Preliminary parasitological results of a pilot mollusciciding campaign to control transmission of *Schistosoma mansoni* in St Lucia*

P. JORDAN,[1] LILIAN WOODSTOCK,[2] & J. A. COOK[3]

A mollusciciding campaign was begun in Cul-de-Sac Valley, St Lucia, at the end of 1970, following several years of epidemiological studies in which transmission of Schistosoma mansoni *was found to be high in settlements on the valley floor but low in hillside settlements. Postcontrol (1971–73) findings in children, when compared with precontrol data and with data from an adjacent valley having a similar transmission pattern, show significant reductions in prevalence, incidence, and intensity of infection.*

A comparative evaluation of different methods of controlling transmission of *Schistosoma mansoni* has been under way in St Lucia since 1967. On the basis of detailed biological studies made in Cul-de-Sac Valley (*4, 5*) a strategy for controlling the intermediate snail host, *Biomphalaria glabrata*, in natural habitats (*6, 7*) was implemented in the valley in September 1970.

Epidemiological studies were begun in Cul-de-Sac in 1967, and in adjacent Riche Fond Valley in 1968. The latter, which has a similar *S. mansoni* transmission pattern, was chosen as the comparison area.

This paper reports changes in indices of transmission and infection for *S. mansoni* (prevalence, incidence, and intensity of infection) among the younger age groups in the population after 2 years of snail control. Parasitological changes in infection among adults will be the subject of a separate communication.

THE PROJECT AND COMPARISON AREAS

Cul-de-Sac and Riche Fond valleys are topographically similar, each having well-defined walls and a flat floor that is used by commercial companies and peasant farmers for the extensive cultivation of bananas. In both valleys, settlements are located close to the river on the valley floor and extend up the nearby hillsides (Fig. 1).

Cul-de-Sac Valley has been described in detail elsewhere (*3, 5*). Riche Fond Valley, which lies on the eastern side of St Lucia, is fan-shaped; three streams running through the valley form the Mabouya River, which flows into the Atlantic. The settlements on the southern side of Riche Fond have been used to investigate the control of *S. mansoni* transmission through provision of household water supplies (*2, 8*), settlements on the northern side, where water is available only from public standpipes, serving as comparison areas.

Living conditions in these rural valleys are typical of those in many developing countries. Houses are generally small and of timber construction; sanitation is primitive, although pit latrines are slowly coming into use. A few protected springs exist and some householders collect water from roofs, but rivers and streams are the usual sources of water for domestic purposes and appear to be the main *S. mansoni* transmission sites (*5*). Transmission probably also occurs sporadically as an occupational hazard in banana drains and marshes.

In both valleys, transmission of *S. mansoni* was found to be high in settlements close to the river on the valley floor but much lower in settlements situated on the nearby hillsides. Results of the mollusciciding are therefore evaluated in terms of high-transmission settlements (incidence rates of

* From the Research and Control Department, Castries, St Lucia, West Indies. The Research and Control Department is supported by the Government of St Lucia, the Rockefeller Foundation, New York, NY, USA, and the Overseas Development Administration, London, England (Scheme R. 2108 A-C).

[1] Director; member of external staff, Medical Research Council of Great Britain, seconded to The Rockefeller Foundation.

[2] Formerly Laboratory Supervisor.

[3] Staff member, The Rockefeller Foundation, New York, NY, USA.

