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REPORT ON THE STATUS OF MALARIA ERADICATION IN THE AMERICAS  
AND ESTIMATED REQUIREMENTS FOR THE SPECIAL MALARIA FUND OF  
THE PAN AMERICAN HEALTH ORGANIZATION

A. REPORT ON THE STATUS OF MALARIA ERADICATION  
IN THE AMERICAS

XII REPORT

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## REPORT OF THE STATUS OF MALARIA ERADICATION IN THE AMERICAS

### XII REPORT

#### Introduction

The Director of the Pan American Sanitary Bureau has the honor to present to the XV Meeting of the Directing Council the XII Report on the status of malaria eradication in the Americas.

The report consists of four chapters. The first chapter contains information on the status of the program in general and also country-by-country summaries of progress, depicting the history and present condition of each program in tables and graphs. The second chapter discusses special technical problems which have arisen; the third, field research projects in progress; and the last, international cooperation in the malaria eradication program.

The data presented are from the answers of each country to a detailed annual questionnaire and from monthly and quarterly statistical reports submitted to the Pan American Sanitary Bureau by most of the programs. Special technical reports concerning research projects are also presented by the countries when appropriate.

#### I. STATUS OF THE MALARIA ERADICATION PROGRAM

##### A. General Picture

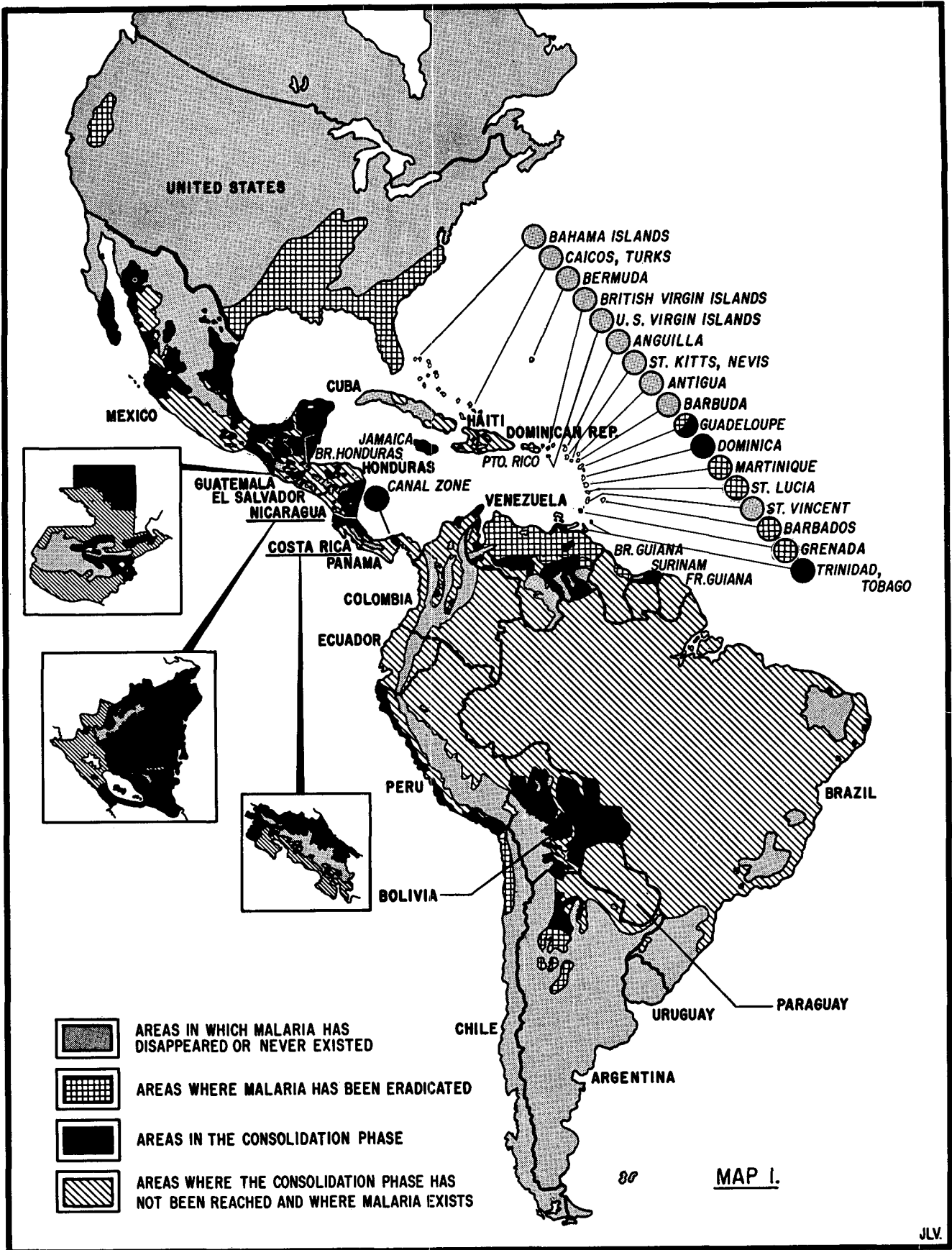
The progressive movement of areas from attack phase into consolidation and from consolidation to the goal of completed eradication (maintenance phase) continued satisfactorily during 1963. The situation at the end of 1963 can be readily compared with that at the end of 1962 by inspection of Maps 1 and 2 and the summary presented in Table 1.

The territory in which eradication is claimed was augmented during 1963 by the addition of new areas in Venezuela, of the last remaining part of the originally malarious area of Guadeloupe, and of the first areas to be placed in maintenance phase in Peru.

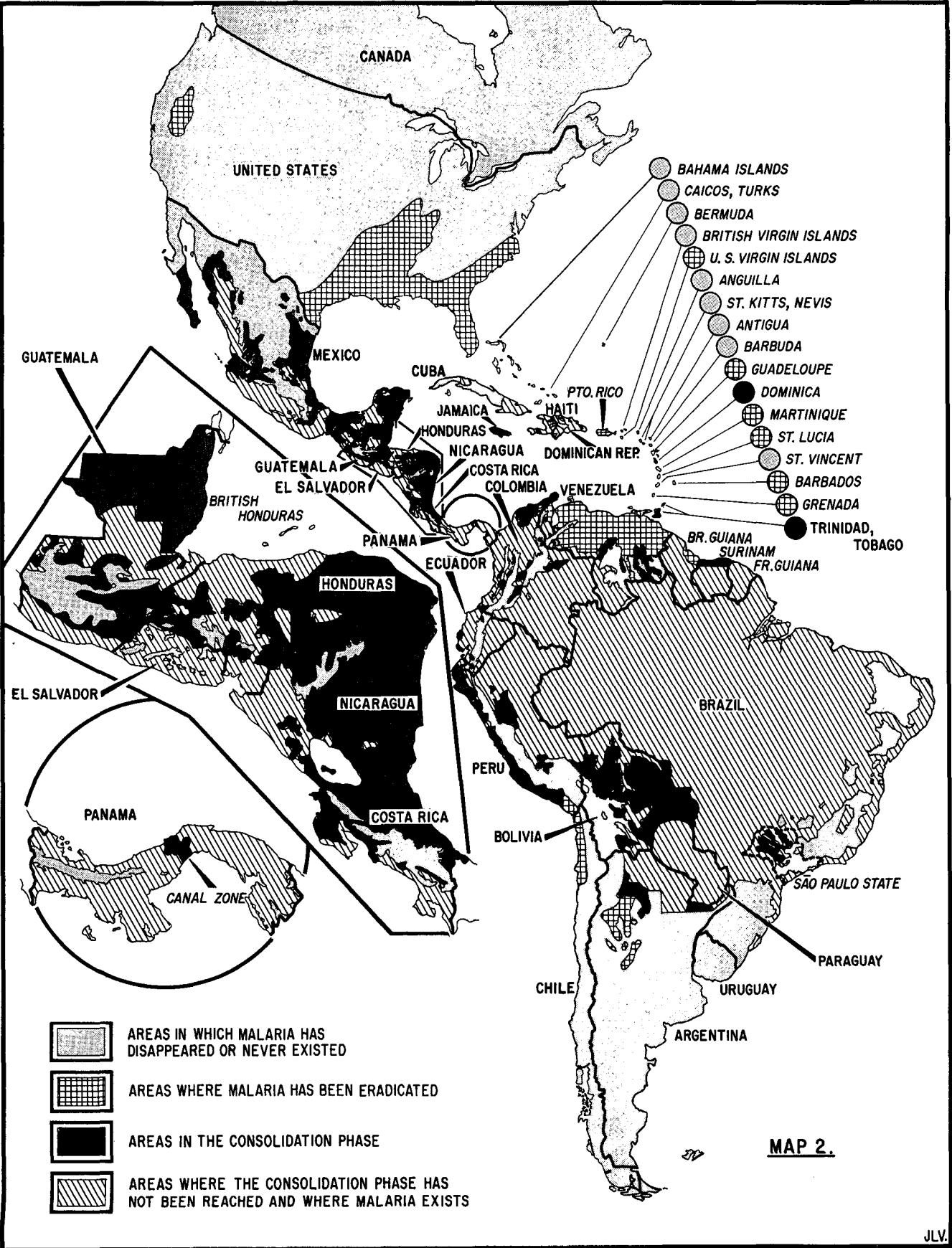
Eight million people living in some seven hundred thousand square kilometers of originally malarious territory passed during 1963 from the attack phase into the consolidation phase, an increase of 30.8 per cent in the number of inhabitants of consolidation phase areas.

The population in attack areas has decreased as a result of this progress into consolidation phase.

A decrease of a less auspicious nature occurred in Brazil, where in 1963 considerable areas were retired from attack and placed again in the preparatory phase. Some of these areas were being partially protected by insecticide spraying but full attack measures were not in effect. The change, more terminological than actual, resulted from a general improvement and tightening-up of evaluation standards. The status of other large areas was reconsidered and some previously reported as in maintenance or consolidation phase, but actually without adequate surveillance, were reclassified temporarily. Pending completion of studies initiated to delimit areas which can legitimately be placed in consolidation and those which will require attack measures the official figures submitted for this report have included the doubtful territories as in the preparatory phase. In Tables 1 and 2 these corrections have been carried back for preceding years. It is expected that some of these areas will be replaced in consolidation, with appropriate surveillance, beginning with 1964. Geographical reconnaissance was carried out during 1963 in preparatory phase areas and it is hoped to reach total attack coverage by the end of 1964. Data for the State of São Paulo are not affected.



STATUS OF THE MALARIA ERADICATION PROGRAM IN THE AMERICAS, 31 DECEMBER 1962.



STATUS OF THE MALARIA ERADICATION PROGRAM IN THE AMERICAS, 31 DECEMBER 1963.



Table 1

COMPARISON OF 1962 AND 1963 POPULATION AND AREA IN VARIOUS PHASES  
OF THE MALARIA ERADICATION PROGRAMS IN THE AMERICAS,  
AND PERCENTAGES OF CHANGE BY PHASE <sup>1/</sup>

Phase	1962	1963	Percentage change
A. Population in thousands:			
1. Malaria eradication claimed or registered	55 397	56 546	+ 2.1
2. Consolidation phase .....	25 914	33 901	+ 30.8
3. Attack phase .....	49 276	31 910	- 35.2
4. Preparatory phase or not yet started ....	23 155	29 664	+ 28.1
B. Area in km <sup>2</sup>			
1. Malaria eradication claimed or registered	2 810 968	2 874 214	+ 2.2
2. Consolidation phase .....	1 712 179	2 411 815	+ 40.9
3. Attack phase .....	5 728 032	3 378 932	- 41.0
4. Preparatory phase or not yet started ....	6 087 581	7 663 009	+ 25.9

Administrative problems are still among the most serious facing malaria eradication programs in the Hemisphere. In some cases these are primarily matters of increased efficiency of administration required within campaigns; a number of such cases have already found solution or are on the road to it, as in the Dominican Republic, where a thorough administrative reorganization has been carried out with PASB technical assistance and the campaign is now headed by co-directors, one national and one appointed by PASB; in Colombia where administrative revision is in process and Brazil, already mentioned.

The areas in which the primary problem is insufficient funds are still numerous. Foremost among these are many countries facing technical problems (see below), but others also find themselves unable to prosecute operations to the extent required by the technical circumstances of the program. In Paraguay, where the previous program has been paralyzed since late 1960, attack has still not been begun and is now planned, under a new campaign, to start in 1965. Argentina has not as yet been able to begin attack in the provinces of Chaco and Formosa. The situation in Panama has not improved, the budget for the program being inadequate and provision of funds budgeted being often delayed. Bolivia experienced several serious outbreaks in consolidation areas in early 1964 following sharp curtailment of surveillance operations and reductions in spraying personnel in late 1963 and early 1964, consequent upon reduction by a third of the annual budget (provided by AID) and a cut-off of funds as of the end of February due to delay on the part of the Government in agreeing to increase its share of the malaria program budget for 1964. A new bilateral agreement is under negotiation. In Peru activities were deeply cut at the end of 1963 for lack of funds. A minor set-back occurred in Costa Rica in mid-1963, partly because of delay in the provision of funds. In Honduras the program was essentially paralyzed in the latter part of 1963 due to the cutting-off of AID support. Temporary reduced financing has been provided by AID for the first quarter of 1964 and a new tripartite agreement is under negotiation.

No important additional areas were found during 1963 to have technical problems, but the problem areas already delimited at the beginning of the year still present obstacles to eradication in a number of countries, in particular some Central American countries and Mexico. Both field trials and basic research were carried out and supported by PAHO during 1963 in pursuit of better solutions of these problems. (Details in Chapters II and III).

<sup>1/</sup> Figures relating to 1962 differ from those presented in the XI Report, as a result of new information received from the Government of Brazil to the effect that areas previously reported as in maintenance and consolidation phases had been mis-classified. In official figures for 1963 these have been reclassified as in the preparatory stage; and this correction has been made for 1962 by PAHO.

A step forward in the coordination of malaria eradication efforts in the countries of Central America and Panama was made on 6 July 1963 when the Ministers of Health of these countries signed an agreement "ad referendum" for the Organization of a Regional Campaign for Eradication of Malaria in the Isthmus of Central America. PAHO submitted the agreement, based upon recommendations of the XVI Panamerican Health Conference and the XIV Meeting of the World Health Organization Regional Committee for the Americas; it calls for unification of the technical and economic resources devoted to malaria eradication by the Member Governments with those provided by the international and bilateral agencies under the aegis of this Office. The Service, to be known as SEMICA (Servicio de Erradicación de la Malaria del Istmo Centroamericano), will hold evaluative and executive responsibility under basic regulations which have already been submitted to the Member Governments for their comments.

#### B. Current Extent of the Problem

In Tables 1 and 2 can be seen the gradual shifting of malarious areas in the Hemisphere from the attack into the consolidation phase and thence to the maintenance phase with eradication claimed or certified. Details by country are presented in Tables 3 and 4 and an over-all percentage distribution by phase in Table 5. Nearly 50 million people live in areas from which it is claimed that malaria was eradicated before the initiation of the Hemisphere-wide campaign. Apart from these areas, the active eradication campaigns in the Americas are mostly in the age-group which should be entering or passing through consolidation; relatively few have had time to complete attack and the required consolidation period. Latest information shows 30 million or 20 per cent in preparatory phase (a figure greatly inflated by the temporary redefinition of large areas of Brazil), 32 million (21 per cent) in attack (this also strongly affected by the withdrawal from attack of areas including some 10 million persons in Brazil), 34 million (22 per cent) in areas under the régime of consolidation and nearly 57 million (37 per cent) in areas where eradication is claimed.

Table 2

Year	Population in thousands <sup>1/</sup>			
	Malaria eradication claimed or achieved	Consolidation phase	Annual % of increase	
			Malaria eradication claimed	Consolidation phase
1960	50 741	1 991	-	-
1961	53 357	13 879	5.2	597.1
1962	55 397	25 914	3.8	86.7
1963	56 546	33 901	2.1	30.8

As consolidation areas include more and more people from year to year, with new areas entering the phase but few as yet passing out of it into the maintenance phase, the per cent increase from year to year naturally falls. The reservoir of attack areas diminishes and the areas in which interruption of transmission is difficult - whether because of technical problems or for reasons of difficult access, recalcitrant population, shortage of funds, etc.- form a proportionately larger part of it.

Areas were shifted from attack to consolidation phase in 11 countries, in eight of which considerable areas and populations were affected. Colombia made the greatest contribution to the increase in population in areas in the consolidation phase, adding over two million persons to those already in this phase. Peru and Mexico each had new areas with over a million inhabitants attaining consolidation status. Honduras now has about half the population and three-quarters of the area of its originally malarious territory in this phase. In 1963 for the first time Ecuador placed areas in the consolidation phase, including over nine hundred thousand inhabitants, Bolivia more than doubled the number in her consolidation areas and Argentina, Costa Rica and Nicaragua also completed the attack phase and began consolidation in new areas.

<sup>1/</sup>Data for all years corrected for the reclassification of areas in Brazil. See footnote to Table 1.

Table 3

STATUS OF MALARIA ERADICATION IN THE AMERICAS, BY POPULATION, 1963

(Population in thousands)

Country or other political unit	Total population <sup>a</sup>	Population of originally malarious areas				
		Total	Malaria eradication claimed (maintenance phase)	Consolidation phase	Attack phase	Prep. phase or program not yet started
Argentina .....	21 100	2 692	1 004	580 <sup>b</sup>	359	749
Bolivia .....	3 609	1 307	-	1 179	128	-
Brazil .....	77 074	34 916	-	1 256	6 550	27 110 <sup>c</sup>
Canada .....	18 600	-	-	-	-	-
Chile .....	8 050	129	129	-	-	-
Colombia .....	15 181	9 564	-	5 305	4 009	250
Costa Rica .....	1 338	426	-	262	164	-
Cuba .....	7 134	1 921	-	-	1 921	-
Dominican Republic .....	3 348	2 740	-	-	2 740	-
Ecuador .....	4 696	2 550	-	927	1 623	-
El Salvador .....	2 511	1 641	-	-	1 641	-
Guatemala .....	4 120	1 912	-	1 234	678	-
Haiti .....	4 439	3 449	-	-	3 449	-
Honduras .....	2 008	1 892	-	941	951	-
Jamaica .....	1 685	1 309	-	1 309	-	-
Mexico .....	38 313	20 901	-	16 830	4 071	-
Nicaragua .....	1 767	1 697	-	668	1 029 <sup>d</sup>	-
Panama .....	1 164	1 121	-	-	1 121	-
Paraguay .....	1 864	1 551	-	-	-	1 551
Peru .....	11 073	3 287	43	2 199	1 045	-
Trinidad and Tobago .....	828	828	-	828	-	-
United States .....	188 800	45 800	45 800	-	-	-
Uruguay .....	2 846	-	-	-	-	-
Venezuela .....	8 093	6 048	5 656 <sup>e</sup>	102	290	-
Antigua .....	62	-	-	-	-	-
Bahamas .....	111	-	-	-	-	-
Barbados .....	232	228	228	-	-	-
Bermuda .....	47	-	-	-	-	-
British Guiana .....	613	613	572	-	41	-
British Honduras .....	100	100	-	100	-	-
Dominica .....	60	14	-	14	-	-
Falkland Islands .....	2	-	-	-	-	-
French Guiana .....	34	34	-	-	30	4
Grenada and Carriacou .....	91	37	37 <sup>f</sup>	-	-	-
Guadeloupe .....	290	260	260	-	-	-
Martinique .....	292	185	185	-	-	-
Montserrat .....	13	-	-	-	-	-
Netherlands Antilles .....	200	-	-	-	-	-
Panama Canal Zone .....	47	47	-	46	1	-
Puerto Rico .....	2 513	2 513	2 513	-	-	-
St. Kitts-Nevis-Anguilla .....	59	-	-	-	-	-
St. Lucia .....	97	82	82 <sup>f</sup>	-	-	-
St. Pierre-Miquelon .....	5	-	-	-	-	-
St. Vincent .....	82	-	-	-	-	-
Surinam .....	315	190	-	121	69	-
Virgin Islands (U. K.) .....	7	-	-	-	-	-
Virgin Islands (U. S.) <sup>g</sup> .....	37	37	37	-	-	-
Total .....	434 950	152 021	56 546	33 901	31 910	29 664

- None

(a) Latest available official figures. (b) An area with 206 000 inhabitants in which no antimalaria work was done and no positive cases occurred, is included. (c) Part of this population is partially protected by insecticide spraying. (d) 384 264 inhabitants in area in which transmission occurs but attack was suspended for financial reasons. (e) 4 642 341 inhabitants in area in which malaria has been eradicated registered by PAHO. (f) Area in which malaria has been eradicated registered by PAHO. (g) New official information (received for the first time).

Table 4

STATUS OF MALARIA ERADICATION IN THE AMERICAS, BY AREA, 1963  
(Area in Km<sup>2</sup>)

Country or other political unit	Total area	Originally malarious area				
		Total	Malaria eradication claimed (maintenance phase)	Consolidation phase	Attack phase	Prep. phase or program not yet started
Argentina .....	4 024 458	349 051	40 100	59 336 <sup>a</sup>	93 549	156 066
Bolivia .....	1 098 581	824 260	-	619 540	204 720	-
Brazil .....	8 513 861	7 566 774	-	145 829	360 592	7 060 353 <sup>b</sup>
Canada .....	9 974 375	-	-	-	-	-
Chile .....	741 767	55 287	55 287	-	-	-
Colombia .....	1 138 338	1 026 433	-	122 920	863 513	40 000
Costa Rica .....	51 011	31 526	-	23 523	8 003	-
Cuba .....	114 524	37 376	-	-	37 376	-
Dominican Republic .....	48 442	39 000	-	-	39 000	-
Ecuador .....	291 906	175 462	-	6 394	169 068	-
El Salvador .....	21 149	19 940	-	-	19 940	-
Guatemala .....	108 889	80 350	-	49 345	31 005	-
Haiti .....	27 750	19 100	-	-	19 100	-
Honduras .....	112 088	107 035	-	78 703	28 332	-
Jamaica .....	11 428	10 028	-	10 028	-	-
Mexico .....	1 969 367	1 147 564	-	858 378	289 186	-
Nicaragua .....	139 000	132 385	-	108 527	23 858	-
Panama .....	74 470	68 497	-	-	68 497	-
Paraguay .....	406 752	406 590	-	-	-	406 590
Peru .....	1 381 800	943 200	31 000	268 200	644 000	-
Trinidad and Tobago .....	5 605	5 605	-	5 605	-	-
United States .....	9 339 900	2 255 890	2 255 890	-	-	-
Uruguay .....	186 926	-	-	-	-	-
Venezuela .....	912 050	600 000	469 552 <sup>c</sup>	26 857	103 591	-
Antigua .....	280	-	-	-	-	-
Bahamas .....	11 396	-	-	-	-	-
Barbados .....	431	430	430	-	-	-
Bermuda .....	53	-	-	-	-	-
British Guiana .....	215 800	215 800	10 600	-	205 200	-
British Honduras .....	22 696	22 696	-	22 696	-	-
Dominica .....	790	152	-	152	-	-
Falkland Islands .....	11 961	-	-	-	-	-
French Guiana .....	86 000	32 000 <sup>d</sup>	-	-	32 000	-
Grenada and Carriacou .....	344	171	171 <sup>e</sup>	-	-	-
Guadeloupe .....	1 779	1 136	1 136	-	-	-
Martinique .....	1 102	300	300	-	-	-
Montserrat .....	84	-	-	-	-	-
Netherlands Antilles .....	961	-	-	-	-	-
Panama Canal Zone .....	1 432	1 432	-	1 432 <sup>f</sup>	(f)	-
Puerto Rico .....	8 896	8 896	8 896	-	-	-
St. Kitts-Nevis-Anguilla .....	396	-	-	-	-	-
St. Lucia .....	603	510	510	-	-	-
St. Pierre-Miquelon .....	240	-	-	-	-	-
St. Vincent .....	389	-	-	-	-	-
Surinam .....	142 822	142 752	-	4 350	138 402	-
Virgin Islands (U. K.) .....	174	-	-	-	-	-
Virgin Islands (U. S.) .....	342	342 <sup>g</sup>	342 <sup>g</sup>	-	-	-
Total .....	41 203 408	16 327 970	2 874 214	2 411 815	3 378 932	7 663 009

- None

(a) Includes an area of 22 000 km<sup>2</sup> in which, with no attack measures no malaria transmission has been confirmed.  
 (b) Part of this area is partially sprayed. (c) 407 945 km<sup>2</sup> area in which malaria eradication has been registered by PAHO. (d) Excludes uninhabited areas. (e) Area in which malaria eradication has been registered by PAHO.  
 (f) Spraying is continued in limited areas showed as in consolidation phase. (g) New official information (received for the first time).

Table 5

PERCENTAGE DISTRIBUTION OF POPULATION AND AREA IN THE AMERICAS, 1963  
BY STATUS OF MALARIA ERADICATION

Status	Percentage distribution	
	Population	Area
Total .....	100.0	100.0
Non malarious areas .....	65.1	60.4
Originally malarious areas .....	34.9	39.6
Preparatory phase .....	6.8	18.6
Attack phase .....	7.3	8.2
Consolidation phase .....	7.8	5.8
Maintenance phase .....	13.0	7.0

In some countries, areas were returned to attack, for example in Mexico and Nicaragua, as adjustments were made to borders between problem and consolidation areas, but these movements are not apparent in the country totals since larger areas were concurrently shifted from attack to consolidation phase.

In addition to the three countries which claimed eradication in new territories -Peru, Venezuela and Guadeloupe- the entire originally malarious areas of Grenada and Carriacou and St. Lucia were registered by PAHO as having achieved eradication at the end of 1962. The Virgin Islands (U. S. ) for the first time, have officially given information indicating the eradication of malaria. Previously these have been reported as being non-malarious.

As mentioned above, areas with technical problems are still confronted with serious difficulties despite encouraging results obtained with many of the attack measures tried.

A catalogue of problem areas is being developed, and will be presented next year. This will include the data as to population and areas where technical problems exist.

Some of the problems of Nicaragua have been attacked during 1963 by mass drug programs, spraying with malathion, and larviciding techniques, all giving good results when applied in appropriate situations. The remainder of the area with vectors resistant to insecticide is in recess from DDT spraying, and no attack measures were carried out there. Financing for the extension of the methods tested to more areas is the "sine qua non" of timely eradication. In its absence outbreaks occurred in consolidation areas, where insecticide residues left from previous years' attack measures are diminishing and cases imported from problem areas continually seed new transmission.

In Guatemala the malaria situation deteriorated slightly during 1963. Increased strength and spread of resistance in the vector, higher-than-usual vector density, increasing transient migration, and inadequate surveillance in consolidation areas produced an increasing number of cases of malaria, and some municipios have been recommended for return to attack phase. As considerable migration occurs to and from problem areas along the coast, malaria cannot be eradicated in the rest of the country until this source of reinfection has been cleared up. Mass drug treatment and larviciding, supplemented by continued DDT spraying, have been recommended. The drug program initiated on a trial basis in 1962 has been extended more widely in the cotton-growing area (the area of high vector resistance) with the cooperation of leading cotton planters and the United Fruit Company. In this program also, the main problem is the lack of funds for extending selective attack measures to the required extent.

The problem areas of El Salvador have been attacked using mass drug treatment, with excellent results. Only one-fourth of the problem area has been included in the drug program however, and money is still lacking for extending this measure, and others which have been investigated, to the remaining areas.

Problem areas in Mexico have experienced no substantial improvement and new methods of attack are being sought. The experimental mass drug program initiated in 1962 with PAHO financing gave promising results, but the gains made were not held since funds were lacking to carry on the treatment and reinfection from surrounding areas took place. In a considerable number of localities special entomological studies have been carried out throughout the problem areas in an effort to find new solutions. Gains have been made in Mexico in non-problem areas.

Technical problems have also handicapped the campaign in another quarter of the Hemisphere, where a chloroquine-resistant strain of P. falciparum in a district in the interior of British Guiana has reduced the effectiveness of the medicated-salt program in operation in the interior of the country. House spraying has been instituted and appears effective. About 100 cases of actinic dermatitis resulting from chloroquinated salt have been discovered but these are self-limiting and have not required a change in the salt-medication program.

It has become clear that technical problems in the Hemisphere fall into a limited number of major categories, even though minor variations are infinite. In each area careful selection from among available antimalaria methods of the appropriate measure or combination of measures, and their application with a high degree of skill and attention are required for the solution of existing problems. In addition, operational research is necessary on many subjects including good alternative insecticides, optimal procedures for basic residual spraying, evaluation of case detection operations, entomological techniques and longer-lasting antimalaria drugs. Research programs are in progress in some of these fields, as well as numerous supervised field trials (See Chapters II and III).

### C. Field Operations

The personnel engaged in malaria eradication activities are shown by type of work and by category of operation in Tables 6 through 10.

Comparisons of numbers engaged at 31 December in 1962 and 1963 by category -spraying operations, epidemiological operations, administration and others, transport- are presented in Table 6. Details of personnel by country and activity are given in the following tables.

An increase is apparent in personnel in spraying operations, despite the decrease in areas in the attack phase. This results mainly from increases in numbers of spraymen employed in some countries with technical problems, notably Mexico which increased its spraymen from 715 at the end of 1962 to 1,835 at the same date in 1963, and an increase in Brazil where the program is expanding. A number of countries decreased or eliminated spraymen as their need for them was reduced by the progress of their programs. In a few instances reductions were forced by lack of funds, as in Peru where the decrease is partly the result of decreases in attack areas and partly for financial reasons. The reduction in number of engineers is evidence of progress as some countries no longer need to carry out extensive spraying operations and thus can cut down on professional direction.

The decrease in total epidemiological personnel arises entirely from a decrease in the number of evaluators and their inspectors, primarily in Mexico, where financial stringencies caused a reduction in this category in order to permit the increases already mentioned in other personnel required for problem areas. A sizeable reduction was also made in Colombia. In Brazil, the number of evaluators rose by 250 as the program made efforts to increase evaluation operations to the required level, and Nicaragua also made a major expansion in its staff of evaluators, which increased from 59 to 181 in order to carry out mass drug programs and evaluation activities.

Personnel in administration and other activities diminished between 31 December 1962 and the end of 1963. As data for the Federal Program in Brazil were not available for 1962, the 1,321 persons in these categories in Brazil in 1963 produce the effect of an increase, but if Brazilian Federal Program figures are omitted the total personnel in all other programs shows a fall from 2,732 to 2,431 persons spread over almost all categories.

Table 6

PERSONNEL EMPLOYED IN MALARIA ERADICATION PROGRAMS IN THE AMERICAS  
31 DECEMBER 1962 AND 1963 BY CATEGORY

(Part-time personnel in parentheses)

Title		1962	1963
SPRAYING OPERATIONS	Engineers .....	129 (1)	119 (1)
	Spraying Chiefs (non-professionals) .....	142 (2)	166 (2)
	Sector Chiefs .....	516 (6)	646 (2)
	Squad Chiefs .....	1 933 (2)	1 923 (2)
	Spraymen .....	8 773 (55)	9 584 (20)
	Draftsmen .....	104	133
	SUB-TOTAL .....	11 597 (66)	12 571 (27)
EPIDEMIOLOGICAL OPERATIONS	Physicians .....	274 (19)	278 (18)
	Entomologists .....	25 (1)	31 (1)
	Entomologist Assistants .....	224 (14)	262 (12)
	Statisticians and Statistician Assistants ....	80	119
	Evaluation Inspectors .....	612 (2)	507 (2)
	Evaluators .....	3 982 (7)	3 693 (7)
	Microscopists .....	683 (12)	756 (14)
SUB-TOTAL .....	5 880 (55)	5 646 (54)	
ADMINISTRATION AND OTHERS	Administrators .....	87 (1)	317 (1)
	Administrative Assistants .....	485	947
	Accountants .....	13	34
	Disbursing Officers .....	54	51
	Storekeepers .....	91	96
	Assistant Storekeepers .....	101 (1)	104 (1)
	Secretaries .....	444 (1)	351 (1)
	Others .....	1 457 (8)	1 852 (56)
SUB-TOTAL .....	2 732 (11)	3 752 (59)	
TRANSPORT	Mechanics and Assistant Mechanics .....	333	507
	Drivers .....	856 (2)	1 464 (2)
	Motorboat Operators .....	198 (2)	223 (2)
	Boatmen .....	45	36
	SUB-TOTAL .....	1 432 (4)	2 230 (4)
GRAND TOTAL .....		21 641 (136)	24 199 (144)

Table 7  
PERSONNEL EMPLOYED IN SPRAYING OPERATIONS IN MALARIA ERADICATION PROGRAMS  
IN THE AMERICAS - 31 DECEMBER 1963  
(Part-time personnel in parentheses)

Country or other political unit	Total	Engineers	Sanitarians or Spraying Chiefs	Sector Chiefs	Squad Chiefs	Spraymen	Draftsmen
Argentina .....	137	2	6	11	28	86	4
Bolivia .....	60	1	6	4	4	44	1
Brazil (excl. São Paulo) .	4 451	23	22 <sup>a</sup>	192	693	3 493	28
Brazil (São Paulo) .....	657	8	-	35	130	466	18
Colombia .....	731	3	20	61	22	611	14
Costa Rica .....	44	1	1	6	7	29	-
Cuba <sup>b</sup> .....	482	1	4	15	75	385	2
Dominican Republic ....	419	2	-	14	67	333	3
Ecuador .....	531	7	-	35	97	390	2
El Salvador .....	147	1	-	-	14	130	2
Guatemala .....	303	2	5	8	38	246	4
Haiti .....	759	6	8	23	120	595	7
Honduras .....	48	-	3	2	6	37	-
Jamaica .....	46	-	1	16	23	6	-
Mexico .....	2 496	51	58	128	403	1 835	21
Nicaragua .....	153	1	7	29	14	99	3
Panama .....	286	-	6	10	45	224	1
Paraguay <sup>b c</sup> .....	36	3	7	2	18	-	6
Peru <sup>b</sup> .....	306	6	8	29	53	202	8
Venezuela .....	356	1	-	20	34	293	8
British Guiana .....	19	-	2	1	3	13	-
French Guiana .....	30	-	-	-	8	22	-
Panama Canal Zone ....	(27)	(1)	(2)	(2)	(2)	(20)	-
Surinam <sup>b</sup> .....	74	-	2	5	21	45	1
Total .....	12 571 (27)	119 (1)	166 (2)	646 (2)	1 923 (2)	9 584 (20)	133

- None.

(a) Statistician aides for spraying operations. (b) November. c) Attack phase suspended in March 1961, new program being planned.



Table 8  
PERSONNEL EMPLOYED IN EPIDEMIOLOGICAL EVALUATION IN MALARIA ERADICATION PROGRAMS  
IN THE AMERICAS- 31 DECEMBER 1963

(Part-time personnel in parentheses)

Country or other political unit	Total	Physicians	Entomologists	Entomologist Assistants	Statisticians and Statistician Assistants	Evaluation Inspectors	Evaluators	Microscopists and Laboratory Personnel
Argentina .....	162	8	1	4	2	25	97	25
Bolivia .....	205	10	1	6	9	34	121	24
Brazil (excl. São Paulo) ..	1 333	52	9	25	26	188	893	140
Brazil (São Paulo) .....	239	13	1	12	1	32	125	55
Colombia .....	453	19	1	8	4	47	332	42
Costa Rica .....	138	1	-	-	3	4	112	18
Cuba .....	29	7	1	2	3	-	8	8
Dominican Republic .....	40	3	-	2	4	2	20	9
Ecuador .....	161	11	5	5	1	-	107	32
El Salvador .....	106	2	-	5	4	10	68	17
Guatemala .....	148	3	1	22	7	9	79	27
Haiti .....	139	8	3	10	9	12	55	42
Honduras .....	72	1	-	2	1	5	39	24
Jamaica .....	69	1	-	-	-	1	48	19
Mexico .....	1 139	93	1	30	2	65	832	116
Nicaragua .....	225	5	1	9	8	4	181	17
Panama .....	43	1	1	3	5	-	23	10
Paraguay <sup>a</sup> .....	64	7	-	12	9	4	23	9
Peru <sup>a</sup> .....	188	15	1	5	14	6	105	42
Trinidad and Tobago .....	238	1	-	64	-	12	149	12
Venezuela .....	335	15	2	25	-	42	203	48
British Guiana .....	29 (1)	(1)	-	-	3	-	19	7
British Honduras .....	16	1	-	-	1	2	10	2
Dominica .....	8 (1)	(1)	-	-	-	1	6	1
French Guiana .....	2 (4)	(4)	1	1	-	-	-	-
Grenada .....	12	-	-	9	-	1	1	1
Guadeloupe .....	12 (6)	1	1	1	-	-	6 (4)	3 (2)
Panama Canal Zone .....	(40)	(10)	(1)	(12)	-	(2)	(3)	(12)
St. Lucia .....	5 (1)	(1)	-	-	-	-	3	2
Surinam <sup>a</sup> .....	36 (1)	(1)	-	-	3	1	28	4
Total .....	5 646 (54)	278 (18)	31 (1)	262 (12)	119	507 (2)	3 693 (7)	756 (14)

- None

(a) November 1963

Table 9  
PERSONNEL EMPLOYED IN ADMINISTRATIVE SERVICES AND OTHERS IN MALARIA ERADICATION PROGRAMS  
IN THE AMERICAS- 31 DECEMBER 1963  
(Part-time personnel in parentheses)

Country or other political unit	Total	Administrators	Administrative Assistants	Accountants	Disbursing Officers	Storekeepers	Storekeeper Assistants	Secretaries	Others
Argentina .....	124	4	61	-	-	4	8	3	44
Bolivia .....	52	10	11	5	-	-	-	10	16
Brazil (excl. São Paulo) ..	1 321	242	423	21	-	24	-	22	589
Brazil (São Paulo) .....	406	15	83	-	9	7	13	-	279 <sup>a</sup>
Colombia .....	264	1	8	-	15	12	12	63	153
Costa Rica .....	17	1	7	-	-	1	1	2	5
Cuba <sup>b</sup> .....	21	2	3	-	-	2	-	4	10
Dominican Republic .....	20	1	2	-	-	1	1	4	11
Ecuador .....	98	6	15	-	7	7	-	25	38
El Salvador .....	91	1	1	-	1	1	4	8	75
Guatemala .....	49	-	8	-	-	1	2	6	32
Haiti .....	141	9	10	2	1	5	3	17	94
Honduras .....	23	1	4	-	-	-	-	7	11
Jamaica .....	28	2	-	-	-	1	3	3	19
Mexico .....	523	14	217	-	16	14	25	128	109
Nicaragua .....	70	-	4	-	-	1	7	10	48
Panama .....	37	1	5	-	-	2	10	4	15
Paraguay <sup>b</sup> .....	53	1	26	-	-	1	1	6	18
Peru <sup>b</sup> .....	146	-	55	6	1	7	7	18	52
Trinidad and Tobago .....	13	1	2	-	-	2	3	5	...
Venezuela .....	209	...	...	-	...	...	...	...	209
British Guiana .....	14	1	-	-	-	1	1	1	10
British Honduras .....	5	1	-	-	-	-	-	2	2
Dominica .....	1 (1)	(1)	-	-	-	-	-	1	-
French Guiana .....	1	-	-	-	-	-	-	1	-
Grenada .....	1 (1)	1	-	-	-	-	(1)	-	-
Guadeloupe .....	1 (54)	1	-	-	-	-	-	-	(54) <sup>c</sup>
Panama Canal Zone .....	(2)	-	-	-	-	-	-	-	(2)
St. Lucia .....	1 (1)	-	-	-	-	-	-	(1)	1
Surinam <sup>b</sup> .....	22	1	2	-	1	2	3	1	12
Total .....	3 752 (59)	317 (1)	947	34	51	96	104 (1)	351 (1)	1 852 (56)

... No information.  
- None

(a) Some personnel of Chagas disease control, included. (b) November. (c) 48 spraymen for other purposes, not for malaria program.

