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The Secretary of the Expert Committee on Malaria
has the honour to communicate hereunder
the following note:

MALARIA CONTROL IN AREAS WHERE HOUSES HAVE MUD WALLS

with a note on:

MALARIA CONTROL IN THE TRANSVAAL

by

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Dependent on the various factors described later in this precis, the control methods applied differ with different circumstances. The choice lies between

- (i) Dual control i.e. adulticidal control with residual insecticides (DDT or BHC) and anti-larval work with DDT. Emulsion or anti-malaria oil in the same area.
- (ii) Adulticidal control with residual insecticides alone.
- (iii) Larval control alone.

This last method is mostly used, in Transvaal, in isolated instances such as densely populated light epidemic areas with limited surface waters; it is seldom, if ever, used in endemic areas.

The density of population and the relative feasibility of treating all surface waters with larvicide are important considerations when decisions are made as to what control methods to apply. Economic factors naturally play an important role. In densely populated endemic regions, with a fair amount of surface water, houses would be sprayed with a residual insecticide and waters treated with larvicide. In areas with scattered population (this is what we find mostly in the Transvaal rural areas) control with residual insecticides only has proven to be effective.

With rare exceptions all native dwellings are built of poles and are mud-plastered. The plaster itself is either red or black turf or a gray sandy loam. The mud plaster is often finished off with white lime-wash to improve the appearance. Roofs are invariably thatched with any available grass and there is always an opening between the roof and the top of the walls. Grass roofs overhang the walls to a distance of 2 - 3 feet. Windows are rare and if present are usually kept closed. The door is made of any available planks, seldom fits properly and always opens inwards.

Natives live in "kraals" or "stats". Such a kraal or stat always includes huts in which they sleep and in which they naturally hang their blankets and mats on the rafters during the day time. There is always a hut in which food and beer is kept and a construction of wattle and daub raised on wooden posts in which grain is stored. A combined cattle, goat, sheep and donkey kraal (enclosure) by no means weather- or wind-proof near the "stat" completes the picture.

This is a hot country and the native often sleeps outside his hut. When discussing the effect of residual insecticides in native huts it is apparent that a number of important factors must be borne in mind. These are:

- (a) We spray only the inside of the sleeping hut.
- (b) Natives often sleep outside this sleeping hut.
- (c) The overhanging grass roofs provide adequate shelter for mosquitoes.
- (d) The grain store and beer-room-kitchen also provide adequate shelter for mosquitoes.
- (e) Cattle enclosures shelter vector mosquitoes.

Resting blood-fed Anopheles gambiae have been collected in day time in these usually unsprayed hideouts. In most instances they had fed on human beings as proved by precipitin tests.

Where larval control is efficiently carried out, whether in conjunction with residual adulticidal work or not, mosquito numbers dwindle to zero. This has never been the case in areas where residual spraying alone is done. Breeding

takes place unchecked although houses may be free from mosquitos, and even the additional shelters enumerated above may show very small quantities of mosquitoes. The incidence of malaria in such residually sprayed areas, however, is greatly reduced. After seven years of experience I can now make the statement that with moderate rainfall the disease can be checked, and reduced to negligible proportions with residual insecticides, provided the applications of insecticides are carried out timely, in relation to rainfall, and thoroughly.* Extensive rainfall leading to gambiae spread and so to epidemic conditions, can be checked, but not controlled by insecticides alone. Although a very useful initial measure, it must be complemented by anti-larval work as soon as practicable.

DDT and BHC both in wettable powder formulations, are used in our control programme in native territories where humans live in huts with mud walls. DDT is applied at 150 mg sq ft (1.5 g sq m) and BHC at 20 mg gamma sq ft (0.2 g sq m). Both preparations are supplied by the South African Factory of Klipfontein. The DDT wettable powder contains 50% technically pure DDT, 75% p-p' isomer and the BHC 40% technically pure BHC with not less than 6% gamma isomer.

Both residual insecticides are applied with four Oaks Eclipse Sprayers and even coverage is naturally aimed at but not always achieved. On plain mud surfaces without a limewash finish, and more particularly on red and black turf surfaces, the white deposit on walls serves to indicate the even distribution or otherwise of the insecticide. This factor is most important when checking the quality of work. Instances have occurred where the insecticide was applied on some parts of a hut while others were not touched at all. Slight shaking of the container in which the suspension is held obviates sedimentation satisfactorily.

Trained African staff learn soon exactly how much of the suspension to apply to secure the correct coverage and we rely on this more than on any other single factor. In a malaria season where up to 400,000 huts are sprayed the mean dosage always works out correctly.

