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To my Teacher
Col. D. Wright
with thankful regs
G. Georgopoulos
24/5/55
Athens

EXTENSION TO CHLORDANE OF THE RESISTANCE TO DDT OBSERVED IN ANOPHELES SACHAROVI

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SYNOPSIS

Observations made in 1952 in the Skála district of Lakonia (Peloponnese) showed that the local malaria vector, *Anopheles sacharovi*, had developed a certain degree of resistance to DDT and Gammexane.

Since chlordane had produced 100% mortality among *A. sacharovi* from the same area in laboratory experiments, investigations were made to test this insecticide under field conditions. A village where chlordane had not previously been used, but DDT had been applied annually from 1946 to 1950, was accordingly sprayed with a 74% emulsion. The survival rate of the mosquitos caught inside the sprayed premises was very similar to that of those captured in unsprayed control premises—a finding which indicates that *sacharovi*'s resistance to DDT has now been extended to chlordane, although probably in a lower degree.

From observations made in Greece in 1951,[2, 3, 7] it appeared that, after a five-year nation-wide malaria-control programme carried out with the use of DDT, there were indications that *Anopheles sacharovi* had developed a certain degree of resistance to this insecticide.

Later observations,[4, 5] and especially those made in the Skála district of Lakonia (Peloponnese) in the summer of 1952,[8] fully confirmed the above phenomenon, and, as revealed by laboratory experiments made at the same time, the resistance developed by the local vector was also extended to Gammexane.[8] Concurrently, a 100% mortality was observed among *A. sacharovi*, from the same area, placed in contact with chlordane and dieldrin under laboratory conditions.

With special regard to chlordane, which in the past had given satisfactory results against DDT-resistant *Musca domestica*,[1, 6] it should be noted that 4,071 *A. sacharovi*, placed for 30 minutes in sprayed cages (rate of spraying : 150 mg per m^2), kept in the laboratory, were all killed

within the first 24 hours, and that this lethal action extended for a period of at least 40 days after the spraying.

During the same period, it was decided, for practical purposes, to investigate whether the efficiency of chlordane against the local vector would remain steady under outdoor conditions.

For this purpose, the village of Leimonas, in Skála district, which is located near the outfall of river Evrótas, was selected. This village has a population of 834 and is surrounded by extensive rice-fields and cotton plantations.

Malaria Conditions in the Area

Anopheline density in the area has always been high. During the pre-DDT period, malaria incidence in the area (13 villages, population 7,180) was high, and the school-age endemo-epidemiological indices collected annually in the neighbouring village of Skála (considered as representative of the whole area) reached high rates (see table I).

TABLE I. SPLEEN-RATES AND PARASITE-RATES AMONG SCHOOLCHILDREN IN THE DISTRICT OF SKÁLA, LAKONIA (PELOPONNESE), 1933-51

Year	Spleen survey		Parasite survey	
	number examined	spleen-rate (%)	number examined	parasite-rate (%)
1933	99	80	99	38
1934	95	89	95	58
1935	94	89	94	64
1936	100	77	100	34
1937	84	63	84	25
1938	100	63	98	54
1945			25	8
1946*	**	32	100	0
1948			93	0
1949	**	11	100	0
1950			100	0
1951			205	0

* During this year a parasite survey of nine infants showed a parasite-rate of 0.
** Figures no longer available.

The rates collected during recent years from schoolchildren in Skála and in the village of Leimonas show a complete decline (see table II).

TABLE II. SPLEEN-RATES AND PARASITE-RATES AMONG SCHOOLCHILDREN IN THE VILLAGE OF LEIMONAS, 1949-52

Year	Spleen survey		Parasite survey	
	number examined	spleen-rate (%)	number examined	parasite-rate (%)
1949	48	14.5	47	0
1950			62	0
1951*			73	0

* During this year a parasite survey of seven infants showed a parasite-rate of 0.

The anopheline density of Leimonas during the 1952 malaria season, when the chlordane spraying was carried out, was very high, reaching a peak two days prior to the spray (12 July, four premises, 412 males, 4,542 females).

The village had been sprayed with DDT (1.8 g per m²) for five successive years (1946-50), but no spraying was done in 1951.

Observations in the Village of Leimonas

During the period 14-17 July 1952, and while the anopheline population in the village was high, all houses and stables in the village (430 premises in all) were sprayed with a 74% emulsion of chlordane at the rate of 1.5 g per m² of surface.

Three stables in the village were left unsprayed to serve as control stations.

Other stables in the neighbouring village of Souli, located 7 km (approximately 4 miles) away, were also used as control stations.

From 22 July, i.e., five days after the chlordane spraying, catches of mosquitos were started (*a*) in sprayed premises of Leimonas, (*b*) in unsprayed premises of Leimonas, and (*c*) in premises of the unsprayed village of Souli.

These daily catches were made long after sunrise (two to three hours) in bedrooms and stables of the village of Leimonas (at the average ratio of two bedrooms to one stable) and until a number of anophelines sufficient for further observations had been obtained.

The anophelines caught were transferred to unsprayed premises and were placed separately in clean screen cages, 40 cm × 40 cm × 40 cm, and kept under suitable environmental conditions.

Every morning, and for three 24-hour periods after their caging, the dead mosquitos were counted.

TABLE III. SURVIVAL RATES OF ANOPHELES SACHAROVI CAUGHT IN SPRAYED PREMISES IN THE VILLAGE OF LEIMONAS

Observation period (1952)	Interval between spraying and observation (days)	Number of tests	Number caged			Average percentage of survivors								
						after 24 hours			after 48 hours			after 72 hours		
			males	females	total	males	females	total	males	females	total	males	females	total
22-31 July	5-15	10	141	944	1,085	31.9	76.4	70.6	12.7	55.0	49.5	3.5	26.6	23.6
1-10 August	16-25	10	192	1,246	1,438	17.7	71.1	63.9	7.8	45.3	40.3	3.6	14.8	13.3
11-20 August	26-35	10	77	685	762	46.7	75.3	72.4	19.4	57.6	53.8	6.4	39.5	36.2
21-30 August	36-45	10	70	866	936	68.5	91.1	89.4	41.4	83.9	80.7	34.2	69.2	66.6
31 August-9 September	46-55	10	27	526	553	29.6	88.7	85.8	18.5	71.4	68.8	14.8	53.8	51.8

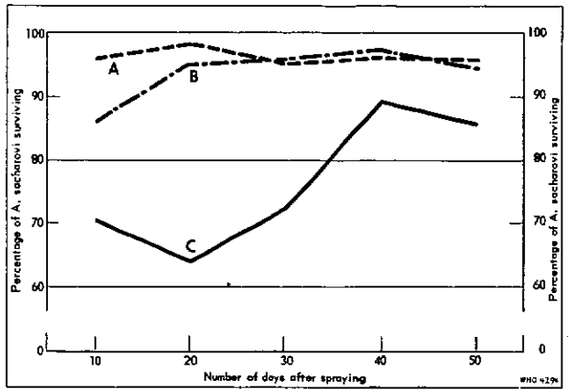
TABLE IV. SURVIVAL RATES OF ANOPHELES SACHAROVI CAUGHT IN UNSPRAYED PREMISES IN THE VILLAGE OF LEIMONAS

Observation period (1952)	Number of tests	Number caged			Average percentage of survivors								
					after 24 hours			after 48 hours			after 72 hours		
		males	females	total	males	females	total	males	females	total	males	females	total
22-31 July	10	142	940	1,082	67.6	89.1	86.3	18.3	67.0	60.6	7.7	46.7	41.6
1-10 August	10	101	1,483	1,584	58.4	97.9	95.3	25.7	81.5	78.0	5.9	43.1	40.7
11-20 August	10	37	815	852	91.9	96.0	95.7	64.8	87.7	86.7	48.6	77.9	76.6
21-30 August	10	38	969	1,007	84.2	97.9	97.4	71.0	95.8	94.9	60.5	82.9	82.1
31 August-9 September	10	23	484	507	78.2	95.8	95.0	30.4	80.9	78.6	21.7	66.5	64.4

TABLE V. SURVIVAL RATES OF ANOPHELES SACHAROVI CAUGHT IN THE UNSPRAYED VILLAGE OF SOULI

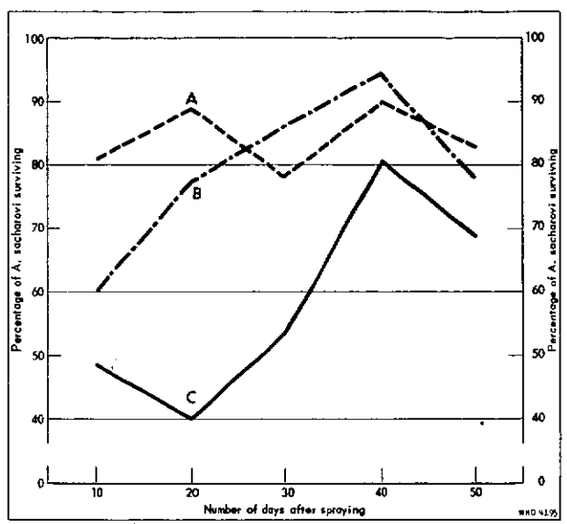
Observation period (1952)	Number of tests	Number caged			Average percentage of survivors									
					after 24 hours			after 48 hours			after 72 hours			
		males	females	total	males	females	total	males	females	total	males	females	total
22-31 July	10	61	1,318	1,379	77.0	96.8	96.0	63.9	78.8	81.6	44.2	64.6	63.7
1-10 August	10	24	1,187	1,211	83.3	98.6	98.3	70.8	90.1	89.7	54.1	77.5	77.1
11-20 August	19	12	1,143	1,155	75.0	95.7	95.4	50.0	78.8	78.5	25.0	60.8	60.5
21-30 August	10	29	1,099	1,128	58.6	97.4	96.4	41.3	91.9	90.6	37.9	78.2	77.2
31 August-9 September	10	30	1,199	1,229	46.6	97.0	95.8	33.3	83.9	82.7	20.0	62.8	61.7

FIG. 1. PERCENTAGE OF ANOPHELES SACHAROVI SURVIVING IN SPRAYED AND UNSPRAYED QUARTERS IN THE VILLAGE OF LEIMONAS AND IN THE UNSPRAYED VILLAGE OF SOULI—I: AFTER FIRST 24-HOUR PERIOD



A = unsprayed quarters in Souli
B = unsprayed quarters in Leimonas
C = sprayed quarters in Leimonas

FIG. 2. PERCENTAGE OF ANOPHELES SACHAROVI SURVIVING IN SPRAYED AND UNSPRAYED QUARTERS IN THE VILLAGE OF LEIMONAS AND IN THE UNSPRAYED VILLAGE OF SOULI—II: AFTER SECOND 24-HOUR PERIOD



A = unsprayed quarters in Souli
B = unsprayed quarters in Leimonas
C = sprayed quarters in Leimonas

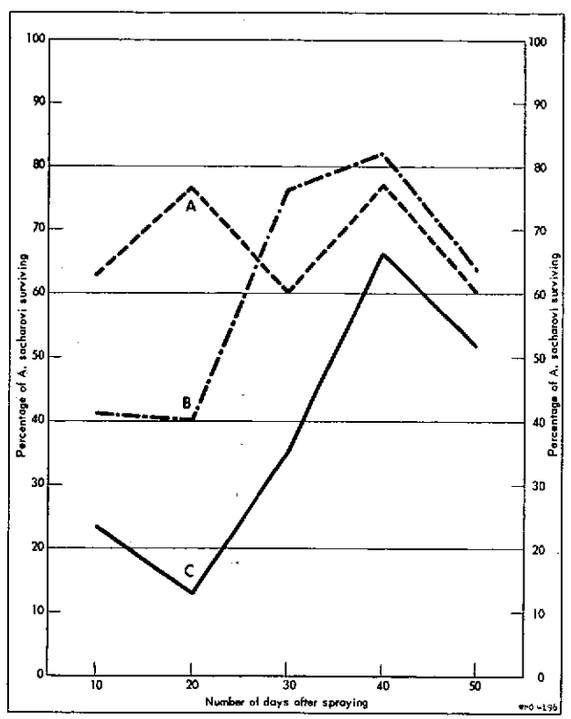
Results

The results obtained, which are shown in detail in tables III, IV, and V, and in fig. 1-3, may be summarized as follows :

(*a*) Of 4,774 *A. sacharovi* (507 males, 4,267 females) caught 2-3 hours after sunrise in bedrooms and stables sprayed with 74% chlordane (1.5 g per m^2), 63.9%-89.4% survived for 24 hours, 40.3%-80.7% for 48 hours, and 13.3%-66.6% for 72 hours.

(*b*) Of 5,032 *A. sacharovi* (341 males, 4,691 females) caught in unsprayed stables in Leimonas, 86.3%-97.4% survived for 24 hours, 60.6%-94.9% for 48 hours, and 40.7%-82.1% for 72 hours.

FIG. 3. PERCENTAGE OF ANOPHELES SACHAROVI SURVIVING IN SPRAYED AND UNSPRAYED QUARTERS IN THE VILLAGE OF LEIMONAS AND IN THE UNSPRAYED VILLAGE OF SOULI — III : AFTER THIRD 24-HOUR PERIOD



A = unsprayed quarters in Souli
B = unsprayed quarters in Leimonas
C = sprayed quarters in Leimonas

(*c*) Of 6,102 *A. sacharovi* (156 males, 5,946 females) caught in stables in the unsprayed village of Souli, 95.4%-98.3% survived for 24 hours, 78.5%-90.6% for 48 hours, and 60.5%-77.2% for 72 hours.

(*d*) The survival rate of *A. sacharovi* caught within premises sprayed with chlordane was considerable from the first catches, i.e., from the fifth day after spraying, and, on the whole, became higher as the interval between the date of capture and that of the spraying became longer. The survival rate was, in all cases, considerably higher among the females.

Conclusions

The 74% chlordane residual spray, applied for the first time in 1952 in the village of Leimonas, which had been sprayed with DDT for five successive years, had but little effect on *A. sacharovi*.

The observed survival rate of the mosquitos caught inside chlordane-sprayed premises in Leimonas was nearly the same as that noted among the mosquitos caught in unsprayed premises of the same village and in premises of the unsprayed village of Souli.

These observations are in complete contrast to those made in Greece during the 1946-50 period with the same insecticide, and indicate that the resistance to DDT, developed by the local vector, has extended to chlordane, although probably in a lower degree, which seems to justify the contrary results, obtained with the same insecticide under laboratory conditions.

RÉSUMÉ

Les observations faites en Grèce en 1952, dans le district de Skála (Péloponnèse) ont montré que le vecteur du paludisme *Anopheles sacharovi* présentait une certaine résistance au DDT et au HCH, après cinq années de lutte antipaludique au moyen de ces insecticides. Comme le chlordane avait causé, dans les expériences de laboratoire, une mortalité de 100 % chez les moustiques de cette région, des essais ont été entrepris pour vérifier l'action de cet insecticide sur le terrain. Dans un village où seul le DDT avait été employé auparavant, certains locaux (chambres et étables) furent traités par des pulvérisations de chlordane en émulsion à 74 %, à raison de 1,5 g/m^2, tandis que d'autres locaux non traités, dans le même village et dans un village voisin, servaient de témoins.

A partir du 5e jour après le traitement, on procédait à la capture de moustiques chaque jour, et on les gardait dans des cages d'observation. Le taux de survie a été établi chaque 24 heures pendant trois jours. Près de 11.000 moustiques ont été ainsi observés. Le taux de survie a été à peu près le même, qu'il s'agisse de *A. sacharovi* ayant séjourné dans les locaux traités au chlordane ou dans les locaux non traités. *Locaux traités :* 63,9 %-89,4 % survivants après 24 heures, 40,3 %-80,7 % après 48 heures, 13,3 %-66,6 % après 72 heures. *Locaux témoins du même village :* 86,3 %-97,4 % après 24 heures, 60,6 %-94,9 % après 48 heures, 40,7 %-82,1 % après 72 heures.

Ces résultats suggèrent que la résistance de *A. sacharovi* s'étend maintenant au chlordane, bien qu'elle paraisse cependant moins accusée que la résistance au DDT. Le taux de survie a été beaucoup plus élevé chez les femelles que chez les mâles.

REFERENCES

1. Georgopoulos, G. D. (1951) *Arch. Hyg. (Athens)*, Nos. 1-4, 108 (Greek), 118 (English)
2. Georgopoulos, G. D. (1951) *Arch. Hyg. (Athens)*, Nos. 9-12, 246 (Greek), 264 (English)
3. Georgopoulos, G. D. (1951) *On certain malariological subjects on Boeotia and Phtiotis* (unpublished report to the Ministry of Social Welfare)
4. Georgopoulos, G. D. (1952) *Inactivation of DDT to anopheles and other domestic insects in Greece* (unpublished report to WHO)
5. Georgopoulos, G. D. (1952) *The antimalaria programme of 1952* (unpublished report to the Ministry of Social Welfare)
6. Hajinicolaou, J. N. (1948) *Arch. Hyg. (Athens)*, **6**, 137 (Greek), 222 (English)
7. Livadas, G. [A.] (1951) *Do anophelines acquire resistance to DDT?* (unpublished working document WHO/Mal/74)
8. Livadas, G. A. & Georgopoulos, G. [D.] (1953) *Bull. Wld Hlth Org.* **8**, 497

PAN AMERICAN SANITARY ORGANIZATION

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ANNUAL REPORT OF THE DIRECTOR
OF THE
PAN AMERICAN SANITARY BUREAU
REGIONAL OFFICE FOR THE AMERICAS
OF THE
WORLD HEALTH ORGANIZATION
1956

PAN AMERICAN SANITARY BUREAU

Regional Office of the World Health Organization
1501 New Hampshire Avenue, N.W.
Washington 6, D.C.

To the Member States of the Pan American

Sanitary Organization

I have the honor to transmit herewith the Annual Report of the Pan American Sanitary Bureau, Regional Office for the Americas of the World Health Organization, for the year 1956. This Report covers the work of the Washington Office as well as that of the Zone Offices. It describes projects implemented in collaboration with the governments of Member States and with other international organizations. The Financial Statement for the year, is submitted separately.

Respectfully yours,

Fred L. Soper
Director

ANNUAL REPORT OF THE DIRECTOR 1956

ANNUAL REPORT

of the

DIRECTOR

1956

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ABBREVIATIONS

AIDIS	Inter-American Association of Sanitary Engineering
CCTA/OAS	Coordinating Committee in Technical Assistance of the Organization of American States
CINVA	Inter-American Housing Center
CIRSA	Regional International Committee for Health in Agriculture and Livestock
CNEP	National Commission for Eradication of Malaria
COMEP	Coordination Office for Malaria Eradication Program
FAO	Food and Agriculture Organization
ICA	International Cooperation Administration
ICAO	International Civil Aviation Organization
IIAA	Institute of Inter-American Affairs
IA-ECOSOC	Inter-American Economic and Social Council
ILO	International Labor Organization
INCAP	Institute of Nutrition of Central America and Panama
OAS	Organization of American States
OAS/TA	Organization of American States-Technical Assistance
OIRSA	Regional International Organization for Health in Agriculture and Livestock
PASB	Pan American Sanitary Bureau
PASC	Pan American Sanitary Conference
PASO	Pan American Sanitary Organization
PAU	Pan American Union
SCISP	Inter-American Cooperative Public Health Service
SNEM	National Service for the Eradication of Malaria
TAB	Technical Assistance Board
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations International Children's Fund
UNTAA	United Nations Technical Assistance Administration
USPHS	United States Public Health Service
WHO	World Health Organization

Illustrations, Graphs, and Tables

INTRODUCTORY SECTION

INTRODUCTORY REVIEW

Stabilization and Growth

The Long View

Long-range objectives and long-term planning were the watch words for the Pan American Sanitary Bureau (PASB), Regional Office of the World Health Organization (WHO), as it completed its activities for 1956. In the ensuing Annual Report of the Director, the word Bureau will be used at times for the sake of brevity to designate the one office which carries out this dual capacity.

Today systematic eradication of certain major communicable diseases has come to be a prime target in any long-range program in the field of public health. This was kept in mind when in 1956 major Pan American Sanitary Bureau efforts continued to converge on a campaign to eradicate malaria from the Western Hemisphere.

At the IX Meeting of the Directing Council of the Pan American Sanitary Organization (PASO), the Representative of the United States announced that his government was making a special contribution of $1,500,000 to increase the special fund of the Pan American Sanitary Organization for anti-malaria activities in the Hemisphere. This substantial support from a Member Government which has but recently succeeded in eradicating malaria within its own borders acts as an incentive to other Member Governments to achieve a like result.

Consonant with long-term directive planning there was in 1956 in all PASB/WHO cooperative health work in the Hemisphere an unremitting effort to ensure continued progress in an extensive program of varied public health activities. Broadly speaking, 1956 programs aimed toward: (1) the strengthening of the fundamental health services of Member Governments; (2) the expansion of education and training facilities for health workers; and (3) the intensification of coordination and assistance in the planning and operation of activities for the eradication of communicable diseases which lend themselves to eradication.

To accomplish these objectives, PASB/WHO continued to operate organically with Headquarters in Washington, D.C., and Zone and Field Offices located in Buenos Aires, El Paso, Guatemala City, Kingston, Lima, Mexico City, and Rio de Janeiro. Through these offices and field staff stationed in the several countries, the cooperation with the various Member Governments was continued as in previous years in order to promote "the highest possible level of health for the people of the Americas."

As the numerous projects, particularly those of relatively longer duration, have become stabilized throughout the Hemisphere, interest is centering on their consolidation and transfer to the governments for continuity of operation by the countries themselves.

Steps in Organization

Cooperation in public health in the Western Hemisphere began with regional conferences in Latin America as early as 1873, and with international conferences in the United States in 1881.

The Pan American Sanitary Bureau had its inception in a resolution of the Second International Conference of American States in Mexico City in January 1902, and was organized by the International Sanitary Convention in Washington, D. C. in December of the same year. This was the first of 14 Pan American Sanitary Conferences held to date.

In 1924, in Havana, Cuba, the VII Pan American Sanitary Conference adopted the Pan American Sanitary Code, a treaty which established the functions and duties of the Bureau as a technical international organization directly responsible to the Pan American Sanitary Conference composed of representatives of the American Republics.

The XII Pan American Sanitary Conference (Caracas, Venezuela, January 11-24, 1947) proved to be of special significance in the history of continental and world public health. This was so because of the large number of participants, the nature of the topic considered, and the resolutions adopted.

After declaring that the continued progress made by the Pan American Sanitary Bureau has been a decisive factor in the promotion of public health in the Americas, the Conference adopted the basis for the formal establishment of the Pan American Sanitary Organization which was to consist of four organs: (a) the Pan American Sanitary Conference; (b) the Directing Council; (c) the Executive

Committee; and (d) the Pan American Sanitary Bureau, as the operating organ of the Organization.

The XII Pan American Sanitary Conference performed one more significant act, inasmuch as it resolved: "That the Pan American Sanitary Organization, represented by the Pan American Sanitary Conference and the Pan American Sanitary Bureau, shall continue to function in its continental character in American aspects of health problems and shall act as Regional Committee and Regional Office of the World Health Organization in the Western Hemisphere in accordance with the Constitution of the WHO."

The PASB/WHO agreement was signed in May 1949, soon after the principles established by the PASC were fulfilled. As a result of this agreement the Western Hemisphere became one of the six geographical areas of WHO, the Directing Council of the Pan American Sanitary Organization and the Pan American Sanitary Bureau serving respectively as the Regional Committee and the Regional Office. In this manner, there is a united front which permits working relationships with all political units in the Americas in the field of health, which is so essential if good results are to be expected from international health activities.

The status of the PASO as an Inter-American Specialized Organization was defined and its relationship to the WHO recognized in an agreement between the Council of the Organization of American States and the Directing Council of the PASO in May 1950.

Program and Funds

The key objective of the Bureau is to collaborate with Member Governments in the development of national health programs to be executed by the corresponding national health authorities. The Bureau, at the request of these governments, gives advice and technical aid in the promotion of these programs. This is often done through the provision of advisory services in many fields. It is done through granting of fellowships, organization of training courses and seminars, where it is possible to exchange information and experiences among doctors, engineers, nurses, sanitarians, and other health workers from the several countries.

Predominantly, the program is carried out through the organization and operation of cooperative activities usually known as "projects", 142 of which were in operation in 1956, over 40 of them being of inter-country and continent-wide character.

Where does the PASB obtain its funds?

This question can be answered only generally in this introduction, for the sources of financial support are several, somewhat interlocking and, at first glance, complicated. The details of the flow of this network of funds are spelled out more comprehensively in another section of this Report. Suffice to state here that there are three main sources of funds, the first one being the funds of the PASO, coming from the annual quota assessments of the 21 American Republics, plus the financial participation of France, the Netherlands, and the United Kingdom on behalf of their dependent territories. In addition, as the Regional Office of WHO, the Bureau receives funds corresponding to the regional activities of WHO in the Americas financed from the regular budget of WHO plus the funds coming as a result of WHO participation in the United Nations Technical Assistance Program.

The Bureau participates also in the program of technical cooperation of the Organization of American States by administering the Pan American Foot-and-Mouth Disease Center.

There are other sources of funds composed of grants, and the like, which are received by the Bureau for the administration of the Institute of Nutrition of Central America and Panama. Other funds come from special grants made for specific purposes by institutions and agencies.

Furthermore, the multilateral international health activities in the Americas are supplemented by the contributions of UNICEF in equipment and supplies for programs technically approved and supported by PASB/WHO.

Expenditures of the Bureau during the year amounted to $5,104,449.

Closing in on Malaria

Earlier Developments

One of the most urgent health problems confronting the Americas today is the eradication of malaria. During 1956 the countries of the Americas continued closing in on the disease, bringing closer the day on which it will have been eradicated, and the Hemisphere will be free from this most important scourge.

Malaria is a disease caused by the parasite *Plasmodium*, which is present primarily in the blood stream. It produces a marked anemia in its victims, who drag wearily about, unable to make more than a minimum physical and mental effort. In regions where it is endemic, the chronic debilitating effects of the disease act as a block to social and economic progress. In such regions, labor output is reduced, and industrial incentive and effort impeded. Since malaria often occurs in the most fertile zones of a country, the agricultural development of these areas is either inhibited altogether, or kept close to a bare subsistence level.

The urgency of malaria eradication is explained in part by the debilitating effects of the disease, and in part by the fact that it can now be eradicated. Inexpensive eradication, however, will be possible only if concerted action occurs before the mosquito vectors develop resistance to the newer insecticides. The tools for eradication are available to the Americas, but there is a time limit to their effectiveness. The task must be completed before time runs out.

The history of man's struggle against malaria is a fascinating story of new discoveries and changes in strategy as a result of them, all in an effort to provide protection to the greatest possible number of people. From unrecorded times man has lived with malaria, but as soon as records appear, they speak of man's desire to live without it, and of techniques for doing so. Malaria gets its name from the "bad air" which emanated from marshes and swamps, long supposed the cause of the disease. But until the parasite was discovered, and the mode of transmission defined and studied, no firm steps could be taken, and man could only suggest tentative hypotheses for combating it, groping in the darkness of ignorance of its causes.

Toward the end of the 19th century, man began to learn specific things about malaria, and, since then, each step forward in the struggle has been a step to narrow the field of action, to concentrate efforts and heighten their effects, and to take maximum advantage of the weak points in the chain of transmission. The discovery of the parasite by Laveran, and the study of its life cycle, gave man his first real look at the enemy and opened new fields of study. New drugs could be synthesized and tested.

The discovery by Ross of the transmission of malaria by mosquitoes of the genus *Anopheles* was a tremendous stride forward. Man now had a knowledge of the complete cycle of transmission. But there are many species of anophelines, and to combat all of them is exceedingly difficult and costly.

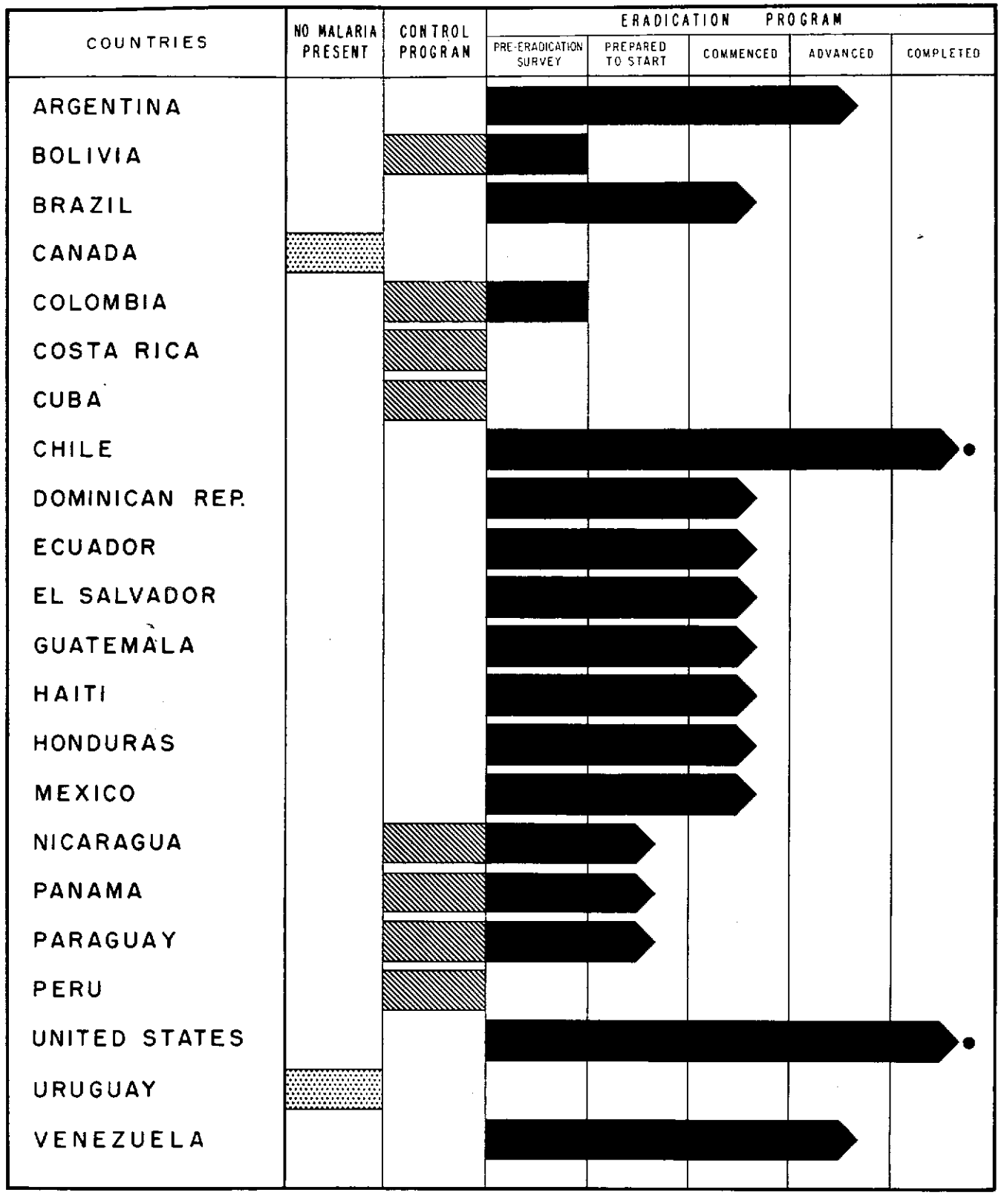
The discovery that not all anophelines transmit malaria, and that by controlling only the vector species it is possible to reduce malaria, was a further step in narrowing the field of action and in permitting efforts to be concentrated. This concept, called "species sanitation", made it possible for man to attack only those anophelines which were directly causing malaria. Other species could be ignored. Funds could be channeled into campaigns which would be most effective.

During the period from the turn of the century until World War II, efforts in malaria control were directed toward reducing the number of vector mosquitoes which could attack the population. This meant that the fight was usually directed toward the aquatic form of the insect. Swamps were drained and oiled, dikes and floodgates constructed, and rivers were channeled so that favorable breeding places would be at a minimum. The battleground against malaria was at the water surface of actual or potential breeding places. The cost of malaria control was high, and limited to those communities which could afford it. The vast majority of the population of the Americas, which lives in rural areas, and could not afford this kind of protection, was forced to live with its malaria.

