Prevalence of *Wuchereria bancrofti* in Georgetown, Guyana[1]

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A random sample bloodsmear survey was conducted during evening hours in Georgetown, Guyana, to determine the prevalence of* Wuchereria bancrofti *microfilariae. In all, 182 of 2,818 persons tested (6.5%) yielded positive results—indicating that the overall prevalence of Bancroftian filariasis has not diminished and may be on the rise. Relatively high prevalences found in children and adolescents point to active transmission. It appears likely that certain socioeconomic and environmental factors have been contributing to such transmission, and that similar factors could encourage increased transmission elsewhere in the Americas as well.

It is thought that improved living standards have made a major contribution to the declining prevalence of Bancroftian filariasis in the Americas since the turn of the century (*1*). No longer is the disease widespread or regarded as being of major public health importance in the Region. Nevertheless a number of foci have persisted, most notably in Brazil, Costa Rica, Guyana, Haiti, and Trinidad and Tobago.

The results of clinical, parasitologic, and epidemiologic filariasis surveys in endemic coastal areas of Guyana were reported by several workers from 1948 through 1964 (*2–7*). According to an unpublished report by Muller and Tikasingh (*8*), as of 1975 the most extensive recent surveys were those conducted during the period 1963–1969 by the Filaria Control Unit of the Ministry of Health, mainly in the Demerara Region (Region IV, which includes the capital city, Georgetown). These latter surveys, which recorded *Wuchereria bancrofti* microfilaria indexes ranging from 4.8% to 12.3%, pointed to an apparent decline in overall prevalence since the mid-1940s, when a 15.9% index was recorded (*2*). With the exception of a limited microfilaria survey performed in Georgetown in 1981 (Stroom, unpublished report), in which a prevalence of 4.1% (56 of 1,365 people tested) was recorded, no systematic surveys have taken place since the 1960s.

Since then, changes have occurred in both urban and suburban socioeconomic conditions that could intensify filariasis transmission. In order to determine whether any major changes in filariasis endemicity had actually taken place, and also to provide a baseline for future monitoring, a microfilaria prevalence survey was conducted in the Greater Georgetown Area in 1984. This article reports the results of that survey.

MATERIALS AND METHODS

The city center and suburbs of Georgetown, with a total population estimated

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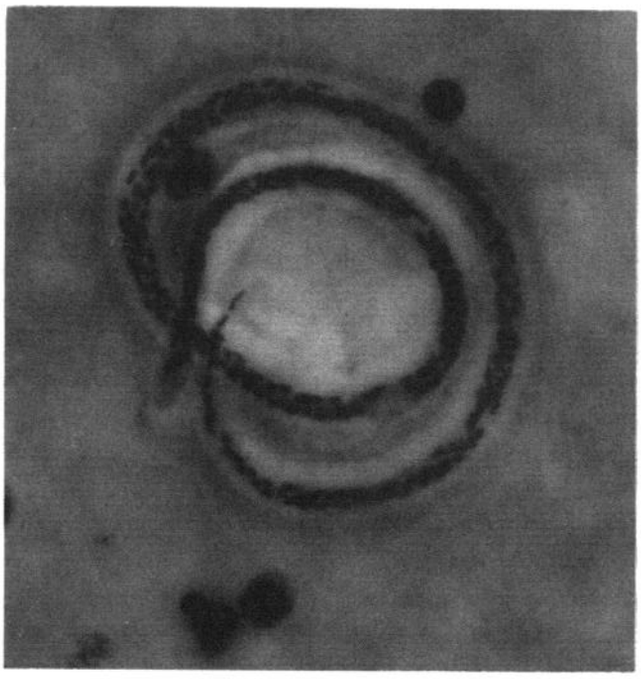

