

WORLD HEALTH
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DE LA SANTEEXPERT COMMITTEE ON
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The Secretary of the Expert Committee on Malaria has the honour to communicate hereunder a Digest¹ of the

REPORT ON PROGRESS OF MALARIA ERADICATION SCHEME - COLONY OF MAURITIUS

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Officer in Charge

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I. Malaria in Mauritius. (Area, 720 sq. miles; Population, 1947: 438,703)²

Malaria first made its appearance on the island in 1865 and in 1867, during the month of April, more than 6,000 people, out of a total population of 47,000, in Port Louis, died of the disease.

Malaria, to-day, causes a high infant mortality rate which reaches its peak during the epidemic season (February to May). Its severity is also reflected in the general death rate. According to a survey carried out in 1942-43 by SIPPE and MAY TWINING (Fig.1) the highest spleen and parasite rates were found during the months of May-July and the lowest in November-December.

The two vector species are A. gambiae and A. funestus.

¹ Drafted in collaboration with Dr. F.J.C. CAMBOURNAC, WHO Malaria Consultant for Africa.

² Editor's note.

A. funestus breeds all the year round in the warm coastal districts causing a constant malaria transmission even during the winter months.

A. gambiae makes its appearance during December and January, especially when there is heavy rainfall; it breeds in high numbers in water-logged soil. This species is largely responsible for the sharp epidemic season (see fig. 2).

II. Eradication Methods

On 9 November 1948, a Research Team appointed by the Colonial Office arrived in Mauritius with the task of directing a campaign to eradicate malaria from the island and, if possible, its vectors.

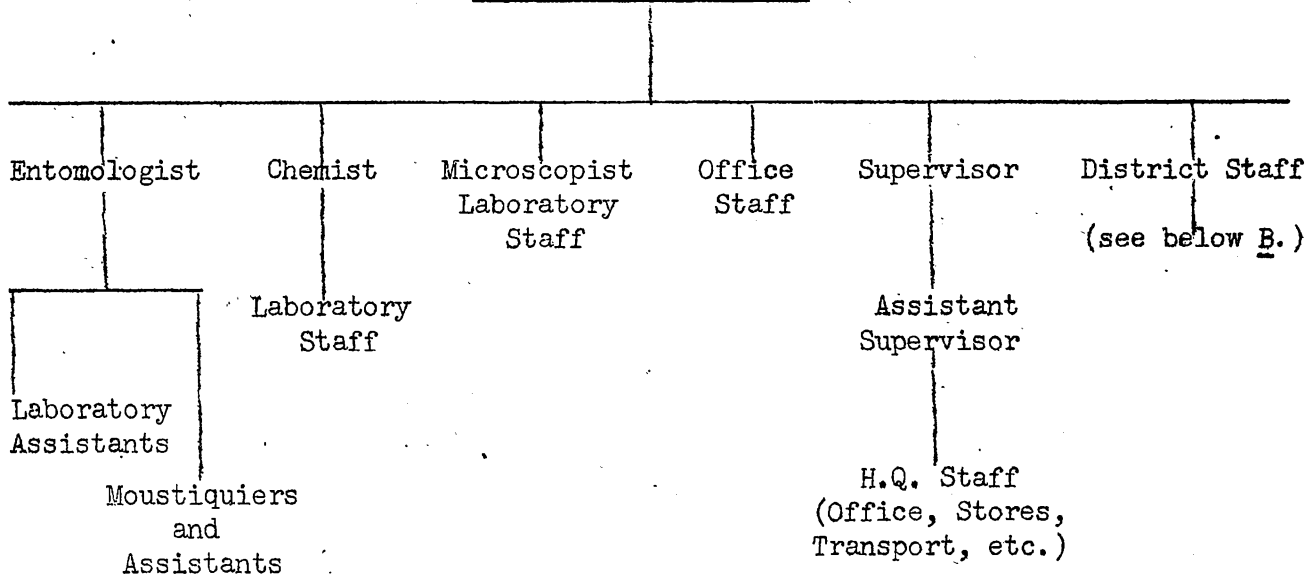
A census and survey were organized by the Director of Medical Services of the island for the purpose of mapping villages and scattered houses. In addition, overseers record the number of inhabitants permanently residing in each house at the time of spraying with insecticide in order to have an accurate census for each district.

