ERADICATION OF MALARIA IN THE AMERICAS
STRATEGY AND ORGANIZATION

CARLOS A. ALVARADO, PATRICK N. OWENS
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The concept of eradication of malaria was born with Ross, who worked on the mathematics of malaria eradication without mosquito eradication. But, in general, rural malaria defied attempts at reasonably economic control, and, only two decades ago, Boyd, in his Presidential Address to the American Society of Tropical Medicine, was willing to settle for «building out» malaria from year to year, through long term local programs.

Health workers in other fields had spoken boldly of eradication, but the concept itself was abandoned by an entire generation of health workers in the face of continued failure and frustation.

Hopes for eradication of species, either disease-bearing organisms, or causative agents themselves, began to revive in the Americas following the successfull eradication of *Aedes aegypti* from Brazilian cities, and the eradication of *Anopheles gambiae* from Brazil and Egypt.

The introduction of D. D. T., which made the human dwelling the determining parameter for calculating unit costs, rather than the surfaces of anopheline breeding places, made the antimalaria compaigns technically and economically feasible. All control programs began to be expanded, thus lowering mortality, morbidity, and all malarial indices, but demonstrating at the same time that.

Eradication is not a simple extension of control unless control is of an unusually high order of efficiency and perfection; must include, initially, fairly large areas; and expand at the periphery without regard to international boundaries.

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[1] From the malaria eradication unit, Pan American Sanitary Organization. Washington 6, D. C.

Proc. 6th Int. Congr. Trop. Med. and Malar., 7: 464-482, 1959

The initial euphoria, and the amount of annual malaria budgets, began to decline at approximately the same time that anopheline resistance began to appear. Although some of the countries with leading places in the eradication movement had demonstrated the practicability of malaria eradication, it was not until the Pan American Sanitary Organization and the World Health Organization had developed into organizations with the confidence of the national health authorities and with the ability to coordinate work in all countries of a geographical region, that a hemispheric, and later, a world movement toward eradication became apparent and consistent.

A short historical summary will show the succession of events in malaria eradication, as they occurred in the Americas:

1 — In 1947, the Congress of the United States voted funds for «The National Malaria Eradication Program».

2 — In 1948, British Guiana reported the eradication of the vector of malaria, *A. darlingi,* from the coastal zones.

3 — A reconnaissance of the malaria control programs in the Americas was made in 1950 for the XIII Pan American Sanitary Conference, with recommendations for eradication programs to be begun immediately. The Conference, meeting in October of the same year, supported the eradication concept, but the countries were neiter psychologically ready, nor was the P. A. S. B. economically able to implement the resolutions of the Conference.

4 — In November of the same year, a symposium on malaria eradication was held in Savannah, Georgia, U. S. A., sponsored by the National Malaria Society. At the same meeting, the N. M. S. established the criteria for malaria eradication and voted to disband itself.

5 — In 1954, Venezuela reported the first large area of malaria eradication within the tropical regions.

6 — A new reconnaissance of the status of the malaria programs in the Americas was made in 1954 again under the auspices of the Pan American Sanitary Bureau. It showed both a lack of consolidation and progress, and a frank deterioration of the National Malaria Services over the situation obtaining in 1950; and that in the face of the possibilities of resistance in vector species. This picture was presented to the XIV Pan American Sanitary Conference at Santiago, Chile, in October, 1954, and a strong resolution was passed declaring that it was of the

utmost urgency to carry out the terms of the previous resolution of the XIII Conference, recommended to member governments the conversion of control programs into eradication campaigns and instructed the P. A. S. B. to implement the aforesaid resolution, to establish an emergency fund for administrative purposes, and authorized the creation of a special voluntary eradication fund.

7 — In January, 1955, the Presidente of Mexico, a country considered at that time as one of the principal reservoirs of malaria transmisssion in the Americas, authorized the preparation of a nation-wide malaria eradication plan, to be supported with extra-budgetary funds and long-term financing, but later supported with regular budgetary funds.

8 — In March, 1955, the Executive Board of the International Childrens' Fund (U. N. I. C. E. F.), subject to the technical recommendations of the U. N. I. C. E. F.-W. H. O. Joint Committee on Health Policy, decided to endorse the general proposition that U. N. I. C. E. F. provide increased aid to enable governments to intensify their control programs in order to achieve malaria eradication.

9 — Early in May, 1955, the Joint Committee on Health Policy recommended that U. N. I. C. E. F., in giving aid to new antimalaria projects, should give first priority to eradication programs, and established the basic conditions under which such aid might be obtained.

10 — A few days later, the VIII World Health Assembly, meeting in Mexico City, approved a resolution for the development of a coordinated program for the eradication of malaria throughout the World, and authorized the creation of a malaria eradication special account.

11 — In September of 1956, the Government of the U. S. A., having become more and more interested in malaria eradication, announced a contribution of $ 1,500,000 for the Special Malaria Fund of the PASB. Early in 1957, the Dominican Republic contributed $ 100,000 as the first payment on a pledge of $ 500,000 to the Special Malaria Fund, and Venezuela gave a contribution of $ 300,000.

12 — In mid-1957, the Congress of the U. S. A. made a specific appropriation for World-wide malaria eradication, through the International Cooperation Administration of that Government. A significant part of this appropriation was channelled through the international agencies and the balance through separate bilateral agreement with the governments concerned.

With the first administrative fund ($ 100,000) authorized by the XIV Pan American Sanitary Conference, the Bureau organized and established a special coordinating office for the malaria eradication programs, located, initially, in Mexico City, and gave to it the responsability of preparing operating standards and developing the strategy for the continental plan.