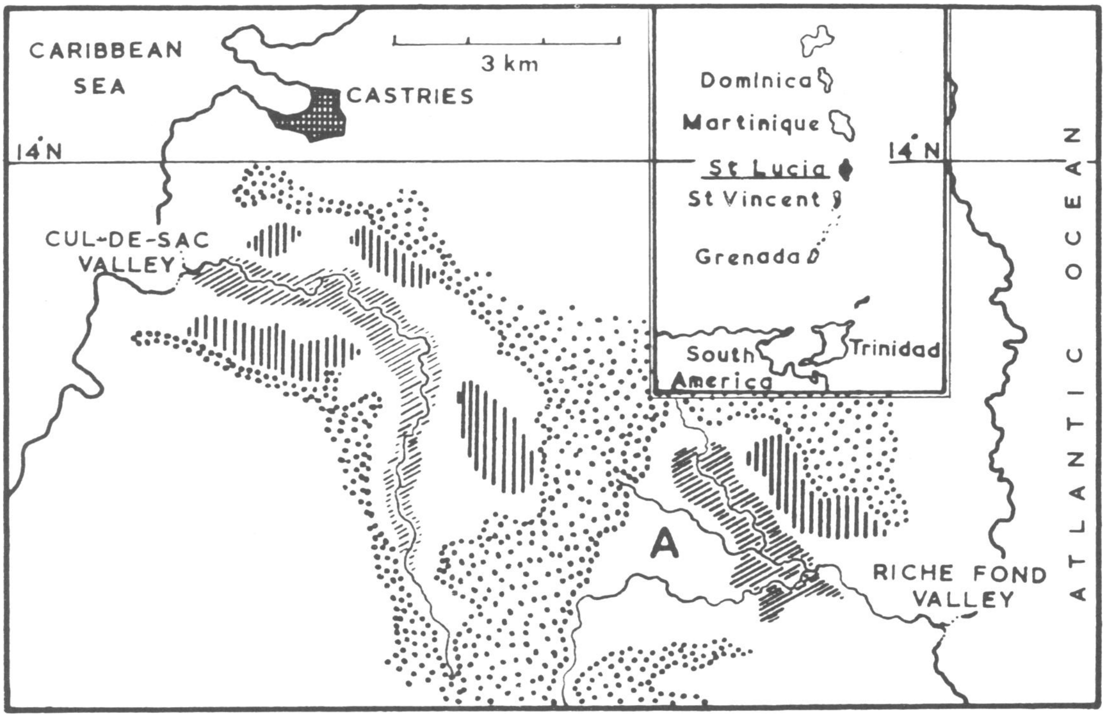

Fig. 1. Location of Cul-de-Sac and Riche Fond valleys and high- and low-transmission areas in each valley. Household water supplies were provided as a method of control in area A (see Jordan et al. (*2*)). Stippling indicates land over 180 m; vertical shading indicates areas of low transmission and diagonal shading areas of high transmission.

more than 15% in the 0–7-years age group between 1969 and 1970) and low-transmission settlements (incidence rates of less than 15%). In the first category, 6 Cul-de-Sac settlements (population 2500) are compared with 6 Riche Fond settlements (population 2000). In the second category, 9 Cul-de-Sac settlements (population 2500) are compared with 3 Riche Fond settlements (population 1600).

METHODS

Details of survey, laboratory, and statistical methods have been described elsewhere (*2*). Stools were examined qualitatively by a sedimentation/concentration technique, up to three slides being examined before the stool was recorded as negative. Stools positive for *S. mansoni* were examined quantitatively by the filtration/staining technique (*1*), but in some cases insufficient faecal material was submitted and quantitative results are not necessarily from the same number of persons found to be infected.

The first survey, involving all age groups of the population, took place in Cul-de-Sac between January and May 1967 and in Riche Fond between May and October 1968. The second survey, of children only, was made in 1969 in both valleys, and subsequent surveys were for all practical purposes made at 12-month intervals. Ideally, surveys should have been carried out at the same time in each valley, but logistically this was not possible.

Mollusciciding in Cul-de-Sac was started in September 1970. Stools from all age groups were examined at the following survey (the fourth), which began in January 1971. This interval allowed the maturation of immature *S. mansoni* in the population, and the 1971 survey results thus constitute the last premollusciciding data.

RESULTS

Changes in prevalence, incidence, and intensity of infection in the high- and low-transmission settlements of Cul-de-Sac and Riche Fond are compared over the pre- and postmollusciciding periods, and postcontrol data from Cul-de-Sac are compared with precontrol data.

