

"CAMPAIGN AGAINST AEDES AEGYPTI IN MEXICO"

(Document presented by the Government of Mexico)

CAMPAIGN AGAINST AEDES AEGYPTI IN MEXICO (INFORMATION ON THE  
ERADICATION CAMPAIGN, THE PARTIAL EVALUATIONS DURING 1959  
AND 1961, AND THE SPECIAL VERIFICATION OF ERADICATION)

1. Brief history of the Aedes aegypti eradication campaign  
in Mexico

The first references to urban yellow fever in Mexico appear in  
Cogolludo's description in 1648: \*

"In April and May of 1648 several deaths occurred that caused  
anxiety in the city of Merida ... At the beginning of June, cases of  
the disease appeared in the town of Campeche, and within a few days the  
disease had spread so rapidly that the town was considered devastated ...  
Travelers to Campeche were warned to beware of the contagion, but if  
the Almighty will not protect the city, what can human efforts accom-  
plish? This fear of divine justice was widespread during July. At the  
end of that month a number of persons who became ill died within a short  
time, but it was not known until August that this was an outbreak of the  
disease. It attacked the high and the low, the rich and the poor, with  
such speed and violence that many of the most influential and distin-  
guished citizens died. The city had never seen such misfortune since  
the Spanish conquest. By decree of the Cabildo, permission to bring the  
holy image of Our Lady of Izamal was requested. As such a disaster had  
not occurred before, the people were grief-stricken ... In other lands,

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\* Bustamante, Miguel E., Fiebre Amarilla en México y su Origen en  
América. Instituto de Salubridad y Enfermedades Tropicales,  
Mexico City, 1958. pp. 66-68.

plagues are often a common accident and afflict everyone equally; but it was not thus in Yucatan, and even greater confusion was caused. It is not possible to identify the disease involved, because the doctors themselves did not recognize it ... The usual symptoms were a very painful and intense headache and aching of all the bones of the body, so that the patient had the sensation of being violently split apart or crushed in a press (the bar blow of Dutertre, 1635). The pain was followed by a very high fever, which was accompanied in most cases by delirium. Vomiting of a substance that resembled putrid blood occurred, and very few of the persons so affected survived. Other patients suffered from loose bowels and upset stomach, which resulted in the so-called dysentery without vomiting. Still others felt a violent urge to vomit, without being able to vomit anything; and many suffered from fever and pain in their bones without any of the other symptoms ... On the third day, most patients seemed to be completely free from fever, and said they were experiencing no pain. Their delirium ceased, and they were able to speak sensibly, but they could neither eat nor drink anything and they remained in that state for one or more days, until they expired, affirming to the last that they felt well (Cogolludo, Chapter XIV, page 645, 1845). Many did not live beyond the third day, the largest number died at the beginning of the fifth day, and very few reached the seventh day, except for those who survived the illness, most of whom were older persons. The healthiest and most robust young men were attacked most violently and died most quickly ... Although many women became ill, the disease did not afflict them as badly as it did the men (page 646) ... Some patients slept

through the fever until they recovered without having been given any remedy. Twenty of our Franciscan fathers died in the city. Almost all the most prominent religious and lay persons died in that plague. Among them were the Governor and most members of the ecclesiastical chapter, the Provincial Father of this Province, the two Superiors of the two convents of the city, and the Superior of the Society of Jesus ... While the disease was rampant among the Spaniards, the Indians were not affected, except those who were with them and those who went to the city. Most of the latter died in their own villages, but those who aided them were not affected. That caused the bold assertion by the Indians that the outbreak was a punishment from God, because they only became ill in the city and the towns because of the bad treatment they were given. A deceitful Indian spread the rumor that all the Spaniards in Yucatan were going to die, and that only the Indians would be left alive ... A few days later the same disease that attacked the Spaniards broke out in many Indian towns, causing horrible devastation on the people who lacked facilities and medicines... The disease was rife in the land for two years ... Only rarely did anyone live in the area, or come there, during that period without becoming ill, and rarely did one die at a relapse after having recovered from the first attack. Everyone was left as pale as a corpse, with no hair on the head, often without eyebrows, so weakened that, even if the fever had lasted for only two days and the pain in the bones had been slight, as occurred in my case, it was frequently impossible to regain one's strength."

