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ELEVENTH MEETING OF THE
ADVISORY COMMITTEE ON MEDICAL RESEARCH

Washington, D.C.

19-23 June 1972

SECOND MEETING OF THE

SCIENTIFIC ADVISORY COMMITTEE ON DENGUE

PAN AMERICAN HEALTH ORGANIZATION

SCIENTIFIC ADVISORY COMMITTEE ON DENGUE

SECOND MEETING
23-24 MARCH 1972
PORT-OF-SPAIN, TRINIDAD

DENGUE IN THE AMERICAS

A REPORT TO THE DIRECTOR

Ref: RD/CD 11/4
APRIL 1972

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Pan American Sanitary Bureau, Regional Office of the
WORLD HEALTH ORGANIZATION

Washington, D.C.

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INTRODUCTION

The meeting was opened by the Minister of Health, the Hon. Dr. Francis C. Prevatt, who referred to the present dengue epidemic in the Caribbean by commenting that Trinidad and Tobago were not involved, due no doubt to his government's successful Aëdes aegypti eradication program despite continuous reinfestation from neighboring areas. The Secretary of the Committee, Dr. M. Martins da Silva, welcomed the members and other participants on behalf of PAHO/WHO, and briefly reviewed the accomplishments of the program since the first meeting. Dr. James Bond reported on plans to recruit two Peace Corps epidemiologists to be assigned to the program under PAHO's supervision.

The Committee then started its two-day deliberations in accordance with the agenda under the chairmanship of Dr. William F. Scherer.

In the morning of the second day the Chairman appointed four working parties to prepare a preliminary draft of this report, which the full committee then discussed.

DENGUE IN THE AMERICAS

1. Importance of the Disease

Dengue and dengue-like diseases have recurred in epidemic fashion at frequent intervals in the Western Hemisphere. In this century, major outbreaks occurred in 1904, 1915, 1922, 1934, 1941, 1949-50, 1963-64, 1968-69, and 1971-72. Attack rates were high, sometimes exceeding 70 or 80 per cent. Serotype 2 dengue virus was first isolated in Trinidad in 1953 and dengue serotype 3 was first recovered in Puerto Rico during the 1963-64 epidemic. Both serotypes 2 and 3 caused epidemic disease in the Americas during 1968, and serotype 2 predominated in 1969. At least two authorities believe that the Colombian epidemic of 1971-72 resulted in 400,000 cases.

Infection with one serotype does not confer protection against subsequent infection with another, and may, under some circumstances, lead to dengue hemorrhagic fever (DHF), including the shock syndrome. Classic dengue may have a number of relatively innocuous hemorrhagic manifestations, but profound shock and life-threatening hemorrhage are thus far recognized only in the DHF syndrome. In Southeast Asia, DHF including shock syndrome occurred in areas where all four serotypes of dengue virus are endemic. In Tahiti and New Caledonia, however, shock syndrome and dengue hemorrhagic fever were recently observed in association with apparent serial infection from dengue 2 and 3 serotypes only. These serotypes were already present in the Caribbean. Shock syndrome has not yet been identified in the Caribbean, but systematic surveillance has not been carried out. Some disturbances in hemovascular mechanisms were observed in cases of dengue in the Netherlands Antilles in 1964 and 1968.

It is not generally appreciated that profound gastrointestinal hemorrhage, including that seen in patients with previous ulcer disease, may be the predominating sign of DHF. Patients admitted for surgical

treatment of gastrointestinal hemorrhage may not be thought to have dengue. Other "surgical" manifestations of dengue include major epistaxis, uterine bleeding, threatened abortion, and premature separation of the placenta.

Even though permanent residua or death are not significant features of classical dengue, the high attack rate and the associated morbidity, which includes long periods of convalescence, lead to absenteeism and impaired efficiency at work. Moreover, outbreaks of the disease place a burden on health facilities, thus diverting them from the care of the more seriously ill. Finally, dengue may produce subtle effects which have not yet been fully explored, such as the possible induction of congenital abnormalities, abortion, and recrudescence of underlying diseases.

The toll of an outbreak includes, in addition to the direct cost of treatment, indirect losses from expensive emergency vector control measures, lowered work productivity, and, in some areas, decreased tourist revenue. In addition to these economic losses, the cost of initial and follow-up programs to control A. aegypti are a heavy burden on communities at risk. Despite large recent expenditures in several countries for the control or eradication of the vector, dengue outbreaks continue to recur after reinfestation.