Table 1. High- and low-transmission settlements: point prevalence rates and intensity of infection among children of Cul-de-Sac Valley (control area) and Riche Fond Valley (comparison area) at the last precontrol survey (1971) and after 2 years of molluscididing (1973)

Age group (years)	High-transmission settlements						Low-transmission settlements					
	1971			1973			1971			1973		
	No. positive/No. examined	Positive (%)	GM [a]	No. positive/No. examined	Positive (%)	GM [a]	No. positive/No. examined	Positive (%)	GM [a]	No. positive/No. examined	Positive (%)	GM [a]
					Cul-de-Sac							
0–4	26/313	8.3	21	12/301	4.0	18	5/372	1.3	10	2/406	0.5	23
5–9	161/426	37.8	30	94/432	21.8	18	37/432	8.6	20	27/456	5.9	
10–14	188/282	66.7	48	197/359	54.9	27	58/278	20.9	27	57/357	16.0	19
					Riche Fond							
0–4	19/234	8.1	27	73/266	27.4	30	4/166	2.4	16	18/213	8.5	23
5–9	125/359	34.8	23	204/361	56.5	41	20/217	9.2		39/260	15.0	22
10–14	147/189	77.7	37	224/283	79.2	59	53/146	36.3	22	78/182	42.9	25

[a] Geometric mean of egg output per ml of faeces. Owing to insufficient amount of stool provided for some positive cases, the GM is based on 75–85 % of cases found positive for *S. mansoni*.

In addition, changes in the infection status of cohorts of children examined in 1969 and 1971 are compared with changes occurring in similar cohorts examined in 1971 and 1973 (i.e., during the first 2 years of molluscididing).

Point prevalence

High-transmission settlements. Point prevalence data from the initial surveys of the two valleys are not strictly comparable, having been obtained in different years. Prevalence data for 1969, 1970, and 1971 are comparable, however, and showed similar patterns of change: an increase in prevalence between 1969 and 1970, with a decrease in 1971. Only in 1970 was prevalence significantly greater in Cul-de-Sac than in Riche Fond (at the 5% level). After molluscididing, in 1972 and 1973, prevalence was significantly lower (at the 0.1% level) in Cul-de-Sac (Table 1).[a]

In Cul-de-Sac considered alone, prevalence rates in 1973 were significantly lower than in any previous survey year including 1969, which marked the lowest rates in the precontrol period. In Riche Fond, on the other hand, the 1973 rates were higher than in any previous survey year.

[a] Detailed statistical tables of point prevalence and incidence rates and intensity of infection among children in high- and low-transmission settlements in the two valleys before and after molluscididing have been prepared and deposited in the WHO library. Single photocopies of these tables are available to officially or professionally interested persons free of charge on request. Requests should be addressed to Chief, Office of Library and Health Literature Services, World Health Organization, 1211 Geneva 27, Switzerland.

Low-transmission settlements. The patterns of change in these settlements in 1969, 1970, and 1971 were also the same and similar to those in the high-transmission settlements. The only significant difference between the valleys during this period occurred in 1971, when prevalence was higher in Riche Fond. In 1972 (after the first year of molluscididing) the slight changes in prevalence in the two valleys were not significant. By 1973, however, prevalence had fallen significantly in Cul-de-Sac and had risen significantly in Riche Fond. Again, 1973 represented the lowest prevalence recorded for Cul-de-Sac but the highest for Riche Fond.

Incidence

The incidence of new infections was calculated from the number of children in a stated age group whose stools converted between surveys from *S. mansoni*-positive to *S. mansoni*-negative. The number is expressed as a percentage of all individuals in the age group who were negative at the first of two surveys.

High-transmission settlements. Incidence for both valleys was low during 1968/69, increased during 1969/70, and then dropped slightly during 1970/71. At no time was there a significant difference between the valleys.

Table 2. High- and low-transmission settlements: final precontrol incidence of infection (1970/71) among children of Cul-de-Sac Valley (control area) and Riche Fond Valley (comparison area) and incidence after 2 years of mollusciciding (1972/73).

Age (years) at first of 2 surveys	High-transmission settlements				Low-transmission settlements			
	1970/71		1972/73		1970/71		1972/73	
	Incidence [a]	Percentage	Incidence [a]	Percentage	Incidence [a]	Percentage	Incidence [a]	Percentage
				Cul-de-Sac				
0–2	4/83	4.8	4/91	4.4	0/107	0.0	1/144	0.7
3–5	28/126	22.2	3/120	2.5	9/173	5.2	5/168	3.0
6–7	19/68	27.9	11/94	11.7	3/93	3.2	2/124	1.6
8–10	25/68	36.8	18/92	19.6	10/126	7.9	9/167	5.4
11–13	—		14/43	32.6	—		6/102	5.9
				Riche Fond				
0–2	7/75	9.3	19/89	21.3	1/44	2.3	5/70	7.1
3–5	16/120	13.3	20/79	25.3	3/72	4.2	6/99	6.1
6–7	28/86	32.6	22/65	33.8	1/46	2.2	12/80	15.0
8–10	27/54	50.0	22/55	40.0	13/49	26.5	25/89	28.1
11–13	—		7/18	38.9	—		17/44	38.6

[a] Denominator, number of children negative for *S. mansoni* at the first of the two surveys; numerator, number converting to *S. mansoni*-positive at next survey.