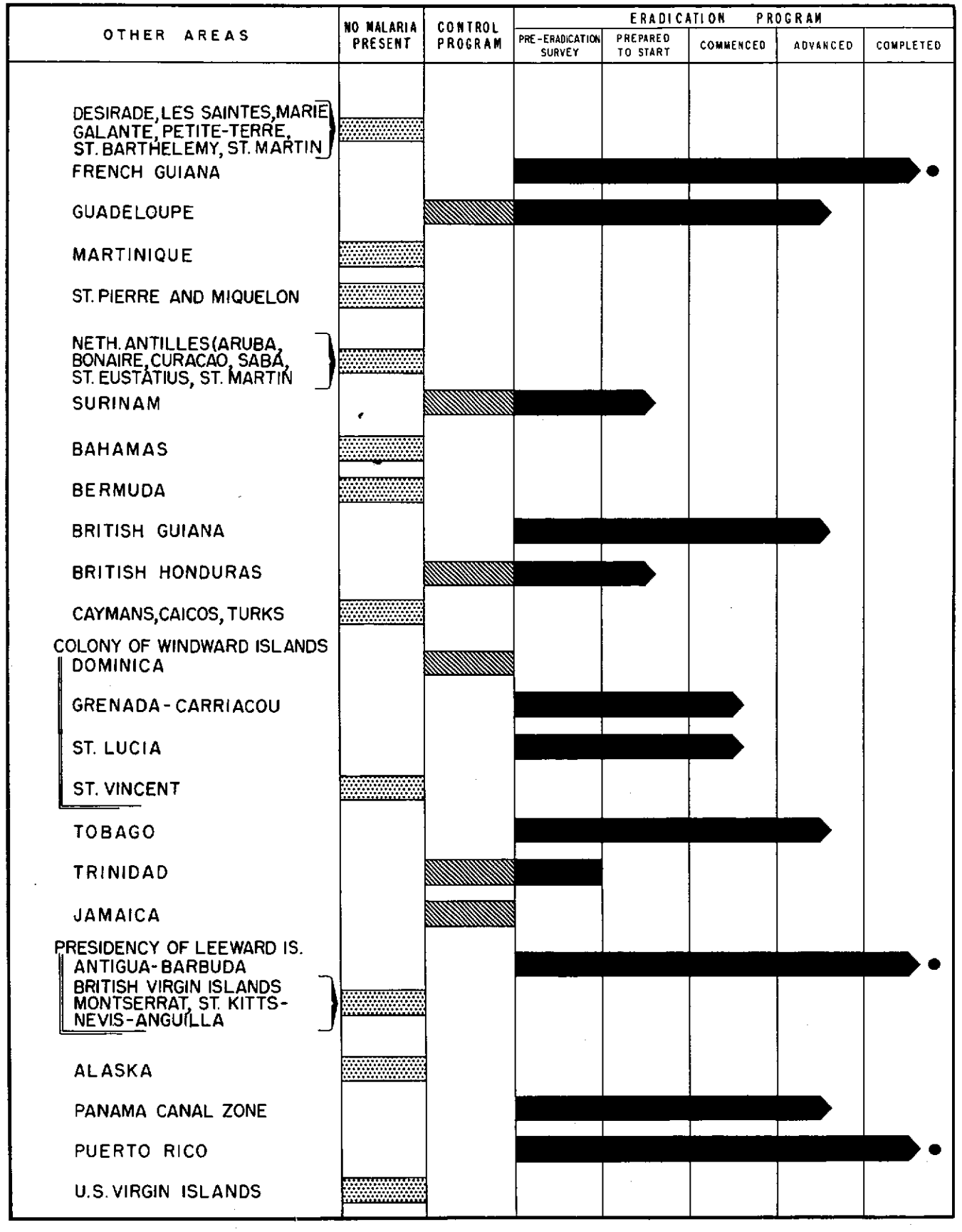
After World War II many countries embarked upon eradication campaigns with DDT. It was soon realized that it was not necessary to continue the DDT spraying year in and year out because, if transmission between man and mosquito can be prevented for three consecutive years, practically all the parasites spontaneously die out in the human host and malaria disappears whether or not the carrier mosquito is eradicated. This realization plus the finding that repeated campaigns may give rise to resistance of mosquitoes to insecticides have brought about a reorientation in the strategy of malaria control. It has led to an all-out attack on malaria with the aim of completely eradicating the disease from the Western Hemisphere. There is really no alternative to this course, since the eradication of malaria from one country only, is of little value unless the same result is achieved in neighboring countries, and the danger of reinfection thereby eliminated. Eradication, once achieved anywhere, must spread in an ever-widening circle.

The XIV Pan American Sanitary Conference, meeting in Santiago, Chile, in 1954, called on the governments to convert all control programs to eradication campaigns. In 1955, the Eighth World Health Assembly established a working fund to assist national programs for the eradication of malaria.

STATUS OF THE ANTIMALARIA CAMPAIGN, 31 DECEMBER 1956



STATUS OF THE ANTIMALARIA CAMPAIGN, 31 DECEMBER 1956



The value to a country to rid its people of this disease is inestimable. Anti-malaria campaigns make it possible to: (1) reclaim land for agricultural purposes; (2) exploit forests and mineral resources; (3) increase individual and family earnings by contributing to the prevention of debilitating diseases, hospitalization, and premature death; (4) remove obstacles to construction of dams, roads, and the communication services which are essential for the economic development of a country; and (5) increase agricultural and industrial out-put.

Progress made in the Americas has been encouraging. The majority of the countries and territories in this Hemisphere have already converted or are in the process of converting from control to eradication programs. Of the 16 countries with control programs in January 1955, 13 had eradication programs at the end of 1956. Of the 10 malarious territories in the Region, eight have joined the eradication campaign. There were, in 1956, 11 active PASB/WHO projects concentrating on malaria eradication or on yellow fever and Aëdes aegypti work combined with malaria work. Full details on these projects are given in other sections of this Report.

An Active Campaign

To illustrate the scope and magnitude of present-day anti-malaria operations, it is helpful to give some details on one particular campaign now under way. This is the campaign in Mexico which has the biggest single malaria problem in the Hemisphere. There are some 19 million people left unprotected in the malaria zones of the country, constituting about 65 per cent of the total unprotected population of the Hemisphere. In Mexico, there are 20,000 deaths annually from malaria. Two million persons had the disease in 1954. Mexico is now taking vigorous steps to overcome this handicap and enable it to join the list of countries in the Hemisphere that have eradicated the disease.

Perhaps in no other malaria eradication program has there been such extensive support at high governmental levels as is being demonstrated in Mexico. Officially this program was initiated by the signing of the Tripartite Agreement in December 1955 between the government, WHO and UNICEF, and by the presidential decree establishing the Comisión Nacional para la Erradicación de Paludismo (CNEP) on December 17 of that year. Diligent efforts on the part of national and international personnel had preceded both these important events. Careful studies had been made of all existing information about malaria, its incidence, the people to be protected, and houses to be sprayed; estimates had been made of the necessary materials and their costs; the general structure of the needed organization had been carefully planned. Some implementation of these early plans had been effected by the end of 1955.

A policy-making body, the Consejo Directivo, with the Minister of Health as its president, was established. Under the Consejo was appointed a director-general and a secretariat to carry out the programs. Central departments were organized for administration, spraying operations, logistics, epidemiology, investigation and development, training, and health education.

The areas considered malarious in Mexico were divided into 14 zones, each headed by a malariologist. Some 2,500 people are employed in this operation.

The program has also called upon many other resources not usually available. For example, the Minister of Defense has granted leave to military medical personnel to serve during the eradication campaign. The Logistics Department is staffed almost entirely by military specialists in this field. The Navy is cooperating by providing coastal and inland vessels for transportation of personnel and material. The school system under the Ministry of Education is promoting school and community programs and cooperation of ecclesiastical authorities has been achieved.

The general pattern of action which developed rapidly during 1956 has included training of personnel, geographic delimitation and reconnaissance of malarious areas, provision and movement of supplies and equipment, education and notification of householders to insure entry into and preparation of houses for spraying, and spraying of houses. Supervision of these activities is by zone officials and by inspectors from the central office of the director-general.

Mexico has approximately 99,000 localities, officially recognized and named, even though often consisting of a single house or ranch. In their epidemiological studies in the various zones the malariologists have had to consider over 70,000 of these localities. Detailed and repeated surveys for fever cases have been made in those areas where the transmission of malaria was suspected. Thousands of houses have been searched and 15 species or subspecies of anophelines have been captured of which *Anopheles pseudopunctipennis* and *A. albimanus* have been most numerous. In carrying out the reconnaissance of the malarious areas, almost 2,910,000 houses have been located and numbered; sketch maps have been made of about 40,000 localities. Data were also gathered on house construction materials, access roads, and transport problems.

Spraymen undergoing training: malaria eradication campaign, Caribbean Area. Extensions to nozzles of sprayers guide students in distance to hold nozzle from wall

Mexican doctors engaged in malaria eradication campaign-inspecting egg hatching in larvae pans in a corner of the insectary, Institute of Tropical Diseases, University of Mexico

More than 1,500,000 pounds of 75 per cent DDT powder, supplied by UNICEF, have been moved by ship to dry storage, and large portions have been moved on to zone, sector, or brigade supply facilities.

Since September 1956 over 800 spraymen have been engaged in preliminary though limited spraying operations, many traveling on foot, by horse, or by boat into areas difficult of access. The total coverage phase of spraying begins in January 1957 and will continue for a period of four years. This will interrupt transmission for three consecutive years, after which epidemiological surveillance will be undertaken together with necessary measures to clear up any local infestations discovered for as long as the problem remains.

The Time Factor

Though the malaria eradication crusade in the Hemisphere began well before the Mexican campaign, this country has given it dramatic impetus. So far as the whole of the American continent is concerned, the aim is to attain malaria eradication in the shortest possible time and before mosquitoes can develop resistance to residual insecticides. If and when this objective is reached, campaigns can be discontinued and the cost of malaria control will cease to be a burden on national health budgets. Furthermore, if such eradication programs are put into operation over the next 10 years, there is no doubt that the return of catastrophic epidemics can be prevented.

Already, largely by the use of comparatively new residual action insecticides, malaria campaigns have protected 105 million people in the Hemisphere. Vigorous campaigns, now being carried out, are expected to extend this protection to a further 30 millions within the next few years.

Such protective schemes are endangered when malaria-carrying mosquitoes begin to show resistance to the new insecticides. This resistance usually takes some years to develop, and is manifested either by actual growth of physiological tolerance to the chemical or by a change in behavior that has made the insects stay away from sprayed surfaces. It also seems that once an anopheline mosquito acquires resistance to one of the new insecticides, now in large-scale use, it may within a few months develop resistance to others. Five species of *Anopheles*, out of the 60 types known to be malaria carriers, have already shown or developed a small measure of resistance in a few places. In Panama, for example, the strain of *A. albimanus*, which has long been exposed to insecticides, has appreciably changed its behavior. A strain of the species *A. quadrimaculatus*, a former active transmitter in the Mississippi area of the United States, is also noteworthy for its strong resistance to Dieldrin, BHC, and chlordane. There is, therefore, a race against time to get the job done before resistance of the malaria mosquito to our most potent known weapons develops. The campaign must be extended over wider areas; countries must join together in these campaigns, lest malaria, beaten in one country, invade again from the territory of a neighbor.

Inspecting equipment and procedure used in mixing solution for anti-malaria spraying

Cost and Other Factors

Some idea of costs and financial benefits is obtained when it is considered that in Peru, for example, 26 million dollars is the amount, according to recent estimates, of the economic damage done every year by malaria. Yet the expenditure of an estimated eight million dollars over a four-year period would eradicate this disease from Peru. This is typical. The "balance sheets" on malaria campaigns show that money expended on the prevention of this disease buys more than mere freedom from sickness. Not only is health improved but there are solid gains in economic development, and the money invested in such campaigns often returns several times the initial capital outlay.

Apparently, the countries of the Americas recognize the value of their investment. Almost 11 million dollars were spent in the campaign in the Americas in 1955. For complete coverage, allotted funds will have to be stepped up quickly to an estimated 39 million in 1958. Mexico's eradication plan, the biggest, calls for a peak investment of $6,700,000, in 1957.

Inspector, in training to work in the nation-wide malaria and Aëdes aegypti eradication campaign in Colombia, completes census form during Initial Survey of malarious area

Checking bromeliads for mosquito breeding foci, Cauca Valley, Colombia

No other region of the world has accumulated as much data on the international aspects of the malaria problem as has the Americas. The differences between a control program and an eradication program are clearly grasped. The first is usually under the direction of the national malaria service and the quality and extent of the work depend on the organization of that service and the funds available. In the case of eradication, a series of additional factors must be considered. There is an indispensable minimum of funds and working facilities that must be provided. Time is another basic factor, as is good administration.

Moreover, not only the officials but the entire population must be aware of the fact that the program is not only an activity of the local malaria service but a country-wide campaign, and that when international aid is received the government assumes a commitment to safeguard not only its own investment but the international contribution as well. Another indispensable condition for the success of the eradication program is that the national organization responsible for its execution holds an appropriately high position within the Ministry of Health. Very close supervision of field work is absolutely essential. There must be established standards for determining when eradication has been achieved. The WHO Expert Committee on Malaria has established well-defined criteria covering that point. These can also be followed in defining the various phases of an eradication program. Finally, it should be noted that the Eighth World Health Assembly in 1955 has already unequivocally declared that the ultimate objective of present malaria programs is the world-wide eradication of the disease.

The Jungle Threatens

Yellow Fever, Urban and Jungle

The two epidemiological types of yellow fever have been defined in previous Annual Reports. Main points about them will be repeated here to facilitate the discussion which follows.

The first type of yellow fever to be recognized was the urban type, transmitted directly from man to man by the Aëdes aegypti mosquito.

Secondly, there is the jungle type, contracted by man in the jungle, not from another man, but from the bite of a jungle mosquito that had acquired the virus from some warm-blooded forest vertebrate.

The Aëdes aegypti mosquito does not transmit jungle yellow fever because it does not breed in jungles. In the Americas, jungle yellow fever is transmitted by several different species of mosquitoes, most of them belonging to the genus *Haemagogus*. These mosquitoes live chiefly in the tree tops—in the upper canopy of the forest—and they rarely leave the forests.

Jungle yellow fever studies in Guatemala: making a capture with human bait in the canopy of a tropical forest of mosquitoes which transmit the disease

Linking the two forms of yellow fever is the so-called "urbanization" of yellow fever virus. This occurs when a man who gets infected with jungle yellow fever in the forest immediately goes to a town or city that is infested with Aëdes aegypti mosquitoes. When he is bitten by those mosquitoes he may start an epidemic of urban yellow fever.

The strategy of yellow fever control is now, as it has been in the past, to do away with *Aëdes aeygpti*. Notable historical triumphs were attained by this method in the early sanitation of Havana, a former hotbed of yellow fever, and of the Panama Canal Zone.

If aegypti were eradicated everywhere in the Americas, the threat of urban yellow fever would be completely abolished there. Urban yellow fever is still possible in those places where aegypti is still present, and the total number of such places remains surprisingly large, especially in the United States of America.

Procedures for the eradication of *Aëdes aegypti* have been perfected. They are being widely used. But the jungle mosquito vectors of yellow fever virus cannot be eradicated. Therefore, the chief protection against jungle yellow fever must be the vaccination of the human population in contact with forested areas.

Recent Annual Reports of the Director have pointed out the renewed danger of yellow fever as it creeps northward and westward through Central America toward the aegypti-infested portions of Mexico and the United States. It is now apparent that the wave of jungle yellow fever, which seemed to have stopped on the north coast of Honduras in 1954 did, as a matter of fact, continue on into Guatemala. There is presented in succeeding paragraphs a rapid survey of this development with emphasis on the events of 1956.

Yellow Fever Creeps North

The Bureau, in cooperation with the Gorgas Memorial Laboratory, at Panama, and the Carlos Finlay Institute, at Bogota, Colombia, has been engaged for the past seven years in studies relating to the epidemiology of jungle yellow fever in Central America.

This work was undertaken as a result of the diagnosis of fatal human yellow fever in 1948 in the Republic of Panama. The last previous authochthonous case had occurred there in 1906. From its starting place in eastern Panama the epidemic wave of jungle yellow fever has spread through western Panama, Costa Rica, Nicaragua, Honduras, and Guatemala where it was active in wild monkeys as the year ended.

The first cases of yellow fever in Panama in 1948 were infected only a few miles from the present international airport at Tocumen, which was then not yet in operation. The first group of five cases, all fatal, was succeeded by a few fatalities in central and western Panama in 1949-1950. In 1951-2, Costa Rica suffered rather severely from jungle yellow fever with 57 confirmed cases and 51 deaths. In Nicaragua there were 14 fatal cases in 1952 and 1953, and in Honduras, only one proven fatality—in 1954. No human cases, fatal or otherwise, were diagnosed in 1955; one human death occurred, however, in Panama in August 1956.

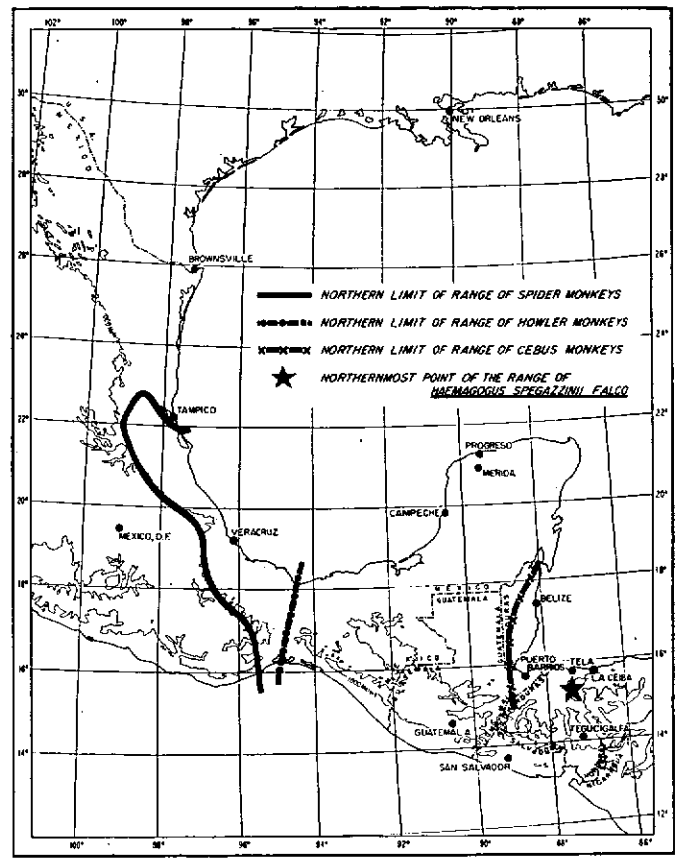
The serious threat to the human population has been largely circumvented by prompt preventive measures: vaccination and control of *Aëdes aegypti*. At times, the virus has caused spectacular epizootics among the howler and spider monkeys. From Costa Rica northward they have often died in such large numbers that the forests have reeked of monkey carrion.

After reaching Honduras in 1953-54, virus activity became unapparent for more than a year. Yellow fever virus was not detected anywhere in Central America in 1955 and it was thought it might have burned itself out.

Such was not the case. In January 1956 there were reports of dead monkeys in the forests near Puerto Barrios, on the east coast of Guatemala. The putrid carcass of a howler (*Alouatta*) monkey was found near the Rio San Francisco del Mar. A piece of the liver of this monkey sent to the Gorgas Memorial Laboratory for histological examination showed post-mortem degenerative changes so pronounced that a definite diagnosis could not be made but the appearance was very suggestive of yellow fever. During the first half of the year the virus was epizootic in the monkeys of the Motagua Valley, Guatemala, inland from Puerto Barrios. In February there were trustworthy reports of dead monkeys on the south shore of Lake Izabal, just north of the Motagua River and distant only about 100 miles from the southernmost tip of Mexico.

During February, six additional liver specimens from dead howler monkeys, collected in Guatemala and Honduras, were sent to the Gorgas Memorial Laboratory and also to the Carlos Finlay Institute. Four showed the changes characteristic of yellow fever infection. In addition, yellow fever virus was isolated at the Gorgas Laboratory from a piece of glycerinated liver taken from an obviously sick monkey that was shot in May, at El Tipon, in the Motagua Valley. It is believed that this is the first time that yellow fever virus has ever been isolated by this procedure at a base laboratory 800 miles distant from the field station. The formalin-preserved specimen of the same liver contained the typical microscopic changes due to yellow fever. Later in the year (August—November) there was monkey mortality again in the Lake Izabal area in the Rio Polochic area, but no positive liver specimens were obtained.

Since the geographical range of the insect vectors of yellow fever in northwestern South America ends in Honduras, an attempt was made to determine the species



MONKEYS AND HAEMAGOGUS MOSQUITOES—
NORTHERN LIMIT OF THEIR RANGE IN MIDDLE AMERICA

of mosquito responsible for transmission in Guatemala. Beginning late in March 1956, mosquitoes were collected in the Motagua Valley in two localities where there had been evidence of recent virus activity in monkeys. The mosquitoes were captured with human bait, mostly in the forest canopy, but also to some extent on the ground. They were then put in jars and forwarded on ice to the Gorgas Memorial Laboratory where they were sorted by species, ground up, and inoculated into mice. The trip to Panama takes about 48 hours by combined rail and plane transport.

Yellow fever virus was recovered from several batches of *Haemagogus mesodentatus*, and *H. equinus*. In addition, three strains of unidentified virus, not yellow fever, were isolated. In 1956 over 9,000 mosquitoes were collected and processed in this way.

Field work in which the Bureau cooperated in previous years has furnished extensive data on the distribution of these mosquitoes. *Haemagogus mesodentatus* ranges north from the Panama-Costa Rica border along the Atlantic slopes of Central America to the end of the neotropical faunal zone near Tamazunchale, Mexico. The northernmost specimens were collected in a coffee plantation 82 miles southwest of Tampico. The greatly decreased rainfall and the consequent absence of moist, tropical forests north of this point limit the range of this forest-inhabiting

species. This point is also the northern limit of the distribution of monkeys.

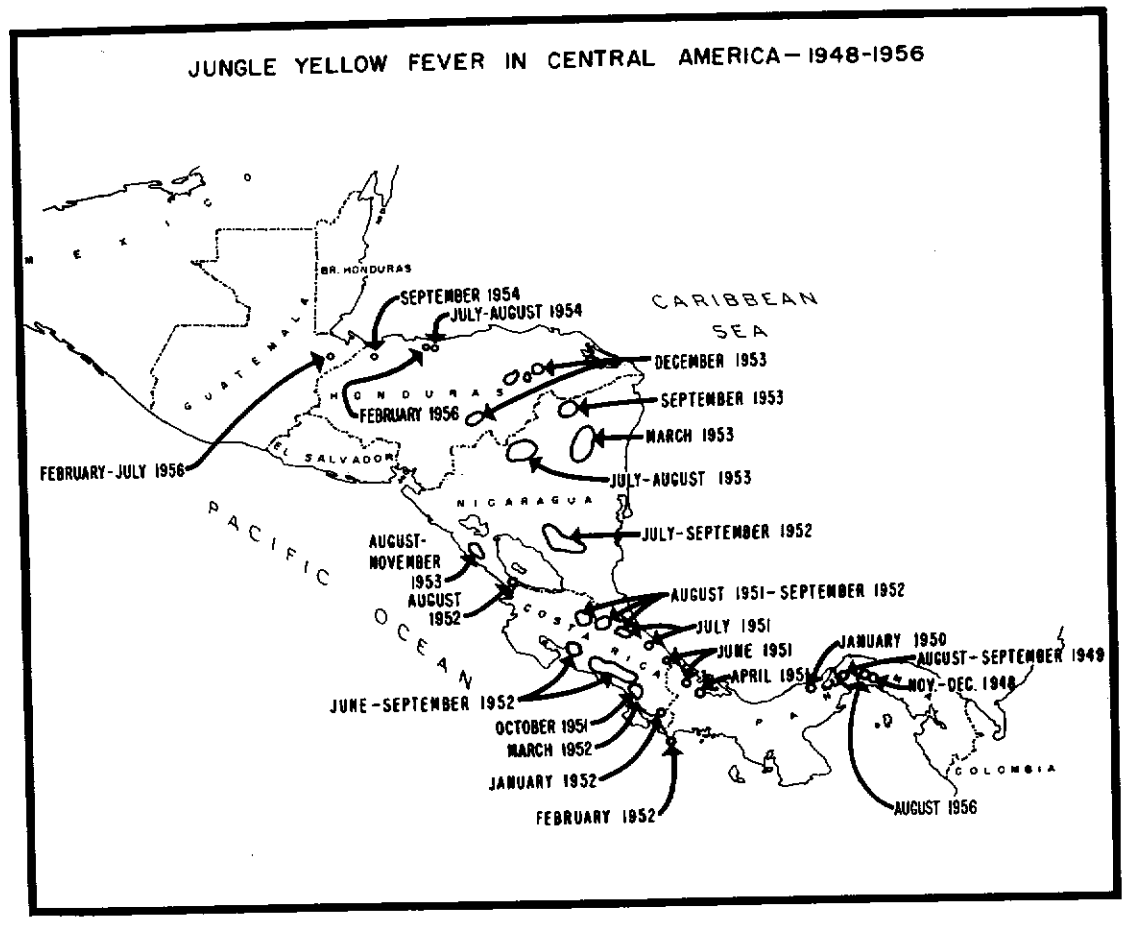
Haemagogus equinus has the most extensive range of any Central American species of this genus. It has been found to be abundant on both the Atlantic and Pacific slopes. On the Pacific slope it has been taken as far north as San Blas, Nayarit, Mexico, but the extreme limit of its distribution on the Pacific side has not yet been determined. On the Atlantic side it extends beyond the limits of the neotropical zone into Texas, at Brownsville. This species is the least discriminating of any Central American *Haemagogus* in its choice of habitat. It has been found biting man not only in tropical rain forest and tropical deciduous forest, but also in areas of semi-arid scrub vegetation, coastal mangrove, and even in peridomestic situations.

Moist tropical forests extend north from the present area of virus activity in Guatemala, across the Peten of Guatemala and into the Mexican States of Chiapas, Tabasco, and Veracruz as far north as the southeastern corner of the Mexican State of San Luis Potosi, except where they are broken by cultivation, or by limited areas of savannah or pine woods. This forest carries with it the monkeys and the mosquitoes which are capable of sustaining yellow fever virus in nature, and provides conditions that are potentially suitable for yellow fever virus. Just how far north the virus will travel remains to be determined by careful monitoring.

In Central America, *Aëdes aegypti* has been so well controlled as to be practically exterminated, and during the whole eight years in which the current epidemic has lasted not a single case of aegypti-transmitted yellow fever has been recognized in this region. Vaccination against yellow fever has been widespread and has doubtless contributed importantly to the fact that the current march of yellow fever virus through Central America has been followed mainly in monkeys rather than in man.

Aëdes aegypti is widespread on both coasts of Mexico, in Texas, and in the southeastern portion of the United States. Furthermore, the intensity of the aegypti infestation is not accurately known and comprehensive surveys are needed as a prelude to the indicated eradication measures. With the situation as it is, the threat of yellow fever cannot be ignored.

A glance at the map on p. 42 indicating the distribution of *Aëdes aegypti* in the Western Hemisphere will show the reader how prevalent aegypti still is, in spite of the very large amount of work that has already been done.



Public Health as an International Problem

National Health Plans

When the United States, after eradicating malaria from within its boundaries, indicated its intention to make a sizable contribution toward eliminating malaria from the whole Hemisphere as well, it was setting an example of international cooperation in the public health field. Today such concern of one nation for the health of other nations has become a necessity; it is a part of the concept of disease eradication. The moment a communicable disease, such as malaria, has been banished from one country, the next step is to keep it from coming back in. The best way to do this is to eliminate it from neighboring countries, then from the entire Hemisphere, and eventually from the world. Eradication of a disease calls for an ever-expanding international effort aimed at the final goal making that disease extinct.

Such efforts must be made within the over-all picture of good national health planning.

At its annual meeting of 1955, the PASO Directing Council stressed the need for each country to undertake national health planning as an indispensable requisite for adequate international collaboration. Accordingly, the Directing Council resolved that the theme of the technical discussions for 1956 would be "Methods for the Preparation of National Health Plans".

The purpose of a national health plan is to establish the coordinated actions to be put into practice in the future by that country to solve its health problems in stages, based on the relative importance of the diverse problems and on the technical, economical, and cultural possibilities of the country.

The content of a national health plan includes the following elements:

(a) Identification of health problems—investigation of the conditions and of the national, local, and regional resources directly or indirectly connected with health;

(b) Determination of the services required—country-wide, local, or area needs that can be filled in a determined period and the relative priority of each need in the long-term solution of the country's health problems;

(c) Formulation of the plan—general and special plans to satisfy these health needs by definite steps.

The process of planning is the responsibility of the health authorities. The working methods will vary considerably according to the size and socio-economic level of the country, the political-administrative structure, the grade of autonomy of the local-regional agencies, the quality and quantity of information available, and especially the presence or absence of adequately trained personnel.

At the IX Meeting of the Directing Council, held in Antigua, Guatemala, September 1956, the theme of planning was fully discussed. The participants in the technical discussions recognized the absolute necessity of planning in public health, pinpointed the responsibility for planning, and stressed the full determination of resources available and the clear definition of objectives. The role which can be played by international organizations in national health planning was also considered, and it was decided that planning is a field pre-eminently suited to international collaboration. The collaboration which an international agency may give to a country in the matter of planning will be all the more effective if it is directed toward helping that country develop its own process of planning.

Crucial to the proper functioning of any national plan is the close interrelation among the three normally operative services—local, provincial, and national.

The local services should be organic functional units, with maximum authority and full freedom of communication among themselves and with the smaller health centers. However, they are not self-sufficient and need the supporting and specialized services of intermediate provincial organizations and of the national service. Because of the diverse structure of the countries, it is difficult to indicate what the limits should be between the functions of the national and the regional services. A fundamental part of the process of planning is to determine the number and extension of the local-regional health services required and possible, in accordance with the geographic and administrative conditions, the health problems and the resources in personnel and funds.

The methodology of planning will comprise: (1) survey of conditions and resources; (2) diagnosis of health problems; (3) determination of priorities and solutions; and (4) setting up defined local, national, and regional programs.

Role of the Bureau

Priorities for international collaboration point to four areas of the public health field:

1) Eradication campaigns for which the Governing Bodies of the Organization have established definite mandates, namely malaria, *Aëdes aegypti*, yaws, and smallpox;

2) Other communicable diseases, in the prevention and

control of which new and more efficient methods can be applied, such as tuberculosis, leprosy, and poliomyelitis;

3) Strengthening of national health services with greatest emphasis on development of plans and evaluation of current programs; and

4) New activities, such as chronic diseases, occupational health, food and drug services, and nuclear energy.

Progress in planning during the past year included preparation and distribution of 10 additional guides for international health work in the Americas, in the fields of organization of public health services, national health planning, forms for local health services, public health laboratories, smallpox vaccination, prevention and control of diarrheal diseases, training of nursing auxiliaries, and training of sanitary inspectors. Review of public health programs through analysis of reports, field visits, and other means has been considerably facilitated by the preparation of the guides mentioned above.

Special mention should be made of the Meeting of International Advisers to the Integrated Health Programs of Zones II and III, held in Antigua, Guatemala, October 8-13, because of the value of the discussions in better defining the role of international collaboration and in reviewing current programs as a basis for planning of future activities.

Advisory services to the field continue to expand as new developments in many health activities make it necessary to keep personnel and national officials abreast of progress. Malaria, poliomyelitis, leprosy, tuberculosis, treponematosis, diarrheal diseases, and viruses have been the main subjects of the flow of information. Support was also given to field activities through the preparation of seminars, aid in the preparation of plans of operations in the field, and by analysis and dissemination of information on training facilities for auxiliary nursing and sanitation personnel, hospitals, preservation of food, public health dentistry, and health problems in the field of atomic energy.

Atomic Energy in Relation to Health

The expanding use of atomic energy in peaceful pursuits poses new problems for the public health services. They may be a hazard only to the health of individuals concerned with the preparation of fissionable material or with the use of isotopes for diagnosis, for therapy, or as a tracer; or they may threaten the very existence of communities and even whole industries by improper disposal of radioactive wastes. The cumulative effect of radiation may produce effects on tissue growth or genetic changes the extent of which cannot be determined exactly at present with the current knowledge available.

Man has always been exposed to a certain minimum level of radiation from cosmic rays and some radioactive ores, but since the discovery of X-rays and radium at the turn of the century radiation hazards which have been introduced have not heretofore concerned the general public. The new developments in atomic energy have changed all this, and the full expansion of this new force may depend upon man's ability to prevent raising the radiation background of the atmosphere to intolerable levels.

The discovery of these new forces, and of methods for their safe application, has brought the hope that they can be put advantageously to the use of mankind as a cheap source of energy for multiple purposes as well as in the fields of medicine and health. It is of general knowledge that ambitious plans are being considered to make atomic energy available for peaceful purposes to countries of the Hemisphere, and some of those countries have already begun to use fissionable materials. As with many other technological developments, these anticipated benefits cannot be realized without the direction of trained workers in sufficient numbers and with adequate qualifications. This is especially true with respect to atomic energy, where the hazards of misuse may outweigh the gains derived. Here is a special field in which unusual opportunity is offered today to prevent a health hazard before it develops.

The Organization has those problems already under consideration with a view to devising methods for collaborating with the public health authorities of Member Governments in the preventive medicine aspects of nuclear energy, and with emphasis on the education and training of health workers.

Cooperation with UNICEF

Thirty-nine PASB/WHO projects, or nearly 30 per cent of total projects during the year, involved UNICEF assistance. Responsibility for putting into practice the principles governing WHO relationship with UNICEF is delegated to respective WHO Regional Offices. In the Americas PASB/WHO and the UNICEF Regional Office for the Americas jointly cooperate with governments in the planning and implementation of health projects.

The basic principles governing the WHO and UNICEF relationship have not changed materially since they were established in 1949 by the Joint Committee on Health Policy of the two agencies and approved by their respective governing bodies. The role of UNICEF is to provide supplies and equipment for health projects which benefit mothers and children. WHO, of course, provides technical advice in the preparation, execution and evaluation of these projects. All projects must fall within health fields approved by the Joint Committee on Health Policy in order to be eligible for assistance from UNICEF. Individual project requests must be approved by WHO for technical soundness before being considered by the UNICEF Executive Board for an allocation of funds. The cooperation of both WHO and UNICEF with governments is based upon joint consultation at all stages of development and mutual agreement of respective responsibilities set forth in a Tripartite Plan of Operations for each health project.