The island was divided into six districts, each one with its Headquarter and Organization (Fig. 1). A chart of the general organization is presented on Table I.

T A B L E I.

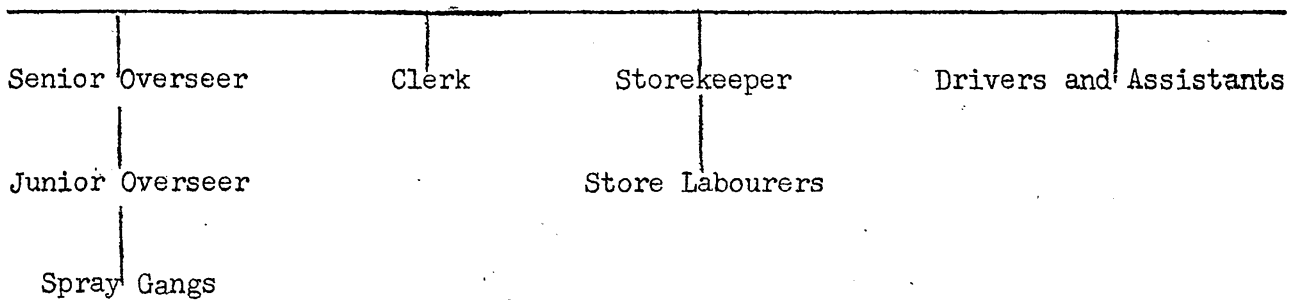
CHART OF ORGANIZATION

A. Officer in Charge



B. Field Officer

ASSISTANT FIELD OFFICER



NOTE: It is impossible to separate spraying from experimental staff, as, in the inter-spraying period, all personnel are employed on scientific control work.

Three preparations of residual insecticides were used in the different districts, as shown in fig.1, and the types of the insecticides were as follows:

- DDT (80% p.p.¹) solution in kerosene
- DDT 50% wettable powder in watery suspension
- Gammexane (BHC) 50% wettable powder in watery suspension.

A dosage of 100 to 200 mgm of insecticides (DDT or BHC) per square foot was aimed at. In certain zones, however, where it was considered that the wettable powder would damage painted or varnished surfaces, a solution of DDT in kerosene was substituted for the suspension. Care was also taken not to damage furniture or other belongings. These were either removed from the room or covered up before the spraying.

Spraying began on a small scale in all the districts on 17 January 1949, slowly gathering speed and efficiency. In Port Louis, however, an early attempt was made on 13 December 1948 in order to destroy the fly population in view of a poliomyelitis epidemic.

The number of houses and rooms treated in this first spraying, as well as the population protected, are summarized in Table II.

T A B L E II

DATA ON THE FIRST SPRAYING (January - May 1949)

<u>District letter</u>	<u>Number of Houses sprayed</u>	<u>Number of Rooms sprayed</u>	<u>Population protected</u>
A	13,397	82,721	66,868
B	9,702	48,584	50,811
C	17,396	78,121	69,463
D	13,084	54,657	49,666
E	11,476	61,036	46,034
F	10,774	51,879	41,339
Total	<u>75,829</u>	<u>376,998</u>	<u>324,181</u>

These totals do not actually represent total spraying figures for district staffs, as those with smaller districts have been switched to help the others.

This preliminary campaign was completed by 21 May 1949. It can however, be said that the spraying of the malaria zone was virtually completed by the end of March 1949.

The principle of the campaign is to spray the inside surfaces of all possible resting places for adult mosquitos, including houses, churches, warehouses, factories, animal shelters, etc. In each house and outhouse careful records are kept of the actual data of spraying and the names of the personnel responsible for the spraying in the event of some query or complaint. A further check on the efficiency of the spraying teams was obtained by the chemical estimation of the insecticide deposited in test papers applied to the surfaces. This has been carried out in the laboratory in Floreal.

The results of the tests made are summarized in Table III.

