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MALARIA PARASITE RATES IN SOUTHERN RHODESIA: MAY-SEPTEMBER 1956

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SYNOPSIS

The author reports on malaria parasite rates found in the indigenous population of Southern Rhodesia after seven years of insecticide spraying. Although there is little or no overt malaria in sprayed areas, larvae of *Anopheles gambiae* are still found in certain foci. It is thought possible that the parasite rate is now so low that for practical purposes a break in transmission has been achieved, but the author points out that a dangerous potential source of infection exists in immigrant labour from other territories. Immigrants are now being treated on entry with up to 450 mg of amodiaquine and 45 mg of primaquine.

After seven years of insecticide spraying in Southern Rhodesia, it was decided to risk cessation of spraying in the central areas and to initiate instead a " barrier-ring " spraying of the low-lying " native reserves " on the periphery of the country. This was begun in October 1955 and carried on until April 1956. (It has been repeated in 1956-57.) Although there appeared to be little or no overt malaria in the sprayed areas, larvae of *Anopheles gambiae* were still found in widely scattered foci. I felt therefore that the barrier spraying should be supplemented or aided by the distribution of chloroquine to as many as possible of the indigenous population in some of the peripheral areas, and that blood films from samples of this population should be taken. Accordingly, one dose of chloroquine was given. Adults were given three tablets (600 mg chloroquine sulfate), children two tablets, and infants and very young children from one half to one tablet. This dosing was begun in May 1956, continued until September of that year, and repeated in the corresponding months of 1957. During this period of 1956, some 599 080 tablets were distributed, and 7694 thick and thin blood films were taken. By and large, therefore, it could be said that the films were taken in the non-transmission season, although it is a fact that in much of the Rhodesian " low-veld " (altitude up to 600 metres) malaria formerly occurred throughout the year. It can also be stated quite categorically that the dispensing of chloroquine had no effect on the parasite rates. since the films were taken at the same time as the chloroquine was

given. It must be noted here that it was not possible to administer tablets in every sprayed area.

The examination of the films has now been concluded, and it has been a slow and careful one.

Meantime, in 1957, we have still found larvae of *A. gambiae* widely scattered through the country, with the same story of little or no overt malaria and very few findings of *A. gambiae* adults in huts or houses.

Results of Blood Film Examinations

The accompanying table shows the results, and needs little explanation or discussion. The term " children " includes all children able to walk, up to the age of 16-17 years, while " infants " includes children from those one week old to those aged about 15 months. (This figure would, of course, be far too wide if any attempt were being made to assess infection rates in the first few weeks of life, and is not in accordance with, for instance, the recommendations made at the Second African Malaria Conference, held in Lagos, Nigeria, in 1955.) A summing up of the results and of some facts not elucidated by the table or in the text may be useful.

1. All positives refer to *P. falciparum*, unless otherwise indicated, and all films were taken from Africans.

2. Out of the 36 " native areas " in which blood films were taken, eleven areas, in which 1777 people were examined, appeared to be completely free of the disease.

3. Gametocytes were never found in a population group shown to be free of trophozoites (ring forms).

4. All the positive films showed scanty parasites. This was particularly so with gametocytes. The maximum number found in any film was three; the figures being four films with one gametocyte, three with two, and one with three.

5. It is noteworthy that in the 2700 adults examined out of the grand total of 7694, no gametocytes were found.

6. Of the 32 areas where " infants " were examined, there were 24 areas where none of the infants showed parasites, while in the other eight areas only 21 infants had ring forms in their blood. In two of the four areas where no infants were examined all the adults and children seen were parasite-free.

Other Blood Film Surveys

From time to time, over the last twenty years, blood film surveys have been carried out in Southern Rhodesia. It is not proposed to burden this short paper with the numerous detailed totals involved, but it is desired to show (*a*) that a considerable amount of data had been amassed before

POSITIVE BLOOD FILMS AND GAMETOCYTE RATES IN SOUTHERN RHODESIA (MAY-SEPTEMBER 1956)

