INCIDENCE OF HELMINTHIASIS AMONG THE OAYANA INDIANS OF SURINAM AND FRENCH GUIANA

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In this 1971 study of intestinal helminthiasis in the Oayana Indians living in six villages on the Maroni, Lawa, and Itany rivers, *Ascaris lumbricoides* was identified in 44% of the fecal specimens, *Strongyloides stercoralis* in 26%, *Necator americana* in 59%, *Trichuris trichiura* in 53%, and *Taenia solium* in 13%. The incidence of these parasites is reported by age-group and sex of the infected host.

The Carib-speaking Oayana currently reside in semipermanent villages along the upper Maroni River and its major tributaries in southeastern Surinam and adjacent French Guiana. The elevation varies from 450 m to 600 m; rainfall, averaging 2,000 mm annually, is concentrated in two rainy seasons alternating with two dry periods; the dominant climax vegetation is tropical rainforest (1).

An estimated 500 Oayana live in Surinam and French Guiana, approximately 200 more than earlier reported (1). The indigenous population is dispersed in 20 to 30 villages, each containing 25 to 30 inhabitants (1).

The parasitological data presented herein were collected in July, 1971, ancillary to preliminary field studies in tropical human ecology of the Oayana. Fecal specimens were obtained from inhabitants of six villages on the Maroni, Lawa, and Itany rivers (Table 1).

To our knowledge no previous investigations on intestinal helminthiasis among the Oayana have been undertaken. The Oayana and adjacent Trio were surveyed in 1952 for histoplasmosis, tuberculosis, typhoid, syphilis, and filariasis (1), in 1958 for yellow fever (2), and in 1967 for tuberculosis (3).

METHODS

At each village 4-ounce sterilized vials were randomly distributed. The sex and age of each donor were recorded. If the age could not be ascertained precisely or if it were suspected that the sample was from another individual, the specimen was referred to the category "age unknown" (Tables 1 and 2). Although the total sample is numerically small, it represents at least 10% of the known Oayana residents in the Guianas.

Fecal samples were preserved in 30% formaldehyde for storage and transportation. In the laboratory, individual samples were filtered through standard gauze into 10 mm centrifuge tubes to which 1 ml of 100% ether was added. The samples were then centrifuged for 3 min after which the supernatant was decanted. The residue was then examined microscopically for ova. Non-helminthic intestinal parasites were not retained for study although the incidence and identification were noted.

RESULTS

Ascaris lumbricoides was identified in 44% of all fecal samples, *Strongyloides stercoralis* in 26%, *Necator americana* in 59%, *Trichuris trichiura* in 53%, and *Taenia solium* in 13%.

The incidence by sex of the host (20 males and 32 females) was: *A. lumbricoides*, 47% (♂), 53% (♀); *S. stercoralis*, 36% (♂), 64% (♀); *N. americana*, 30% (♂), 70% (♀); *T. trichiura*, 43% (♂), 57% (♀).

DISCUSSION

Historically, the Oayana established their villages on high riverine bluffs from which site vegetation is removed and the area is kept meticulously clean. The porous soil permits rapid percolation of water during

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TABLE 1. *Incidence of helminthiasis by village.*

Village	*Ascaris lumbricoides* (%)	*Strongyloides stercoralis* (%)	*Necator americana* (%)	*Trichurus trichiura* (%)	*Taenia solium* (%)	Number of fecal samples examined
Malawat	44	31	62	75	12	16[a]
Palansiwa	59	14	43	28	14	7
Alowike	50	16	58	50	0	12
Koemastapan	50	25	75	25	50	4
Ceneka	20	20	40	60	0	5
Alabe	50	50	75	50	25	8

[a] Of the 16 fecal samples examined 44% contained *A. lumbricoides*, 31% *S. stercoralis*, 62% *N. americana*, 75% *T. trichiura*, 12% *T. solium*. Percentages were similarly calculated for other samples.

TABLE 2. *Incidence of helminthiasis by age-groups among Oayana.*

Age-group (yr)	*Ascaris lumbricoides* (%)	*Strongyloides stercoralis* (%)	*Necator americana* (%)	*Trichurus trichiura* (%)	*Taenia solium* (%)	Number of fecal samples examined
0-10	21	7	3	4	28	9[a]
11-20	13	0	12	10	14	6
21-30	8	7	6	7	0	4
31-40	28	0	9	14	0	6
41-50	13	7	9	14	0	4
51-60	1	42	22	25	14	9
Unknown	30	35	35	14	42	14

[a] Of the 9 fecal samples examined *A. lumbricoides* was diagnosed in 21%, *S. strongyloides* in 7%, *N. americana* in 3%, *T. trichiura* in 4%, and *T. solium* in 28%. Percentages were similarly calculated for other samples.

the rainy season. Numerous trails and paths lead from the village to cleared fields in the rainforests where yuca (*Manihot* sp.) and plantain (*Musa* sp.) are grown. Sites along more frequently travelled paths are designated for defecation. These areas are used by adults and older children. The buttocks of infants are cleaned with a stick which is tossed into the nearest clump of vegetation. Toddlers are led to the nearest clump of bushes. Feces are usually haphazardly covered with soil or leaves. The concentration of fecal deposits along frequented trails as well as its dispersion in the village, the absence of footwear, the culturally defined hygienic habits, and optimal environmental conditions serve to perpetuate the high incidence of intestinal helminthiasis.

Except for the 51-60 age group, the incidence of *S. stercoralis* and *N. americana* was relatively constant (Table 2.) No significant differences were obtained among the villages (Table 1). Belding (4) noted that *S. strongyloides* and *N. americana* occur sympatrically, but that *S. strongyloides* is less abundant. Most of the infections are apparently acquired and maintained among adults through visits to the "village latrine." The higher level of infection among the 51-60 age group cannot be explained at present.

Infections of *A. lumbricoides* were highest among the 0-10 age group (Table 2), a level attributable to lax sanitation, in part culturally defined, and to the fact that younger children play in contaminated soil. The high level of ascariasis in adults is probably maintained by the noticeably indifferent personal hygiene. No significant differences in incidence of infection occurred among villages (Table 1).

The frequency of *T. trichirua* was relatively constant in all but the oldest age group (Table 2), but the levels of trichiuriasis varied widely among villages (Table 1). The significance of the variance is not known.

The incidence of *T. solium* was greater among the 0-10 age group (Table 2), yet it also varied widely among the villages (Table 1). The primary reservoir of taeniasis is probably the peccary, *Tayassu pecari*, also a major source of animal protein. The flesh is eaten either smoked or boiled in the "pepper pot" (a continuously boiling soup containing meat, fish, pepper (*Capsicum*), and other ingredients). The latter method of preparation apparently

destroys the cysticerci. Children and adults often nibble on smoked peccary throughout the day, probably the source of viable cysticerci, although adults consume less smoked meat, preferring to eat from the "pepper pot" in the early morning and late afternoon. Belding (4) noted that cysticerci are killed at 40-50 C., temperatures apparently seldom attained during the smoking process.

Dunn (5), summarizing the available data on intestinal helminthiasis among certain tropical hunters and gatherers, ascertained that the Semang of Malaya and the Pygmy of Africa possess 10 and 11 species of intestinal helminths, respectively. He related the number of helminth species to numerous adaptive opportunities which, in turn, reflects the greater diversity of species of vectors, intermediate hosts, and alternative hosts for infective organisms. The Oayana, more culturally evolved, occupy a similar neotropical habitat. Given a greater population sample, the number of species of intestinal helminths would probably equal that of the aforementioned tropical rainforest populations.

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