From that time to the present, as we know, all human resources have been employed in an effort to liberate us from that plague.

There is evidence that the Mayas in their frequent migratory movements, in which they were of course motivated by other factors as well, sought a way to avoid the cruel impact of this disease, which was mentioned in their codices and had a disastrous effect on their progress and development.

Many years later appeared the first measures directed against a perfectly differentiated nosological entity, known in many of its aspects.

In 1876, a grave epidemic occurred in Yucatan. Since it was observed that most of the patients were members of the federal forces, as a prophylactic measure the soldiers were sent in small groups to towns in the interior of the country.

At the end of the XIX Century, the Second American Scientific Congress was held in Mexico City, and various local and international measures to combat the disease were proposed.

In 1901 the health authorities decided to wage an intensive campaign to banish yellow fever from our soil, and in 1902 and 1903 they formulated a plan of attack against "the black vomit" in Veracruz, which had as principal objectives the isolation of the yellow fever patient and the complete elimination of the mosquitoes.

The campaign was begun on September 1, 1903, and was directed by Dr. Eduardo Liceaga. The role of Aedes aegypti in transmission had already been confirmed. (Carlos Finlay and the United States Army

Commission composed of Reed, Carroll, Lazear, and Agramonte). Later it was extended to Tampico, Merida, and Progreso.

In 1921, accepting the disinterested offer of technical and economic assistance by the International Health Office of the Rockefeller Foundation, the Special Commission for the Campaign against Yellow Fever was founded, and was directed by the following Mexican and United States officials:

Dr. Teodoro C. Lyster, Director; Dr. Angel Brioso Vasconcelos, Assistant Director; Drs. Francisco Castillo Nájera, Enrique Osornio, Bert W. Caldwell, Emmett I. Vaughn and Michael E. Connor as members. Subsequently, the following were named auxiliaries on the basis of merit: Drs. Juan Graham Casasús, Everardo Landa, Tomás G. Perrín, Alfredo Cuarón, Mauro Loyo, Pedro Pérez Grovas, E. J. Scanell, R. A. Stubbs and A. N. Walcott, and Engineer J. A. Le Prince, all of whom worked in regions where yellow fever was present, or was believed to be able to flourish.

In October 1921, the first Mexican Convention on Yellow Fever was held in Mexico City, at which a number of interesting studies and papers were presented.

At the meeting it was decided to divide the country into six zones and to establish laboratories in Tampico, Veracruz, and Merida to improve the organization of measures to combat the disease.

Simultaneously, educational efforts on a broad scale were made by means of various publicity media, to bring about the destruction of breeding places of mosquitoes, as well as to emphasize the need for notification and isolation of suspected cases.

With the disappearance of urban yellow fever from the health scene in Mexico, after 1923, when the last case occurred, and with the termination of the work of the Special Commission in 1925, measures to combat the disease were changed radically and a preventive services phase was entered.

The services in question were successful in maintaining low indices of Aedes aegypti infestation in the principal ports and in the city of Merida, and even brought about the elimination of the species on occasion, as occurred in the port of Veracruz in 1930, where the health unit was headed by Miguel E. Bustamante.

By virtue of the proven existence of jungle yellow fever in our territory, the Office of Yellow Fever Prophylaxis was created by an agreement between the Secretariat of Health and Welfare and the Pan American Sanitary Bureau, which went into effect on August 13, 1950.

The Aedes aegypti campaign was substantially modified with the use of DDT, which was applied in the southeastern part of the country with international techniques and instructors in 1949, 1950, 1954, and 1955.