Tens of millions of people, not including an undetermined number of tourists, live in areas at risk of dengue outbreaks. These areas now include the Caribbean islands, the northern South American countries, and the southeastern part of the United States. The geographic extent of the disease may increase as reinfestation of formerly A. aegypti-free areas continues because of increases in human population and decreases in effective mosquito eradication programs. In addition, larger human populations and A. aegypti indices indicate that yellow fever--like dengue--may become likelier due to decreased herd immunity. There is evidence that 11.8 million km^2, or 29 per cent of the land in the Western Hemisphere, is capable of supporting A. aegypti. As of December 1971, 3.1 million km^2 were infested (see Figure 1).

The rapidity with which dengue outbreaks spread from one area to another makes the disease an important international problem. Moreover, as long as ecologic factors permit outbreaks to occur frequently and A. aegypti control is still incomplete, conditions exist for introduction and dissemination of other virulent viruses, such as yellow fever, that have a similar transmission cycle.

Importations from Asia and Africa of dengue 1 or 4 serotypes as well as disabling viruses such as chikungunya that may produce dengue-like disease are also an ever-present danger. Likewise, exportation of dengue viruses to adjacent and remote regions of the world where Stegomyia mosquitoes are found is also a possibility. The apparently accelerating frequency of epidemics in the Caribbean (Figures 2, 3, 4, and 5) and that area's dense human population (Table 1) may lead to a situation in the Western Hemisphere similar to that now present in Southeast Asia and, consequently, to the possible occurrence of DHF, with its associated mortality.

2. Current Status of Surveillance and Care

In the Americas, recognition and reporting of infectious diseases such as dengue have traditionally been in the hands of physicians, yet the disease is often overlooked. In countries where epidemics have occurred, physicians will generally recognize dengue by the time an epidemic has reached its peak, although they may confuse it with similarly presenting diseases such as rubella, ECHO-9 infection, influenza, or typhoid. Thus, considerable misdiagnosis may result if only clinical criteria are used to establish etiology. Laboratory procedures are not now being used uniformly and systematically to diagnose febrile illnesses with and without rash. Dengue in children is even less readily recognized clinically because of its mild manifestations. Hemorrhagic and shock syndromes are not likely to be attributed to dengue by Caribbean clinicians. Paramedical workers are not now employed in the recognition and reporting of dengue-like disease.

Resources for the specific diagnosis of dengue, as well as for certain investigative programs on the disease, exist in various laboratories in the countries and territories where dengue has been active in the last two decades. Another group of institutions, laboratories, and university microbiology departments in the United States is interested in various aspects of the problem. Within the Caribbean area, the laboratories include the Department of Microbiology at the University of the West Indies in Jamaica; the Trinidad Regional Virus Laboratory; the National Institute of Hygiene in Venezuela; the National Institute for Special Health Programs in Colombia; the Department of Microbiology at the Valle University in Cali, Colombia; the Gorgas Memorial Laboratory, and the Middle America Research Unit (NIH) in Panama; the newly-established Dutch Institute of Tropical Medicine in Surinam; the Evandro Chagas Institute in Belém; the San Juan Tropical Disease Laboratories, Center for Disease Control, San Juan, Puerto Rico; and the Pasteur Institute in French Guiana. United States organizations interested in dengue include the Center for Disease Control, the Walter Reed Army Institute of Research, the NIAID Pacific Research Section, the Yale Arbovirus Research Unit, and the departments of microbiology, epidemiology, or medicine at the following universities: California, Cornell, Hawaii, Johns Hopkins, Maryland, Miami, Pittsburgh, and Rutgers.

Systems for the collection and dissemination of information regarding dengue vary (Table 2). In most instances, ministries or departments of health have an epidemiologist responsible for reporting communicable diseases to the Chief Medical Officer or his equivalent in the governmental health structure. With respect to the Caribbean area, such epidemiologists exist in Puerto Rico, Haiti, the Dominican Republic, Jamaica, Guyana, French Guiana, the Netherlands Antilles, Cuba, and Trinidad. Epidemiologists reporting infectious diseases have long been at work in Venezuela, Colombia, Panama, and all the countries of Central America. In addition to the two entomologists associated with A. aegypti and malaria control programs in the Caribbean, medical entomologic capabilities also exist in: Brazil, Colombia, Costa Rica, Cuba, El Salvador, French Guiana, Guatemala, Jamaica, Mexico, Nicaragua, Panama, Puerto Rico,

Surinam, Trinidad, the United States (Center for Disease Control, Atlanta), and Venezuela.