The fields in which UNICEF now assists include: maternal and child health; nutrition; rehabilitation of the handicapped; malaria; treponematosis; smallpox; diphtheria and pertussis; leprosy; trachoma; endemic goiter prevention; tuberculosis and environmental sanitation.

UNICEF support for environmental sanitation projects, beginning in 1954, and acceptance of the concept of promoting material and child health through support of integrated public health projects, have greatly expanded possibilities of collaboration with PASB/WHO. UNICEF now works with the Bureau in many basic projects in public health which are directly important for improvement in child health.

In 1955, the Joint Committee on Health Policy endorsed malaria eradication projects as appropriate to be financed from UNICEF funds. This was followed by a decision of the UNICEF Executive Board to enter into this program on a large scale, of which the major portion would be in the Americas during the next four or five years.

During 1956 UNICEF allocations, amounting to $1,879,600 were approved by the UNICEF Executive Board for the Americas. Of that sum, $1,578,100 was allocated for malaria eradication and control in a number of countries and territories, $250,700 for maternal and child health including environmental sanitation in several countries and one territory, $27,000 for BCG anti-tuberculosis vaccination in two countries, and $23,800 for yaws/VD control in two areas of the Caribbean.

It should be explained that a UNICEF allocation is valid until the funds are expended. For example, UNICEF supplies being used on a project in 1956 may have been provided from an allocation in the same year or any previous year. No attempt, therefore, is made to relate UNICEF supported projects to the date of UNICEF allocations.

The Basic Training of Health Workers

Strengthening of schools of medicine and public health, schools of nursing, and other educational establishments affiliated with the field of public health in the Americas played a major role in Bureau activities in 1956. Efforts were made to help these institutions improve instruction through seminars, consultant services, fellowships, and the furnishing of medical literature.

Consistent with the idea that progress in public health depends fundamentally on adequate basic training of those who are going to be responsible for the health of the community, directives of the governing bodies to strengthen educational establishments associated with the field of public health in the Americas have been followed. As in previous years, various procedures were used to achieve this end. First, discussion of teaching methods and curriculum organization in the Latin American schools was stimulated through the Seminar on the Teaching of Preventive Medicine, held in Tehuacan (Puebla) in Mexico. Surveys of the teaching of certain disciplines in schools were conducted. Advisory services to individual schools were also continued. In this connection, it seems interesting to cite the successful completion of the co-operative project on education in Costa Rica, where the government took over the complete responsibility after a five-year period of advice by international consultants. Professors and international consultants were also provided to nursing, medical, and public health schools, as well as opportunities for key teaching personnel to visit other schools abroad in countries of this Hemisphere and Europe.

Fellowships have continued to be used as a means of fundamental importance to improve the training and education of public health personnel throughout the Americas.

Specific Collaborative Activities

Nutrition

The main activities of the Bureau in 1956 in this field related to the administration of the Institute of Nutrition of Central America and Panama (INCAP). This Institute continued to be supported by the regular quota contributions of its Member Governments: Costa Rica; El Salvador; Guatemala; Honduras; Nicaragua; and Panama, as well as from the contributions of the PASB/WHO, Kellogg Foundation, and grants from several other sources.

The excellent results obtained by INCAP are an example of the importance of pooling the resources of several

countries for tackling a public health problem of paramount importance to each of them, but the solution of which goes beyond the resources of the individual nations.

Nutritional and dietary surveys have been carried out in all the member countries, revealing the basic deficiencies of protein of good quality, vitamin A, and riboflavin.

Leprosy

"The Problem of Leprosy in the Americas" was included for discussion on the agenda of the IX Meeting of the PASO Directing Council by decision of the Executive Committee at its 28th Meeting in June 1956. Resolution XV of the Directing Council Meeting in September expressed satisfaction at the attention given by the Bureau to the leprosy problem in the Americas. It furthermore recommended to the countries of the Hemisphere that national programs be revised in accordance with modern concepts and practices of diagnosis, treatment, prevention, and rehabilitation. The Council requested the Director of the Pan American Sanitary Bureau to continue the studies undertaken to determine the extent of the leprosy problem in the Americas and obtain a knowledge of the various national agencies entrusted with anti-leprosy work. In addition, it instructed the Director to undertake studies and measures necessary to provide the fullest possible facilities for the training of personnel of national leprosy services and promote exchange of experience among professionals.

Dental Health

Efforts toward the development of an international dental health program in the Americas continued during 1956. In September the Bureau dental consultant completed an over-all survey of dental public health activities, dental practice, and dental education in the Hemisphere.

Having begun in October 1955, he visited all the countries in the Region as well as the islands of Trinidad, Barbados, and Jamaica.

The objective of this survey was to gain some insight into the dental problems of the Region and the current approach used by member countries toward their solution. An attempt was also made to determine in which activities international cooperation might be indicated in the field of public health dentistry.

Although different stages of development of dentistry can be found in various countries of the Region, there are no basic differences in the nature of the dental problems or in the indicated approaches to their solution. Uniformly a situation is found where dental defects occur at a rate that far exceeds the capacity of the dental profession to repair them. Data show that among school children from several countries, under the best conditions, only 20 per cent of decaying teeth received treatment.

The interest manifested by several member countries, the existence of a body of knowledge on prevention and treatment of dental diseases which is not being adequately utilized, and the possibility of improving health conditions in many parts of the Region through more efficient utilization of presently available dental resources, all seem to indicate an opportunity for the development of a dental program within the framework of the policies and program of the Bureau.

Integrated Health Services

Strengthening the national services of public health in the countries of the Americas is one of the goals of PASB/WHO. Today the so-called "integrated projects" constitute one of the best methods of collaborating with Member Governments in attaining this objective.

The integration of health services in many of the Latin American countries has been progressing with PASB/WHO cooperation for more than five years. There has been a steady increase in the number and scope of activities. The Bureau is attempting: (1) to promote establishment in each of the countries of efficient national and local health services; and (2) to assist so that eventually the individual health services will be better able to maintain and further develop these services on their own.

Yaws

One of the important programs being carried out by the Bureau in cooperation with UNICEF is that of aid to the countries of the Region in yaws eradication. With this objective in mind and as a first phase of such a program the PASB has been assisting Haiti in the organization and development of a yaws eradication campaign. This was near successful completion at the end of 1956. Similar campaigns have been likewise initiated in the Dominican Republic and in some of the Caribbean territories. Following the same expansive trend, it is hoped that the yaws eradication efforts will be extended to other countries in the near future. Yaws is one of a group of diseases which includes syphilis and pinta. While all three of these diseases manifest themselves in different ways they have one element in common. They can easily be cured or rendered noninfectious through the use of penicillin. A single injection of this drug is sufficient to interrupt the chain of transmission and thus prevent the disease from spreading to healthy persons. Penicillin is also cheap, easily administered, and, therefore, most useful in mass treatment campaigns.

Quite obviously then, eradication of the treponematoses is feasible. In fact, the problem is much more administrative than technical in nature.

Inspector takes names of rural Haitian family prior to examination for symptoms of yaws

The Concept of Eradication

Eradication means the complete elimination of all sources of infection or infestation so that even in the absence of all specific preventive measures the disease does not reappear.

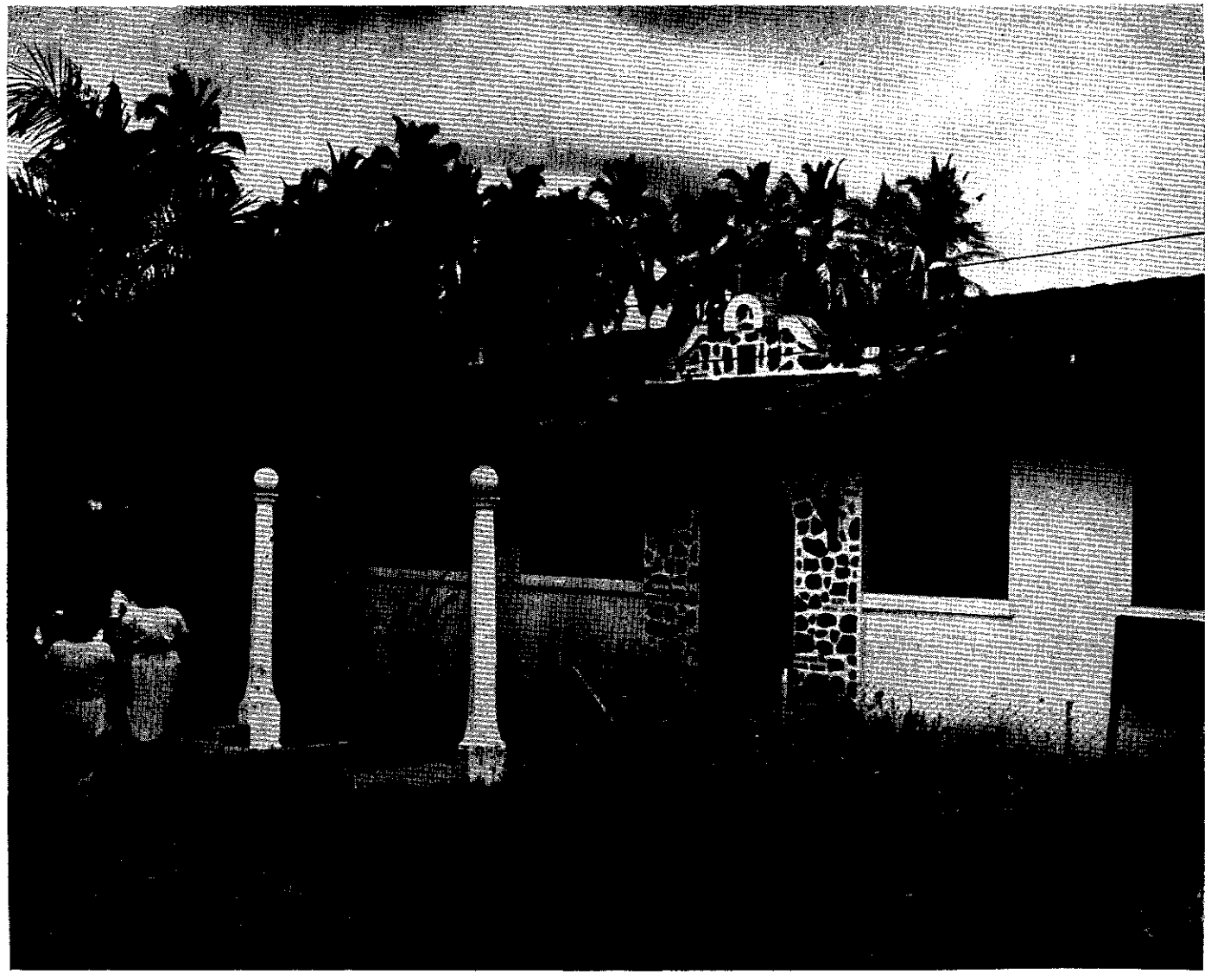
Eradication of a given communicable disease should only be considered if the following criteria apply: (a) the disease is of economic and public health importance; (b) the disease is easily detected and identified; (c) the disease is amenable to known methods of control; and (d) there are adequate means of prevention of reinfection.

The following phases can be distinguished in a yaws eradication program: (1) Phase of mass attack—all known and possible foci are treated and eliminated. This usually means the treatment of complete populations. Coverage must be as near as possible to 100 per cent. House-to-house methods are used; (2) Phase of search for unknown foci—house-to-house method; all persons are inspected and infectious cases (and contacts) eventually found are treated. An apparent "point zero" is reached at the end of this phase; (3) Phase of consistently negative findings—despite continued and careful searches, no more infectious cases are found. With the information at present available, it seems reasonable to consider that eradication is achieved when, following the first survey in which no active yaws cases are found, this absence continues for at least two years during which simple though careful clinical surveys have been made of the population at least once a year; (4) Phase of "sentinel" procedures—appropriate measures are taken and strongly maintained to avoid reintroduction of *Treponema pertenue*, the cause of yaws, from other areas where eradication has not yet been accomplished.

Eradication can be assisted and expedited through the general public health services of a country. Nevertheless, even where these services are poorly developed, eradication can be accomplished provided the eradication service is strong enough, has a clear understanding of the objective and a will to succeed in reaching it. Full use should be made of all the community resources. These can help immeasurably, particularly during the phase of search for unknown foci. The clergy, medical missions, and police, among others, will, if properly oriented, help to maintain interest in the objective of the program, report isolated cases and their contacts, and indirectly contribute to the supervision of the inspections.

In the pages which follow a fuller account is given of eradication and other public health activities in which the Bureau is cooperating. The reader is urged also to make full use of the index which has been provided on page 161 and which pulls together the various discussions in different parts of the Report relating to the same topic.

Streets being laid out by survey team, La Chorrera, Panama



HEALTH UNIT AT CHAME, PANAMA

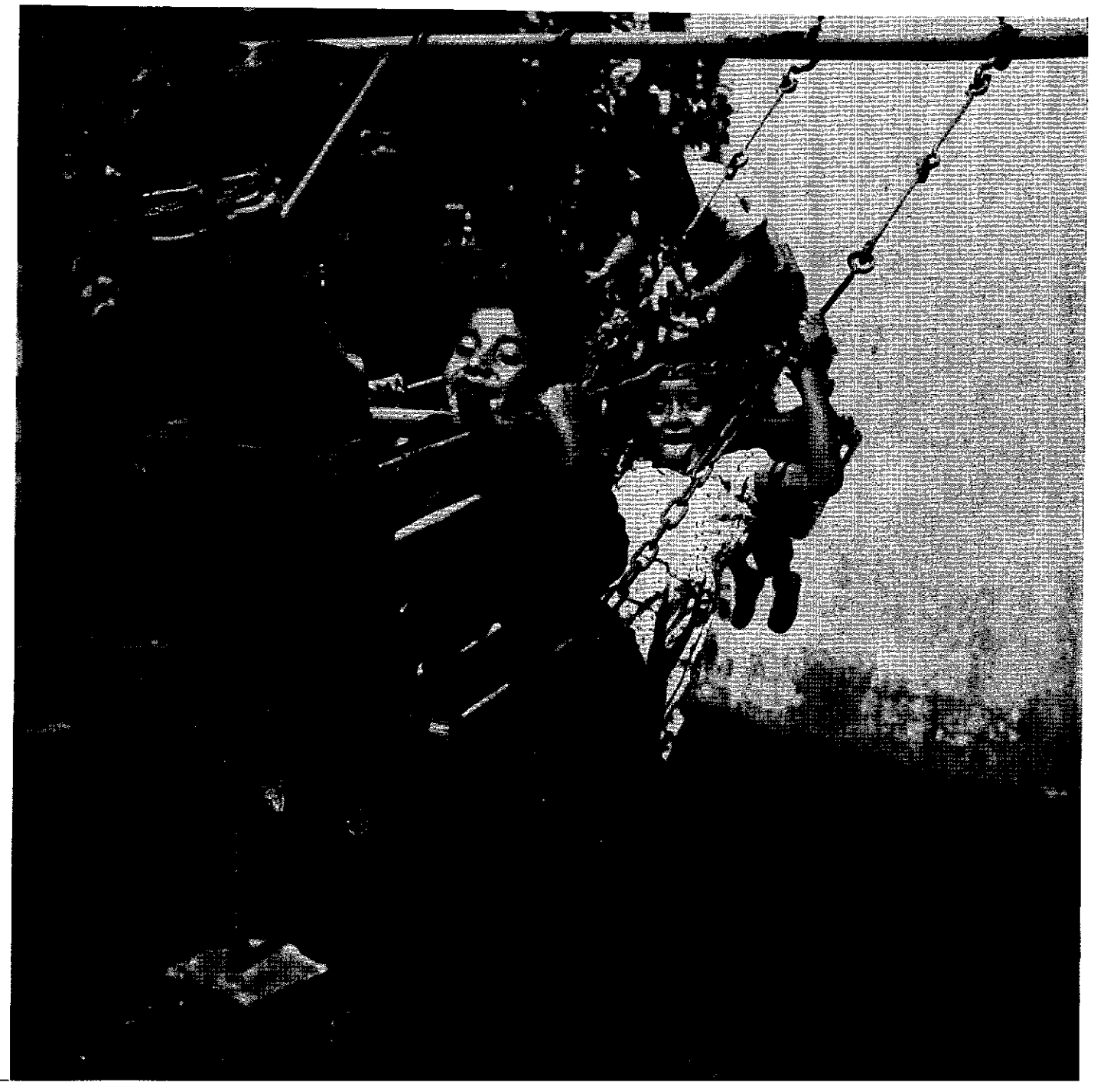
ACTIVITIES IN 1956

While the Introduction to the 1956 Annual Report of the Director states in general terms the objectives and major programs of the Bureau, the second portion is its main body. Herein are spelled out in specific detail the many accomplishments of the PASB during the year, both in an advisory role and in a participating manner.

This portion of the Report is therefore organized into three main sections: (1) communicable diseases; (2) public health administration; and (3) education and training. Together, these areas cover the most important activities of the Bureau. Individually, they are developed in separate content with the view toward illustrating the gains made so far and the needs still unfulfilled.

A section is also presented on the activities of the Bureau from the point of view of performance in the various Zone and Field Offices.

In the final section of the Report is a discussion of the organization, meetings and transactions and the administrative activities of the Bureau during the year.



PART II—ACTIVITIES IN 1956

COMMUNICABLE DISEASES

COMMUNICABLE DISEASES

COMMUNICABLE DISEASES

Malaria Eradication

General Progress

The XIV Pan American Sanitary Conference in 1954 issued an urgent mandate to the PASB to take urgent measures to eradicate malaria in the Americas as rapidly as possible. The Conference, considering the need to provide the Bureau with financial resources to carry out that mandate, authorized the Director of PASB to use $100,000 of surplus funds available at the end of 1954 for this purpose, and approved an increase of $100,000 in the total of the proposed 1956 budget above that of 1955 to continue this activity.

Advances made in this field in the Hemisphere have been promising. Following the historic resolutions adopted at the XIII and XIV Pan American Sanitary Conferences, the majority of the countries and territories have already converted or are in the process of converting control into eradication campaigns. From data received in 1956, it appears that malaria is nonexistent in Uruguay, the Virgin Islands, Canada, and Bermuda; has been eradicated or almost eradicated from Antigua, Bahama, Barbados, Canal Zone, Chile, French Guiana, Martinique, Montserrat, Netherlands Antilles, Puerto Rico, St. Kitts-Nevis, and the United States. In addition, malaria has been eradicated from large areas of Argentina and Venezuela, and from parts of British Guiana, Grenada, and Guadeloupe.

However, much work still lies ahead. The initial malarious area in the Latin American countries (excluding Bolivia) is 4,680,955 square miles with a population of 81,537,153. The area from which malaria has been eradicated is 168,255 square miles with a population of 3,709,951, less than five per cent of the total population. Not included in these figures are the countries where eradication has been completed in total, as listed above. In the United States, for example, the original malarious area in 13 southern states, before eradication, was 871,741 square miles, with 42,366,000 population. Thus the job to be done on the rest of the continent affects approximately twice as many people as were living in the malaria area in the United States.

There were, in 1956, five active PASB/WHO projects for malaria eradication. Those dealing with malaria eradication alone included: AMRO-109, Malaria Eradication—Supplemental Assistance to Country Projects; AMRO-90, Eradication of Malaria; Paraguay-1; Ecuador-14; and Bolivia-4. In addition was in operation the AMRO-105 project, Field Studies of Dieldrin and Other Insecticides.

Six others were combined with Aëdes aegypti eradication programs: AMRO-8, Malaria and Aëdes aegypti Eradication, Caribbean; AMRO-7, Malaria and Aëdes aegypti Eradication, Central America and Panama; Haiti-4; Dominican Republic-2; Colombia-5; and Mexico-53. Those projects on yellow fever and Aëdes aegypti eradication exclusively were: AMRO-88, Aëdes aegypti Eradication; AMRO-57, Yellow Fever Studies; Argentina-51; Cuba-1; Brazil-51; and Colombia-52.

The report of a 1955 survey of malaria infections and of malaria vectors in Paraguay was written during the year. The data obtained form a firm basis for planning the malaria eradication program.

The Paraguayan National Ministry of Public Health and Social Welfare has long been concerned about malaria. Limited parasitological surveys of the central and southern regions were carried out in 1951, but progress, though steady, has not been rapid. This comprehensive survey for the whole country served as a basis for the preparation of an eradication program (Paraguay-1). The Bureau provided, in addition to personnel from COMEP, (Coordination Office for Malaria Eradication Program) three short-term consultants.

A five-year Plan of Operations was prepared, through the collaboration of local government authorities, Zone Representatives, and COMEP.

The government presented the plan to UNICEF in September 1956.

UNICEF is providing 70 per cent of the imported equipment. It is expected that the preparatory period of training and organization can be completed in sufficient time so that spraying can be started in 1957 and continued for four years, followed by epidemiological surveillance.

An unusual characteristic of this plan is that eradication can be maintained at the lowest cost and most easily with the full collaboration of Argentina and Brazil who can

contribute materially by setting up "strategic barriers" in the Parana and Paraguay Rivers. This could prevent invasion by *Anopheles darlingi* which periodically causes intense epidemics which go beyond the endemic malaria areas to be covered by regular sprayings. Brazil and Argentina have promised to collaborate, thus marking one of the first examples of international coordination to protect the malaria eradication program in a given country.

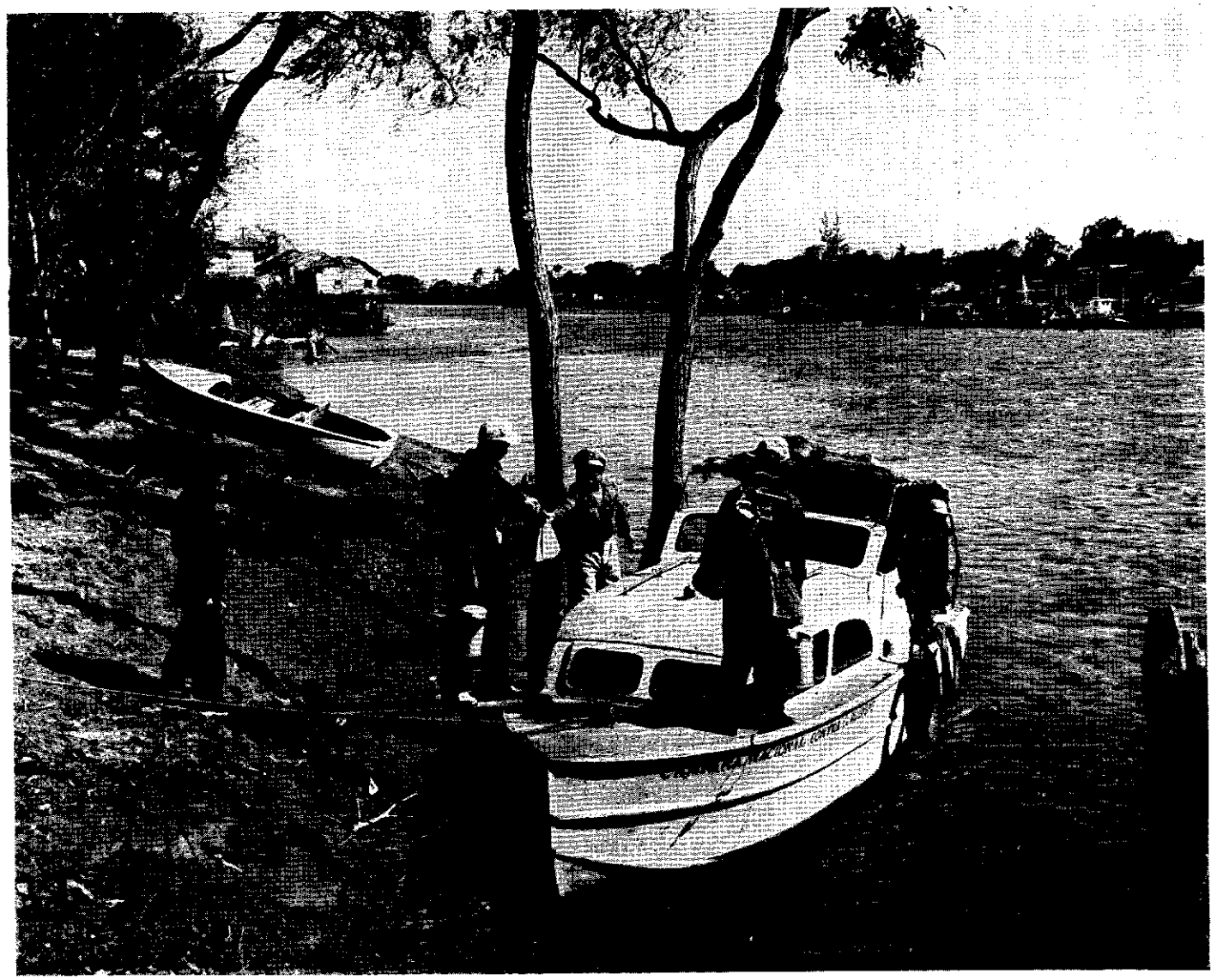
With the participation of PASB the IV Meeting of Directors of National Malaria Eradication Services of Central America, Mexico, and Panama took place, in Managua, Nicaragua, from January 23 to 30, 1956. At the meeting each country presented a report of its progress in control and eradication programs and discussed various technical problems.

Mexico

The Mexican campaign was so well prepared and initiated that it is here presented in some detail as an example of how an eradication campaign should be prepared.

Malaria in Mexico represents one of the most important public health problems in the country. The malarious area covers some 772,000 square miles. Following Resolution XLII on malaria eradication in the Americas, approved by the XIV Pan American Sanitary Conference, the Government of Mexico decided to convert its control measures to a nation-wide eradication program, with the cooperation of the Bureau and UNICEF (Mexico-53). The plan was completed and approved in 1955 and the year of training and preparation began.

A malaria eradication spray team prepares to leave for a day's work along the Grijalva River, near Villahermosa, Tabasco, Mexico



Fellowships were awarded both in that year and in 1956 for malariologists, engineers, epidemiologists, entomologists, and other professionals to receive specialized training in Venezuela, Brazil, and the United States. The National Commission for the Eradication of Malaria (CNEP), with the collaboration of the Bureau, completed a set of operation manuals covering all phases of the spraying campaign and the epidemiological evaluation to be carried out in the zones of operation.

Two significant modifications of the original plan were made during the past year; a delay in the beginning of spraying operations and additions and subtractions from the malarious area as originally estimated. The original project anticipated the initiation of preliminary spraying operations in May-June, with total coverage to begin in September. Difficulty in recuiting part-time field technicians led to delays and to adoption of a policy to employ full-time field technicians. The late start of their training in turn delayed the work on definition of malarious areas.

When the geographic reconnaissance began in the areas defined as malarious, the work progressed more slowly than anticipated, upsetting the possibilities of meeting the original date for spraying operations. Strong epidemiological evidence suggested that seasonal transmission might be more common than previously suspected, making it impossible to define accurately all the malarious areas before September. A decision was therefore made to initiate spraying on a limited (approximately one-half strength) scale in September. Work was scheduled for areas already recognized as malarious, and numbers of brigades were kept at such a level as to permit adequate supervision. Following these revisions in schedule, the initiation of spraying operations was celebrated in impressive ceremonies on September 7, including proclamations by the President and the Minister of Health over a nation-wide radio hookup.

Preceding the actual spraying operations a geographical reconnaissance of malarious areas was carried out. This reconnaissance consisted in the locating and numbering of individual houses, sketch-mapping of localities, and gathering information regarding house construction materials, access roads, and other data concerning communication and transportation. Although several zones carried out geographical reconnaissance earlier, the major effort did not begin until April 1956. A great portion of the work was completed in about six months. Recruitment of additional personnel was necessary in order to accelerate this work, but this recruitment was carried out keeping in mind the selection of persons who might be retained as brigade chiefs or spraymen during the spraying operations phase.

Beginning on September 10 and extending through the first week in December 1956, a preliminary phase of spraying operations was carried out. A total of 478,871 houses was sprayed—averaging 9.1 houses sprayed per man per working day. This activity was designed to obtain field spraying experience under a variety of conditions in each zone where sectors or brigades may be organized, with spraymen moving out in vehicles, on horseback, or by boat. Experience was gained in sector and brigade organization, in the use of spraying equipment and protective clothing, and in the adequacy of spraying techniques as outlined in the Manual of Spraying Operations.

Based on the experience obtained during the September-December period, the plan for the period of total coverage which commences on January 2, 1957, was prepared. It was concluded that 2,834,805 houses would have to be sprayed. Dieldrin will be used to spray about 15 per cent of the houses; DDT will be used for the balance.

The main tasks of the Department of Epidemiology in Mexico during the year were the delimitation of the malarious areas of the country and studies on the susceptibility of anophelines. The department staff was made up of a chief of department, two assistant malariologists, one entomologist, three assistant entomologists, one chief of laboratory, and four microscopists.

There was some delay in the initiation of malariometric studies. These did not start in full swing until April 1956 instead of December 1955, as previously planned. According to the original plan of operations blood surveys would be carried out by lay personnel specially trained for this purpose. However, later it was decided to use general medical practitioners on a part-time basis for this purpose. The compensation offered was not enough to entice many doctors, so it was necessary to contract full-time physicians, who are called field technicians or "técnicos de campo". They look for all febrile cases, take blood smears, and carry out epidemiological investigations in doubtful areas. One or two assistants help them in the entomological investigations. Recruiting and special training of personnel took place during early April.

As a result of the epidemiological studies, areas formerly considered as malarious were found free from the disease, and other areas considered as non-malarious were found positive.

During the month of December the zones completed the concentration of epidemiological data which served as a basis for the spraying operational plans of the total coverage phase.

The malarious area was classified into four categories: (1) areas with transmission occurring during more than six months of each year; (2) areas of seasonal transmission with beginning and terminal dates of transmission known; (3) areas considered as having seasonal transmission, but with the inital or terminal transmission date still undetermined; and (4) areas with suspected but unconfirmed transmission. In the first category were 2,464,523 houses; in the second were 50,121 houses; in the third were 320,161 houses, and in the final category were 516,385 houses.

Studies on the susceptibility of anophelines to insecticides were started in September. Eggs were sent from all the zones to Mexico City for rearing. The Fay-Quarterman technique has been the one employed in these tests. The Office of Evaluation and COMEP have also taken part in such tests.

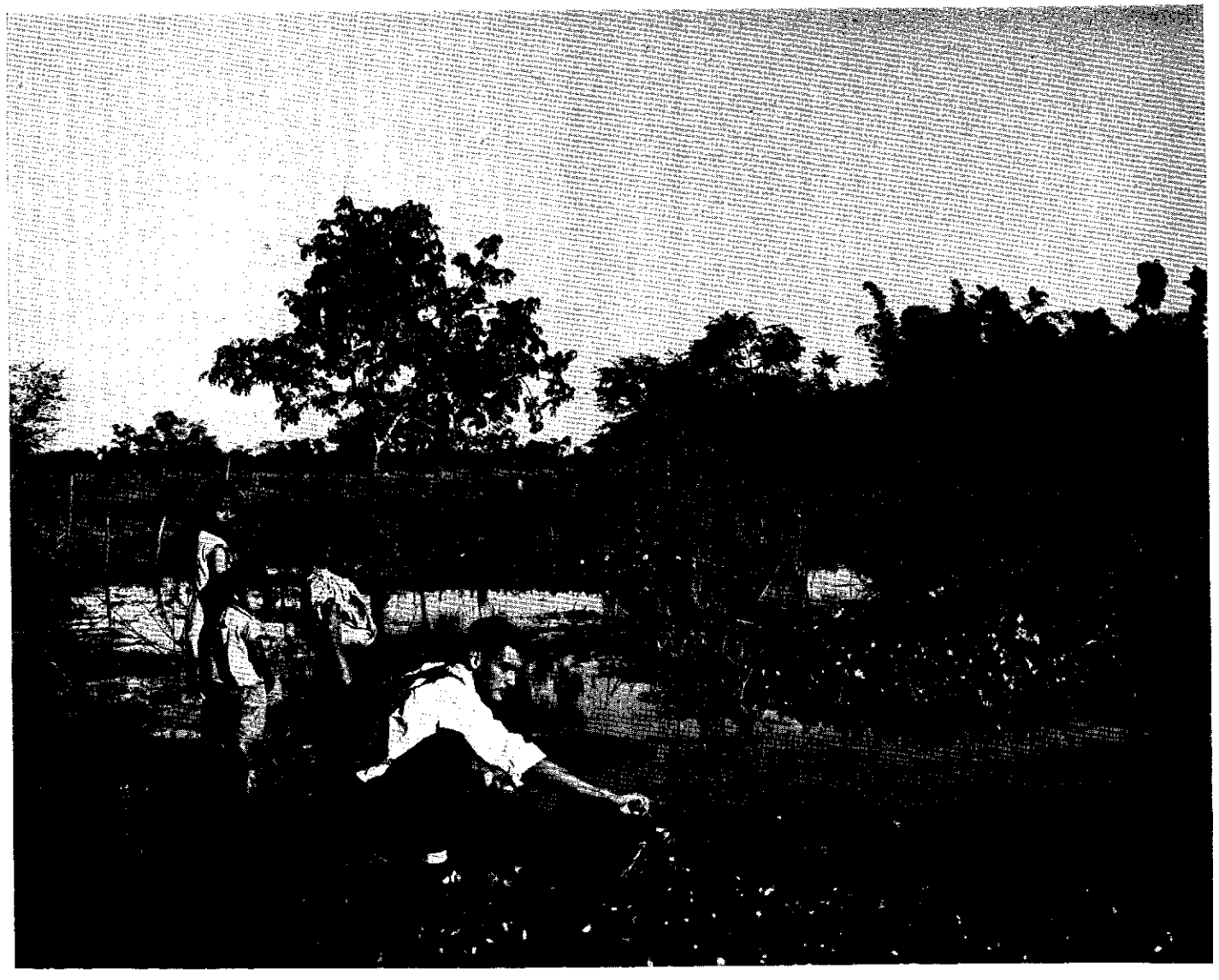
Routine adult mosquito collections inside houses have helped in determining the geographic distribution of anophelines. Special studies are being carried out to determine resting places.