Mexico's decision to implement an Aedes aegypti eradication program came as a result of its established policy of solving public health problems

as quickly as possible within the scope of its capability and in accordance with the priority given to each problem and pursuant to the international commitment undertaken in the resolution adopted at the 1947 meeting in Buenos Aires of the Directing Council of the Pan American Health Organization, of which Mexico is a member.

The susceptibility of this species to DDT, which has not been lessened in Mexico, as well as its habits and purely domiciliary behavior pattern, made it possible for us to define and apply precise techniques for its elimination.

The temporary opportunity offered by the malaria eradication campaign whose large-scale sprayings would be taken advantage of, and the conclusions from the experimental work of Carlos Ortiz Mariotte and Mateo Luna Batalla made it possible for us to adapt as the basis for our program the destruction of Aedes aegypti rapidly and surely by intradomiciliary spraying with DDT.

In 1956 the National Anti-Mosquito Service was established, under the direction of the Department of Epidemiology and Health Campaigns, as the agency in charge of the eradication program, which it has continued to be.

2. Detailed information on the eradication campaign carried out since 1957

A. Delimitation of the area initially presumed to be infested.

As the program is on a national level, the country, including its islands, has been considered as a whole, with a total area of 1,969,367 square kilometers, with 1,836 municipalities, 99,028 communities, and an estimated population of 37,170,485 as of June 30, 1962.



To determine the area presumably infested with Aedes aegypti, the fact that the species had not been found in Mexico at altitudes in excess of 1,000 meters above sea level was taken as a basis. Slightly less than 1,000,000 square kilometers of the total area, or 48.65 per cent, has an altitude of less than 1,000 meters.

The area presumably infested, outside of the initial malarious area, consists of 380,430 square kilometers or 20 per cent of the total area of the country. It includes 116 municipalities, or 6.4 per cent of the total number, which are composed of 7,291 communities, or 7 per cent, with a population of slightly more than 2,000,000, or 5.4 per cent of the population of the country.

B. Initial survey made in this area. Treatment and verification made in the communities found to be positive.

Surveys were made in 4,272, or approximately 60 per cent, of the 7,291 communities mentioned above.

The urban communities, of 500 or more houses, were surveyed in their entirety. Slightly more than 58 per cent of the rural communities, with fewer than 500 houses each, were surveyed, with preference being given to those having a larger number of houses. In other words, the only communities not surveyed were those of the least importance from the point of view of population, where the probability of finding Aedes aegypti was practically nil.

This survey revealed 248 positive communities, outside of the malarious area. Of those, 204 were rural and 44 urban, representing 5.8 per cent and 41.1 per cent of their kind, respectively.

Several investigations made before 1956 revealed 352 positive communities, which, added to the ones mentioned above, gave a total of 600.

Within the malarious area surveys were made in a number of localities, principally in the large population centers protected by barrier zones set up by the National Commission for Malaria Eradication, in the parts of them that had not been sprayed. That led to the discovery of five positive communities, which are included in the total given above.

There was particular interest in the inspection of the islands, which resulted in the discovery of the species on Maria Madre Island, Nayarit.

All positive localities received two treatments with the following specifications:

- I. Method used: Intradomiciliary spraying.
- II. Insecticide utilized: DDT 75 per cent wettable powder.  
WHO specifications.
- III. Vehicle for its application: water for permeable surfaces and petroleum for impermeable ones.
- IV. Concentration of the mixture for its application: 5 per cent, to deposit 2 grams of active principle per square meter.
- V. Number and interval of the applications: Two applications with an interval of six months, thus maintaining the uninterrupted action of the insecticide for twelve months, a period sufficient to eliminate the Aedes aegypti infestation.

All the houses were sprayed, including offices, warehouses, workshops, factories, shipyards, etc.

The spraying covered all rooms, corridors, and eaves, including ceilings or insides of roofs only when these were less than three meters high. The lower and rear surfaces of furniture also received treatment. The outbuildings for the use of animals were excluded.

The total number of sprayings was 626,698.