Table 3. High-transmission settlements: change in infection status among cohorts of children from Cul-de-Sac Valley (control area) and Riche Fond Valley (comparison area) examined in 1969 and 1971, and among similar cohorts from the two valleys examined in 1971 and 1973

Valley	1969/71 cohort			1971/73 cohort			
	year	age group in 1969 (years)		year	age group in 1971 (years)		
		0–4	5–9		0–4	5–9	10–13
			Cul-de-Sac				
No. examined		172	181		211	313	132
First paired prevalence rate	1969	10 %	35 %	1971	7 %	37 %	62 %
Conversions [a]		26 (17 %)	52 (44 %)		13 (7 %)	41 (21 %)	16 (32 %)
Reversions [a]		6 (35 %)	18 (29 %)		11 (73 %)	32 (27 %)	12 (15 %)
Second paired prevalence rate	1971	22 %	54 %	1973	8 %	40 %	65 %
Significance of change [b]		0.01 %	0.01 %		NS [c]	NS [c]	NS [c]
			Riche Fond				
No. examined		200	233		160	268	118
First paired prevalence rate	1969	8 %	32 %	1971	9 %	33 %	78 %
Conversions [a]		28 (15 %)	66 (42 %)		60 (41 %)	106 (59 %)	17 (65 %)
Reversions [a]		12 (75 %)	14 (19 %)		7 (47 %)	15 (17 %)	7 (8 %)
Second paired prevalence rate	1971	16 %	54 %	1973	43 %	66 %	86 %
Significance of change [b]		5 %	0.01 %		0.01 %	0.01 %	1 %

[a] Conversion rates were calculated as shown in the following example: of 172 children aged 0–4 years examined in 1969, 17 (10 %) were positive for *S. mansoni*; of the 155 negative for *S. mansoni* in 1969, 26 (17 %) became positive by 1971. Similarly, the corresponding reversion rate was calculated in the following way: 6 out of 17 (35 %) *S. mansoni*-positive children became apparently negative for *S. mansoni* in 1971. [b] Sign test applied to conversion and reversion figures. [c] NS, not significant.

Table 4. Low-transmission settlements: change in infection status among cohorts of children from Cul-de-Sac Valley (control area) and Riche Fond Valley (comparison area) examined in 19d9 and 1971, and among similar cohorts from the two valleys examined in 1971 and 197ö

Valley	1969/71 cohort		1971/73 cohort		
	year	age group in 1969 (years)	year	age group in 1971 (years)	
		0–9		0–9	10–13
Cul-de-Sac					
No. examined		362		510	136
First paired prevalence rate	1969	4 %	1971	4 %	24 %
Conversions [a]		17 (5 %)		13 (3 %)	15 (14 %)
Reversions [a]		6 (40 %)		14 (64 %)	10 (31 %)
Second paired prevalence rate	1971	7 %	1973	4 %	27 %
Significance of change [b]		5 %		NS [c]	NS [c]
Riche Fond					
No. examined		208		263	66
First paired prevalence rate	1969	2 %	1971	6 %	41 %
Conversions [a]		18 (9 %)		39 (16 %)	14 (36 %)
Reversions [a]		3 (60 %)		8 (53 %)	4 (15 %)
Second paired prevalence rate	1971	10 %	1973	18 %	56 %
Significance of change [b]		1 %		0.1 %	5 %

[a] For method of calculation, see footnote [a] to Table 3.
[b] Sign test applied to conversion and reversion figures.
[c] NS, not significant.

During 1971/72, after 1 year of mollusciciding, a significant decrease (at the 5% level) occurred in Cul-de-Sac and a significant increase (at the 0.1% level) in Riche Fond. During 1972/73 incidence decreased in both valleys (significant at the 1% level), but the proportional drop in Cul-de-Sac was greater. Incidence rates after 2 years of mollusciciding were thus significantly lower in Cul-de-Sac than in Riche Fond (Table 2).