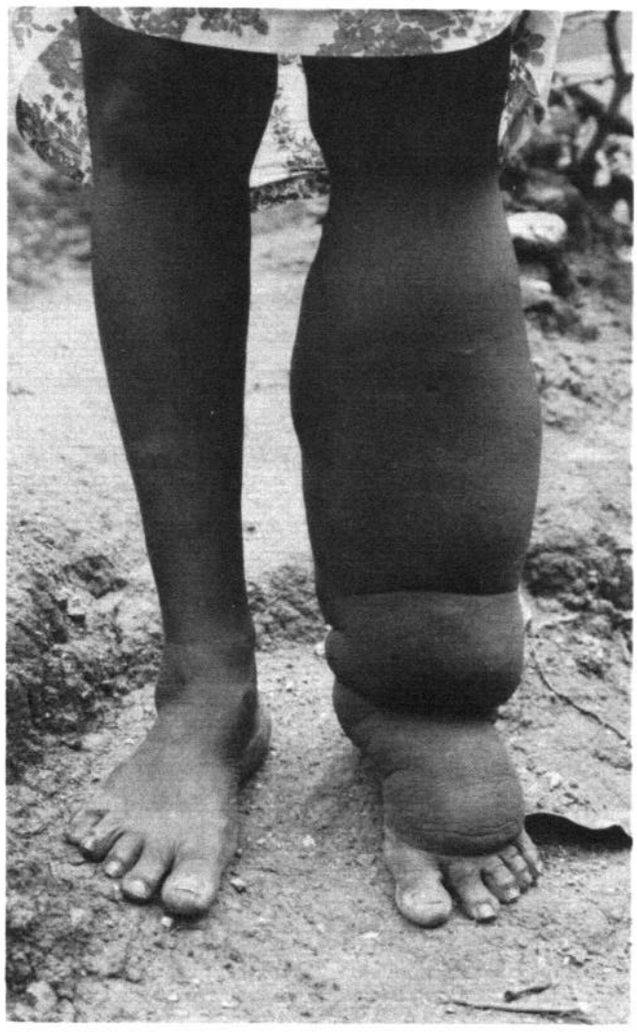

Wuchereria bancrofti (left) and a case of elephantiasis resulting from *W. bancrofti* infection in Trinidad (right).

at 167,839 (1980 national census), were subdivided into nine areas for survey purposes. Each area included between two and eight municipal units or wards. Survey households were randomly selected in a systematic manner within each area. The household heads involved were notified of the survey in advance in order to enlist their support.

Thick smears were prepared using approximately 20mm^3 of blood taken by finger prick from each member of the household present at the time of the visit. These smears, collected between 8 p.m. and 12 p.m., were dried and stored overnight. After staining with Giemsa, using standard procedures, they were microscopically examined for the presence of microfilariae. All positive smears and 10% of the negative ones were reexamined. Personal data on each subject—including his or her age, sex, and ethnic origin—were recorded at the time of blood collection. Those subjects found to have microfilariae were notified and offered appropriate treatment (with diethylcarbamazine) at the Georgetown Filariasis Clinic.

RESULTS

Smears were collected from a total of 2,818 subjects representing 1.7% of the Greater Georgetown population. Of these, 60% were Negroes, 26% were East Indians, and 14% were of mixed or other ethnic origins. The percentages closely parallel those cited by the census data—these being, respectively, 51%, 27%, and 22%. Of the 2,818 smears collected, 183 were found positive for microfilariae. *Mansonella ozzardi*, a filarial parasite occurring in some interior communities (*9, 10*) was found in one male Amerindian; all the other microfilariae detected were identified as *W. bancrofti*, giving a prevalence for this species of 6.5%.

The distribution of microfilaremias according to age, sex, and ethnic origin are shown in Tables 1A and 1B. The young-

Table 1A. Prevalences of *W. bancrofti* microfilariae found in Negro and East Indian study subjects in Georgetown, by age and sex.

	Negro subjects									East Indian subjects								
	Males			Females			Total			Males			Females			Total		
Age (in years)	No. tested	No. positive	% positive	No. tested	No. positive	% positive	No. tested	No. positive	% positive	No. tested	No. positive	% positive	No. tested	No. positive	% positive	No. tested	No. positive	% positive
0–4	111	3	2.7	75	1	1.3	186	4	2.2	20	0	0.0	32	0	0.0	52	0	0.0
5–9	120	8	6.7	114	11	9.6	234	19	8.1	40	0	0.0	32	1	3.1	72	1	1.4
10–19	211	21	10.0	248	14	5.6	459	35	7.6	93	3	3.2	101	7	6.9	194	10	5.2
20–29	117	15	12.8	199	18	9.0	316	33	10.4	58	6	10.3	119	5	4.2	177	11	6.2
30–39	59	4	6.8	126	7	5.6	185	11	5.9	47	3	6.4	56	2	3.6	103	5	4.9
40–49	39	7	17.9	62	3	4.8	101	10	9.9	30	2	6.7	48	0	0.0	78	2	2.6
50–59	27	2	7.4	66	8	12.1	93	10	10.8	19	3	15.8	20	1	5.0	39	4	10.3
≥60	30	2	6.7	71	5	7.0	101	7	6.9	9	0	0.0	18	1	5.6	27	1	3.7
Total	714	62	8.7	961	67	7.0	1,675	129	7.7	316	17	5.4	426	17	4.0	742	34	4.6