The Pan American Health Organization has considered dengue a reportable infectious disease since 1965. Statistical reports of dengue cases are therefore received at PAHO Headquarters through the regular channels of disease reporting maintained between the Organization and the various country and territory governments. The time between the completion of such reports by a government agency and the appearance of the data in the Weekly Epidemiological Report is between three and six weeks. An analysis of the reporting systems used in the various countries is presented in Table 2. Table 3 shows the dengue statistics for the last decade compiled by PAHO on the basis of regular reports, supplemented by answers to an annual PAHO questionnaire.

Other sources of information concerning dengue in the Americas include Morbidity and Mortality, the weekly report of the Center for Disease Control; the Arbovirus Information Exchange; WHO Virus Diseases Quarterly Report, which is maintained as an informal service for groups actively working in the field of arbovirology; and, of course, the scientific literature. The Arbovirus Information Exchange appears in English. Although it is of considerable use to participating laboratories, it is not intended to provide standardized information to larger communities of public health workers and scientists. With respect to the scientific literature, a problem exists in the time lapse between the occurrence of significant events and the publication of findings. Another difficulty is that the literature on dengue may appear in either Spanish or English, and English-speaking workers may not be aware of studies and reports published in Spanish-language journals of small circulation.

Today's surveillance and diagnosis of dengue have significant shortcomings. Laboratory tests are not uniformly available or widely used to confirm clinically diagnosed dengue. As a concomitant, there is widespread failure to diagnose the disease in children. Also, the incidence of the disease is grossly underestimated. Collection and

processing of dengue information are deficient in several regards: certain regions are not covered at all, acquisition and dissemination of data are slow, and long-term clinical records that might reveal new, unrecognized manifestations have not been kept.

Adequacy of intensive care units, supplies of blood and plasma, and knowledge of how to deal with the life-threatening aspects of dengue hemorrhagic fever clinically are unknown to the Committee as is the status of pathologic services in the Caribbean.

3. Need for Improved Surveillance

The epidemiologic mechanisms that result in periodic dengue outbreaks in the Hemisphere are poorly understood. Only some of the areas of endemicity during interepidemic years have been defined. The ecologic factors relating to endemic transmission and the reasons for the appearance of an outbreak are not fully known. Interpretation and understanding of the epidemiologic events in any single country or territory depend on knowledge of the situation in the entire surrounding area in which transmission of dengue viruses is potentially present. It is in such areas, identifiable only by effective surveillance, that major investigative efforts should be made. Experience in the last three years has indicated that where effective epidemiologic investigations have been made in suspected areas, a surprising amount of dengue infection has been found (for example, in Puerto Rico, Hispaniola, and Grenada).

The persistence of large A. aegypti populations, particularly in the Caribbean (Figure 1) and the increasing density of the human population in the Americas (Table 1) will be associated with the continuous or periodic presence of dengue. The level of endemic dengue transmission and the occurrence of hemorrhagic fever have been related to the increases in population size and density in Southeast Asia. Ultimate control of dengue and other A. aegypti-borne diseases such as yellow fever obviously depends on reduction or elimination of the primary vector, but the present eradication program has run into difficulties in several countries

and territories. The 1971-72 Colombian dengue epidemic occurred after A. aegypti reinfestation. In the absence of adequate universal vector control, active surveillance is necessary for prevention and control of dengue. This surveillance should attempt to supply the epidemiologic and virologic information necessary to identify potentially dangerous developments and hopefully to provide guidance for vector control programs. It could not only provide an early warning of epidemics but would also increase our understanding of the interepidemic nature of dengue. Any dengue surveillance network would, of course, be equally applicable to urban yellow fever.

There is urgent need for serologic surveys in certain areas where information is lacking, such as Cuba and the smaller Caribbean islands. In localities that are considered relatively or absolutely free of A. aegypti, such surveys would provide information on unrecognized foci of transmission. Such serologic surveys have proven very valuable in certain areas of Central America. Laboratory investigations likely to produce results of the greatest relevance to the present epidemiologic situation are those directed toward biologic and antigenic characterization of dengue viruses, the ultimate objective being to clearly differentiate subtypes and relate the different subtypes to epidemiologic and clinical disease patterns. Efforts to increase the sensitivity and efficiency of virus isolation procedures should be encouraged. The microplaque-reduction neutralization test has proven extremely useful for survey and diagnostic purposes. Efforts should be made to further develop and extend the use of this technique.