The urban localities found to be positive were subjected to three verifications after treatment, the first and second of which were made by investigation of foci and the third by investigation of foci and capture of adult mosquitoes in the houses.

All three, accomplished consecutively, were negative with respect to Aedes aegypti. The positive rural localities were submitted to a single verification of one hundred per cent of the houses, with similar negative results obtained with respect to Aedes aegypti.

C. Sprayings of the National Commission for Malaria Eradication.

According to the information supplied by the National Commission for Malaria Eradication, during 1957, 1958, 1959, 1960, 1961, and 1962, it made a total of 27,175,810 sprayings.

In 1955, 70 per cent of the area infested with Aedes aegypti coincided with the malarious area.

3. Information on the partial evaluations of the campaign made in 1959 and 1961

Hardly any standard verifications were made in 1959 because the campaign was in the treatment phase. In 1961, verifications were begun within the time limits set by the regulations. The verifications continued as outlined in Part B of Section 2, above, until the required number was reached. (Appendix)

4. Complete information on the current special verification

When the prescribed verifications consecutive to the treatments were completed with negative results with respect to Aedes aegypti, the Secretariat requested the collaboration of the Pan American Sanitary Bureau, pursuant to the provisions of Article 8 of Chapter C of the "Guide for Reports on the Aedes aegypti Eradication Campaign in the Americas," so that, on completion of the special confirmatory verification, the Government of Mexico might be able to declare the species eradicated. The Directing Council of the Pan American Health Organization would then be able to receive the information on Mexico's eradication of the urban yellow fever vector in accordance with the resolution passed in Buenos Aires in 1947.

In 1961, a preliminary investigation was made by the PASB Regional Consultant for the Americas and a Bureau advisor in 7 localities in the State of Coahuila, 6 in the State of Nuevo Leon, and 3 in the State of Tamaulipas, with negative results with respect to Aedes aegypti. There were 7,333 houses, of which 3,010 were visited and found to be negative.

In 1962, activities continued on a regular basis with two squads, each accompanied by a PASB advisor. Verification was completed in 19 localities in the State of Chiapas, 5 in the State of Oaxaca, 11 in the territory of Quintana Roo, and 154 in the State of Yucatan, giving a total of 189 localities with 99,491 houses, 37,950 of which were visited.

During 1963, the number of Pan American Sanitary Bureau advisors was increased to four, and the Secretariat provided sufficient field personnel, vehicles, including small planes, supplies, and equipment to intensify the work and complete it by August 15. Thus verification was made for 1 locality in Baja California Sur, 25 in Campeche, 5 in Coahuila, 8 in Colima, 1 in Nayarit, 4 in Nuevo Leon, 4 in Quintana Roo, 10 in Sinaloa, 6 in Sonora, 6 in Tabasco, 8 in Tamaulipas, 30 in Veracruz, and 110 in Yucatan, giving a total of 218 localities with 569,563 houses, of which 151,210 were inspected.

In short, the special verification began in July 1961, although it had not been definitively programmed, and after an interruption, was concluded in August 1963, seven days before the estimated date.

It covered the following geographical units: Baja California Sur, Campeche, Coahuila, Colima, Chiapas, Nayarit, Nuevo Leon, Oaxaca, Quintana Roo, Sinaloa, Sonora, Tabasco, Tamaulipas, Veracruz, and Yucatan.

In these areas, a total of 432 localities were covered in the verification, and 192,170 of the 676,387 houses therein were visited.

When the special confirmatory verification was completed with negative results with respect to Aedes aegypti, on August 8, 1963, Mexico was free of the species that transmitted urban yellow fever, which had been prevalent in the country for centuries, and had thus solved an important public health problem and complied with an international commitment.

5. Plans for surveillance to prevent reinfestation

Our Government's economic effort, unstinting during the development of the eradication phase, and the historical significance for health in Mexico of the elimination of a transmitting species for the first time in history more than justify the maintenance of the program of surveillance.