*Underlined by the Editor.

NOTE ON MALARIA CONTROL IN THE TRANSVAAL

Malaria control by the State was instituted in the Transvaal in 1944/45 and a period of several years saw the malaria organization at its peak. The malaria area covers 60,000 sq miles and is inhabited by 120,000 Europeans and 1,200,000 Africans.

Although no excessive rainfall was registered during the years 1945-1949 we did not experience any particularly dry years. The malaria seasons 1949-1950, 1950-1951 and 1951-1952 were, however, particularly and exceptionally dry ones with a total rainfall of 12-18 inches where 35-50 would be normal. The first rains during this season 1952-1953 came in November 1952 when a general fall of 4-5 inches was registered. This was followed by 8-10 inches in December. Then came two months of excessive and incessant rains when over 30 inches was registered over all Transvaal malaria areas - equally divided between January and February. In March only 4-5 inches was registered and less in April.

Although our organization was functioning properly, difficulties arose. Firstly our men, with rare exceptions, do not know what gambiae can do after very successful control over six dry years. Secondly the continuous rains in January and February, giving no break at all, added to our difficulties. Transport of men and materials was delayed to such an extent that the residual-spraying programme was a month or more behind schedule by the end of February. Important endemic areas could not be reached with motor transport. Little of our residual programme could be put into operation.

From the above it is obvious that we had to act quickly and institute as effective a control as possible in the minimum of time.

As rains diminished an anti-larval programme as full as practicable was launched, and mobile (on bicycle) African labourers served a most useful purpose. All shallow waters were potential gambiae breeding places and had to be treated; DDT emulsion diluted with any available water was used as larvicide. The residual spraying programme was also soon brought up to date.

A. gambiae had however, such a start that residual spraying alone, particularly in sparsely populated areas could only stem the disease, but not stop

it altogether. A. gambiae was found mostly outside human habitations and could not be eliminated with residual insecticides. Malaria cases continued to occur until the anti-larval programme came into full operation when a rapid decline in mosquito numbers and malaria cases followed, at the peak of the transmission season. The situation was saved by anti-larval work; the malaria incidence was only 0.16% of the European population and 0.01% of the non-European population. No disruption of agricultural economy occurred.

To sum up an epidemic was completely and successfully averted by effective field measures,* though handicapped by inexperience and climatic conditions. In Northern Transvaal no epidemic occurred, nor even threatened, and the final costing reflected no increase, which was largely attributable to thoroughly planned organization. The same picture, however, cannot be told for Natal and Zululand, where an epidemic occurred.

Check Area

Over the years of control it was felt that an area sufficiently large should be kept 'open' where nothing was done, in order to watch the natural progress of the disease each year and at the same time to serve as teaching and testing grounds. Newer drugs are tested out on the population exposed to natural incidence of the disease while insecticides flooding the marked have to be tested on mosquito population. Very careful malarimetric data were obtained from year to year and served as a guide to similar data in controlled regions. In this connexion it is interesting to record the data obtained during the past four seasons including 1952-1953.

*Underlined by the Editor.

Year	Cases Examined		Spleen Rate		Parasite Rate	
	Age group: 0-2	2-6	0-2	2-6	0-2	2-6
March 1950	100	Nil	46	Nil	40	Nil
March 1951	103	Nil	35	Nil	39	Nil
March 1952	97	90	19.4	41.3	17.8	30.6
March 1953	79	99	46.8	71.7	76.0	85.9

An explanatory graph is attached. Carriers with more than one parasite per every ten leucocytes show a tremendous increase in 1953 over previous years and so does the number of carriers with more than one gametocyte per every three hundred leucocytes.

In conclusion this area is not particularly a heavy endemic area. It has a scanty rainfall of 10-12 inches per annum. In 1953 the rainfall has undoubtedly been more than trebled and where mosquito breeding is usually confined to riverbed pooling, A. gambiae this year, had free and unchecked breeding facilities everywhere. I feel that this picture would have been general over the Transvaal malaria areas had control not been successful.

Quinine administration was undertaken, very careful watch was kept over the population and mortality was successfully prevented. Finally, no overflow occurred thanks to the field control in the adjacent areas.

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MALARIA INCIDENCE AMONG NATIVE CHILDREN IN UNCONTROLLED AREA

FRÉQUENCE DU PALUDISME CHEZ LES ENFANTS D'AUTOCHTONES DANS UNE RÉGION NON TRAITÉE