4. Investigations of Suspected Dengue Epidemics

Although knowledge of the epidemic behavior of dengue viruses in the Western Hemisphere has increased in recent years, very much remains to be learned. We do not know whether severe hemorrhagic disease due to dengue virus infection has occurred in the region or what the virologic-epidemiologic prerequisites are for such disease. We are not sure how

many of the four presently recognized dengue virus serotypes have been active in the area, although serotypes 2 and 3 have been definitely incriminated. Few isolations of dengue virus have been made from mosquitoes and no data are available to correlate mosquito density and infection rates with the occurrence of outbreaks in man.

Since health authorities in the different American countries are aware that dengue epidemics and endemicity have serious international implications, it is their duty to pay timely and adequate attention to the problem, to notify PAHO of a suspected dengue outbreak, and to obtain its active collaboration in control measures whenever necessary.

Countries without complete facilities for the study of the problem should promptly ask PAHO for emergency assistance. It should be emphasized, however, that all countries concerned should do their utmost to provide early and accurate information with their own resources and should take into consideration the urgent Hemisphere's need to obtain a complete picture of a given epidemic as early as possible.

The goals of dengue epidemic investigations are:

A. Identification of causative agent(s).

B. Detailed description and documentation of the clinical spectrum of human disease associated with dengue virus infection.

C. Measurement of infection rates in the affected population.

D. Identification of the arthropod vector responsible for virus transmission, and quantitative correlation of vector populations and their infection rates with human infection rates.

It is recognized that not all of the above goals are likely to be achieved in all dengue epidemics. However, pursuit of these objectives would permit national authorities to: advise the people of the precise nature of the epidemic; decide whether and how to organize medical facilities for patient care; alert the medical profession to the possibility

of unusually severe cases and advise how best to manage them; make decisions regarding institution of emergency vector-control measures; and decide intelligently when to seek specific types of international assistance in the emergency.

Their achievement would also be of international public health significance by: providing early warning of potential outbreaks in other countries, and contributing further knowledge to the emergent understanding of the regional behavior and disease potential of dengue viruses.

5. Proposed Program

A coordinated, well-planned program for surveillance, investigation, and education concerning dengue in the Americas is essential. Such a program should be directed toward accomplishing the following objectives:

a. To discover dengue epidemics in the early stages and thus permit prompt institution of emergency control measures, pertinent research investigations, and patient treatment programs.

b. To detect dengue shock syndrome/hemorrhagic fever or other currently unrecognized and unfamiliar manifestations of dengue viruses so that prompt and proper patient management may be applied.

c. To facilitate research aimed at understanding natural endemic and epidemic dengue cycles and at eventually controlling the disease, with or without eradication of A. aegypti.

d. To educate medical and other health personnel in the recognition of dengue and its complications.

e. To disseminate newer information on virus isolation techniques at the laboratory director level and on the manitude of dengue as a public health and economic problem.

f. To identify new areas where yellow fever may be transmitted and to supplement and augment the existing surveillance for yellow fever.

Specifically surveillance epidemiologists would undertake to do the following:

a. Identify sentinel populations of adults at risk in areas of low endemicity to be bled at intervals. In endemic and recent epidemic areas, populations of young children should be sought for periodic serologic surveillance. Where existing surveillance programs for other diseases are being carried out, dengue surveillance should be integrated into them.

b. Activate special mechanisms to search out dengue-like illness, including collaboration with existing medical care units to observe and collect diagnostic material from patients with rash, fevers of unknown origin, or suspected hemorrhagic fever or shock.

c. Encourage countries at risk of dengue that are not now reporting cases to do so and provide them with the assistance as required. Attempt by education to improve the existing reporting systems. This should be complemented by active investigation of reported febrile or rash diseases such as rubella, typhoid, measles, malaria, and influenza.

d. Provide health officials and physicians with new information and laboratory diagnostic support necessary to permit early detection of dengue, including the hemorrhagic fever/shock syndrome.

e. Select surveillance areas, guided by information regarding the current status of A. aegypti eradication programs and the degree of infestation.

f. Investigate reports of outbreaks and immediately contact PAHO to determine jointly the additional steps to be taken; initiate and implement the measures agreed on.

g. Coordinate their activities with other concerned persons, such as other PAHO epidemiologists, laboratory workers, and A. aegypti control personnel assigned to the zones involved.