Table 10

PERSONNEL EMPLOYED IN TRANSPORT SERVICES IN MALARIA ERADICATION PROGRAMS  
IN THE AMERICAS - 31 DECEMBER 1963

(Part-time personnel in parentheses)

Country or other political unit	Total	Mechanics and assistant Mechanics	Drivers	Motorboat operators	Boatmen
Argentina .....	56	26	30	-	-
Bolivia .....	78	12	47	19	-
Brazil (excl. São Paulo) .....	827	174	627 <sup>a</sup>	22	4
Brazil (São Paulo) .....	281	40	238	3	-
Colombia .....	256	56	71	107	22
Costa Rica .....	12	2	10	-	-
Cuba <sup>b</sup> .....	13	5	8	-	-
Dominican Republic .....	54	16	38	-	-
Ecuador .....	45	11	27	7	-
El Salvador .....	65	11	53	1	-
Guatemala .....	46	3	38	1	4
Haiti .....	75	23	50	2	-
Honduras .....	27	3	23	1	-
Jamaica .....	36	4	32	-	-
Mexico .....	111	78	25	8	-
Nicaragua .....	64	2	54	8	-
Panama .....	10	5	5	-	-
Paraguay <sup>b</sup> .....	24	1	21	-	2
Peru <sup>b</sup> .....	50	14	23	13	-
Trinidad and Tobago .....	5	4	1	-	-
Venezuela.....	21	...	17	4	-
British Guiana.....	13	-	5	4	4
British Honduras .....	2	2	-	-	-
Dominica .....	1	-	1	-	-
French Guiana .....	4	1	3	-	-
Grenada .....	2	1 <sup>c</sup>	1	-	-
Guadeloupe .....	6	2	4	-	-
Panama Canal Zone .....	(4)	-	(2)	(2)	-
Surinam <sup>b</sup> .....	46	11	12	23	-
Total .....	2 230 (4)	507	1 464 (2)	223 (2)	36

... No information.

- None.

(a) One airplane pilot included. (b) November. (c) Spraying supervisor.

In transport also, data for the Federal Program of Brazil were lacking of 1962. After adjustment for this lack, the total number of transport personnel in malaria eradication programs can be seen to have remained essentially the same, although individual programs have had increases, as in Bolivia, El Salvador, São Paulo, or decreases as in Colombia, Honduras and Peru. There is an increasing tendency, encouraged by PAHO, to dispense with drivers for vehicles where one evaluator or supervisor travels singly, and to provide motorcycles instead of jeeps for such persons. This tendency can be seen in Table 11, which gives details of the means of transport used by individual country programs. The number of motorcycles in use has increased by 58 per cent from 52 at the end of 1962 to 82 in December 1963. Other means of transport have also generally increased in number, the second largest increase being in the number of jeeps, which increased by 19 per cent. Decreases occurred in the number of large trucks, boats without motor and saddle and pack animals.

It can also be mentioned in connection with transport that the services of two transport consultants are now provided by PAHO to aid the national programs, the second having been added during 1963.

Means of transport, both terrestrial and fluvial, have been promptly provided by UNICEF during the year in the quantities recommended by the Organization.

Table 12 presents data concerning the national budgets for malaria eradication, for 1962, 1963, and commitments for 1964, by country, in dollar equivalents. These budget figures may be taken to be adequate in countries whose programs are progressing smoothly, but for many, and especially for those with grave problems which require special supplementary attack measures, the funds which are and can be provided by national governments are seriously inadequate. Such programs are indicated in the table by an asterisk. The need for additional funds to finance attack on all fronts of the problem areas now, before neighboring consolidation areas are reinfected to a degree requiring them also to be placed again under attack, is urgent. This need is primarily for additional resources to finance local costs, for which outside sources of assistance in the form of loans are being sought. A loan has been arranged to aid the Federal Program in Brazil, but this is mainly intended to finance imported materials and equipment.

In Table 14 a summary is presented of case detection activities carried out by all programs, by years from 1958 through 1963. The steady increase in slides taken is mainly a result of the gradual progress of malarious areas from early to late attack phase, and thence into consolidation. As remaining areas reach consolidation phase this increase will continue. The per cent of slides positive has been considerably affected in recent years by the practice followed in most programs of sampling problem or troublesome areas much more heavily than areas in which transmission is being interrupted or consolidation progressing as expected. The percentage of positive slides in these difficult areas being higher, this weighted distribution tends to increase the over-all positivity artificially.

The work done in each program, together with a brief statement of basic data, is shown in a series of tables and graphs for individual countries. Each country table begins with a summary of the population and area covered by the program and a map of the distribution of areas within the country, both by phase as of 31 December 1963, a resumé of personnel and a table showing the kinds and number of the means of transport available for each major category of operation. The next section presents data relating to the attack areas of the country. Spraying operations since their inception are shown by cycle and a graph covering the data is also presented for quicker appreciation of the history and achievements to date. The total population of the attack area for which direct protection is considered necessary and the number of persons actually directly protected by residual spraying are also shown on the graph.

Evaluation operations in the attack area are also detailed in a table. The number of blood smears which should be collected and the preferred method of sampling (i. e. by random sample, active case detection, passive case detection) vary in the different years of attack phase, the essential datum being the per cent of slides found positive (which, however, must be interpreted according to the methods of slide taking used). Figures for slides examined and positives are tabulated by year of total coverage, and positives shown by species.

Table 11  
MEANS OF TRANSPORT IN MALARIA ERADICATION PROGRAMS IN THE AMERICAS - 1963

Country or other political unit	Trucks (3 tons or more)	Trucks and "Pick-up" (less than 3 tons)	Jeeps	Automobiles and station wagons	Motorcycles	Bicycles	Motor boats	Boats without motor	Saddle and pack animals	Other
Argentina .....	10	90	12	12	1	-	-	-	-	-
Bolivia .....	2	34	35	2	-	32	23	-	176	-
Brazil (excl. São Paulo) .	54	354	807	34	-	-	36	7	724	1 a
Brazil (São Paulo) .....	11	158	58	13	-	1	9	2	-	-
Colombia .....	18	171	146	29	-	81	165	87	1 073	-
Costa Rica .....	1	8	16	3	-	50	11	-	-	-
Cuba .....	-	16	30	41	-	-	-	-	160	-
Dominican Republic .....	-	78	22	4	-	14	-	-	-	-
Ecuador .....	8	61	50	9	-	10	58	17	323	-
El Salvador .....	2	50	16	7	15	1	-	1	-	-
Guatemala .....	1	39	6	19	31	30	4	-	6	-
Haiti .....	2	70	26	18	-	-	2	-	-	-
Honduras .....	2	35	30	6	-	25	1	-	134	-
Jamaica .....	1	30	23	12	-	-	-	-	-	-
Mexico .....	16	503	377	18	-	-	13	-	-	-
Nicaragua .....	2	24	34	14	-	-	11	-	-	-
Panama .....	1	48	18	9	-	-	20	-	(b)	-
Paraguay .....	-	4	8	3	14	-	5	-	8	-
Peru .....	4	116	79	1	-	1	55	15	-	-
Trinidad and Tobago .....	12	6	9	1	-	-	1	-	-	2 c
Venezuela .....	3	59	62	25	6	200	98	-	623	36 d
British Guiana .....	1	2	3	-	-	-	4	-	-	-
British Honduras .....	-	4	8	1	-	3	4	-	-	-
Dominica .....	-	-	3	-	4	-	-	-	-	-
French Guiana .....	1	3	5	-	2	-	1	-	-	-
Grenada .....	-	2	-	-	1	-	-	-	-	-
Guadeloupe .....	1	4	4	-	2	-	-	-	-	-
Panama Canal Zone .....	-	2 e	-	-	-	-	-	2 e	-	-
St. Lucia .....	-	-	1	-	2	-	-	-	-	-
Surinam .....	2	4	6	1	4	6	26	-	-	-

- None. (a) Airplane. (b) Rented as needed. (c) Bromelias spraying machines. (d) Fogging machines, tractors. (e) Part-time.

Table 12

NATIONAL BUDGETS FOR MALARIA ERADICATION IN THE AMERICAS, 1962-1964  
(in thousands of U. S. dollars)

Country or other political unit	National Budget 1962	National Budget 1963	National Commitments 1964
Argentina .....	576	681	892 *
Bolivia .....	-	-	67 *
Brazil (excl. São Paulo) .....	4 120	9 878	11 667
Brazil (São Paulo) .....	520	979	1 569
Colombia .....	2 383	2 333	2 333 *
Costa Rica .....	276	226	226 *
Cuba .....	1 454	1 684	1 818
Dominican Republic .....	...	...	... *
Ecuador .....	476	698	...
El Salvador .....	466	366	728 *
Guatemala .....	511	470	... *
Haiti .....	50	50	50
Honduras .....	337	320	200 *
Jamaica .....	355	341	...
Mexico .....	4 965	5 982	6 440 *
Nicaragua <sup>a</sup> .....	315	319	485 *
Panama .....	545	632	644 *
Paraguay .....	258	296	279 *
Peru .....	867	888	962
Trinidad and Tobago .....	509	468	470
Venezuela .....	3 406	3 593	3 593
British Guiana .....	41	47	47
British Honduras .....	35	33	34
Dominica .....	12	9	10
French Guiana .....	96	...	...
Grenada .....	8	1	1
Guadeloupe .....	130	146	...
Panama Canal Zone .....	50	50	50
St. Lucia .....	23	5	...
Surinam .....	209	188	298

... No information.

- None.

(a) Government budget from July to June.

\* Projects considered under financed.

Table 13

COMPARATIVE RESULTS OF ACTIVE AND PASSIVE CASE DETECTION IN MALARIA ERADICATION PROGRAMS IN THE AMERICAS, 1963

Country or other political unit	Active case detection				Passive case detection				
	Average number of evaluators	Blood slides		Average production per evaluator per month	Average number of notification posts	Average of notification post producing slides per month	Blood slides		Average of slides per month per productive notification post
		Number examined	Per cent positive				Number examined	Per cent positive	
Argentina .....	94	128 789	0.2	114.2	1 253	211	28 621	2.2	11.3
Bolivia .....	156	113 957	1.5	60.8	2 266	820	62 062	1.1	6.3
Brazil (excl. São Paulo)	856	370 768	7.0	36.1	17 570	5 721	489 913	17.0	7.1
Brazil (São Paulo) ...	148	287 961	0.2	162.1	4 704	1 815	97 032	1.8	4.5
Colombia .....	377	329 910	3.2	72.9	8 032	4 963	247 496	3.0	4.2
Costa Rica .....	89	236 019	0.3	221.0	646	121	21 801	2.6	15.0
Cuba .....	8	6 051	0.5	63.0	867	280	120 283	0.7	35.8
Dominican Republic ..	18	69 302	0.3	320.8	600	53	4 050	4.1	6.4
Ecuador .....	100	105 103	0.3	87.6	3 827	1 730	181 348	1.9	8.7
El Salvador .....	68	39 493	3.2	48.4	1 440	1 178	199 298	8.3	14.1
Guatemala .....	117	242 201	2.5	172.5	2 278	1 038	106 665	8.5	8.6
Haiti .....	47	312 140	1.5	553.4	639	361	74 517	2.5	17.2
Honduras .....	85	72 064	2.5	70.6	2 182	1 369	192 067	2.7	11.7
Jamaica .....	82	63 350	0.0	64.4	711	172	122 109	0.0	59.2
Mexico .....	559	1 400 550	0.7	208.8	22 399	5 323	432 001	1.5	6.8
Nicaragua .....	65	124 650	3.7	159.8	1 520	873	90 200	7.7	8.6
Panama .....	21	89 182	1.2	353.9	1 060	282	63 716	2.5	18.8
Paraguay .....	37	27 712	0.8	62.4	2 130	850	65 094	4.9	6.4
Peru .....	117	354 568	0.3	252.5	9 388	1 572	136 359	0.5	7.2
Trinidad and Tobago .	73	108 632	0	124.0	83	...	2 291	0	...
United States .....	...	-	-	-	...	...	58	87.9	...
Venezuela .....	422	352 029	0.6	69.5	2 285	344	147 915	0.6	35.8
British Guiana .....	19	28 345 a	1.3	124.3	78	7	3 910 b	2.6	55.8
British Honduras ....	9	4 904	0.2	45.4	129	81	8 181	0.1	8.4
Dominica .....	5	7 264	0	121.0	26	16	9 511	0	49.6
French Guiana c .....	-	1 227	1.6	-	...	...	1 421	3.5	...
Grenada c .....	1	56	0	4.7	-	-	-	-	-
Guadeloupe c .....	8	17 035	0	177.5	...	...	135	0.7	...
Panama Canal Zone ..	3 d	-	-	-	...	...	21 008	0.1	...
St. Lucia .....	3	4 031	0.1	112.0	88	41	11 105	0.0	22.6
Surinam .....	25	62 475	0.6	208.2	48	5	5 221	28.9	87.0

... No information.

- None.

(a) Includes slides from passive case detection for November and December. (b) January-October. (c) January-September. (d) Part-time.

Table 14

SUMMARY OF CASE DETECTION IN THE AMERICAS, 1958-1963

Year	Number of slides examined	Number of slides found positive	Per cent positive
1958	1 716 103	56 705	3.3
1959	2 749 117	75 612	2.8
1960	3 955 149	79 998	2.0
1961	5 341 004	99 539	1.9
1962	7 221 367	177 089	2.4
1963	7 903 156	227 026	2.9

In connection with these figures it should be noted that in many programs, particularly those with technical problems but also those with areas in which attack operations are lagging or transmission persists because of difficulties of access, heavy migration and similar problems, the taking of blood smears is often more intense in the more malarious areas than in areas responding well to attack, and the percentage of positives for the attack area as a whole is distorted, with an upward bias. This effect is present in the data for Mexico from mid-1960 onwards, for Guatemala, Nicaragua, Honduras, Costa Rica and others.

Changes in the positivity rate for attack areas must also be interpreted in relation to shifts of areas from attack into consolidation phase. The areas of lowest positivity are removed and this tends to increase positivity in the remaining attack area, while at the same time perhaps increasing the parasite incidence rate in the consolidation area to which these new regions are added.

Operations in consolidation phase areas are set out in the following section of the country table. It is considered that populations in consolidation areas should be uniformly sampled by the taking of blood smears at a usual rate of approximately one per cent of the population per month during the transmission season (somewhat less for cities and large towns), and the per cent of positive slides is an indicator of the progress made. This datum also must be interpreted in the light of the adequacy and quality of the slides taken, and also with regard to the origin of the infection as determined by careful investigation of each case -whether autochthonous, relapsing, imported, etc. Quarterly data on population of consolidation areas, slides examined, and positives by species and by the origin of the infection are tabulated.

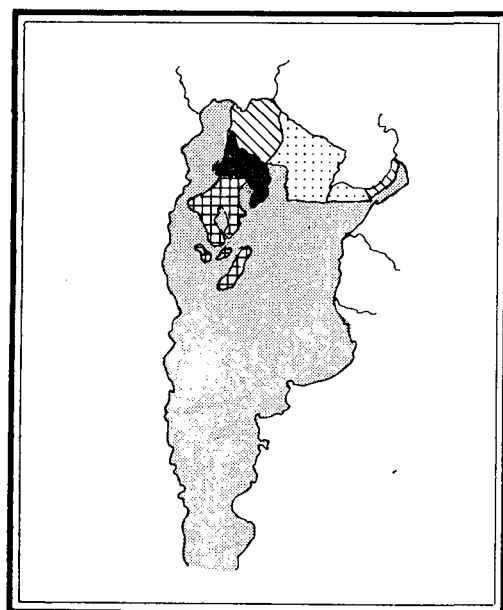
Operations in maintenance areas are similarly presented in a following section, these data also being shown by quarter.



Country: ARGENTINA

Date attack phase began: 1 August 1959

STATUS OF MALARIA PROGRAM AT DECEMBER 1963



	Population (thousands)	Area km <sup>2</sup>
TOTAL COUNTRY	<u>21 100</u>	<u>4 024 458</u>
Non malarious areas	<u>18 408</u>	<u>3 675 407</u>
Originally malarious areas		
Maintenance phase	<u>1 004</u>	<u>40 100</u>
Consolidation phase	<u>580</u>	<u>59 336</u>
Attack phase	<u>359</u>	<u>93 549</u>
Preparatory phase	<u>749</u>	<u>156 066</u>
Total originally malarious areas	<u>2 692</u>	<u>349 051</u>

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	2	135	137
Evaluation operations	13	149	162
Administrative and other	-	124	124
Transport	-	56	56
Total	15	464	479

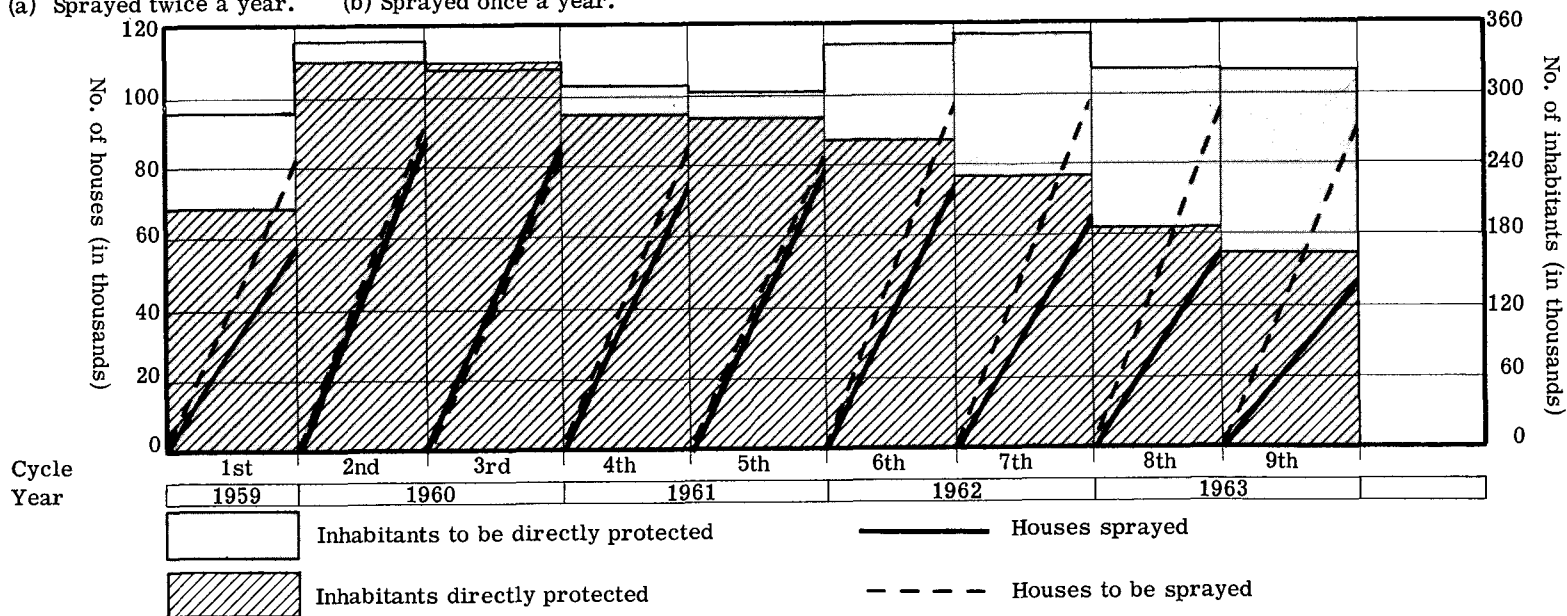
TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four wheel vehicles	55	49	20	124
Two wheel vehicles	-	-	1	1
Boats	-	-	-	-
Animals	-	-	-	-
Other	-	-	-	-
Total	55	49	21	125

SPRAYING OPERATIONS

Year of total coverage	Date	Cycle DDT	Houses sprayed		Inhabitants directly protected		Insecticide used per house (g. technical) DDT	Average No. of houses sprayed per sprayman/day
			Planned	Sprayed	Planned	Protected		
1st	Aug. 59-Jun. 60	1st	81 619	55 849 <sup>a</sup> 2 146 <sup>b</sup>	288 768	205 189	263	...
		2nd	92 438	81 170 <sup>a</sup> 6 909 <sup>b</sup>	347 012	330 733	255	
2nd	Jul. 60-Jul. 61	3rd	84 011	78 487 <sup>a</sup> 6 442 <sup>b</sup>	323 610	327 209	305	...
		4th	84 077	74 188 <sup>a</sup> 2 803 <sup>b</sup>	308 142	282 178	334	
3rd	Aug. 61-Jun. 62	5th	81 906	73 682 <sup>a</sup> 2 052 <sup>b</sup>	303 290	280 425	383	...
		6th	96 249	73 027 <sup>a</sup>	341 780	259 379	349	
4th	Jul. 62-Jun. 63	7th	97 908	63 967 <sup>a</sup> 54 392 <sup>a</sup> 350 <sup>b</sup>	351 098	229 432	353	...
		8th	95 552		318 288	182 273	329	
5th	Jul. 63-Dec. 63	9th	90 333	46 627 <sup>a</sup>	317 972	164 420	320	...

(a) Sprayed twice a year. (b) Sprayed once a year.



EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year of total coverage	Date	Slides examined			Species found		
		Total No.	Positive		<u>P. falci-parum</u>	<u>P. vivax</u>	<u>P. malariae</u>
			Number	Percentage			
1st <sup>a</sup>	Aug. 59-Jun. 60	70 700	2 497	3.53	6	2 491	-
2nd <sup>b</sup>	Jul. 60-Jul. 61	96 991	3 880	4.00	4	3 876	-
3rd	Aug. 61-Jun. 62	107 926	5 081	4.71	1	5 080	-
4th	Jul. 62-Jun. 63	102 418	1 572	1.53	-	1 571	1
5th	Jul. 63-Dec. 63	45 147	146	0.32	-	146	-

EPIDEMIOLOGICAL EVALUATION OPERATIONS, CONSOLIDATION AND MAINTENANCE PHASE AREAS

Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled	Total No. of positive	Origin of infections							Species of parasite		
Year	Quarter					Au-tochtho-nous	Relaps-ing	Imported		Induced	Intro-duced	Unclassi-fied	<u>P. falci-parum</u>	<u>P. vivax</u>	<u>P. malar-iae</u>
								from abroad	from areas within country						
1959		911	9 491	1.0	51	-	-	-	32	-	19	-	...	19	...
1960		929	14 438	1.5	26	-	-	-	14	-	12	-	-	26	-
1961	1st	1 278	12 374	3.9	1	-	1	-	-	-	-	-	-	1	-
	2nd		13 054	4.1	13	-	-	-	5	-	8	-	-	13	-
	3rd		8 222	2.6	2	-	1	-	-	-	1	-	-	2	-
	4th		10 655	3.3	1	-	-	-	-	-	1	-	-	1	-
1962	1st	1 542	9 011	2.3	1	-	1	-	-	-	-	-	-	-	1
	2nd		8 034	2.1	11	-	1	-	3	1	6	-	-	10	1
	3rd		6 545	1.7	4	-	4	-	-	-	-	-	-	3	1
	4th		16 085	4.2	7	-	4	-	2	-	1	-	-	7	-
1963	1st	1 584	13 371	3.4	7	2	-	-	4	1	-	-	-	6	1
	2nd		17 759	4.5	2	-	-	-	1	1	-	-	-	1	1
	3rd		12 367	3.1	2	-	-	-	1	-	-	1	-	2	-
	4th		17 245	4.3	-	-	-	-	-	-	-	-	-	-	-

... No information.

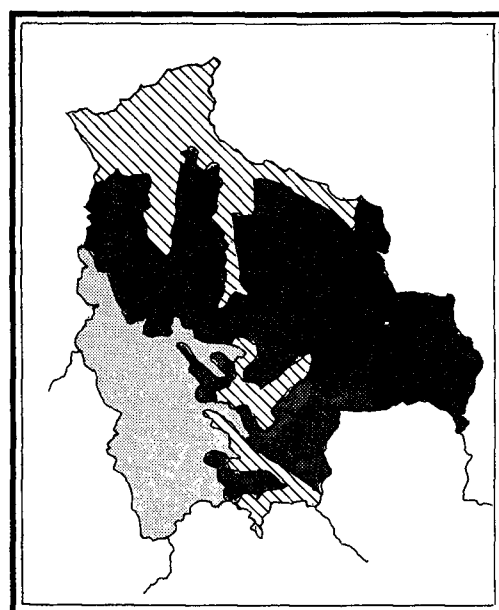
- None.

(a) Data for entire country; not separated by attack or consolidation phase. (b) Data for attack and consolidation phases, July to December 1960; attack phase only, January to July 1961.

Country: BOLIVIA

Date attack phase began: 1 September 1958

STATUS OF MALARIA PROGRAM AT DECEMBER 1963



	Population (thousands)	Area km <sup>2</sup>
TOTAL COUNTRY	3 609	1 098 581
Non malarious areas	2 302	274 321
Originally malarious areas		
Maintenance phase	0	0
Consolidation phase	1 179	619 540
Attack phase	128	204 720
Preparatory phase	0	0
Total originally malarious areas	1 307	824 260

PERSONNEL

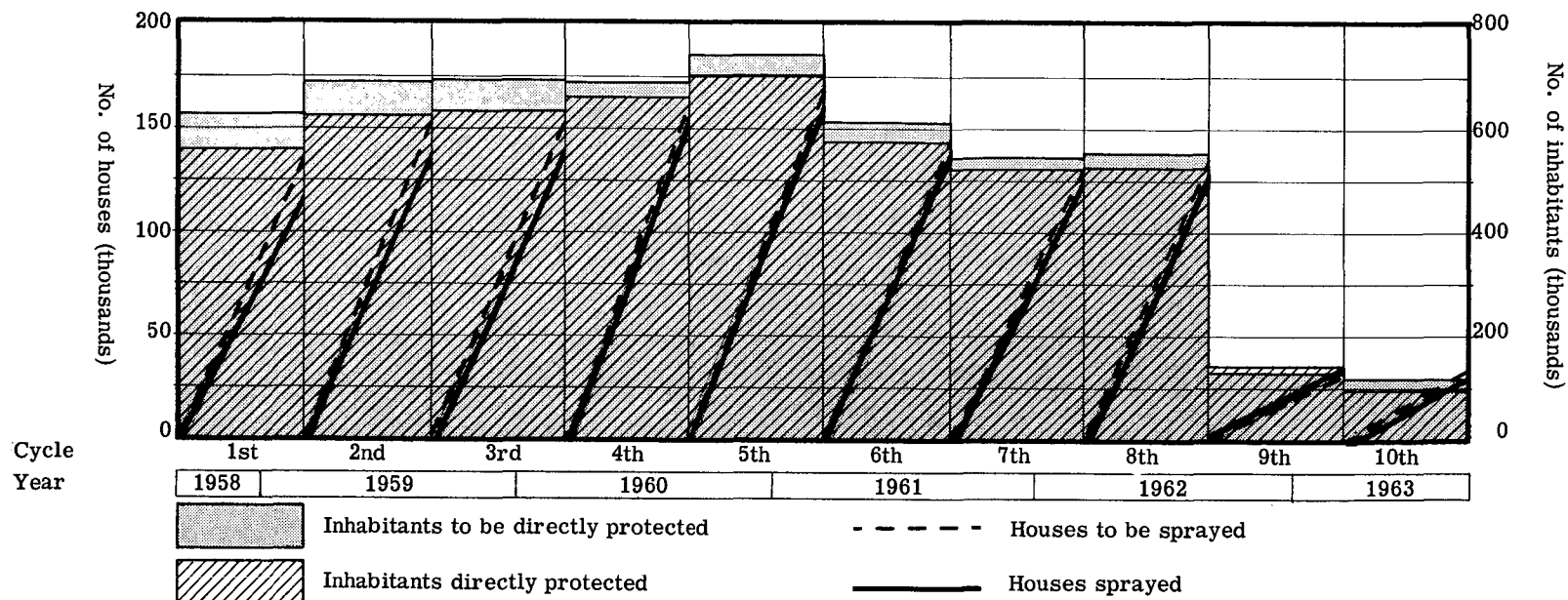
Activity	Professional	Non professional	Total
Spraying operations	1	59	60
Evaluation operations	16	189	205
Administrative and other	3	49	52
Transport	-	78	78
Total	20	375	395

TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four wheel vehicles	8	56	9	73
Two wheel vehicles	5	25	2	32
Boats	11	10	2	23
Animals	114	62	-	176
Other	-	-	-	-
Total	138	153	13	304

SPRAYING OPERATIONS

Year of total coverage	Date	Houses sprayed						Inhabitants directly protected		Insecticide used per house (g. technical)		Average houses sprayed per spray-man/day
		DDT			Dieldrin			Planned	Protected	DDT	Dieldrin	
		Cycle	Planned	Sprayed	Cycle	Planned	Sprayed					
1st	Sep. 58-Aug. 59	1st	131 444	116 572	1st	6 365	10 910	627 362	556 190	362	115	8.3
		2nd	148 200	129 119								
2nd	Sep. 59-Aug. 60	3rd	147 263	136 601	2nd	11 331	12 268	695 521	634 859	319	118	7.6
		4th	153 514	142 536								
3rd	Sep. 60-Aug. 61	5th	169 690	159 952	-	-	-	742 902	700 295	331	-	7.6
		6th	142 210	134 173								
4th	Sep. 61-Sep. 62	7th	129 600	124 623	-	-	-	546 005	524 986	353	-	7.9
		8th	135 474	128 898								
5th	Oct. 62-Sep. 63	9th	32 561	34 469	-	-	-	124 643	131 962	408	-	6.0
		10th	32 361	28 893								



## EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year of total coverage	Date	Slides examined			Species found		
		Total No.	Positive		<u>P. falciparum</u>	<u>P. vivax</u>	<u>P. malariae</u>
			Number	Percentage			
1st	Sep.58-Aug.59	50 980	1 843	3.62	273	1 268	302
2nd	Sep.59-Aug.60	99 241	1 106	1.12	124	803	179
3rd <sup>a</sup>	Sep.60-Aug.61	126 384	735	0.58	90	615	30
4th <sup>a</sup>	Sep.61-Sep. 62	174 800	982	0.56	214	758	10
5th <sup>a</sup>	Oct.62-Sep. 63	165 200	2 026	1.23	803	1 222	1
6th <sup>a</sup>	Oct.63-Dec.63	64 913	679	1.05	281	398	-

## EPIDEMIOLOGICAL EVALUATION OPERATIONS, CONSOLIDATION PHASE AREAS

Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled	Total No. of positive slides	Origin of infections							Species of parasite		
Year	Quarter					Au-tochthonous	Relaps-ing	Imported		Induced	Intro-duced	Unclassi-fied	<u>P. falciparum</u>	<u>P.vivax</u>	<u>P. malar-iae</u>
								from abroad	from areas within country						
1961		461	11 975	2.6	14	1	1	5	7	-	-	-	-	14	-
1962 <sup>b</sup>		759	18 131	3.2	21	-	-	2	19	-	-	-	-	21	-
1963 <sup>c</sup>		1 179	58 587	7.4	104	18	1	-	73	-	2	10	4	100	-

- None.

(a) Data for the entire country, not separated by attack or consolidation phase. (b) January-September. (c) January-August.

Country: BRAZIL (excl. São Paulo)

Date attack phase began: August 1959

STATUS OF MALARIA PROGRAM AT DECEMBER 1963



	Population (thousands)	Area km <sup>2</sup>
TOTAL COUNTRY	63 248	8 266 622
Non malarious areas	31 084	927 863
Originally malarious areas		
Maintenance phase	0	0
Consolidation phase	0	0
Attack phase	5 054	278 406
Preparatory phase	27 110	7 060 353
Total originally malarious areas	32 164	7 338 759

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	27	4 424	4 451
Evaluation operations	60	1 273	1 333
Administrative and other	34	1 287	1 321
Transport	2	825	827
Total	123	7 809	7 932

TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four wheel vehicles	717	276	256	1 249
Two wheel vehicles	-	-	-	-
Boats	25	11	7	43
Animals	601	123	-	724
Other	-	-	1 <sup>a</sup>	1
Total	1 343	410	264	2 017

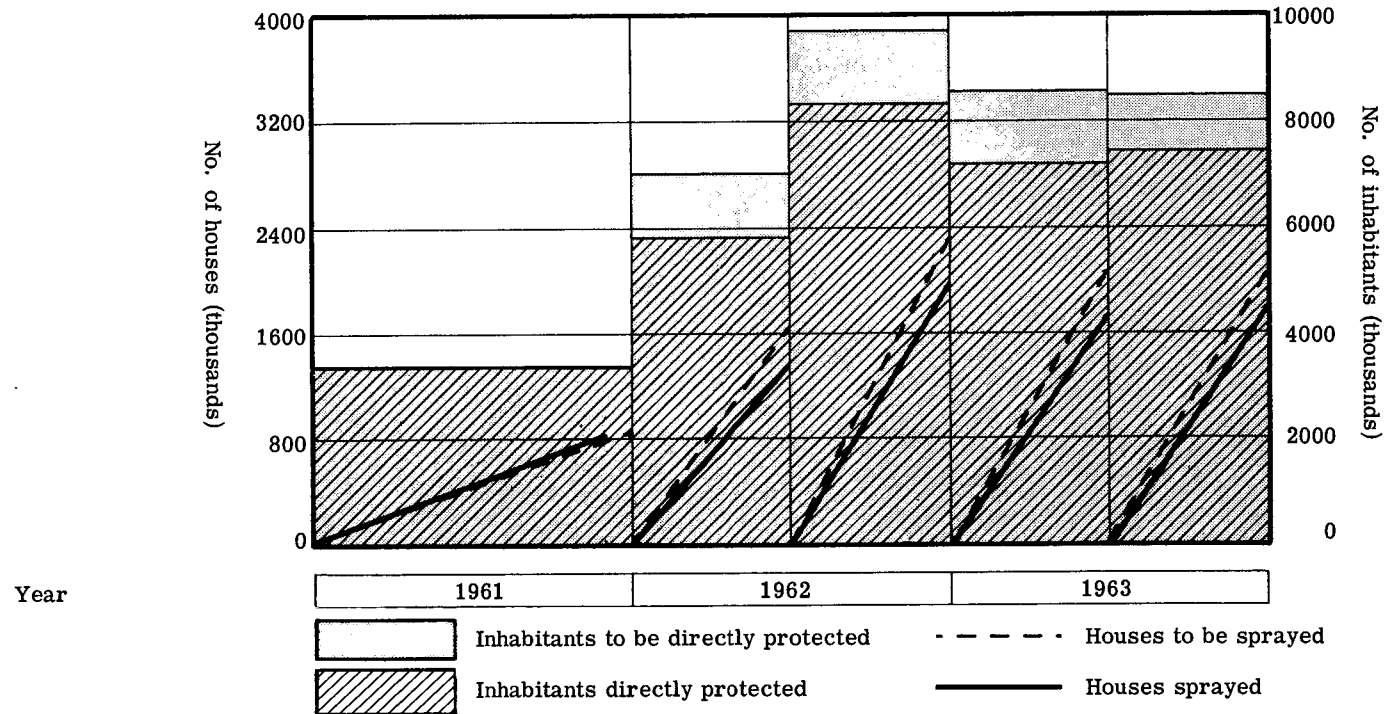
a) Airplane.