These operating standards were given in a series of documents known by the title of «PASB/COMEP Documents», which, reviewed and approved by the PASB Advisory Committee on Malaria Eradication, constituted the framework for technical program planning. This planning, as developed in the Americas, consisted of the following points:

1) Preparation of an initial plan of operations as detailed and perfect as possible.

2) Creation in each country of a «National Malaria Eradication Service» at a high level within the governmental structure; and provision of full administrative authority and an adequate and well trained staff;

3) Enactment of appropriate legislation for the program;

4) Adequate financing for the entire period of the program;

5) Development of the plan of operations in three phases:

preparatory (or conversion from control), 1 year;
full attack, 4 years; and
consolidation, 3 years;

6) Execution of all operations, from the very beginning, throughout the entire endemic malarious area;

7) Production of a great impact on the general public psychology through an intensive campaign of health education and information; which both awakens interest and obtains public support;

8) Promotion of collaboration of all governmental agencies (public health services, schools, armed forces, etc., etc.) as well as ecclesiastical and private organizations, and the general public;

9) Rigourous supervision of all operations, judging them not so much by what has been done, as by what still needs be done;

10) Epidemiological evaluation of results, related to ZERO, from the moment of beginning total coverage with insecticides. For this evaluation, the creation of a department of epidemiology is a *sine qua non*; and the department must be provided with the necessary material,

transportation and personnel for carrying out its function, which, in the main, will consists of the systematic search for malaria cases, through a network of community collaborators and by house-to-house visits.

This operational methodology, as just described, has not been followed in all of its implications in all the malaria services of the Americas; however, in each governmental unit efforts have been made, and are continuing, to adjust the national programs into the general lines as listed above.

The integration of the hemisphere-wide plan also to the object of strategic planning, above all with relation to activities by the international agencies involved. This plan included, among other items, the following:

1. Organization of a large scale training effort in all activities related to malaria eradication, and at all levels of the services. The existing facilities, offered for many years by the Government of Venezuela at Maracay, were utilized to the fullest, but the pressure of the training requirements was so great that additional centers have been established in Mexico City, Kingston (Jamaica) and São Paulo (Brazil).
2. Maximum utilization or any program which offered possibilities for demonstration of techniques, and awarding of travel grants to key personnel of all services so that maximum advantage of these facilities might be taken.
3. Reinforcement of the technical advisory services by the international agencies, assigning to each eradication program a medical officer and an engineer, both trained in malaria eradication techniques, as well as a variable number of specialized sanitary inspectors. In addition, supervisory personnel of the international agencies were increased.
4. Other specialized advisory personnel have been appointed, under zonal or regional basis specifically, in the fields of entomology, parasitology, statistic, health education, administrative methods, and vehicle management.
5. Organization of a special unit called the «Evaluation Team», to certify the eradication of malaria at the countries request and to evaluate the efficiency of the epidemiological operations.
6. Organization of seminars, workshops, and meeting of several kinds, of which particular mention should be made of the meeting of Directors of Malaria Eradication Services of neighbouring countries. These

meeting have unified the technical approach, and the frank and free review of progress and difficulties; the development of methods and procedures which result from these meeting, and which spring spontaneously from the services themselves are among the most stimulating examples of the desire of the countries for a dynamic and productive approach to the perfection required by eradication programs.

7. The stimulation and maintenance of a spirit of singleness of purpose in the continental plan for eradication, in which the plan in each country is considered by that country as part of a hemisphere-wide effort. This spirit of corps is being achieved in great part, through the regional meeting of directors and their chief advisers and executive officers, in which meeting as already mentioned, there exists a singular atmosphere of give-and-take during the discussions, and a fruitful comradeship in attacking common problems.

The fact that eradication programs began almost simultaneously in several countries, and that the PASB received significant contributions to its Special Malaria Fund, have modified both the amount and the character of its antimalaria work. From what initially was a purely technical advisory capacity for the planning of programs, the Bureau has been obliged to grapple with problems of organization, of administrative implications in all phases of the programs, of training on a large scale, both of national and international personnel, of the provision of essential supplies and materials, and, at times, of direct financial assistence to certain countries. The multiplicity of problems obliged the director to transfer the malaria unit from Mexico City to the regional headquarters in Washington.

Before passing to a consideration of the progress and actual status of the programs in the Americas, it might be well to state that although difficulties have arisen at several stages in a number of the countries, these are being overcome as rapidly as possible. It may be interesting for reprentatives of other regions of the world to learn that one of the consistent errors in planning malaria eradication programs in the Americas has been the underestimation of the magnitude of the problem in terms of the population at risk. Ordinarily this estimation is made on the basis of census data, projected for the years following. But it would seem that previous malaria control, in many countries, had been so successful that population growth in previously malarious areas has

exceeded the demographers' expectations. Such data have often been determined only after the operations of geographical reconnaissance.

The important thing to record for this group today is that as these errors and difficulties become apparent, they are attacked and corrected by the countries and the internationel agencies, so that their effects are minimized or nullified.

Another difficulty already presenting itself is that of anopheline resistance. During the investigation of several persistent foci of transmission in El Salvador three months ago, the entomologists Duret and Heredia found a high level of physiological resistance by *A. albimanus* to Dieldrin, and a moderate level of resistance to D. D. T.

The present status of the eradication program of the Americas may be appreciated from a consideration of the tables which we will show which have been taken from the VI Report on the malaria situation, prepared for the XV Pan-American Sanitary Conference, to be held in San Juan, Puerto Rico, within the month.

