Wa-Kala	Wa-Nyika	

Nineteen Cape boys are included in the whole total for Africans.

The following table shows percentages of infections

among those tribes of which numbers over twenty-five were examined :—

TABLE SHOWING PERCENTAGES OF INFECTIONS AMONG THOSE TRIBES OF WHICH NUMBERS OVER TWENTY-FIVE WERE EXAMINED

The Nubi are here included to show the high degree of Bilharzial infection among them.

—	Wa-Ganda	Wa-Kavirondo	Wa-Kamba	Wa-Kikuyu	Wa-Kisii	Wa-Nubi	Wa-Nyamwezi	Wa-Somali	Wa-Swahili	Total other East Africans
No. of individuals examined	25	166	44	91	61	13	39	21	107	103
Infections—										
A. duodenale	24·0	18·0	29·5	36·2	29·5	15·3	48·7	23·8	44·8	32·0
A. lumbricoides	12·0	39·1	22·7	39·5	29·5	15·3	23·0	23·8	18·6	26·2
T. dispar	28·0	33·1	23·0	30·7	27·7	33·0	41·0	33·3	47·6	3·30
T. saginata	16·0	25·9	18·1	24·1	22·9	7·6	12·8	14·2	8·4	9·1
Schis. Mansoni	12·0	3·0	6·8	—	—	30·7	2·5	—	1·8	5·8
Double infections	24·0	19·8	20·4	18·6	22·9	15·3	28·2	28·5	25·2	20·3
Triple ,,	4·0	8·4	6·8	12·0	13·1	—	12·8	4·3	8·4	7·7
Quadruple ,,	—	2·4	—	4·3	—	—	2·5	—	—	—
Quintuple ,,	—	—	—	—	—	—	—	—	—	—

It is not, of course, suggested that figures deduced from examinations, varying between 25 to 150 members of any one tribe, examined at a distance from their homes, can be taken as an index of the general and tribal distribution of helminthiasis in East Africa. Nevertheless, curiously enough, in nearly every instance in which the distribution of a disease was previously known, an examination of the last table shows that the natives from those areas return a proportionately high rate of infection to a remarkable degree. For example, bilharzia is well known on the Upper Nile, and a reference to the table immediately shows true by recording a high percentage figure for the tribes therefrom : the Nilotic Nubi giving a return of no less than 30·7 per cent.

It has also been recognised for some time past that the natives settled in the Nyika country, along the course of the Kibwezi and Sabaki rivers, are infected with the same disease,

and this is borne out by the 6·8 per cent. for *S. Mansoni* for the Wa-Kamba.

The Wa-Giriama—following figures not included in this paper—are also infected: probably very heavily, for of eighteen porters sent for physical examination, who appeared to be in good health, a history of previous hæmaturia was obtained from nine; and of four of these, who also stated that they could pass blood at the time, and which was done, the terminal-spined ova of *S. hœmatobium* were demonstrated in all.

On the other hand, the high figures for the tapeworm infections—almost all *T. saginata*—are due, I believe, to the personal habits of the natives of certain tribes—*i.e.*, the Wa-Kavirondo, Kikuyu, and Kisii—who do not cook their meat sufficiently, but eat it practically raw, and their results are therefore correspondingly raised.

Variations in the distribution of the various infections are thus not only dependent upon geographical, climatic, and seasonal conditions, but likewise on the tribal and individual habits of the native.

Parasitic human helminthiasis occupies an important position in its bearing on the question of native labour, more especially with reference to its relationship to the inefficiency and mortality which occur whenever such labour is concentrated on works, whatever they happen to be.

From the administrative outlook the problem for the present must apparently confine itself to the practical sanitation of townships, stations, and areas, necessarily circumscribed and selected, on which native labourers are employed in large numbers.

Expenditure incurred for such special and temporary reasons, and directed towards the attainment of immediate results, is not only justifiable but economic.

No ultimate and permanent results could be anticipated with reasonable expectation of success were the same principle to be applied to large areas, except at an entirely prohibitive cost, unless there were at the same time a decided advancement in the standard of education and civilisation of the native.