Low-transmission settlements. Prior to 1970/71, when incidence was higher in Riche Fond (at the 5% level of significance), incidence rates in the two valleys were similar. After 2 years of snail control rates had fallen slightly in Cul-de-Sac but had increased significantly in the comparison settlements.

Intensity of infection

High-transmission settlements. Intensity of infection (geometric mean of the egg counts of infected persons) in different age groups shows a general increase with age (Table 1). Between the first and second surveys a significant decrease occurred in both valleys (cf., changes in prevalence). Between 1969 and 1971 changes were not significant but the similarity in pattern of change continued. There was little difference between the valleys in this period, although in the 1971 survey the intensity was higher (significant at the 5% level) in Cul-de-Sac.

After 2 years of mollusciciding a significant decrease in intensity occurred in Cul-de-Sac and a significant increase in Riche Fond, so that in 1973 egg loads were significantly greater (at the 0.1% level) in the latter than in Cul-de-Sac (Table 1).

Low-transmission settlements. Reduction in intensity of infection in the low-transmission settlements of Cul-de-Sac was less apparent; however, even though intensity was slightly higher in Cul-de-Sac in the precontrol years, in 1973 it was higher in Riche Fond.

Change in infection status

Paired results for cohorts of children from the high- and low-transmission settlements examined in 1969 and again in 1971, and for similar cohorts examined in 1971 and again in 1973, are shown in Tables 3 and 4. For the cohorts initially examined in 1969, the respective first paired prevalence rates in the two valleys were similar, and, with conversions (new infections) exceeding reversions (apparent lost infections), the second paired prevalence rates were all significantly higher.

For the cohorts examined in 1971 and 1973, results in the two valleys diverged. In Riche Fond conversions again outnumbered reversions and the second paired prevalence rates were again higher than the first. In Cul-de-Sac there was no significant difference between conversions and reversions (the latter having increased in comparison with the 1969/71 data) and thus no significant change between the first and second paired prevalence rates, even though the children in 1973 were 2 years older than when first examined. This led to the lowered point prevalence for Cul-de-Sac shown in Table 1.

DISCUSSION

Comparability of the two areas

The similarity of the two valleys as regards topography and transmission patterns has already been mentioned. In terms of pattern of climatic change from year to year also the valleys are similar, although rainfall is generally heavier in Cul-de-Sac.

In the high-transmission settlements there was little difference in prevalence between the valleys in the premollusciciding years, although in 1970 prevalence was slightly higher in Cul-de-Sac; the patterns of change from one survey to the next were the same, and there was no difference in incidence between the valleys. In the low-transmission settlements in this period incidence levels also were similar but prevalence was higher in Riche Fond in 1971.

These transmission patterns are considered sufficiently alike to warrant use of the two sets of Riche Fond settlements for comparison with the high- and low transmission settlements in Cul-de-Sac.

Standards of stool examination

As control of transmission of *S. mansoni* is achieved and more of the stools to be examined are negative, maintenance of microscopists' standards of work becomes an increasing problem that, furthermore, is accentuated by departures of staff and the necessity to recruit and train additional personnel.

A system of checking at least 10% of all negative slides was introduced in both valleys and the false negative rate (FNR) (*2*) calculated. In 1971 the FNR in the high-transmission settlements of Cul-de-Sac was greater than that for stools examined from Riche Fond. On correcting data for both valleys, prevalence was slightly higher in Cul-de-Sac. In 1973 in the low-transmission settlements the FNR was greater for stools from Cul-de-Sac, but corrected values did not change the original finding that prevalence was significantly greater in Riche Fond.

Variation in transmission

Transmission of *S. mansoni* in St Lucia, being dependent on snails in natural habitats as distinct from irrigation canals under water management, occurs mainly in the drier first 6 months of the year when snail colonies build up in the slow-moving rivers and streams (*5*). However, rainfall varies considerably from year to year; the dry season may be drier than normal, in which case snail habitats may dry completely, or rains may be above normal and as a consequence the usual build-up of snail populations does not occur. Similar variations in rainfall in the rainy season can affect transmission, particularly if rains are poor. If snail colonies are not washed out transmission could continue at this time.