Table no. 1 shows the countries or political units in which malaria is either unknown historically, or from which it has disappeared without specific eradication measures.

TABLE 1 — *Countries and other political units in which malaria is not known to have occurred or has disappeared without specific eradication measures*

Country or other political unit	Area in km²	Estimated population as of 1 July 1957
Total	*10 187 740*	*19 877 000*
Canada	9 974 375	16 589 000
Uruguay	186 926	2 690 000
Antigua	442	55 000
Bahamas	11 396	120 000
Bermuda	53	42 000
Falkland Islands	11 961	2 000
Montserrat	83	17 000
Netherland Antilles	961	190 000
St. Kitts-Nevis-Anguilla	396	55 000
St. Pierre and Miquelon	240	5 000
St. Vincent	389	80 000
Virgin Islands (Br.)	174	8 000
Virgin Islands (U. S. A.)	344	24 000

Table no. 2 shows countries and other political units from which malaria has been eradicated. It will be seen that the larges portions of the population of 45 014 000 living in areas from which malaria has been eradicated, corresponds to that in the U. S. A. and Puerto Rico.

TABLE 2 — *Countries and other political units where malaria has been eradicated*

Country or other political unit	Area in km²	Population	Original malarious areas	
			Area in km²	Population
Total	*10 098 948*	*179 993 000*	*2 322 691*	*45 014 000*
Chile	741 767	6 681 000	55 287	112 000
U. S. A.	9 346 751	170 547 000	2 257 809	42 366 000
Barbados	431	230 000	430	228 000
Martinique	1 102	255 000	300	45 000
Puerto Rico	8 897	2 280 000	8 865	2 263 000

Table no. 3 is a combination of table 3 and 4 of the mimiographic paper and expresses the present situation with respect to the other countries and territories. It may be seen that Venezuela contains the largest area from which malaria has been eradicated in these countries, and the largest population freed from the disease.

Table no. 4 is a resumé of the situation presented in map form in the paper. It may be seen that four countries were in the preparation phase as of July 31/58: Brazil, Colombia, Haiti and Nicaragua, and that one country is still without a plan as of that date. However, Haiti began the phase of total coverage with insecticides on September 1, and Colombia is ready to begin on September 8. Brazil plans to begin in January, 1959, with a program of total coverage in three stages, during three successive years; while Nicaragua had begun its program but was forced to suspend operations for administrative reasons, will begin again before December 31.

Only one country, Cuba, has not yet been incorporated into the hemisphere-wide plan, but it is expected to do so as soon as local difficulties can be overcome.

Figure no. 1-*a* shows several of the plans of operations, prepared by the countries, for malaria eradication in the Americas.

Table no. 5 shows the position of the National Malaria Eradication Services within the health structures of the countries. It will be seen

TABLE 3 — *Extent of malarial problem by areas in the Americas, 1958*

Country or other political unit	Total area in km²	Original malarious area in km²	Area with malaria eradicated		Area under surveillance		Area with malaria not yet eradicated	
			Three or more years without indigenous case		Less than three years without indigenous case		Regularly sprayed	Not regularly sprayed (*a*)
			Area in km²	Spraying continued	Area in km²	Spraying continued	Area in km²	Area in km²
Total	*19 539 572*	*12 235 392*	*407 744*		*140 242*		*8 877 996*	*2 809 410*
Argentina	2 778 412	120 000	26 200	No	23 000	No	70 800	—
Bolivia	1 098 581	842 018	—	—	—	—	842 018	—
Brazil (*b*)	8 268 814	7 299 969	611	Yes	—	—	5 958 814	1 340 544
São Paulo	247 223	110 318	—	—	—	—	—	110 318
Colombia	1 138 355	1 026 433	—	—	—	—	—	1 026 433
Costa Rica	50 900	31 526	—	—	—	—	31 526	—
Cuba	114 524	**	**	**	**	**	**	**
Dominican Republic	48 734	41 010	—	—	—	—	41 010	—
Ecuador	270 670	153 498	—	—	—	—	53 098	—
El Salvador	20 000	19 310	—	—	—	—	19 310	—
Guatemala	108 889	80 380	—	—	—	—	80 380	—
Haiti	27 750	21 300	—	—	—	—	—	21 300
Honduras	112 088	87 383	—	—	—	—	87 383	—
Mexico	1 969 269	928 749	—	—	—	—	928 749	—
Nicaragua	148 000	127 199	—	—	—	—	8 126	119 073
Panama	74 470	68 499	—	—	—	—	68 499	—
Paraguay	406 752	42 286	—	—	—	—	42 286	—
Peru	1 249 049	154 191	—	—	—	—	154 191	—
Venezuela	912 050	600 000	372 604	Yes	36 464	Yes	190 932	—
Other political units								
British Guiana	215 800	215 800	4 940	No	—	—	19 760	191 100
British Honduras	22 965	22 965	—	—	—	—	22 965	—
Dominica	789	642	—	—	—	—	—	642
French Guiana	91 000	80 000	—	—	80 000	Yes	—	—
Grenada	344	160	—	—	—	—	160	—
Guadeloupe	1 780	1 136	69	...	752	Yes	315	—
Jamaica	12 188	10 050	—	—	—	—	10 050	—
Panama Canal Zone	1 432	1 438	—	—	—	—	1 438	—
St. Lucia	616	524	—	—	—	—	524	—
Surinam	143 000	143 470	3 320	No	—	—	140 150	—
Trinidad and Tobago	5 128	5 138	—	—	26	No	5 112	—

(*a*) Includes areas not sprayed under a plan of total coverage.
(*b*) Not including the State of São Paulo.
— Nil.
** Report not received.
... Data not available.