The Department of Investigations and Development consisted of 15 persons at the beginning of the current year and increased to 19 persons by the end of October 1956.

This department has undertaken a rather ambitious series of investigations, such as the investigation on the fate of anti-malarial drugs fed to laboratory animals. A number of tests have been run on the effectiveness of anti-malarial drugs when cooked with various Mexican foods before ingestion by laboratory animals.

Field studies on malaria rates in various areas sprayed

PASB entomologist collects mosquito larvae in the vicinity of Villahermosa, Tabasco, Mexico



with DDT or Dieldrin have been carried out as a continuation of last year's work.

The Department of Investigation and Development began the year with a backlog of much experience acquired in 1955, when 141 technical personnel were trained in courses in México City and Villahermosa, Tabasco. Also, 16 senior personnel (eight malariologists and eight engineers) in CNEP had studied in Venezuela in 1955 on PASB fellowships.

The 1956 activities began in January with courses for sector chiefs. The department included six persons, plus 29 field personnel on loan from CNEP zone II during the training courses. Chiefly because of better accessibility, the training area was moved to Veracruz in May, using the facilities at Boca del Río. Courses or parts of courses requiring laboratory facilities continued to be given in Mexico City. The number of personnel trained during the first 10 months of 1956 in courses operated by the training department totaled 265, of whom 17 were trainees from countries other than Mexico. Additionally, the department organized curricula and furnished some guidance for the training, by the individual zones, of 1,916 persons for field work in malariological or geographic reconnaissance, and in spraying techniques.

Experience gained from field training courses through July 1956 indicated that re-training of spraymen was in order before initiating field operations in September. The engineer of COMEP aided the training and engineering personnel of the campaign in organizing new instructions for the training of spraymen. The new protocol was used in all zones during sprayman training in late August.

The organization of public health education activities of the campaign is somewhat complex. These activities have been divided among three units: the Office of Hygienic Education; an Office of Information directly responsible to the Minister; and the Department of Health Education, Information, and Public Relations of CNEP. The Office of Hygienic Education is in charge of health education activities per se, preparing posters, leaflets, and films. The Office of Information prepares all publicity handouts for the press, radio, and TV. The Department of Public Health Education of CNEP acts as liaison between the CNEP and other interested parties. In each zone there is a public health educator who coordinates all health education activities in his area.

During the early part of 1956 all activities were on a high level basis. Plans were drafted on how to carry out the health education campaign. The Bureau Zone II health education consultant assisted in this planning. In July a manual of health education practices as related to the malaria program was prepared and distributed to all CNEP zones. The first of a series of posters produced by the Audio-Visual Center of the Office of Hygienic Education, with the collaboration of the National Lottery, was also distributed to the zones. A motion picture of phases of the campaign was shot during the month.

During the latter part of August and early September the campaign received very wide publicity coverage in the press, radio, and television, both in and outside Mexico. This was related to the start of spraying operations.

On September 1, the President, in his annual message to Congress, made several references to the work accomplished during the past year by CNEP and its future plans. One week later, on September 7, in a ceremony held at the presidential palace, with the participation of cabinet members, Army, Navy, State Governors, members of international organizations, and CNEP department heads, the President officially proclaimed the start of spraying operation activities. This proclamation was carried to the people over a nation-wide radio hookup. The PASB Director was present at this ceremony as a special guest of the Government of Mexico. Special ceremonies were held in the 14 zones simultaneously with those in Mexico City.

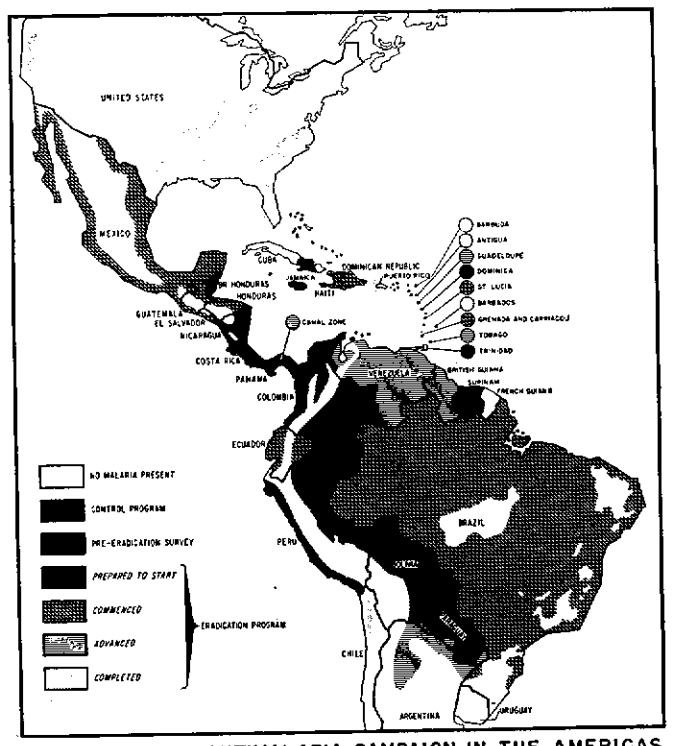
In October, as part of UN week, international personnel from various agencies (WHO, UNICEF, UNESCO, UN Information Center) participated in radio and television shows dealing with the campaign. The Mexico–53 project personnel prepared and tape-recorded an eight-minute interview concerning the eradication program for world-wide distribution by the UN Information Center.

Central America and Panama

Plans were completed and approved in March for malaria eradication in British Honduras, Nicaragua, and Honduras, and for Panama later in the year. It is expected that by mid-1957 all these areas will have active malaria eradication programs in operation.

In Nicaragua, malaria is one of the principal causes of morbidity and mortality, the latter being particularly high among infants and young children. The government had carried on a control program for several years, but following the resolution of the XIV Pan American Sanitary Conference in 1954, it was decided to convert these control measures into an eradication program with the assistance of the Bureau and UNICEF. The full-scale program is expected to begin late in 1957. Similar plans are envisaged for Panama and Honduras.

By the end of 1956, eradication programs were in operation in El Salvador and Guatemala. The process of conversion is well-advanced in El Salvador and a full-scale eradication program has begun. The objective is to spray 276,000 houses. In Guatemala the process of conversion has reached the stage where a full-scale eradication program can be expected to start in 1957. The geographical survey and the numeration of houses was virtually complete at the end of this year. The malaria eradication law was



STATUS OF THE ANTIMALARIA CAMPAIGN IN THE AMERICAS
31 DECEMBER 1956

approved in June 1956. Residual house-spraying with Dieldrin will be carried out in all malarious areas.

In the case of Costa Rica, it is expected to have the plan for eradication ready for approval by the spring of 1957, so that conversion can be completed and full operations undertaken by the end of the year. The sum of $180,000 has been made available for the eradication program.

For all of these projects consultant services are available from the central unit for Central America and Panama (AMRO–7).

Under this project the Bureau, for administrative efficiency, is providing technical cooperation for both malaria and Aëdes aegypti eradication. The malaria eradication personnel (two medical officers and two sanitarians) constitute a central unit of technical consultants who provide periodic short-term advice and assistance to the individual country malaria projects in planning, training, operation of the spraying campaign, evaluation, and epidemiological surveillance. This unit assures maximum utilization of the limited numbers of technical personnel available.

South America

In spite of 25 years of intermittent malaria control operations, Bolivia is still afflicted with malaria. The disease was controlled in the most seriously infected areas, but moderately severe infection has remained in an area containing over half a million people. Another half million live in fringe areas where infection, though moderate, is endemic and must be removed if eradication is to be achieved.

At the beginning of 1956 an agreement was reached between the government, ICA, and the Inter-American Cooperative Public Health Service (SCISP), whereby the latter planned to make available 250,000,000 bolivianos in order to survey the malarious areas of the country and prepare a plan of operations. The pre-eradication survey began in May and will last one year. The Bureau has been cooperating with the Bolivian authorities in an insect control program (Bolivia–4), anticipating this would eventually lead to a malaria eradication program.

Since the beginning of the survey and by the end of the year, 21,922 houses had been surveyed covering a population of 115,592 inhabitants. It is planned to begin eradication activities in 1958.

The decision was made during the year for a malaria survey in Colombia (Colombia–5). The malaria area in this country has an estimated population of over seven million living in approximately 1,400,000 houses. This pre-eradication survey, beginning in the second quarter of 1956, is expected to be completed within a year. The survey includes not only delimiting the extension of the malaria area, but also geographical reconnaissance, numbering of houses, and preparation of itineraries, all of which constitute advance performance of work normally required in the preparatory year preceding full spraying coverage. It is expected that by the beginning of 1957 the SNEM (National Service for Eradication of Malaria) will operate as an autonomous body, and that eradication will start in 1958. The international team will continue to comprise two malariologists in 1957 and 1958. An entomologist who worked in the country during 1956 will continue until May 1957 at which time the national entomological technicians will have been trained.

Malaria has been the number one health problem for Ecuador. Approximately half of the country is malaria infested. Almost 60 per cent (1,764,000) of the population lives in this area.

In 1956, with the technical cooperation of the Bureau, intensive work was done following a survey and preparation of a plan done the previous year, and providing the basis for a cooperative project of the government, the Bureau, and UNICEF (Ecuador–14). On October 8 the geographical survey and numeration of houses began and by the end of the year 195,000 had been surveyed. It is estimated there are 290,000 houses in the malarious areas.

In Argentina, the eradication problem has been actually reduced to only two of the 13 provinces originally malarious. The government has decided to intensify its efforts and to complete the campaign without having recourse to UNICEF aid.

Only incomplete figures for the incidence of the disease in Brazil are available. Nevertheless, malaria remains as one of the major health problems in rural Brazil. The estimated total cases for this year are 100,000. Plans are now being made to shift the malaria program from that of control to eradication. In mid-year an agreement was worked out between the authorities of Brazil and Paraguay to establish a special border malaria program in order to prevent the spread of malaria from a currently endemic to a free area. Another step forward was the agreement of the government to set up with the National Department of Endemic Diseases an independent malaria service to do the job of malaria eradication in the country.

The three main causes of infant mortality in Venezuela are congenital and developmental defects, alimentary disturbances, and infectious diseases. Malaria contributes to all three.

Venezuela, was the first country to start a national DDT program late in 1945. Work here is going on as part of the AMRO–90 project and is far advanced. Confirmed eradication covers 117,525 square miles with a population of two and one-half million inhabitants.

Caribbean Area

The conversion of malaria programs from control to eradication in the Caribbean area began in 1955 and continued successfully through 1956 (AMRO–8). Six British territories and one French territory are concerned with malaria eradication, these being Jamaica, Dominica, St. Lucia, Grenada, Trinidad-Tobago, Surinam, and Guadeloupe. British Guiana has eradicated malaria from the coast but the disease is still endemic in the interior. (British Guiana and Surinam are included in the AMRO–8 project for administrative purposes).

Approximately half of the population living in malarious areas served by FOC (Field Office Caribbean) are to be found in Jamaica. The present insect control program operating with the assistance of PASB/WHO and UNICEF, has concentrated on the twice-yearly spraying of houses in the more highly endemic areas during the past three years. From 41,685 houses sprayed in 1953, the number has increased to 275,098 houses sprayed in 1955 and a similar level was expected in 1956. The total number of houses in the endemic areas of this island number approximately 285,000. A considerable decline in island-wide morbidity and mortality has been observed during the past three years.

During 1956 plans for a malaria eradication program for Jamaica were completed with the assistance of PASB/WHO and officially presented. This program will provide total coverage and the necessary auxiliary services beginning in 1957. The first six months of 1957 will comprise the conversion period.

Guadeloupe has conducted for some years a program of malaria control and at present malaria is reported to persist in an area of only 384 square miles with a population of 34,000 inhabitants. Planning for eradication is scheduled to take place in January 1957.

In 1956 an eradication campaign was prepared by the Government of Dominica with the assistance of PASB/WHO. However, for budgetary reasons it was not possible to present the project during this calendar year. Malaria has progressively declined in Dominica to a presently very low level. Late in 1956 an intensive evaluation program was inaugurated and it will be possible in 1957 to define more accurately the extent and intensity of the disease. In 1955 spraying operations reached 15,421 houses and 12,716 houses in 1956, providing one DDT cycle per year of the estimated 10,000 houses in the endemic areas.

Programs for malaria eradication which were prepared in 1955 for St. Lucia and Grenada were inaugurated in 1956 in both islands with the assistance of FOC and COMEP. Evaluation techniques, principally house-to-house fever surveys, carried out in 1956 in these two islands indicated

Mother and daughter remove valued pieces from home prior to spraying by a brigade member of malaria eradication program, Guatemala

a very low incidence of the disease and it can be assumed that this is the result of the malaria control operations which were begun in 1953 with the assistance of PASB/WHO/UNICEF. By the end of 1956 in Grenada, the malaria endemic zones had been well delineated as covering some 40 square miles and comprising about 7,000 houses with a population of about 28,000 persons. Spraying will be carried out on a five and one-half month cycle, each house being sprayed twice a year. The taking of blood smears in the malaria endemic zones began in August.

Trinidad-Tobago was scheduled to begin a pre-eradication program in July of 1956 in conformity with planning carried out late in 1955. Delays in the arrival of the WHO consultant and in the delivery of drugs and vehicles have disrupted the time-table, and 1956 was devoted exclusively to a continuation of existing methods of control. Residual treatment, twice yearly with Dieldrin of all houses in the *Anopheles bellator* area, and the inauguration of a program of chemoprophylaxis as a "second front" against the malaria transmitted by this mosquito have been postponed to 1957. Malaria rates have declined substantially in the last five years. In 1955, only 187 slides were found positive in an examination of a total of 3,470 smears from suspected cases of malaria.

In Surinam twice-annual spraying of 30,000 houses in the endemic areas of the coastal zones was completed during 1955 and 1956. With the continued assistance of PASB/WHO and UNICEF, total coverage and adequate evaluation are scheduled to begin in 1957, using DDT on a twice-annual basis in the coastal zones and Dieldrin once annually in the savannah belt and the interior of the country. As in other territories of this area, progressive annual reductions in malaria morbidity and mortality are being observed.

National Malaria Service launch in Brazil makes trips along the Amazon Region rivers to distribute table salt treated with anti-malaria drug

At the end of 1956 planning was inaugurated in FOC for the establishment of a training center in Jamaica for English speaking personnel (both national and international) concerned with programs of malaria eradication. In addition, Jamaica was also tentatively indicated as the headquarters for the international evaluation team which will periodically visit and evaluate the progress of the eradication campaigns under way in Mexico, Central America, and the Caribbean.

In the Dominican Republic and Haiti, the conversion of malaria control to a malaria eradication campaign took place in 1956 and the campaign will continue through 1957. These operations were combined with the Aëdes aegypti eradication programs (Dominican Republic–2 and Haiti–4). In the Dominican Republic of some 377,700 houses in malarious areas over 150,000 were sprayed during the year. One-third of these received more than one spraying. In Haiti during the year 660,793 houses were numbered. House numbering, sketch surveying, and population and house censuses in the malarious zones were completed in October. Inspected areas covered 2,565 square miles of the 9,650 square miles initially presumed infested.

Malaria was at one time one of the most important public health problems in Cuba. It was present throughout the island, including the municipal area of Havana. After intensive work done with the cooperation of the Rockefeller Foundation, there remains only a limited problem in the Province of Oriente and on the north coast of Pinar del Rio, where there is an estimated population of 430,000 of whom almost 80 per cent lives in rural areas.

The purpose of the project (Cuba–5), commencing in 1957, is to eradicate malaria from Cuba in order to protect the population and to form part of a hemisphere-wide eradication campaign in which eradication must be completed in each country to protect others from reinfestation.

Other Work

Two other projects, interzone in character, dealt with malaria eradication during the year, (AMRO–90 and AMRO–109). With the financial support (AMRO–90) given by the XIV Pan American Conference action, as mentioned earlier, and in order to facilitate the implementation of the program, a special unit was established within the Bureau to provide technical advice on and coordination of the anti-malaria activities that are being or will be carried on by the Bureau in the Western Hemisphere. This special unit, known as the Coordination Office of Malaria Eradication (COMEP), includes five technical advisers, and had headquarters initially located in Mexico City. At the end of 1956 the decision was made to move this unit to the Washington Headquarters.

The broad objectives of the Bureau in establishing COMEP are: (1) to develop technical standards for the malaria eradication programs on the continent; (2) to give technical advice to governments in the planning, operation and evaluation of malaria eradication projects; (3) to train personnel for malaria eradication activities; (4) to devise terminal procedures for assuring the successful completion of the program; and (5) to develop a system for evaluating field activities.

From the organizational point of view, the technical activities of COMEP come within the functions of the PASB Division of Public Health. Steps have been taken to assure a proper coordination with the Zone Offices which maintain direct responsibilities for the operation of the malaria eradication projects within their respective geographical jurisdictions.

The rapid expansion of the hemisphere-wide malaria program has created requirements for international cooperation in excess of available resources. It is essential, therefore, to be able to meet emergency requirements in various country projects. During 1956 it has been possible to use the special fund which had been allocated by the Directing Council from surplus funds, to recruit personnel, and to provide fellowships (AMRO–109, Supplemental Assistance to Country Projects).

Dieldrin Study

The development of resistance to DDT in the program of malaria eradication has stimulated much interest in the Bureau in the evaluation of other insecticides. In furtherance of this interest, and aided by a grant from the Shell Chemical Corporation, the PASB has undertaken a study to ascertain conditions under which the insecticide Dieldrin should be used for anti-malaria work, especially the effect of mud walls on the duration of toxicity. With the collaboration of the government this study is now being carried out in Mexico (AMRO–105). It is hoped this experiment will provide fundamental information of critical value to countries in Latin America and other parts of the world.

The study began in April 1956 when surveys were carried out to locate three suitable areas that had been unsprayed and had a history of malaria. Five or more villages were selected in each State of Puebla, Oaxaca, and Guerrero.

The chief objectives of the study are: (1) to evaluate the biological effectiveness of test pesticides against the important vectors of malaria under various climatic conditions in different areas; and (2) to determine the susceptibility levels of the malaria vectors to test pesticides.

To attain these objectives specific studies include: comparison of test dosages between Dieldrin using 25, 50, and 100 mg. per square foot, and DDT, using 200 mg. per square foot; the measurement of the effect on different types of surfaces (adobe, sticks, mud, plaster, and brick); the efficacy of complete versus partial treatment of dwellings; the influence of weather variables on insecticidal efficacy; and finally, the relationship of the time of treatment and mosquito abundance to the duration of residual action of the deposits.

The first tests began in October 1956 in three villages in the Puebla area. Formulations of 25 mg. of Dieldrin per square foot and regular DDT of 200 mg. per square foot were used. The Dieldrin was applied to about 50 houses in the village of Casa Blanca; DDT was applied to about 100 houses in the village of Tatetla. Roughly 50 per cent of the houses were made of mud (adobe or straw plastered). Preliminary results based on 30 days of activity have shown that "wall-tests" in which mosquitoes were exposed to the walls for one hour gave a "kill" at the end of 24 hours of up to 88 per cent. Inspection of the houses before and after spraying show approximately 90 per cent reduction in mosquitoes. More tests are being made, however, before a proper evaluation can be determined. This program will include both biological and chemical tests. In the biological tests the appraisal of the efficacy of the insecticides will be made by wall-cage tests and by measurement of mosquito densities, whereas in the chemical tests samples will be taken from the wall, probably each month, to determine the amount of material on the surface of the wall.

This study is planned for two years, and, under the director, is employing nine men in the field—one entomologist and two biological aides in each of the three test areas.

Yellow Fever and Aëdes Aegypti Eradication

Eight Years of Bureau Sponsorship

The continental eradication of *Aëdes aegypti*, under the sponsorship of the PASB since 1948, has paid generous dividends in protecting urban areas and ports from the occurrence of yellow fever. The campaign gained speed during the first four years when eradication was all but completed in Paraguay, Uruguay, Peru, Ecuador, and most of Central America. Since then *A. aegypti* has been declared eradicated from Bolivia, French Guiana, and Bermuda, and numerous comprehensive verifications have been negative in Brazil, Chile, Grenada, British Guiana, and British Honduras.

The outbreaks of yellow fever in recent years in Central America and Trinidad, and the continued presence of the disease in several of the other Latin American countries, in spite of intensive vaccination of the human population, however, show very clearly that there are still a great many aspects of the epidemiology of yellow fever which need to be studied. It is now obvious that yellow fever virus is permanently ensconced in the jungles in several places in South America, and that it cannot be eradicated from this formidable refuge with any procedure now known. This, as has been pointed out in the Introductory Review makes it all the more necessary to stress the eradication of *Aëdes aegypti*.

A special project (AMRO–57) was originally set up to study the epidemiology of the current epidemic wave of jungle yellow fever in Central America and to help the Member Governments provide protection against the disease.

This epidemic is unique in the degree to which it was preceded and accompanied by a fatal epizootic in the monkeys of the region—so much so that the progress of the yellow fever virus could be monitored by the monkeys it killed throughout large areas in which there were no human fatalities. The investigations carried out during the year are described in detail in an earlier section of this Report. In 1957 the area in which these epidemiological studies are to be carried out is expanded to all areas of the Americas where jungle yellow fever may occur. Arrangements have been made for close cooperation with several scientific institutions, among which are the Carlos Finlay Institute, the Gorgas Memorial Laboratory, and the Rockefeller Foundation Virus Laboratories.

Perifocal Treatment

The Bureau has developed an efficient procedure for the eradication of *Aëdes aegypti* which can be applied anywhere in the Americas at a low cost. The procedure involves the "perifocal" treatment of actual and potential breeding places of the aegypti mosquito in a three month cycle. *A. aegypti* is a domestic mosquito, breeding inside and around houses, so that every house in an infested locality must be inspected, inside and out, and treated if necessary. The treatment is applied in "pinpoint" fashion in and around the breeding places. The idea is to put DDT in a minimum area for a maximal effect. Thoroughness is essential and the success of the campaign depends upon good administration, with work of inspectors checked, cross-checked, and double-checked.

Experience has demonstrated that (a) one well-applied DDT treatment eliminates *Aëdes aegypti* from small localities (less than one thousand houses) where, generally, there is no problem of hidden foci or foci difficult to reach; and (b) normally, two DDT applications during a year are sufficient to solve the problem in average localities (from one to five thousand houses). In larger cities the problem of closed houses greatly increases the administrative difficulties of applying DDT to all infested points in all houses—requiring an increased number of treatment cycles.

Since the action of DDT provides safety for at least three months, it has been possible to extend the treatment cycle to that period, from the weekly cycle necessary in the pre-DDT days, thereby effecting considerable economies in the campaign. Nevertheless, it is still essential to inspect and treat all parts of all houses and other buildings during each treatment cycle. A single missed house that is breeding aegypti can cost a whole extra cycle of treatment in a locality. Thus, right of access to all parts of all houses must still be had by every aegypti eradication service.

In cities or other places with large old buildings, hidden primary breeding places, or "mother foci", continue to be of first importance in the eradication of aegypti. These breeding places may be missed entirely if sole reliance is placed on larvae; recourse must be had also to search for adult aegypti.

The method of making an Initial Survey of aegypti has been simplified. Formerly, every third house in all blocks

An aegypti eradication team in Colombia takes a dug-out canoe to work along the Ahuyama Canal →

Jungle yellow fever studies in Guatemala: transferring live mosquitoes from individual vials to a jar for shipment under refrigeration to the Gorgas Memorial Laboratory, Panama. There the mosquitoes are tested for yellow fever virus by grinding them up and inoculating them into the brains of albino mice

of an urban locality had to be checked, whereas today it suffices to check every third house until the first positive one is found in each block.

Publication of Standards

After some years of experience in eradication operations based on DDT, it has been possible to formulate standards governing techniques and evaluation of results, and to print them in the *Guide for the Preparation of Reports on the Aëdes aegypti Eradication Campaign in the Americas*, originally published by the Pan American Sanitary Bureau in January 1954 and revised in January 1956. This guide describes the two basic reporting forms, a monthly form containing data for publication in the *Boletín* of the Pan American Sanitary Bureau, and a quarterly form showing data on the initial and the present conditions in all localities found with *Aëdes aegypti* in each country. With these reports it has been possible to evaluate correctly the results of the anti-aegypti campaign in the countries and other areas where work is under way. A direct appraisal of the activities is made by advisers and inspectors maintained by the Pan American Sanitary Bureau in the countries to collaborate with the local personnel and to follow up and intensify the work.

The Criteria of Eradication

Any eradication campaign not one hundred per cent successful is a failure! So the criteria of eradication of *Aëdes aegypti* from a country must be very rigorous, and must include a "test of eradication" which consists of stopping completely the application of insecticides while continuing intensive search or "verification" for aegypti over a relatively long period. The minimal requirement is three successive negative verifications at intervals of at least six months each. One year is thus the absolute minimum, but a period of two years is often prescribed where conditions were originally very favorable for aegypti.

The long period between verifications serves several purposes; it allows time for the insecticidal action of DDT to disappear; it gives a chance for any missed aegypti larvae or adults to multiply to numbers that are more easily detected; and it gives adequate time for all dry, but living, aegypti eggs in the area either to die of old age or be eaten by predators like ants, or to hatch into larvae and be detected.

Once the eradication of aegypti has been attained in an area, the size of the eradication service can be greatly reduced, but there is still the need to maintain a "vigilance service" of adequate scope—to detect reinfestation—for as long as there is any appreciable chance of reinfestation from outside the eradicated area.

Specific Projects

Active projects during 1956 dealing with yellow fever and aegypti eradication included Cuba–1, Colombia–52, Argentina–51, Brazil–51, and AMRO–88. Six other aegypti eradication projects were combined with malaria eradication programs (Dominican Republic–2, Haiti–4, Mexico–53,

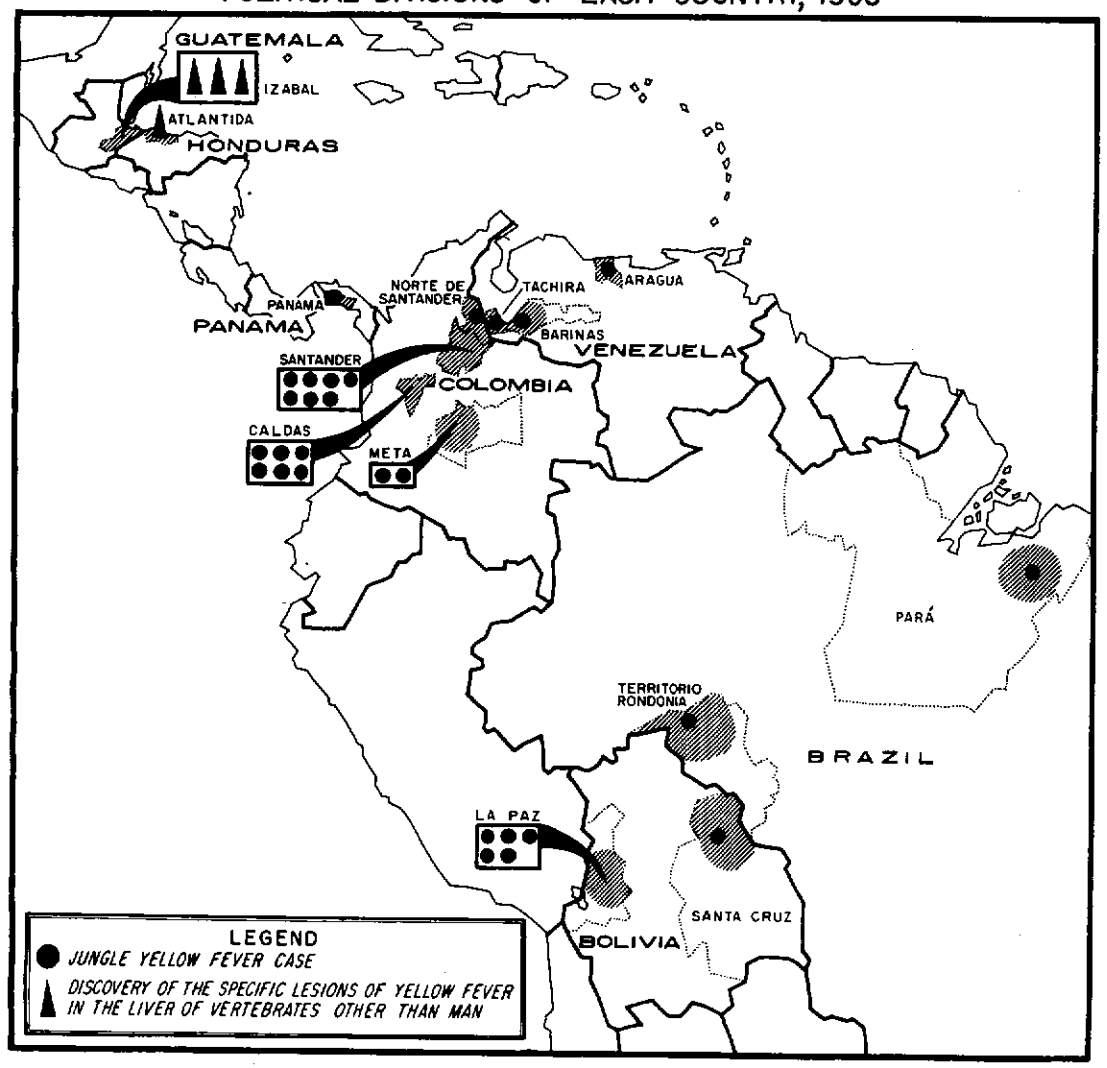
Making 17 D yellow fever vaccine at the Carlos Finlay Institute, Bogota, Colombia. An assistant cuts off the tops of embrionated eggs, using a tiny oxyacetylene flame. If absolute bacteria sterility is not attained the vaccine has to be discarded. The mask protects the eyes of the technician from the sterilizing ultra-violet light in which the whole room is bathed

Colombia–5, AMRO–7, and AMRO–8). In addition, yellow fever studies under the project AMRO–57 continued through the year.

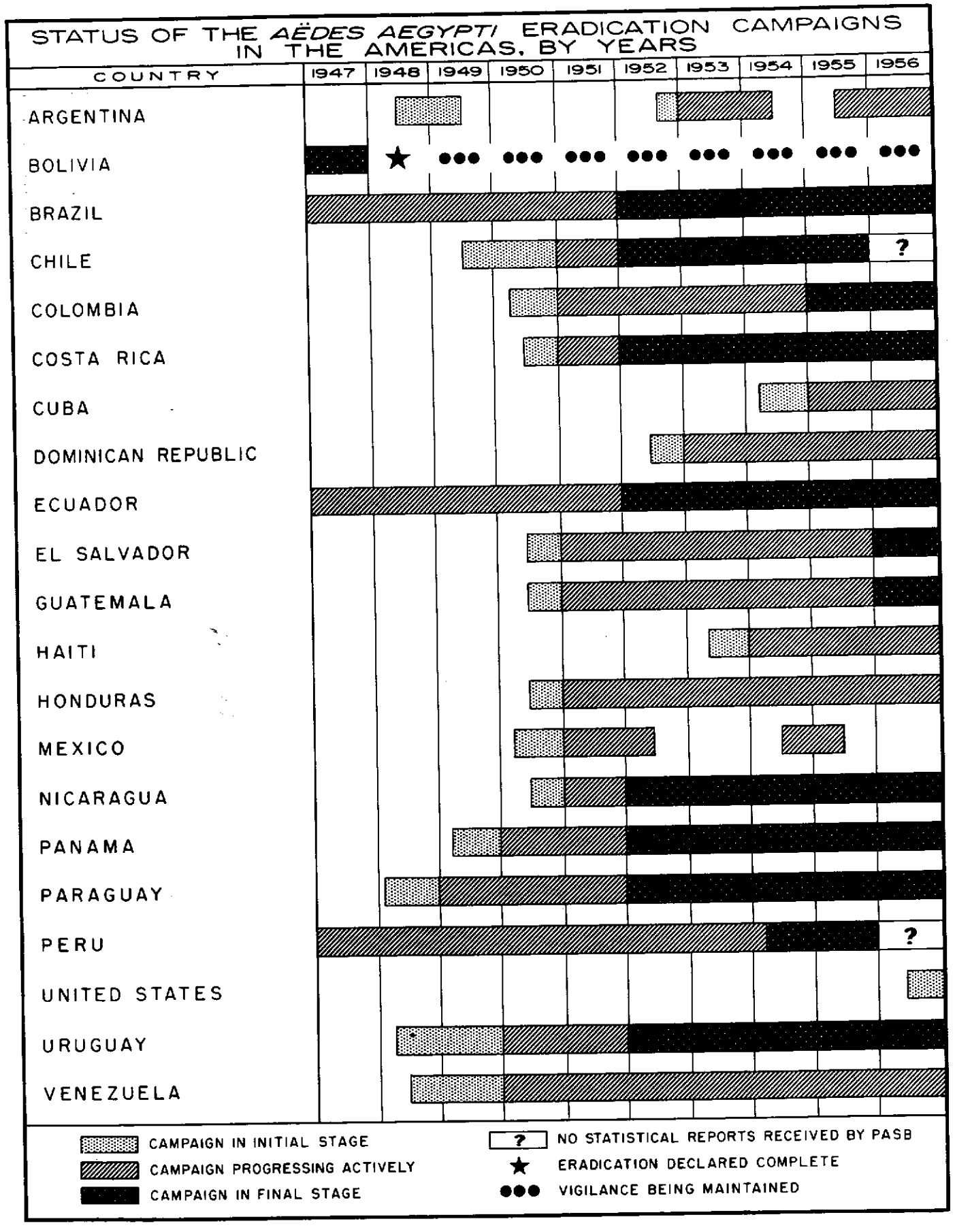
Yellow fever is endemic in the jungle areas of Colombia, and *Aëdes aegypti* is present in many localities of the country. There is, therefore, constant risk of outbreaks of the urban type of the disease. Under a program of Aëdes aegypti eradication household spraying in the Caribbean area of the country was started in May 1952. This was followed by two other cycles of spraying, the third completed in December 1954. The results of the eradication campaign in that area may be considered very satisfactory. As of December 1956, 2,968 localities had been inspected and 334 found positive. In the same period, 318 localities already treated were verified, and only two remained positive, with 16 still to be verified (Colombia–5).