6. Recommendations for Implementation by PAHO

A. Assign three PAHO epidemiologists to the dengue program in the Americas. PAHO should vigorously pursue present efforts to recruit a qualified virologist/epidemiologist for assignment to the Trinidad Regional Virus Laboratory and should coordinate his selection with that of the new director of TRVL. Two physicians with epidemiologic training should be sought through other agencies to participate in the surveillance program. The virologist/epidemiologist assigned to the Trinidad Regional Virus Laboratory could be responsible for the northern coast of South America and the Lesser Antilles. The second spidemiologist could be based in the Dominican Republic under the supervision of the University of Miami's dengue program and have responsibility of augmenting or establishing surveillance in Jamaica, Hispaniola, and Cuba. He should work closely with the CDC Tropical Disease Laboratory in San Juan, Puerto Rico. The third epidemiologist could best be assigned to Colombia to assist in investigating the current epidemic there.

B. Establish an effective system of information exchange on dengue and related diseases. This could be done through a quarterly newsletter, supplemented as necessary by special editions, prepared by the Chief, San Juan Tropical Diseases Laboratories, U. S. Center for Disease Control, San Juan, Puerto Rico. Information on A. aegypti control should be included. These newsletters would be distributed by PAHO to the laboratories directly concerned, to the Chief Medical Officers in the area,

and to the sentinel units, as well as to the members of the PAHO Scientific Advisory Committee on Dengue.

C. Develop specific epidemiologic, entomologic, and virologic technical guidelines pertinent to investigations of dengue viruses and their diseases and make them available to public health personnel of member countries. Assistance of Dengue Advisory Committee members and other consultants should be solicited as soon as possible to prepare these technical publications.

D. Provide such specific virologic assistance as member countries request during a suspected epidemic by having standing agreements with competent laboratories and by supplying national laboratories with appropriate inactivated viral antigens and antisera for serologic use. This might best be supplemented by designating one central dengue reference laboratory for the identification of virus isolates and the conduct of plaque-reduction neutralization tests. This service should be publicized.

E. Designate a panel of emergency consultants available to supplement national and full-time PAHO personnel if a request is received for such assistance. These persons should be sent as PAHO consultants and should always have necessary customs and quarantine documents. This panel should include physicians experienced in the management of life-threatening shock caused by infectious agents whenever such cases are encountered in significant numbers during dengue epidemics.

F. Identify sources of chemicals and equipment that could be made available for emergency vector control.

G. Periodically review the status of A. aegypti infestation in Central America, designate areas requiring dengue surveillance, and assign responsibility to an appropriate field epidemiologist.

H. Conduct a training course for laboratory directors in the latest technique for the isolation of dengue viruses. It is suggested that the Gorgas Memorial Laboratory/Middle America Research Unit (NIH), the U. S. Center for Disease Control, or the Walter Reed Army Institute of Research be considered as a site for this training course, and that

the Directors of at least the following laboratories be invited to participate:

Pasteur Institute in Cayenne, French Guiana
Instituto Nacional de Higiene in Caracas
Instituto Nacional para Programas Especiales de Salud in Bogotá
Valle University Department of Microbiology in Cali
The Gorgas/MARU (NIH, USPHS) laboratories
The Evandro Chagas Institute in Belém
The Department of Microbiology in Kingston
San Juan Tropical Disease Laboratory (U.S. CDC) in Puerto Rico
Trinidad Regional Virus Laboratory

I. Arrange for the production of an educational film for physicians, nurses, and paramedical workers on dengue diagnosis, differential diagnosis, and complications, including hemorrhagic manifestations. Other training aids such as slides, filmstrips, charts, seminar material, and possibly videotapes should also be prepared. Possible resources for the film include the SEATO cinematographic unit in Bangkok and the facilities and expertise of the National Medical Audiovisual Center in Atlanta.

J. Prepare and maintain a bibliography and collection of abstracts on dengue for distribution to interested persons and institutions, possibly through the PAHO Regional Library of Medicine in São Paulo.

7. Conclusions

The Committee urged that the program, as described above, be established, and that epidemiologists be provided for its implementation. Its coordination with all existing dengue activities in the Americas was stressed.

Priorities for designation of areas of investigation were considered to be important because of the magnitude of the program and the limited resources available. The heavily populated areas where A. aegypti is prevalent and where dengue has occurred in the past should, the Com-

mittee felt, receive first attention. In particular, Venezuela and Colombia are considered to be critical areas because of size, population, geographic location, and epidemic and possibly endemic dengue. The situation would appear to call for short-term epidemiologic and long-term laboratory support. The islands of the Greater Antilles are also considered important areas because of evidence for endemicity and large populations. The Committee recommended, therefore, that the epidemiologic studies in these areas be actively supported.

The existing epidemiologic investigation programs currently underway in Hispaniola, Puerto Rico, Trinidad, the French West Indies, Jamaica, Venezuela, and Colombia should be specifically supported by providing technical assistance and training where appropriate, and coordinated through an information exchange system. PAHO should promote and encourage continued investigation of what may be an emerging endemic situation in Colombia.