T A B L E III

CHEMICAL ESTIMATIONS

<u>Zones</u>	<u>No. of Estimations</u>	<u>Mean Dosage</u>
DDT kerosene	235	251 mgms of DDT/sq.feet
DDT wettable	351	217 mgms of DDT/sq.feet
Gammexane	244	187 mgms of BHC/sq.feet (24 mgms gamma isomer per sq.feet)

NOTE: These results are high owing to the early inconsistent figures training of staff at the outset of the campaign.

The Central Highlands (fig. 1) were omitted during the first spraying as practically no vector anopheline mosquitos were caught inside this zone, and because proven cases of malaria contracted in the same area were rare.

Anopheles - usually gambiae - found up country during the hot season had come from the coast. Adequate treatment of the coastal area, therefore, should ensure the protection of the unsprayed zone. The discovery of a malaria vector within the unsprayed zone is always followed up by flitting the houses and searching for breeding places in the surrounding areas. The mosquitoes found under these circumstances were in all cases proved to be solitary vectors probably brought up from the coast by vehicle.

It was anticipated that the second spraying would proceed more rapidly than the first and that it would be completed by the end of December 1949.

III. Epidemiological Data : Spleen and Parasite Surveys

A preliminary survey was carried out before the beginning of the first spraying in mid-January (month preceding the epidemic malaria season). A second survey was conducted after the first spraying. The results of the two surveys are summarized in Table IV. Children under sixteen were examined and the representative towns and villages chosen in each district are comparable in each one of the three surveys (1942-43, 1948, 1949).

T A B L E IV

SPLEEN AND PARASITE SURVEYS (Children under 16 years)

<u>District</u>	<u>Date of Survey</u>	<u>No. of children examined</u>	<u>Spleen rate per cent</u>	<u>Parasite rate per cent</u>
A	January, 1949	600	6.0	3.0
B	January, 1949	587	18.3	8.7
C	December, 1948	596	47.0	11.0
	September, 1949	3,618	13.2	0.9
D	December, 1948	603	52.0	14.0
	July, 1949	2,127	27.8	8.2
E	December, 1948	599	44.3	9.8
	July, 1949	2,179	16.2	2.9
F	December, 1948	600	43.8	9.2

Entomological data. In each of the six districts, some 576 houses were selected as catching stations in December 1948. Mosquito catchers ("moustiquiers") make a regular round of these catching stations, recording and identifying the species collected which are further checked in the central laboratories at Floreal. Records are available of the mosquitoes caught both before and after spraying in the various districts.

The comparison of the results obtained in relation with the different types of insecticides used are summarized in Table V in which the catching station records from December 1948 to May 1949 are shown.

T A B L E V.

MOSQUITO CATCHES RECORDED December 1948 - May 1949
IN CATCHING STATIONS

	No. of houses flitted	<u>A. gambiae</u>	<u>A. funestus</u>	<u>Ae. aegypti</u>	<u>Ae. albo-</u> <u>pictus</u>	Other Culicines
I. DDT KEROSENE ZONE						
Before spraying	1,900	80	767	22	821	48,638
After spraying	883	2	3	-	154	9,505
Reductions per cent	-	94.6%	99.2%	100%	59.6%	67.9%
II. DDT WETTABLE POWDER ZONE						
Before spraying	2,941	957	7,981	85	280	28,829
After spraying	2,322	59	147	-	46	6,614
Reductions per cent	-	92.2%	97.7%	100%	79.2%	70.9%
III. BHC WETTABLE POWDER ZONE						
Before spraying	1,548	906	3,892	1,465	681	31,000
After spraying	1,109	46	10	1	50	3,411
Reductions per cent	-	92.9%	99.7%	99.9%	89.7%	86.0%
TOTAL ALL ZONES						
Before spraying	6,389	1,943	12,640	1,572	1,782	111,467
After spraying	4,314	107	160	1	250	19,530
Reductions per cent	-	91.8%	98.1%	99.9%	79.2%	74.2%
Unsprayed Central Zone						
Rate per house	2,324	2	6	5	1,038	51,490
	-	0.0009	0.0026	0.0021	0.45	22.22
REMAINING DISTRICTS						
Rate before spray-						
ing	-	0.30	1.98	0.20	0.28	17.42
Rate after spraying	-	0.0250	0.0370	0.0002	0.058	4.54

It can be seen that the figures for the unsprayed central zone are comparable to those for the malaria belt after spraying, except for the numbers of Culicines. In view of the high Culicine rate per house, it has been decided to enforce the relevant clauses of Ordinance 28, July 1946.