TABLE 4 — *Extent of malarial problem by population in the Americas, 1958*

Country or other political unit	Total population estimate 1957	Population of the original malarious area	Area with malaria eradicated		Area under surveillance		Area with malaria not yet eradicated	
			Three or more years without indigenous case		Less than three years without indigenous case		Regularly sprayed	Not regularly sprayed (*a*)
			Population	Spraying continued	Population	Spraying continued	Population	Population
Total	*177 795 000*	*86 416 000*	*4 531 000*		*1 493 000*		*53 865 000*	*26 527 000*
Argentina	19 858 000	1 473 000	247 000	No	711 000	No	515 000	—
Bolivia	3 273 000	1 102 000	—	—	—	—	1 102 000	—
Brazil (*b*)	58 538 000	29 495 000	638 000	Yes	—	—	19 921 000	8 936 000
São Paulo	2 730 000	2 678 000	—	—	—	—	—	2 678 000
Colombia	13 227 000	9 787 000	—	—	—	—	—	9 787 000
Costa Rica	1 035 000	451 000	—	—	—	—	451 000	—
Cuba	6 410 000	**	**	**	**	**	**	**
Dominican Republic	2 698 000	2 417 000	—	—	—	—	2 417 000	—
Ecuador	3 890 000	1 955 000	—	—	—	—	1 955 000	—
El Salvador	2 350 000	1 385 000	—	—	—	—	1 385 000	—
Guatemala	3 430 000	1 448 000	—	—	—	—	1 448 000	—
Haiti	3 384 000	4 096 000	—	—	—	—	—	4 096 000
Honduras	1 770 000	1 282 000	—	—	—	—	1 282 000	—
Mexico	31 426 000	15 588 000	—	—	—	—	15 588 000	—
Nicaragua	1 331 000	1 071 000	—	—	—	—	95 000	976 000
Panama	960 000	910 000	—	—	—	—	910 000	—
Paraguay	1 638 000	700 000	—	—	—	—	700 000	—
Peru	9 923 000	2 878 000	—	—	—	—	2 878 000	—
Venezuela	6 134 000	4 479 000	3 065 000	Yes	469 000	Yes	945 000	—
Other political units								
British Guiana	515 000	460 000	423 000	No	—	—	34 000	3 000
British Honduras	84 000	82 000	—	—	—	—	82 000	—
Dominica	62 000	51 000	—	—	—	—	—	51 000
French Guiana	29 000	25 000	—	—	25 000	Yes	—	—
Grenada	94 000	26 000	—	—	—	—	26 000	—
Guadeloupe	250 000	210 000	34 000	...	127 000	Yes	49 000	—
Jamaica	1 594 000	1 296 000	—	—	—	—	1 296 000	—
Panama Canal Zone	55 000	40 000	—	—	—	—	40 000	—
St. Lucia	91 000	68 000	—	—	—	—	68 000	—
Surinam	251 000	250 000	124 000	No	—	—	126 000	—
Trinidad and Tobago	765 000	713 000	—	—	161 000	No	552 000	—

(*a*) Includes areas not sprayed under a plan of total coverage.
(*b*) Not including the State of São Paulo.
— Nil.
** Report not received.
... Data not available.

TABLE 5 — *The organization of national malaria services in the Americas, 1957*

Country or other political unit	Official names of service	Position of service	Activities other than malaria eradication
Argentina	Dirección de Paludismo y Fiebre Amarilla	Primary	Campaign for the eradication of *Aëdes aegypti*
Bolivia	Servicio Nacional de Erradicación de la Malaria	Primary	None
Brazil (*a*)			
São Paulo	Campanha de Erradicação da Malária	Primary	None
	Serviço de Profilaxia da Malária (*b*)	Secondary	Prevention of Chagas' disease and schistosomiasis
Colombia	Servicio Nacional de Erradicación de la Malaria	Autonomous	None
Costa Rica	Departamento de Lucha Contra Insectos Transmisores	Primary	None
Cuba	**	**	**
Dominican Republic	División de Malariologia	Primary	Campaign for the eradication of *Aëdes aegypti*; and insect control
Ecuador	Servicio Nacional de Erradicación de la Malaria	Primary	None
El Salvador	División de Lucha Anti-Palúdica	Primary	Anti-*Aëdes aegypti* campaign
Guatemala	Servicio Nacional de Erradicación de la Malaria	Primary	Eradication of *Aëdes aegypti* and vaccination against yellow fever
Haiti	Service National d'Eradicación de la Malaria	Primary	None
Honduras	Servicio Nacional de Erradicación de la Malaria	Primary	Anti-*Aëdes aegypti* campaign
Mexico	Comisión Nacional para la Erradicación del Paludismo	Autonomous	None
Nicaragua	Servicio Nacional de Erradicación de la Malaria	Primary	Anti-*Aëdes aegypti* campaign

(*a*) Not including the State of São Paulo.
(*b*) Soon to be change to «Serviço Especial de Erradicação de Malária».
** Report not received.