SPRAYING OPERATIONS

Year of total coverage	Date	Cycle DDT	Houses sprayed		Inhabitants directly protected		Insecticide used per house (g. technical)	Average houses sprayed per spray-man/day
			Planned	Sprayed	Planned	Protected		
(a)	Jan. 61-Nov. 61	(a)	820 095	814 475 <sup>b</sup>	3 399 300 <sup>c</sup>	3 380 000 <sup>c</sup>	...	...
(a)	Jan. 62-Jun. 62	...	1 622 052	1 350 566	7 016 997	5 843 075	424	...
	Jul. 62-Dec. 62	...	2 292 000	1 960 358	9 724 956	8 317 433	420	...
(a)	Jan. 63-Jun. 63	...	2 062 265	1 726 289	8 574 898	7 178 751	407	...
	Jul. 63-Nov. 63	...	2 045 534	1 790 239	8 493 057	7 432 511	413	7.6

... No information.

(a) Owing to different spray cycle timing in different regions, these data refer to the calendar year. (b) Sprayings. (c) Estimated.





BRAZIL (excl. São Paulo)

EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year of total coverage	Date	Slides examined			Species found		
		Total No.	Positive		<u>P. falciparum</u>	<u>P. vivax</u>	<u>P. malariae</u>
			Number	Percentage			
(a)	Jan. 61-Dec. 61	230 205	36 912 <sup>b</sup>	16.03	3 620	32 285	2
(a)	Jan. 62-Dec. 62	513 767	68 371	13.31	22 683	45 683	5
(a)	Jan. 63-Dec. 63	860 681	109 210	12.69	37 502	71 610	98

(a) Owing to different spray cycle timing in different regions, these data refer to the calendar year.

(b) Includes 1 005 undifferentiated mixed infections from Espiritu Santo Sector.

Country: BRAZIL (São Paulo)

Date attack phase began: 4 January 1960

STATUS OF MALARIA PROGRAM AT DECEMBER 1963



	Population (thousands)	Area km <sup>2</sup>
TOTAL COUNTRY	<u>13 826</u>	<u>247 239</u>
Non malarious areas	<u>11 074</u>	<u>19 224</u>
Originally malarious areas		
Maintenance phase	<u>0</u>	<u>0</u>
Consolidation phase	<u>1 256</u>	<u>145 829</u>
Attack phase	<u>1 496</u>	<u>82 186</u>
Preparatory phase	<u>0</u>	<u>0</u>
Total originally malarious areas	<u>2 752</u>	<u>228 015</u>

PERSONNEL

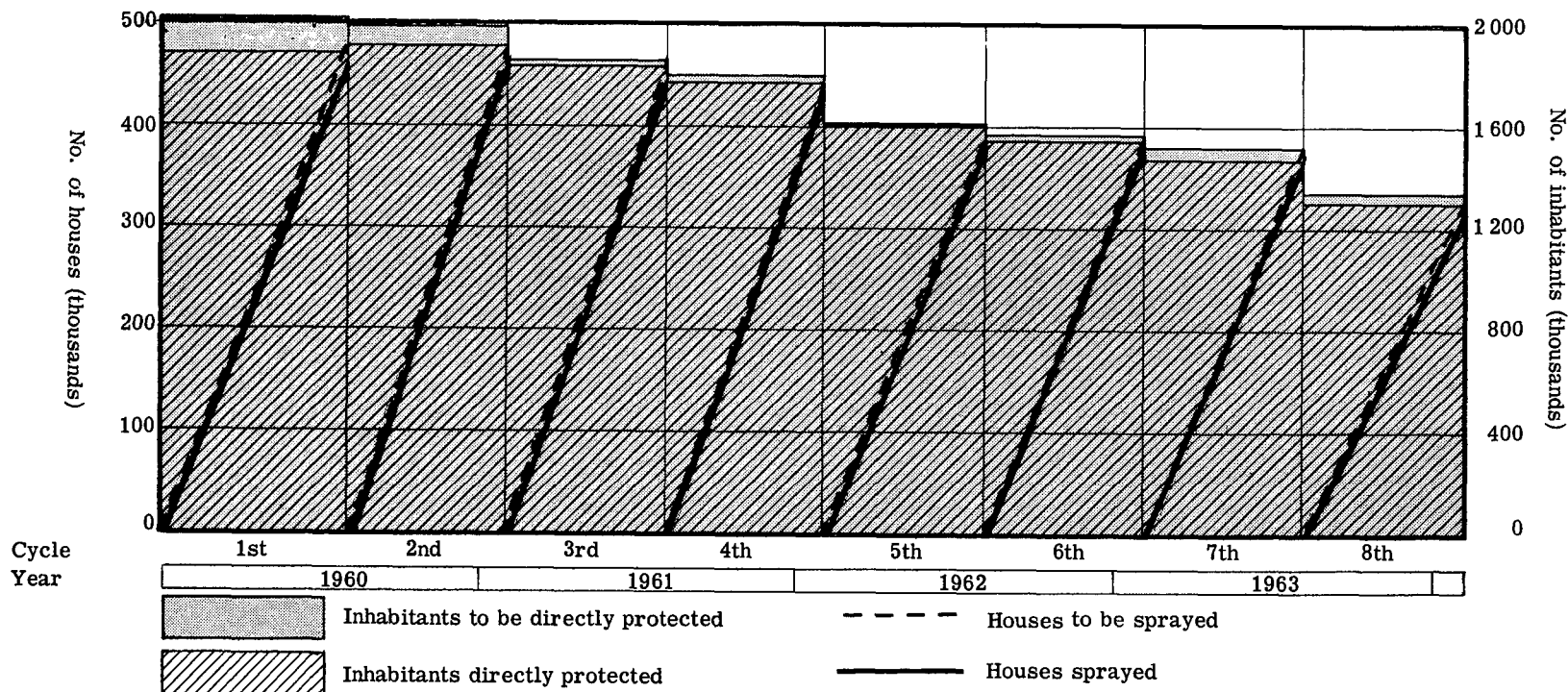
Activity	Professional	Non professional	Total
Spraying operations	8	649	657
Evaluation operations	13	226	239
Administrative and other	-	406	406
Transport	-	281	281
Total	21	1 562	1 583

TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four wheel vehicles	116	112	12	240
Two wheel vehicles	-	-	1	1
Boats	7	4	-	11
Animals	-	-	-	-
Other	-	-	-	-
Total	123	116	13	252

SPRAYING OPERATIONS

Year of total coverage	Date	Cycle DDT	Houses sprayed		Inhabitants directly protected		Insecticide used per house (g. technical) DDT	Average houses sprayed per spray-man/day
			Planned	Sprayed	Planned	Protected		
1st	Jan. 60-Jan. 61	1st	481 533	455 219	2 002 214	1 892 679	433	8.4
		2nd	475 121	458 926	1 992 182	1 924 405	404	9.8
2nd	Feb. 61-Jan. 62	3rd	441 104	436 048	1 870 722	1 849 398	416	9.4
		4th	436 057	431 473	1 807 892	1 789 051	412	9.7
3rd	Feb. 62-Jan. 63	5th	381 254	380 623	1 605 079	1 602 444	419	9.7
		6th	385 555	383 717	1 558 413	1 550 975	420	9.8
4th	Feb. 63-Jan. 64	7th	378 922	366 817	1 525 540	1 477 021	424	9.7
		8th	324 556	316 221	1 346 907	1 312 405	433	9.5



BRAZIL (São Paulo) (Cont.)

EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

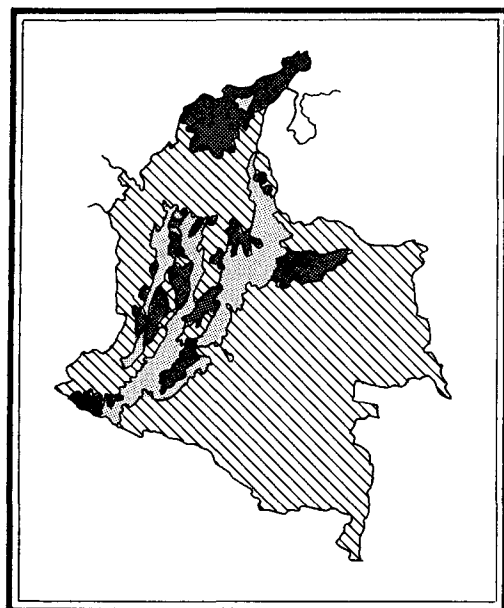
Year of total coverage	Date	Slides examined			Species found		
		Total No.	Positive		<u>P. falci- parum</u>	<u>P. vivax</u>	<u>P. malariae</u>
			Number	Percentage			
1st	Jan. 60-Jan. 61	124 525	9 078	7.29	72	9 005	1
2nd	Feb. 61-Jan. 62	219 841	7 082	3.22	262	6 817	3
3rd <sup>a</sup>	Feb. 62-Jan. 63	381 413	3 314	0.87	228	3 082	4
4th <sup>a</sup>	Feb. 63-Jan. 64	388 981	2 156	0.55	433	1 722	1

(a) Data for entire state; not separated by attack or consolidation phase.

Country: COLOMBIA

Date attack phase began: 20 September 1958

STATUS OF MALARIA PROGRAM AT DECEMBER 1963



	Population (thousands)	Area km <sup>2</sup>
TOTAL COUNTRY	15 181	1 138 338
Non malarious areas	5 617	111 905
Originally malarious areas		
Maintenance phase	0	0
Consolidation phase	5 305	122 920
Attack phase	4 009	863 513
Preparatory phase	250	40 000
Total originally malarious areas	9 564	1 026 433

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	3	728	731
Evaluation operations	24	429	453
Administrative and other	3	261	264
Transport	-	256	256
Total	30	1 674	1 704

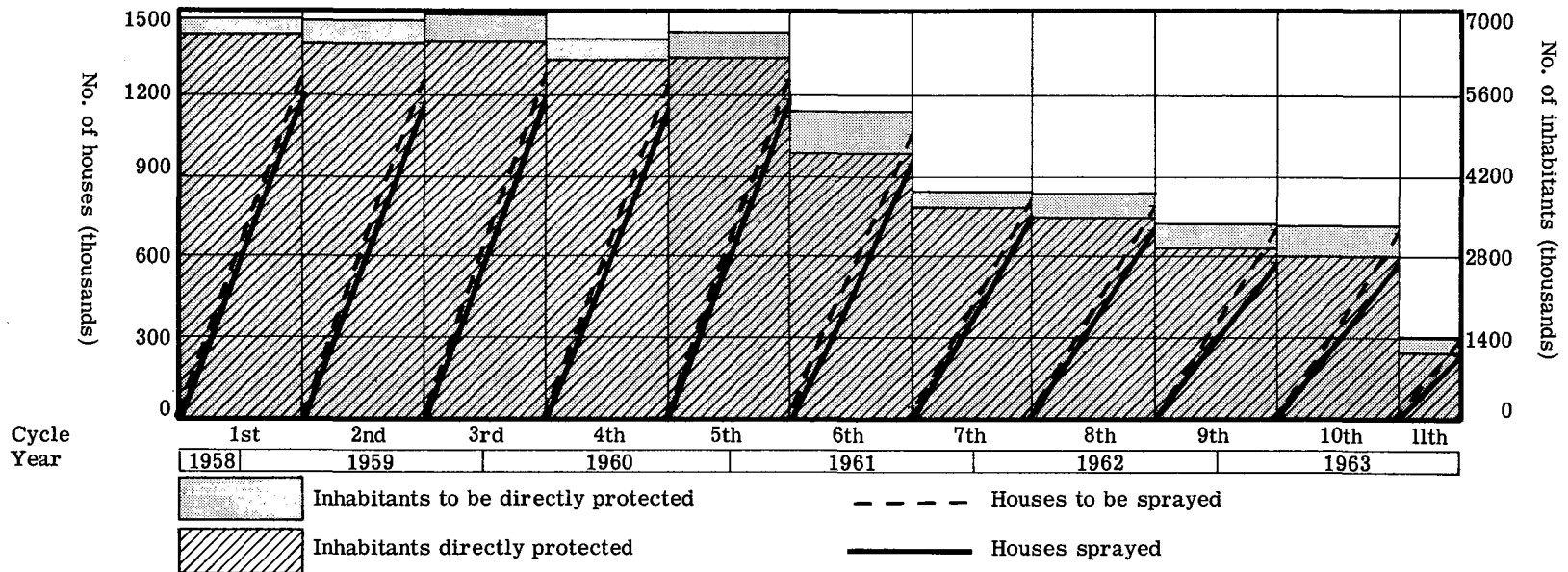
TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four wheel vehicles	-	-	364	364
Two wheel vehicles	-	-	81	81
Boats	-	-	252	252
Animals	-	-	1 073	1 073
Other	-	-	-	-
Total	-	-	1 770	1 770

SPRAYING OPERATIONS

Year of total coverage	Date	Cycle DDT	Houses sprayed		Inhabitants directly protected		Insecticide used per house (g. technical) DDT	Average houses sprayed per spray-man/day
			Planned	Sprayed	Planned	Protected		
1st	Oct. 58-Sep. 59	1st	1 235 473	1 181 235	6 900 118	6 597 002	466	6.6
		2nd	1 240 810	1 176 392	6 848 030	6 492 119	425	8.9
2nd	Oct. 59-Sep. 60	3rd	1 273 295	1 196 930	6 915 265	6 500 325	409	9.4
		4th	1 228 550	1 162 059	6 556 771	6 201 358	309	9.7
3rd	Oct. 60-Sep. 61	5th	1 253 594	1 181 557	6 642 794	6 261 680	397	9.7
		6th	1 050 556	945 501 a	5 320 016	4 788 305	402	9.3
4th	Oct. 61-Sep. 62	7th	796 056	738 459 a	3 997 793	3 708 400	408	8.9
		8th	789 399	693 315 a	3 928 049	3 449 630	421	8.8
5th	Oct. 62-Sep. 63	9th	701 762	586 740 b	3 440 739	2 876 514	435	8.4
		10th	690 726	576 540 b	3 363 145	2 806 950	459	7.9
6th	Oct. 63-Dec. 63	11th c	291 290 d	230 851	1 405 766	1 113 992	440	7.8

(a) Some houses were sprayed in cycles of once a year. (b) Some houses were sprayed in cycles of one, three and four times a year. (c) Cycle not yet finished. (d) 550 518 houses planned to be sprayed in the complete cycle.



## EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year of total coverage	Date	Slides examined			Species found		
		Total No.	Positive		<u>P. falci-</u> <u>parum</u>	<u>P. vivax</u>	<u>P. malariae</u>
			Number	Percentage			
1st	Oct.58-Sep. 59	205 343	2 626	1.28	731	1 877	18
2nd	Oct.59-Sep. 60	542 570	8 529	1.57	3 564	4 923	42
3rd	Oct.60-Sep. 61	515 395	14 591	2.83	8 730	5 822	39
4th	Oct.61-Sep. 62	640 720	17 623	2.75	9 873	7 716	34
5th	Oct.62-Sep. 63	519 600	18 380	3.54	9 809	8 545	26

## EPIDEMIOLOGICAL EVALUATION OPERATIONS, CONSOLIDATION PHASE AREAS

Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled	Total No. of positive slides	Origin of infections							Species of parasite		
Year	Quarter					Au-tochthonous	Relaps-ing	Imported		Induced	Intro-duced	Unclassi-fied	<u>P. falci-</u> <u>parum</u>	<u>P. vivax</u>	<u>P. malar-</u> <u>iae</u>
								from abroad	from areas within country						
1962	2nd	3 027	16 345	2.2	14	1	-	-	10	1	-	2	3	11	-
	3rd	3 027	17 636	2.3	36	1	2	-	29	-	-	4	21	15	-
	4th	3 027	36 269	4.8	97	46	2	-	33	4	-	12	75	22	-
1963	1st	3 874	28 193	2.9	129	26	-	-	61	1	6	35	82	47	-
	2nd	3 874	26 694	2.8	85	6	-	-	52	5	-	22	46	39	-
	3rd	3 874	24 844	2.6	89	4	-	-	78	-	-	7	46	43	-
	4th	5 305	...	...	...	...	...	...	...	...	...	...	...	...	...

- None

... No information

Country: COSTA RICA

Date attack phase began: 15 July 1957

STATUS OF MALARIA PROGRAM AT DECEMBER 1963



	Population (thousands)	Area km <sup>2</sup>
TOTAL COUNTRY	1 338	51 011
Non malarious areas	912	19 485
Originally malarious areas		
Maintenance phase	0	0
Consolidation phase	262	23 523
Attack phase	164	8 003
Preparatory phase	0	0
Total originally malarious areas	426	31 526

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	1	43	44
Evaluation operations	2	136	138
Administrative and other	1	16	17
Transport	-	12	12
Total	4	207	211

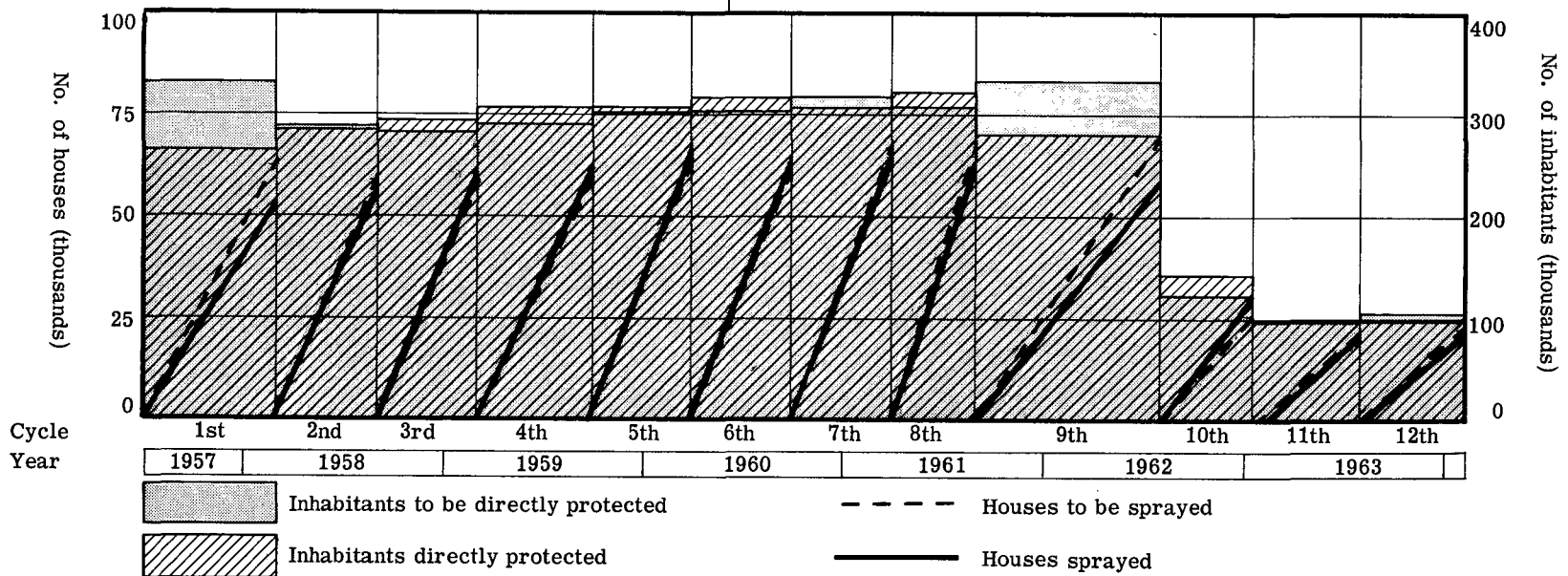
TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four wheel vehicles	9	19	-	28
Two wheel vehicles	-	50	-	50
Boats	2	9	-	11
Animals	-	-	-	-
Other	-	-	-	-
Total	11	78	-	89



SPRAYING OPERATIONS

Year of total coverage	Date	Cycle DDT	Houses sprayed		Inhabitants directly protected		Insecticide used per house (g. technical) DDT	Average houses sprayed per spray-man/day
			Planned	Sprayed	Planned	Protected		
1st	Jul. 57-Aug. 58	1st	67 059	53 297	331 070	263 123	464	5.1
		2nd	58 641	58 624	287 634	287 537	419	7.4
2nd	Sep. 58-Sep. 59	3rd	58 858	60 800	282 930	292 856	465	6.9
		4th	60 413	63 063	290 405	303 151	531	7.1
3rd	Oct. 59-Sep. 60	5th	63 259	63 884	302 568	305 586	512	8.6
		6th	64 057	66 961	302 926	316 629	475	9.3
4th	Oct. 60-Sep. 61	7th	68 300	66 242	317 185	307 601	473	9.4
		8th	65 567	68 277	307 903	320 603	485	9.2
5th	Oct. 61-Dec. 62	9th	69 643	58 910	332 545	281 295	492	8.8
		10th	26 075	30 684	120 753	142 102	508	9.6
6th	Jan. 63-Jan. 64	11th	21 582	21 443	99 300	99 083	509	8.6
		12th	22 764	21 256	106 194	99 162	524	8.4



EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year of total coverage	Date	Slides examined			Species found		
		Total No.	Positive		<u>P. falci-parum</u>	<u>P. vivax</u>	<u>P. malariae</u>
			Number	Percentage			
1st	Jul. 57-Aug.58	24 773	1 786	7.21	115	1 661	10
2nd	Sep. 58-Sep. 59	52 697	2 222	4.22	135	2 081	6
3rd	Oct. 59-Sep. 60	66 721	1 980	2.96	91	1 888	1
4th	Oct. 60-Sep. 61	81 977	1 830	2.23	32	1 798	-
5th	Oct. 61-Dec.62	155 909	1 779	1.14	6	1 772	1
6th	Jan. 63-Jan. 64	132 069	895	0.68	7	888	-

EPIDEMIOLOGICAL EVALUATION OPERATIONS, CONSOLIDATION PHASE

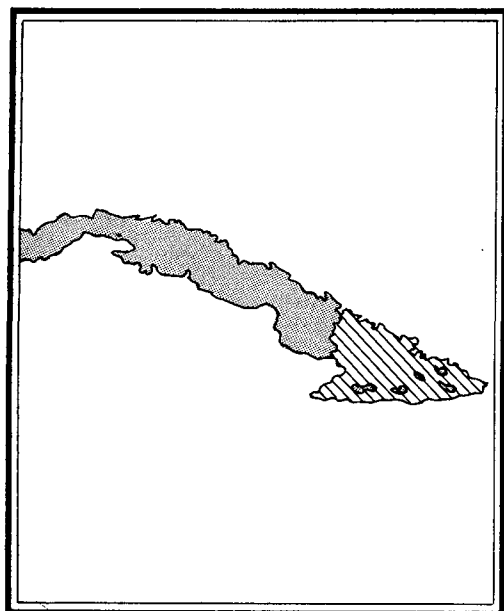
Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled	Total No. of positive slides	Origin of infections							Species of parasite		
Year	Quarter					Autochthonous	Relapsing	Imported		Induced	Introduced	Unclassified	<u>P. falci-parum</u>	<u>P. vivax</u>	<u>P. malariae</u>
								from abroad	from areas within country						
1962	3rd	230	22 765	39.6	37	-	6	2	9	-	17	3	-	37	-
	4th	230	29 829	51.9	64	-	9	2	3	-	34	16	-	64	-
1963	1st	255	35 311	55.4	62	33	13	-	-	-	8	8	-	62	-
	2nd	255	35 946	56.4	59	40	11	-	4	-	-	4	-	59	-
	3rd	255	26 855	42.1	135	101	11	-	3	-	-	20	-	135	-
	4th	262	35 233	53.8	115	70	10	-	-	-	2	33	-	115	-

- None.

Country: CUBA

Date attack phase began: 1 January 1962

STATUS OF MALARIA PROGRAM AT DECEMBER 1963



	Population (thousands)	Area km <sup>2</sup>
TOTAL COUNTRY	<u>7 134</u>	<u>114 524</u>
Non malarious areas	<u>5 213</u>	<u>77 148</u>
Originally malarious areas		
Maintenance phase	<u>0</u>	<u>0</u>
Consolidation phase	<u>0</u>	<u>0</u>
Attack phase	<u>1 921</u>	<u>37 376</u>
Preparatory phase	<u>0</u>	<u>0</u>
Total originally malarious areas	<u>1 921</u>	<u>37 376</u>

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	1	481	482
Evaluation operations	9	20	29
Administrative and other	-	21	21
Transport	-	13	13
Total	10	535	545

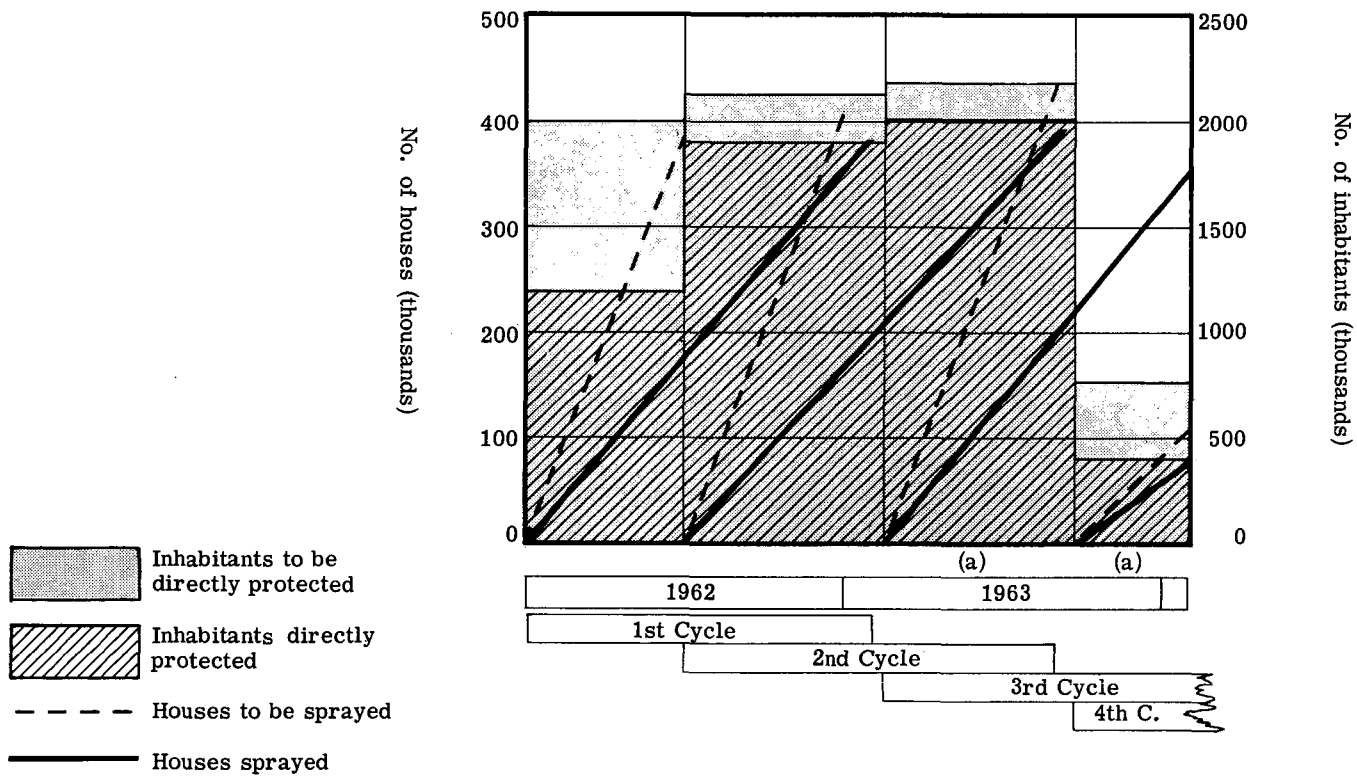
TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four wheel vehicles	71	13	3	87
Two wheel vehicles	-	-	-	-
Boats	-	-	-	-
Animals	160	-	-	160
Other	-	-	-	-
Total	231	13	3	247

SPRAYING OPERATIONS

Year of total coverage	Date	Cycle DDT	Houses sprayed		Inhabitants directly protected		Insecticide used per house (gr. technical) DDT	Average houses sprayed per spray-man/day
			Planned	Sprayed	Planned	Protected		
1st	Jan. 62-Jan. 63 Jul. 62-Aug. 63	1st	391 155	385 020	2 007 000	1 975 528	210	9.7
		2nd	411 773	389 914	2 125 572	2 012 831	209	10.0
2nd	Mar. 63-Jan. 64 Oct. 63-Jan. 64	3rd <sup>a</sup>	432 891	351 969	2 175 710	1 768 990	180	9.9
		4th a	152 828	79 503	768 115	399 582 <sup>b</sup>	196	9.6

(a) Cycle not yet finished. (b) Estimated.



CUBA (Cont.)

EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

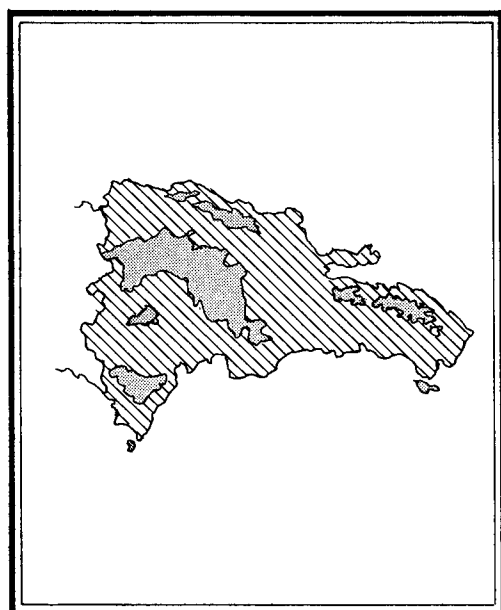
Year of total coverage	Date	Slides examined			Species found		
		Total No.	Positive		<u>P. falci- parum</u>	<u>P. vivax</u>	<u>P. malariae</u>
			Number	Percentage			
(a)	Jan. 60-Dec. 60	28 791	1 325	4.60	197	1 128	-
(a)	Jan. 61-Dec. 61	91 181	3 230	3.54	128	3 102	-
1st	Jan. 62-Dec. 62	100 247	3 515	3.51	31	3 484	-
2nd	Jan. 63-Dec. 63	126 334	833	0.66	6	827	-

(a) Pre-eradication survey.  
- None.

Country: DOMINICAN REPUBLIC

Date attack phase began: 16 June 1958

STATUS OF MALARIA PROGRAM AT DECEMBER 1963



	Population (thousands)	Area km <sup>2</sup>
TOTAL COUNTRY	3 348	48 442
Non malarious areas	608	9 442
Originally malarious areas		
Maintenance phase	0	0
Consolidation phase	0	0
Attack phase	2 740	39 000
Preparatory phase	0	0
Total originally malarious areas	2 740	39 000

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	2	417	419
Evaluation operations	3	37	40
Administrative and other	-	20	20
Transport	-	54	54
Total	5	528	533

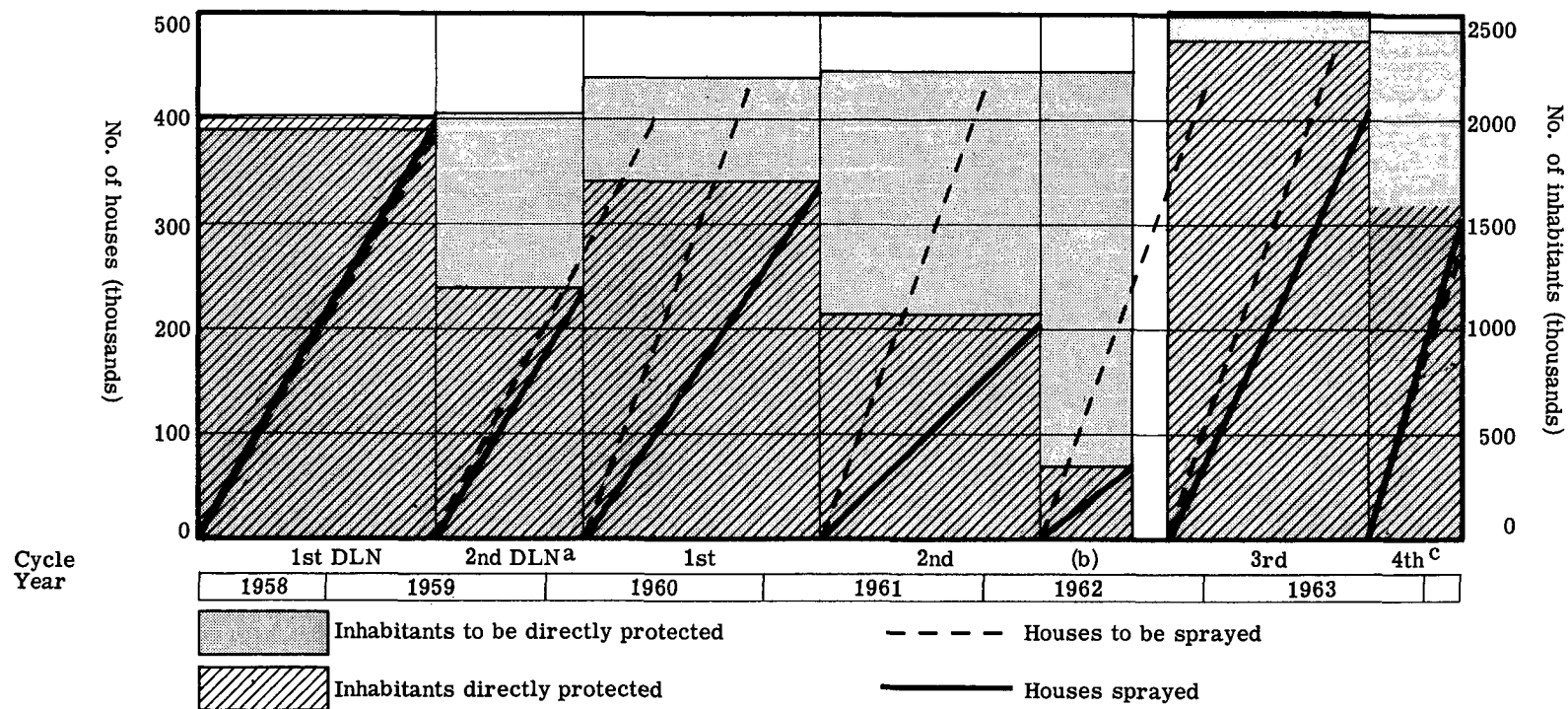
TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four wheel vehicles	91	5	8	104
Two wheel vehicles	-	14	-	14
Boats	-	-	-	-
Animals	-	-	-	-
Other	-	-	-	-
Total	91	19	8	118

SPRAYING OPERATIONS

Year of total coverage	Date	Houses sprayed						Inhabitants directly protected		Insecticide used per house (g. technical)		Average houses sprayed per spray-man/ day
		DDT			Dieldrin							
		Cycle	Planned	Sprayed	Cycle	Planned	Sprayed	Planned	Protected	DDT	Dieldrin	
1st	Jun. 58-Jun. 59	-	-	-	1st	386 120	395 597	1 966 895	2 015 214	-	102	11.4
2nd	Jun. 59- Feb.60	-	-	-	2nd <sup>a</sup>	400 000	236 597	2 032 800	1 202 301	-	119	10.5
3rd	Mar.60-Mar.62	1st	428 615	332 944	-	-	-	2 206 080	1 713 612	495	-	9.0
		2nd	428 615	204 531				2 241 656	1 083 459	472		8.4
(b)	Apr.62-Aug.62	(b)	428 615	72 499	-	-	-	2 241 656	368 201	424	-	8.4
4th	Nov.62- Feb.64 <sup>c</sup>	3rd	462 900	438 706	-	-	-	2 530 674	2 398 328	468	-	8.2
		4th <sup>c</sup>	472 000	301 913				2 442 600	1 562 408	474		8.2

(a) Cycle suspended due to shift of insecticide. (b) Cycle suspended. (c) Cycle not yet finished.



DOMINICAN REPUBLIC (Cont.)

EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year of total coverage	Date	Slides examined			Species found		
		Total No.	Positive		<u>P. falciparum</u>	<u>P. vivax</u>	<u>P. malariae</u>
			Number	Percentage			
1st	Jun. 58-Jun. 59	29 718	3 060	10.30	1 522	1 537	1
2nd	Jul. 59-Feb. 60	19 362	4 214	21.76	2 453	1 751	10
3rd	Mar. 60-Mar. 62	39 534	6 841	17.30	3 934	2 899	8
4th	Apr. 62-Sep. 63	67 816	609	0.90	238	369	2
5th	Oct. 63-Jan. 64 <sup>a</sup>	29 620	161	0.54	55	106	-

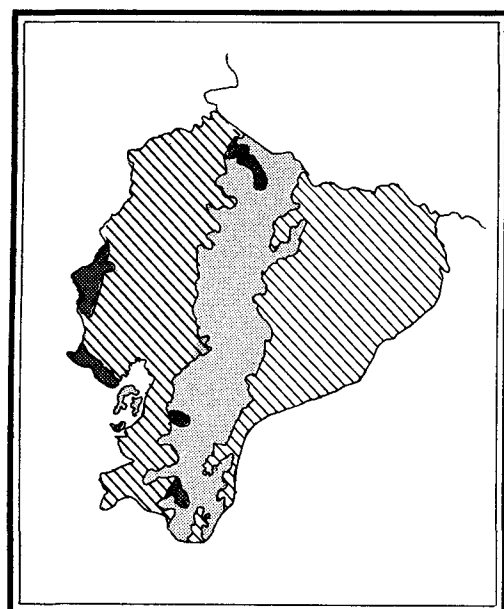
(a) Cycle not yet finished.