During the year, Initial Surveys of the interior of the country, as part of the malaria control campaign, reached

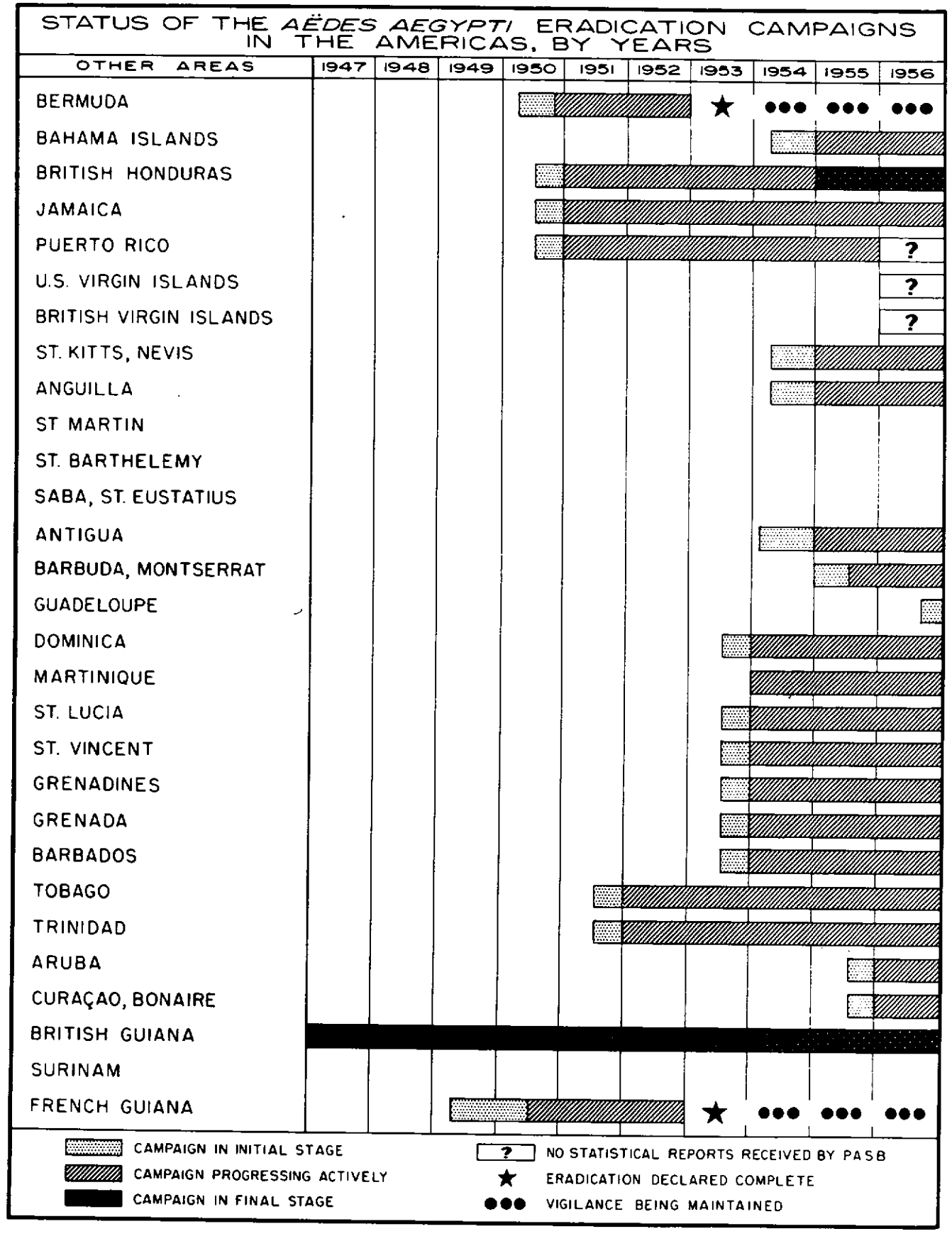
REPORTED CASES OF YELLOW FEVER IN THE AMERICAS, BY MAJOR POLITICAL DIVISIONS OF EACH COUNTRY, 1956

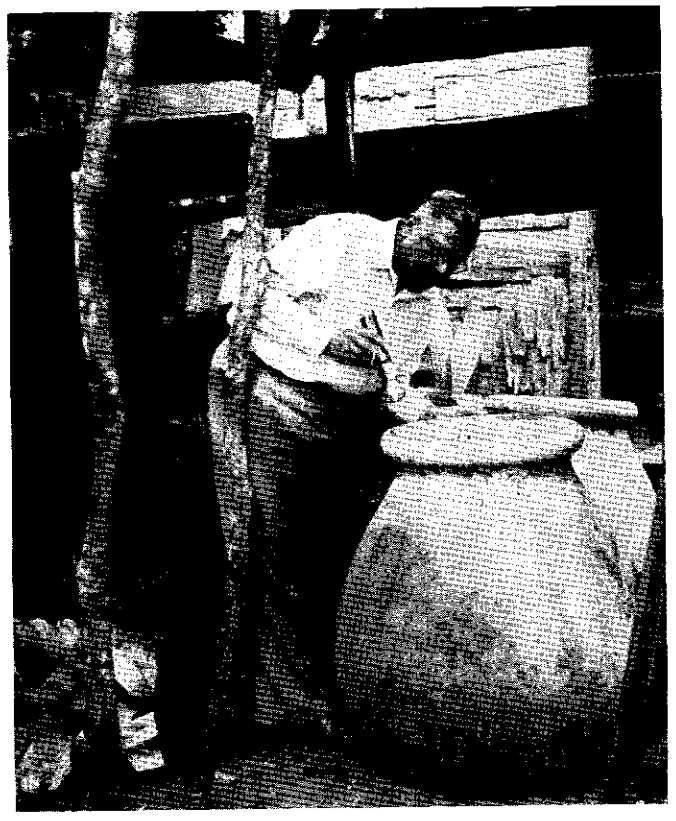


STATUS OF THE *AËDES AEGYPTI* ERADICATION CAMPAIGNS IN THE AMERICAS, BY YEARS



STATUS OF THE *AËDES AEGYPTI* ERADICATION CAMPAIGNS IN THE AMERICAS, BY YEARS





PASB sanitarian looks for larvae of Aëdes aegypti mosquitoes in water jars

extensive areas not previously investigated. In 1957 the aegypti eradication operations will be conducted under the aegis of the Carlos Finlay Institute, entirely separate from the expanded malaria eradication operations. The international staff will comprise one medical adviser and two sanitarians.

Over the past years, a series of agreements have been negotiated with the Government of Colombia with the aim of providing material and technical assistance to support the Carlos Finlay Institute. This has evolved as the result of the resolution adopted by the Directing Council at its meeting in Buenos Aires in 1947 entrusting the PASB with the solution of the problem of urban yellow fever on the continent. A program of yellow fever control was to be developed by the Bureau, which, in agreement with the interested countries, was to take the necessary measures to solve such problems as might emerge in the campaign against yellow fever. As a result of the 1947 resolution it became advisable to arrange for two specialized yellow fever laboratories to serve the needs of the campaign.

The Government of Colombia granted semi-autonomous status to the Carlos Finlay Institute, which has a Technical Administrative Council composed of the Minister of Health, the Director of the PASB, and the Director of the Institute. By the terms of an agreement with the government, signed on August 20, 1952, and extended for a term of three years on December 4, 1956, a yearly contribution of the PASB to the Institute was established. In 1956, it was $31,600. The Bureau also gives technical advice. A project (Colombia–52) was set up to make available the facilities of the Institute to other countries in Latin America in order to assist those countries in the study of yellow fever, by furnishing yellow fever vaccine free of charge, performing serological tests for yellow fever, making pathological examinations of liver samples, and conducting entomological, mammological, and ecological field investigations.

A further purpose is to use the facilities of the Institute for the training of personnel from other countries and to advance studies related to other health campaigns. During 1956, the Institute prepared 1,312,159 doses of yellow fever vaccine and distributed 983,947 doses to 10 countries and territories in the Hemisphere free of charge to the recipient countries except for air freight costs.

The program in Argentina (Argentina–51) is part of the continent-wide aegypti eradication campaign. The infested area extends to the north and east from Bahia Blanca in the south and Mendoza in the west. The presence of jungle yellow fever in neighboring zones inside and outside of Argentina emphasizes the danger of the spread of the virus into the aegypti-infested areas. The eradication of the mosquito in Argentina is essential also for the protection of neighboring countries where this vector has already been eradicated.

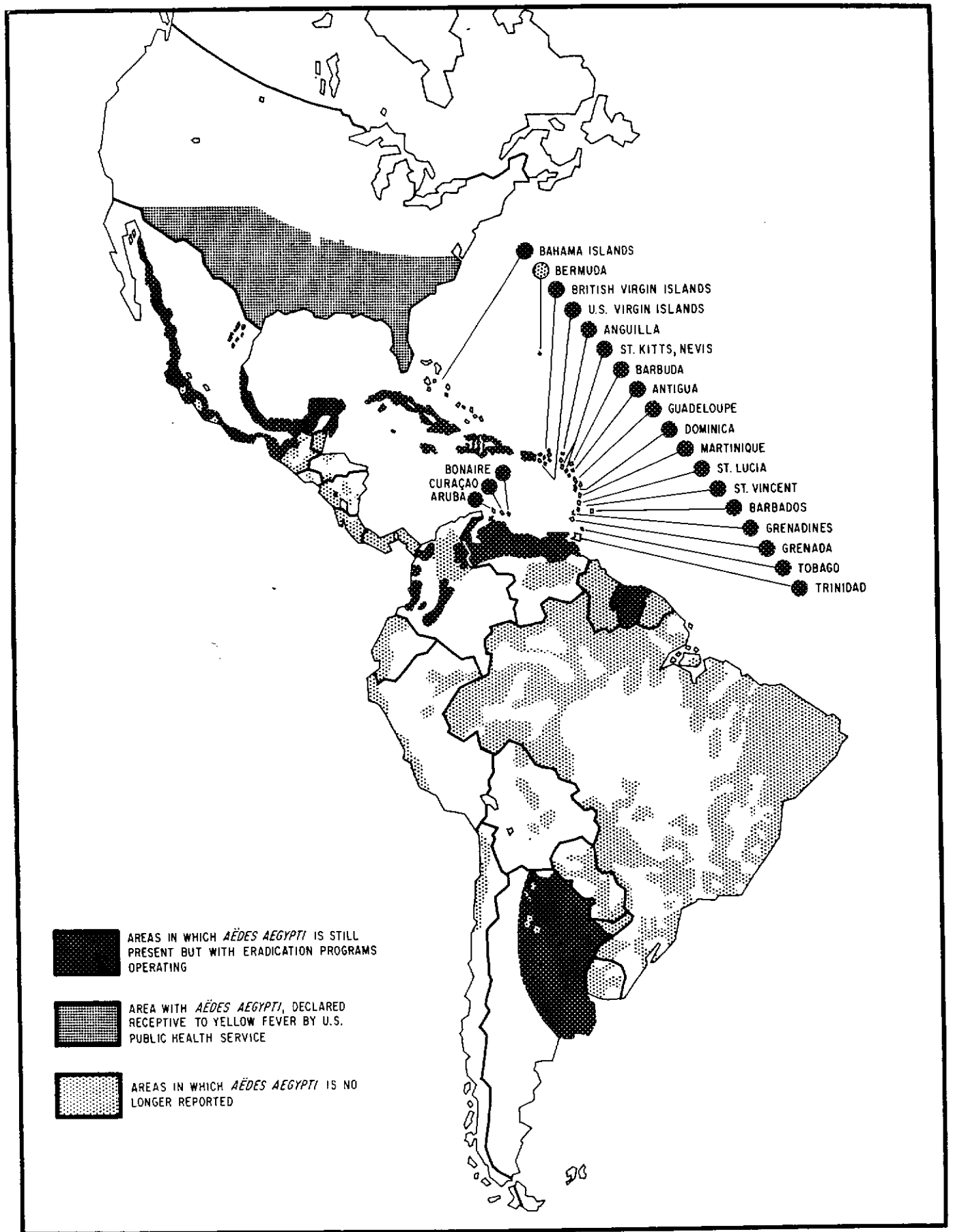
In 1953, activities were concentrated on the training of personnel. In 1954 the control and training program in the northern part of the country continued on a limited scale. In the latter part of the year a formal agreement was signed and subsequently a plan of operations was prepared. The plan provides for work to be carried out by the department of malaria and yellow fever control. The field operations commenced in 1955, in the northeast of the country, in the city of Corrientes where a training center was established for inspectors. Some 70 men received their training and Initial Surveys of aegypti were undertaken in the city of Corrientes and in the provinces of Corrientes and Misiones. The plan of operations provides that 500 men employed by the government will eventually be working in six sectors, which will include the city of Buenos Aires. By the end of 1956, the program had two sectors in full activity. Also, in accordance with the plan of operations, work began during the year in a third sector comprising Greater Buenos Aires and the Tigre Delta. The campaign is going well in Argentina. By December 1956, of 1002 localities initially surveyed in various provinces in the country, only 47 had been found harboring aegypti. Three of these were still known to be infested, but 12 remained to be verified.

In Brazil during the year two cases of jungle yellow fever were reported, both revealed by viscerotomy in known enzootic regions. One case was reported from Porto Velho, deep in the jungles of Mato Grosso; a second was reported from the locality of Tomé-Acú, in the state of Pará.

Extensive verifications to determine the presence of aegypti failed to find any during the year. Vaccination of the rural population has continued and roughly one and one-half million people were vaccinated during the year.

The Oswaldo Cruz Institute in Rio de Janeiro, Brazil, includes the second yellow fever laboratory with which the PASB cooperates. A small grant to the Institute (Brazil–51) assists in the production of 17D yellow fever vaccine,

A new type of breeding place for Aëdes aegypti. Holding water the year round, and insulated against extremes of heat and cold, a large pile of old tires provides almost ideal breeding conditions for the mosquito



STATUS OF *AËDES AEGYPTI* ERADICATION CAMPAIGN IN THE WESTERN HEMISPHERE - 31 DECEMBER 1956

which is distributed free of charge to other governments. The total doses of vaccine produced in 1956, up to December 15, were 6,679,800. Of these the following amounts were supplied through the PASB Zone Office V for shipment to other countries: Haiti, 1,000 doses; Iceland, 1,000 doses; Peru, 40,000 doses; Portugal, 20,000 doses; Uruguay, 32,000 doses; Venezuela, 700,000 doses.

The PASB Zone Office in Rio de Janeiro facilitated aegypti eradication operations by purchasing in Brazil and shipping to various countries in the Americas quantities of mosquito capture tubes, viscerotomes, and the special two-quart pressure sprayers used in the perifocal treatment operations.

In November 1953 an agreement was signed with the Government of Cuba for the implementation of a project to eradicate *Aëdes aegypti* (Cuba–1). This step was followed by the training of national personnel until November 1954, when the field work against *Aëdes aegypti* began in Havana, where aegypti has been reduced but by no means eradicated. Some work is being done in the provincial capitals. The original plan of operations called for a staff of about 150 men on the Cuban aegypti eradication service, but only half that number have been employed so far. It is to be hoped that enough funds can be found to expand the service to its most efficient size. The PASB contributes the services of one medical adviser and one sanitarian.

Two other country projects are combined aegypti and malaria eradication projects (Dominican Republic–2 and Haiti–4). During the year the two medical officers assigned to the two projects have had to divide their attention between the two diverse activities. Each country had two sanitarians, one specialized in each branch of activity. As reported last year, in Ciudad Trujillo *Aëdes aegypti* has acquired resistance to DDT. The special measures that will have to be taken have not yet been decided upon. Aegypti eradication operations have been transferred to interior cities and towns, in close cooperation with the malaria operations.

In Haiti the aegypti operations have been limited to Port-au-Prince and environs. Intensified operations are essential, and it is planned to assign in 1957 a medical adviser full time to the aegypti eradication service.

Interzone and Intrazone Projects

In the countries of Zone III (Central America) there is the project: Malaria and Aëdes aegypti eradication in Central America and Panama (AMRO–7). The aegypti eradication campaign in this area has been in progress since 1950 and no aegypti-transmitted yellow fever has been recognized, in spite of the presence of jungle yellow fever in men and monkeys. The program is in its final stages in Costa Rica, Nicaragua, and Panama, and well advanced in El Salvador, Guatemala, and Honduras.

British Honduras is now among the areas from which *Aëdes aegypti* appears to have been eradicated. Final verification late in the year of 6,956 houses in 53 critical localities on the mainland confirmed the previously reported complete absence of aegypti there. The hundreds of small coral islands off the coast of British Honduras comprise a very special problem in testing for the eradication of aegypti. Final announcement of eradication from the territory must await the solution to this newly encountered problem.

In Costa Rica, at the end of 1956, only the final verification remained to be done.

Aëdes aegypti has not been found for the last three years in Nicaragua. In September the final inspection began in the city of Managua. By December, of a total of 8,300 houses, 4,483 were inspected with a negative aegypti result. Under the supervision of a PASB sanitarian the final verification of all places known to be infested originally was completed by a local brigade in Panama in August, but a considerable area that is presumably infested must be initially surveyed before eradication can be declared. In El Salvador, at the end of November, a verification of the city of San Salvador was completed with a negative for aegypti. This is the same for the country as a whole.

Between July and December, in Guatemala, 87,410 houses were treated perifocally. Twelve units worked during 1956 in the Departments of Izabal, Alta Verapaz, Baja Verapaz, and Peten. From January to the end of November, 246,235 persons were vaccinated. By the end of the year 12,040 square miles of an initial area of 14,236 square miles, presumably infested, had been initially surveyed.

The Bureau aegypti experts provide consultation and actual supervision to all the countries in the area. Provision has been made for one medical officer full time on aegypti work, two sanitarians, and limited supplies and equipment for 1957 and 1958.

In the Caribbean there is another combined malaria and aegypti eradication project, (AMRO–8). Because of the wide scattering of the islands in the Caribbean area, it is necessary for some of the Bureau consultants to provide advice on both activities. However, within each area the two campaigns have separate organizations. Aegypti eradication campaigns have been under way in about half the areas of the Caribbean since 1950, and they are starting in the remainder of the area except for Montserrat and Guadeloupe, where they are in the initial stage, and in four areas—U.S. Virgin Islands, British Virgin Islands, Surinam, and the three very small islands of Saba, St. Eustatius, and St. Martin—where there is no activity.

At the end of the year four areas of the Caribbean were completely negative for *Aëdes aegypti*—Bermuda, Grenada,

British Guiana, and French Guiana—and two other small islands appeared to be free. These are Aruba, and the tiny island of Nevis, which forms part of the colony of St. Kitts-Nevis-Anguilla.

On St. Kitts the infestation was found to be localized in Basse-Terre and St. Peter (some 3,900 houses). The rest of the island has been inspected twice and results have been negative. There is a persistent infestation on Anguilla, however, despite four cycles of three months each. St. Lucia was also apparently negative at the end of 1956 having vigorously eliminated a number of hidden foci during the year.

Bonaire, which is part of the Netherlands Antilles and lies close to Curaçao, was residually and perifocally treated in separate cycles late in 1956. A single whirlwind campaign on the small island reduced the almost universal infestation to about one per cent.

Work was well advanced in Curaçao and Aruba, removing those two important islands as a source of reinfestation for nearby places on the coast of Colombia and Venezuela.

Martinique and Puerto Rico have received relatively little assistance from the Bureau in the execution of their programs as part of the AMRO-8 project. The exact status of the Martinique program will be examined in 1957 by the public health sanitarian presently assigned to Guadeloupe.

In Puerto Rico, a careful review of the program and the full-time assistance of a senior aegypti expert are indicated. No reports for 1956 are available, but in 1955 aegypti was found in 101 localities, including the capital.

The methods employed for aegypti eradication in this area conform to the norms established by the PASB.

Where malaria is a concurrent problem, the residual treatment of houses for malaria has greatly facilitated the work of the aegypti squad, but perifocal treatment of all actual and potential aegypti breeding places remains the basis of the aegypti eradication operations.

Specific projects have been described above. Under an interzone project (AMRO–88) efforts are made to strengthen and coordinate the entire eradication campaign: (1) by assisting in the preparation and execution of national programs; (2) by training and supervising personnel, both in demonstration courses and in the field; and (3) by developing standard operational procedures and making the information available to all interested governments.

Experience has shown the importance of having a regional consultant plus supplies and equipment needed to supplement individual projects under emergency conditions. Provision has been made for one Aëdes aegypti adviser in 1957 and 1958, short term consultants, supplies and equipment, and for three sanitary inspectors in 1958. Their function is to assist national services and to represent the Bureau in the final checkings or checks leading to declare eradication from a territory.

International Quarantine

In connection with the entry into force on October 1, 1956 of the Additional Regulations adopted in May 1955, the World Health Organization has published a list of the areas infected with yellow fever. The Bureau requested the health authorities of all countries situated in the former "yellow fever endemic zone" (Colombia, Ecuador, Peru, Bolivia, Brazil, Venezuela, and the three Guianas) and to other countries with recent history of yellow fever (Panama, Guatemala, and Honduras) to supply information on the local areas within their territories considered to be infected on the basis of: (1) human cases or; (2) proof of the activity of the yellow fever virus in vertebrates other than man, in accordance with the new definition of "yellow-fever infected local area."

A declaration by a country that a local area within its boundaries has become free of infection, in accordance with the terms of Article 6 of the International Sanitary Regulations, will also be of utmost importance to enable the health administrations of other countries to withdraw the measures which were applied against the area when it was infected. Unless information is transmitted to the effect that yellow fever has ceased to be present in a local area, governments may continue to consider such local areas infected.

According to Article 70, as amended in May 1955, health administrations are to inform the Organization of the areas within their territory which fulfill the new definition of a "yellow fever receptive area". This is "an area in which the virus of yellow fever does not exist but where the presence of *Aëdes aegypti* or any other domiciliary or peri-domiciliary vector of yellow fever would permit its development if introduced." Such information has been requested and received from many countries or territories. Only the health authorities of receptive areas may require yellow fever vaccination certificates of travelers arriving from infected local areas.

Under the terms of the International Sanitary Regulations (Art. 8 para. 3), Member Governments are to furnish information to the Organization once a year on their vaccination requirements for international travel. This information is published in a separate report for the use of all countries. All the American countries and territories were requested to submit information on their requirements, and especially on modifications of their yellow-fever requirements in view of the Additional Regulations of 1955.

Additional Regulations were adopted on May 23, 1956 by the Ninth World Health Assembly amending the International Sanitary Regulations with respect to the form of the international certificate of vaccination against smallpox and to the sanitary control of pilgrimages to the Hedjaz. These additional Regulations entered into force on October 1, 1956 and January 1, 1957, respectively. The Additional Regulations modifying the International Certificate of Vaccination or Revaccination against smallpox have been accepted by all of the American countries and territories except the British territories. The Additional Regulations with respect to the Sanitary Control of Pilgrim Traffic were accepted by all except the United States, U.S. Virgin Islands, and Puerto Rico.

Seminar on International Sanitary Regulations

The letter of agreement fort his seminar, scheduled to be held in Venezuela from January 21 to 25, 1957, was signed by the Minister of Health of Venezuela on August 14. Its main objectives are to discuss the application of the International Sanitary Regulations, including the amendments adopted by the Eighth World Health Assembly; and to improve case reporting for a more effective application of the Regulations and as a basis for planning national and international health programs. Directors of health and officials responsible for case reporting and the application of the International Sanitary Regulations in the 10 South American countries were invited to participate.

Treponematoses

A major program being carried out by the Pan American Sanitary Bureau in cooperation with UNICEF is in the field of yaws eradication. Campaigns have been organized in the Dominican Republic (Dominican Republic–52), Haiti (Haiti–1), and in some of the Caribbean territories (AMRO–47). A campaign also is planned in Brazil early in 1957 (Brazil–20).

Yaws is one of a group of diseases usually referred to collectively as treponematoses. Other diseases in this category include syphilis and pinta, a disfiguring disease which has profound social consequences and affects many people in the Americas. In the Americas yaws is present with variable prevalence in Bolivia, Brazil, Colombia, Costa Rica, Cuba, the Dominican Republic, Ecuador, Guatemala, the Guianas, Haiti, Nicaragua, Panama, Peru, Venezuela, and in a number of the Caribbean territories.

The eradication of yaws in the Region of the Americas therefore commands a high priority. Persistence of the disease has brought additional economic problems, among others, into many areas.

Since the adoption of Resolution XLI by the Pan American Sanitary Conference in 1954, considerable interest has developed among the countries and territories in the Caribbean area for the early realization of yaws eradication. Some of the governments have requested the collaboration of international organizations to develop programs for the eradication of yaws and syphilis control. In answer to several of these requests, PASB/WHO, with UNICEF collaboration has set up since the middle of 1955 a special inter-country project (AMRO–47) for the Caribbean area. This eradication project is actively giving assistance to the different local governments in this part of the Region in the study of their problems and the planning of eradication campaigns of an expansive nature. For each of these territories the Bureau is also cooperating toward improvement in the control of the venereal diseases, particularly syphilis.

The long-range objectives of this project are: (1) the eradication of yaws in the Caribbean; (2) the reductions of syphilis and gonorrhea prevalence; (3) the strengthening of territorial venereal disease services, including laboratory serological services: (4) the education of the public on matters pertaining to yaws and the venereal diseases; and (5) the training of local professional, auxiliary, and technical personnel in mass campaign methods.

Under (AMRO–47) the mass treating and testing phase

DISTRIBUTION OF YAWS IN THE AMERICAS - DECEMBER 1956

began in Grenada at the end of January 1956, entailing both treatment with penicillin (PAM) of the whole population and testing a 10 per cent random sample with VDRL on a house-to-house visiting basis. The Presidency of Grenada (which also includes the islands of Carriacou and Petit Martinique in addition to some of the small islets known as the Grenadines) has a total population estimated at 90,000. The prevalence of yaws has been estimated at seven per cent of the population. By the end of October 79,900 persons had been injected and over 6,000 VDRL tests had been performed.

The island of St. Vincent has an estimated population of 76,800. An experimental yaws campaign conducted by the government in one part of the island revealed 1,117 cases or 22.5 per cent of the population of that particular area. In the clinics existing on the island a mean of 2,000 cases are treated each year, but it is known that most cases do not attend those clinics. Following the request by the government for international assistance the campaign started on February 20. By the end of November 1956, 72,418 persons had been treated.

In St. Kitts, Nevis, and Anguilla, where the total population is estimated at 54,000, a mass injection campaign was begun on May 1. In all, 46,539 persons, or about 87 per cent of the population, were treated. A second sweep was finished on August 1 in Nevis; on July 24 in St. Kitts; and August 9 in Anguilla. During this sweep many patients with latent yaws were treated; those missed initially were caught up, and relapses and their contacts were treated. Thus, the mass phase of the program was finished and activities were directed at periodic surveying of the population, looking for new cases and relapses. A random blood sample was taken simultaneously with the mass treatment phase of the campaign. With the completion of the mass campaigns and follow-up sweeps, routine surveillance is being carried out by the regular health services, including the active search for yaws until a two-year period of negativity has elapsed. In the surveillance phase of eradication the Bureau plans also in 1957 to assist those territories already reporting yaws as a disease of extremely low endemicity.

In April a mass campaign concerned solely with the venereal diseases using mass penicillin injection began in the British Virgin Islands (inhabited by some 7,600 people) with the Bureau help of a doctor, two nurses, and one sanitarian on loan from the USPHS; 4,422 persons were treated and 769 VDRL tests performed with a seropositivity ranging from 0.8 to 13.9 per cent depending on the age-group considered. Because of the dispersion of many of the individual houses and the lack of communications in the interior of the islands combination house-to-house and station methods were used. The survey was preceded and accompanied by an intensive propaganda effort as complete coverage of the population was deemed essential.

Yaws eradication campaigns in Trinidad-Tobago and Dominica, with the assistance of PASB/WHO and UNICEF, have been approved for initiation early in 1957. In 1955 Dominica reported 1,031 cases, a case-rate of 17.5 per 1000 population. During the period of January 1, 1954 to June 30, 1956, Trinidad reported a total of 220 cases, most of which originated in several well-defined endemic areas with a total population of 45,950 . . . or an approximate case-rate of 1.9 per thousand population. Tobago, population 33,550, has a presently reported case-rate of 15.1 per thousand population (507 cases per annum) according to the latest studies.

In Haiti during 1956, yaws was approaching the eradication level. During the period 1951-56, 95 per cent of the total population has been reached and a total of 3,700,000 injections administered to cases and contacts.

Evaluation surveys indicated that in 1956 an average prevalence of 0.5 per cent was reached (total of symptomatic active cases), as compared with an estimated prevalence of 40 to 50 per cent in 1950. The results of the Haiti campaign to date justify the concept that eradication is

PASB medical adviser to Yaws Eradication Service, Haiti, obtains power for his microscope light from a jeep battery

possible utilizing the methods and techniques demonstrated in the campaign.

In Jamaica, a yaws control service has been in operation for many years and with considerable success. During the last 12 years a steady decline in the endemicity of yaws has been obtained through the work of five static clinics, that deal also with VD, and two mobile yaws units that ply the island more or less uniformly. A rapid survey conducted in late 1955, during the visit to Jamaica of a special consultant for PASB, furnished data that led to an estimated figure of 4,600 cases of infectious yaws annually. Plans are being drawn for an eradication program.

In the Dominican Republic, reports regarding the size of the yaws problem have been somewhat contradictory. Up to October 1955 only 2,351 cases had been notified through the regular channels from practically all the provinces. Yet, following initiation of a special program with PASB assistance (Dominican Republic–52) in July 1954, information was provided by the project consultant on the number of persons treated in the last four years (1953-1956). Total cases were 71,179; contacts amounted to 352,008; and total persons treated were 423,187.

From this it is only fair to deduct that yaws is far more prevalent in the Dominican Republic than it is generally assumed in the estimates based only on the regular notifications of the disease sent by the provincial offices of health. These facts reinforce the position that an all-out yaws eradication campaign is necessary in this country, which becomes more and more important in view of the success of the eradication campaign in its neighbor, Haiti.

Yaws represents an important public health problem in Brazil. Its socio-economic implications are very important since this disease affects a large segment of the rural population of certain regions of the country.

Introduced in Brazil in the first periods of colonization, through the slave traffic, the disease established its first foci in the initial nuclei of civilization, spreading from there to different points of the country.

Although it shows a scattered distribution, the disease is found in more than half of the Brazilian States, particularly in the north, northeast, and eastern regions.

On account of its vast geographical extension—approximately 3,300,000 square miles—which corresponds to almost half of South America, Brazil presents great variations of climate. For the most part, however, it lies within tropical zones.

Yaws generally exists in zones of a medium monthly temperature (around 68°-77°F) but with a relatively high degree of humidity (80-85 per cent), and medium or high monthly rainfall. Not only in the country as a whole, but particularly in the local foci, yaws is most prevalent in the tropical forest and the savanna zones.

In all foci, the agricultural laborers are, in general, the most prone to develop the disease. In the Amazon, on account of its very sparse and scattered rural population, the natural spread of the disease is retarded. On the other hand, climatic conditions favorable to the development of yaws are found in the whole northern area. As a result, except in small towns, large numbers of cases are seldom found grouped together, although morbidity figures are high in this vast region of approximately 1,350,000 square miles with a population of less than 2,000,000. Along the rivers and their tributaries, and as far as civilization has extended, yaws occurs.

Rural routes in Haiti are hard on vehicles of yaws field personnel

In the northeast and eastern regions, where the population is more concentrated, numerous nuclei exist where five to 15 per cent of the population suffers from yaws. There are, nevertheless, large areas which, although densely populated, are free from the disease, because they do not present conditions favorable for its dissemination.

Complete data on the incidence in the country are still not available, but on the basis of the existing information it is estimated that there are about 530,000 cases in the whole of Brazil. This represents six per cent of the population of the infected area—8,804,081 inhabitants. The greatest incidence of the disease is in the group below 15 years of age. Negroes and mulattoes represent about 70 per cent of the total number of cases. The disease generally occurs among the poorer populations, where the standard of living is low and conditions of hygiene poorer.

