Malaria Situation in Costa Rica, 1979

In 1979 the National Malaria Eradication Service examined 176,784 blood samples, of which 307 were found positive to the disease. Of these 274 were Plasmodium vivax, 31 were P. falciparum, 1 was combined P. vivax-P. falciparum, and 1 was P. malariae.

The provinces from which most cases were examined were Guanacaste, with 92 (30 per cent of the total), Puntarenas with 78 (25 per cent), and Alajuela with 32 (10.4 per cent). In San José Province, which is outside the malarious area, 69 cases (26 per cent of the total) were detected, most of them imported.

Of the total number of cases in 1978, 177 (58 per cent) were classified as imported: 140 came from Nicaragua, 23 from El Salvador, 12 from Honduras, and 2 from Guatemala.

More cases occurred in the consolidation area, mainly in the course of outbreaks, of which there was one of major importance in El Roble, Puntarenas, and adjacent areas, and another in Rio Claro, in the southern Pacific coastal region.

During September and October, 8 cases were detected in El Roble and adjacent areas, 3 of which were imported from Nicaragua. In a second outbreak, which occurred in Rio Claro and four adjacent localities, there were 19 cases, all P. vivax.

Conditions during the rainy season favored an increase in the number of Anopheles albimanus breeding grounds. Transmission was attributed to this and to migratory movements, primarily from Nicaragua.

(Source: Semana Epidemiológica 8(10), 1980. Ministry of Health of Costa Rica.)

Recommendations Submitted During the Meeting on Yellow Fever in Belem, Brazil, 18–22 April 1980

Pathogenesis, Immunity and Diagnosis

In the event of a yellow fever epidemic, PAHO should develop protocols and organize a multidisciplinary team to conduct on-site investigations for the purpose of:

- Obtaining serial serum samples from patients as soon after onset of illness as possible and continuing through the acute phase of illness. Such samples are essential to the evaluation of rapid and early diagnostic techniques.
- Field testing the immunofluorescent antibody technique to determine its applicability for rapid diagnosis. To that end, investigations should be promoted to define optimal practical methods for preparing, storing, and shipping slides, and to determine viral strain and cell types to be used to inactivate the virulence.
- Collecting specimens that will allow direct comparison of cell cultures, in particular Aedes pseudoscutellaris (AP61), A. albopictus (C6/36), Vero, LLCMK2, and others, with other methods including inoculation of mosquitoes and suckling mice, for isolation of yellow fever virus and its identification by direct fluorescent antibody or complement-fixation tests.
- Conducting clinical studies on patients to define pathophysiologic features of the disease, including disseminated intravascular coagulation changes, acid-base and hemodynamic changes, possible immunopathologic mechanisms, endotoxemia, the occurrence of late myocardial and prolonged hepatic dysfunction, and the basis for acute renal failure (hepatorenal syndrome versus tubular necrosis).

PAHO should revise and update the manual on histopathologic diagnosis of yellow fever, considering atypical manifestations and lesions of other organs, and should distribute the revised version to laboratories and pathologists, as well as public health personnel.

Ecology and Epidemiology

PAHO encourages and supports ecological studies on yellow fever virus in areas where outbreaks periodically
occur. An effort should be made to determine if the virus persists in such areas during interepidemic periods and, if so, what the mechanisms of persistence are.

Vector Biology and Emergency Control

PAHO should take steps to strengthen its role in the elimination of *Aedes aegypti* in the Americas by:

- Updating continually its inventory of personnel, equipment, and insecticides available in national programs.
- Assisting in field and laboratory studies necessary to resolve problems associated with genetic makeup of *A. aegypti* strains and their vectorial capacity for yellow fever and dengue.
- Promoting research on the biology, ecology, population density, and geographic distribution of *A. aegypti* and of the jungle vector of yellow fever.
- Assisting in the determination of insecticide resistance in the Region.
- Preparing and distributing guidelines in vector biology and control.
- Encouraging practical training of pilots in aerial spray vector control technique.

Vaccine Supplies

PAHO/WHO should urgently undertake a long-term program directed at modernizing the yellow fever vaccine manufacturing capability in the Americas to meet expected increasing demands in volume and quality. The program should anticipate major investment requirements that will be critically needed within the coming decade. Program elements should include:

- An analysis by appropriate experts of present methods, potential future methods (e.g., cell culture), cost considerations, and requirements for developmental research. Such an analysis would require consultation with representatives of industry, national producers, national regulatory authorities, and international funding agencies. Guidelines should be prepared for the development of the next generation of yellow fever vaccines and production facilities.
- An advanced development program to elaborate and select improved methods for production of an inexpensive and safe vaccine equivalent or better in efficacy to the present product.
- The capitalization and construction of manufacturing facilities to meet the anticipated requirements.

PAHO should actively encourage and support research on new methods to characterize and standardize the existing 17D yellow fever vaccine and new methods for producing, stabilizing and administering it. Recommended research approaches include:

- Assuring stability of diluted vaccine and its improvement, and of lyophilized vaccine.
- Increasing the yield of virus from chicken embryonic pulp by washing the pulp once with diluent and using the wash for vaccine production.
- Improving lyophilization procedures, including nitrogen gas quality.
- Evaluating animal cell lines as virus production substrates, including animal and human cells, insect cells, and cultures in suspension.
- Evaluating further scratch vaccination methods and manufacture of this type of vaccine.
- Determining virus heterogeneity in molecular (oligonucleotide fingerprint, RNA complementation analysis) and other appropriate methods.
- Investigating alternative methods for detecting neurovirulence of vaccine seeds, including the neuroblastoma cell line.

The Scientific Advisory Committee on Dengue, Yellow Fever, and *Aedes aegypti* requested the Director of the Pan American Sanitary Bureau to convey to the Director of the Oswaldo Cruz Foundation, Rio de Janeiro, and the National Institute of Health, Bogotá, its great appreciation of the outstanding service rendered over the years by those two institutions in the production of yellow fever vaccine for the Americas.

The Committee further recommended that PAHO make available to both institutions sufficient resources to develop strong research programs in yellow fever vaccine formulation, production, testing, and delivery.

Likewise, it was recommended that the *Newsletter on Dengue, Yellow Fever and Aedes aegypti* be discontinued following a final issue, its purposes and programs to be included in the new *PAHO Epidemiological Bulletin*. The guide for surveillance of yellow fever, as devised by Dr. Groot and reviewed by Committee members, was recommended for publication in English and Spanish.