Country: ECUADOR

Date attack phase began: 28 March 1957

STATUS OF MALARIA PROGRAM AT DECEMBER 1963



	Population (thousands)	Area km <sup>2</sup>
TOTAL COUNTRY	4 696	291 906
Non malarious areas	2 146	116 444
Originally malarious areas		
Maintenance phase	0	0
Consolidation phase	927	6 394
Attack phase	1 623	169 068
Preparatory phase	0	0
Total originally malarious areas	2 550	175 462

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	7	524	531
Evaluation operations	11	150	161
Administrative and other	1	97	98
Transport	1	44	45
Total	20	815	835

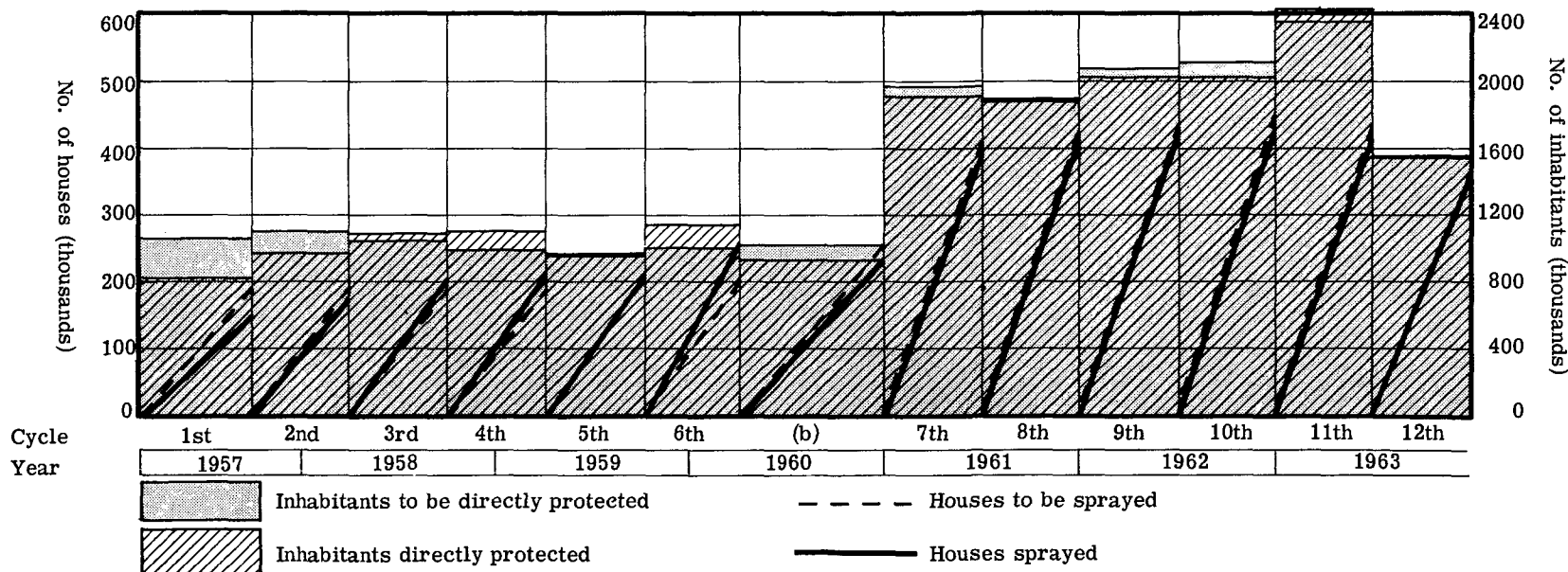
TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four wheel vehicles	73	29	26	128
Two wheel vehicles	-	9	1	10
Boats	52	23	-	75
Animals	269	54	-	323
Other	-	-	-	-
Total	394	115	27	536

SPRAYING OPERATIONS

Year of total coverage	Date	Houses sprayed						Inhabitants directly protected		Insecticide used per house (g. technical)		Average houses sprayed per spray-man/day
		DDT			Dieldrin			Planned	Protected	DDT	Dieldrin	
		Cycle	Planned	Sprayed	Cycle	Planned	Sprayed					
1st	Mar.57-Mar. 58	1st + 2nd	42 418	63 284	1st	244 304	257 697	1 587 866	1 777 566	590	114	8.0
2nd	Apr.58-Mar. 59	3rd	48 104	50 089	2nd	280 832	144 069	1 047 229	1 078 629	490	123.5	6.9
		4th	48 391	83 018			127 348					
3rd	Apr.59-Mar. 60	5th	76 577	72 370	3rd <sup>a</sup>	260 539	135 187	949 386	952 664	399	119	9.3
		6th	76 577	97 790 <sup>a</sup>			136 542 <sup>a</sup>					
(b)	Apr.60-Dec. 60	(b)	251 768	227 411	-	-	-	1 016 387	918 151	424	-	8.9
4th	Jan. 61-Dec. 61	7th	403 989	394 246	-	-	-	1 954 095	1 907 065	446	-	8.4
		8th	413 951	412 008				1 897 137	1 888 183	502		
5th	Jan. 62-Dec. 62	9th	438 027	428 269	-	-	-	2 069 240	2 023 097	529	-	8.4
		10th	448 716	428 329				2 119 734	2 023 430 <sup>c</sup>	557		
6th	Jan. 63-Dec. 63	11th	400 362	409 722	-	-	-	2 360 935	2 416 436	581	-	8.2
		12th	363 437	363 304				1 553 330	1 552 883	602		

(a) Cycle suspended. (b) Emergency spraying. (c) Estimated.



EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year of total coverage	Date	Slides examined			Species found		
		Total No.	Positive		<u>P. falci-parum</u>	<u>P. vivax</u>	<u>P. malariae</u>
			Number	Percentage			
1st	Mar. 57-Mar. 58	47 993	2 258	4.70	1 169	1 086	3
2nd	Apr. 58-Mar. 59	69 085	4 802	6.95	2 361	2 437	4
3rd	Apr. 59-Mar. 60	108 041	6 291	5.82	2 454	3 833	4
(a)	Apr. 60-Dec. 60	92 510	7 692	8.31	2 761	4 912	19
4th	Jan. 61-Dec. 61	213 169	9 733	4.57	1 489	8 243	1
5th	Jan. 62-Dec. 62	269 004	5 531	2.06	658	4 868	5
6th	Jan. 63-Dec. 63	199 673	3 760	1.88	231	3 510	19

EPIDEMIOLOGICAL EVALUATION OPERATIONS, CONSOLIDATION PHASE AREAS

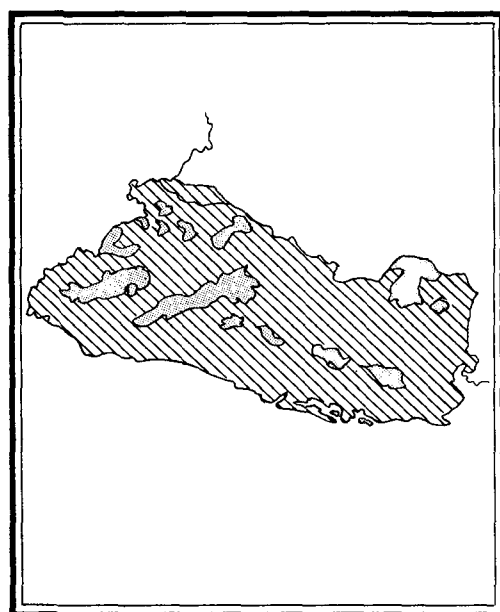
Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled	Total No. of positive slides	Origin of infections							Species of parasite		
Year	Quarter					Au-tochtho-nous	Relaps-ing	Imported		Induced	Intro-duced	Unclassi-fied	<u>P. falci-parum</u>	<u>P. vivax</u>	<u>P. malar-iae</u>
								from abroad	from areas within country						
1963	1st	625	17 734	11.3	6	-	-	-	6	-	-	-	-	5	1
	2nd	625	19 286	12.3	15	-	-	-	15	-	-	-	1	14	-
	3rd	806	25 488	12.6	29	-	-	-	29	-	-	-	1	28	-
	4th	927	24 270	9.6	47	-	-	-	39	-	-	8	4	43	-

- None  
(a) During emergency spraying.

Country: EL SALVADOR

Date attack phase began: 1 July 1956

STATUS OF MALARIA PROGRAM AT DECEMBER 1963



	Population (thousands)	Area km <sup>2</sup>
TOTAL COUNTRY	2511	21 149
Non malarious areas	870	1 209
Originally malarious areas		
Maintenance phase	0	0
Consolidation phase	0	0
Attack phase	1 641	19 940
Preparatory phase	0	0
Total originally malarious areas	1 641	19 940

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	1	146	147
Evaluation operations	3	103	106
Administrative and other	1	90	91
Transport	-	65	65
Total	5	404	409

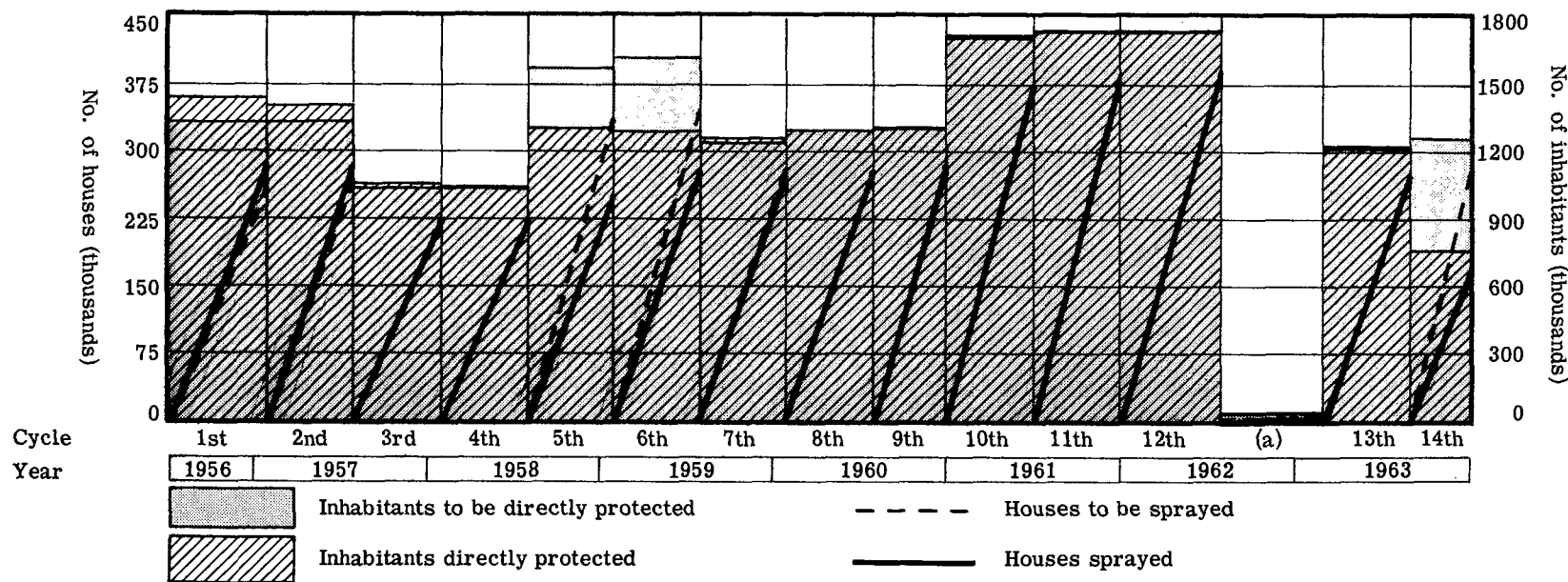
TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four wheel vehicles	34	25	16	75
Two wheel vehicles	-	15	1	16
Boats	1	-	-	1
Animals	-	-	-	-
Other	-	-	-	-
Total	35	40	17	92

SPRAYING OPERATIONS

Year of total coverage	Date	Houses sprayed						Inhabitants directly protected		Insecticide used per house (g. technical)		Average houses sprayed per spray-man/day
		DDT			Dieldrin			Planned	Protected	DDT	Dieldrin	
		Cycle	Planned	Sprayed	Cycle	Planned	Sprayed					
1st	Jul. 56-Jul. 57	1st	177 035	260 035	1st	88 788	21 699	1 330 975	1 440 038	454	158	8.5
		2nd	177 035	173 537		88 788	107 140					
2nd	Aug.57-Jul. 58	3rd	105 983	126 329	2nd	111 620	93 931	1 044 500	1 057 339	469	162	9.4
		4th	111 613	111 726		104 983	108 797					
3rd	Aug.58-Jul. 59	5th	331 975	273 788	-	-	-	1 575 885	1 299 671	493	-	8.6
		6th	341 277	270 719		-	-					
4th	Aug.59-Jul. 60	7th	261 102	265 361	-	-	-	1 237 362	1 257 537	573	-	7.7
		8th	278 991	276 050		-	-					
5th	Aug.60-Jun. 61	9th	281 430	279 481	-	-	-	1 306 400	1 297 262	528	-	7.6
		10th	368 841	371 715		-	-					
6th	Jul. 61-Jul. 62	11th	380 283	377 551	-	-	-	1 748 922	1 736 431	546	-	9.2
		12th	387 944	386 094		-	-					
(a)	Aug.62-Feb.63	(a)	3 901	3 816	-	-	-	20 117	19 680	809	-	6.7
7th	Mar.63-Dec.63	13th	267 239	270 703	-	-	-	1 206 851	1 222 430	559	-	9.3
		14th	273 344	165 666		-	-					

(a) Spraying suspended, only one locality was sprayed.



EL SALVADOR (Cont.)

EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

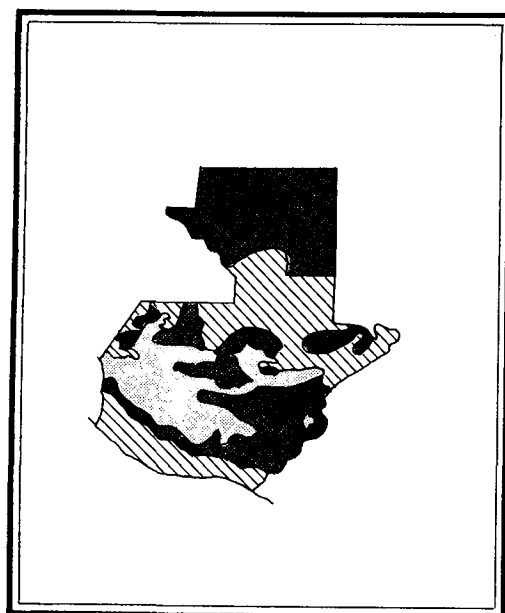
Year of total coverage	Date	Slides examined			Species found		
		Total No.	Positive		<u>P. falci- parum</u>	<u>P. vivax</u>	<u>P. malariae</u>
			Number	Percentage			
1st	Jul. 56-Jul. 57	11 829	2 284	19.31	774	1 510	-
2nd	Aug. 57-Jul. 58	42 216	9 108	21.57	4 212	4 891	5
3rd	Aug. 58-Jul. 59	59 463	13 520	22.74	4 384	9 136	-
4th	Aug. 59-Jul. 60	75 177	12 627	16.80	3 061	9 566	-
5th	Aug. 60-Jun. 61	75 053	10 791	14.38	3 168	7 620	3
6th	Jul. 61-Jun. 62	145 501	12 004	8.25	2 343	9 655	6
(a)	Jul. 62-Feb. 63	163 331	14 104	8.63	2 581	11 520	3
7th	Mar. 63-Dec. 63	215 105	14 949	6.95	1 295	13 652	2

(a) Spraying discontinued due to economic reasons.

Country: GUATEMALA

Date attack phase began: 1 August 1956

STATUS OF MALARIA PROGRAM AT DECEMBER 1963



	Population (thousands)	Area km <sup>2</sup>
TOTAL COUNTRY	4 120	108 889
Non malarious areas	2 208	28 539
Originally malarious areas		
Maintenance phase	0	0
Consolidation phase	1 234	49 345
Attack phase	678	31 005
Preparatory phase	0	0
Total originally malarious areas	1 912	80 350

PERSONNEL

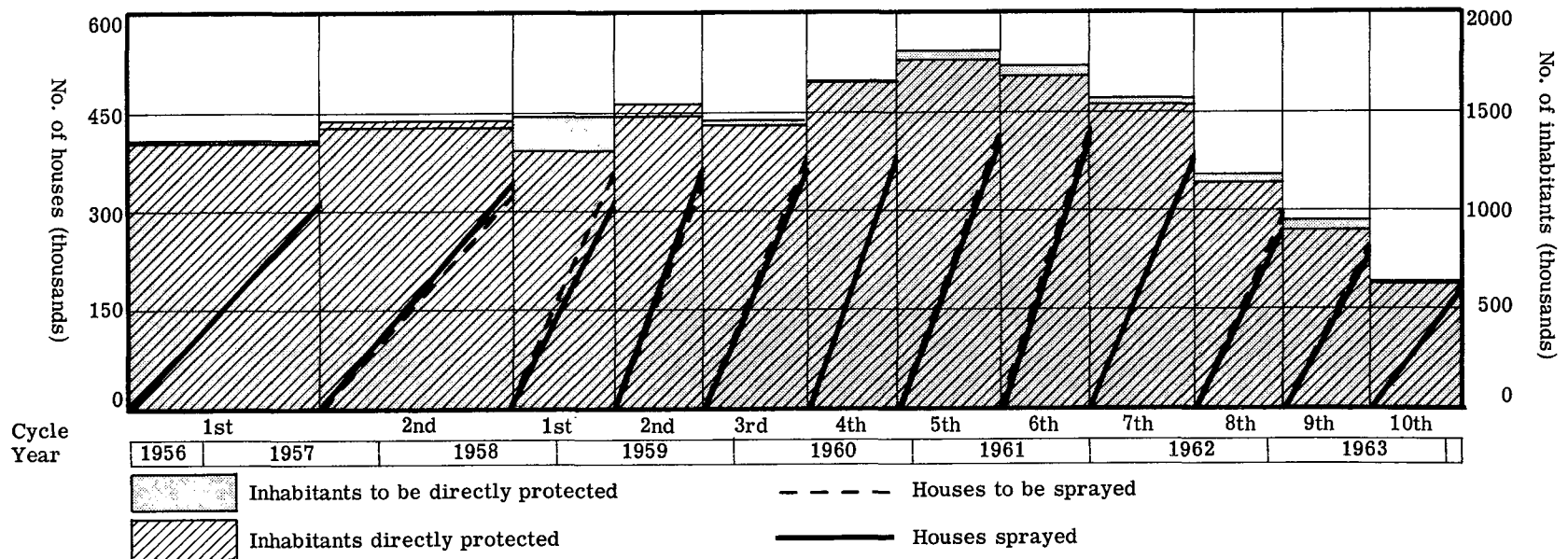
Activity	Professional	Non professional	Total
Spraying operations	2	301	303
Evaluation operations	4	144	148
Administrative and other	-	49	49
Transport	-	46	46
Total	6	540	546

TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four wheel vehicles	34	13	18	65
Two wheel vehicles	-	61	-	61
Boats	3	1	-	4
Animals	6	-	-	6
Other	-	-	-	-
Total	43	75	18	136

SPRAYING OPERATIONS

Year of total coverage	Date	Houses sprayed						Inhabitants directly protected		Insecticide used per house (g. technical)		Average houses sprayed per spray-man/day
		DDT			Dieldrin			Planned	Protected	DDT	Dieldrin	
		Cycle	Planned	Sprayed	Cycle	Planned	Sprayed					
1st	Aug. 56-Aug. 57	-	-	-	1st	308 097	306 306	1 361 175	1 353 121	-	117	8.4
2nd	Sep. 57-Sep. 58	-	-	-	2nd	321 975	331 090	1 422 165	1 462 510	-	117	8.5
3rd	Oct. 58-Oct. 59	1st	341 000	301 329	-	-	-	1 482 670	1 310 317	427	-	8.8
		2nd	342 586	357 104				1 481 342	1 544 144	542	-	7.5
4th	Nov. 59-Nov. 60	3rd	373 641	368 269	-	-	-	1 460 936	1 439 781	541	-	7.1
		4th	377 381	378 636				1 654 816	1 660 207	560	-	8.1
5th	Dec. 60-Dec. 61	5th	396 588	386 737	-	-	-	1 815 183	1 769 971	588	-	7.8
		6th	406 807	393 090				1 737 473	1 678 906	557	-	7.9
6th	Jan. 62-Jan. 63	7th	375 000	368 135	-	-	-	1 562 625	1 534 089	553	-	7.5
		8th	291 490	280 687				1 185 781	1 141 867	589	-	7.5
7th	Feb. 63-Jan. 64	9th	243 511	231 824	-	-	-	949 936	904 382	537	-	7.6
		10th	175 000	171 061				642 950	628 563	502	-	8.0





EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year of total coverage	Date	Slides examined			Species found		
		Total No.	Positive		<u>P. falciparum</u>	<u>P. vivax</u>	<u>P. malariae</u>
			Number	Percentage			
1st	Aug. 56-Aug.57	22 965	5 116	22.28	1 255	3 858	3
2nd	Sep. 57-Sep. 58	47 945	10 084	21.03	3 909	6 174	1
3rd	Oct. 58-Oct. 59	124 519	13 034	10.47	3 734	9 300	-
4th	Nov. 59-Nov.60	126 667	3 367	2.66	400	2 967	-
5th	Dec. 60-Dec.61	230 702	4 356	1.89	865	3 485	6
6th	Jan. 62-Dec.62	275 003	5 783	2.10	1 539	4 224	20
7th	Jan. 63-Dec.63	216 717	12 270	5.66	4 660	7 565	45

EPIDEMIOLOGICAL EVALUATION OPERATIONS, CONSOLIDATION PHASE AREAS

Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled	Total No. of positive slides	Origin of infections						Species of parasite			
Year	Quarter					Autochthonous	Relapsing	Imported		Induced	Introduced	Unclassified	<u>P. falciparum</u>	<u>P. vivax</u>	<u>P. malariae</u>
								from abroad	from areas within country						
1962	1st	175	2 399	5.5	2	-	-	2	-	-	-	1	11	-	
	2nd	175	5 457	12.5	1	-	-	1	-	-	-	1	-	-	
	3rd	498	20 655	16.6	93	1	-	26	-	-	66	18	75	-	
	4th	581	19 859	13.7	117	1	-	71	-	-	45	42	75	-	
1963	1st	890	20 834	9.4	297	-	2	144	-	-	151	68	229	-	
	2nd	890	25 543	11.5	413	17	18	168	-	2	208	117	294	2	
	3rd	1 234	40 400	13.1	1 082	89	64	169	-	-	760	359	723	-	
	4th	1 234	45 372	14.7	1 054	72	58	73	-	-	851	353	699	2	

- None

Country: HAITI

Date attack phase began: 1 January 1962

STATUS OF MALARIA PROGRAM AT DECEMBER 1963



	Population (thousands)	Area km <sup>2</sup>
<b>TOTAL COUNTRY</b>	<u>4 439</u>	<u>27 750</u>
Non malarious areas	<u>990</u>	<u>8 650</u>
Originally malarious areas		
Maintenance phase	<u>0</u>	<u>0</u>
Consolidation phase	<u>0</u>	<u>0</u>
Attack phase	<u>3 449</u>	<u>19 100</u>
Preparatory phase	<u>0</u>	<u>0</u>
<b>Total originally malarious areas</b>	<u>3 449</u>	<u>19 100</u>

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	6	753	759
Evaluation operations	21	118	139
Administrative and other	1	140	141
Transport	-	75	75
<b>Total</b>	<b>28</b>	<b>1 086</b>	<b>1 114</b>

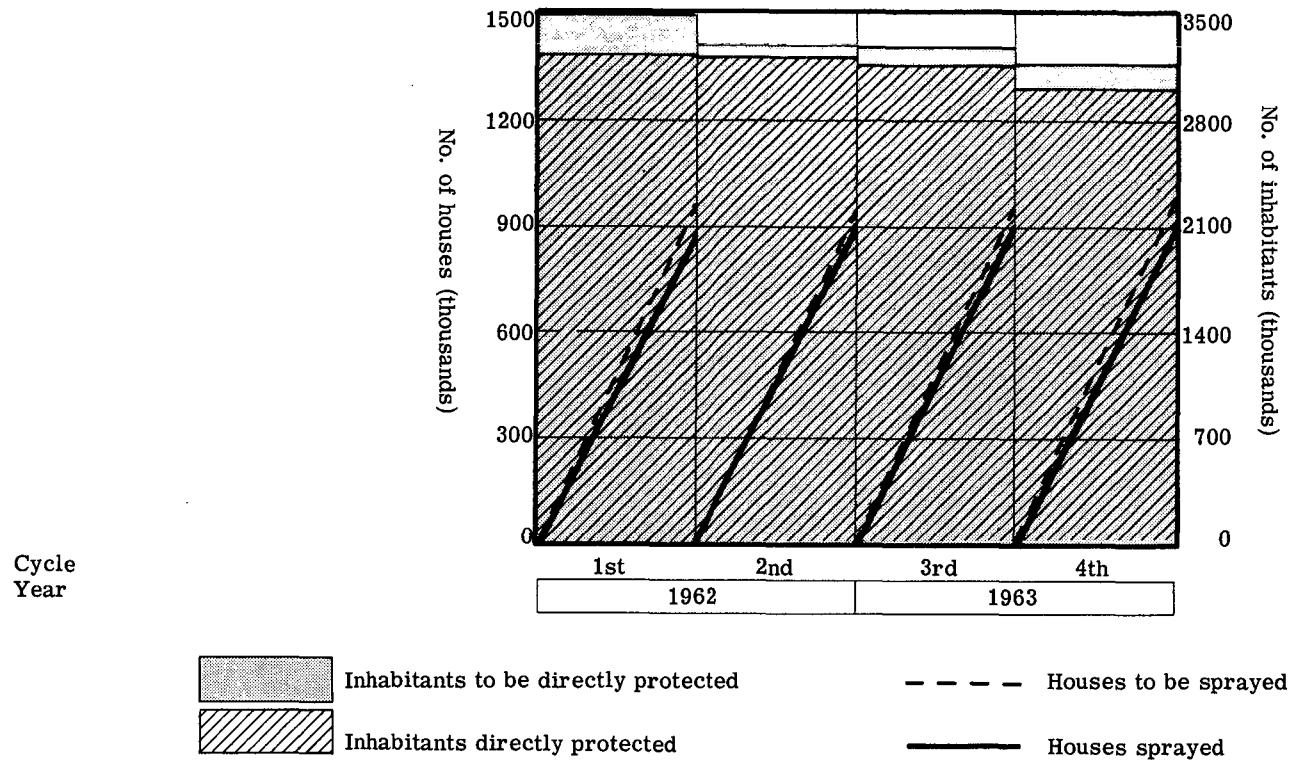
TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four wheel vehicles	63	17	36	116
Two wheel vehicles	-	-	-	-
Boats	1	1	-	2
Animals	-	-	-	-
Other	-	-	-	-
<b>Total</b>	<b>64</b>	<b>18</b>	<b>36</b>	<b>118</b>

SPRAYING OPERATIONS

Year of total coverage	Date	Cycle DDT	Houses sprayed		Inhabitants directly protected		Insecticide used per house (g. technical) DDT	Average houses sprayed per spray-man/day
			Planned	Sprayed	Planned	Protected		
1st	Jan. 62-Dec. 62	1st	952 301	885 549 a	3 490 183	3 245 821	220	14.3
		2nd	929 415	906 846	3 311 505	3 231 438	196	16.6
2nd	Jan. 63-Dec. 63	3rd	940 397	902 687	3 297 032	3 165 209	217	15.4
		4th	964 942	914 340	3 186 238	3 019 259	235	16.2

(a) 10 016 houses sprayed with dieldrin.



HAITI (Cont.)

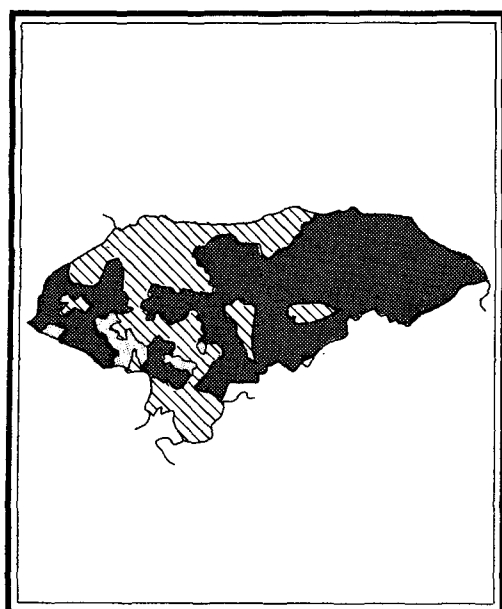
EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year of total coverage	Date	Slides examined			Species found		
		Total No.	Positive		<u>P. falci- parum</u>	<u>P. vivax</u>	<u>P. malariae</u>
			Number	Percentage			
1st	Jan. 62-Dec. 62	111 142	4 033	3.63	3 441	20	572
2nd	Jan. 63-Dec. 63	386 657	6 662	1.72	5 464	12	1 186

Country: HONDURAS

Date attack phase began: 15 July 1959

STATUS OF MALARIA PROGRAM AT DECEMBER 1963



	Population (thousands)	Area km <sup>2</sup>
TOTAL COUNTRY	<u>2 008</u>	<u>112 088</u>
Non malarious areas	<u>116</u>	<u>5 053</u>
Originally malarious areas		
Maintenance phase	<u>0</u>	<u>0</u>
Consolidation phase	<u>941</u>	<u>78 703</u>
Attack phase	<u>951</u>	<u>28 332</u>
Preparatory phase	<u>0</u>	<u>0</u>
Total originally malarious areas	<u>1 892</u>	<u>107 035</u>

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	-	48	48
Evaluation operations	3	69	72
Administrative and other	-	23	23
Transport	-	27	27
Total	3	167	170

TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four wheel vehicles	55	18	-	73
Two wheel vehicles	-	25	-	25
Boats	1	-	-	1
Animals	92	42	-	134
Other	-	-	-	-
Total	148	85	-	233

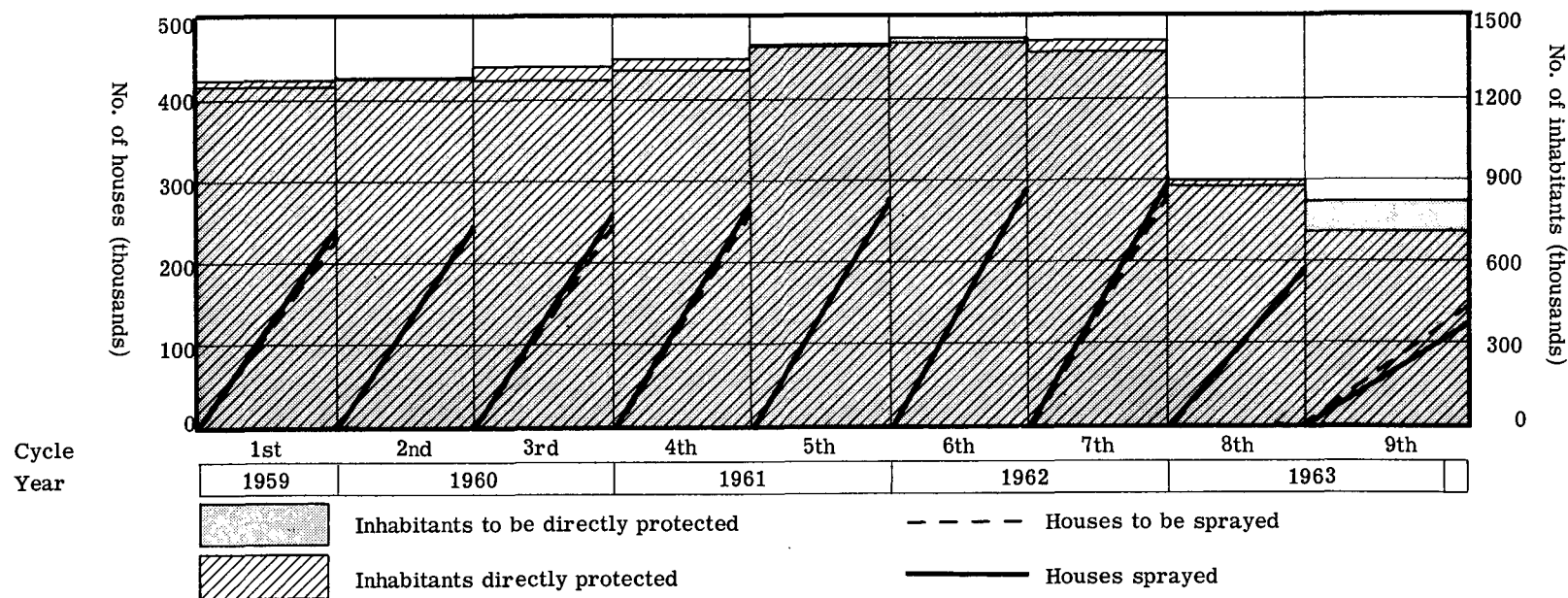
HONDURAS (Cont.)

SPRAYING OPERATIONS

Year of total coverage	Date	Cycle DDT	Houses sprayed		Inhabitants directly protected		Insecticide used per house (gr. technical) DDT	Average houses sprayed per spray-man/day
			Planned	Sprayed	Planned	Protected		
1st	Jul. 59-Jun. 60	1st	232 771	236 963	1 252 773	1 275 237	406	9.8
		2nd	241 726	242 059	1 277 280	1 279 148	368	11.4
2nd	Jul. 60-Jun. 61	3rd.	245 572	254 699	1 274 028	1 321 450	369	11.8
		4th	258 519	265 825	1 314 052	1 351 212	419	10.9
3rd	Jul. 61-Jun. 62	5th	276 458	277 941	1 401 919	1 409 325	360	11.1
		6th	287 516	285 394	1 421 192	1 410 773	362	11.3
4th	Jul. 62-Jun. 63	7th	282 186	290 056	1 376 785	1 415 286	373	11.1
		8th	187 905	191 321	877 892	893 861	377	11.0
5th	Jul. 63-Jan. 64	9th	143 970 a	124 383 b	824 516	712 355	431	11.0

(a) 17 471 houses to be sprayed with malathion.

