UNITED NATIONS

NATIONS UNIES

a 60356

WORLD HEALTH ORGANIZATION

ORGANISATION MONDIALE DE LA SANTÉ

WHO/Mal/84
30 April 1953

ORIGINAL: ENGLISH

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

MALARIA CONTROL BY METHODS OTHER THAN INSECTICIDES

Malaria carried by Anopheles leucosphyrus in Borneo

by

Dr. John McARTHUR, former Director of Malaria Research in North Borneo, Sarawak and Brunei

Fourteen years' work has now been completed by Borneo Malaria Research, first in North Borneo, but later in Sarawak and Brunei as well.

Its aim has been to develop a means for the eradication of malaria, based on a study of local conditions; and it is believed that in this object the work has succeeded.

The steps toward this have been first to define the distribution and intensity of malaria throughout the land, and the identity and distribution of its mosquitoes; next to discover which mosquitoes were vectors of the disease and which were harmless; then to study the habits of the vectors, and thereby to discover some means, if possible imitating Nature's own methods in the locality, of eradicating the transmission of the disease.

It was first shown that malaria is hyperendemic throughout a great part of Borneo, although some parts are completely healthy. Anopheles maculatus, the previously accepted vector, was shown to be almost certainly harmless; and the chief and usually only vector throughout the land was proved to be Anopheles leucosphyrus, which was previously regarded as harmless.

Studies on A. leucosphyrus showed this insect to be extremely dangerous, but also extremely elusive in both the larval and adult stages. Previously it had frequently been missed even where it was abundant, partly because it often bred in inaccessible places, and partly because it was not a house-haunting mosquito, and fed in the early hours when its victims were asleep.

A. leucosphyrus was shown to breed only in seepages under jungle shade. Thus it was shown that the jungle-covered hill ravines were the malarious places, and that towns, cultivated areas and flat plains were in general absolutely healthy at a distance from shaded ravines.

It was thus shown that much widespread oiling, drainage and other conventional anti-mosquito measures were not preventing Borneo malaria; that the considerable sums of money being spent on measures directed against A. maculatus were being wasted; and that the preservation of jungle being carried out for the prevention of A. maculatus breeding, although successful in Malaya, was in fact encouraging the breeding of A. leucosphyrus and the transmission of Borneo malaria.

It was next shown that the clearance of scrub for a small radius - sufficient to admit sunlight - over limited situations along the courses of streams, resulted in the immediate eradication of A. leucosphyrus breeding.

The Tambunan Experiment, established in 1949, was designed to determine whether this admission of sunlight to jungle-covered seepages resulted not only in the control of A. leucosphyrus, but of the malaria which it carries, and whether this might be the ideal method for Borneo malaria eradication.

In this experiment, sunlight was admitted to seepages throughout a ten square mile area of extremely difficult jungle-covered hills, embracing five highly malarious villages. This quite limited clearing resulted in a 95 per cent reduction of A. leucosphyrus breeding, a reduction which was maintained without significant further attention throughout the whole three years of the experiment.

In this treated area, the spleen rate had been maintained, as far as can be known, at a constant high level for 16 years. It was over 80 per cent during every survey before the war between 1937 and 1942, and again since the war. Before the clearing in 1949 the spleen rate was 86 per cent. A year after the

clearing it had fallen, however, for the first time on record, to 56 per cent, and in the subsequent two years it fell further to 53 and 45 per cent respectively.

It is reasonable to believe that this reduction of malaria following the clearing and consequent great reduction of A. leucosphyrus, was in fact due to the clearing.

There was, however, a small degree of malaria transmission remaining, as shown by parasites in the blood of young babies, and it seems likely that this was due to the infiltration of infected A. leucosphyrus through the jungle from surrounding highly malarious villages; and it is extremely desirable that further work should be carried out on A. leucosphyrus, on the scale of an actual campaign, covering a larger area to eliminate infiltration.

A fact which required explanation, but which was most satisfactorily explained, was found in a Comparison area three miles away, in which no measures were taken by the Department. Here, spleen rates which had been 100 per cent at every examination over thirteen years, suddenly fell for the first time on record to 71 per cent during the last survey in 1952.

This at first seemed to invalidate the other observations; but an examination of the village showed that, whereas conditions had remained exactly the same for many years previously under an elderly Headman, in 1951 this old man had died and been replaced by a new Headman, young, enthusiastic, educated at a mission school, and an ex-policeman. This new Headman had in fact attempted drainage and jungle clearance, had distributed drugs to the children, and taken other measures to clean up his village. Thus, far from invalidating the observations in the cleared area, this village had proved the ability of the people themselves to tackle their own malaria problem entirely on their own initiative.

With this experiment, therefore, Borneo Malaria Research has given to the land a proved method of malaria control which is simple yet effective, economical, permanent, which can be carried out by the people themselves, and which at the same time encourages the economic development of the country, and the prosperity as well as the health of the people.

This method of control consists simply in the clearing of scrub and the admission of sunlight to those limited situations where seepages occur, and its replacement if possible by cultivation, cattle grazing, building, or any other activity which maintains the admission of sunlight.

It is claimed that this work has proved that A. leucosphyrus breeding is eradicated by the clearing of jungle over seepages; and that the transmission of malaria can thereby be controlled. I would, therefore, recommend that further work should be carried out on the scale of an actual campaign, possibly as a parallel to a residual spraying campaign in an identical area, in order to compare the relative effectiveness and costs of the two methods.

I would also recommend that experiments should be carried out, using selective herbicides of the type which kills larger growths but leaves grass and small cultivated plants unaffected. Herbicides of this type can be simply applied, and are claimed to be effective for up to five years; and this, if successful, would prove an extremely simple and economical means of malaria control which is worthy of further experiment.

It is hoped that this work has defined a strategy for a warfare against malaria, not only throughout the island of Borneo, but widely throughout the East, in those jungle-covered areas - from Assam to Celebes - where A. leucosphyrus has now been proved a vector.