Table 1

Area, Population, and Population Density in the Caribbean Islands
1960 - 1970

Country	Area of Country Km^2	Total Population in 1,000's		Population Km^2	
		1960	1970	1960	1970
Barbados	430	233	256	542	595
Cuba	114,524	6,826	8,392	60	73
Dominican Republic	48,734	3,036	4,325	62	89
Haiti	27,750	3,991	4,867	144	175
Jamaica	10,962	1,629	1,996	149	182
Trinidad and Tobago	5,128	831	945	162	184
Antigua	442	55	60	124	136
Bahamas	11,405	113	161	10	14
Cayman Islands	259	9	10	35	39
Dominica	751	60	74	80	99
Grenada	344	90	103	262	299
Guadeloupe	1,779	273	327	153	184
Martinique	1,102	285	338	259	307
Montserrat	98	12	15	122	153
Netherlands Antilles	961	192	222	200	231
Puerto Rico	8,895	2,362	2,842	265	319
St. Kitts-Nevis and Anguilla	357	57	62	159	174
St. Lucia	616	86	115	140	187
St. Vincent	388	80	96	206	247
Turks and Caicos Islands	430	6	6	14	14
Virgin Islands (UK)	153	8	11	52	72
Virgin Islands (US)	344	32	59	93	172

Table 2

THE REPORTING OF DENGUE: CURRENT STATUS

A. Countries that include dengue in their weekly communicable disease reports to PAHO

1. Countries that use the PAHO reporting form, which includes dengue

a. Dengue notifiable

Barbados
Guatemala
Guyana
Mexico
Panama
Bahamas
Canal Zone
St. Kitts, Nevis, and Anguilla
St. Lucia
St. Vincent (reporting to begin in 1972)
Surinam
Virgin Islands (UK)

b. Dengue not notifiable

Colombia
Costa Rica
Honduras
French Guiana
Guadeloupe

2. Countries that use their own reporting form, which includes dengue (notifiable)

Dominican Republic
El Salvador
Jamaica
Trinidad and Tobago
Venezuela (outbreaks only)
Antigua (no reports received in 1969 or 1970)
Dominica
Grenada
Puerto Rico

Table 2 ....2/

B. Countries that do not include dengue in their reports or do not report regularly

1. Countries for which dengue is not listed in the weekly reports (not notifiable)

Cuba
Haiti
Nicaragua
United States (optional reports received)
British Honduras
Martinique
Virgin Islands (US)

2. Countries for which dengue has not been stated to be notifiable, and for which no weekly or monthly reports are received

Cayman Islands
Montserrat
Netherlands Antilles
Turks and Caicos Islands (since June 1968)