(b) 18 286 houses sprayed with malathion



## EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year of total coverage	Date	Slides examined			Species found		
		Total No.	Positive		<u>P. falciparum</u>	<u>P. vivax</u>	<u>P. malariae</u>
			Number	Percentage			
1st	Jul. 59-Jun. 60	82 673	6 575	7.95	2 925	3 649	1
2nd	Jul. 60-Jun. 61	137 025	5 223	3.81	1 506	3 716	1
3rd	Jul. 61-Jun. 62	190 209	3 679	1.93	481	3 198	-
4th	Jul. 62-Jun. 63	216 940	7 556	3.48	884	6 672	-
5th	Jul. 63-Dec. 63	86 045	3 578	4.16	228	3 350	-

## EPIDEMIOLOGICAL EVALUATION OPERATIONS, CONSOLIDATION PHASE AREAS

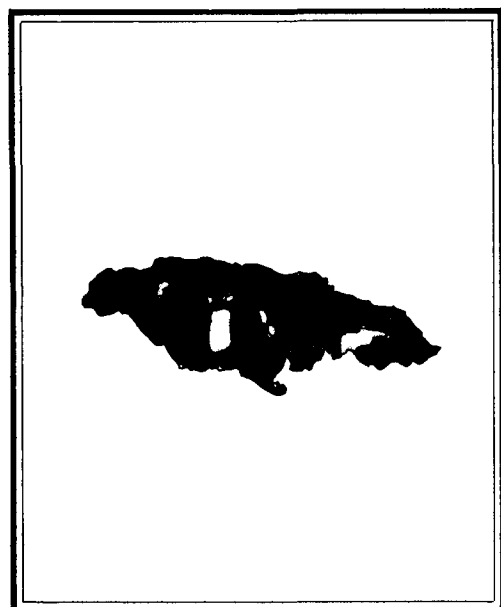
Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled	Total No. of positive slides	Origin of infections							Species of parasite		
Year	Quarter					Autochthonous	Relapsing	Imported		Induced	Introduced	Unclassified	<u>P. falciparum</u>	<u>P. vivax</u>	<u>P. malariae</u>
								from abroad	from areas within country						
1962	3rd	46	6 992	60.8	1	-	1	-	-	-	-	-	-	-	-
	4th	46	2 997	26.0	2	-	-	-	2	-	-	-	-	2	-
1963	1st	526	19 133	14.5	69	23	-	-	36	-	-	10	11	58	-
	2nd	526	19 790	15.0	41	12	6	-	21	-	-	2	3	38	-
	3rd	765	32 869	17.2	89	50	13	-	15	-	-	11	4	85	-
	4th	941	23 702	10.1	157	92	32	1	12	-	-	20	1	156	-

- None

Country: JAMAICA

Date attack phase began: 2 January 1958

STATUS OF MALARIA PROGRAM AT DECEMBER 1963



	Population (thousands)	Area km <sup>2</sup>
TOTAL COUNTRY	<u>1 685</u>	<u>11 428</u>
Non malarious areas	<u>376</u>	<u>1 400</u>
Originally malarious areas		
Maintenance phase	<u>0</u>	<u>0</u>
Consolidation phase	<u>1 309</u>	<u>10 028</u>
Attack phase	<u>0</u>	<u>0</u>
Preparatory phase	<u>0</u>	<u>0</u>
Total originally malarious areas	<u>1 309</u>	<u>10 028</u>

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	-	46	46
Evaluation operations	1	68	69
Administrative and other	-	28	28
Transport	-	36	36
Total	1	178	179

TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four wheel vehicles	-	66	-	66
Two wheel vehicles	-	-	-	-
Boats	-	-	-	-
Animals	-	-	-	-
Other	-	-	-	-
Total	-	66	-	66



EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year of total coverage	Date	Slides examined			Species found		
		Total No.	Positive		<u>P. falciparum</u>	<u>P. vivax</u>	<u>P. malariae</u>
			Number	Percentage			
1st	Jan. 58-Dec. 58	56 266	205	0.36	199	-	6
2nd	Jan. 59-Sep. 59	27 953	295	1.06	280	-	15
3rd	Oct. 59-Sep. 60	111 039	194	0.17	180	-	14
4th	Oct. 60-Dec. 61	190 094	38	0.02	30	-	8

EPIDEMIOLOGICAL EVALUATION OPERATIONS, CONSOLIDATION PHASE AREAS

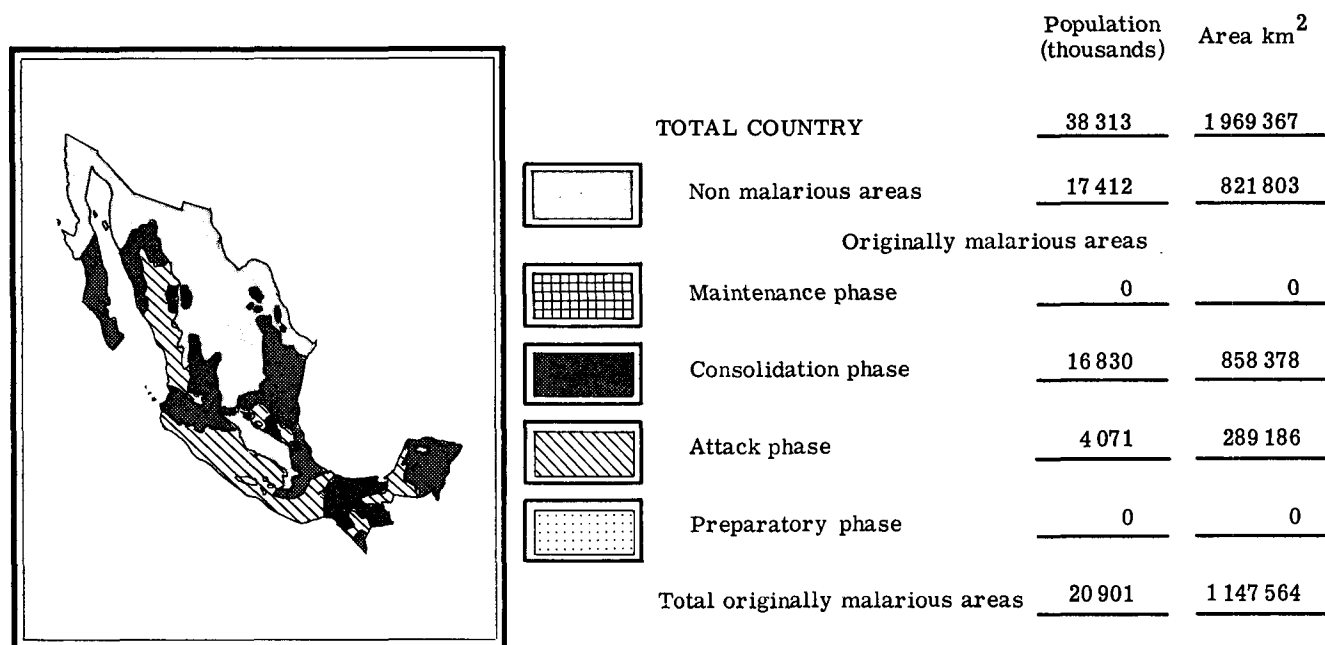
Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled	Total No. of positive slides	Origin of infections							Species of parasite		
Year	Quarter					Autochthonous	Relapsing	Imported		Induced	Introduced	Unclassified	<u>P. falciparum</u>	<u>P. vivax</u>	<u>P. malariae</u>
								from abroad	from areas within country						
1960	3rd	337	29 370	34.9	-	-	-	-	-	-	-	-	-	-	-
	4th		19 041	22.6	2	-	2	-	-	-	-	-	-	-	2
1961	1st	337	21 843	25.9	-	-	-	-	-	-	-	-	-	-	-
	2nd		20 654	24.5	-	-	-	-	-	-	-	-	-	-	-
	3rd		55 088	65.4	7	1	6	-	-	-	-	-	-	-	7
	4th		42 079	49.9	1	-	1	-	-	-	-	-	-	-	1
1962	1st	1 282	63 426	19.8	-	-	-	-	-	-	-	-	-	-	-
	2nd		75 804	23.6	-	-	-	-	-	-	-	-	-	-	-
	3rd		59 089	18.4	1	-	-	1	-	-	-	-	-	1	-
	4th		48 273	15.1	1	-	-	-	-	-	-	1	-	-	1
1963	1st	1 309	43 398	13.3	2	-	2	-	-	-	-	-	-	-	2
	2nd		47 929	14.6	-	-	-	-	-	-	-	-	-	-	-
	3rd		54 264	16.6	1	-	1	-	-	-	-	-	-	-	1
	4th		39 868	12.2	-	-	-	-	-	-	-	-	-	-	-

- None

Country: MEXICO

Date attack phase began: 2 January 1957

STATUS OF MALARIA PROGRAM AT DECEMBER 1963



PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	51	2 445	2 496
Evaluation operations	96	1 043	1 139
Administrative and other	20	503	523
Transport	-	111	111
Total	167	4 102	4 269

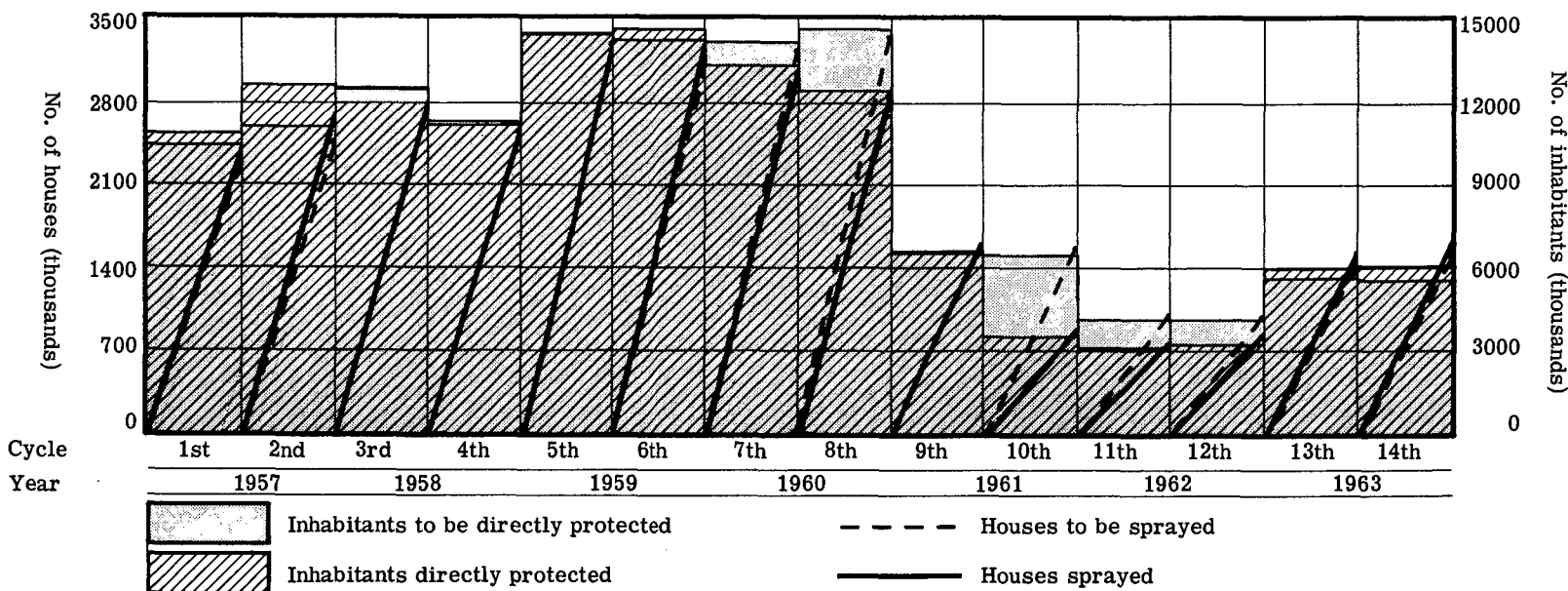
TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four wheel vehicles	490	357	67	914
Two wheel vehicles	-	-	-	-
Boats	5	8	-	13
Animals	-	-	-	-
Other	-	-	-	-
Total	495	365	67	927

SPRAYING OPERATIONS

Year of total coverage	Date	Houses sprayed						Inhabitants directly protected		Insecticide used per house (g. technical)		Average houses sprayed per spray-man/day
		DDT			Dieldrin			Planned	Protected	DDT	Dieldrin	
		Cycle	Planned	Sprayed	Cycle	Planned	Sprayed					
1st	Jan. 57-Dec. 57	1st	2 292 841	2 143 023	1st	(a)	219 662	10 464 526	10 802 292	495	99	9.3
		2nd	2 434 486	2 298 952		(a)	459 064			11 113 428		12 597 171
2nd	Jan. 58-Dec. 58	3rd	2 060 985	2 103 570	2nd	731 872	685 814	12 545 513	12 531 599	402	110	10.3
		4th	1 869 911	1 971 557		666 929	531 742			11 362 506		11 212 496
3rd	Jan. 59-Dec. 59	5th	2 973 820	3 050 952	3rd	321 520	246 753	14 492 905	14 505 650	434	112	10.8
		6th	3 018 184	3 219 340		160 136	45 548			14 226 160		14 614 270
4th	Jan. 60-Dec. 60	7th	3 177 380	3 027 089	4th	68 977	21 390	14 163 856	13 301 924	369	94	10.9
		8th	3 376 695	2 869 093		(a)	1 000			14 681 870		12 481 041
5th	Jan. 61-Dec. 61	9th	1 575 106	1 582 503	-	-	-	6 571 342	6 602 052	356	-	11.2
		10th	1 575 106	852 287	-	-	-			6 409 106		3 468 283
6th	Jan. 62-Dec. 62	11th	1 036 386	783 060b	-	-	-	4 151 927	3 135 873	514	-	8.6
		12th	1 036 386	825 082	-	-	-			4 070 924		3 241 041
7th	Jan. 63-Dec. 63	13th	1 477 793	1 551 297c	-	-	-	5 686 547	5 969 938	512	-	8.6
		14th	1 477 793	1 606 125d	-	-	-			5 572 757		6 056 473

(a) Included in DDT column. (b) 386 746 houses sprayed three times a year and 5 963 once a year. (c) 160 295 houses sprayed three times a year, and 5 697 once a year. (d) 128 743 houses sprayed three times a year, and 4 029 once a year.



EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year of total coverage	Date	Slides examined			Species found		
		Total No.	Positive		<u>P. falciparum</u>	<u>P. vivax</u>	<u>P. malariae</u>
			Number	Percentage			
1st	Jan.57-Dec.57	175 080	4 387	2.51	514	3 856	17
2nd	Jan.58-Dec.58	399 124	3 290	0.82	487	2 779	24
3rd	Jan.59-Dec.59	815 038	3 202	0.39	443	2 705	54
4th	Jan.60-Dec.60	1 208 712	3 569	0.29	245	3 251	73
5th	Jan.61-Dec.61	828 360	8 735	1.05	337	8 283	115
6th	Jan.62-Dec.62	727 262	9 642 a	1.33	139 a	9 450a	53 a
7th	Jan.63-Dec.63	710 448	12 906	1.82	279	12 581	46

EPIDEMIOLOGICAL EVALUATION OPERATIONS, CONSOLIDATION PHASE AREAS

Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled	Total No. of positive slides	Origin of infections						Species of parasite			
Year	Quarter					Autochthonous	Relapsing	Imported		Induced	Introduced	Unclassified	<u>P. falciparum</u>	<u>P. vivax</u>	<u>P. malariae</u>
								from abroad	from areas within country						
1958		59	4 449	7.5	-	-	-	-	-	-	-	-	-	-	-
1959		59	6 560	11.1	-	-	-	-	-	-	-	-	-	-	-
1960 <sup>b</sup>		70	4 058	7.7	-	-	-	-	-	-	-	-	-	-	-
1961	1st	11 721	158 635	5.4	105	6	37	21	-	-	2	39	1	102	2
	2nd		140 419	4.8	214	35	54	23	-	-	5	97	8	206	-
	3rd		200 456	6.8	851	266	145	137	-	-	14	289	20	820	11
	4th		246 397	8.4	1 944	941	210	206	12	69	506	62	1 876	6	
1962 <sup>a</sup>	1st	15 592	241 563	6.2	456	134	97	-	174	-	17	34	17	438	1
	2nd		275 037	7.1	632	111	77	-	83	-	34	327	14	610	8
	3rd		302 124	7.7	1 458	209	111	1	151	2	176	808	8	1 447	3
	4th		421 406	10.8	2 091	757	202	2	287	-	415	428	4	2 082	5
1963	1st	16 830	218 815	5.2	303	47	39	1	82	1	14	119	1	298	4
	2nd		295 992	7.0	719	156	8	-	127	-	60	368	4	710	5
	3rd		291 242	6.9	1 604	666	12	-	170	2	252	502	29	1 568	7
	4th		316 054	7.5	1 209	645	14	-	115	2	64	369	149	1 058	2

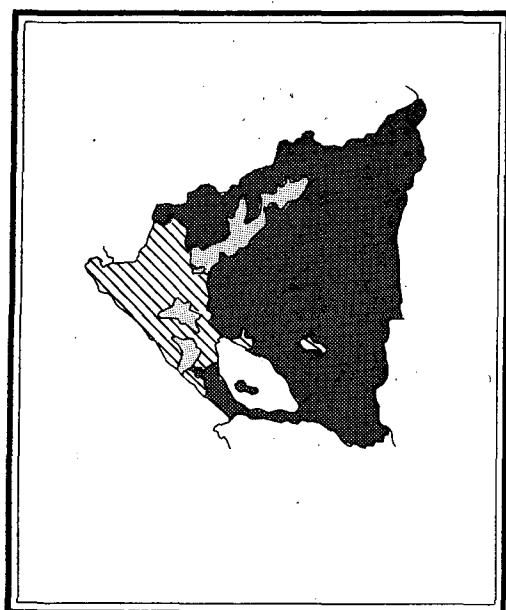
- None

(a) Revised figures. (b) January-September.

Country: NICARAGUA

Date attack phase began: 10 November 1958

STATUS OF MALARIA PROGRAM AT DECEMBER 1963



	Population (thousands)	Area km <sup>2</sup>
TOTAL COUNTRY	1 767	139 000
Non malarious areas	70	6 615
Originally malarious areas		
Maintenance phase	0	0
Consolidation phase	668	108 527
Attack phase	1 029	23 858
Preparatory phase	0	0
Total originally malarious areas	1 697	132 385

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	1	152	153
Evaluation operations	6	219	225
Administrative and other	1	69	70
Transport	-	64	64
Total	8	504	512

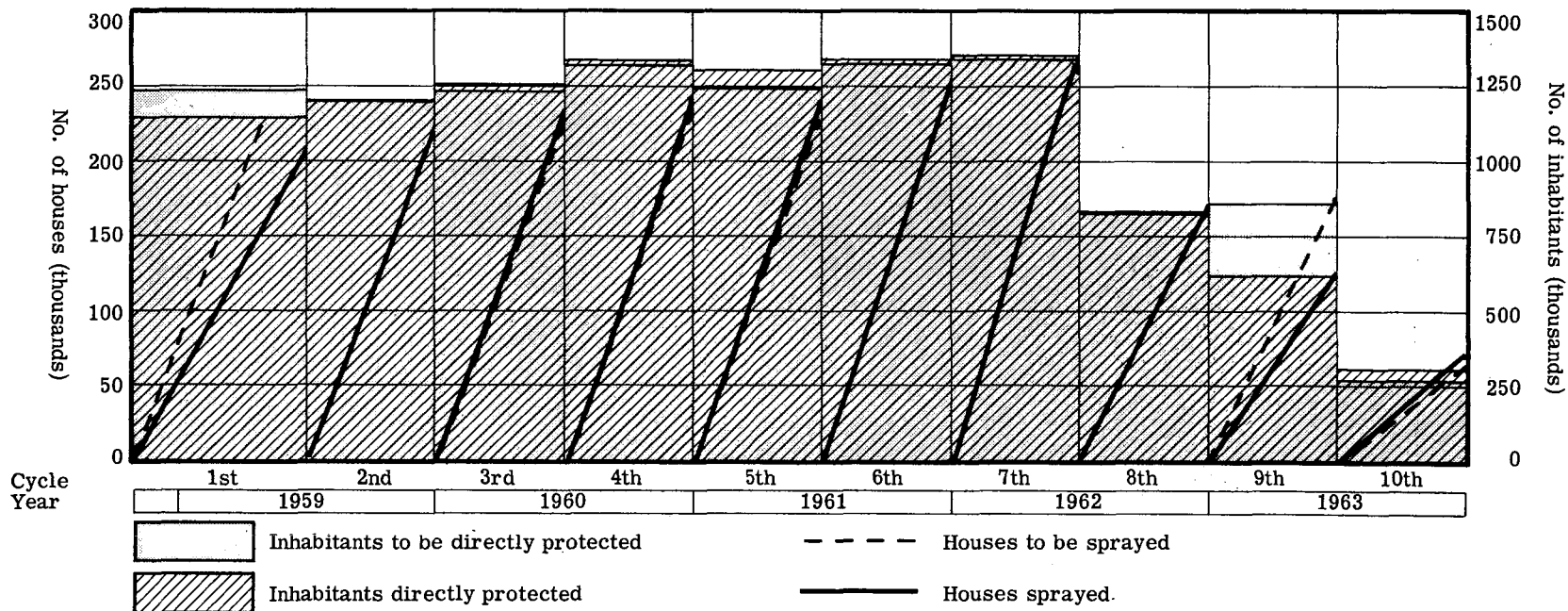
TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four wheel vehicles	24	20	30	74
Two wheel vehicles	-	-	-	-
Boats	-	10	1	11
Animals	-	-	-	-
Other	-	-	-	-
Total	24	30	31	85

SPRAYING OPERATIONS

Year of total coverage	Date	Cycle DDT	Houses sprayed		Inhabitants directly protected		Insecticide used (g. technical) DDT	Average houses sprayed per spray-man/day
			Planned	Sprayed	Planned	Protected		
1st	Nov. 58-Dec. 59	1st	223 220	205 930	1 244 452	1 148 052	401	9.2
		2nd	218 312	218 645	1 202 244	1 204 139	325	10.3
2nd	Jan. 60-Dec. 60	3rd	226 831	230 478	1 232 373	1 252 160	367	9.4
		4th	237 553	239 076	1 275 185	1 283 375	396	8.9
3rd	Jan. 61-Dec. 61	5th	237 062	239 375	1 244 338	1 256 399	403	9.5
		6th	248 739	251 537 a	1 276 530	1 290 900	397	9.1
4th	Jan. 62-Dec. 62	7th	259 760	264 822 b	1 289 708	1 314 866	409	9.6
		8th	169 118	170 333 c	821 913	827 823	440	9.3
5th	Jan. 63-Dec. 63	9th	176 538	126 483 d	863 624	618 699	465	9.0
		10th	62 121	71 232 e	267 680	306 925	471	9.0

(a) Includes 2 469 houses sprayed with malathion. (b) Includes 5 079 houses sprayed with malathion. (c) Includes 5 710 houses sprayed with malathion. (d) Includes 11 460 houses sprayed with malathion. (e) Includes 11 356 houses sprayed with malathion.



EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year of total coverage	Date	Slides examined			Species found		
		Total No.	Positive		<u>P. falci- parum</u>	<u>P. vivax</u>	<u>P. malariae</u>
			Number	Percentage			
1st	Nov.58-Dec.59	38 966	1 875	4.81	619	1 256	-
2nd	Jan. 60-Dec.60	74 074	7 528	10.16	4 217	3 311	-
3rd	Jan. 61-Dec. 61	109 293	8 722	7.98	3 001	5 721	-
4th	Jan. 62-Dec.62	162 733	11 200	6.88	3 428	7 772	-
5th	Jan.63-Dec.63	152 339	10 593	6.95	2 742	7 851	-

EPIDEMIOLOGICAL EVALUATION OPERATIONS, CONSOLIDATION PHASE AREAS

Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled	Total No. of positive slides	Origin of infections							Species of parasite		
Year	Quarter					Autochthonous	Relapsing	Imported		Induced	Introduced	Unclassified	<u>P. falci- parum</u>	<u>P. vivax</u>	<u>P. malar- iae</u>
								from abroad	from areas within country						
1962	3rd	515	9 463	7.3	41	8	6	-	20	-	1	6	10	30	1
	4th	515	9 531	7.4	118	49	7	-	30	-	-	32	16	102	-
1963	1st	533	8 974	6.7	52	7	1	-	28	-	2	14	9	43	-
	2nd	533	10 731	8.0	110	10	11	-	26	-	-	63	19	91	-
	3rd	668	21 869	13.1	385	169	15	-	78	1	-	122	278	107	-
	4th	668	20 937	12.5	419	308	12	-	98	-	1	-	172	247	-

- None

Country: PANAMA

Date attack phase began: 19 August 1957

STATUS OF MALARIA PROGRAM AT DECEMBER 1963



	Population (thousands)	Area km <sup>2</sup>
TOTAL COUNTRY	1 164	74 470
Non malarious areas	43	5 973
Originally malarious areas		
Maintenance phase	0	0
Consolidation phase	0	0
Attack phase	1 121	68 497
Preparatory phase	0	0
Total originally malarious areas	1 121	68 497

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	-	286	286
Evaluation operations	2	41	43
Administrative and other	1	36	37
Transport	-	10	10
Total	3	373	376

TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four wheel vehicles	47	20	9	76
Two wheel vehicles	-	-	-	-
Boats	13	5	2	20
Animals	(a)	(a)	(a)	(a)
Other	-	-	-	-
Total	60	25	11	96

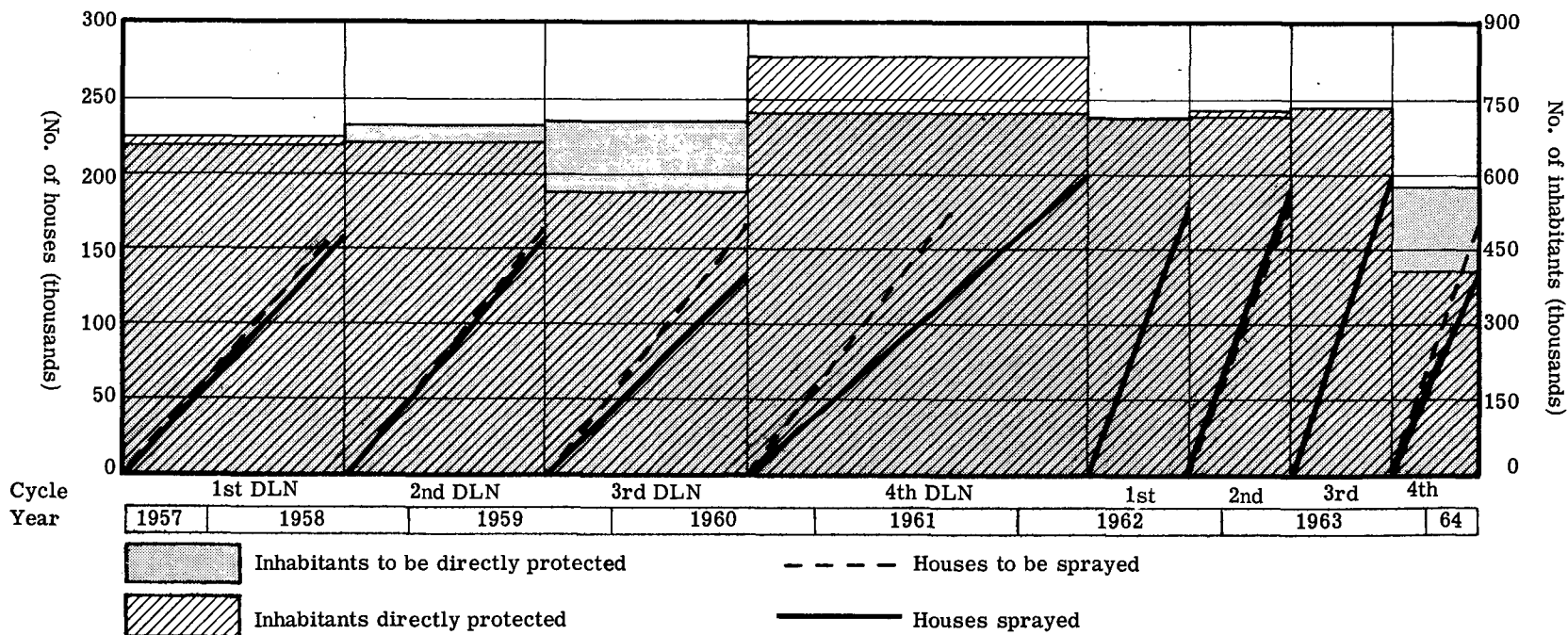
(a) Rented as needed.



SPRAYING OPERATIONS

Year of total coverage	Date	Houses sprayed						Inhabitants directly protected		Insecticide used per house (g. technical)		Average houses sprayed per spray-man/day
		DDT			Dieldrin			Planned	Protected	DDT	Dieldrin	
		Cycle	Planned	Sprayed	Cycle	Planned	Sprayed					
1st	Aug. 57-Aug. 58	-	-	-	1st	152 957	155 963	659 856a	672 824 a	-	119	6.5
2nd	Sep. 58-Aug. 59	-	-	-	2nd	161 700	154 638	697 574	667 095	-	145	6.9
3rd	Sep. 59-Aug. 60	-	-	-	3rd	165 102	131 270	707 462	562 514	-	129	7.3
4th	Sep. 60-Apr. 62	-	-	-	4th	172 121	199 265	722 392	836 229	-	138	6.8
5th	May.62-Apr.63	1st	175 622	174 779	-	(b)	1 101 c	710 918	711 983	490	63	8.1
		2nd	182 784	184 355			1 192 c	714 320	726 944	510	103	
6th	May.63-Mar.64	3rd	197 379	195 675	-	(b)	1 024 c	732 671	730 131	477	77	9.0
		4th d	205 165	144 701			1 156c	577 539	410 615	458	140	

(a) Estimated. (b) Included in DDT column. (c) Sprayed twice a year with 1 g/m<sup>2</sup>. (d) Cycle not yet finished.



PANAMA (Cont.)

EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

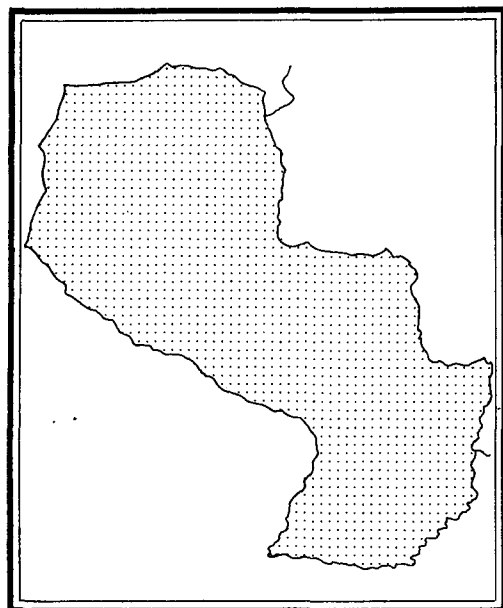
Year of total coverage	Date	Slides examined			Species found		
		Total No.	Positive		<u>P. falciparum</u>	<u>P. vivax</u>	<u>P. malariae</u>
			Number	Percentage			
1o.	Aug.57-Aug.58	69 429	5 634	8.11	1 717	...	...
2o.	Sep. 58-Aug.59	93 338	4 921	5.27	720	4 126	5
3o.	Sep. 59-Aug.60	76 984	5 232	6.80	751	4 479	2
4o.	Sep. 60-Apr.62	160 620	5 817	3.62	1 660	4 155	2
5o.	May.62-Apr.63	147 711	3 310	2.24	538	2 772	-
6o.	May.63-Jan. 64	112 301	1 721	1.53	163	1 557	1

... No information  
 - None.

Country: PARAGUAY

Date attack phase began: \_\_\_\_\_

STATUS OF MALARIA PROGRAM AT DECEMBER 1963



	Population (thousands)	Area km <sup>2</sup>
TOTAL COUNTRY	1864	406752
Non malarious areas	313	162
Originally malarious areas		
Maintenance phase	0	0
Consolidation phase	0	0
Attack phase	0	0
Preparatory phase	1551	406590
Total originally malarious areas	1551	406590

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	3	33	36
Evaluation operations	7	57	64
Administrative and other	2	51	53
Transport	-	24	24
Total	12	165	177

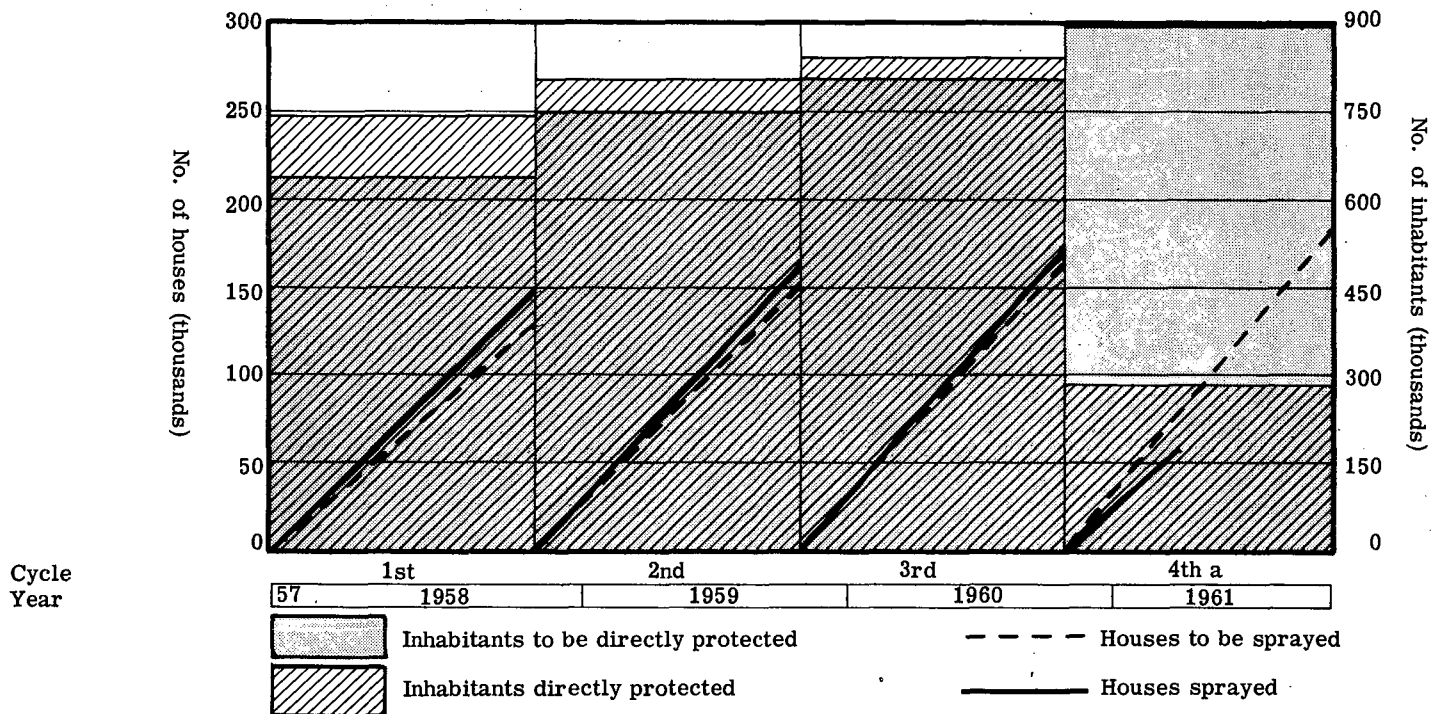
TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four wheel vehicles	1	10	4	15
Two wheel vehicles	-	14	-	14
Boats	-	5	-	5
Animals	-	8	-	8
Other	-	-	-	-
Total	1	37	4	42

SPRAYING OPERATIONS

Year of total coverage	Date	Cycle Dieldrin	Houses sprayed		Inhabitants directly protected		Insecticide used per house (g. technical) Dieldrin	Average houses sprayed per spray-man/day
			Planned	Sprayed	Planned	Protected		
1st	Nov.57-Oct. 58	1st	126 902	148 626	638 190	747 541	105	10.9
2nd	Nov.58-Oct. 59	2nd	150 033	161 261	749 115	805 232	111	14.3
3rd	Nov.59-Oct. 60	3rd	163 586	171 086	807 460	844 515	118	11.7
4th a	Nov.60-Mar.61	4th a	181 097	56 656	898 060	280 982	138	8.1

(a) Program suspended, new program being planned.



PARAGUAY (Cont.)

EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year of total coverage	Date	Slides examined			Species found		
		Total No.	Positive		<u>P. falciparum</u>	<u>P. vivax</u>	<u>P. malariae</u>
			Number	Percentage			
1st	Nov.57-Oct. 58	13 526	500	3.70	3	496	1
2nd	Nov.58-Oct. 59	11 963	621	5.19	3	618	-
3rd	Nov.59-Oct. 60	42 396	1 033	2.44	5	1 028	-
4th <sup>a</sup>	Nov.60-Dec.61	34 452	1 745	5.07	9	1 735	1
(b)	Jan. 62-Dec.62	48 184	5 756	11.95	313	5 443	-
(b)	Jan. 63-Dec.63	92 806	3 443	3.71	313	3 130	-

- None.

(a) Spraying operations suspended in March 1961, program replaced in preparatory phase.

(b) Preparatory phase.

Country: PERU

Date attack phase began: 17 November 1957

STATUS OF MALARIA PROGRAM AT DECEMBER 1963



	Population (thousands)	Area km <sup>2</sup>
TOTAL COUNTRY	11 073	1 381 800
Non malarious areas	7 786	438 600
Originally malarious areas		
Maintenance phase	43	31 000
Consolidation phase	2 199	268 200
Attack phase	1 045	644 000
Preparatory phase	0	0
Total originally malarious areas	3 287	943 200

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	7	299	306
Evaluation operations	22	166	188
Administrative and other	6	140	146
Transport	-	50	50
Total	35	655	690

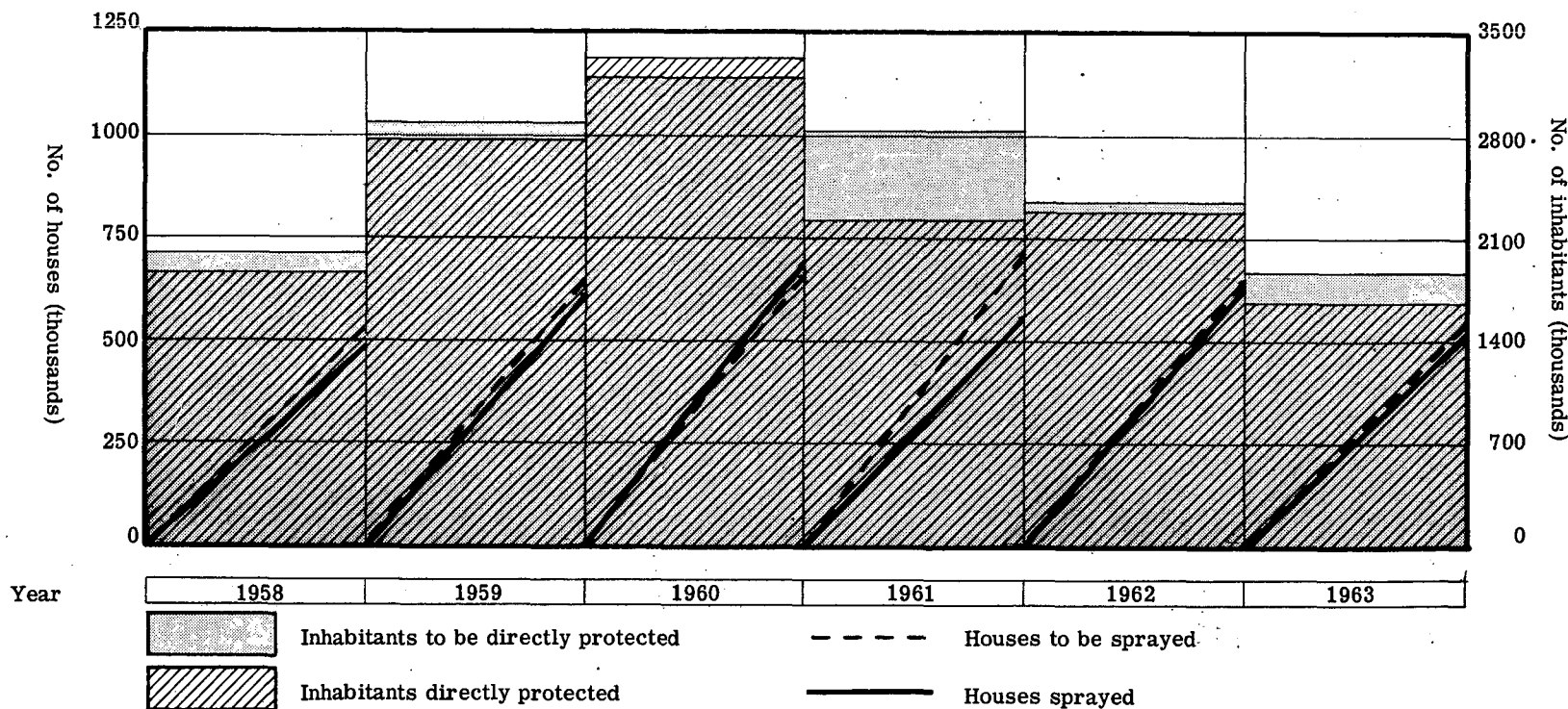
TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four wheel vehicles	107	82	11	200
Two wheel vehicles	-	-	1	1
Boats	15	-	55	70
Animals	-	-	-	-
Other	-	-	-	-
Total	122	82	67	271

SPRAYING OPERATIONS

Year of total coverage	Date	Houses sprayed						Inhabitants directly protected		Insecticide used per house (g. technical)		Average houses sprayed per spray-man/day
		DDT			Dieldrin			Planned	Protected	DDT	Dieldrin	
		Cycle	Planned	Sprayed	Cycle	Planned	Sprayed					
1st	Nov.57-Oct. 58	1st.+ 2nd	527 081	286 764a 70 266b	1st	(c)	122 120	2 054 035	1 867 208	426	115	7.8
2nd	Jan. 59-Dec.59	(d)	637 241	271 065 e	2nd	(c)	341 804	2 886 064	2 775 694	424	118	8.4
3rd	Jan. 60-Dec.60	(d)	654 825	447 848 e	3rd	(c)	234 643	3 209 952	3 345 726	468	95	8.4
4th	Jan. 61-Dec.61	(d)	714 740	534 037 e	4th	(c)	25 005	2 826 797	2 210 988	410	109	7.9
5th	Jan. 62-Dec.62	(d)	646 992	627 527	-	-	-	2 354 405	2 283 960	465	-	8.7
6th	Jan. 63-Dec.63	(d)	537 112	500 218	-	-	-	1 885 800	1 756 286	459	-	8.1

(a) Sprayed once a year. (b) Sprayed twice a year. (c) Included in DDT column. (d) Owing to different spray cycle timing in different regions, these data refer to the calendar year. (e) Sprayings.



## EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year of total coverage	Date	Slides examined			Species found		
		Total No.	Positive		<u>P. falciparum</u>	<u>P. vivax</u>	<u>P. malariae</u>
			Number	Percentage			
1st	Nov. 57-Oct. 58	...	649 <sup>a</sup>	...	77	526	27
(b)	Jan. 59-Dec. 59	148 413	4 658a	3.14	302	4 265	51
(b)	Jan. 60-Dec. 60 <sup>c</sup>	342 503	3 901	1.14	256	3 559	86
(b)	Jan. 61-Dec. 61 <sup>c</sup>	403 748	3 055	0.76	185	2 804	66
(b)	Jan. 62-Dec. 62 <sup>c</sup>	399 309	2 196	0.55	81	2 035	80
(b)	Jan. 63-Dec. 63	313 649	1 630	0.52	101	1 389	140

## EPIDEMIOLOGICAL EVALUATION OPERATIONS, CONSOLIDATION PHASE AREAS

Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled	Total No. of positive slides	Origin of infections							Species of parasite			
Year	Quarter					Au-tochtho-nous	Relaps-ing	Imported		Induced	Intro-duced	Unclassi-fied	<u>P. falciparum</u>	<u>P. vivax</u>	<u>P. malar-iae</u>	
								from abroad	from areas within country							
1959		14	1 378	9.8	-	-	-	-	-	-	-	-	-	-	-	-
1960 <sup>c</sup>		15	7 277	48.5	5	-	-	1	-	4	-	-	-	-	1	4
1961 <sup>c</sup>		47	13 780	29.3	1	-	-	-	1	-	-	-	-	-	1	-
1962 <sup>c</sup>	1st	864	15 091	7.0	9	1	1	-	3	4	-	-	-	-	7	2
	2nd		20 414	9.4	1	-	-	-	1	-	-	-	-	-	1	-
	3rd		17 056	7.9	4	-	-	1	3	-	-	-	-	-	4	-
	4th		18 769	8.7	6	1	-	-	5	-	-	-	1	-	4	1
1963	1st	2 199	35 455	6.4	25	1	2	4	16	2	-	-	-	-	24	1
	2nd		34 049	6.2	26	3	-	-	18	-	-	5	-	-	25	1
	3rd		51 120	9.3	19	5	-	1	12	1	-	-	-	-	18	1
	4th		48 103	8.7	17	4	4	-	5	-	-	4	-	-	16	1
MAINTENANCE																
1963	1st	43	1 990	18.5	1	-	-	1	-	-	-	-	-	-	1	-
	2nd		1 751	16.3	3	-	-	-	1	2	-	-	-	-	1	2
	3rd		1 744	16.2	-	-	-	-	-	-	-	-	-	-	-	-
	4th		3 066	28.5	-	-	-	-	-	-	-	-	-	-	-	-

- None

(a) Includes undifferentiated mixed infections. (b) Owing to different spray cycle timing in different regions, these data refer to the calendar year.

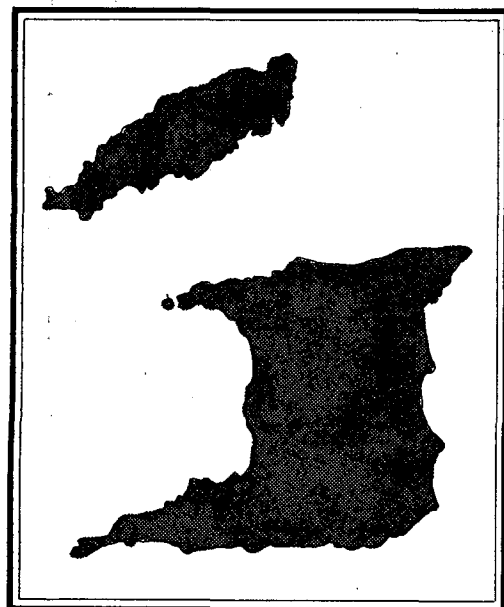
(c) Revised figures.



Country: TRINIDAD AND TOBAGO

Date attack phase began: 2 January 1958

STATUS OF MALARIA PROGRAM AT DECEMBER 1963



	Population (thousands)	Area km <sup>2</sup>
TOTAL COUNTRY	828	5 605
Non malarious areas	0	0
Originally malarious areas		
Maintenance phase	0	0
Consolidation phase	828	5 605
Attack phase	0	0
Preparatory phase	0	0
Total originally malarious areas	828	5 605

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	-	-	-
Evaluation operations	1	237	238
Administrative and other	-	13	13
Transport	-	5	5
Total	1	255	256

TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four wheel vehicles	-	9	19	28
Two wheel vehicles	-	-	-	-
Boats	-	-	1	1
Animals	-	-	-	-
Other	-	-	2	2
Total	-	9	22	31

TRINIDAD AND TOBAGO (Cont.)

EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year of total coverage	Date	Slides examined			Species found		
		Total No.	Positive		<u>P. falci- parum</u>	<u>P. vivax</u>	<u>P. malariae</u>
			Number	Percentage			
1st	Jan. 58-Dec. 58	51 159	374	0.73	316	58	-
2nd	Jan. 59-Dec. 59	101 039	92	0.09	63	28	1
3rd	Jan. 60-Dec. 60	91 388	11	0.01	9	2	-
4th	Jan. 61-Dec. 61	89 569	--	-	-	-	-

EPIDEMIOLOGICAL EVALUATION OPERATIONS, CONSOLIDATION PHASE AREAS

Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled	Total No. of positive slides	Origin of infections							Species of parasite		
Year	Quarter					Autochthonous	Relapsing	Imported		Induced	Introduced	Unclassified	<u>P. falci- parum</u>	<u>P. vivax</u>	<u>P. malariae</u>
								from abroad	from areas within country						
1958		160	21 279	13.2	2	-	-	2	-	-	-	-	2	-	-
1959		160	361	0.2	5	-	-	5	-	-	-	-	4	1	-
1960		185	17 612	9.5	2	-	-	2	-	-	-	-	-	-	-
1961		197	11 602	5.9	1	-	-	1	-	-	-	-	1	-	-
1962	1st	877	36 719	16.7	-	-	-	-	-	-	-	-	-	-	-
	2nd		27 947	12.7	-	-	-	-	-	-	-	-	-	-	-
	3rd		35 614	16.2	1	-	-	1	-	-	-	-	-	-	-
	4th		20 687	9.4	-	-	-	-	-	-	-	-	-	-	-
1963 <sup>a</sup>	1st	828	32 746	15.8	-	-	-	-	-	-	-	-	-	-	-
	2nd		24 640	11.9	-	-	-	-	-	-	-	-	-	-	-
	3rd		18 825	9.1	-	-	-	-	-	-	-	-	-	-	-
	4th		32 712	15.8	-	-	-	-	-	-	-	-	-	-	-

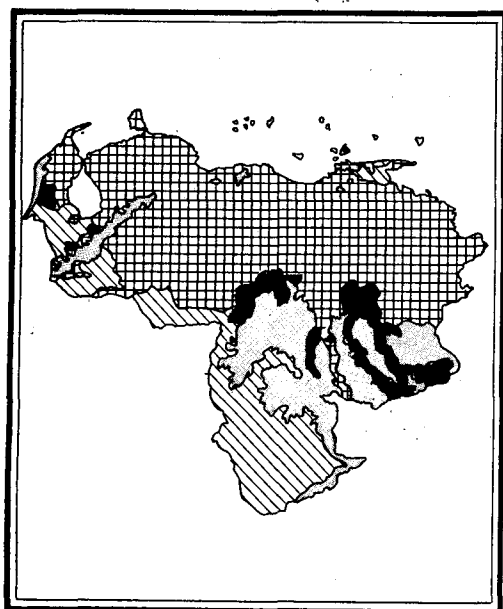
- None

(a) Includes 1 145 slides from Tobago, divided equally among the quarters.

Country: VENEZUELA

Date attack phase began: 1945

STATUS OF MALARIA PROGRAM AT DECEMBER 1963



	Population (thousands)	Area km <sup>2</sup>
<b>TOTAL COUNTRY</b>	<u>8 093</u>	<u>912 050</u>
Non malarious areas	<u>2 045</u>	<u>312 050</u>
Originally malarious areas		
Maintenance phase	<u>5 656</u>	<u>469 552</u>
Consolidation phase	<u>102</u>	<u>26 857</u>
Attack phase	<u>290</u>	<u>103 591</u>
Preparatory phase	<u>0</u>	<u>0</u>
<b>Total originally malarious areas</b>	<u>6 048</u>	<u>600 000</u>

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	1	355	356
Evaluation operations	17	318	335
Administrative and other	-	209	209
Transport	-	21	21
<b>Total</b>	<b>18</b>	<b>903</b>	<b>921</b>

TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four wheel vehicles	51	57	41	149
Two wheel vehicles	17	189	-	206
Boats	16	73	9	98
Animals	218	405	-	623
Other	36	-	-	36
<b>Total</b>	<b>338</b>	<b>724</b>	<b>50</b>	<b>1 112</b>

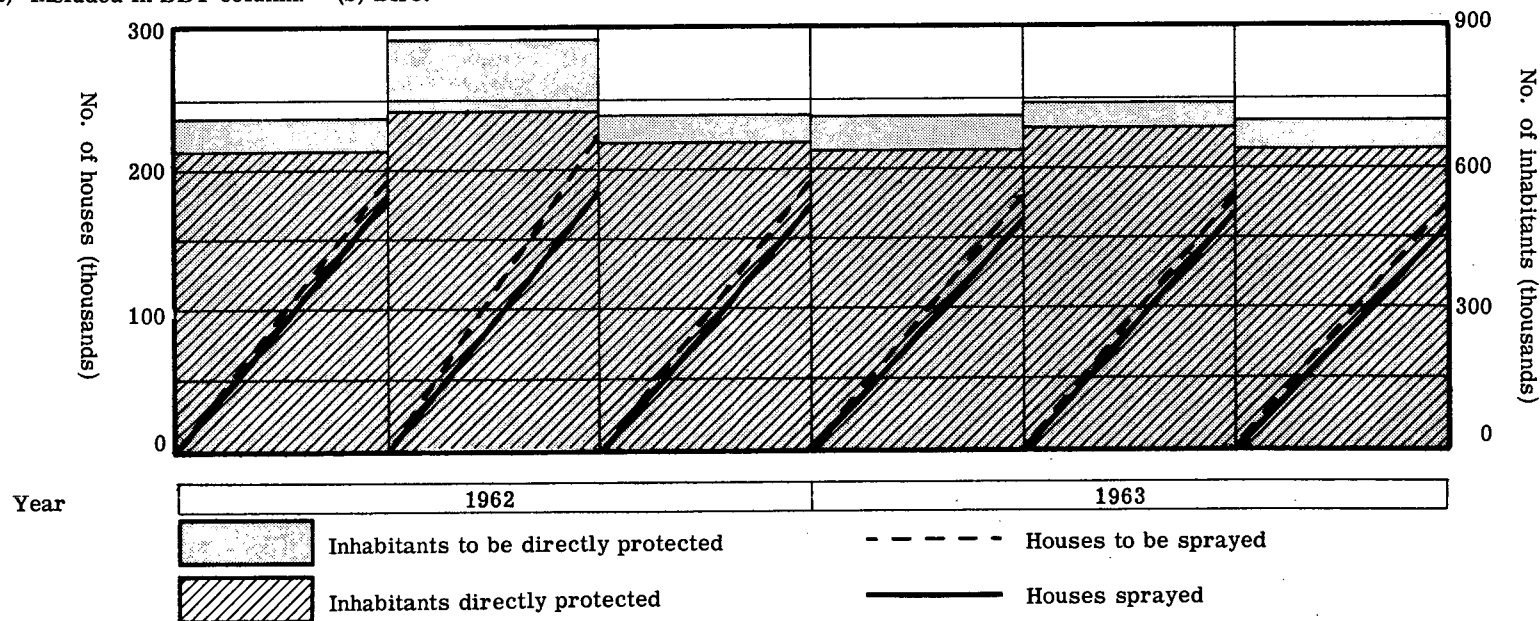
VENEZUELA

SPRAYING OPERATIONS

Year of total coverage	Date	Houses sprayed						Inhabitants directly protected		Insecticide used per house (g. technical)		Average houses sprayed per spray-man/day
		DDT			Dieldrin			Planned	Protected	DDT	Dieldrin	
		Cycle	Planned	Sprayed	Cycle	Planned	Sprayed					
...	Jan. 62-Dec. 62	...	189 083	170 848	...	(a)	3 381 13 125 b	712 276	643 634	422	198 173 b	6.3
		...	220 919	175 962	...	(a)	1 100 5 704 b	877 711	726 147	340	210 148 b	6.5
		...	185 755	163 477	...	(a)	1 595 4 877 b	715 343	654 399	332	247 126 b	7.0
...	Jan. 63-Dec. 63	...	177 294	158 263	...	(a)	789 151 b	712 190	639 525	359	198 182 b	7.0
		...	179 385	163 952	...	(a)	870 1 161 b	739 963	684 615	376	322 187 b	7.0
		...	169 947	153 538	...	(a)	773 368 b	703 241	640 057	370	303 163 b	7.0

... No information.

(a) Included in DDT column. (b) BHC.



EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year of total coverage	Date	Slides examined			Species found		
		Total No.	Positive		<u>P. falciparum</u>	<u>P. vivax</u>	<u>P. malariae</u>
			Number	Percentage			
...	Jan. 58-Dec. 58	269 448	975 <sup>a</sup>	0.36	60	901	4
...	Jan. 59-Dec. 59	232 710	765 <sup>a</sup>	0.33	92	646	14
...	Jan. 60-Sep. 60	209 232	1 008	0.48	...	...	...
...	Jan. 61-Dec. 61	230 336	1 174	0.51	...	...	...
...	Jan. 62-Dec. 62	172 280	883	0.51	...	...	...
...	Jan. 63-Sep. 63	126 475	1 543	1.22	...	...	...

EPIDEMIOLOGICAL EVALUATION OPERATIONS, CONSOLIDATION PHASE AREAS

Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled	Total No. of positive slides	Origin of infections						Species of parasite			
Year	Quarter					Autochthonous	Relapsing	Imported		Induced	Introduced	Unclassified	<u>P. falciparum</u>	<u>P. vivax</u>	<u>P. malariae</u>
								from abroad	from areas within country						
1958		469	69 614	14.8	50	-	-	27	-	23	-	2	46	2	
1959		685	101 878	14.9	45	-	-	37	1	7	-	2	43	-	
1960 <sup>b</sup>		291	58 417	26.8	47	-	-	34	1	12	-	-	46	1	
1961		174	64 522	37.1	57	-	4	15	-	29	-	-	57	-	
1962		150	93 646	62.4	69 <sup>c</sup>	-	1	29	-	39	-	24	45	-	
1963 <sup>b</sup>		102	51 526	67.3	84	-	-	30	-	49	-	27	57	-	
MAINTENANCE <sup>d</sup>															
1958		4 720	145 654	3.1	113 <sup>a</sup>	-	-	79	5	28	1	6	100	6	
1959		5 097	169 189	3.3	101 <sup>a</sup>	-	-	87	6	7	1	14	73	9	
1960 <sup>b</sup>		6 092	165 899	3.6	116	...	...	...	...	...	...	...	...	...	
1961		7 111	304 413	4.3	522	...	...	...	...	...	...	...	...	...	
1962		7 177	282 314	3.9	253	-	4 <sup>e</sup>	44 <sup>e</sup>	2 <sup>e</sup>	131 <sup>e</sup>	-	3 <sup>e</sup>	176 <sup>e</sup>	2 <sup>e</sup>	
1963 <sup>b</sup>		7 701	221 025	3.8	393	-	-	53 <sup>e</sup>	1 <sup>e</sup>	163 <sup>e</sup>	-	5 <sup>e</sup>	351 <sup>e</sup>	-	

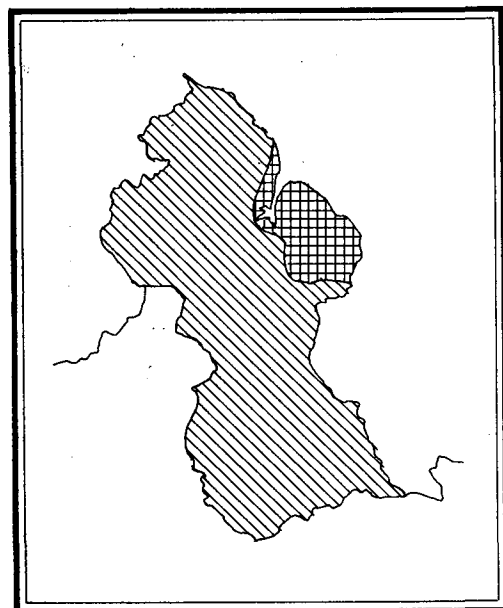
- None. ... No information.

(a) Including undifferentiated mixed infections. (b) January-September. (c) 5 positive cases without information, not included. (d) Including non malarious areas. (e) Maintenance phase only.

Country: BRITISH GUIANA

Date attack phase began: April 1946

STATUS OF MALARIA PROGRAM AT DECEMBER 1963



	Population (thousands)	Area km <sup>2</sup>
TOTAL COUNTRY	613	215 800
Non malarious areas	0	0
Originally malarious areas		
Maintenance phase	572	10 600
Consolidation phase	0	0
Attack phase	41	205 200
Preparatory phase	0	0
Total originally malarious areas	613	215 800

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	-	19	19
Evaluation operations	(1)	29	29 (1)
Administrative and other	1	13	14
Transport	-	13	13
Total	1 (1)	74	75 (1)

(Part-time personnel in parentheses)

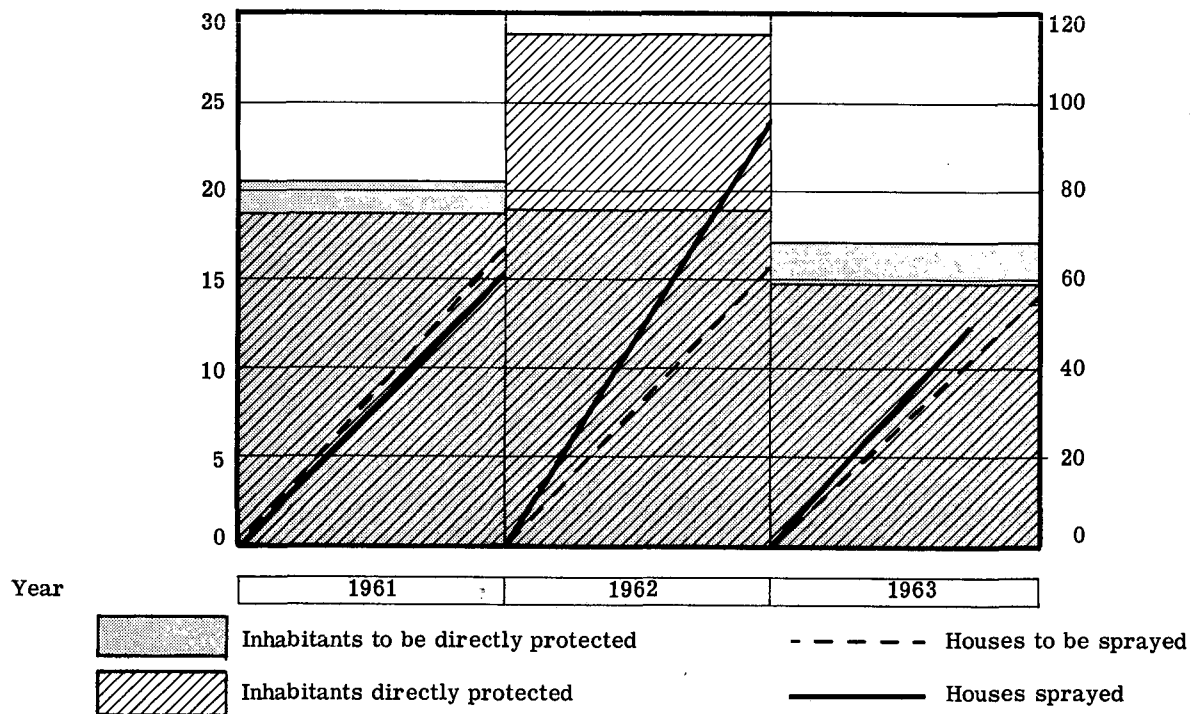
TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four wheel vehicles	3	2	1	6
Two wheel vehicles	-	-	-	-
Boats	1	3	-	4
Animals	-	-	-	-
Other	-	-	-	-
Total	4	5	1	10

SPRAYING OPERATIONS

Year of total coverage	Date	Houses sprayed with DDT						Inhabitants directly protected		Insecticide used per house (g. technical) DDT	Average houses sprayed per spray-man/day
		Once a year			Twice a year			Planned	Protected		
		Cycle	Planned	Sprayed	Cycle	Planned	Sprayed				
...	Jan. 61-Dec. 61	...	16 538	15 107	-	-	-	82 062	74 964	195	4.6
...	Jan. 62-Dec. 62	...	9 542	10 273	...	6 131	13 535	76 563	116 305	183	8.3
...	Jan. 63-Sep. 63	...	6 726	4 270	...	7 218	7 961	68 123	59 542	346	7.3

... No information



## EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year of total coverage	Date	Slides examined			Species found		
		Total No.	Positive		<u>P. falciparum</u>	<u>P. vivax</u>	<u>P. malariae</u>
			Number	Percentage			
...	Jan. 58-Dec. 58	1 520	51	3.34	23	8	20
...	Jan. 59-Dec. 59	3 754	176 <sup>a</sup>	4.68	53	100	13
...	Jan. 60-Sep. 60	3 674	263	7.16	175	67	12
...	Jan. 61-Dec. 61	15 515	218	1.40	57	156	5
...	Jan. 62-Dec. 62	14 358	425	2.96	266	159	-
...	Jan. 63-Dec. 63	16 780	473 <sup>a</sup>	2.81	414	56	-

## EPIDEMIOLOGICAL EVALUATION OPERATIONS, MAINTENANCE PHASE

Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled	Total No. of positive slides	Origin of infections							Species of parasite			
Year	Quarter					Autochthonous	Relapsing	Imported		Induced	Introduced	Unclassified	<u>P. falciparum</u>	<u>P. vivax</u>	<u>P. malariae</u>	
								from abroad	from areas within country							
1958		430	1	0.0	-	-	-	-	-	-	-	-	-	-	-	-
1959		460	-	0	-	-	-	-	-	-	-	-	-	-	-	-
1960		494	-	0	-	-	-	-	-	-	-	-	-	-	-	-
1961		515	1 374	0.3	13	-	-	1	12	-	-	-	1	12	-	-
1962		556	21 088	3.8	21	17	3	-	1	-	-	-	-	21	-	-
1963		572	15 475	2.7	3	-	2	1	-	-	-	-	1	2	-	-

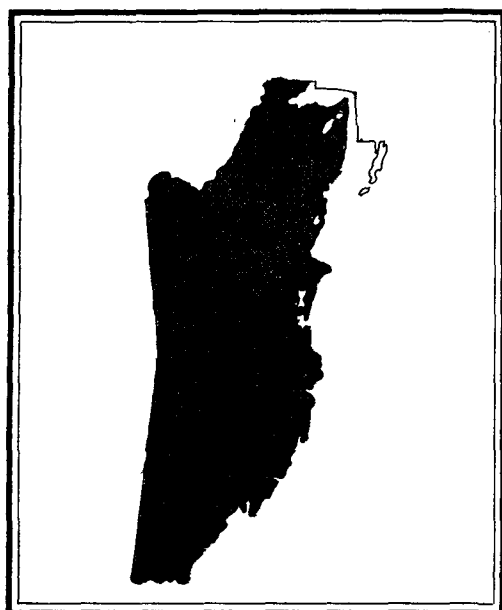
... No information. - None.  
(a) Includes undifferentiated mixed infections.



Country: BRITISH HONDURAS

Date attack phase began: 4 February 1957

STATUS OF MALARIA PROGRAM AT DECEMBER 1963



	Population (thousands)	Area km <sup>2</sup>
TOTAL COUNTRY	100	22 696
Non malarious areas	0	0
Originally malarious areas		
Maintenance phase	0	0
Consolidation phase	100	22 696
Attack phase	0	0
Preparatory phase	0	0
Total originally malarious areas	100	22 696

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	-	-	-
Evaluation operations	1	15	16
Administrative and other	-	5	5
Transport	-	2	2
Total	1	22	23

TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four wheel vehicles	2	8	3	13
Two wheel vehicles	-	2	1	3
Boats	-	4	-	4
Animals	-	-	-	-
Other	-	-	-	-
Total	2	14	4	20

## EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year of total coverage	Date	Slides examined			Species found		
		Total No.	Positive		<u>P. falciparum</u>	<u>P. vivax</u>	<u>P. malariae</u>
			Number	Percentage			
1st	Feb.57-Jan. 58	2 132	256	12.01	148	56	52
2nd	Feb.58-Apr.59	8 081	593	7.34	321	226	46
3rd	May 59-Jun. 60	12 985	819	6.31	542	207	70
4th	Jul. 60-Jun. 61	15 149	82	0.54	11	71	-
5th	Jul. 61-Jul. 62	12 741	12	0.09	-	12	-

## EPIDEMIOLOGICAL EVALUATION OPERATIONS, CONSOLIDATION PHASE AREAS

Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled	Total No. of positive slides	Origin of infections							Species of parasite			
Year	Quarter					Autochthonous	Relapsing	Imported		Induced	Introduced	Unclassified	<u>P. falciparum</u>	<u>P. vivax</u>	<u>P. malariae</u>	
								from abroad	from areas within country							
1962	3rd <sup>a</sup>	100	3 004	12.0	14	6	7	1	-	-	-	-	-	14	-	
	4th		3 657	14.6	4	4	-	-	-	-	-	-	-	4	-	
1963	1st	100	3 284	13.1	2	2	-	-	-	-	-	-	-	2	-	
	2nd		2 622	10.5	2	2	-	-	-	-	-	-	-	2	-	
	3rd		3 114	12.5	-	-	-	-	-	-	-	-	-	-	-	-
	4th		4 065	16.3	13	13	-	-	-	-	-	-	-	13	-	

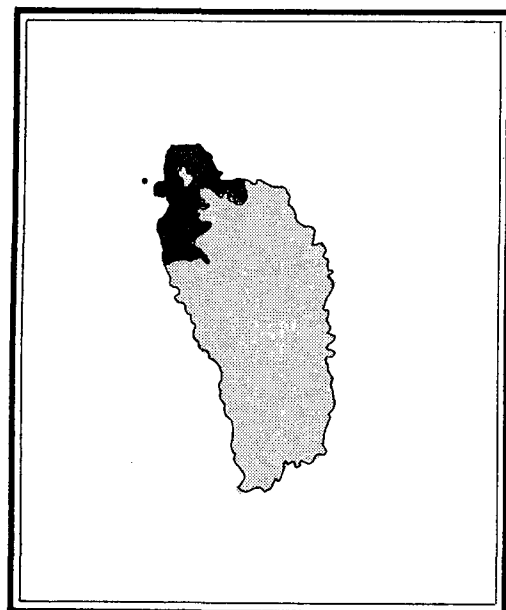
- None

(a) August-September

Country: DOMINICA

Date attack phase began: 8 June 1959

STATUS OF MALARIA PROGRAM AT DECEMBER 1963



	Population (thousands)	Area km <sup>2</sup>
TOTAL COUNTRY	60	790
Non malarious areas	46	638
Originally malarious areas		
Maintenance phase	0	0
Consolidation phase	14	152
Attack phase	0	0
Preparatory phase	0	0
Total originally malarious areas	14	152

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	-	-	-
Evaluation operations	(1)	8	8 (1)
Administrative and other	-	1 (1)	1 (1)
Transport	-	1	1
Total	(1)	10 (1)	10 (2)

(Part-time personnel in parentheses)

TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four wheel vehicles	-	3	-	3
Two wheel vehicles	-	4	-	4
Boats	-	-	-	-
Animals	-	-	-	-
Other	-	-	-	-
Total	-	7	-	7

DOMINICA (Cont.)

EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year of total coverage	Date	Slides examined			Species found		
		Total No.	Positive		<u>P. falciparum</u>	<u>P. vivax</u>	<u>P. malariae</u>
			Number	Percentage			
1st	Jun. 59-May 60	5 233	51	1.0	51	-	-
2nd	Jun. 60-Oct. 61	12 136	3	0.0	2	-	1
3rd	Nov. 61-Dec. 62	15 069	1	0.0	-	-	1

EPIDEMIOLOGICAL EVALUATION OPERATIONS, CONSOLIDATION PHASE AREAS

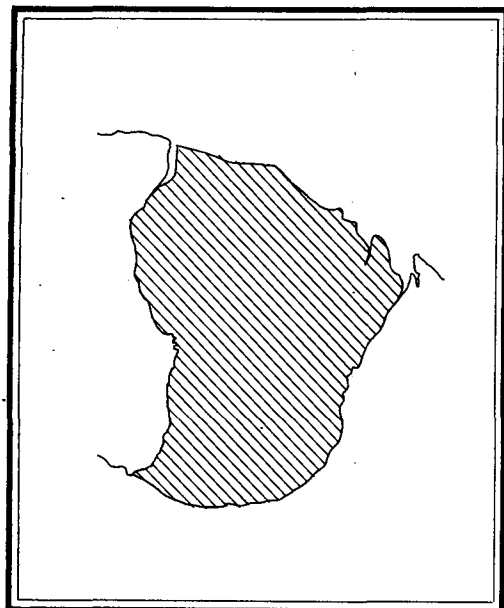
Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled	Total No. of positive slides	Origin of infections						Species of parasite			
Year	Quarter					Autochthonous	Relapsing	Imported		Induced	Introduced	Unclassified	<u>P. falciparum</u>	<u>P. vivax</u>	<u>P. malariae</u>
								from abroad	from areas within country						
1963	1st	14	4 093	116.9	-	-	-	-	-	-	-	-	-	-	
	2nd		4 441	126.8	-	-	-	-	-	-	-	-	-	-	
	3rd		3 648	104.2	-	-	-	-	-	-	-	-	-	-	
	4th		4 593	131.2	-	-	-	-	-	-	-	-	-	-	

- None

Country: FRENCH GUIANA

Date attack phase began: May 1958

STATUS OF MALARIA PROGRAM AT DECEMBER 1963



	Population (thousands)	Area km <sup>2</sup>
TOTAL COUNTRY	<u>34</u>	<u>86 000</u>
Non malarious or uninhabited areas	<u>0</u>	<u>54 000</u>
Originally malarious areas		
Maintenance phase	<u>0</u>	<u>0</u>
Consolidation phase	<u>0</u>	<u>0</u>
Attack phase	<u>30</u>	<u>32 000</u>
Preparatory phase	<u>4<sup>a</sup></u>	<u>0</u>
Total originally malarious areas	<u>34</u>	<u>32 000<sup>b</sup></u>

(a) Areas in the Oyapock zone. (b) Includes some areas in preparatory phase in the Oyapock zone, and excludes uninhabited areas.

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	-	30	30
Evaluation operations	1 (4)	1	2 (4)
Administrative and other	-	1	1
Transport	-	4	4
Total	1 (4)	36	37 (4)

(Part-time personnel in parentheses)

TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four wheel vehicles	4	-	5	9
Two wheel vehicles	-	-	2	2
Boats	1	-	-	1
Animals	-	-	-	-
Other	-	-	-	-
Total	5	-	7	12

FRENCH GUIANA (Cont.)

EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

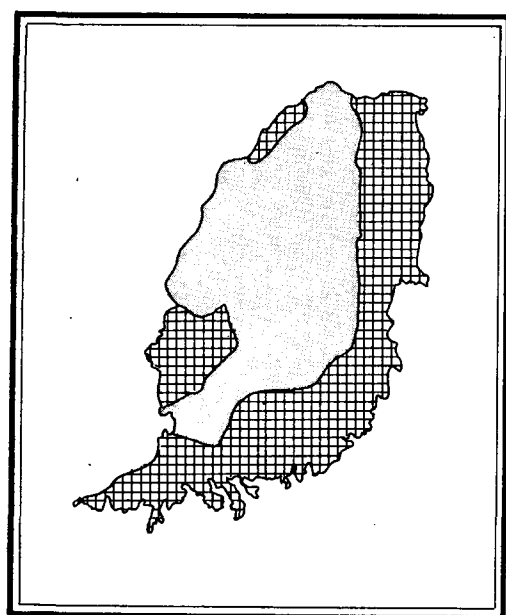
Year of total coverage	Date	Slides examined			Species found		
		Total No.	Positive		<u>P. falci-</u> <u>parum</u>	<u>P. vivax</u>	<u>P. malariae</u>
			Number	Percentage			
...	Jan. 60-Dec. 60	3 343	37	1.11	30	6	1
...	Jan. 61-Dec. 61	1 197	33	2.76	33	-	-
...	Jan. 62-Dec. 62	2 183	70	3.21	60	10	-
...	Jan. 63-Sep. 63	2 648	70	2.64	61	9	-

... No information.  
- None.

Country: GRENADA AND CARRIACOU

Date attack phase began: 12 February 1957

STATUS OF MALARIA PROGRAM AT DECEMBER 1963



(Island of Carriacou in Maintenance phase not shown in the Map)

	Population (thousands)	Area km <sup>2</sup>
TOTAL COUNTRY	91	344
Non malarious areas	54	173
Originally malarious areas		
Maintenance phase	37	171
Consolidation phase	0	0
Attack phase	0	0
Preparatory phase	0	0
Total originally malarious areas	37	171

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	-	-	-
Evaluation operations	-	12	12
Administrative and other	-	1 (1)	1 (1)
Transport	-	2	2
Total	-	15 (1)	15 (1)

(Part-time personnel in parentheses)

TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four wheel vehicles	-	2	-	2
Two wheel vehicles	-	1	-	1
Boats	-	-	-	-
Animals	-	-	-	-
Other	-	-	-	-
Total	-	3	-	3

GRENADA AND CARRIACOU

EPIDEMIOLOGICAL EVALUATION OPERATIONS, MAINTENANCE PHASE AREAS

Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled	Total No. of positive slides	Origin of infections							Species of parasite			
Year	Quarter					Autochthonous	Relapsing	Imported		Induced	Introduced	Unclassified	<u>P. falciparum</u>	<u>P. vivax</u>	<u>P. malariae</u>	
								from abroad	from areas within country							
1962		37	1996	5.4	-	-	-	-	-	-	-	-	-	-	-	-
1963 <sup>a</sup>		37	56	0.2	-	-	-	-	-	-	-	-	-	-	-	-

- None

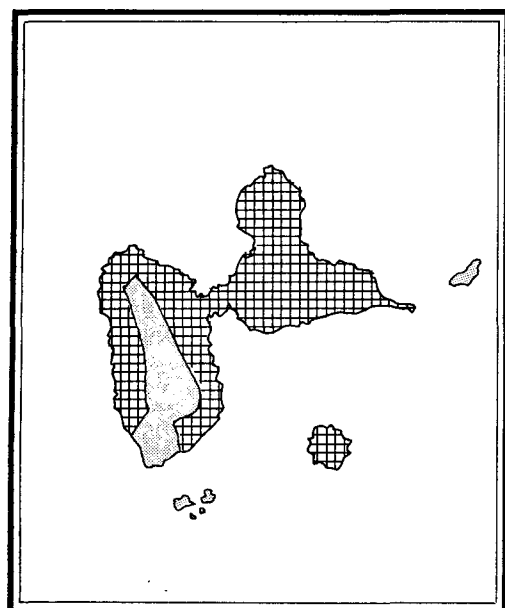
(a) January-September.