Reserve	Adults					Children					Infants					Total				
	Number examined	Positive films		Gameto-cytes		Number examined	Positive films		Gameto-cytes		Number examined	Positive films		Gameto-cytes		Number examined	Positive films		Gameto-cytes	
		no.	%	no.	%		no.	%	no.	%		no.	%	no.	%		no.	%	no.	%
Sipolilo	100	1	1	0		144	6	4.2	0		50	1	2	0		294	8	2.7	0	
Chiweshe	75	1	1.8	0		188	1	0.5	0		22	0	0	0		285	2	0.7	0	
Madziwa	50	0	0	0		101	2	1.9	0		14	0	0	0		165	2	1.2	0	
Bushu	35	2	5.7	0		24	0	0	0		10	0	0	0		69	2	2.9	0	
Mtoko	250	6	2.4	0		366	15	4.1	2	0.5	154	5	3.2	1	0.6	772	26	3.4	3	0.38
Mkota	100	0	0	0		165	1	0.6	1	0.6	80	2	2.5	0		345	3	0.9	1	0.29
Chikwazo	129	0	0	0		120	0	0	0		74	0	0	0		323	0	0	0	
Inyanga (N)	75	0	0	0		80	0	0	0		8	0	0	0		163	0	0	0	
Nyamaropa	—	—	—	—		69	2	2.9	1	1.4	14	1	7.1	1	7.1	83	3	3.6	2	2.4
Manga	26	0	0	0		44	0	0	0		9	0	0	0		79	0	0	0	
Mutasa (N & S)	55	0	0	0		89	3	3.3	0		26	0	0	0		170	3	1.8	0	
Holdenby	59	1	1.7	0		101	0	0	0		24	0	0	0		184	1	0.5	0	
Zimumya	29	0	0	0		66	0	0	0		—	—	—	—		95	0	0	0	
Mutambara	18	0	0	0		37	0	0	0		—	—	—	—		55	0	0	0	
Charter	81	1	1.2	0		65	0	0	0		43	0	0	0		189	1	0.5	0	
Muwushu	93	1	1.1	0		123	1	0.8	0		19	0	0	0		235	2	0.9	0	
Mutema	38	1	2.6	0		30	1	3.3	0		12	0	0	0		80	2	2.5	0	
Musikawanhu	75	0	0	0		59	0	0	0		25	0	0	0		159	0	0	0	
Sabi N.P.A.	87	0	0	0		100	0	0	0		30	0	0	0		217	0	0	0	

POSITIVE BLOOD FILMS AND GAMETOCYTE RATES IN SOUTHERN RHODESIA (MAY-SEPTEMBER 1956) (concluded)

Reserve	Adults					Children					Infants					Total				
	Number examined	Positive films		Gameto-cytes		Number examined	Positive films		Gameto-cytes		Number examined	Positive films		Gameto-cytes		Number examined	Positive films		Gameto-cytes	
		no.	%	no.	%		no.	%	no.	%		no.	%	no.	%		no.	%	no.	%
Matsai	76	0	0	0		60	3	5	0		48	0	0	0		184	3	1.6	0	
Bikita	111	0	0	0		127	0	0	0		112	0	0	0		350	0	0	0	
Ndanga (Zaka)	50	1	2	0		55	1	1.8	0		—	—	—	—		105	2	1.9	0	
Sangwe	13	1	7.7	0		18	3	16.3	0		7	1	14.3	0		38	5	13.2	0	
Belingwe	70	0	0	0		55	0	0	0		140	0	0	0		265	0	0	0	
Gwanda	9	0	0	0		16	0	0	0		4	0	0	0		29	0	0	0	
Semokwe	82	2	2.4	0		60	1	1.7	0		84	1	1.2	0		226	4	1.8	0	
Shashani	12	0	0	0		13	0	0	0		17	0	0	0		42	0	0	0	
South Nata	104	2	1.9	0		195	5	2.6	0		116	8	6.9	1	0.9	415	15	3.6	1	0.2
North Nata	100	0	0	0		63	1	1.6	0		73	0	0	0		236	1	0.4	0	
Gwaai	87	1	1.1	0		111	0	0	0		93	0	0	0		291	1	0.3	0	
Lupani	250	0	0	0		150	2	1.3	0		70	2	2.9	0		470	4	0.9	0	
Sanyati	74	0	0	0		144	1	0.7	0		41	0	0	0		259	1	0.4	0	
Umniati	50	0	0	0		70	2	2.9	0		33	0	0	0		153	2	1.3	0	
Magondi	29	0	0	0		60	2	3.3	0		—	—	—	—		89	2	2.2	0	
Zwimba	118	3	2.8	0		214	4	1.9	1	0.5	76	0	0	0		408	7	1.7	1	0.25
Urungwe	90	3	3.3	0		46	3	6.5	0		38	0	0	0		174	6	3.4	0	
Total	2700	27	1	0	0	3428	60	1.8	5	0.1	1566	21	1.3	3	0.19	7694	108	1.3	8	0.1