The XVI Pan American Sanitary Conference, which took place in Minneapolis in August 1962, urged the Governments of the countries and areas where the vector had been eradicated to maintain alert programs of surveillance to prevent reinfestation.

The chronological discrepancy in attaining eradication in the Americas makes it imperative for the countries that are free of the species to maintain costly surveillance services.

When the National Anti-Mosquito Service had confirmed negativity throughout the whole country by means of the prescribed verifications, it began a program of consolidation and surveillance in seaports, airports, and border stations that had traffic with countries where the species had not yet been eradicated with a view to forestalling reintroduction.

This program has had two phases:

1a. Inspection of ships and aircraft coming from countries infested with Aedes aegypti on arrival at ports and airports in Mexico, the latter when less than 1,000 meters above sea level.

Inspection of zones adjacent to the ports and airports.  
Periodic spraying of national transportation facilities and equipment.

2a. Elimination of inspection of ships and aircraft, replacing it by inspection of seaports and airports having international traffic with infested countries, and the application of insecticide to houses in case of infestation.

Surveillance was begun after a rigorous selection and training of personnel, utilizing the observation and results obtained in the consolidation phase, which was conceived, planned, and carried out as a preliminary phase.

To avoid any possibility of error we shall administer periodic spraying, with the specifications of the intradomiciliary spraying, on all national ships, especially those engaged in coastwise traffic, to avoid the presence of residual foci.

The first phase has now been concluded, and we are now in the midst of the second phase in the following ports and airports: Ensenada, B.C.; La Paz, B.C.; Guaymas, Sonora; Mazatlan, Sinaloa; Manzanillo, Colima;

Acapulco, Guerrero; Salina Cruz, Oaxaca; Tampico, Tamaulipas; Veracruz, Coatzacoalcos and Minatitlan, Veracruz; Frontera, Tabasco; Campeche y Ciudad del Carmen, Campeche; Progreso, Yucatan; Cozumel, Quintana Roo; Monterrey, Nuevo Leon and Merida, Yucatan.

The Caribbean Islands have merited our special attention with regard to the Mexican ports that may be real or potential ports of entry for Aedes aegypti. In view of the possibility of not exercising effective control over vessels that may be out of our reach for some unforeseen reason, we have arranged for at least two sprayings to be administered per year during the next two years, in addition to the above-mentioned periodic inspection.

Mexico City, August 1963



LIST OF LOCALITIES WHERE VERIFICATION WAS MADE IN 1959

Internal Verifications

LOCALITY	MUNICIPALITY	STATE
1. CAMPECHE	CAMPECHE	CAMPECHE
2. CIUDAD DEL CARMEN	CARMEN	"
3. SABANCUY	"	"
4. CHAMPOTON	CHAMPOTON	"
5. HALTUNCHEN	"	"
6. SEYBAPLAYA	"	"
7. SIHOCHAC	"	"
8. BECANCHEN	HOPELCHEN	"
9. BOLONCHENTICUL	"	"
10. HOPELCHEN	"	"
11. ICH EK	"	"
12. KONCHEN	"	"
13. SAN JUAN BAUTISTA	"	"
14. SUCTUC	"	"
15. XCUPII	"	"
16. IXCHE	"	"
17. PALIZADA	PALIZADA	"
18. BOHELA	TENABO	"
19. TENABO (Nucleo 1)	"	"
20. TENABO	"	"
21. TINUM	"	"
22. CINTALAPA	CINTALAPA	CHIAPAS
23. TRES PICOS	TONALA	"
24. TUXTLA GUTIERREZ	TUXTLA GUTIERREZ	"
25. HUIXTLA	HUIXTLA	"
26. HOLBOX	ISLA MUJERES	QUINTANA ROO
27. ALTAMIRA	ALTAMIRA	TAMAULIPAS
28. TUXPAM	TUXPAM	VERACRUZ
29. BUCZOTZ	BUCZOTZ	YUCATAN
30. SAN JOSE	CUZANA	"
31. DZONCAUICH	DZONCAUICH	"