Country: GUADELOUPE

Date attack phase began: July 1956

STATUS OF MALARIA PROGRAM AT DECEMBER 1963



	Population (thousands)	Area km <sup>2</sup>
TOTAL COUNTRY	290	1 779
Non malarious areas	30	643
Originally malarious areas		
Maintenance phase	260	1 136
Consolidation phase	0	0
Attack phase	0	0
Preparatory phase	0	0
Total originally malarious areas	260	1 136

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	-	-	-
Evaluation operations	2	10 (6)	12 (6)
Administrative and other	1	(54)	1 (54)
Transport	-	6	6
Total	3	16 (60)	19 (60)

(Part-time personnel in parentheses)

TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four wheel vehicles	6	3	-	9
Two wheel vehicles	-	2	-	2
Boats	-	-	-	-
Animals	-	-	-	-
Other	-	-	-	-
Total	6	5	-	11

EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year of total coverage	Date	Slides examined			Species found		
		Total No.	Positive		<u>P. falci- parum</u>	<u>P. vivax</u>	<u>P. malariae</u>
			Number	Percentage			
...	Jan.58-Dec.58	1 150	3	0.26	-	-	3
...	Jan.59-Dec.59	3 903	-	0	-	-	-
...	Jan.60-Sep. 60	4 450	2	0.04	...	...	...

EPIDEMIOLOGICAL EVALUATION OPERATIONS, CONSOLIDATION PHASE AREAS

Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled	Total No. of positive slides	Origin of infections						Species of parasite			
Year	Quarter					Autochthonous	Relapsing	Imported		Induced	Introduced	Unclassified	<u>P. falci- parum</u>	<u>P. vivax</u>	<u>P. malar- iae</u>
								from abroad	from areas within country						
1958		129	4 887	3.8	-	-	-	-	-	-	-	-	-	-	-
1959		133	3 691	4.8	-	-	-	-	-	-	-	-	-	-	-
1960 <sup>a</sup>		145	7 080	4.9	-	-	-	-	-	-	-	-	-	-	-
1961		186	11 857	6.4	-	-	-	-	-	-	-	-	-	-	-
1962		66	11 196	17.0	-	-	-	-	-	-	-	-	-	-	-
MAINTENANCE															
1961		58	2 407	4.1	-	-	-	-	-	-	-	-	-	-	-
1962		187	5 239	2.8	-	-	-	-	-	-	-	-	-	-	-
1963 <sup>a</sup>		260	17 170	8.8	1	-	-	1	-	-	-	-	1	-	-

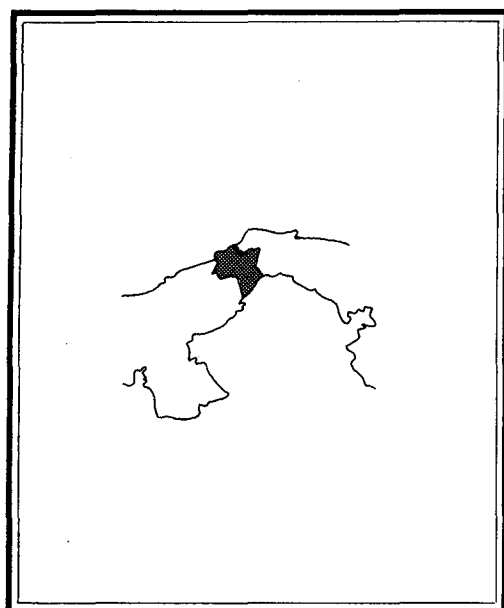
- None.

(a) January-September.

Country: PANAMA CANAL ZONE

Date attack phase began: 1957

STATUS OF MALARIA PROGRAM AT DECEMBER 1963



	Population (thousands)	Area km <sup>2</sup>
TOTAL COUNTRY	47	1 432
Non malarious areas	0	0
Originally malarious areas		
Maintenance phase	0	0
Consolidation phase	46	1 432 <sup>a</sup>
Attack phase	1	0 <sup>a</sup>
Preparatory phase	0	0
Total originally malarious areas	47	1 432

(a) Spraying is continued in a limited area showed as in consolidation phase.

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	(1)	(26)	(27)
Evaluation operations	(11)	(29)	(40)
Administrative and other	-	(2)	(2)
Transport	-	(4)	(4)
Total	(12)	(61)	(73)

(All part-time personnel)

TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four wheel vehicles	2 <sup>a</sup>	-	-	2 <sup>a</sup>
Two wheel vehicles	-	-	-	-
Boats	2 <sup>a</sup>	-	-	2 <sup>a</sup>
Animals	-	-	-	-
Other	-	-	-	-
Total	4 <sup>a</sup>	-	-	4 <sup>a</sup>

(a) Part-time

PANAMA CANAL ZONE (Eng.)

EPIDEMIOLOGICAL EVALUATION OPERATIONS, CONSOLIDATION PHASE AREAS

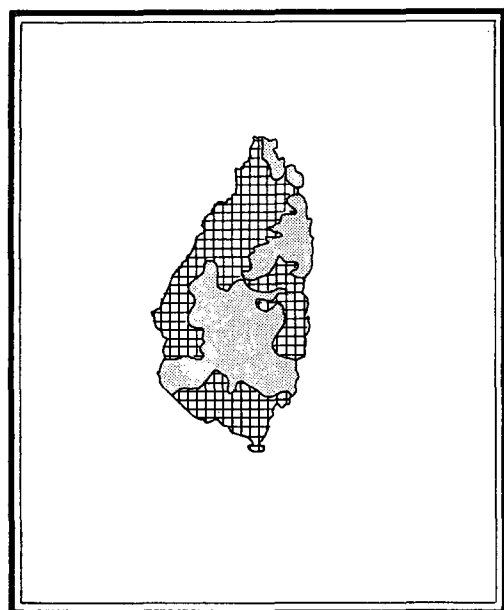
Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled	Total No. of positive slides	Origin of infections							Species of parasite		
Year	Quarter					Autochthonous	Relapsing	Imported		Induced	Introduced	Unclassified	<u>P. falciparum</u>	<u>P. vivax</u>	<u>P. malariae</u>
								from abroad	from areas within country						
1960		41	2 656	6.5	27	27	-	-	-	-	-	-	3	24	-
1961		41	5 984	14.6	25	25	-	-	-	-	-	-	2	23	-
1962		44	677	1.5	18	18	-	-	-	-	-	-	-	18	-
1963		47	21 008	44.7	22	-	1	16	-	-	-	5	2	20	-

- None

Country: ST. LUCIA

Date attack phase began: 16 January 1956

STATUS OF MALARIA PROGRAM AT DECEMBER 1963



	Population (thousands)	Area km <sup>2</sup>
TOTAL COUNTRY	97	603
Non malarious areas	15	93
Originally malarious areas		
Maintenance phase	82	510
Consolidation phase	0	0
Attack phase	0	0
Preparatory phase	0	0
Total originally malarious areas	82	510

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	-	-	-
Evaluation operations	(1)	5	5 (1)
Administrative and other	(1)	1	1 (1)
Transport	-	-	-
Total	(2)	6	6 (2)

(Part-time personnel in parentheses)

TRANSPORT FACILITIES

Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four wheel vehicles	-	1	-	1
Two wheel vehicles	-	2	-	2
Boats	-	-	-	-
Animals	-	-	-	-
Other	-	-	-	-
Total	-	3	-	3

St. LUCIA (Cont.)

EPIDEMIOLOGICAL EVALUATION OPERATIONS, MAINTENANCE PHASE AREAS

Date		Estimated population in the area (thousands)	No. of slides examined	% of population sampled	Total No. of positive slides	Origin of infections							Species of parasite		
Year	Quarter					Autochthonous	Relapsing	Imported		Induced	Introduced	Unclassified	<u>P. falciparum</u>	<u>P. vivax</u>	<u>P. malariae</u>
								from abroad	from areas within country						
1962	4th	82	5 059	24.7	-	-	-	-	-	-	-	-	-	-	-
1963	1st	82	3 530	17.2	-	-	-	-	-	-	-	-	-	-	-
	2nd		3 764	18.4	6	2	1	-	-	-	-	3 <sup>a</sup>	-	-	6
	3rd		2 834	13.8	1	-	1	-	-	-	-	-	-	-	1
	4th		5 008	24.4	-	-	-	-	-	-	-	-	-	-	-

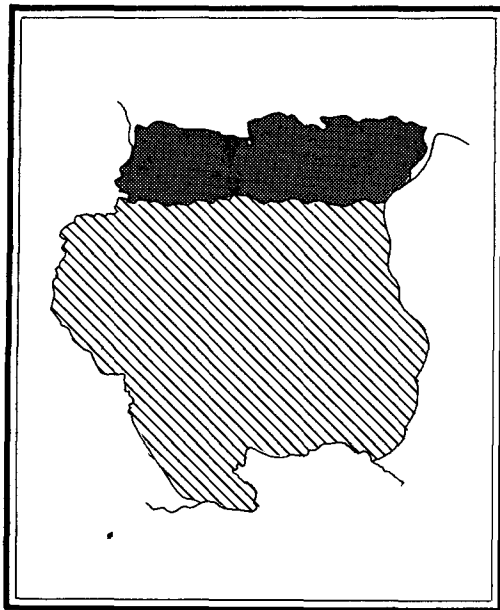
- None.

(a) Uncertain origin.

Country: SURINAM

Date attack phase began: 5 May 1958

STATUS OF MALARIA PROGRAM AT DECEMBER 1963



	Population (thousands)	Area km <sup>2</sup>
TOTAL COUNTRY	<u>315</u>	<u>142 822</u>
Non malarious areas	<u>125</u>	<u>70</u>
Originally malarious areas		
Maintenance phase	<u>0</u>	<u>0</u>
Consolidation phase	<u>121</u>	<u>4 350</u>
Attack phase	<u>69</u>	<u>138 402</u>
Preparatory phase	<u>0</u>	<u>0</u>
Total originally malarious areas	<u>190</u>	<u>142 752</u>

PERSONNEL

Activity	Professional	Non professional	Total
Spraying operations	-	74	74
Evaluation operations	(1)	36	36 (1)
Administrative and other	-	22	22
Transport	-	46	46
Total	(1)	178	178 (1)

(Part-time personnel in parentheses)

TRANSPORT FACILITIES

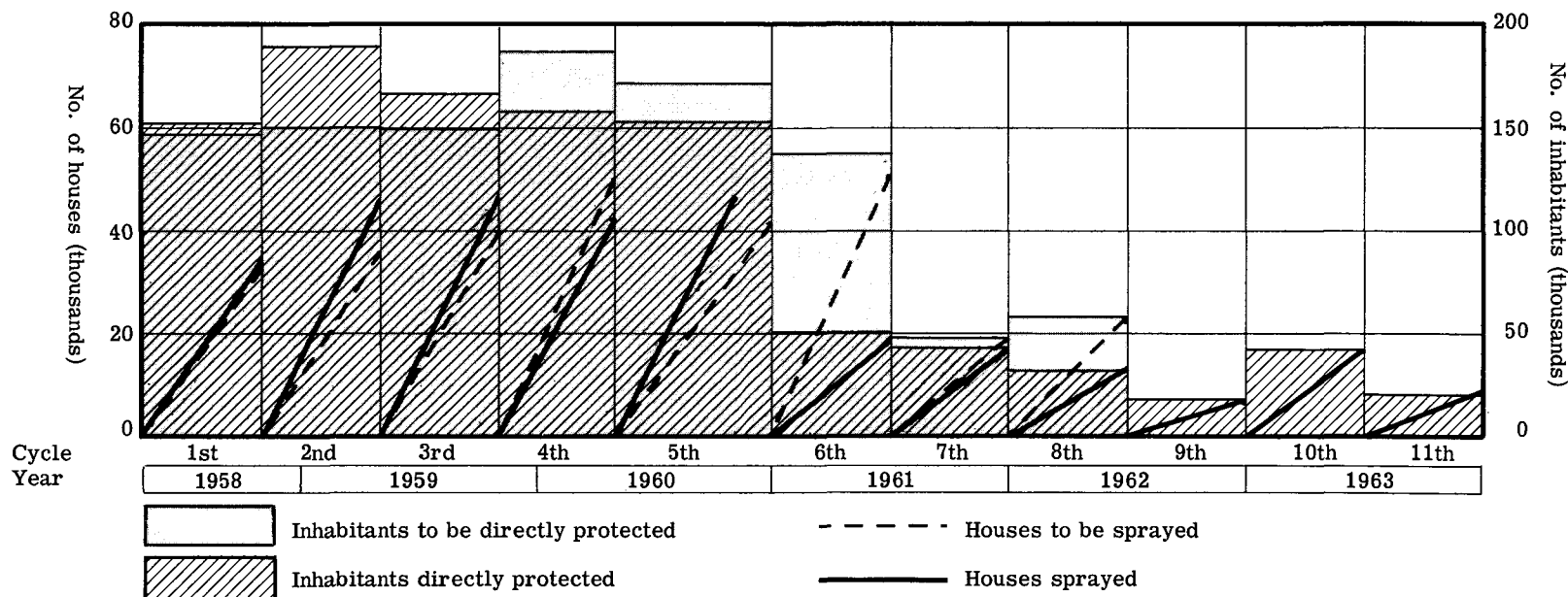
Type	Spraying Operations	Evaluation Operations	Mixed or other operations	Total
Four wheel vehicles	6	1	6	13
Two wheel vehicles	-	10	-	10
Boats	-	-	26	26
Animals	-	-	-	-
Other	-	-	-	-
Total	6	11	32	49

SPRAYING OPERATIONS

Year of total coverage	Date	Houses sprayed						Inhabitants directly protected		Insecticide used per house (g. technical)		Average houses sprayed per spray-man/day
		DDT			Dieldrin			Planned	Protected	DDT	Dieldrin	
		Cycle	Planned	Sprayed	Cycle	Planned	Sprayed					
1st	May 58-Apr.59	1st	32 722	31 299	1st	(a)	2 554	147 314	152 422	310	58	5.8
		2nd	35 540	40 211		(a)	4 930					
2nd	May 59-Apr.60	3rd	39 683	37 563	2nd	(a)	8 342	149 287	172 694	274	58	8.0
		4th	50 024	37 445		(a)	4 713					
3rd	May 60-Jun. 60	5th	46 537	36 861	3rd	(a)	4 571	172 233	153 687	263	65	6.2
		6th	50 652	16 298		(a)	2 187					
4th	Jul. 61-Jun. 62	7th	18 485	15 533	-	-	1 320	47 746	43 526	211	54	5.7
		8th	22 351	12 984		-	-					
5th	Jul. 62-Jun. 63	9th	...	6 397	-	-	-	...	16 523 <sup>b</sup>	-	-	...
		10th	...	16 681		-	-					
6th	Jul. 63-Oct. 63	11th	...	8 458	-	-	-	...	19 164	-	-	...

... No information

(a) Included in DDT column. (b) Estimated.





## EPIDEMIOLOGICAL EVALUATION OPERATIONS, ATTACK PHASE AREAS

Year of total coverage	Date	Slides examined			Species found		
		Total No.	Positive		<u>P. falci- parum</u>	<u>P. vivax</u>	<u>P. malariae</u>
			Number	Percentage			
1st	May 58-Apr.59	37 297	3 547	9.51	3 356	71	120
2nd	May 59-Apr.60	46 158	1 944	4.21	1 665	7	272
3rd	May 60-Jun. 61	43 012	1 007	2.34	938	3	66
4th	Jul. 61-Jun. 62	20 267	543	2.68	515	-	28
5th	Jul. 62-Jun. 63	20 643	1 443	6.99	1 416	7	20
6th	Jul. 63-Dec.63	17 012	844	4.96	827	1	16

## EPIDEMIOLOGICAL EVALUATION OPERATIONS, CONSOLIDATION PHASE AREAS

Date		Estimated population in the area (thousands) (a)	No. of slides examined (b)	% of population sampled	Total No. of positive slides (b)	Origin of infections							Species of parasite		
Year	Quarter					Au- tochtho- nous	Relaps- ing	Imported		Induced	Intro- duced	Unclassi- fied	<u>P. falci- parum</u>	<u>P. vivax</u>	<u>P. malar- iae</u>
								from abroad	from areas within country						
1961	1st	225	4 057	7.2	4	-	-	-	4	-	-	-	3	-	1
	2nd		2 123	3.8	5	-	-	-	5	-	-	-	5	-	-
	3rd		4 101	7.3	6	-	-	-	6	-	-	-	5	-	1
	4th		4 613	8.2	11	-	-	-	11	-	-	-	10	-	1
1962	1st	240	5 144	8.6	8	-	-	-	8	-	-	-	6	-	2
	2nd		3 746	6.2	-	-	-	-	-	-	-	-	-	-	-
	3rd		5 352	8.9	3	-	1	-	2	-	-	-	1	-	2
	4th		4 783	8.0	11	-	-	-	11	-	-	-	10	-	1
1963	1st	240	8 899	14.8	9	-	-	-	9	-	-	-	9	-	-
	2nd		11 054	18.4	4	-	-	-	4	-	-	-	3	-	1
	3rd		9 012	15.0	13	-	-	-	13	-	-	-	12	1	-
	4th		9 896	16.5	7	-	-	-	-	-	-	-	4	2	1

- None

(a) Includes the population of the city of Paramaribo, originally non-malarious area. (b) Includes slides taken and positives found in Paramaribo, originally non-malarious area.

## II. SPECIAL TECHNICAL PROBLEMS

### A. General

The role of technical problems in delaying progress toward eradication and the methods for overcoming them, were further elucidated during 1963. In summary, the problems are the same as those noted in the XI Report, and previous ones, and this report will concern itself mainly with new developments either in the problem area or in supplementary attack methods, which have been the subject of much study.

### B. Physiological Resistance of Anophelines to Insecticides

The most serious problem obstructing eradication of malaria remains the resistance of the vector A. albimanus to DDT. This problem has expanded slightly in area, involving during 1963 portions of additional departments in southwestern Guatemala and a small area nearby in Mexico, in Chiapas State, and a very small increase in El Salvador and Honduras. All of the new resistant areas are directly related to the very recent introduction of large scale cotton growing. The impact of the change from susceptible to resistant strains was dramatic during 1963, a rise of 400 per cent in the number of malaria cases in southwestern Guatemala, and a sudden intense outbreak in Chiapas directly involving the area where resistance recently appeared.

Up till now, malathion is the only alternate insecticide ready for use on an operational scale, and although it is 100 per cent effective in killing DDT-resistant vectors, it has very short duration of effect on sorptive muds, and therefore is not practical where many houses of this material are found.

The degree of resistance has not changed in those areas where it was fully established, but it has increased from low or medium to high in some of the cotton-growing areas of Guatemala, Honduras and El Salvador.

A few new small and sharply localized areas of DDT resistance have been found in upland valleys in Guatemala, El Salvador, Honduras and Nicaragua. Several of these have been completely controlled by one or another supplementary attack method, and the others are on the way to being controlled. There is a former or current history of cotton growing in some of these but not in all. In a valley in Northern Guatemala a program for antilarval attack with DDT was used some years ago, which may account for the finding of resistance there. Measures for attacking these problem areas will be discussed below.

### C. Irritability

Great strides were made during 1963 in measuring the degree of excito-repellency (a function of irritability) of A. albimanus. The development of the Excito-Repellency (E-R) Test Box by AMRO-196 has enabled a better understanding of the ability of some strains of this mosquito to escape from contact with DDT before receiving a fatal dose. (See Research).

As far as tests have been done, resistant forms of A. albimanus found in El Salvador remain irritable for the most part, and this is considered to be a favorable factor in reducing the amount of transmission that would otherwise occur if the strain were not driven out of houses before biting, or forced to seek biting places less desirable than houses. Whether or not spraying of DDT reduces the number that enter houses cannot be stated with confidence as the evidence is conflicting. In both Greece and India the appearance of DDT-resistance did not prevent successful eradication of malaria by use of DDT, but in some other situations, this insecticide failed due to resistance. Even where DDT resistance is high in the Americas, there appears to be less malaria with its use than before it was used, although precise and comparable data are not available to make valid comparisons.

### D. Sorption of Insecticides

So far no new insecticide has shown the durability of DDT on sorptive mud walls. Various bio-assay and wall capture studies have been done on mud walls sprayed with malathion. The time of disappearance of malathion varies from a few days to 3 months depending on the type of mud. The

difference in properties of muds has been and is being studied by AMRO-196. Various attempts both by PAHO and WHO have so far failed to discover a satisfactory sealer to render sorptive mud walls non-sorptive. This factor is the main hindrance to the use of alternative insecticides.

#### E. Construction of New Houses Between Cycles

Studies of AMRO-220 revealed that the habits of the people in respect to construction or renovation of houses was an important element in the failure of DDT in western El Salvador. During the dry season, November-May, there is little need for building or repairing the thatch or pole houses, or replastering the walls of mud houses. This work is often done shortly before the rainy season begins. When this happens, spraying done in February and March is often seriously altered before the transmission season begins. It was planned to reduce this cause of defects in spray protection by timing the spray cycles so as to occur just before the beginning of the transmission season.

#### F. Migration

Migration presents serious hazards to areas which are in consolidation or ready for it, as long as appreciable numbers of migrants enter from areas in which malaria is still prevalent. In Guatemala, this migration increased greatly during 1963, transient workers coming in ever larger numbers to pick cotton in the infected coastal plain, and returning a month later to their homes in cleared areas.

Migration also causes difficulties in consolidation areas and areas undergoing special attack in El Salvador, Honduras, Nicaragua and Mexico. A special aspect, colonization of new lands, creates problems in these countries, and in Venezuela, Colombia, Ecuador, Peru and Bolivia as well.

#### G. Chloroquine-resistant Plasmodium falciparum

During 1963 the presence of chloroquine-resistant strains of *P. falciparum* was fully confirmed in 4 areas of the Amazon basin and 2 areas of Colombia. The Resistant Strain Study Center at Riberão Preto not only proved the presumption of resistance of this species to chloroquine but showed that the degree of resistance was sometimes partial and variable, and that it extended to one or more other types of drug as well. (See Research). There is presumptive evidence that chloroquine tolerance also exists in the north of Beni in northern Bolivia, near Rondônia, Brazil, where a proved resistant strain has been found, and strong presumptive evidence that one of the causes of failure of the chloroquine salt program in the Rupununi District of British Guiana is the presence of a tolerant strain imported from adjacent Roraima where resistance was discovered in 1962.

While tolerant strains have also been described in Venezuela, they do not appear to be spreading or causing much difficulty because the main point of attack is the mosquito, and this is being intensively prosecuted with increased frequency of residual house spraying and with fog-dispersal equipment.

#### H. Solutions to Problems of Continuing Transmission

##### a) Change to an alternate insecticide

In 3 sugar estates of Nicaragua a study was continued during 1963 to see what could be done with malathion alone on 4-month cycles as a means of attack in the presence of DDT-resistance. All radical treatment was suspended. The results are difficult to evaluate because in all 3 estates transmission continues after one and a half years although reduced to about 25 per cent or less from previous levels. The transmission rate was originally one of the highest in the entire country. There is a great deal of migration into and out of the sugar estates from nearby uncontrolled areas, which complicates the problem. There are many houses of mud, some of which is rather deleterious to malathion. The results of one year of entomological observations in these sugar estates have been written up for publication. It is considered that certain foci in the sugar estates need supplementary mass drug treatment and they will get it in 1964. The best solution would be to bring all of the problem area under adequate attack, but as yet funds have not been made available to do this.

In the city of Estelí where houses are mainly of wood a good response to spraying with malathion was produced after the second cycle, in spite of a fairly high refusal rate, 13-16 per cent. Fortunately the refusals were concentrated in the center of the town where there is little transmission. This field trial is being continued, with a change to premium grade malathion in the hope that this grade will be more acceptable to the householders because of its reduced unpleasant odor.

In Costa Rica, transmission persists, although at a considerably reduced level, in a relatively limited proportion of the Pacific coastal area. This is believed to be due mainly to open construction of houses plus irritability of vectors to DDT. Dieldrin is the only practical insecticide available which is not irritating to A. albimanus, and the vectors are susceptible to it in Costa Rica and Panama. A change to dieldrin at  $0.4 \text{ g/m}^2$  twice a year was recommended and has been accepted in Costa Rica. A small field trial of dieldrin at 0.3 g twice a year is being continued in Panama, where dieldrin at 0.6 g once a year failed because of many alterations to the walls between cycles. The purpose is to compare it with DDT which is known to be irritating to A. albimanus in that country.

b) Rescheduling or increasing cycles of DDT

Whether due to partial loss of effectiveness of DDT or to many alterations and aggressions in sprayed houses in the course of 6 months, it was shown in Mexico that cases were more numerous in the second three months after DDT spraying than during the first three months. Because of this, a trial of shorter cycles of spraying was undertaken in Mexico, 3 sections of a problem area to be sprayed 3 times a year with varying doses of DDT, 2-2-2 g, 1-2-1 g, and 1-1-1 g. Definitive results cannot be expected until the end of the 1964 transmission season, but differences between the epidemiological effectiveness of the 3 different schedules do not appear large. In the present year, a field trial of 4 sprayings per year is being made in another area to determine the ultimate limit of impact on transmission that could be obtained by increased frequency of spraying, a measure considered useful in Venezuela.

In El Salvador, because of the long dry season with very little transmission, and a great amount of alteration of houses occurring just before the rainy season, it was recommended to use 2 cycles of DDT of 3 months each, so scheduled as to cover the houses twice during the rainy season and not at all during the dry season. This trial was put into effect May 1964.

c) Antilarval measures

Larviciding with chlorthion or fenthion was completely successful in the Sanarate River valley in Guatemala, and the program was suspended in August 1963. A. pseudopunctipennis returned immediately in large numbers but A. albimanus has remained absent, as has malaria itself. Finca Moca at 900 meters elevation also has been freed of A. albimanus. But in the low coastal plain with widely distributed and changing breeding places, the field trial of larviciding by hand was found to be expensive and less effective than a program of drugs, and was therefore abandoned in favor of the latter. AMRO-196 studies also showed that hand larviciding was not efficient or economical in rural parts of the coastal plain. (See Research).

In Honduras, a combination of drainage and filling removed most of the man-made breeding places that created the large outbreak in Talanga at the end of 1962, and larviciding brought the problem to a minimum. A short course of mass drug treatment then was used to clean up the parasite reservoir in the population. The combined attack cleared the problem area effectively.

Larviciding by hand was continued along the shores of Lake Managua, Nicaragua, to protect the city and nearby areas. It was not completely effective because of difficulty of access, and aircraft dispersal was repeatedly recommended. However, no agency was found willing to undertake this task on a regular year-around basis. A program of drugs was used for 33 cycles, 1 1/4 years, and with the combined attack, the area was finally cleared. However, so much migration occurs that larviciding must be continued as a preventive measure until the rest of the country is cleaned up.

The large city of Guayaquil, Ecuador, was brought into consolidation in 1963 by several years of antilarval measures, at first using oil, and later fenthion. The breeding in peripheral parts of the city is prolific in the rainy season, and tremendous potential of transmission exists.

The risk of reinfection is high, with many imported cases being discovered each year, and an intensive case finding mechanism has been established in the hospitals and health centers, together with a strong investigation system.

d) Mass Drug Treatment

This measure was given further trials during 1963 with varying results. The outcome depended upon the intensity of transmission, the percentage of people treated, and the length of time treatment was given.

Short courses of combined chloroquine-primaquine given at weekly intervals for 10-11 weeks showed their utility in El Salvador, Nicaragua and Honduras for mopping up small but heavily infected foci. Acceptance of as high as 99 per cent was achieved.

The Costa Rican program was very effective in the localities treated, because of high percentage treated, but wide coverage was sacrificed to achieve this. Each distributor covered an average of less than 500 persons each 2 weeks, revisiting nearly every house at least once to obtain 90-98 per cent treated. A strong law, with fines for those who refused, was also employed, if needed. Unfortunately, some localities with high transmission were not treated, and the final clearing of the Pacific coastal problem area is still probably one and a half to two years away.

The El Salvador program using standard 2-week cycles is considered to have been a successful demonstration in its first year of large scale coverage, treating 57,000 persons, in all the problem areas of 2 Departments. It was used in conjunction with DDT where spraying was partially effective. It was begun at the most opportune time, before the start of high transmission; a high percentage of coverage (over 80 per cent) was reached everywhere except in the city of Acajutla; and very careful surveillance was instituted when it was terminated. In areas of comparatively low transmission, 12 cycles appeared to have been sufficient and these areas will remain in consolidation. In areas of high transmission, two periods were tried, 15 and 23 cycles. During the four months following the 15-cycle treatment, 50 cases were found where 2,200 cases had occurred before treatment. Of these, 18 were imported, 9 were relapses, 18 autochthonous, and 5 lost. Transmission was much reduced and limited to a few outbreaks in localities with persistent mosquito breeding places during this period. Treatment will be resumed in the rainy season, and probably will have to be repeated for several rainy seasons until importation is eliminated by clearing up other transmission areas in El Salvador and Guatemala.

The Guatemalan drug program was limited in size. For 14 months it covered 20,000 persons, and for the next 5 months 35,000. It reduced the incidence in a high transmission area but after the first few cycles no further progress was made. This was due to insufficient supervision and health education with a resulting acceptance of treatment by only 60-65 per cent of the people, and also to large-scale migration from adjoining high-transmission areas. Because of its high cost, lack of funds, and inability to overcome the problem of continued importation until the entire problem area was placed under similar attack, it was decided to suspend the project and use available personnel in establishing a cooperative project with the finca owners of the entire problem area. This was begun in October 1963, and has been expanded rapidly. The owners provide personnel to administer the drug which is given under supervision of SNEM personnel. Funds are as yet lacking to extend the treatment to localities outside the cooperating fincas.

In Nicaragua, two separate drug programs have been tried:

Managua-Tipitapa, 6,000 persons, 33 cycles. This was successful and the program was terminated 28 December 1963 after a period of 3 months without autochthonous cases. In the Managua-Tipitapa area, treatment averaged about 70 per cent, larviciding was used in conjunction in part of the area, and 33 cycles (1 1/4 years) were necessary to achieve complete halting of new cases. However, there is appreciable importation of cases.

Madriz-Estelf, 59,000 persons. Of these 75 per cent terminated after 16-18 cycles, the remainder are still under treatment, 20-26 cycles. In the Madriz-Estelf area, acceptance of treatment varied. It was 85-95 per cent initially, but fell quickly. In the least successful locality, Condega city, it averaged 50 per cent, and here appreciable transmission persists. In areas where drugs alone have not been rapidly successful, there has been found a combination of high mosquito

density and poor acceptance of medication. Supplementary antilarval measures are being tried in the worst of these.

In one problem area of Honduras with very high DDT resistance, where more than 2,000 cases of *P. vivax* were found among 7,000 persons in late 1962 and early 1963, antilarval measures were used to reduce the potential of transmission, but malaria persisted. Mass drug treatment, 14 cycles at 2 week intervals among 6,000 persons was highly effective. Treatment was accepted by 95 per cent of the people in smaller localities but in the largest town it varied from 81.4 to 65.6 per cent. On the foundation of drainage and filling of man-made breeding places plus a little larviciding in the few that were not eliminated, the relatively low acceptance was not a serious defect.

In Mexico, a field trial of mass drug treatment covering 85,000 persons was terminated after 14 cycles in April 1963. It was centered on Pochutla in the state of Oaxaca, and embraced an area with one of the highest transmission rates yet remaining in Mexico, although this was not really high by most standards: 235 persons were found positive at the peak of the transmission season in one survey and one search for fever cases. In the two searches, 14,000 slides were taken among 80,000 persons, and the resulting incidence was about 3 cases per 1,000 persons. The number of cases was reduced to about 15 positives per month from the 5th to the 14th cycles. Over-all treatment rates were low, maximum 76 per cent in the 4th cycle, minimum below 57 per cent in the 10th, 11th, and 12th cycles.

There were 22 municipios in the area, varying considerably in their malaria, and in their acceptance of treatment. An IBM analysis was made of treatment and sampling of persons who were registered in the study for 7 or more cycles. In the best municipio, 94 per cent of this population received 9 or more doses. In the worst, 48 per cent. In Pochutla, the municipio showing the poorest result, where 12 positives were found after the 10th cycle, only 53 per cent of the population received 9 or more doses. It must be added that this municipio also received more imported cases than any other. Migrants continued to arrive in the study area, some already infected, up to the last cycle.

After the final random survey in April 1963, there were 2 months with virtually no case finding or control. The main transmission season began as usual in June 1963, and reached higher numbers of cases in July and August than in the preceding year. However, these high figures were accumulated on the basis of sharp outbreaks in a relatively few localities, possibly assisted by an increase in notification posts. It cannot be said whether the source of these outbreaks were relapses of inadequately treated cases or imported cases, but both types were found to be present in the last few cycles and the final survey.

e) Chloroquinized salt program

In British Guiana, a general strike halted the production and distribution of chloroquine medicated salt for nearly 3 months, April to June, as well as reducing or stopping spraying and evaluation. Much non-medicated salt was introduced into the interior during this period. Nevertheless, the 28,000 persons in the 2 districts which had been rendered negative during the preceding 2 1/4 years remained so. In the third district, the Rupununi, where a presumably chloroquine-tolerant strain of *P. falciparum* became established in 1962, both *falciparum* and *vivax* cases had apparently increased after the strike when case-finding was restored. This is felt to be due in part to the loss of much of the spray cycle, and in part to the interruption of the supply of medicated salt throughout the area. Chloroquine is at least partially effective against many of the tolerant strains, and quinine or pyrimethamine is being used to treat those who are not cured by a full dose of chloroquine. The interruption of transmission of chloroquine-resistant strains will require a very tight spray program. This is being pushed with all possible effort by both Government and PAHO personnel, but is rendered difficult by the movements of balata bleeders through the forest, and their habit of building temporary, precarious shelters in remote places. Fortunately the vector is *A. darlingi* and the total number of persons affected is only 8,000. A similar drug-resistance problem appears to be developing in the northern tip of Bolivia.

Conclusion: The presence of technical problems in some portion of the country has delayed the achievement of eradication in 8 countries. Resistance of the vector to insecticides, while possibly the most potent obstacle, involves only about 1 million persons in Central America and the adjacent portion of Mexico. Excito-repellency of the vector toward DDT when coupled with dieldrin

resistance, is responsible for a very low level of persistent transmission in the Pacific coast and foothills of Mexico and in small parts of Guatemala and El Salvador, total about 2 million persons. It is a contributing factor in some resistant areas. Excito-repellency without resistance to dieldrin is a problem in less than 100,000 persons in Costa Rica and Panama, and should be soluble by the use of dieldrin. Some outdoor biting is present in every situation, but it is a major problem in parts of Brazil, and is being tackled by antilarval work or the use of drugs. It is also a part of the problem in western Venezuela and eastern Colombia. In Venezuela a combination of methods is being used, including mass drug treatment and insecticidal fogging. Chloroquine resistance of P. falciparum has blocked the successful use of mass drug treatment by the medicated salt method, but it has not presented great operational difficulties in programs such as Venezuela which depend on spray operations.

For problem areas, solutions exist. However, great flexibility must be employed in the selection of supplementary attack methods, and additional funds must be provided because they are considerably more expensive in most instances.

### III. RESEARCH ON MALARIA

#### A. Malaria Eradication Epidemiology Team - AMRO-0210 (AMRO-220)

The task of compiling and analyzing the vast amount of data collected in the course of the intensive epidemiological studies that the Epidemiology Team made in two representative localities in El Salvador occupied much of 1963, until they were interrupted by the untimely death of Dr. René G. Rachou, who had been the team leader. At the time of his death Dr. Rachou had almost finished a definitive manuscript that contained his description of the results and an analysis of his findings. The preparation of that manuscript for publication is under way.

In addition, the Epidemiological Field Study Team under Dr. Rachou began some extensive field studies late in October 1962 and continued them for a full twelve-month ending in early November 1963. The results of these studies are being prepared for publication under the title: SYNOPTIC TWO-WEEK EPIDEMIOLOGICAL STUDIES OF MALARIA IN EL SALVADOR.

The Synoptic Studies were an outgrowth of the intensive malariological studies that had been brought to a close in September 1962. During those studies many things had been conclusively demonstrated for El Salvador generally, and did not need to be exhaustively examined in each locality.

The procedures used in the studies were only those that were considered to be of greatest use in characterizing the malaria situation in El Salvador. In each of the eight representative study areas covered the procedures used were: meteorological observations, census of the houses and the inhabitants in the study areas, parasitemia surveys by a 20 per cent random sample of the population, active and passive case detection, the investigation of the malaria cases diagnosed and the classification of the cases investigated. Entomological studies were more extensive, with major attention being given to the ecology of adult anophelines, and included: daytime captures of anophelines resting in houses, night captures with human bait, night captures in cattle corrals, larva searches and susceptibility and excito-repellency tests of the populations of A. albimanus at each study area.