spraying was begun in 1949, and (*b*) that any impression that there was no real malaria problem in Southern Rhodesia is completely erroneous.

Between 1937 and 1948 a total of 18 100 thick blood films from both adults and children were taken, with 7813 positive films—ring forms of *P. falciparum*—and 1001 films showing gametocytes. In addition 366 films showed trophozoites of *P. malariae*, *P. vivax*, and *P. ovale*, with a further 23 showing gametocytes of one or another of these parasites. These figures are, of course, survey figures and do not include the routine laboratories' figures for films for patients in hospitals, dispensaries or clinics.

They include, moreover, surveys done of schoolchildren in urban and in high altitude areas where transmission rates have never been high. The rates, based on a total of 18 100 films examined, of what can reasonably be called a fair cross-section of the African population of Southern Rhodesia were: ring forms (*P. falciparum*), 43.2%; gametocytes (*P. falciparum*), 5.5%; other trophozoites, 2%; other gametocytes, 0.1%.

One of the areas—Bushu Reserve, in the north-east—has been kept under moderately close survey since 1947, and the examination of thick films from children has given the following results:

	Year	*Number of films*	*Positive*	*Gametocytes*
Children under 3 years old	1947	246	160 (61%)	27 (11%)
	1948	156	120 (77%)	19 (12%)
	1949	100	73 (73%)	20 (20%)
	1950	92	59 (64%)	8 (9%)
	1952	106	11 (10%)	1 (1%)
Children under 15 years old	1955 (March)	932	81 (9%)	21 (2%)
All ages	1956	69	2*(3%)	0 (—)

*Both were adults.

In April 1956 a sample survey of immigrant labour families from Nyasaland and Mozambique entering Southern Rhodesia through Mtoko revealed 136 with ring forms and 16 with gametocytes in 400 films examined.

Conclusions

The findings detailed briefly in this paper highlight the remaining problems facing Southern Rhodesia.

1. *A. gambiae* larvae are still found in small but widely-spread foci.

2. Immigrant labour has been shown to be a potential source of infection now very much more dangerous than the local population. Steps have now been taken to dose immigrants at several points of entry. The drug being used is Camoprim, each tablet of which contains 150 mg amodiaquine and 15 mg primaquine.

3. It is clearly important to discover the role of the *A. gambiae* still found in Southern Rhodesia.

4. It is possible that the parasite rate in the indigenous population of Southern Rhodesia is now so low that for practical purposes a break in transmission has been achieved in the central high plateau area. If this is so, the use of chloroquine may be unjustified, as indeed may also be the continuation of large-scale insecticide applications.

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RÉSUMÉ

Après sept années de traitement par les insecticides des régions impaludées de la Rhodésie du Sud, les pulvérisations dans la zone centrale ont été remplacées par des pulvérisations « en barrage » le long de la frontière, sur le pourtour des terres basses. On a procédé à ces opérations d'octobre 1955 à avril 1956 et à nouveau en 1956-57. Des larves d'*Anopheles gambiae* ayant été trouvées dans des foyers largement disséminés — bien qu'il n'y ait plus ou guère de paludisme avéré — il a été décidé d'administrer de la chloroquine à la population indigène dans certaines zones périphériques. L'examen microscopique du sang effectué sur enfants et adultes a révélé un indice parasitaire extrêmement faible. On pourrait considérer la transmission comme pratiquement interrompue, si ce n'était le risque de réinfection que représentent les travailleurs immigrants. Pour parer à ce danger, des mesures ont été prises pour traiter ces immigrants en divers points de la frontière au moyen de Camoprim (amodiaquine et primaquine). Il importe en outre d'élucider le rôle des foyers résiduels d'*A. gambiae*.