The Government of Brazil is determined to carry out an intensive campaign to eradicate yaws from the country. It is planned to examine at least 95 per cent of the population of the infected area and treat the cases and their contacts by the "house-to-house" method and with a single injection of penicillin. For this purpose, the government has requested the cooperation of WHO and UNICEF (Brazil–20).

During the year Paraguay continued a country-wide program for the control of venereal disease. Active work has been done in this field for over four years in the country and is now administered as part of the public health services project (Paraguay–10). From January to October 1956, some 65,887 examinations were made. About nine per cent of these persons examined were found to have reactive sera. Of these, 4,944 received treatment. For the purposes of evaluation resurveys were made in places in which mass campaigns had been conducted previously. Results showed the percentage of reactive sera to be decreasing significantly.

The First International Symposium on Venereal Diseases and Treponematosis met in Washington, D.C., during May 1956. At the meeting the Director of PASB/WHO delivered a welcoming speech in the name of the Organization and presented a paper or the eradication concept. Among the specialists from all over the world, the Latin American countries were well represented. Papers were presented by speakers from Bolivia, Brazil, Chile, Cuba, Haiti, Mexico, Nicaragua, and Venezuela.

A seminar on treponematosis eradication (AMRO–103) was held in Port-au-Prince, Haiti, October 21-27, 1956. Its agenda included discussions on the extent of the yaws and pinta problems in the countries in the Region, objectives, methods and results of eradication programs, as compared with measures of control, international cooperation in treponematosis eradication programs, and possible extension of these programs to countries not yet conducting them. There was also opportunity to study, including field observations, the organization, methods, and results achieved thus far in the yaws eradication program now under way in Haiti.

The following conclusions and recommendations were approved:

1) It is recognized that in many places information on the prevalence of yaws is inadequate.

   It is recommended that in such places preliminary surveys be undertaken to determine the prevalence and geographical and demographic distribution of the disease, plant the eradication campaign, and evaluate its operation and results.

2) It is recognized that the methods available at present make yaws eradication practicable.

   It is therefore recommended that all countries having a yaws problem consider the possibility of initiating an eradication program or of converting from a control program to one of eradication.

3) Recognizing the magnitude and implications of the yaws problem in the Americas, and in accord with Resolution XLI of the XIV Pan American Sanitary Conference (Santiago, Chile, 1954), it is recommended that the governments avail themselves of the cooperation of the international and bilateral agencies for the planning and execution of their yaws eradication programs, and that they also coordinate their efforts to prevent the reintroduction of yaws into areas freed of the disease.

4) Recognizing the importance of the problem of pinta in certain countries, it is agreed that the above recommendations equally apply in these countries, with allowance made for differences inherent in the disease.

5) Recognizing the good results of the Haitian campaign to date, it is recommended that careful consideration be given to the methods and techniques employed in this campaign in planning similar activities in other countries.

6) Recognizing the vital importance of field personnel in eradication campaigns, it is recommended that these personnel be properly selected, adequately trained for all phases of their activities, just and equitably remunerated, and given constant supervision.

7) Recognizing the desirability of being able to evaluate the progress of campaigns in different countries, it is recommended that minimal comparable data be collected and similar standards and terminology be employed.

8) Recognizing the importance of serological tests in the evaluation surveys and in the surveillance phase, it is recommended that treponematosis eradication campaigns be provided with pilot laboratory facilities for serodiagnosis.

9) Recognizing the importance of health education to the success of eradication programs, it is recommended that health education personnel be included throughout the campaign to participate in its planning and execution and in the training of field staff.

10) Recognizing the importance of adequate supervision of personnel at all levels, it is recommended that due consideration be given to the establishment of a pyramidal system of supervision with well-defined individual responsibilities, creating an atmosphere to encourage the formation of a homogeneous group of workers with staff "esprit de corps".

11) The seminar notes with great satisfaction the consideration given to the topics covering surveys, evaluation, and integration and the intense interest shown in them. It recommends that these topics continue to receive special attention, with reference to yaws eradication.

Smallpox

Smallpox is still an important public health problem in the Americas. Though in some countries of the Region smallpox has been eradicated, in others the disease continues as a serious challenge despite the fact that for a long time there has been available a preventive measure of the highest efficacy—vaccination against the disease.

The XIII Pan American Sanitary Conference in 1950 recommended to the Member Governments the development of a systematic program for smallpox vaccination and revaccination in the respective territories, with a view toward eradication of the disease from the continent. At a later date, the Governing Bodies of the Organization established a special fund of $219,089 to be utilized for such a smallpox eradication program. The continuation of this program (AMRO–60) will require additional funds under the PASB regular budget in 1958.

The objective of the program is to stimulate and assist the countries of the Americas in the planning of smallpox eradication programs through vaccination campaigns, to be integrated in the general framework of the public health services of the countries, and with the aim of obtaining the final eradication of the disease from the Western Hemisphere.

Because of difficult transportation problems as well as unfavorable climatic conditions in many areas of the Americas, increasing emphasis has been put on the establishment of dried smallpox vaccine production units in several of the countries. Glycerinated vaccine has been observed as being unable to withstand the challenging conditions of climate and delay in delivery.

PASB assistance has been given to several national laboratories including provisions of laboratory equipment, fellowships, technical information, consultant services for the development of laboratories, and facilities for control tests of the potency and safety of the vaccines produced. During the year dried vaccine, produced in the different laboratories in the Region, was tested in the State Serum Institute, Copenhagen. As a result of this service improvement in the quality of vaccine has been realized. The Bureau has also provided several countries with the services of specialized consultants for the organization and development of vaccination campaigns.

With the purpose of facilitating the planning and development of these campaigns, *A Guide for Smallpox Vaccination Campaigns* was prepared and distributed in 1956. This guide provides information about the different factors

TABLE 1. REPORTED CASES OF SMALLPOX IN THE AMERICAS, 1952-1956

Country	1952	1953	1954	1955	1956*
Argentina	740	336	256	55	62
Bolivia	432	429	624	355	434
Brazil[a]	1,318	878	1,035	1,758	1,330
Chile	15	9	—	—	—
Colombia	3,235	5,526	7,203	3,404	2,151
Ecuador	659	707	2,516	1,171	674
Guatemala	—	1	—	—	—
Paraguay	313	—	—	57	36
Peru	1,360	172	115	—	—
United States	21	4	9[b]	2[b]	—
Uruguay	16	7	1	43	42
Venezuela	109	250	13	2	—

* Provisional.
— No cases.
[a] Federal District and capitals of States and Territories.
[b] None of these cases fulfills the generally accepted criteria for a diagnosis of smallpox.

borderline, following a plan made in collaboration with the rural public health program. This is being realized with the cooperation of the Bureau. The program was coordinated with a similar one which was carried out in the city of Livramento, Brazil.

The month of December marked a two-year period without a single case of smallpox in Peru. By November 1956, a total of 824,557 vaccinations and re-vaccinations had been done.

The Bureau assisted the health authorities of Mexico in consolidating the smallpox eradication campaign by furnishing the equipment during the year for a dried smallpox vaccine production unit. The services of one expert in vaccine production were also provided.

Tuberculosis

New challenging possibilities for the prevention of this disease are offered to health workers in the Americas.

Tuberculosis continues to be one of the important causes of sickness, incapacity, and mortality in the Americas, although marked decline has occurred in the death rates of many countries. The reduction in the number of cases has been much less dramatic, but in many places the balance is clearly against the survival of the *tubercle bacillus*, thus opening the possibility of eradicating the disease.

Since the introduction of treatment with drugs such as streptomycin, para-aminosalicylic acid (PAS), and, especially, isoniazid, the public health approach to the tuberculosis problem has completely changed. The effect of chemotherapy of patients with pulmonary tuberculosis is that most of them live longer than could priorly be expected, a large portion of cases is rendered non-infectious, and a considerable number are saved from dying of the disease to the point that mortality figures can no longer be used as an index of the tuberculosis problem.

The possibility of large scale application of chemotherapy is leading to a great reduction of the need for isolation of patients in hospital beds. This development means that the cost of tuberculosis programs might be reduced, so that it is economically possible to extend them throughout all countries.

In the last few years the collaboration of PASB/WHO has been devoted mostly to mass BCG (*Bacillus Calmette-Guérin*) vaccination projects. In 10 countries these programs have terminated, and in another five are nearing completion. In addition, assistance has been given to three countries for the organization of BCG–producing laboratories, to three others for TB diagnostic facilities, and to another two for training courses. A number of nationals have been trained under PASB/WHO fellowships and the tuberculosis control program has been considered as an active phase of the integrated health projects in several countries.

These efforts will be continued where needed, but it is necessary to expand activities toward fields such as ambulatory chemotherapy and chemoprophylaxis which offer great possibilities as public health measures against this disease.

The BCG Production Laboratory in Guayaquil (Ecuador–6) was approved in 1956 by Geneva Headquarters for the preparation of BCG vaccine to be used in PASB/WHO/UNICEF campaigns. This has come about as the result of a program devoted to the organization of some selected laboratories which can produce a BCG vaccine meeting internationally accepted standards of safety and activity.

Also during the year came the approval of the Santiago BCG Laboratory (Chile–10) for the same purposes. A rural mass vaccination campaign was undertaken early in April. The original program was designed to cover from the province of Coquimbo in the north to Llanquihue in the south, with the idea of covering 1,500,000 inhabitants. The rural population of Chile is widely scattered. Due to lack of transportation, the original area proposed in the program was reduced somewhat and the goal was set for tuberculin testing 1,126,000 inhabitants, of which 709,000 were calculated to be BCG-vaccinated. By the end of December, eight provinces had been covered and the total

to be taken into consideration when planning and organizing vaccination campaigns and about the chronological sequences of their development. Instructions on vaccination techniques and models of forms to be used during the campaigns were also included in the guide.

Since it was considered desirable at this stage of the smallpox eradication program in the Americas that persons concerned with the production and control of the vaccine have an opportunity to meet and exchange ideas and experiences, a seminar on smallpox vaccination was held in Lima, Peru, August 19-25, 1956. Representatives from Argentina, Brazil, Colombia, Cuba, Ecuador, Mexico, Peru, El Salvador, Uruguay, and Venezuela attended. Demonstrations were carried out by the personnel of the Instituto de Salud Pública of Lima. Four observers and 10 consultants including PASB regular personnel attended.

The seminar provided opportunity for discussion on the different techniques of vaccine production and gave special emphasis to the subject of dried smallpox vaccine production. There was also considerable discussion on the subject of mass smallpox vaccination campaigns.

Efforts are being made to standardize, as much as possible, the techniques of vaccine control, and to improve the existing knowledge about the results obtained with different types of vaccines used in vaccination campaigns.

Concerned with the AMRO–60 regional project on smallpox vaccination are Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Mexico, Peru, and Uruguay. Collaboration is envisaged with Cuba, Dominican Republic, Haiti, and Venezuela.

The Government of Colombia continued to carry out a national smallpox eradication campaign during the year. PASB collaboration was in nature of a medical consultant to advise the national authorities in the planning and implementation of the campaign, a vaccination inspector to advise in the training of vaccinators, and a short-term consultant to advise the laboratory in dried vaccine production. The objective of the program is to vaccinate about 80 per cent of the population of some 12,000,000. This would represent about 9,600,000 vaccinations over a period of five years. By October, 867,726 persons were vaccinated. These people reside in areas most difficult to reach because of rugged terrain and poor roads. Secondly, fewer vaccinators than originally planned were available accounting for the modest start. Plans for 1957 are to complete the Department of Boyacá, and to continue with those of Cundinamarca, Caldas, Valle, and probably Antioquia, which are more populated and have better means of communication. In these departments live approximately half the population of Colombia. The number of vaccinations will therefore accumulate at a much faster rate in 1957.

In Bolivia the Bureau provided the equipment for the installation of a dried vaccine production unit though production had not begun by the end of the year. Plans are to provide a consultant in 1958 to assist in the planning, organization, and implementation of a national eradication campaign.

PASB consultant examines a primo-vaccination in a rural community, Colombia

The assistance of a consultant is planned for Ecuador in 1957 as soon as arrangements with the government are completed. The Bureau has furnished equipment to the National Institute of Health in Guayaquil to install a dried smallpox vaccine production unit as well as the services of an expert in this field to advise on the installation of equipment and the methods of production of this type of vaccine.

The Bureau assisted the health authorities of Paraguay in developing a smallpox vaccination campaign by providing some amount of dried vaccine. The Zone VI Office has made available the services of the smallpox consultant for planning a national campaign in the future.

Smallpox is still an important public health problem in Brazil. Equipment was purchased and shipped to install the first dried smallpox vaccine production laboratory in Porto Alegre, Rio Grande do Sul, in 1957. A campaign is planned for this state. A second dried smallpox vaccine production unit for a laboratory located in Recife, Pernambuco, will be provided during 1957. The vaccine produced by this laboratory will be used in a mass vaccination campaign covering the northeast of Brazil.

In Uruguay, a smallpox vaccination program was developed in the Department of Rivera, on the Brazilian

Mother Superior receiving first tuberculin test, Trinidad-Tobago

number of persons tested was 413,808 of which 210,662 non-reactors were vaccinated. The services of a nurse consultant, specialized in BCG vaccination campaigns, were provided in 1956 and will be continued throughout 1957.

The BCG vaccine was prepared by the Bacteriological Institute of Santiago, Chile, after the Bureau gave approval to its production. The standard purified protein derivative (PPD) from Copenhagen has been used. Training of BCG technicians and other personnel related to this program was done previous to inception of the campaign.

In Paraguay, a plan of "consolidation" of the BCG campaign was carried out. Mass tuberculin testing and BCG vaccination were completed early in 1956, (Paraguay–7). A Tripartite Plan of Operations, signed in April 1954, stated that UNICEF would provide the necessary equipment and supplies, PASB/WHO, one doctor and one nurse for technical advice to the direction of the campaign, plus fellowships for training of local professionals, and the government, all the other facilities and personnel not provided for by the other two parties. In this program 691,859 persons between one and 30 years of age were tested with tuberculin. Of the 386,651 people who gave a negative reaction, 383,538 were vaccinated by the end of 1955. This plan calls for the continuation of effort through the establishment of permanent BCG vaccination in the local health services throughout the country. This is being done in 18 health centers and hospitals; one of them in the capital city is being used as a demonstration center where more local technicians are being trained. Beginning in Asunción, and to be extended later to other places, BCG vaccination of the newborn is being carried out. UNICEF is providing aid in the provision of BCG and PPD. This activity will be continued in 1957 with Ministry of Health funds purchasing the vaccine. During the year one doctor and two nurses embarked on three-month PASB/WHO fellowships to San Salvador and Jamaica where they studied the techniques and procedures used in BCG vaccination campaigns. Fourteen nurses and nursing auxiliaries, one organizer, two health educators, and other personnel received in-service training while working in the campaign.

The role of the newly discovered anti-tuberculosis drugs, particularly isoniazid, as a more aggressive approach to tuberculosis control programs, has been lately the object of much study and discussion. At the Ninth Meeting of the Joint Committee on Health Policies in May 1956, WHO/UNICEF studied the problems arising from the use of ambulatory chemotherapy in countries with limited tuberculosis control resources and agreed to furnish drugs not only to "pilot" projects but also to already existing tuberculosis control centers able to perform accurate diagnosis and insure proper domiciliary treatment. The possibility of using chemoprophylaxis was also considered; it was urged that a study be made on the feasibility of its application. Experimental studies on the use of isoniazid have been done on guinea pigs. After a series of experiences, conclusions were reached that a daily dose of isoniazid, up to five mg. per kilo of body weight, if initiated before virulent challenge and continued for 10 weeks, is apparently sufficient to prevent mortality, at least during 26 weeks of observation. The treated and challenged animals continued to grow in weight and at the same rate as normal control guinea pigs.

Where it is not possible to follow up persons found tuberculin-positive during a BCG-vaccination campaign, the prophylactic administration of isoniazid would seem to offer a solution, but more information is needed as a basis for a mass program. Since conditions in Guatemala are apparently favorable for organizing a study to provide such knowledge, the Zone III Office is exploring such possibilities (Guatemala–11).

In Guatemala the government has organized a BCG vaccination campaign through its Ministry of Public Health, with economic aid from UNICEF and the technical assistance of PASB. Work began in July. A BCG campaign was carried out in Guatemala City in which over 80 per cent of the population was examined and almost 100,000 people vaccinated. This program was then expanded to the rest of the country. By the end of the year over half a million tuberculin tests had been done and 240,379 persons had been vaccinated in the country.

At the end of 1953, the Government of Colombia requested the collaboration of the Organization and UNICEF to initiate a nation-wide mass campaign, using the most recent techniques, as a complement to the already existing services for the control of tuberculosis.

It was planned to test about four million persons under 30 years of age and to vaccinate with BCG those found to be tuberculin-negative reactors. Standard tuberculin and BCG vaccine, produced by a WHO-approved laboratory and provided by UNICEF, have been used. Specially trained field teams, whose work was preceded by an intensive health education campaign, carried out the program. Between September 1954, when the BCG campaign began (Colombia–15), and March 1956 a total of 3,479,729 persons had been tested and 2,009,403 vaccinated.

Tuberculosis is one of the most important communicable diseases of the Caribbean area and is recognized as such by the health departments. By the end of 1955 WHO and UNICEF had assisted the Governments of Jamaica, St. Kitts-Nevis-Anguilla, Grenada, Trinidad-Tobago, Surinam, and British Guiana in the execution of the mass phase of a BCG campaign. Concurrently with the mass vaccination campaign hospital beds and diagnostic facilities were substantially increased in several of the territories. Mass BCG campaigns were inaugurated by the Government of Surinam in November 1955 (Surinam–3) and by the Government of Barbados in January 1956 (done as part of the integrated health project, Barbados–2). The program in Barbados was assisted in its organization and early operational phase by a consultant of PASB/WHO. As an integral part of the TB program, a mass radiography unit has been installed in one of the regional health offices and the existing hospital beds for tuberculosis have been augmented by the construction and activation of a new 50-bed wing. The mass BCG vaccination program will terminate in March of 1957.

Both campaigns have as their objective the tuberculin testing of all persons 25 years and under in urban areas and 45 years and under in rural areas. Barbados, at the end of 10 months of operation, has tested 62.4 per cent of the 120,000 estimated population in these age groups, while Surinam has tested 71.9 per cent of an estimated 150,000.

Rabies

In most countries of the Americas the rabies problem has become a matter of serious concern. The movement of animals, both wild and domestic, makes it necessary to coordinate national and international programs and studies if preventive work is to be effective.

The objectives of the rabies control project of the Bureau (AMRO–61), are: to provide technical aid and coordination in both national and local control programs including diagnosis and production of biologicals; to guide and coordinate the study of the ecology of bats and their importance in the continued existence of rabies; and to assist in training national officials.

This project has been in operation for a number of years and was begun as a result of numerous requests from several countries in the Americas for technical assistance on a variety of problems in connection with this threat. Assistance and technical advice is provided in all aspects of rabies control, with laboratory diagnosis, vaccine and hyper-immune serum production, and anti-canine rabies control programs receiving the greatest attention.

One additional aspect of this project (US-Mexico) continues the work begun under a project now terminated (Mexico–4).

The activities of the AMRO–61 project in 1956, staffed by the Veterinary Public Health Adviser for Zone II, took place in Cuba, Haiti, Dominican Republic, Mexico, United States, Grenada Trinidad, Colombia, and Venezuela.

In addition, assistance was provided to Argentina, Chile, Brazil, Peru, and Paraguay in planning anti-rabies campaigns. Uruguay remained free from rabies. The effective control measures taken in Greater Santiago, Chile, in 1955 (Chile–4) served to diminish the problem in that area, but cases continued to occur, especially in other parts of the country.

Mexico is making noteworthy progress, particularly in its mass immunization of cattle. In the last four years, the vaccination of more than three million head of cattle in the enzootic areas has produced substantial results. In the State of Jalisco alone, cattle mortality was reduced in three years from 56 to 0.7 per cent.

Conditions along the U.S.-Mexico border have been aggravated by the recrudescence of canine and sylvatic rabies in four border states of the United States. In California, for example, the largest number of rabies cases in eight years was registered in 1955. Three significant factors were observed: (1) an increase in the total number of

animal cases; (2) a large increase in the geographic area involved (26 countries); and (3) a considerable increase of rabies in wildlife specimens.

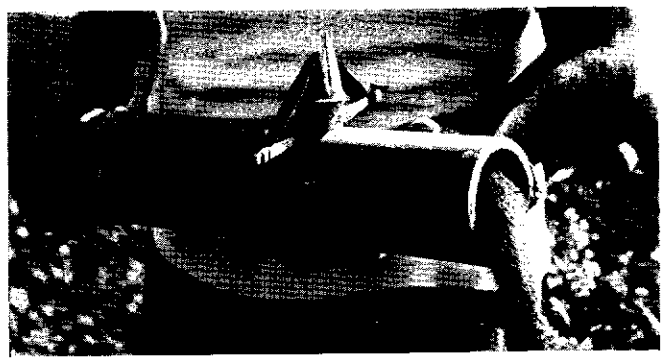
In Arizona and New Mexico, near the borderline area, epizootic outbreaks of rabies in dogs and coyotes have been recognized. Rabies was reported for the first time among the guano bats of the Carlsbad Caverns, New Mexico, in September 1955. In Texas, bat rabies has been added to the already serious problem of rabies in dogs, skunks, and foxes. The common guano bat, *Tadarida brasilensis mexicana*, has been found infected in the urban roosting places near San Antonio and Austin, Texas. This creature is migratory, moving south at the approach of winter for mating and north in the spring to bear its young in the warm caves that apparently constitute its original habitat.

Vampire bats have been reported in Trinidad since the discovery of the island by Columbus in 1498, but it is only since 1925 that paralytic rabies has been recognized in livestock. From 1925 to 1935 rabies constituted a serious public health problem. However, in recent years human cases have not occurred. In 1954, at the request of the government, a survey was carried out by a public health veterinarian of the Bureau and recommendations were submitted to the government. These included coordination of existing activities, compulsory notification of suspected cases, improved diagnostic facilities, intensification of bat research and bat control, and vaccination of cattle using an avianized vaccine.

In 1955 recommendations were presented to the government for the implementation of additional measures, including the reduction of the mongoose population, the vaccination and licensing of dogs, and the elimination of feral and ownerless dogs. Virus isolation has not yet confirmed the presence of rabies in the mongoose (although Negri bodies have been found).

In 1956, a veterinarian from Trinidad received a WHO fellowship in rabies, with particular reference to laboratory diagnosis.

Mongoose-transmitted rabies in Grenada has been recognized for at least 15 years and, in 1955, cases were diagnosed not only in cattle but also in one water buffalo and one dog. In 1956, with the assistance of the Bureau, a program for the vaccination and licensing of dogs, the



A mongoose is trapped using a bamboo tube, salt fish, and bad eggs as bait, Grenada

elimination of ownerless and feral dogs, and the poisoning of mongoose using thallium sulfate, was undertaken. The program is proceeding satisfactorily and by the end of the year approximately 75 per cent of the dog population (estimated at 7,000) was vaccinated. In support of this program the Bureau has provided consultant services, vaccine, poison, syringes, and needles.

While bat-transmitted rabies apparently does not occur in Grenada, it does constitute a livestock problem in the Guianas, and a visit by the rabies consultant to British Guiana, Surinam, and French Guiana, for the purpose of collecting the latest epidemiological information and analyzing the present control programs, will be carried out early in 1957.

The Bureau has assisted and coordinated studies in bat rabies by the U.S. Public Health Service, the Public Health Service of the U.S. Army, Cornell and Johns Hopkins Universities, and the Texas Public Health Service.

A regional rabies training course and virus seminar is planned for the spring of 1957 in Caracas, Venezuela.

Typhus

Since 1951 the Governments of Peru and Bolivia, with the assistance of PASB/WHO and UNICEF, have been developing a program of typhus control in the highland regions. Epidemiological and laboratory studies have been undertaken to bring about a better understanding of the epidemiology of the disease and to develop methods for control within the economic resources of the country.

The Department of Epidemiology of the School of Medicine, Tulane University, is cooperating in these studies.

The objectives of this project (AMRO-83) are: (1) to determine and establish adequate and economical technical standards and procedures for large-scale typhus control operations; (2) to organize good laboratory facilities for diagnosis of typhus; (3) to strengthen the public health organization of both countries, with special reference to the departments of communicable diseases; and (4) to train professional and auxiliary personnel in the methods and techniques of typhus control.

The typhus control operation has consisted of periodic application of residual-effect insecticides to the population residing in the epidemic and endemic typhus regions in Peru and Bolivia. In the areas where DDT dusting has been accomplished, a sharp decrease in the morbidity and mortality rates for typhus has been shown. The existence of lice resistance to DDT as was demonstrated in Peru, however, can seriously hamper a program based on the use of the insecticide. Secondly, it is not practicable to maintain a permanent program of DDT application. Because of this, the importance of the development of a good vaccine, therefore, stands out. In cooperation with personnel of Tulane University a test of strain E of *Rickettsia prowazeki* vaccine has been developed in Ilave, Puno, Peru. A careful study is being made on the incidence of typhus among the vaccinated groups as well as the control groups. In addition, a special study of recrudescence of typhus (Brill's disease—a mild form of epidemic typhus fever) is under way in Chincheros, Cuzco, Peru.

During the first 11 months of study (in the Ilave, Puno area) a rate of 43.5 per 100,000 was found among the vaccinated group. Among those in the control group, who were vaccinated with killed Rocky Mountain spotted fever vaccine, however, the rate was 184.6 per 100,000, and among those not injected it was 226.7 per 100,000, or five times higher than the vaccinated group.

This program will continue until the middle of 1957. If the results at the end of the experiment are satisfactory, an economical method for the control of typhus will be available.

Poliomyelitis

At present the only effective means of control of poliomyelitis is the vaccination of the susceptible populations. The availability of a vaccine that has already been used with reported good results in mass vaccination campaigns in several countries, especially the United States, Canada, and Denmark, has aroused the interest of the countries of the Region in tackling the poliomyelitis problem. Some of them are already producing or taking steps toward the production of this vaccine.

Although the case rates for poliomyelitis for many countries in the Americas have been relatively low, data indicate that an increase has occurred in the reported cases and several outbreaks have been reported in the last few years (Chile, Costa Rica, Jamaica, Mexico, and Argentina).

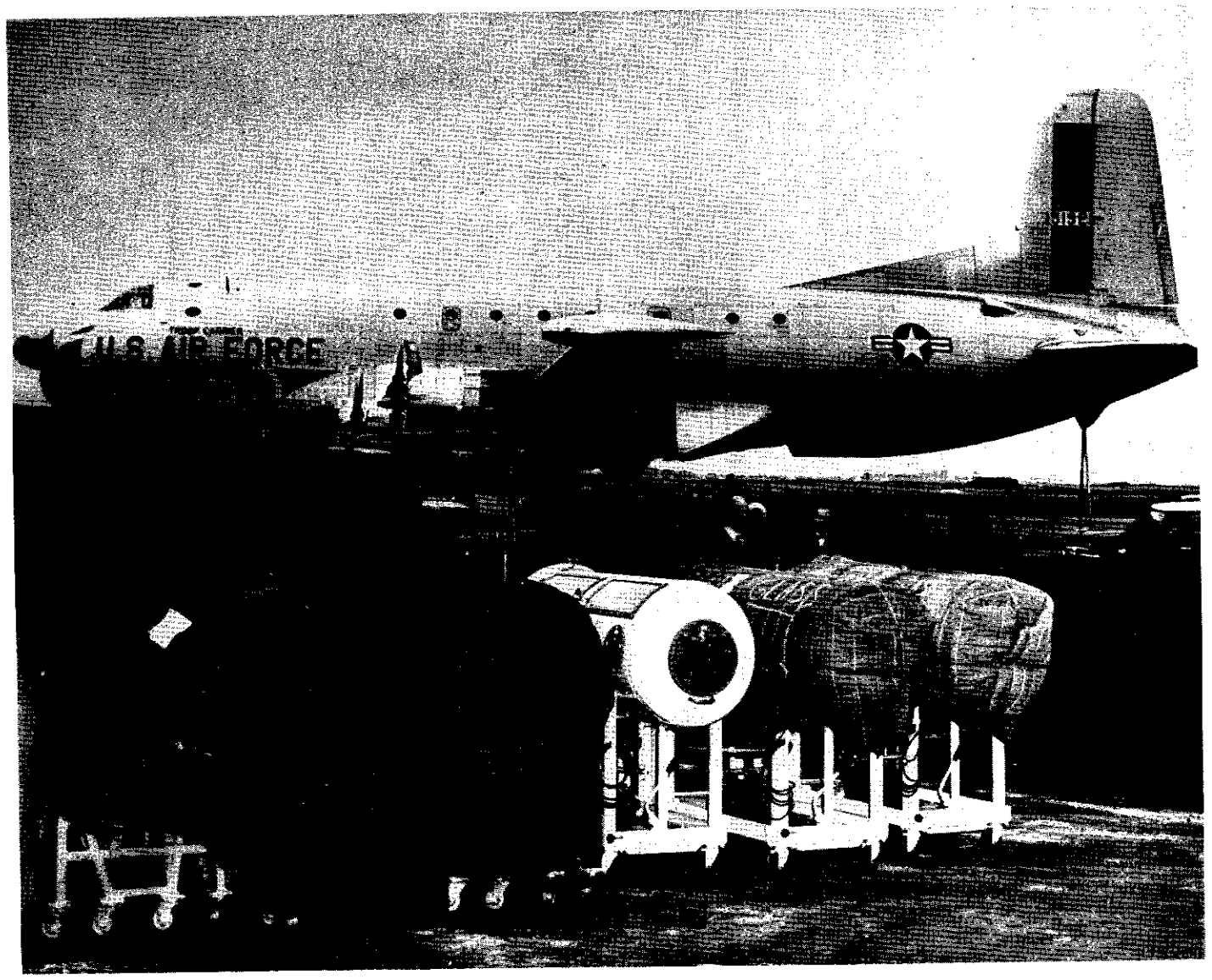
Data for a five-year period indicate that poliomyelitis was a much more serious problem in the United States and Canada than in the other countries. In many the re-

ported incidence was low. However the comparative analysis of reported cases of poliomyelitis by countries and by years is confused because of the variations in the inclusion of non-paralytic poliomyelitis.

In 1956, Argentina experienced a severe outbreak with 6,377 cases (32.8 per 100,000 population) of which 5,320 cases were reported in the first six months of the year. An increase was noted in Chile, which had a provisional total of 768 cases reported for the year.

WHO convened, in November 1955, an international group for discussion of poliomyelitis vaccination. In considering the use of the vaccine the group stated that

Iron lungs being prepared for loading at Boston Airport for shipment to Argentina



the incidence of paralytic disease and also the age incidence should be considered since paralytic poliomyelitis tends to be more severe in adult life.

If a mass vaccination campaign is considered advisable in a given country or area of a country, it would be necessary to decide which groups have to receive the vaccine to obtain the maximum benefit with minimum costs.

The knowledge of distribution of cases by age is very important then for planning poliomyelitis vaccination programs.

TABLE 2. SELECTED DATA REGARDING AGE DISTRIBUTION OF REPORTED CASES OF POLIOMYELITIS IN FIVE COUNTRIES IN RECENT PERIODS OF HIGH INCIDENCE

Country	Chile 1954	Costa Rica 1954	Argentina Jan.–June 1956	Jamaica 1954	United States (34 States) Apr. 12–Oct. 31 1955
Cases	593	1,081	5,320	647	18,339
Rate per 100,000	9.0	118.2	27.4	42.6	15.2
Percentage*					
Under 5 years	86.8	86.0	72.6	53.1	25.9
5–9 years	6.8	9.8	14.6	9.5	25.1
10–14 years	3.3		5.3	5.5	14.7
15 years and over	3.1	4.2	7.5	31.9	34.3

* Percentage distribution of cases of known age.

In the past in the United States reported cases were concentrated in early childhood, but there has been a gradual shift in the age distribution, and, as shown in Table 2, in 1955 only one-fourth of the cases were of children under five years of age.

In Chile (1954) and in epidemics in Argentina (1956) and Costa Rica (1954), cases were concentrated in early childhood. The percentages of the cases under five years of age were 86.8 for Chile, 86.0 for Costa Rica, and 72.6 for Argentina.

In countries where accurate records of the incidence of paralytic poliomyelitis over a number of years are not available or incomplete, serological surveys will have to be carried out to obtain information on the general immunological status of the population.

For carrying out this type of work, laboratory facilities and highly trained scientific personnel are necessary. Both are lacking or insufficiently developed in many countries of the Region.

The cost of a vaccination program should be considered in relation to the health needs and resources of the country. Because of the great costs involved and the low incidence of paralytic disease, countries with limited resources for health work should consider the situation carefully before introduction of the use of poliomyelitis vaccine as a routine public health measure.

In order to evaluate the cost of vaccination for a country, rough estimates can be made. For example, in a country of 10,000,000 population with a low incidence (one per 100,000 inhabitants) the cost per case prevented would be from $36,000 to $60,000 or even more. The cost per case prevented would be less in a country with a higher incidence (10 per 100,000)—$7,200 to $12,000 or more.

Epidemiological studies are needed for knowledge of the actual conditions in countries in order to initiate the most suitable vaccination programs if the incidence increases and epidemics occur. Greater effort should be made to obtain currently reliable reporting of cases, by ages, form of the disease (paralytic and non-paralytic), and geographical areas of the country. Studies are needed for determination of types of virus responsible for cases of poliomyelitis, and serological surveys should be made, especially if reporting of cases has not been complete, for determination of the immunity status of the population.