The results of the Synoptic Studies confirmed that A. albimanus is the overwhelmingly predominant man-biting anopheline mosquito in El Salvador, and the only proven vector of malaria. They also confirmed the previous explanation of the failure of DDT-spraying to interrupt the transmission of malaria in the problem areas on the coastal plain of El Salvador, namely that it stems from the outdoor-biting habit of the species, the precarious housing that is so prevalent, coupled with the excito-repellency and physiological resistance to DDT exhibited by albimanus everywhere.

Synoptic Studies are proposed mainly for use in malaria eradication problem areas. This means that a great deal of routine malariological data will have been collected about the problem areas. Such data provide a good starting point for many aspects of the studies, and should be used to the fullest extent possible, because of the short cuts that can be made because of them. Full use should be made of all the available routine case detection data, especially in regard to the relation of rainfall to the seasonal periodicity of malaria transmission.

In addition to the malariological data obtained in the course of the Synoptic Studies some techniques for summarizing and visualizing the results obtained were developed. These are described in detail in the report because of the importance of having data available for scrutiny and study with the least possible, or feasible, delay after they are obtained. By giving appropriate attention to the manner in which the data are tabulated, and then making use of the cheap and ubiquitous "ozalid" reproduction procedure, it is possible for any national malaria eradication service to have available longitudinal summaries of field data within a week or two after they are collected.

These synoptic studies and the visualization procedures afford the ground-work for the rather extensive operational research studies that will be required to perfect ways and means of interrupting the transmission of malaria in problem areas that exist in El Salvador and elsewhere.

El Salvador is a small country with a total area of only 8,164 square miles (21,146 square kilometers). *Albimanus* is the only vector of malaria, and everywhere in the country it exhibits marked excito-repellency to DDT. In spite of these factors it is possible to recognize six MALARIOLOGICAL ZONES in El Salvador, namely:

1. Zone of heavy persistent malaria transmission with DDT resistant *A. albimanus* located on the coastal plain at altitudes below 100 meters.
2. Zone of heavy persistent malaria transmission with *albimanus* susceptible to DDT, located on the coastal plain at altitudes below 100 meters.

Zones 1 and 2 comprise the Problem Area of El Salvador, which is largely conterminous with the cotton-growing areas of the country.

3. Zone of moderate persistent malaria transmission with DDT-resistant *albimanus*, located at intermediate altitudes (200 to 500 meters).
4. Zone of moderate persistent malaria transmission with *albimanus* susceptible to DDT.

This zone is admittedly somewhat theoretical. Epidemic incidents due to a variety of causes occur at various altitudes.

5. Zone of minimal persisting malaria transmission with *albimanus* DDT-resistant, at some parts of intermediate altitudes (200-500 meters).
6. Zone of minimal persisting malaria transmission with *albimanus* susceptible to DDT at some parts of intermediate and higher altitudes in El Salvador (200 to 700 meters).

#### B. Insecticide Testing Team - AMRO-0209 (AMRO-196)

The Insecticide Testing Team continued its activities in El Salvador during the entire year, devoting major attention to three things: the evaluation of larviciding as an additional malaria eradication measure; the evaluation of several candidate insecticides on various types of wall surface as substitutes for DDT in areas in which the vector exhibits excito-repellency and physiological resistance to DDT; and laboratory studies of the OPS Excito-Repellency Test Box as a testing device.

In regard to larviciding as an additional eradication measure it was concluded that, given the conditions existing on the coastal plain of El Salvador, the application from the ground of any of the available anopheline larvicides was not efficacious as a supplemental measure to DDT spraying because of its high cost.

During the second half of the year a great deal of effort was spent in the evaluation of air-plane application of the organo-phosphorus insecticide fenthion as a larvicide. It was found that when fenthion in a diluted water emulsion was applied from a Piper "Pawnee" crop-dusting plane at a target dosage of 40 grams per hectare (about 0.04 pounds per acre) the material penetrated emergent vegetation and was highly effective as a larvicide. Fenthion emulsion applied in this manner also penetrated the foliage of trees and killed anopheline larvae in various types of ground pools underneath them.



Unfortunately, however, the breeding places of albimanus were so large and so scattered that the airplane application of larvicide in this fashion would be too expensive to be feasible in the conditions that exist on the coastal plain of El Salvador.

Though the evaluation studies were discontinued in November 1963, the working methods that were evolved were fully documented, and are thus available for use in any other situations which might be more favorable for airplane larviciding.

Another by-product of the antilarval studies that had lasted about 18 months was the perfection of a procedure for epidemiological evaluation of the results of larviciding -for the ultimate test of success of antilarval measures, in fact of any entomological measures, is in epidemiological evaluation. Entomological evaluation, though valuable, can provide only presumptive proof of effectiveness.

To this end, a procedure for making and keeping a cumulative graphic register and summary of the results of case detection work in the larviciding demonstration area was perfected. Case detection was all passive, based on some 28 lay voluntary collaborators and one medical collaborator in a health unit. In so far as possible every diagnosed case of malaria was studied promptly and a case history taken. With the latter in hand the case was classified as either AUTOCHTHONOUS, AUTOCHTHONOUS-SUSPECT, or IMPORTED in respect to the place at which the blood smear had been taken. The imported cases were appropriately allocated to their place of origin.

From the file of case histories a histogram of cases by month of occurrence was constructed, in the form of a master copy of tracing paper, so that ozalid copies of the results could be made at monthly intervals and attached to the monthly reports of the activities of the Larviciding Demonstration.

The principles and practices developed for the epidemiological evaluation of the larviciding demonstration are believed to be usable for the epidemiological evaluation of any malaria eradication operations. This is important because the visualization of the results of continuing epidemiological evaluation of malaria eradication operations is not an easy matter. The difficulties derive from the need to keep an "open file" for about six months, in order that cases diagnosed in any month can be allocated back six months or even more, to their month of occurrence or of infection.

Returning again to the entomological activities of the Insecticide Testing Team, studies were begun on some residual insecticides as candidates to replace DDT in areas in which the latter is not effective. Four insecticides were studied: Bayer 39007, Bayer 41831, Sevin and Hercules 5727, but the latter was dropped when adverse reports of its human toxicity were received from WHO. Bayer 39007 and Sevin are carbamates; Bayer 41831 is an organo-phosphorus compound.

Using DDT-resistant *A. albimanus* the methods of study were: appropriately controlled bio-assays of insecticide residues on plywood and mud surfaces that had been treated accurately with the candidate insecticides; and excito-repellency tests of the new insecticides, alone and in combination with DDT.

The bio-assays revealed the profoundly adverse effect of sorptive mud walls upon all the insecticides, even though some of the insecticides gave good results not only on mahogany plywood panels, but also on walls of non-sorptive mud.

The Excito-Repellency Test Box - Model OPS, that had been devised in 1962 by the Epidemiological Field Study Team, and described by Rachou et al (Proc. Fiftieth Annual Meeting of the New Jersey Mosquito Extermination Association - 1963), was used by the Insecticide Testing Team to make some studies of combinations of insecticides on a single surface.

Using the OPS Excito-Repellency Test Box lined with kraft paper treated with insecticides in water-dispersible powder formulation at one gram per square meter, it was found that when Bayer 39007 and Hercules 5727 were applied over -or more accurately after or into- DDT they completely overcame the excito-repellency effect of the DDT, while the other insecticides did not do this.

Samples of muds from El Salvador were tested at the Tropical Pesticides Research Unit, Porton, England, and found to have almost as much sorptive activity as the most sorptive "standard" mud from Africa.

Further entomological evaluation is needed before it would be justified to undertake extensive field trials with any of the presently available candidate insecticides.

C. Resistance of Malaria Plasmodia Strains to Drugs - AMRO-0212 (AMRO-350)

During 1963 the Screening Center was set up in Ribeirão Preto, São Paulo, Brazil under the auspices of the National Malaria Eradication Service of Brazil and the Psychiatric Department of the São Paulo State Health Service, with financial support from PAHO. The Center has been functioning as planned, receiving specimens of whole blood taken from persons believed infected with chloroquine-resistant strains of malaria plasmodia (only *P. falciparum* parasites have so far been submitted) and making sub-inoculations into other subjects. The response of the plasmodium to drugs, particularly chloroquine, is then tested. Forty-one sub-inoculations have so far been made and several tolerant strains been confirmed.

Observations have been made on 4 Brazilian and 2 Colombian strains subjected to repeated trials with different drugs. All patients inoculated were hospitalized and under medical supervision throughout the time of observation, guaranteeing that the antimalaria drugs were properly administered and follow-up was correct. The results were as follows:

- Brazil:
1. Rondonia strain: Resistant to chloroquine 1.5-5.0 g. in 2-3 days, pyrimethamine 0.3 g. in 3 days, mepacrine 2.5 g. in 7 days, proguanil 3.0-3.2 g. in 8-10 days. Nevertheless 4 patients inoculated with this strain were cured with the second dose of chloroquine 1.9-4.8 g.
  2. Goiania strain: Resistant to chloroquine 1.5-3.0 g. in 3-4 days, and pyrimethamine 0.3 g. in 2 days.
  3. Boa Vista strain: 3 patients were cured with the first treatment of chloroquine 3.6-4.95 g. in 3-5 days; 3 were cured with the second treatment of chloroquine 2.7-5.4 g. in 2-3 days; 2 patients showed resistance after 2 courses of chloroquine 2.25-3.0 g. in 3 days, and one of these was cured with 0.2 g. pyrimethamine, the other relapsing after 0.3 g. of the same drug.
  4. Pará strains: Resistant to chloroquine 2.4-2.55 g. in 2-3 days and pyrimethamine 0.3-0.4 g. in 3 days.
- Colombia:
1. Boyacá strains: Resistant to chloroquine 1.5-5.4 g. in 2-3 days, and appear to be susceptible to pyrimethamine 0.15-0.25 g. in 2-3 days.
  2. Southern part of the Department of Magdalena: Resistant to chloroquine 2.4 g. in 2-3 days and pyrimethamine 0.3 g. in 3 days.

Nevertheless one patient was cured with chloroquine 2.1 g. in 3 days.

The new combination, 0.2 g. pyrimethamine in 3-4 days together with 15-21 g. sulfadiazine in 6-7 days has produced rapid disappearance of parasitemia and, up to the date of the report, 40 days of negativity in 10 patients who relapsed after treatment with chloroquine and/or pyrimethamine alone.

These data show that there is need for more investigation in this field, particularly the trial of more drug combinations.

Some samples of plasma have been sent to the National Institutes of Health in Bethesda for estimation of the chloroquine level in the patient's blood, and trials are planned to determine whether chloroquine level can be estimated from lyophilized plasma or serum. Lyophilized materials will be sent from the Screening Center and the experimental estimations carried out at NIH.

D. Pilot Project with DDVP

A pilot project to test the fumigant insecticide dichlorvos (DDVP) was started in Haiti in July 1962 in cooperation with the Communicable Disease Center of the U. S. Public Health Service, the CDC and USAID performing entomological evaluation and PASB the epidemiological evaluation. So far results have not been very encouraging, but it has been agreed by CDC/AID and PASB that the study should be continued for another year in order to have a better basis for making a final evaluation.

E. Antibromeliad Spraying with Calcium Arsenite

Breeding of *Anopheles (kerteszia) cruzii* and *A.(K) bellator* in bromeliad plants growing on trees has presented a problem in Paraná State, Brazil. An experimental spraying by airplane with calcium arsenite was carried out in June 1963 and produced a good kill of bromeliads. Comprehensive evaluation of the results -botanical, entomological and epidemiological- is being carried out.

F. Field Tests of Pressure Regulator Disc for Spray Pumps

Experiences in using these discs in the field have not borne out the promising results of preliminary studies but further studies are in process, in Mexico and Guatemala, using a disc of new material. The Guatemala study is being done in cooperation with the Communicable Disease Center of the U. S. Public Health Service, acting for USAID. Early data from these studies are encouraging.

#### IV. INTERNATIONAL COOPERATION

Table 15 shows the distribution of PAHO staff personnel assigned to ME projects in the various countries during the past 3 years, and as projected for 1964, by type of consultant.

Table 16 shows the numbers of personnel of various government and international malaria programs who have received training in international courses in the Americas during the past 7 years, and during the first half of 1964. The major need for new personnel is in Brazil, and this country trains its personnel in its own training center. Such trainees are excluded from the list of those receiving PAHO support.

Table 17 shows the number of fellowships granted by PAHO for study travel in Malaria Eradication during 1962 and 1963.

Table 18 shows the amount of equipment and supplies exclusive of drugs which has been furnished by PAHO to the various countries in support of malaria eradication programs. These are necessary items which the programs could not obtain from local or other sources.

Table 19 shows the drugs provided by PAHO to all the campaigns from 1958 to 1962, and during 1963. In place of the primary antimalarial drugs, a few programs in the late consolidation phase were given aspirin or aspirin-caffeine to be used in voluntary collaborator posts as an attraction to bring fever cases to the posts after malaria has disappeared. In late 1962, UNICEF agreed to furnish combined tablets of chloroquine-primaquine when these are used in mass drug treatment campaigns as a supplement to or alternative for spraying with residual insecticides. PAHO will furnish the drugs used in presumptive or radical treatment of cases of malaria, as in the past.

Table 20 shows the amount of international contributions made to each of the malaria eradication programs in the Americas by 4 international or bilateral agencies during 1963, and those projected for 1964. The contributions of AID (USA) reached a peak of \$7 million in 1963, and according to policy are to be changed progressively toward loans in the future. For example, a loan of \$6,500,000 has been negotiated for the Brazilian program in 1964. In addition to the contributions made to country programs, AID (USA) has contributed an average of \$2 million annually to the PAHO Special Malaria Fund. UNICEF contributed insecticides, transportation equipment, and certain laboratory supplies to the extent of \$3.46 million in 1963 and it is estimated that its 1964

Table 15

PAHO/WHO FULL-TIME PROFESSIONAL AND TECHNICAL STAFF ASSIGNED TO COUNTRY, INTER-COUNTRY  
AND INTER-ZONE MALARIA ERADICATION PROJECTS IN THE AMERICAS, 1961 TO MAY 1964

Country or other political unit	Medical Officers				Sanitary Engineers				Sanitary Inspectors				Entomologists				Other			
	1961	1962	1963	1964	1961	1962	1963	1964	1961	1962	1963	1964	1961	1962	1963	1964	1961	1962	1963	1964
Argentina .....	-	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bolivia .....	2	1	1	1	1	1	1	-	4	2	2	3	-	-	-	-	-	-	-	-
Brazil (excl. São Paulo)	-	3	2	2	1	3	3	3	-	2	2	2	-	-	-	-	-	1 <sup>a</sup>	1 <sup>a</sup>	2 <sup>b</sup>
Brazil (São Paulo) .....	-	-	-	-	1	1	1	1	3	2	2	1	-	-	-	-	-	1 <sup>c</sup>	1 <sup>c</sup>	1 <sup>d</sup>
Colombia .....	2	2	2	1	1	1	1	1	5	4	4	6	1	-	-	1	1 <sup>c</sup>	1 <sup>c</sup>	1 <sup>c</sup>	1 <sup>d</sup>
Costa Rica .....	1	1	-	1	-	-	-	-	2	3	3	3	-	1	-	-	-	-	-	-
Cuba .....	1	1	1	1	1	1	1	-	1	1	1	2	-	-	-	-	-	-	-	-
Dominican Republic .....	1	1	1	2	1	1	1	1	3	3	3	3	-	1	-	-	-	-	-	1 <sup>a</sup>
Ecuador .....	2	1	1	2	1	1	1	1	4	4	4	3	-	1	1	1	-	-	-	-
El Salvador .....	1	1	2	2	1	1	1	1	2	2	1	2	-	1	1	1	1 <sup>d</sup>	1 <sup>d</sup>	1 <sup>d</sup>	2 <sup>e</sup>
Guatemala .....	1	1	2	1	1	1	1	1	3	3	3	3	-	-	-	-	-	-	-	-
Haiti .....	1	1	1	2	1	1	1	1	2	3	3	3	-	-	-	-	-	1 <sup>d</sup>	1 <sup>d</sup>	-
Honduras .....	1	1	1	1	1	1	1	-	2	2	2	2	-	1	1	1	-	-	-	-
Jamaica .....	1	1	1	-	-	-	-	-	2	1	1	-	-	-	-	-	-	-	-	-
Mexico .....	2	2	2	3	1	1	1	1	1	1	1	1	1	1	1	-	2 <sup>e</sup>	2 <sup>e</sup>	2 <sup>e</sup>	-
Nicaragua .....	1	2	2	1	1	1	1	1	2	2	2	2	-	-	1	1	1 <sup>d</sup>	1 <sup>d</sup>	1 <sup>d</sup>	-
Panama .....	1	1	1	1	-	1	1	1	2	3	3	3	1	-	-	-	-	-	-	-
Paraguay .....	1	-	-	-	1	-	-	1	2	1	1	1	-	1	1	-	-	-	-	-
Peru .....	1	1	1	2	1	1	1	1	5	5	5	5	-	-	-	-	-	-	-	-
British Guiana .....	-	-	-	-	-	-	-	-	-	2	2	2	-	-	-	-	-	-	-	-
British Honduras .....	1	1	1	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Surinam .....	1	1	1	1	-	-	-	-	2	3	3	3	-	1	1	1	1 <sup>e</sup>	1 <sup>e</sup>	1 <sup>e</sup>	1 <sup>e</sup>
Windward Islands .....	-	-	-	-	-	-	-	-	2	1	1	1	-	-	-	-	-	-	-	-
Inter-zone or inter- country projects .....	9	9	8	6	3	2	2	1	1	-	-	-	7	5	4	3	13 <sup>f</sup>	13 <sup>g</sup>	14 <sup>h</sup>	12 <sup>i</sup>
Total .....	31	33	32	32	18	19	19	16	51	50	49	51	10	13	11	9	19	21	22	19

- None

(a) Administrative officer. (b) Administrative officer and assistant engineer. (c) Malaria statistician. (d) Entomological aide. (e) Health educator. (f) Six administrative officers, two parasitologists, one entomologist assistant, two entomological aides, one laboratory technician, and one statistician. (g) Five administrative officers, one entomological assistant, three entomological aides, one laboratory technician, one operations analyst, one parasitologist assistant, and one translator. (h) Six administrative officers, one laboratory technician, three entomological aides, one entomological assistant, one operations analyst, one parasitologist assistant, and one translator. (i) One parasitologist, four administrative officers, one statistician, one program officer, one health educator one operations analyst, one entomological assistant, one entomological aide, and one laboratory adviser.

Table 16

PERSONNEL TRAINED IN MALARIA ERADICATION TECHNIQUES AT INTERNATIONAL CENTERS, 1949-1963 AND FIRST SEMESTER OF 1964 <sup>a</sup>

Country or other political unit	Total	Venezuela				Mexico			Jamaica					Brazil				
		1949-1963		1964		1957-1960			1958-1963 <sup>b</sup>					1958-1963			1964	
		Physicians	Sanitary Engineers	Physicians	Sanitary Engineers	Physicians	Sanitary Engineers	Sanitary Inspectors	Physicians	Sanitary Engineers	Sanitary Inspectors	Entomologists	Others	Physicians	Sanitary Engineers	Entomologists	Others	Entomologists
Argentina .....	24	4	1	-	-	4	3	7	1	-	-	-	-	1	-	1	2	-
Bolivia.....	37	9	7	-	-	3	6	5	1	-	-	-	1	-	-	5	-	-
Brazil .....	63	12	1	1	-	19	16	13	1	-	-	-	-	-	-	-	-	-
Chile .....	7	1	-	-	-	1	1	2	1	-	-	-	-	1	-	-	-	-
Colombia .....	76	31	5	2	-	11	7	5	-	-	-	-	4	3	6	2	-	-
Costa Rica .....	12	3	1	1	-	1	1	4	-	-	-	-	-	-	1	-	-	-
Cuba .....	14	3	1	-	-	5	1	2	-	-	-	-	-	-	2	-	-	-
Dominican Republic .	8	3	-	-	-	1	1	1	1	-	-	-	-	1	-	-	-	-
Ecuador .....	22	6	2	1	1	1	-	4	1	-	-	-	-	2	3	1	-	-
El Salvador .....	15	2	-	-	-	2	-	10	-	-	-	-	-	-	-	-	-	1
Guatemala .....	24	3	1	1	-	2	3	12	-	-	-	-	-	-	2	-	-	-
Haiti .....	26	6	2	-	-	-	-	16	1	-	-	-	1	-	-	-	-	-
Honduras .....	15	-	2	-	-	-	-	12	-	-	-	-	-	-	1	-	-	-
Mexico .....	34	14	11	-	-	-	2	1	-	-	-	-	1	-	5	-	-	-
Nicaragua .....	14	3	1	-	-	2	-	6	-	-	-	-	1	-	1	-	-	-
Panama .....	14	1	-	-	-	1	1	9	-	1	-	-	-	-	1	-	-	-
Paraguay .....	21	5	2	-	-	2	-	9	-	-	-	-	-	-	2	-	-	-
Peru .....	42	5	2	-	-	9	7	12	1	-	1	-	-	-	4	1	-	-
Puerto Rico .....	14	-	1	-	-	-	-	1	-	-	12	-	-	-	-	-	-	-
United States .....	44	-	-	-	-	-	2	1	2	8	9	11	11	-	-	-	-	-
Uruguay.....	3	1	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
Trinidad .....	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Venezuela .....	4	-	-	-	-	1	-	-	-	-	1	-	-	1	-	-	1	-
British Guiana .....	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
British Honduras ...	6	-	-	-	-	-	-	3	-	-	3	-	-	-	-	-	-	-
Dominica .....	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
French Guiana .....	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
Surinam .....	11	-	-	-	-	-	-	-	-	-	6	-	5	-	-	-	-	-
Other Regions .....	285	2	-	-	-	1	-	-	122	51	36	33	37	1	-	-	2	-
Total .....	839	115	40	6	1	66	51	137	132	60	71	44	55	10	7	34	9	1

None

(a) Excluding nationals of the host country.

(b) 140 sponsored by AID and 119 by WHO

Table 17

FELLOWSHIPS FOR STUDY TRAVEL IN MALARIA ERADICATION, 1962 AND 1963

Country or other political unit	Total		Physicians		Engineers		Entomologists		Others	
	1962	1963	1962	1963	1962	1963	1962	1963	1962	1963
Argentina .....	2	1	1	-	-	1	1	-	-	-
Bolivia .....	3	-	1	-	-	-	2	-	-	-
Brazil .....	2	-	2	-	-	-	-	-	-	-
Colombia .....	4	-	2	-	-	-	2	-	-	-
Cuba .....	-	2	-	2	-	-	-	-	-	-
Dominican Republic .....	-	1	-	1	-	-	-	-	-	-
Ecuador .....	3	1	-	-	1	-	2	1	-	-
El Salvador .....	-	1	-	1	-	-	-	-	-	-
Guatemala .....	1	1	1	1	-	-	-	-	-	-
Haiti .....	4	1	3	-	1	1	-	-	-	-
Jamaica .....	9	-	1	-	-	-	-	-	8 <sup>a</sup>	-
Mexico .....	4	4	2	2	1	1	1	1	-	-
Nicaragua .....	1	1	1	1	-	-	-	-	-	-
Panama .....	1	2	-	-	-	-	-	1	1 <sup>a</sup>	1 <sup>b</sup>
Paraguay .....	3	1	2	1	1	-	-	-	-	-
Peru .....	2	2	1	2	-	-	1	-	-	-
Trinidad and Tobago .....	-	1	-	1	-	-	-	-	-	-
Venezuela .....	1	-	-	-	-	-	-	-	1 <sup>a</sup>	-
British Guiana .....	2	1	-	-	-	-	-	1	2 <sup>c</sup>	-
Surinam .....	5	-	-	-	-	-	-	-	5 <sup>a</sup>	-
Total .....	47	20	17	12	4	3	9	4	17	1

- None
- (a) Nonprofessionals.
- (b) Administrator
- (c) Laboratory Technicians

Table 18  
EQUIPMENT AND SUPPLIES, EXCLUDING DRUGS, CONTRIBUTED BY PAHO TO MALARIA ERADICATION  
PROGRAMS IN THE AMERICAS, 1958 TO DECEMBER 1963

Country or other political unit	Protective equipment						Laboratory supplies						Others				
	Helmets	Bands	Visors	Gloves	Ponchos	Life-jackets	Mailing tubes	"Surgitube" (rolls)	Plastic tubes	Microscopes (a)	Microscope accessories (b)	Slides (gross)	Vehicles and motors (c)	Insecticides (lbs.)	Kardex files	Test kits adults	Test kits larvae
Argentina .....	-	-	-	-	-	-	6 000	10	20	(1)	21(1)	-	-	-	-	1	-
Bolivia .....	50	180	160	40	80	55	10 000	10	70	(1)	-	-	3	-	-	5	-
Brazil <sup>d</sup> .....	-	-	-	-	-	90	283 000	32	40	71(19)	4(13)	-	2	-	-	37	8
Colombia .....	-	-	-	-	-	450	100 000	10	20	2(1)	(2)	-	-	-	-	17	2
Costa Rica .....	-	-	-	-	-	35	500	40	52	-	-	-	-	-	40	1	-
Cuba .....	-	-	-	-	-	-	10 000	20	20	10	1	-	1	-	-	-	3
Dominican Republic <sup>e</sup>	366	332	664	166	166	-	9 000	12	20	2(1)	-	-	-	-	-	2	1
Ecuador .....	431	412	824	206	206	151	50 000	30	20	2	11(4)	-	2	-	-	4	-
El Salvador .....	230	476	952	238	238	30	15 000	100	56	(4)	(6)	-	3	2 900	24	4	1
Guatemala .....	541	500	1 000	250	255	24	30 000	40	52	1(3)	(2)	1 340	2	-	7	2	1
Haiti .....	341	682	1 364	341	341	40	9 000	11	-	(1)	7(1)	-	6	-	-	1	2
Honduras .....	165	330	660	165	165	10	20 000	40	52	(1)	(2)	70	-	-	1	2	-
Jamaica <sup>f</sup> .....	25	200	400	104	209	-	22 500	10	20	-	-	-	1	-	-	8	12
Mexico <sup>g</sup> .....	-	-	-	-	-	75	400 040	93	-	-	-	-	-	-	-	37	1
Nicaragua .....	117	234	468	117	117	-	21 000	90	64	(3)	(4)	157	1	-	65	4	1
Panama <sup>h</sup> .....	137	274	548	137	137	50	19 000	62	52	2(2)	(2)	35	1	-	26	3	-
Paraguay .....	174	808	408	102	773	40	30 000	18	20	(1)	-	-	2	-	-	6	1
Peru .....	618	1 236	3 672	368	668	200	75 000	10	20	(2)	(1)	-	(1)	46 410	24	3	-
Trinidad and Tobago	-	-	-	-	-	-	1 150	10	20	-	-	-	-	-	-	3	1
British Guiana .....	36	72	144	96	36	-	2 000	-	-	-	3	-	-	-	-	-	-
British Honduras ...	61	38	76	19	19	10	1 900	10	20	-	(1)	-	2	-	-	1	-
Dominica .....	-	-	-	-	-	-	630	-	-	-	-	-	1 <sup>i</sup>	-	-	-	-
French Guiana <sup>j</sup> .....	-	-	-	-	-	-	-	-	-	(1)	-	-	5(3) <sup>k</sup>	-	-	2	1
Grenada .....	-	-	-	-	-	-	120	-	-	-	-	-	-	-	-	-	-
St. Lucia .....	-	-	-	-	-	-	110	10	20	-	-	-	3 <sup>l</sup>	-	-	-	-
Surinam <sup>m</sup> .....	55	10	20	5	5	-	2 550	26	20	2	(2)	-	1(4)	-	-	2	1
Total <sup>n</sup> .....	3 347	5 784	11 360	2 444	3 415	1 260	1 118 500	694	678	92(41)	47(41)	1 602	36(8)	49 310	187	145	36

- None  
(a) Microscopes transferred from METC in parentheses. (b) Microscope accessories transferred from METC in parentheses. (c) Station wagons unless otherwise indicated; marine motors in parentheses. (d) Plus 20 tons calcium arseniate, and U. S. \$704.00 in miscellaneous items. (e) Plus U. S. \$400.00 in miscellaneous items. (f) 210,000 imperial gallons of kerosene also provided. (g) Plus 8,500 lancets for taking blood samples, and U. S. \$60.00 in miscellaneous items. (h) Plus U. S. \$20.00 in miscellaneous items. (i) Motorcycles. (j) Plus U. S. \$1,194.00 in miscellaneous items. (k) Two motorcycles. (l) One station wagon and two motorcycles. (m) Plus U. S. \$4,645.72 in miscellaneous items. (n) Plus U. S. \$10,800 in miscellaneous items.

Table 19

## DRUGS PROVIDED FOR MALARIA ERADICATION PROGRAMS IN THE AMERICAS BY PAHO, 1958-1963

(in thousands of tablets)

Country or other political unit	1958-1962 <sup>a</sup>					1963 <sup>b</sup>					Total				
	Chloro- quine 150 mg.	Primaquine		Pyrime- thamine 25 mg.	Chloro- quine Prima- quine combined	Chloro- quine 150 mg.	Primaquine		Pyrime- thamine 25 mg.	Chloro- quine Prima- quine combined	Chloro- quine 150 mg.	Primaquine		Pyrime- thamine 25 mg.	Chloro- quine Prima- quine combined
		15 mg.	5 mg.				15 mg.	5 mg.				15 mg.	5 mg.		
Argentina .....	1 144	55	35	297	-	-	10	-	-	-	1 144	65	35	297	-
Bolivia .....	1 665	35	20	21	10	1 200	28	10	-	-	2 865	63	30	21	10
Brazil (excl. São Paulo)	18 853	260.5	130	-	200	16 000(240)	98	44	-	-	34 613	358.5	174	-	200
Brazil (São Paulo).....	2 143	47.5	7	184	-	-	40	12	-	-	2 143	87.5	19	184	-
Colombia .....	10 076	179.5	4.5	664	-	1 100	125	125	-	-	11 176	304.5	129.5	664	-
Costa Rica .....	926	90	19	213	1 310	98	44(1)	16	-	75	1 024	133	35	213	1 385
Cuba .....	830	30	9	80	-	-	-	5	-	-	830	30	14	80	-
Dominican Republic ...	2 234	39	164	10	-	460	-	-	-	-	2 694	39	164	10	-
Ecuador .....	2 590	158.5	125	195	-	-	(65)	(35)	-	-	2 590	93.5	90	195	-
El Salvador .....	2 040	87.5	50	118	2 070	750	100	23(8)	-	-	2 790	187.5	65	118	2 070
Guatemala .....	3 205	383	63	27	1 240	1 114(50)	19(35)	(4)	-	6 831	4 269	367	59	27	8 071
Haiti .....	3 627	57.5	-	280	-	611	25	-	-	-	4 238	82.5	-	280	-
Honduras .....	2 818	96.6	64	88	190	2 531(630) <sup>c</sup>	135	175(10)	-	1 100	4 719	231.6	229	88	1 290
Jamaica .....	880	18	-	288	50	(1)	-	-	-	-	879	18	-	288	50
Mexico .....	8 380	828	975	3 010	6 600	4 131	344	181(5)	2 250	(1 100)	12 511	1 172	1 151	5 260	5 500
Nicaragua .....	2 074	64.5	40	6	5 530	1 325	53	44(1)	-	(5)	3 399	117.5	83	6	5 525
Panama .....	1 295	42.5	20	146	-	627	120	3	-	-	1 922	162.5	23	146	-
Paraguay .....	1 460	25	5	48	-	740	-	-	-	-	2 200	25	5	48	-
Peru .....	5 286	160.5	53	196	-	2 170	409	85	-	-	7 456	569.5	138	196	-
Trinidad and Tobago ..	964	1 058	869	180	-	1	(117.5)	(10)	-	-	965	940.5	859	180	-
British Guiana .....	86	4	3	260	-	200	177.5	70	7	-	286	181.5	73	267	-
British Honduras .....	190	12	7	6	-	-	2	6	-	-	190	14	13	6	-
Dominica .....	90	1	-	45	-	-	-	-	-	-	90	1	1	45	-
French Guiana .....	-	-	-	-	-	-	-	-	-	32	-	-	-	-	32
Grenada .....	43	0.5	-	45	-	-	-	-	-	-	43	0.5	-	45	-
St. Lucia .....	68	1	-	70	-	-	-	-	-	-	68	1	-	70	-
Surinam .....	826	9	10	497	200	217	-	-	-	-	1 043	9	10	497	200
Total .....	73 793	3 743.6	2 672.5	6 974	17 400	32 354	1 511	726	2 257	6 933	106 147	5 254.6	3 398.5	9 231	24 333

- None.

The figures in parentheses represent transfers to other programs.

(a) Plus 56 500 tablets of aspirin, 400 000 tablets of camoprime, 4 120 lbs. of chloroquine-diphosphate, 2 510 lbs. of tricalcium phosphate and 20 tons of calcium arsenate.  
 (b) Revised amounts according to transfers made among countries in 1963. Besides there were provided 401 000 tablets of aspirin-caffeine, 202 000 tablets of aspirin 52 000 lbs. of chloroquine diphosphate, 1 000 lbs. of tricalcium phosphate, and 20 000 tablets of quinine sulphate. (c) Including 380 950 tablets of camoquin which were donated.



Table 20

INTERNATIONAL CONTRIBUTIONS TO MALARIA ERADICATION PROGRAMS IN THE AMERICAS  
1963 AND ESTIMATED 1964  
(U. S. dollars)

Country or other political unit	Date of initiation of total coverage	1963				1964 (estimated)			
		PAHO/SMF	WHO and WHO/TA	UNICEF <sup>a</sup>	AID(USA) (fiscal year) <sup>b</sup>	PAHO/SMF	WHO and WHO/TA	UNICEF <sup>a</sup>	AID(USA) (fiscal year) <sup>b</sup>
Argentina .....	Aug. 1959	21 718	-	71 000	-	35 949	-	170 000	-
Bolivia .....	Sep. 1958	60 784	19 285	101 000	364 000 <sup>c</sup>	66 769	-	87 000	268 000 <sup>c</sup>
Brazil (excl. São Paulo)	Aug. 1959 <sup>d</sup>	249 071	-	-	3 593 000	265 186	-	-	150 000 <sup>e</sup>
Brazil (São Paulo) ....	Jan. 1960	52 116	-	-	-	39 229	-	-	-
Colombia .....	Sep. 1958	165 551	-	378 000	-	169 090	-	270 000	-
Costa Rica .....	Jul. 1957	60 588	-	16 000	-	91 363	-	50 000	-
Cuba .....	1962	-	3 745	-	-	-	78 000	-	-
Dominican Republic ...	Jun. 1958	92 131	-	137 000	-	110 709	-	310 000	-
Ecuador .....	Mar. 1957	112 187	10 376	360 000	437 000	104 325	15 900	330 000	365 000
El Salvador .....	Jul. 1956	183 544	-	146 000	200 000	146 778	-	250 000	-
Guatemala .....	Aug. 1956	164 511	-	121 000	585 000	103 553	-	380 000	500 000
Haiti .....	Jan. 1962	129 245	-	303 000	1 346 000	105 702	-	377 000	1 500 000
Honduras .....	Jul. 1959	101 801	-	118 000	410 000	81 726	-	145 000	410 000
Jamaica .....	Jan. 1958	27 611	-	-	-	350	-	5 000	-
Mexico .....	Jan. 1957	146 527	74 034	1 177 000	-	60 064	67 000	1 490 000	-
Nicaragua .....	Nov. 1958	141 189	-	100 000	430 000	118 395	-	330 000	420 000
Panama .....	Aug. 1957	91 006	-	141 000	-	96 373	-	170 000	-
Paraguay .....	Oct. 1957	33 173	-	1 000	-	75 189	-	-	-
Peru .....	Nov. 1957	147 942	-	225 000	-	143 142	-	430 000	-
British Guiana .....	Jan. 1947	43 541	-	13 000	-	50 930	-	6 000	-
British Honduras .....	Feb. 1957	19 572	-	8 000	-	19 534	-	4 000	-
Dominica .....	Jun. 1959	16 129	-	4 000	-	13 770	-	1 000	-
French Guiana .....	Sep. 1963 <sup>f</sup>	13 054	-	-	-	19 700	-	-	-
St. Lucia .....	Jan. 1956	-	-	1 000	-	-	-	-	-
Surinam .....	May 1958	100 420	-	43 000	-	101 294	-	25 000	-
Inter-country Projects and general services		737 338	77 705	-	54 000	608 173	108 125	-	20 000
Total .....		2 910 749	185 145	3 464 000	7 419 000	2 627 293	269 025	4 830 000	3 633 000

- None

(a) Rounded to the nearest thousands; shipping not included. (b) AID fiscal year does not necessarily coincide with fiscal years of the countries shown. (c) Dollar equivalent of local currencies under joint control of the U. S. and the Government of Bolivia. (d) Program developed by stages, date of first area shown. (e) \$150 000 in technical aid, and a loan of \$6 500 000. (f) Date of signature of agreement between PAHO/French Guiana Prefecture.

contribution to Malaria Eradication in the Americas will reach \$4.83 million exclusive of shipping costs. The value of PAHO's supplies and services totalled \$2.91 million in 1963, and is expected to reach \$2.63 million in 1964. According to available funds, it will have to be reduced below \$2.5 million in the future.

The cooperation and the contribution of international agencies in furnishing supplies, technical advice and financial assistance has been an absolutely essential factor in the progress achieved to date in the eradication of malaria from the Americas.