Daily, as well as monthly and yearly, variations in rainfall may influence transmission. Heavy rain in a single day can lead to flash flooding, and if this occurs towards the end of the dry season transmission may be stopped early. During the period 1967–69, which was marked by a surprising drop in prevalence rates in both valleys, a hurricane (Beulah) deposited 45 cm of rain in 24 hours in September 1967, completely dislodging snail colonies in the streams and presumably affecting transmission in the 1968 dry season (*5*).

Parasitological changes

High-transmission settlements. Low rainfall in 1971, 1972, and 1973 was probably responsible for the increase in prevalence between 1971 and 1973 in Riche Fond (Table 1). Since the pattern of change in incidence had been the same in both valleys prior to 1971, it seems reasonable to suppose that high transmission would also have occurred in Cul-de-Sac if snail control had not been implemented there.

Before snail control there was no significant difference in incidence between the two valleys, but after control incidence was significantly greater in Riche Fond. For all children aged 0–13 years, incidence between 1972 and 1973 was 11.4% (50/440) in Cul-de-Sac compared with 29.4% (90/306) in Riche Fond (Table 2). Assuming that in the absence of snail control incidence would have been as high in Cul-de-Sac as in Riche Fond, it is calculated that incidence in the former was reduced by 61.2%.

Besides this lowering in the rate of new infections in Cul-de-Sac, the reinfection rate of children already infected must have been reduced. In the absence of reinfection, the rate of loss of infection (reversions) in children aged 0–4 years (those who initially had light infections, Table 3) rose from 35% to 73%, and a reduction in intensity of infection occurred among children aged 10–14 years (Table 1). The reduction in intensity in the latter was greater than that in children aged 0–9 years, in which group there was a slight increase. This apparent paradox (i.e., a greater loss of infections in younger children) is explained by the light initial infections in the younger children (geometric mean of 18 eggs per ml of faeces in 1971) and the quantitative technique used which detected only counts greater than 10 eggs per ml.

In the high-transmission settlements the results of the snail control programme are probably best seen from the cohort studies (Table 3). Between 1971 and 1973 there was a highly significant increase between the first and second paired prevalence rates for children aged 0–13 years in Riche Fond but no such increase in Cul-de-Sac, even though the children had become 2 years older. The diminishing ratio of reversions to conversions (i.e., from 3.3 between 1969 and 1971 to 1.3 between 1971 and 1973) is of prime importance in indicating a marked change in transmission. The combined effect in Cul-de-Sac of lower point prevalence (Table 1) and reduced intensity of infection among those infected led to a reduction in potential contamination there of 58% (based on the sum of the product of the geometric mean of egg counts and the prevalence rate of children in different age groups) compared with a doubling of potential contamination in Riche Fond.

The reduced contamination potential in the high-transmission settlements of Cul-de-Sac should mean less chance of infection occurring in snails that survive mollusciciding, and there is evidence from exposure of laboratory-bred sentinel snails that contamination of the streams is diminishing (Upatham, unpublished observations).

Low-transmission settlements. As biological studies of Cul-de-Sac revealed few foci of *B. glabrata* on the sides of the valley, infections of people living in these settlements are believed to be dependent upon their having occasional contact with infected waters on the valley floor. Given the lower indices of infection (prevalence, incidence, and intensity of infection) among these people, convincing results of snail control are more difficult to demonstrate. However, whereas before control there was no significant difference in incidence between the valleys, after control incidence was significantly higher in Riche Fond and within Cul-de-Sac there had been a significant decrease (Table 2).

Although the effect of the reduced incidence on intensity of infection in Cul-de-Sac was minimal owing to the initial light infections, the cohort studies of children aged 0–13 years (Table 4) show a significant increase (at the 1% level) in paired prevalence rates for Riche Fond but a non significant change in those for Cul-de-Sac. The combined effect of changes in point prevalence and intensity of infection between 1971 and 1973 led to a reduction in potential contamination of 28% in Cul-de-Sac, as compared with an increase of 38% in Riche Fond.