Special effort has been given to keeping the governments fully informed in this field, particularly regarding the newer developments of the Salk vaccine, its use, effectiveness, and safety. In addition, much informative material has been furnished to governments and PASB Zone Offices.

Activities of the Organization

As a consequence of the increasingly frequent and serious poliomyelitis, large numbers of crippled children, adolescents, and even adults make more urgent the necessity of establishing measures for their rehabilitation. Requests for assistance in this field have already been received from several countries. Facilities should be provided for treatment of the acute cases and for their rehabilitation as necessary.

Specific collaboration to governments on poliomyelitis was restricted in 1956 to the provision of a short-term

consultant in rehabilitation, two fellowships (one for training in testing Salk vaccine and the other for rehabilitation and provision of antigens and antisera for poliomyelitis work). The Bureau fulfilled its coordinating function, acting as a clearing center for technical and epidemiological information and channelling available resources for assistance to countries in normal as well as in emergency situations. The collaboration with the Argentinian Government early in the year to secure iron lungs and other emergency services deserves special mention.

The PASB is expanding its program in this field on a limited scale in 1957. It is planned to provide short-term consultants for poliomyelitis studies and rehabilitation, fellowships in the same fields, a virus training course, supplies and equipment for laboratory work, therapy, and rehabilitiation.

Plague

During 1956, cases of plague were reported in five countries: Brazil; Ecuador; Peru; United States; and Venezuela. The ensuing table shows the number of reported cases of plague in the Americas for the period 1952-1956.

TABLE 3. REPORTED CASES OF PLAGUE IN THE AMERICAS, 1952-1956

Country	1952	1953	1954	1955	1956
Argentina	2	—	—	—	—
Bolivia	55	—	9	45	—
Brazil	65	10	6	27	4
Ecuador	43	90	81	7	80
Peru	26	163	75	8	7
United States	—	—	*a*	—	1
Venezuela	—	1	—	—	3
Hawaii	—	*a*	*a*	—	*a*

— No cases
a The presence of rodent plague was confirmed

The cases reported in 1956 were of the sylvatic type of the disease. The ports and important cities of the continent have been maintained free of the disease.

In 1956 the Organization continued its cooperation in anti-plague campaigns and in epidemiological investigations.

Having completed his work in Bolivia in 1955, the Bureau consultant conducted in 1956 similar studies in Peru and Ecuador, with the objective of obtaining a better knowledge of the plague problem in these countries in order to improve the present methods of control. The final report of the consultant will be ready early in 1957.

A very extensive study of the species of the rodents, as well as their ectoparasites, present in the plague endemic areas of Peru and Ecuador was carried out. The cooperation of scientific institutions in Argentina, England, and the United States was obtained for the classification of rodents and their ectoparasites.

In 1957 the Bureau consultant will be transferred to Brazil where, at the request of the government, he will study the controversial problem of the presence or absence of sylvatic plague in that country.

Leprosy

Leprosy is a problem whose importance cannot be ignored. It has profound social, economic, and psychological repercussions and is a source of great concern to the public health and welfare services of the affected countries.

In the Americas there are a number of foci of the disease, and although generally speaking the prevalence rates are not as high as in some parts of Africa or Asia, forceful measures are required to solve the problem in this Hemisphere.

Before any systematic program for the control of leprosy can be planned in the Americas, at either the national or the international level, more precise knowledge must be gained of the extent and epidemiological characteristics of the problem. Many countries have yet to undertake leprosy censuses, and in others such censuses have been only partial or incomplete.

The number of leprosy cases reported in 35 countries and territories in the Americas in the period 1952-1956, according to the governments' reports, is shown in Table 4.

Table 5 summarizes the information it has been possible to obtain on the prevalence of leprosy in the Americas and the existing facilities for its treatment and control.

As this information shows, the prevalence of the endemia varies widely in the different countries. In some cases there is also variation in different parts of the same country. There is no uniformity, either, in the level of organization of the anti-leprosy campaigns, which in general have not yet attained the desired effectiveness.

The leprosy endemia in some countries is still limited to certain regions where the disease is relatively recent and takes a malign form, showing high prevalence rates. In other countries it is distributed over a large part of the national territory and the prevalence rates range from medium to high. Finally, in a small group of countries either leprosy does not exist or the number of cases is so small that the disease does not constitute a public health problem.

Wide variation, as stated, is also observed in the stage of development reached by the anti-leprosy services in the different countries. In some, the campaigns, started only recently, are in an early stage of organization. In others, the existing services, although larger in scale, have not developed sufficiently as regards either volume or proper balance of activities. In a few countries the organization is adequate in relation to the size and importance of the problem; there is sufficient knowledge of the location, prevalence rates, and characteristics of the endemia, and there are modern isolation and control services, adequate in number and capacity and properly located. These services have the support of valuable social cooperation.

An essential factor in the anti-leprosy campaign is adequate legislation on the prevention of this disease.

Almost all the American countries have legislation on leprosy. In most cases, however, such laws were adopted before modern concepts and techniques were developed for the control of the disease. The strides made in leprosy therapy make it essential that legislation on the disease be changed so that antiquated methods, based mostly on control of an administrative and police nature, may be revamped to keep pace with modern knowledge and present-day social conditions.

TABLE 4. REPORTED CASES OF LEPROSY IN THE AMERICAS, 1952-1956

Area	1952	1953	1954	1955	1956*
Argentina	404	399	420	426	385
Bolivia	8	36	...	11	*b* 5
Canada	—	2	1	...	...
Chile	—	—	—	*g* 1	—
Colombia	705	903	980	...	...
Costa Rica	25	8	34	34	*c* —
Cuba	99	* 36	50	16	34
Dominican Republic	35	*c* 31	21	...	...
Ecuador	—	...	44	...	...
Guatemala	3	4	3	11	*a* 9
Haiti	2	* 6	4	8	*a* 4
Mexico	248	312	291	*f*237	...
Nicaragua	15	11	130	14	*f* 14
Panama	4	9	*d* 7	1	*e* 4
Paraguay	340	*1,127	*389	167	*b*210
Peru	92	92	93	88	*a* 62
United States	57	60	56	75	...
Uruguay	13	10	15	5	*f* 6
Venezuela	742	*c*623	*214	*429	...
Alaska	—	—	—	—	...
Bahamas	1	2	1	—	...
Barbados	3	1	...	...	...
British Guiana	10	15	...	...	...
French Guiana	5	48	...	60	20
Guadeloupe	6	9	...	78	*f*105
Hawaii	21	23	20	25	...
Jamaica	24	10	18	15	17
Leeward Islands					
Antigua	5	6	5	...	...
Montserrat	—	—	...	...	...
St. Kitts-Nevis-Anguilla	3	3	1	3	*d* 2
Martinique	98	112	183	217	135
Netherlands Antilles	—	6	1	3	...
Panama Canal Zone	—	—	—	—	—
Puerto Rico	14	12	13	1	5
Trinidad and Tobago	420	...	1	...	17
U.S. Virgin Islands	—	—	2	—	...
Windward Islands					
Dominica	1	2	—	...	...
Grenada	—	2	...	...	...
St. Lucia	5	2	...	...	*f* 3
St. Vincent	—	—	...	...	...

— No case.
... Data not available.
* Provisional.
a 10 months.
b 8 months.
c 6 months.
d 37 weeks.
e 49 weeks.
f 11 months.
g Imported.

TABLE 5. PREVALENCE OF LEPROSY AND EXISTING FACILITIES FOR ITS TREATMENT AND CONTROL IN THE AMERICAS (*)

Political Entities	Estimated Population for Mid-Year 1953	LEPROSY CASES				Leprosaria and Colonies		Dispensaries	Date of Information
		Total Known		Segregated	Total estimated	Number	Capacity		
			Rate (**)						
Argentina	18,379,000	8,975	48.8	...	16,000	5(g)	2,785	4	1954
Bolivia	3,127,603	610	19.5	35	1,400	2	...	3	1954
Brazil	55,211,268	62,010	112.3	22,381	80,938	36(h)	24,000	80	1950–55
Canada	14,756,000(a)	16	0.1	10	17	...	...	...	1952
Chile	6,024,981	37(f)	0.6	13	37	1	40	...	1954
Colombia	12,107,810	9,155	75.6	6,507	12,000	2(i)	...	11	1950–56
Costa Rica	881,313	211	23.9	164	...	1	200	1	1950
Cuba	5,394,396(b)	3,623	67.2	736	6,000	2	...	10	1952
Dominican Rep.	2,290,805	268	11.7	188	...	...	...	...	1950
Ecuador	3,439,000(c)	150	4.4	...	...	2	...	1	1955
El Salvador	1,929,779	62	3.2	...	...	...	...	...	1953
Honduras	1,555,664	40	2.6	5	...	—(j)	—	—	1955
Mexico	28,052,513	11,378	40.6	...	50,000	1(k)	...	19	1953
Paraguay	1,504,246	1,990	132.3	400	10,000	1(l)	...	1	1954–56
Peru	8,591,300	1,245	14.5	...	3,400	3	550	7	1951–55
United States	158,306,000	...	...	400	1-2,000	6	...	...	1955
Uruguay	2,523,000(c)	...	...	62	500-1,000	—(m)	...	...	1954
Venezuela	5,377,508	8,872	165.0	866	...	2	1,000	175	1956
Bahama Islands	85,000	14	16.5	14	...	—(n)	—	—	1954
Barbados	221,000	66	29.9	28	...	1	175	1	1953
British Guiana	441,000(d)	1,292	293.0	268	...	1(l)	400	8	1950–55
British Honduras	75,782	1	1.3	1	...	—	—	—	1955
French Guiana	29,555	1,304	4,412.1	120	...	1	160	3	1953
Guadeloupe	314,460	1,085	345.0	100	1,155	1	100	2(o)	1955
Leeward Islands:									
Antigua	48,953	96	196.1	32	131	1	49	1	1954
Saint Kitts and Nevis	52,023	50	96.1	30	150	1	54	—	1953
Martinique	292,435	1,348	461.0	148	1,548	—	—	1	1954–56
Netherlands Antilles	161,000(e)	13	8.1	13	...	1	32	—	1955
Surinam	219,000(e)	1,270	579.9	599	...	3	735	...	1954
Trinidad and Tobago	678,300	884	130.3	229	...	1	...	5	1953
Windward Islands:									
Dominica	57,000	15	26.3	15	...	1	24	—	1953
Grenada	82,794	7	8.5	7	...	1	16	—	1955
Santa Lucia	83,905	22	26.2	14	...	1	14	—	1953
San Vincent	72,711	20	27.5	20	...	1	20	—	1953

(*) No data obtained for Guatemala, Haiti, Jamaica, Nicaragua, and Panama.
(**) Cases per 100,000 population.
— None.
... No information.
(a) Excluding the Yukon and the Northwest Territories. Population as of June 1.
(b) Estimated population for mid-1952.
(c) Estimated by PASB.
(d) Excluding Amerinds.
(e) Estimated population for mid-1950.
(f) There are no leprosy cases in continental Chile. These are found on Easter Island (population 800).
(g) Plus 5 transit hospitals and 1 preventorium.
(h) Plus 31 preventoria.
(i) These are in fact "lazarets," having a mixed population of patients and healthy persons.
(j) The Tegucigalpa Hospital has 8 beds for leprosy patients.
(k) Plus 4 special wards in general hospitals with 105 beds.
(l) Plus 1 preventorium for healthy children of leprosy patients.
(m) Patients are interned in a general hospital.
(n) There are 25 beds for leprosy patients in the Nassau Hospital.
(o) Treatment is provided also in 34 general polyclinics.

Supplementary data on the situation in the countries and territories of the Americas were given in the document presented to the Directing Council (CD 9/15, 15 August 1956).

Activities of the PASO/WHO in the Control of Leprosy

The activities of the Organization in this field have thus far been directed toward obtaining a better knowledge of the extent and characteristics of the problem and of the human and material resources available in the various countries, as a basis for the organization of leprosy control programs.

In 1951, a consultant of the Organization visited Paraguay, Bolivia, Peru, Ecuador, and Colombia and his report on the status of the problem in those countries was later transmitted to the respective governments. Similar surveys were made in 1955 in Trinidad and Surinam, and in 1956, in French Guiana, British Guiana, Guadeloupe, Martinique, Saint Lucia, and Grenada.

At the request of the Government of Paraguay, and following another visit by the consultant, a plan of operations was drawn up in 1954 for the control of leprosy in that country, where the problem is especially serious. UNICEF has agreed to collaborate by providing equipment, drugs, and other necessary items. Fellowships have been awarded to Paraguayan physicians for training in leprology and the services of a consultant are to be provided for a period of one year, beginning in September 1956.

It is planned to intensify Bureau activities in the important field of leprosy control, and to this end provision is made in the 1958 proposed program and budget, to be considered by the Directing Council, for programs of collaboration to four countries (Bolivia-12, Peru-24, Ecuador-18, and Colombia-19) and for broadening and expanding the regional program already in operation (AMRO-58).

Schistosomiasis

Schistosomiasis is a chronic parasitic disease, usually affecting rural people or those who come in contact with streams and ground water where the intermediate host, the snail, exists. The parasite or helminth, an intestinal worm, produces inflammation of the liver and intestines.

Among the Americas, Brazil suffers more than any other country from this malady. In various states of Brazil, schistosomiasis control methods have been studied in a cooperative project involving the Pan American Sanitary Bureau, the United States Public Health Service and the Brazilian Ministry of Health (Brazil-53). This project included ecological studies and practical field trials conducted to ascertain the chemical best suited under prevailing conditions as a molluscocide against the intermediate host snail. Also, as part of the project, the training of medical and auxiliary personnel and the development of a manual of field operations were undertaken. This work began in 1951. The project, in 1956, was conducted in three states, Minas Gerais, Bahia and Ceara, and was devoted to large use of the chemicals and techniques deemed most useful in the earlier studies. The Bureau maintained a consultant to assist in the program.

In August 1956, sodium pentachlorophenate (NaPCP), which had been found to be a most suitable molluscocide, was again applied in the snail infested waters of the health resort area near the city of Araxa, Minas Gerais. This chemical compound is easily applied, effective in both flowing and still water, economical, and non-toxic to man and animals in the concentrations used. The area had not been treated since August 1955 when an application of NaPCP was originally made. Four months following the initial treatments, many of the waters became re-infested with the intermediate host snail known as *Australorbis glabratus*. It was significant though that the density population counts were much lower prior to the 1956 application than in the 1955 pre-treatment survey. In the survey made during July 1956, all the waters, except the stream near the village used for bathing and laundering, harbored few or no snails. In that stream about 35 snails were collected per man-minute in August 1955 as compared with 5.4 snails per man-minute in August 1956.

In Minas Gerais is the community of Barreiras. Although the incidence of schistosomiasis in the indigenous population is comparatively low, Barreiras is of special interest

because the National Department of Rural Endemic Diseases will attempt to eradicate schistosomiasis from this isolated community in western Minas Gerais. A full-time medical officer has been assigned to supervise the project which consists of treatment of all infected people, health education, and snail eradication.

In July 1956 an inspection trip was made to the State of Bahia to observe the results of schistosomiasis control which has been in progress for over a year. Although heavy rains and floods made the roads impassable in some parts of the state, it was possible to visit a number of the 250 population centers consisting of cities, towns, and large farms, where schistosomiasis has been under control with NaPCP applied as a molluscocide.

Here are some observations concerning those centers.

It is estimated that about 150,000 to 300,000 people living in the control areas were protected from infection. About 30 tons of NaPCP were used during this period. The present cost of the compound delivered in Brazil is about $610.00 (U.S.) per ton. If approximately 200,000 people were protected in those areas, the cost of the chemical was about eight cents per person during the period—a bargain rate of protection against a communicable disease.

There was no known transmission of the disease during the control period. Following each application a biweekly snail survey was made and snails were examined for infestation. Each area where living snails were found was immediately treated again. With a few possible exceptions none of the snails examined in the 250 localities under treatment were found to be infested. In parts of some areas five treatments a year had to be made to control the snails. But in many areas no living snails were found five to six months after each treatment and some places were free of snails for eight or more months.

Worth mentioning are the results of control at Jequie, a city of some 28,000 inhabitants in Bahia, with an incidence of about 28 per cent. Here only a section of a long river, the Rio de Contas, passing through the town was treated. The average year-round width of the river is about 35 feet. During the dry season numerous sand banks are exposed and people can wade across. NaPCP was introduced into the stream by the drip method at a point three miles above the town. The banks and still waters along the sides of the stream were spray-treated. The calculated rate of application was about 10 parts per million (ppm) for about one day. Treatment of the banks and still waters increased the concentration slightly over 10 ppm. In the treated area, three miles above and over three miles below the town, no living *Tropicorbis*, one of the involved snails, was found before the sixth month following application. These results demonstrate that treatment of segments of long rivers near densely populated areas is quite feasible. It apparently takes considerable time for snails from the untreated waters upstream to invade the treated area. A large swamp at the edge of Jequie was still found free of *Australorbis* over eight months after the latest application. In other towns, some of which had an incidence as high as 85 per cent initially, comparable results were observed.

In experiments in Bahia, it was found that both CuSO4 (copper sulfate) and NaPCP were effective molluscocides. Nonetheless, NaPCP is preferred because the much smaller amounts of this chemical required for control make it less costly than the CuSO4. Similar methods are used in applying the compounds.

Since the State of Ceara is located in the Sertão, the desert of northeast Brazil, the control problem here may be different from many other areas. In one area of this state a demonstration project has begun. Even along the coast the rainfall is very low in comparison with the other states where control tests were made. Most of the state experiences frequent droughts; periods of two or more years without precipitation are not uncommon. Much of the region is mountainous, with some peaks as high as 2,500 feet above sea level. In some respects the typical landscape resembles that of the arid regions in the southwest of the United States.

Application of Na PCP (sodium pentachlorophenate) by the drip method, Minas Gerais State, Brazil

The initial control work was started near Redenção in the Pacoti River valley in 1956. Steep hills, 1,000 to 1,500 feet high, rise from the narrow, intensely cultivated floor of the valley. Water from a dam about five miles north of Redenção is used to supply the city of Fortaleza and for irrigation of the sugar cane and cotton fields in the valley. The water system being treated consists of a segment of the river, a few small tributaries, irrigation, and drainage canals and a few wells and ponds. All of the waters in the area about 15 miles downstream from the dam harbor snails. No snails were found in the impounded waters above the dam. About 29,000 people live in this area. The people have been examined frequently for helminths over a period of years. Incidence based on a recent survey is shown in the table following.

No treatments have been given or other control measures taken in this area to date. According to reports received, many cases of schistosomiasis requiring hospitalization occur in this area.

TABLE 6. INCIDENCE OF SHISTOSOMIASIS IN THE HUMAN POPULATION IN REDENÇÃO

Age group in years	Number examined	Per cent found infected with schistosomiasis
0–6	435	27.5
7–14	590	77.5
15–45	690	66.9
45 and over	291	45.7

Although the incidence of infection in snails is low as shown in table 7, it appears to be adequate to maintain a high and severe rate of infection in man.

TABLE 7. SNAILS EXAMINED 1953-55

Year	Number examined	Number found infected
1953	5,081	13
1954	20,065	12
1955	21,477	14

Snail control is an important but difficult aspect of schistosomiasis control for it can be carried on only in the breeding places, which are endlessly varied and continually changing, as they depend on rainfall and vast fluctuating hydrographic networks covering the country.

In spite of numerous setbacks for various reasons, great progress in this field has been made. The methods developed in Brazil under this program have become widely known, so much so that specialists in this field from many parts of the world have gone to Brazil for observation and training. There is also an urgent demand for copies of the field manual of operations that has been developed by this project. The new schistosomiasis control program in Egypt initiated by the USPHS/ICA and the Egyptian Government was predicated on the initial work done in Brazil.

Schistosomiasis is a problem also in Venezuela, Puerto Rico, the Dominican Republic, and Surinam.

It is believed that this program has made a very valuable contribution to the advancement of control of schistosomiasis not only in Brazil but in other parts of the world.

Hydatidosis

In connection with this disease, in 1953 a field demonstration was established in Uruguay to show the effectiveness of practical field control techniques and to train national personnel in the methods of conducting a control program; a grant was made to the Anti-Rabies Institute in Uruguay for a study of newer chemicals and drugs in an effort to find a more efficient ovicide, and an improved technique in the treatment of canines; and another grant went to the Parasitological Institute in Chile for a study of the influence of wildlife on the perpetuation of this disease.

During 1955 and 1956 funds were provided for additional

equipment and materials for the field demonstration unit. Several fellowships were awarded to zoonoses control personnel in several countries.

Hydatidosis control measures were effected during the year in Argentina (Buenos Aires Province) and Uruguay (Department of Rio Negro), the latter with PASB assistance (AMRO-43), where a second full year of operations was completed. The work in Uruguay is based upon a triple attack principle: (1) mass canine treatment for echinococcosis; (2) improvement of livestock slaughtering practices; and (3) education of the public. The Uruguayan field program has already provided valuable experience in meeting and solving problems incident to this type of campaign.

Special studies on the importance of wildlife as a reservoir for hydatidosis continued in Chile during 1956 (also AMRO-43). A large variety of wild rodents and carnivores were captured and autopsied.

Zoonoses

The large group of diseases transmissible from animals to man, some of which are discussed earlier in this section, continued to pose a major problem during the year, both from the public health point of view and also because of the enormous nutritional and economic losses caused by these diseases. The role of the agricultural sector of the economy in many countries of the Americas lends added gravity to the problem.

The dangers of such diseases as malaria and smallpox are now generally appreciated. This is not the case with most of the zoonoses, with the result that budgetary allocations for national control work are being made very slowly, and apathy exists in some quarters. Generally, however, there was an increased interest in the subject during 1956. Some governments established new veterinary public health departments, while others revitalized existing ones. The major action in this field during 1956 was devoted to plans for a Zoonosis Center on which governments could lean for advice and assistance.

Pan American Zoonosis Center

The problem of the zoonoses was referred to the Bureau in 1953 following a resolution of the Inter-American Economic and Social Council that consideration should be given to the "creation of a Training Center for the Study and Control of Zoonoses." The PASB Director considered that it would be appropriate for international action and drew up a proposal (AMRO-81), which was approved by the Inter-American Economic and Social Council, as part of the Program for Technical Cooperation of OAS, for operation as soon as funds were available. No funds became available from this source in 1954, 1955, or 1956.

Meanwhile, the Directing Council of the Pan American Sanitary Organization discussed the matter at its 1955 session. The delegates stressed the importance of the zoonoses and took note of the fact that a majority of the governments in the Hemisphere had expressed in writing their desire to participate in the work of a Zoonosis Center. The Directing Council accordingly adopted the following resolution:

> The Directing Council,
>
> Considering the importance of establishing a Pan American Zoonosis Center,
>
> RESOLVES,
>
> To authorize the Director of PASB to take appropriate measures so that the Pan American Zoonosis Center may receive, at the earliest possible date, the funds required for its operation.

The Director considered possible sources of funds and decided to submit the proposal to the Director-General of WHO for presentation to the Technical Assistance Board for financing under the U. S. Expanded Program of Technical Assistance.

The Government of Argentina had offered to provide facilities for a Center in 1954, and, following approval by the Bureau in 1954, budgeted a generous appropriation for the Center. PASB made provision for a Director, who was actually appointed at the end of 1956. As funds to initiate the work were now in sight a formal agreement for the establishment and operation of the Pan American Zoonosis Center in Azul, Argentina, was signed in Buenos Aires on August 10 by the Minister of Foreign Affairs and Culture of the Argentine Republic, the Minister of Social Assistance and Public Health, the Minister of Agriculture and Livestock Production, and by the Director of the PASB.

The Center will offer the following services:

a) Education and training;

b) Technical consultation;

c) Reference diagnosis;

d) Standardization of diagnostic methods and of procedures for biological production;

e) Dissemination of information, both technical and popular, on the zoonoses and their control;

f) Methodology, research and evaluation of procedures;

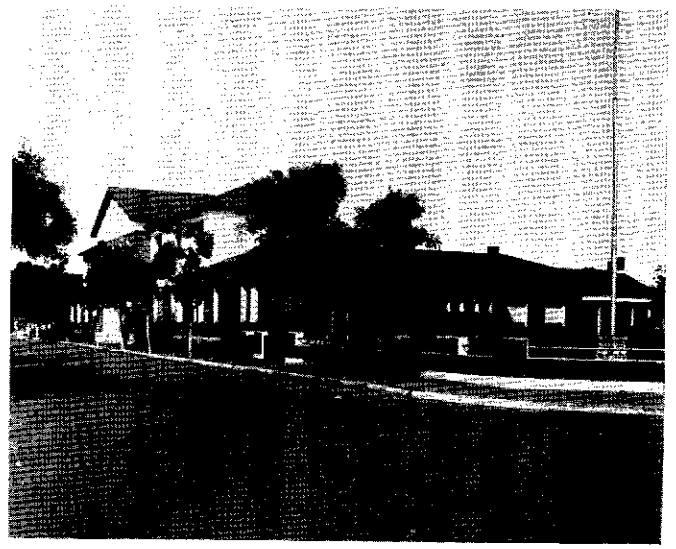
g) Demonstration of the practical application of anti-zoonosis measures.

Fellowships for training at the Center will be offered to cooperating governments.

Financing for this project is envisioned during 1957 from the budgets of PASB, UN/TA, and the Government of Argentina. In the agreement and plans for the Center provision is made to allow additional financing by other international agencies, such as the United Nations Food and Agriculture Organization and the Inter-American Institute of Agriculture Sciences, by non-governmental agencies, and especially by the participating countries. It is anticipated that the majority of the long-term financing of this Center will come directly from the participating countries.

During the year assistance was also provided to a number of countries in planning rabies and hydatidosis control campaigns.

Some governments have expressed concern that the success of their national campaigns against these and other zoonoses is endangered by foci of infection in adjacent countries. It is envisaged that seminars and training courses to be held in the Azul Center will help to coordinate and unify campaigns along national frontiers. This problem has already been discussed at border public health meetings, but the shortage of trained technicians to implement known procedures against the zoonoses is still a serious problem. The incidence of brucellosis in milk cattle is of particular concern in several countries.



Main building, Pan American Zoonosis Center, Azul, Argentina

Bureau activity in the fields of jungle yellow fever, rabies, and hydatidosis are considered elsewhere in this section.

PUBLIC HEALTH ADMINISTRATION

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Health Statistics

Salient factors in the activities of the year have been the expansion of the field consultant services, the preparation of guides for international health work, as well as a greater utilization of statistics in program planning. These activities are described herein following the four main classifications of activities: (1) Collection, Analysis and Distribution of Statistical Information; (2) Education and Training Program; (3) Field Consultant Services; and (4) Collaboration with Other Organizations.

Collection, Analysis and Distribution of Statistical Information

Reporting of quarantinable diseases from the countries to the Organization showed definite progress. Improvement of this activity is due to various factors, as follows: more effective follow-up procedures through Zones and consultants; improvement of reporting within the countries; and results of the training program and seminars. With very rare exceptions all countries are now sending reports of quarantinable diseases if these occur. Further efforts for improvement in this field are now directed to rapidity and timeliness. Considerable improvement is needed in this respect.

The Weekly Epidemiological Report was prepared with regularity and distributed by air mail to the health authorities.

The quarterly publication, "Health Statistics," was also issued regularly. In addition to statistical data on the incidence of communicable diseases in the American countries, including the quarantinable group, this publication contained information of statistical interest such as: activities of National Committees on Vital and Health Statistics; courses in health statistics in Peru and Mexico; activities of the Latin American Center for Classification of Diseases; statistical yearbooks, handbooks, manuals, and guides.

To facilitate and standardize reporting operations a revised edition (English, Spanish, and French editions) of the Guide for the Reporting of Communicable Diseases in the Americas was issued and distributed. The first edition of the Guide was prepared in 1953. The procedures recommended in this new Guide are in accordance with the Additional Regulations adopted by the Eighth World Health Assembly amending the International Sanitary Regulations and with the recommendations of the Seminar on Reporting of Communicable Diseases held in Chile in 1953. One of the major changes is the introduction of weekly reporting procedures which will add timeliness to the data obtained as compared to monthly reporting. Annual reports are also recommended in order that final data be available for all countries. The various reporting forms were also distributed.

Monthly and quarterly reports of the Aëdes aegypti eradication campaign were prepared and published in the Weekly Epidemiological Report and in the *Boletín*. A revised Guide (English and Spanish editions), for the preparation of the statistical reports of this campaign was also prepared and distributed. The procedures included in the revised Guide are expected to contribute to the improvement and standardization of the reports prepared on the activities and progress of the campaign.

During the year instructions and Guides in English, Spanish, and French were prepared and distributed in order to furnish the necessary information for the establishment of the direct venereal disease contact reporting system. The new system, whereby countries and localities report venereal disease contacts directly to other countries and localities, was therefore put into operation. The forms to be used in reporting have also been provided. Arrangements were conducted with the U.S. Public Health Service for the establishment of a direct reporting system between US-Mexico border cities, as an integral part of the Inter-American Reporting System.

The Additional Regulations, approved by the Eighth World Health Assembly, amending the International Sanitary Regulations, became effective on October 1, 1956. It was therefore necessary to collect information regarding yellow fever infected areas in the Americas as well as yellow fever receptive areas, as the definitions of both these areas were modified by the Additional Regulations. Information was also collected regarding vaccination requirements applicable to international travelers.

As indicated above one of the prominent features of the activities of the year has been the greater use made by

the Organization of statistical data in program planning. The Summary of Reports on the Health Conditions in the Americas has been particularly useful in this respect.

With the greater use of statistics in program planning and evaluation there is a corresponding need to increase the supply of information and to broaden its scope. To this effect plans for a comprehensive 10-year report on cases of notifiable diseases have been completed and emphasis is being placed on the collection and analysis of causes of maternal, infant, and childhood mortality since these are major problems in the Latin American countries.

A preliminary report has been prepared on the malaria situation in Latin America, based on the information presented by the delegates at the meeting of the Directing Council in Antigua, Guatemala. The report provides data for 16 countries and 10 territories.

Studies of diarrheal disease have been conducted with the Health Promotion Branch of the Organization. These studies were presented at the seminar on diarrheal disease held in Chile in November 1956. The statistical data indicate that not only are the death rates high from diarrheal disease in infancy but also that in several countries excessive mortality is noted in children one to four years of age.

The papers presented stressed the importance of the problem, the difficulties involved in obtaining comparable statistics on diarrheal disease, the epidemiological factors, influence of availability of water in prevention of diarrheal disease, and etiology and mortality by type of feeding.

In accordance with the recommendations of the XIV Pan American Sanitary Conference plans were made during the year to collect data for the four-year report on health conditions to be presented to the XV Pan American Sanitary Conference in September 1958. The forms for information have two parts, part I for population, vital statistics and case reports and part II on health personnel, facilities and programs. The Ninth World Health Assembly adopted Resolution WHA 9.27 in which the Assembly invited the Members to prepare a report covering the period 1954-1956. For the countries in the Americas the reports prepared for the XV Pan American Sanitary Conference will serve also to meet the needs of the World Health Organization. In order to meet both needs the countries are being requested to send two copies to the Bureau by September 1, 1957. Plans have been made with Headquarters to coordinate activities and to prevent duplication in these reports. WHO will prepare a synthesis of the situation and the Bureau will prepare a statistical report.

For some time the Bureau has been conscious of the need of making available records and procedures in Spanish for local health work. Considerable progress in this field was made during the year and a first draft of several records for a Manual of Records for Local Health Services was prepared and distributed among field personnel. These include summary cards for live births, deaths, foetal deaths, and statistical tables, as well as basic records for communicable diseases, general services, and maternal and infant hygiene. Records and instructions have also been prepared for experimentation as follows: individual index card; family record; maternal service record; and infant and pre-school child record.

Country basic information forms were distributed through Zone Representatives. Considerable importance is attached to these forms as a means of obtaining needed basic data on health conditions and facilities in countries. The information so requested from Peru and Ecuador has been received.

Education and Training Program

Statistical training and education offers one of the most effective mechanisms for the improvement of the quality of statistical data and of statistical services in general. This program was given additional impetus during the year through the utilization not only of the facilities of such training centers as the Schools of Public Health of Chile and Mexico, but of the services of the field consultants in training activities (short courses). The efforts and planning of the Organization in this respect are directed to increasing education and training facilities so that all types and levels of statisticians can be developed including hospital statisticians (medical records librarians). Assistance is therefore rendered to schools of public health to strengthen statistical education and to other training centers such as the Latin American Center for Classification of Diseases.

The Organization was again able to utilize the services of Dr. John Fertig, professor of biostatistics at the School of Public Health, Columbia University, who, as a short-term consultant, dictated a course in medical statistics (12 sessions) at the School of Public Health of São Paulo for faculty members. Dr. Fertig also visited the Schools of Public Health of Chile and Mexico in an advisory capacity and to appraise available facilities and needs in the field of statistical education and training.

January 1 marked the termination of the agreement among the three sponsors of the Inter-American Center of Biostatistics in Chile (AMRO-10): the United Nations; the Government of Chile; and the World Health Organization. At the same time a new agreement between the Government of Chile and the World Health Organization was put in operation. Although the United Nations no longer gives financial support to the administration of the center, they continue to award fellowships. The School of Public Health of the University of Chile is now fully responsible for the Course in Vital and Health Statistics. This annual influx of Latin American statisticians is expected to contribute in great measure to the establishment of improved statistical methods and procedures that will lead to the production of more complete, accurate, and comparable health data.