Table 1B. Prevalences of *W. bancrofti* microfilariae found in Georgetown study subjects other than Negroes and East Indians, and also in all Georgetown study subjects, by age and sex.

	Other subjects (not Negroes or East Indians)									All subjects								
	Males			Females			Total			Males			Females			Total		
Age (in years)	No. tested	No. positive	% positive	No. tested	No. positive	% positive	No. tested	No. positive	% positive	No. tested	No. positive	% positive	No. tested	No. positive	% positive	No. tested	No. positive	% positive
0–4	16	0	0.0	29	0	0.0	45	0	0.0	147	3	2.0	136	1	0.7	283	4	1.4
5–9	34	0	0.0	25	0	0.0	59	0	0.0	194	8	4.1	171	12	7.0	365	20	5.5
10–19	43	3	7.0	69	4	5.8	112	7	6.3	347	27	7.8	418	25	6.0	765	52	6.8
20–29	27	5	18.5	37	3	8.1	64	8	12.5	202	26	12.9	355	26	7.3	557	52	9.3
30–39	17	2	11.8	30	0	0.0	47	2	4.3	123	9	7.3	212	9	4.2	335	18	5.4
40–49	11	0	0.0	21	0	0.0	32	0	0.0	80	9	11.3	131	3	2.3	211	12	5.7
50–59	5	0	0.0	11	0	0.0	16	0	0.0	51	5	9.8	97	9	9.3	148	14	9.5
≥60	13	2	15.4	13	0	0.0	26	2	7.7	52	4	7.7	102	6	5.9	154	10	6.5
Total	166	12	7.2	235	7	3.0	401	19	4.7	1,196	91	7.6	1,622	91	5.6	2,818	182	6.5

Table 2. Data showing the observed prevalences of *W. bancrofti* in subjects from each of the nine Georgetown survey areas and the ethnic composition of the survey population in each area.

Survey area	Georgetown wards	Survey subjects			Ethnic composition of survey population					
		No. tested	No. positive	% positive	Negroes		East Indians		Others	
					No.	%	No.	%	No.	%
I	Kingston, Cummingsburg	444	25	5.6	186	42	165	37	93	21
II	Lacytown, Bourda Stabroek, Albertown	232	17	7.3	122	53	38	16	72	31
III	Queenstown, Bel Air Park	181	8	4.4	94	52	56	31	31	17
IV	Kitty, Subryanville	626	21	3.4	309	49	236	38	81	13
V	Meadowbrook Gardens, Lamaha Gardens, Prashad Nagar, Bel Air Gardens, Bel Air, Bel Air Springs, D'Urban Backlands	162	2	1.2	79	49	63	39	20	12
VI	Werk-en-Rust, Charlestown, Wortmanville, Albouystown, Lodge, Lodge Housing Scheme	274	25	9.1	201	73	27	10	46	17
VII	Newtown, Campbellville	206	6	2.9	109	53	87	42	10	5
VIII	N., S., W., and E. La Penitence, Alexander Village, W. and E. Ruimveldt	547	67	12.2	454	83	64	12	29	5
IX	Roxanne Burnham Gardens, South Ruimveldt Gardens, Tucville, South Ruimveldt Park, North Ruimveldt, Festival City, Guyhoc Park, Tucville Terrace	146	11	7.5	121	83	6	4	19	13
	Total	2,818	182	6.5	1,675	60	742	26	401	14

est carrier was a one-year-old child. The observed prevalences increased rapidly with age up through the 20–29 year age group, where the overall prevalence was 9.3%. Thereafter, in the older age groups, the prevalence ranged from 5.4% to 9.5%. In all cohorts except that of 5–9 years, the observed prevalence was higher among males than among females—the overall rates for the two sexes being 7.6% in males and 5.6% in females.