Funestus larvae which should have been found in large numbers in the coastal areas at this time of the year almost disappeared after April.

Data on Vital Statistics

The general death rate per thousand, calculated in each case from figures for the first six months of the year, from 1934 to 1948 ranged from a minimum of 20.5 to a maximum of 38.4, showing a mean of 28.0 ± 4.45 , whereas for the first 6 months of 1949, the rate was 16.8. The mean monthly number of deaths of persons over 5 years of age for the four months of April-July, since 1934 to 1948 was 268, ranging from 148 to 431, whereas in 1949 it has been only 87 (with an increased population).

It is also important to note that a close correlation exists between the rainfall of the first two months of the year and the number of deaths due to communicable diseases during the months of the epidemic malaria season (February-May) from 1934 to 1948, while in 1949 a marked reduction has been observed in the number of deaths due to the above mentioned diseases.

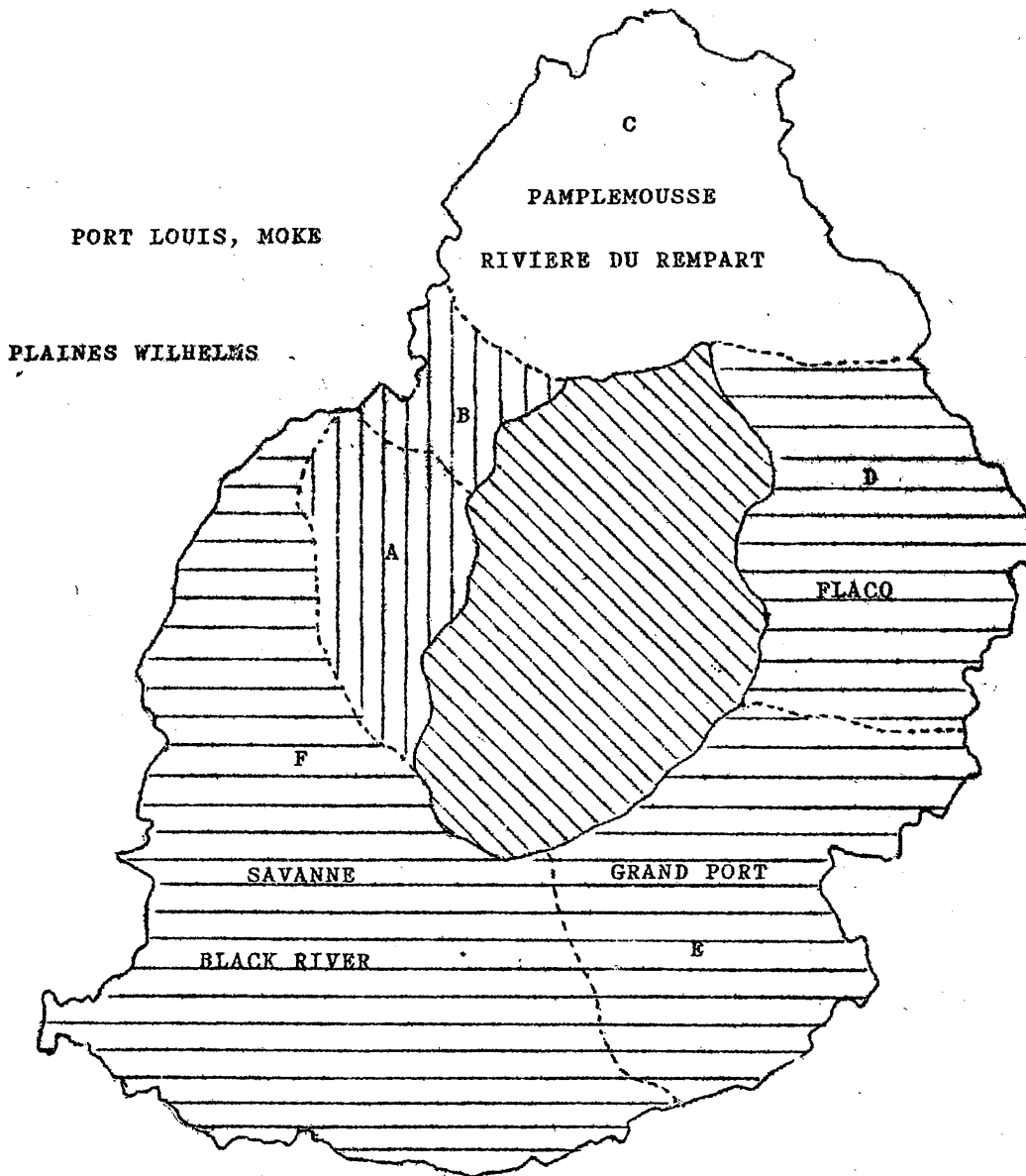
Cost of the first spraying in each zone: The per capita cost of the first spraying has been 1.94 rupees¹ for the zone treated with DDT kerosene solution, 1.55 rupees for the zone treated with Gammexane suspension and 1.41 rupees for the zone sprayed with DDT suspension. Average cost per capita 1.63 rupees. The population directly protected amounted to 324,191, with a total of 229,100 buildings (of which 75,829 houses) and 376,998 rooms. If the whole population of the island is considered protected by the area sprayed, the per capita cost for spraying would amount to 1.19 rupees. It is expected that the cost of the following sprayings will be lower.