TABLE 5 — (Continuação)

Country or other political unit	Official names of service	Position of service	Activities other than malaria eradication
Panama	Servicio Nacional de Erradicación de la Malaria	Primary	Control of yellow fever (vaccination and *Aëdes aegypti* eradication)
Paraguay	Servicio Nacional de Erradicación del Paludismo	Primary	None
Peru	Servicio Nacional de Erradicación de la Malaria	Primary	None
Venezuela	División de Malariologia	Primary	*Aëdes aegypti* eradication, control of Triatomidae, flies, rodents, etc.
Other political units			
British Guiana	Mosquito Control Service	Secondary	*Aëdes aegypti* and bancroftial filariasis control
British Honduras	Health Department	Primary	Yellow fever and other public health activities
Dominica	Anti-Malaria Activities under Sanitary Department	Primary	Insect control in general
French Guiana	Service de la Lutte Antipaludique et Antiamarile	Secondary	Yellow fever campaign and destruction of other anthropods of Public Health import
Grenada	Medical Department	Primary	Other public health activities
Guadeloupe	Service Départemental de Désinsectisation	Secondary	Disinfection and disinsecting in general
Jamaica	Malaria Eradication Programme	Primary	None
Panama Canal Zone	Health Bureau, Canal Zone Government	Secondary	Pest mosquito and culicoides control, all phases of environmental sanitation, and sanitary engineering and entomological support for maritime quarantine
St. Lucia	Malaria Eradication Program	Primary	Anti-*Aëdes aegypti* campaign
Surinam	Malariabestrijdingsdienst	Primary	None
Trinidad and Tobago	Malaria Division	Primary	*Aëdes aegypti* eradication, general insect control and quarantine activities

clearly that the services now enjoy a high stature within the national public health structure. Two countries, Mexico and Colombia, have «autonomous» organizations reporting directly to the Minister of Health, and all others have the N. M. E. in primary position, reporting to the director of Health or his equivalent. This is indeed a great advance over the year 1954 in which 12 countries had their malaria services in secondary rank.

The next table is not possible to project due to its size. It contains a comparative study on malaria legislation. It shows that most of the countries and territories possess special legislation, some with advanced features, such as the compulsory notification of cases within 24 hours with corresponding blood samples; the obligation of patients to submit to treatment and permit blood extraction; reporting of migratory movements of the population; and, in one case, with the prohibition of occupancy of unsprayed premises.

The panorama presented represents a most promising situation. The beginning of the effort may be considered as entirely satisfactory; but it is recognized that only the initial battles in the war have been won: preparation of correct plans; training of personnel; supporting legislation; adequate financing; high position of the services; the beginning of the direct attack; and integration of the hemisphere plan with adequate international advice and assistance. Other battles are being fought: the system of epidemiological evaluation and reporting of cases are being perfected, and the administrative machinery is being modified as required. For the future, there is the test of time itself. First, the completion of the four years of total coverage, without a diminution in the intensity, regularity, and perfection of the operations, which requires protection of the programs against political and administrative contingencies. Secondly, an alertness is required at all levels for the early detection and resolution of the technical problems which will arise with the passage of time. Thirdly, it will be necessary to maintain and intensify the concept of the universality of eradication, the foundation stone for its lasting effects once achieved.

We have chronicled the sequence of events as they have occurred in the Americas, and have sketched some of the fundamentals of strategy and organization as these have developed. There is a further characteristic of the programs in the Americas which we should mention at this time, and it is simply that apart from the scientific facts, the technical

TABLE 6 — *Comparative antimalaria*

Subject	Argentina	Bolivia	Brazil (*a*)	São Paulo	Colombia	Costa Rica	Cuba	Dominican Republic	Ecuador	El Salvador
Has special legislation	x	x	x	x	x	x	**	x	x	x
Obligation to combat malaria	x	x	x	x	x	x	**	x	x	x
Declaration of malarious zones	x	x	—	x	x	x	**	—	—	—
Declaration of the problem as being of national interest	x	x	—	—	x	x	**	x	—	x
Application of the concept of eradication	—	x	x	—	x	x	**	x	x	x
Obligation to apply imagocides	x	x	—	—	—	x	**	x	—	x
Obligation to permit access to houses	x	x	—	x	—	x	**	x	x	x
Obligation to give drugs	x	x	x	x	—	x	**	—	x	—
Control of distribution and dispensing of drugs	x	—	—	x	—	x	**	—	—	x
Obligation to report the construction or renovation of dwellings	x	—	x	—	—	—	**	—	—	—
Compulsory case reporting	x	x	x	x	x	x	**	x	x	x
Time limit (No. of days)	1	1	—	(*c*)	—	1	**	1	(*c*)	1
With blood sample	x	—	—	—	—	x	**	x	—	—
Obligation of patient to take treatment	—	x	—	—	—	x	**	x	x	—
Obligation of patient to permit blood extraction	x	—	—	—	—	x	**	x	—	—
Sanctions	x	x	x	x	—	x	**	x	x	x
Obligation of authorities, firms, and individuals to cooperate	x	x	—	x	x	x	**	x	x	x
Exemption from customs duties	—	x	—	—	x	x	**	—	x	x
Obligation to spray aircraft and ships	—	—	x	x	—	—	**	—	—	—
Postal franking privileges	—	—	—	—	—	x	**	—	—	—
Obligation to report on painting or washing of sprayed premises	—	—	—	—	—	x	**	—	—	—
Reporting on migratory movements	x	x	x	—	—	x	**	x	—	—
Prohibition against occupancy of unsprayed premises	—	—	—	—	—	x	**	—	—	—
Obligation to carry out environmental sanitation activities	x	x	x	x	x	x	**	x	x	x

(*a*) Not including the State of São Paulo.
(*b*) Information taken from V Report.
(*c*) Immediate reporting but without set time limit.
× Yes.
— Nil.
** Report not received.
... Data not available.