Differences observed between the prevalences in different ethnic groups were in agreement with previous observations (2, 4), in that the prevalences tended to be higher in Negroes (7.7%) than in East Indians (4.6%) or in people with other or mixed ethnic backgrounds (4.7%). Among the Negro subjects a comparatively high microfilaria prevalence was observed in the children and young adults, this being the only ethnic group with positives in the 0–4 year cohort.

Analysis by survey area (Table 2) showed microfilaria prevalences ranging from 1.2% (in Area V subjects) to 12.2% (in Area VIII subjects). In general, relatively higher prevalences were found in those areas with higher proportions of Negroes in the study population.

DISCUSSION AND CONCLUSIONS

Several microfilaria surveys were conducted in Guyana (formerly British Guiana) before independence. Giglioli (2) has summarized the results of such sur-

veys occurring over the period 1896–1947. According to this account, the infection was regarded as endemic to the lowland coastal areas, where some 90% of the population now resides. Microfilaria carriers were frequently identified during malaria case detection activities in the interior areas of the country; however, these latter infections were presumed to have been locally imported.

In the survey reported here, the age distribution of microfilaremias (showing high prevalences in the younger age groups) clearly indicates continuing endemicity of *W. bancrofti* in the Georgetown environs, with no major improvement since the 1960s. Indeed, there has been an apparent increase in the overall prevalence since 1981, from 4.1% in 1981 (Stroom, unpublished) to 6.5% in 1984, although this could be due, at least in part, to collection of larger volumes of blood in the more recent survey or to population sampling differences.

The ethnic differences evident in our prevalence data, which have also been noted in previous Guyana surveys, suggest the existence of a predisposing genetic factor influencing susceptibility to infection. It is also true, of course, that the disparity could arise at least partly from differences in human behavior and the environment—even in communities where the two major ethnic groups involved live in close association with one another.

In urban coastal areas of Guyana, *Culex quinquefasciatus* is a serious nocturnal biting pest that breeds opportunistically in stagnant water with a high organic content (e.g., in flooded pit latrines, septic tanks, silted and overgrown drainage ditches, and to a lesser extent in vessels such as rainwater drums, barrels, and discarded household containers). Its local role as the main vector of Bancroftian filariasis has been well documented (2, 6, 7).

Anopheles darlingi was also considered an important vector of both filariasis and malaria prior to its elimination from the coastal areas during the DDT residual house spraying campaign of the late 1940s (2). Burton (6) subsequently concluded that *Mansonia titillans* and *An. aquasalis* were acting as secondary vectors. However, his observation that the former species prefers to feed during the daytime, when there are few if any circulating microfilariae in the peripheral blood of infected persons, differs from the authors' observations in both Guyana and Suriname—observations indicating that *M. titillans* has distinctly crepuscular/nocturnal biting habits (unpublished data).

Although the systematic use of DDT as a residual adulticide ultimately eradicated *An. darlingi* from Guyana's coastal areas, rapid development of insecticide resistance mitigated the impact of this and other residual insecticides on *C. quinquefasciatus* (2, 3, 11). Later efforts to control filariasis, particularly in the 1960s, were directed at reducing breeding sites through improved environmental sanitation, better larval control achieved through oiling, and detection and treatment of microfilaria carriers with diethylcarbamazine.

However, since the onset of the global economic recession in the early 1970s, human and financial resources available for environmental health programs in Guyana have diminished. This has undoubtedly contributed to a proliferation of available breeding sites for *C. quinquefasciatus* and *M. titillans*, the latter of which breeds amid floating vegetation in the overgrown ditches and canals that drain the city. Without major improvements in the environmental sanitation of Guyana's urban areas, an increase in Bancroftian filariasis' prevalence, intensity of infection, and clinical manifestations (now readily apparent in the populace) can be expected.

Whereas population growth in Guyana is minimal and there is presently no significant trend toward urbanization (*12*), Latin American growth is rapid and the share of the population living in urban areas has risen from an estimated 41% in 1950 to 69% in 1985 (*13*). Uncontrolled settlement, frequently associated with migration to the cities and general population growth, has led to inadequate provision of health care, water, and sanitary services. Under these conditions, extensive breeding of urban mosquitoes such as *C. quinquefasciatus* can occur, and the introduction of microfilaria carriers could ultimately lead to renewed transmission of urban filariasis in geographic areas previously freed of the disease.

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