Table 3

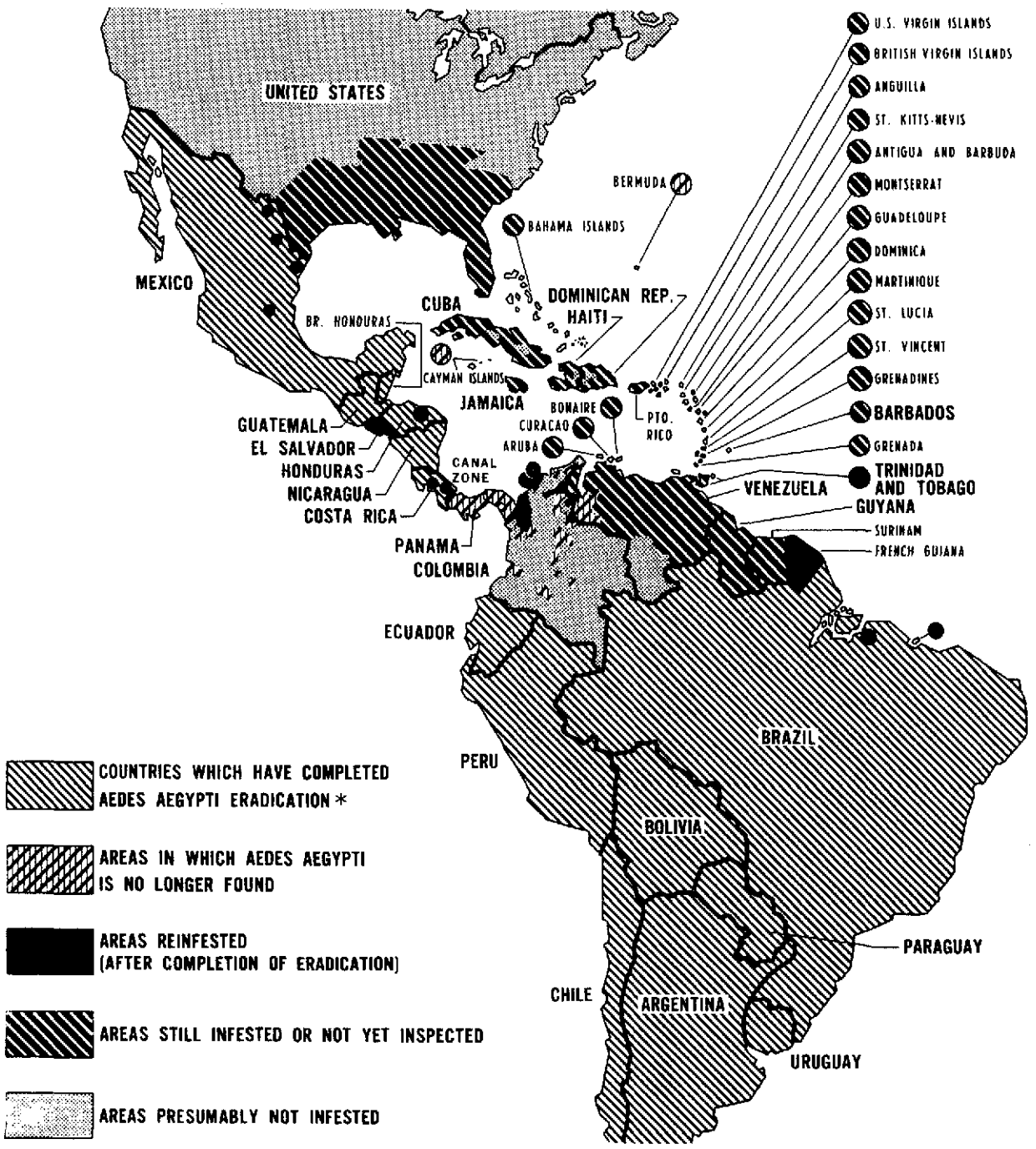
Reported cases or suspected outbreaks of dengue in the Caribbean area
1960 - 1971

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
Barbados	...	...	...	...	...	...	...	...	(p)	...	-	-
Colombia	-	-	-	-	-	-	-	-	-	-	-	(p)
Dominican Republic	494	821	822	350	407	527	...	...	-	16	3	3
Haiti	...	...	...	...	...	...	...	...	(p)	...	...	...
Jamaica	-	-	-	1,578	156	36	6	6	367	545	31	14
Venezuela[(a)]	56	-	-	-	18,306	4,040	7,750	1,330	383	3,917	...	-
Antigua	-	-	-	-	264	8	-	-	179	...	...	...
Bahamas	-	-	-	-	-	-	-	-	-	-	-	1
Dominica	...	...	-	2	43	-	...	-	41	-	-	-
Grenada	...	...	...	...	...	...	...	...	...	81	15	27
Martinique	...	...	...	(p)	...	...	...	...	...	...	...	-
Montserrat	-	-	-	-	-	-	-	-	(p)	...	...	...
Netherlands Antilles	...	...	...	(p)	...	...	...	...	...	...	...	...
Puerto Rico	-	-	-	25,737	2,440	93	2	1	-	16,665	136	14
St. Kitts - Nevis & Anguilla	-	-	-	-	721	-	-	-	(p)	-	-	-
St. Lucia	-	...	...	...	...	...	...	-	(p)	...	...	-
St. Vincent	-	-	-	-	-	-	-	...	(p)	-	-	...

- No cases.
... No data available.
(a) Reporting area.
(p) Outbreak or presence of dengue-like illness reported.