In order to have comparable data, a survey of the island of Reunion, epidemiologically similar to Mauritius, was planned and carried out by a small survey team in the winter months, thanks to the co-operation of the French authorities. About 2,320 children in different localities of the coast were examined. The data obtained give an indication of the prevalence of malaria during the winter months. It is hoped that a second survey will be authorized during the peak epidemic month of February 1950.

¹ 1 Rupee = US \$ 0.21

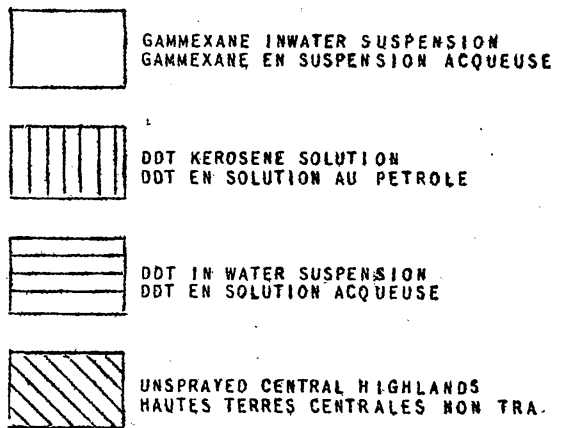
CORRIGENDUM: End of 3rd paragraph, after "diseases" add "although the rainfall was a little above the mean for the previous years!"

DIVISION OF THE ISLAND OF MAURITIUS IN SIX DISTRICTS FOR SPRAYING OPERATIONS
 DIVISION DE L'ISLE MAURICE EN SIX DISTRICTS POUR LES OPERATIONS D'ASPERSION AU DDT



1942-1943
 SPLEEN AND PARASITE RATES
 INDICES SPLENIQUES ET PARASITAIRES
 SIPPE & TWING, 1946

DISTRICT	AV. SPLEEN RATE INDICE SPLENIQUE MOYENNE	AV. PARASITE RATE INDICE PARASITAIRE MOYENNE
A	-	-
B	56	32
C	65	45
D	67	50
E	26	21
F	71	47



THE PART PLAYED BY A. GAMBIAE AND A. FUNESTUS IN MALARIA TRANSMISSION IN MAURITIUS
 ROLE JOUE PAR L'A. GAMBIAE ET L'A. FUNESTUS DANS LA TRANSMISSION DU PALUDISME DANS
 L'ILE MAURICE.