legislation in the Americas, 1958

Guatemala	Haiti	Honduras	Mexico	Nicaragua	Panama	Paraguay	Peru	Venezuela (*b*)	British Guiana (*b*)	British Honduras	Dominica	French Guiana	Grenade	Guadeloupe	Jamaica	Panama Canal Zone	St. Lucia	Surinam	Trinidad and Tobago
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	...	x	...	x
x	x	x	x	x	x	x	x	x	x	x	—	x	x	—	—	...	x	...	x
—	—	—	—	—	—	—	x	x	—	—	x	—	—	—	—	...	—	...	x
x	x	x	x	x	x	—	x	—	—	—	—	—	—	—	—	...	—	...	—
x	x	x	x	x	x	x	x	—	—	—	—	—	—	—	—	...	—	...	—
x	—	x	—	x	x	—	x	—	x	—	—	x	x	—	—	...	x	...	—
x	—	x	—	—	x	x	x	—	x	x	—	x	x	x	x	...	x	...	—
x	x	x	—	x	—	x	x	x	—	—	—	—	—	—	—	...	x	...	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	...	—	...	—
x	x	—	—	—	x	x	—	—	—	—	—	—	—	—	—	...	—	...	—
x	x	x	x	x	x	x	x	x	x	x	x	—	—	—	x	...	x	...	—
1	1	1	1	1	1	1	7	7	(*c*)	7	30	—	—	—	(*c*)	...	7	...	—
x	x	x	—	x	x	x	—	—	x	—	—	—	—	—	—	...	—	...	—
x	—	x	—	x	x	x	—	x	—	x	—	—	—	—	—	...	—	...	—
—	x	x	—	x	x	—	—	x	—	x	—	—	—	—	x	...	—	...	—
x	x	x	—	x	x	x	—	x	x	x	x	x	x	—	—	...	x	...	x
x	x	x	—	x	x	x	x	—	—	—	—	—	—	—	—	...	—	...	—
—	—	—	x	—	—	—	—	x	—	—	—	—	—	—	—	...	—	...	—
—	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—	...	—	...	—
x	—	x	—	x	x	x	—	—	—	—	—	—	—	—	—	...	—	...	—
—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—	...	—	...	—
x	—	x	—	x	—	x	—	—	—	—	—	—	—	—	—	...	—	...	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	...	—	...	—
x	—	—	x	—	x	—	x	x	x	x	x	x	x	x	—	...	x	...	x

details, and the strategy, eradication of malaria is being carried out by an extraordinary number of devoted people. For Ministers of Health and microscopists, for spraymen and schoolteachers, for director of services and drivers of vehicles, wiping out malaria once and for all is what they wish to do more than any other thing, and this is the reason for the advanced status of the effort. More and more, in the Americas, the initials D. D. T. stand for Dedication to the concept of eradication; Discipline in the attack, and Tenacity of purpose.

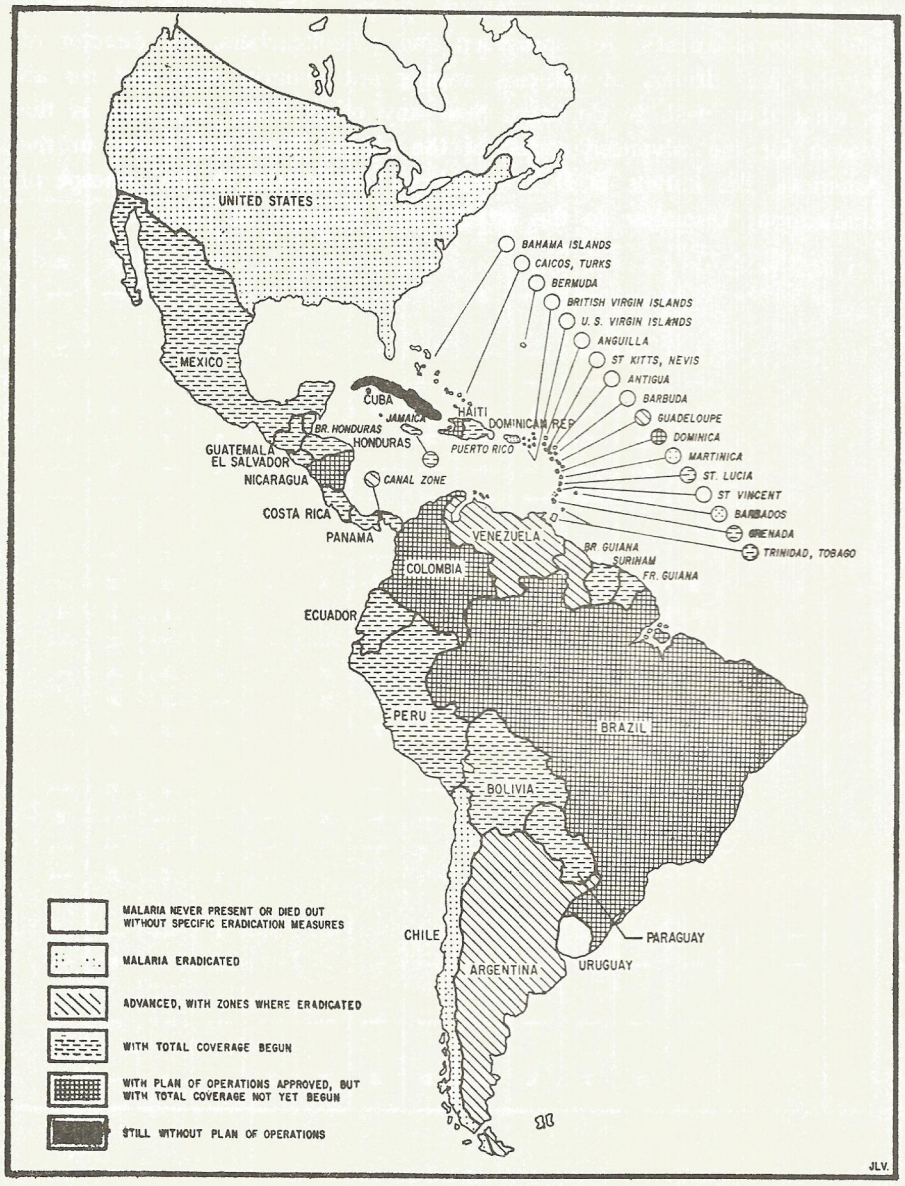
UNITED STATES
BAHAMA ISLANDS
CAICOS, TURKS
BERMUDA
BRITISH VIRGIN ISLANDS
U. S. VIRGIN ISLANDS
ANGUILLA
ST KITTS, NEVIS
ANTIGUA
BARBUDA
GUADELOUPE
DOMINICA
MARTINICA
ST. LUCIA
ST VINCENT
BARBADOS
GRENADA
TRINIDAD, TOBAGO
MEXICO
CUBA
JAMAICA
HAITI
DOMINICAN REP
PUERTO RICO
BR. HONDURAS
HONDURAS
GUATEMALA
EL SALVADOR
NICARAGUA
CANAL ZONE
COSTA RICA
PANAMA
VENEZUELA
BR GUIANA
SURINAM
FR. GUIANA
COLOMBIA
ECUADOR
PERU
BRAZIL
BOLIVIA
CHILE
PARAGUAY
ARGENTINA
URUGUAY
MALARIA NEVER PRESENT OR DIED OUT WITHOUT SPECIFIC ERADICATION MEASURES
MALARIA ERADICATED
ADVANCED, WITH ZONES WHERE ERADICATED
WITH TOTAL COVERAGE BEGUN
WITH PLAN OF OPERATIONS APPROVED, BUT WITH TOTAL COVERAGE NOT YET BEGUN
STILL WITHOUT PLAN OF OPERATIONS
JLV.