32.	DIUCHE	HOCTUN	YUCATAN
33.	PETENCHI	"	"
34.	SAN JOSE PONIENTE	"	"
35.	SAN ISIDRO OCHIL	HOMUN	"
36.	PALABAN	"	"
37.	SAN ANTONIO	HUCHI	"
38.	SAN MIGUEL	"	"
39.	TLXCACAL QUINTERO	"	"
40.	X-KANTU	"	"
41.	SAN PEDRO	IZAMAL	"
42.	SITILPECH	"	"
43.	CHACZIKIN	MERIDA	"
44.	CHACZUSICHE	"	"
45.	DZUNUNCAN	"	"
46.	MERIDA	"	"
47.	XCUMPICH	"	"
48.	QUINTANA ROO	QUINTANA ROO	"
49.	TAHMEK	TAHMEK	"
50.	GAMBUL	TECOH	"
51.	SAN ISIDRO OCHIL	"	"
52.	X-KIN	"	"
53.	X-POC	"	"
54.	X-POLOL	"	"
55.	HOLANE	TEKANTO	"
56.	SAN DIEGO RODRIGUEZ	"	"
57.	TEKANTO	"	"
58.	TLXKOCHOK	"	"
59.	SAHCATZIN	TEPEKAN	"
60.	OXTANPACAB	TIMICUY	"
61.	SAN JOSE	TIXPEUAL	"
62.	CHAC	UCU	"
63.	SAN ANTONIO CHEL	"	"
64.	UMAN	UMAN	"
65.	XOCHEL	XOCHEL	"
66.	MUCUYCHE	CACALCHE	"
67.	CEPEDA	HALACHO	"
68.	OXTAPACAB	TECO	"
69.	EKMUL	TLXCOKOB	"

## LIST OF LOCALITIES WHERE VERIFICATION WAS MADE IN 1961

## Prescribed Verifications

LOCALITY	MUNICIPALITY	STATE
1. CAMPECHE	CAMPECHE	CAMPECHE
2. CIUDAD DEL CARMEN	CARMEN	"
3. PIEDRAS NEGRAS	PIEDRAS NEGRAS	COAHUILA
4. RODRIGUEZ	ABASOLO	"
5. ALLENDE	ALLENDE	"
6. CANDELA	CANDELA	"
7. ESCOBEDO	ESCOBEDO	"
8. MORELOS	MORELOS	"
9. PROGRESO	PROGRESO	"
10. SAN JOSE DE AURA	"	"
11. AGUJITAS	SABINAS	"
12. SABINAS	"	"
13. CHARCOS	VILLA UNION	"
14. AGUALEGUAS	AGUALEGUAS	NUEVO LEON
15. LA CEJA	CHINA	"
16. CHINA	"	"
17. EMPALME LOS HERRERAS	"	"
18. GENERAL TREVIÑO	GENERAL TREVIÑO	"
19. LOS HERRERAS	HERRERAS	"
20. HERRERAS ESTACION	"	"
21. MARIN	MARIN	"
22. VALLECILLOS	VALLECILLO	"
23. CULIACAN	CULIACAN	SINALOA
24. MAZATLAN	MAZATLAN	"
25. NAVOJOA	NAVOJOA	SONORA
26. QUEROBABI	OPODEPE	"
27. GUAYMAS	GUAYMAS	"
28. LOS ANGELES	SAN MIGUEL HORCASITAS	"
29. PESQUEIRA	"	"
30. SAN MIGUEL DE CAMARGO	CAMARGO	TAMAULIPAS
31. CIUDAD MIER	MIER	"
32. NUEVO LAREDO	NUEVO LAREDO	"
33. CIUDAD VICTORIA	VICTORIA	"
34. CACALCHEN	CACALCHEN	YUCATAN
35. MERIDA	MERIDA	"
36. PROGRESO	PROGRESO	"

Mexico City, September 6, 1963