Figure 1

STATUS OF THE AEDES AEGYPTI ERADICATION CAMPAIGN IN THE AMERICAS
DECEMBER 1971



* ERADICATION CARRIED OUT ACCORDING TO THE STANDARDS ESTABLISHED BY THE PAN AMERICAN HEALTH ORGANIZATION

OCCURRENCE OF DENGUE IN THE CARIBBEAN

Figure 2

1963-1965

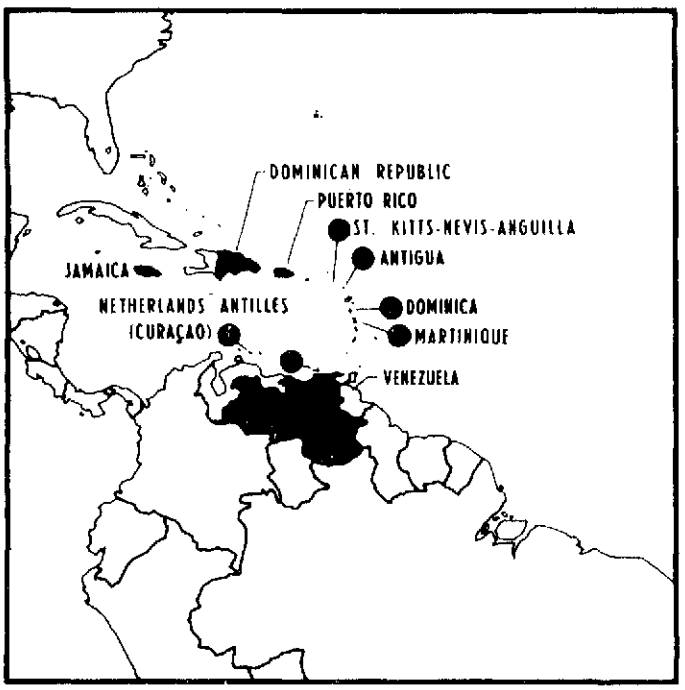


Figure 3

1966-1967

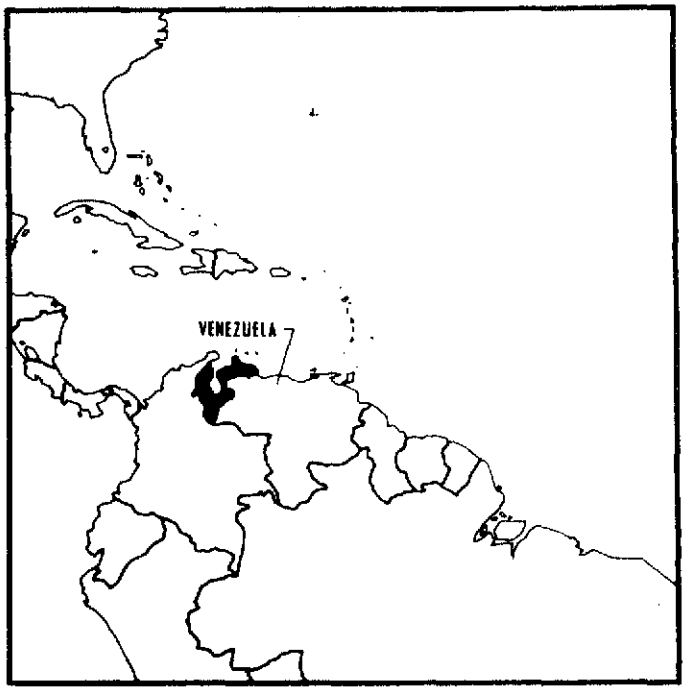


Figure 4

1968-1969

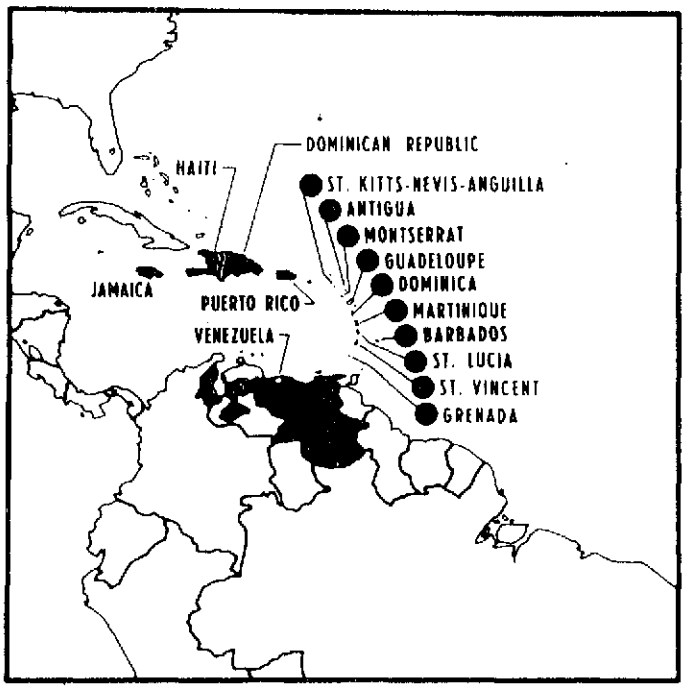


Figure 5

1970-1971