Fig. 1

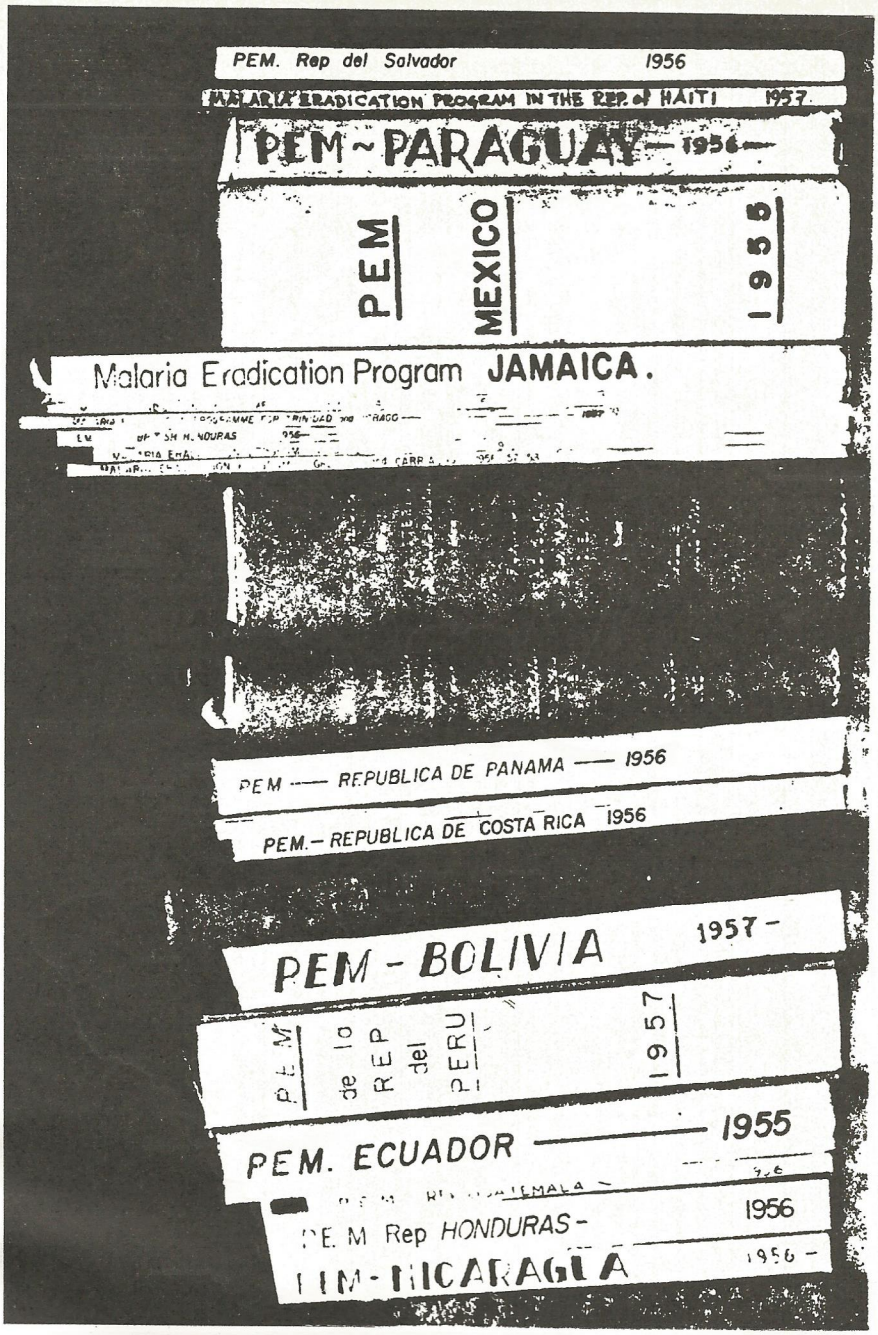
PEM. Rep del Salvador 1956
MALARIA ERADICATION PROGRAM IN THE REP. of HAITI 1957
PEM ~ PARAGUAY — 1956 —
PEM MEXICO 1955
Malaria Eradication Program JAMAICA.
PEM — REPUBLICA DE PANAMA — 1956
PEM.— REPUBLICA DE COSTA RICA 1956
PEM - BOLIVIA 1957 -
P.E.M. de la REP del PERU 1957
PEM. ECUADOR — 1955
P.E.M Rep HONDURAS - 1956
PEM - NICARAGUA 1956 -