Comment

It is apparent that transmission of *S. mansoni* in Cul-de-Sac Valley, an area containing a variety of natural snail habitats, has been significantly reduced at a time when increased transmission might have been expected. With successful snail control, further significant reduction in incidence of new infections among younger children may be difficult to demonstrate, and it will probably be necessary to examine older children in order to show continuing reduced transmission. However, false incidence rates are more likely to be obtained in older children.

Successful control can lead to problems in the laboratory. As the number of negative faecal specimens to be examined increases, there is need for special vigilance on the part of microscopists, who may tend to become uninterested in negative results. Moreover, if up to three slides must be examined qualitatively before a specimen is considered negative (as in the present study), the time taken to examine single specimens increases, additional microscopists may be required, and the workload of supervisors in checking negative slides becomes heavier.

RÉSUMÉ

RÉSULTATS PARASITOLOGIQUES PRÉLIMINAIRES D'UNE CAMPAGNE PILOTE D'APPLICATION DE MOLLUSCICIDES POUR COMBATTRE LA TRANSMISSION DE *SCHISTOSOMA MANSONI* À SAINTE-LUCIE

Sur la base des études biologiques de la transmission de *Schistosoma mansoni* dans la Cul-de-Sac Valley à Sainte-Lucie, une stratégie a été appliquée à la lutte par les molluscicides contre *Biomphalaria glabrata*, mollusque hôte intermédiaire. On a choisi à des fins de comparaison, une vallée adjacente où la transmission de *S. mansoni* avait une allure similaire.

Pour les deux vallées, la dernière enquête avant les mesures de lutte a montré que dans les établissements humains du creux de la vallée, les taux de prévalence étaient élevés (plus de 70% parmi les enfants de 12 à 14 ans), mais qu'ils étaient plus faibles dans les établissements situés à flanc de côteau.

Bien que l'incidence des nouvelles infections variait d'une année à l'autre au cours de la période précédant la lutte, l'allure du changement et les taux étaient similaires dans les deux régions. Au cours de l'année précédant le début de l'application de molluscicide, l'incidence chez les enfants de 0 à 10 ans, dans les établissements du creux des deux vallées, était de 22%. Après deux années de lutte, elle était de 9% à Cul-de-Sac contre 29% dans la vallée témoin (Riche Fond) où il n'y avait pas eu de lutte contre les mollusques. En ce qui concerne les établissements humains à flanc de côteau, l'incidence est tombée de 4,4% à 2,8% dans la Cul-de-Sac Valley, alors qu'elle augmentait, passant de 8,5% à 14% dans la vallée témoin. Ces changements ont entraîné une réduction du taux de prévalence (de 37% à 28%) parmi les enfants de 0 à 14 ans dans la Cul-de-Sac Valley et une augmentation des taux, de 37% à 55%, à Riche Fond. Les modifications de l'intensité de l'infection ont été semblables à celles de la prévalence: diminution dans la vallée où les mesures de lutte ont été effectuées et augmentation dans la vallée témoin.

Deux études par cohortes d'enfants âgés de 0 à 13 ans, d'une durée de deux ans, ont montré une augmentation marquée du nombre de sujets infectés dans la vallée témoin et une augmentation minime dans celle où la lutte contre les mollusques avait été effectuée.

On fait observer que lors d'opérations réussies de lutte contre la transmission, les microscopistes doivent être de plus en plus vigilants afin de détecter les nombres décroissants d'œufs de *S. mansoni* présents dans les selles. La charge de travail des superviseurs qui vérifient la proportion de selles négatives augmente au fur et à mesure que la lutte devient plus efficace.

REFERENCES

1. BELL, D. R. *Bulletin of the World Health Organization*, **29**: 525-530 (1963).
2. JORDAN, P. ET AL. *Bulletin of the World Health Organization*, **52**: 9-20 (1975).
3. LEES, R. E. M. *West Indian medical journal*, **14**: 82-88 (1965).
4. STURROCK, R. F. *International journal for parasitology*, **3**: 165-174 (1973).
5. STURROCK, R. F. *International journal for parasitology*, **3**: 175-194 (1973).
6. STURROCK, R. F. *International journal for parasitology*, **3**: 795-801 (1973).
7. STURROCK, R. F. ET AL. *International journal for parasitology*, **4**: 231-240 (1974).
8. UNRAU, G. O. *Bulletin of the World Health Organization*, **52**: 1-8 (1975).