Fig. 1-*a*

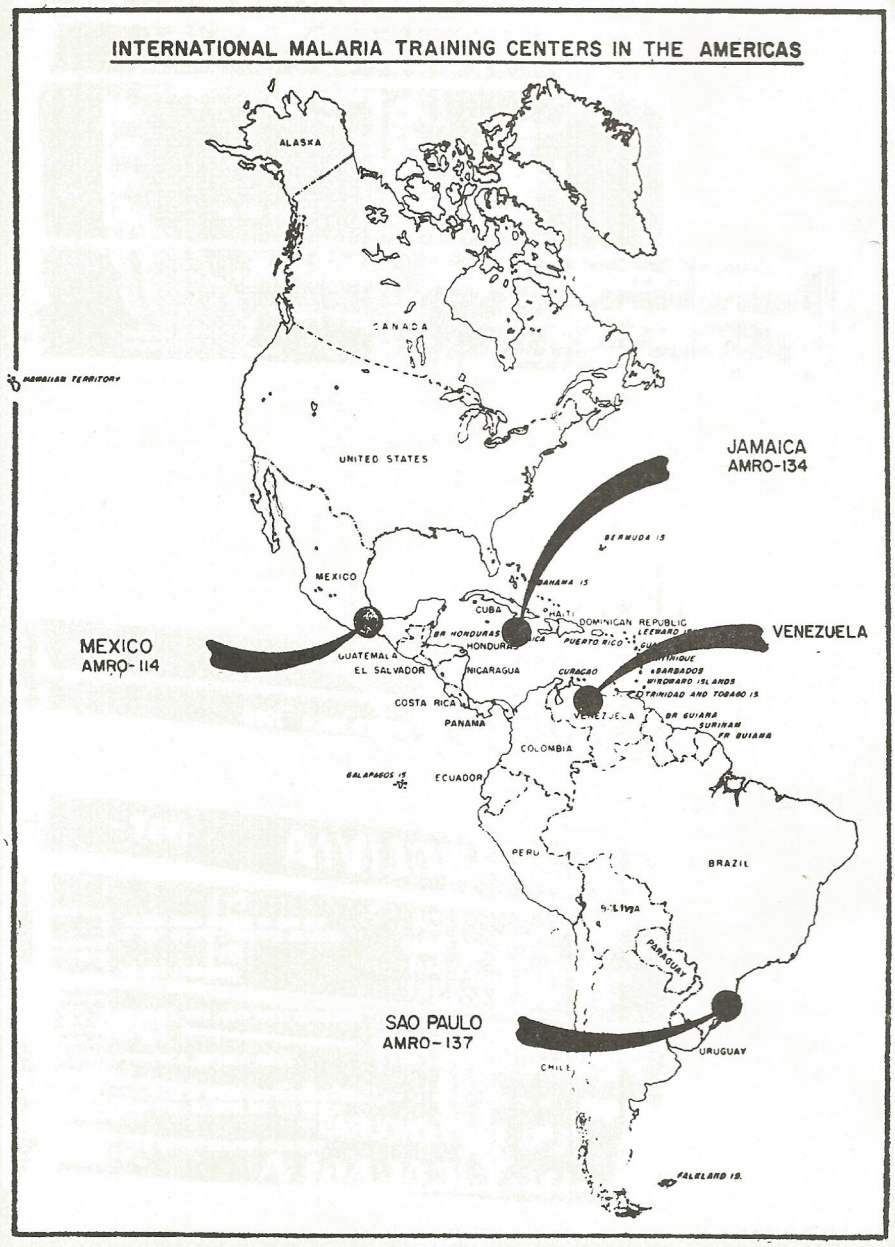
INTERNATIONAL MALARIA TRAINING CENTERS IN THE AMERICAS
ALASKA
CANADA
HAWAIIAN TERRITORY
UNITED STATES
MEXICO
JAMAICA
AMRO-134
BERMUDA IS
PANAMA IS
CUBA
HAITI
DOMINICAN REPUBLIC
PUERTO RICO
BR HONDURAS
HONDURAS
GUATEMALA
EL SALVADOR
NICARAGUA
COSTA RICA
PANAMA
MEXICO
AMRO-114
VENEZUELA
CURACAO
BARBADOS
TRINIDAD AND TOBAGO IS
VENEZUELA
BR GUIANA
SURINAM
FR GUIANA
COLOMBIA
GALAPAGOS IS
ECUADOR
PERU
BRAZIL
PARAGUAY
URUGUAY
CHILE
SAO PAULO
AMRO-137
FALKLAND IS

Fig. 2

Emp. Tip. Casa Portuguesa Suc., Lda. - Lisboa