The 1956 course, which is the fourth of its kind, began on March 19. The table below shows the total number of students, by country, who have been trained to date.

TABLE 8. TOTAL NUMBER OF STUDENTS AND THOSE RECEIVING CERTIFICATES, BY COUNTRIES 1953-1956

Country	Total Number	With Certificates	Others
Total	151	111	40
Argentina	10	8	2
Bolivia	4	2	2
Brazil	2	2	—
Colombia	3	2	1
Chile	67	48	19
Costa Rica	6	6	—
Cuba	2	2	—
Dominican Republic	1	—	1
Ecuador	6	3	3
El Salvador	3	3	—
Guatemala	5	2	3
Haiti	3	—	3
Mexico	8	6	2
Nicaragua	2	1	1
Panama	5	5	—
Paraguay	7	5	2
Peru	7	7	—
Uruguay	8	6	2
Venezuela	2	1	1

The Ministry of Public Health in Peru has shown considerable interest in the development of a Course in Vital and Health Statistics in Lima for physicians of the Central Staff and provinces of the Ministry. The course, designed for physicians responsible for epidemiological work and control of communicable diseases, became a reality in January 1956. The first course offered six weeks of intensive instruction in biostatistics for about 20 physicians, the initial group of registrants. This course, which essentially embodies practical statistics, will be of great value toward the development of basic statistical data in the country.

During the year the statistical consultant to Zones II-III (AMRO-86) dictated a series of 15 classes in biostatistics to 22 officials of the statistical section of the Cuban Health Service and other interested health personnel.

The Zone consultant also gave a 10-day course in biostatistics to students of the Haitian Medical School. This was the second such course of its type and the Haitian authorities have decided to incorporate it into the regular curriculum of the school.

The second training course on coding causes of death of the Latin American Center for Classification of Diseases (AMRO-85) was held in Caracas, Venezuela, from August 20 to August 31. Fourteen fellowships were awarded to Latin American officials engaged in coding or entrusted with supervisory responsibilities in this field. Countries included were: Costa Rica, Cuba, Chile, Ecuador, Guatemala, Mexico, Nicaragua, Panama, and Peru. A PASB consultant participated. The type of training furnished will contribute to the improvement of the comparability of mortality statistics. A total of 26 coders have thus far been trained at the center.

This center has also been rendering advisory services to Spanish-speaking countries on problems of the application of the International Statistical Classification of Diseases, Injuries, and Causes of Death. The center was able to collect considerable information from countries on medical terminology employed in Latin America for cause of death certification and to present valuable material for the Spanish version of the seventh edition of the International Statistical Classification of Diseases, Injuries, and Causes of Death. From the results obtained in the two-year existence of the center there is no doubt but that every effort should be made to maintain this center in operation and expand its activities. Plans are being made so that the center will be in a position to send instructors to other countries to assist in training of coders.

Reproductions have been made of the film strip on medical certification adopted by the center (60 slides and legends for oral commentaries) from the one originally prepared by the National Office of Vital Statistics of the U.S. Public Health Service, so that one copy can be made available to training centers and national health services for use in lecture work to physicians in an effort to improve medical certification of causes of death.

During the year classes were also initiated in Guatemala by a Bureau consultant for basic biostatistical training of physicians, nurses, and inspectors. Employees and other officials of the biostatistical office of the National Health Service likewise participated.

Plans are being formulated to develop training facilities for hospital statistics as there is an ever increasing interest and need for this type of training in Latin America.

The second seminar on the International Sanitary Regulations, originally scheduled for October 1956, was postponed until January 1957. This seminar will be similar to the one held in Costa Rica in 1955. Participation will be limited to officials of the 10 South American republics. It will serve as a forum for the discussion of the application of the International Sanitary Regulations and procedures for reporting the quarantinable and other communicable diseases.

Field Consultant Service

The statistical consultant for Zones II and III collaborated with the Panamanian authorities and the I.C.A. consultant in the organization of hospital reporting procedures in Panama. These were applied experimentally in one hospital, and it is planned to extend their application so that each hospital in Panama will render basic information accurately and promptly. The consultant has taken initial steps for the preparation of a plan of organization of the Section of Sanitary Reports and Studies of the National Health Service of Panama; has rendered services in Cuba preparatory to the reorganization of the biostatistical service of the National Department of Health, and has worked with the Guatemalan authorities in planning the reorganization of the Biostatistical Section of the National Health Service.

Progress was made during the year in the establishment or reactivation of the National Committees on Vital and Health Statistics. The importance of the role of those committees in the standardization and coordination of statistical activities within a country cannot be overemphasized. The consultants of the Organization have endeavored at all times to render the necessary assistance in this direction and to encourage and promote the formation of these groups. Committees have now been established in 16 countries in the Americas, as follows: Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, El Salvador, Guatemala, Haiti, Mexico, Panama, Paraguay, Peru, United States, Uruguay, and Venezuela.

A second consultant in health statistics joined the Organization (AMRO-86) in July and was assigned to Zone IV, with duty station in Bogota, Colombia. Activities of this consultant include collaboration with the national health services, medical schools and hospitals in the collection of vital, health, and hospital statistics and on the organization of such services; the collection of data for basic country information; planning of surveys; and evaluation of services.

A review of death certificates was initiated by the consultant in Colombia and plans in 1957 call for the continuation of this survey with a view to improving medical certification and ascertaining facts on medical care. Education of physicians and statistical personnel in certification and classification matters is likewise planned.

In Venezuela the consultant has also devoted considerable time to assisting the University Hospital in organizing a medical records system and has been working with the health and hospital authorities on a hospital morbidity statistics plan for the 24 hospitals of the national group.

Collaboration with Other Organizations

In March, discussions took place with officials of the United Nations Department of Social Affairs and of the Population Branch in regard to the proposed establishment in Chile of the Regional Center for Demographic Research. This center is sponsored by the United Nations and the Government of Chile. Its main objective is to conduct research in the demographic field and to provide education and training in demography to selected officials of the Latin American countries. This involves the need for the coordination of teaching in the three statistical centers now in operation in Chile, namely, the Inter-American Training Center for Economic and Financial Statistics (Faculty of Economic Sciences of the University of Chile), the Inter-American Program for Education in Biostatistics (School of Public Health of the University of Chile), and the new Regional Center for Demographic Research and Training for Latin America (Institute of Sociological Investigations of the University of Chile).

During April 13-15, the United States-Mexico Border Public Health Association held its annual meeting in Calexico-Mexicali. Nearly 300 public health workers attended. PASB was represented by eight staff members from the Washington Office, the El Paso Field Office, Zone II, and COMEP. At the meeting, a U.S. Public Health official distributed 100 copies of the Bureau's new manual, "Exchange of Reports of Cases of Venereal Diseases and Contacts of Cases in the Americas."

The Chief of the Epidemiology and Statistics Section was the World Health Organization representative to the United Nations Statistical Commission which also met in April at the United Nations Headquarters, New York. The United Nations Document, "Review of International Statistics," which was given considerable study at the meeting, reported principally the development of statistical standards, recent developments in the application of sampling, and advisory and training activities in statistics. The representatives of the various United Nations specialized agencies presented summaries of the activities of these agencies on international standards in health statistics (WHO), labor statistics (ILO), educational and cultural statistics (UNESCO), and agricultural statistics (FAO).

The "Sociedad Mexicana de Higiene" held a symposium on June 29-30 at the School and Institute of Public Health and Tropical Diseases on the "New Models of Certificate of Death and Foetal Death." These were introduced in Mexico in 1956. The Chief of the Bureau Epidemiology and Statistics Section presented a paper on "Utilización de los datos de los nuevos modelos de certificados de defunción y de muerte fetal, a nivel internacional." This meeting was the first of its type held in Mexico. It should result in greater coordination of the agencies concerned with vital statistics and improvement in the quality of data. Over three hundred persons participated.

Environmental Sanitation

A Long Way to Go

Environmental Sanitation remains a critical deficiency throughout the Americas. Only a few countries have made substantial progress over the past several years. Major problems are found in two basic aspects—water supply and excreta disposal.

In some countries much less than half the urban population is served by public water-supply systems; the rural population fares even worse. Water supplies where they exist, are often inadequate or of poor quality. Inefficient sewage disposal also presents a severe threat to health, particularly in densely populated areas. Both these facilities, when inadequate in quantity, quality, or both serve as contributing causes of illness and death, from parasitic diseases and gastro-intestinal disorders.

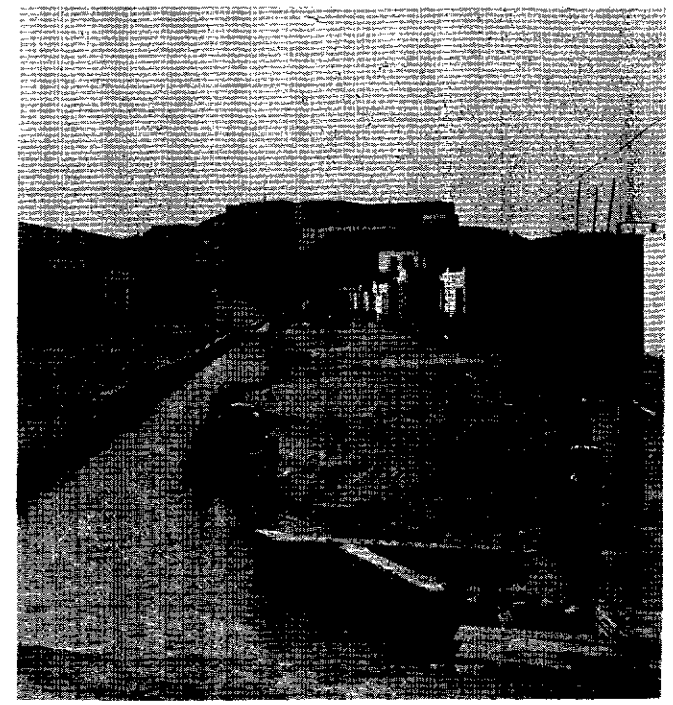
During the year an analysis was made at PASB of the present and probable needs for the next 20 years for urban and rural water-supply and excreta disposal facilities in Middle and South America. It is estimated that 21 million persons in urban communities lack a public water supply; 36 million persons in these communities lack sewerage systems (Table 9). The need is equally great in rural areas where 70 million persons lack water-supply and excreta disposal facilities.

TABLE 9. ESTIMATE OF URBAN AND RURAL WATER SUPPLY AND EXCRETA DISPOSAL FACILITIES NEEDED IN MIDDLE* AND SOUTH AMERICA

Service needed	Population Now Lacking the Facility	Cost Per Capita	Total Estimated Cost
Urban water supply	21,318,885	$20.00	$ 426,377,700
Urban sewerage	36,058,327	20.00	721,166,540
Rural water supply	70,226,607	10.00	702,266,070
Rural excreta disposal	65,982,874	5.00	329,914,370
Total Estimated Cost to provide facilities now lacking			$2,179,724,680
Total Estimated Cost 1956-1976 based on anticipated increase in population and costs			$4,000,000,000

* Middle America, by the United Nations definition, includes Mexico, Central America, and the Caribbean.

National health administrations are deeply concerned with these basic needs. Many governments have prepared plans for improvements or extensions which cannot be carried on—primarily for lack of funds. Large capital investments are required. There is, in addition, a shortage of sanitary engineers and other health personnel.



Villagers drawing drinking water from a small canal before a safe water supply was available

The PASB is engaged in several types of activities in this field. It is assisting in field programs, arranging seminars and conferences, advising governments through consultant services, and helping in educating and training personnel.

During the past five years the number of sanitary engineers on the staff has been increased from three (during the period March to July 1952) to a total of 21 at the close of 1956. Four of these are assigned to malaria eradication, three serve as Zone consultants, two serve in the Regional Office, and 12 are members of consultant teams to member countries. One of the latter serves in the Caribbean area as project consultant to several local programs of sanitation improvement. Nine additional engineers have served as short-term consultants during the past five years for periods of three months up to more than one year. Project funds for these sanitation personnel and their activities range from 10 to 12 per cent of the total project funds from all sources. Over 25 per cent of the personnel and project funds assigned to organization of health services are for sanitation. Sanitation also claims about 10 per cent of personnel and 15 per cent of funds for education and training.

This expansion of the staff has taken place largely in connection with the establishment of integrated health programs in the member countries. Most of the short-term consultants served in connection with training activities. New programs are planned during 1957. The greatest emphasis, however, will be in evaluating the programs already developed, in consolidating those started recently, in providing more and better orientation of all field programs, in providing improved advisory services to member countries and in making sound plans for an expanded program in the years ahead when additional funds may become available.

National Sanitary Engineering and Sanitation Services

One of the most important advisory services the Bureau can give to the member countries is that related to the organization and staffing of national health services. Most of these in the Region of the Americas include one or more units which are concerned with environmental sanitation activities. The range of activities covered, the type and amount of service rendered, and the organizational location and structure of the unit within the national health service, as well as the name given to the unit, all differ widely from country to country. The policy of the Bureau is to encourage the establishment of such units as major divisions of the health services, staffed with an adequate number of full-time, well-qualified specialists in the various aspects of the broad field of sanitation, under the direction of an experienced sanitary engineer who has received special training in public health.

In a number of countries, a large part of the sanitation activity of the national government is carried on in a special health unit which receives joint support from the national government and the ICA. These special services have helped to demonstrate, over the past 15 years, the types of environmental sanitation service and methods for their organization and operation that are suitable or unsuitable for the various areas, particularly in the field of sanitary engineering. It should be possible now for most of these countries to translate this experience into specific action in establishing or strengthening the sanitation services in the regular national health services.

Field Programs

The sanitation program of the rural public health services program in Guatemala (Guatemala-8) has accomplished much in its first year. Eight of the 16 inspectors trained in the first course are now working in different towns of the zone demonstration area of Amatitlan. The other eight are working in other programs in the country. The regional health center of Amatitlan and the health center of Palin are in operation. A third center is under construction in Pacaya. A new training center was established in Amatitlan to serve physicians, auxiliary nurses, sanitary inspectors.

The Division of Rural Health Services of the Ministry of Health, is now housed in a special building in Guatemala City, where office space is provided also for the international consultants to the program. The budget of the zone demonstration area program for 1956 included $100,000 for a broad sanitation program covering rural water supplies, abbatoirs, garbage and refuse collection and disposal, and rural housing improvement. This program is carried out by the Sanitary Engineering Section of the Division, which has a sanitary engineer, a sanitary inspector supervisor, and other auxiliary personnel. This section integrates its work closely with the Sanitary Engineering Division of the Ministry.

In Paraguay, as part of the integrated public health services project (Paraguay-10), activities in a hookworm campaign continued during the year. It is estimated that 52,000 houses were inspected. The percentage of houses having either no latrines or inadequate facilities was reduced from 67 per cent in 1955 to 27 per cent in 1956. Approximately 100,000 persons have been benefited by this campaign. It is expected that by the end of 1957 this work will be completely integrated into the activities of the health centers of the country.

Drilling a well for water in Chile

During 1956 the organization of the services of the San Cristobal Unit was accomplished in the Dominican Republic (Dominican Republic-4). At the end of the year the unit was giving efficient assistance to the community.

Training of public health personnel, improvement of water supply, and the building of latrines were also part of the program of cooperation with the Dominican Government in the field of environmental sanitation.

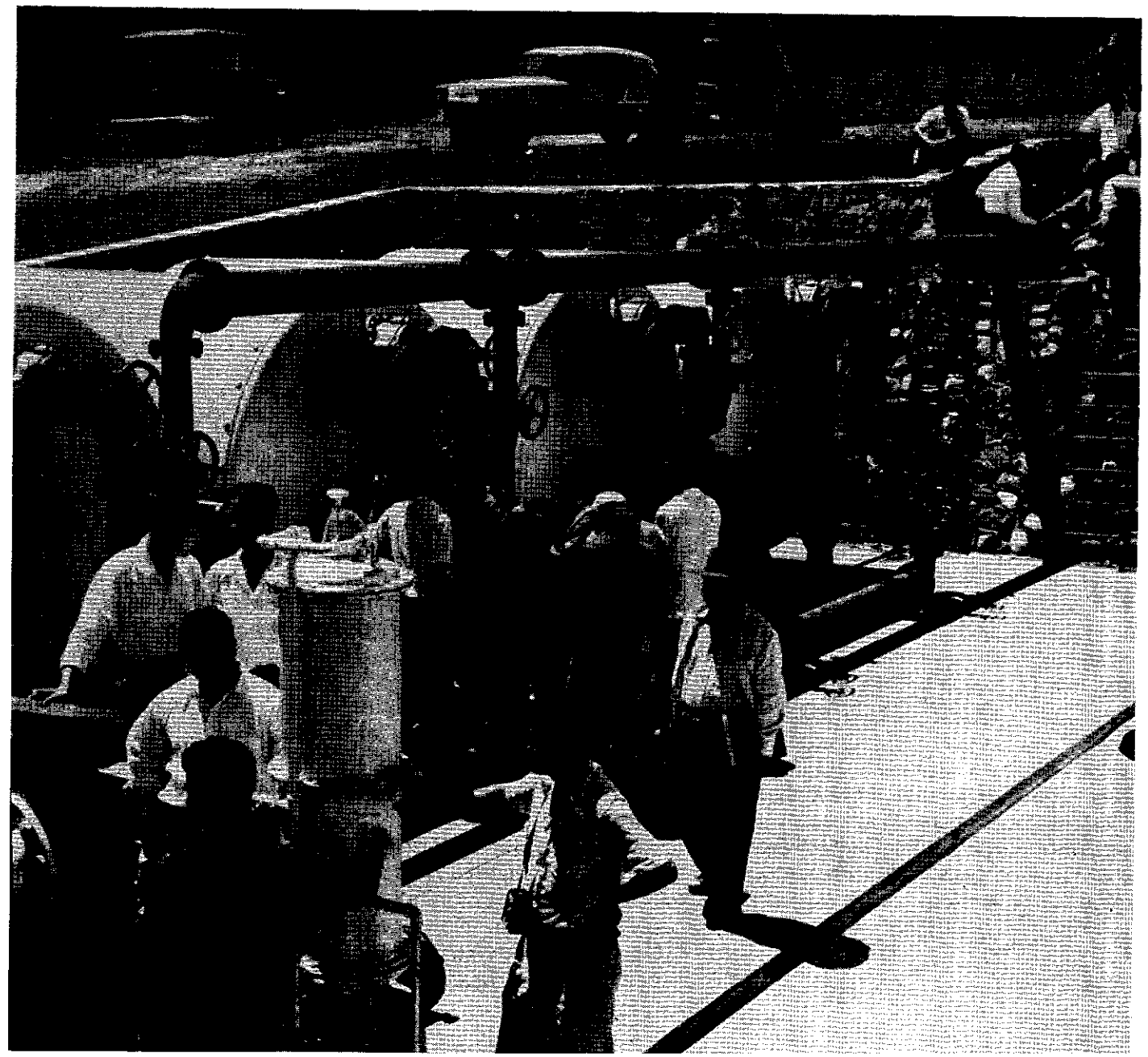
In El Salvador during the year, a great effort was given to the maintenance, repair, and operation of water-supply systems in rural as well as in urban communities (El Salvador-5). The latrines installation program continued in the rural areas of the country.

In 1956 in Panama (Panama-1) the water supply program and installation of latrines followed the established plan. Progress continued in four communities of the La Chorrera area: Nuevo Guararé; Camarón; Nuevo Arraiján; and Vista Alegre.

Conferences and Meetings

The Inter-American Association of Sanitary Engineering (AIDIS) is one of the vehicles through which the Bureau promotes sanitation improvements and maintains essential liaison with the sanitary engineering profession of the

Examining a battery of water filters at the plant in El Cambray, Guatemala



Hemisphere. The Biennial Congress sponsored by AIDIS met in Lima, Peru, March 19-25, 1956 and was attended by several hundred key sanitary engineers and other sanitation workers from the countries of the Region. Seven Bureau staff engineers attended as well as the Zone IV Representatives. More than 50 papers were heard at the congress of which eight have been recommended for publication in the *Boletín*. These relate to organization of rural sanitation programs, education and training of sanitary engineers and sanitarians, sanitary engineering aspects of occupational hygiene and nuclear energy, water fluoridation, and the sanitation of tourist accommodations. The next congress meets in Puerto Rico in 1958.

A seminar on Planning National Sanitation Services (AMRO-64) is being planned for 1957.

At the request of the Government of Costa Rica the agenda for the PASB Directing Council meeting in September 1956 included a discussion on the sanitation of tourist centers. This subject was discussed at the V Inter-American Congress on Sanitary Engineering and at the Inter-American Travel Congress held in San Jose, Costa Rica in April. At the request of the Pan American Union, acting for the Inter-American Travel Congress, the Director of PASB has established a technical committee to study and make recommendations with respect to minimum standards of sanitation applicable at tourist centers. This committee will include representatives of the International Travel Congresses, the Chief of the Division of Sanitary Engineering of the USPHS, and the Chief of the Environmental Sanitation Branch, PASB, who will serve as chairman. The work of the committee will be coordinated as far as possible with that of the Joint-Committee of WHO/ICAO dealing with the hygiene of airports.

Education and Training

There is a severe shortage of trained sanitary engineers and other sanitation workers in all the member countries. This shortage is aggravated by the high turnover rate in sanitation posts. Some causes of this are: (1) the relatively low salaries; (2) the financing of sanitation posts out of special funds rather than from regular, recurring appropriations; (3) the increasing opportunities in other fields for greater financial and other remuneration, especially for engineers; and (4) in some cases still, the political instability of posts in the government service.

The transfer of sanitary engineers with public health training from posts in official health agencies to posts in public works or to private consulting work or teaching posts is not entirely to be deplored since this does favor better working relationships among these agencies. It indicates the need for PASB/WHO assistance, however, in a field much broader than the sanitation programs of official health services alone.

PASB/WHO plays an important part in helping to alleviate this shortage by awarding fellowships, direct assistance to training centers for sanitation personnel, sponsorship and assistance in arranging sanitation and sanitary engineering seminars, and assistance in setting up training courses in special aspects of sanitation such as waterworks operation.

Information concerning specific education and training activities of the Bureau in this and other fields is given in another part of this Report.

Fluoridation of Water

During March and April of this year, an engineer was loaned to the Bureau by the USPHS, to serve as a consultant on water fluoridation (AMRO-50). An exploratory trip was made by the consultant to a number of places where water fluoridation has begun or is contemplated, or where it was thought demonstration installations might be appropriate. Visits were made to Lima, Peru; Santiago and Curico, Chile; Buenos Aires, Argentina; São Paulo, Araraquara, and Rio de Janeiro, Brazil; Port-of-Spain, Trinidad; Guatemala City; and Mexico City. Discussions were held with public health and water-supply officials and advice was given concerning fluoridation procedure, equipment and chemicals, analytical methods, and equipment. Discussions were also held with the teaching staffs of the schools of public health at São Paulo, Brazil; Santiago, Chile; and Mexico City, in addition to the staff of the School of Sanitary Engineering in Mexico City. These talks were concerned with the demonstration of economical and safe methods of water fluoridation, with the organization and content of short training courses in this field, with the provision of adequate laboratory facilities for studies on the fluoride content of natural waters, and with the control of water fluoridation. Recommendations were made on the selection of suitable water supplies for the installation of demonstration fluoridation equipment, and preliminary lists of needed fluoridation equipment, chemicals, and laboratory supplies and equipment were prepared. In several places, the discussions also touched on the problem of assuring a continuous supply of fluoridation chemical and the possible variation of optimum fluorine content in water supplies of different areas. It is realized that the optimum content, which has been found to be one part per million in the United States, may be slightly lower in hot, dry areas where the amount of water consumption is greater than that in the United States. In Mexico, it is felt that this matter needs more study before fluoridation is encouraged in that country.

Some of the communities in Central America have experienced difficulties in obtaining adequate quantities of the fluoridation chemicals and the help of the Organization has been solicited in solving this problem. Orders placed by the ministries of health through the PASB purchasing service, at least six months in advance of the need for the chemical, will probably assure the provision of the needed chemical.

It is planned to have the consultant make another trip in 1957, re-visiting some areas to assist in the inauguration of demonstration installations or training courses and to visit other locations where demonstration installations or fluoridation courses are contemplated.

Sanitation of Travel Centers

It is recognized that the study of sanitary regulations for hotels and restaurants with a special view to the health protection of international travelers is, in fact, only one phase of the general environmental sanitation problems of the various countries. Yet there is increasing interest and activity in practically all the countries of the Hemisphere in sanitation improvements at international ports, at hotels, restaurants and resort areas, and on planes, ships, and trains serving the traveling public.

Since it is now recognized by the health officials of the Member States that the traveling public is more vulnerable than the local population to many health hazards associated with deficient sanitation of tourist centers and facilities, the risk of disease may be a powerful deterrent to the potential visitors coming to the country for business or recreation. Some countries value the visits of such international travelers as a considerable source of income each year. Such income is worth conserving and can help finance many needed public health improvements.

The Bureau consequently has assumed direct participation in the study and formulation of standards of sanitation applicable to these travel facilities.

Maternal and Child Health Services

More and more maternal and child health services are being organized in their rightful place as an integral part of the over-all health services of the country and not as a special service to a part of the community. Medical and nursing supervision of mothers and children, both in clinics and at home, is a major activity of all local health services. In each of the integrated health projects in the several countries, maternal and child health constitutes the core of the work. This activity is being intensified in such areas as: improved sanitation in the home; prevention of communicable diseases, primarily through immunization; improved dietary habits and feeding practices, particularly during the weaning period; and general education.

In one major field, control of the diarrheal diseases, which are a dominant cause of death, especially among infants and small children, in so many countries of the Americas, specific efforts were initiated in 1956. The subject of diarrheal diseases was emphasized during the technical discussions of the XIV Pan American Sanitary Conference held in Santiago, Chile, in 1954, and it is with the object of focusing attention on the problem that the Pan American Sanitary Bureau, Regional Office of the World Health Organization, has planned a series of seminars for groups of countries of Latin America (AMRO-94).

Seminar on Diarrheal Diseases

The first of these seminars, held in Santiago last November, included a group of countries of South America which has shown an increasing national interest in the problem, namely, Argentina, Brazil, Chile, Paraguay, Uruguay, and Venezuela.

In view of the complexity of the problem and of its relationship with all the fundamental activities of public health and medical care, it was considered necessary to start this program through a team approach. For this reason, representatives of the professions having a major responsibility or interest in the problem, and who constituted representative teams of each country, were invited to participate in the seminar. In addition, participants included professional staff of the International Cooperation Administration, the Rockefeller Foundation, and the Pan American Sanitary Bureau.

Three inter-professional groups were organized for discussion of the program, as past experience indicated that better results are obtained through active discussion, with personal participation, in comparatively small groups.

The seminar was jointly sponsored by the National Health Service, the University of Chile, the Medical College of Chile, and the Pan American Sanitary Bureau.

Conclusions

The discussions were centered around three fundamental aspects: (1) the importance of the problem; (2) the prevention of diarrheal diseases; and (3) the prevention of mortality caused by them.

The magnitude of the problem can be given only approximately, since the only assessments available at the level of a country or area are the data on mortality. The seminar recognized that the majority of the Latin American countries with high infant death rates now have rates of mortality of diarrheal diseases which approximate those

which prevailed at the beginning of the century in countries which have since reached a high level of social and economic development. This mortality is found in children under two years of age, and in countries with very high rates it extends up to five years of age. It was recognized that the necessary progress in these countries with high rates can be accelerated in the light of more knowledge of the mechanisms which determine mortality by this group of diseases. Consequently, there is no need to permit the decline of the diarrheal diseases to be realized at the same slow pace of historic evolution.

The seminar recognized also that it is necessary to include the measurement of morbidity. In the same way, this is related to the causative agents of major importance, their distribution in the community, the mechanisms of dissemination, and their impact on the child. Available bacteriological data have provided information on the most common causative agents, but the results have varied according to the sample of population studied, the methods employed, the time at which the samples were taken during the illness, and the influence of the treatment previously administered.

The seminar recognized the need for studying the standard methods which should be applied in the laboratory. There was insistence that, in addition to the value of the laboratory for individual diagnosis, when applicable, its more important contribution lies in the evaluation of the program against the diarrheal diseases. The participation of the laboratory in epidemiological studies in selected areas of different countries would permit more accurate measurement of the existing problem and better estimation of the progress being made as a result of the program. In such epidemiological studies, bacteriologists, parasitologists, immunologists, pathologists, statisticians, and clinicians should unite their efforts.

In spite of the lack of knowledge, it is recognized that the group of infectious agents considered pathogenic which are found most frequently are the shigella and the salmonella. In addition to this group, enteropathogenic escherichias and agents belonging to other groups are found with variable frequency.

There was agreement at the seminar also on the most frequent mechanisms of dissemination of salmonella and shigella and, in regard to the other groups, it was considered necessary to carry out further study of the mechanisms of dissemination through epidemiological studies. For the shigella, it is recognized that the usual mechanism is human contact. Following in importance are flies and soiled objects. For salmonella, it is recognized that the most frequent mechanisms are the animal-human contact and contaminated food.

A program for the prevention of the diarrheal diseases is directly related to the development of adequate health

A fishing village in the area covered by the maternal and child health program at the Huacho Health Center, Peru

services, especially in the fields of environmental sanitation and education of the family, and with the maternal and child health program. On the other hand, the prevention of deaths due to diarrheal diseases depends on the rapidity with which treatment can be instituted as well as the quality of the therapy. The complete development of such a program implies a considerable extension of the appropriate services throughout the country and is thus closely related to general economic development. Considering the great inequality of the conditions of life in urban and rural zones, it was believed in the past that, especially in the rural areas, with lack of professional personnel and facilities, it would be necessary to wait for an appreciable improvement in the level of living before anything effective could be accomplished. The seminar concluded that certain specific efforts in the field of sanitation and education of the family could be introduced with success through the maternal and child health services, even in the more remote areas. The sanitation of the environment exerts a great influence through combined efforts to obtain greater availability of water of satisfactory quality, adequate disposal of sewage, control of flies, and disposal of garbage, in addition to certain improvements in housing.

In attacking the major culprit, the shigella, epidemiological studies have shown that greater availability of water in the house, permitting cleanliness of the hands, is able to reduce to one-tenth the prevalence of this agent in the community. One point on which the report of the seminar placed special emphasis is the need for providing a water supply close to the house, even in rural areas. To this is added the possible use of insecticides to reduce the fly population, the introduction of simple procedures for

hygienic garbage disposal, and the provision of certain domestic facilities for safe storage of food.

Complementing this effort to obtain some basic changes in the environment, the need of effecting a program of health education was stressed, particularly in relation to the mother and the child. The principal points proposed were adequate breast-feeding through improvement of nutrition of the pregnant woman and nursing mother, adequate knowledge of supplementary early and adequate feeding in order to ensure a satisfactory protein intake, and avoidance of the risk of contamination through the introduction of new foods. Activities directed to a better understanding of the beliefs, habits, and superstitions of the community have particular value in bringing about their modification into favorable forms of a program.

With the object of introducing this program in the rural area it would be necessary to use not only the limited resources in professional, medical, and para-medical personnel, but also to employ a larger number of auxiliary personnel, especially in the field of nursing. The need for training the professional and auxiliary personnel in adequate methods of health education was also clearly recognized.

On analyzing the program of medical care for the child with diarrhea, the seminar called attention to the great importance of preventing death, since for a certain number of years, even in countries with good programs of control of the diarrheal diseases, there would be a large number of children in immediate danger of death. It was recognized that from the mild to the serious diarrhea, the fundamental changes which are produced in the infant are the loss of water and electrolytes, manifestations of circulatory shock, and other metabolic and organic changes. When dehydration is present, the case is transformed into a serious pathological condition; its correction, rehydration, is a fundamental and unpostponable need. The methods of administration of fluid and electrolytes must be adapted to the seriousness of the case. It should be remembered that early treatment is essential. The respective values of the intravenous method, recognized as the only appropriate method of treatment of serious cases, and of other methods such as subcutaneous, gastroclysis, and oral were discussed. These procedures were considered from the point of view of their therapeutic value as well as their applicability in the rural environment which so often lacks resources. In this environment efforts to improve the knowledge of the mother regarding the value of early oral rehydration stressed the need, for this purpose, of training nursing auxiliaries. It was felt that gastroclysis, applied by professional and auxiliary personnel, could be extended even to remote rural areas. This can be a substitute for the more adequate treatment, by the intravenous route, in places where this latter method cannot be carried out because of lack of medical and professional personnel and lack of adequate equipment.

There was a full discussion on the use of the antibiotics and chemotherapy in the treatment of the infectious component of infant diarrheas and their use and limitations were recognized. It was stated, however, that treatment, especially with sulfa drugs, had certain risks which cannot be overlooked.

In addition to indicating the need for appropriate programs for the early and effective treatment of the diarrheal disease, it was pointed out that it was necessary to adopt administrative measures which will permit a better and more rational utilization of the hospital resources available in each country, and to complement these resources with the establishment of rehydration services in the largest possible number of conveniently located places. Still more, the necessity of integrating the program of treatment with the general maternal and child health program was particularly stressed.

The seminar proposed a program which has a double emphasis: (1) early treatment, especially rehydration of the largest possible number of cases of infant diarrhea, employing all methods which can be applied, in an effort to combat the high mortality from this disease; (2) the expansion of certain specific methods within the general program of public health, destined to prevent diarrheal diseases, with special reference to favorable changes in the environment.

Care of Premature Infants, Chile

One other project in connection with the MCH program in 1956 deserves mention.

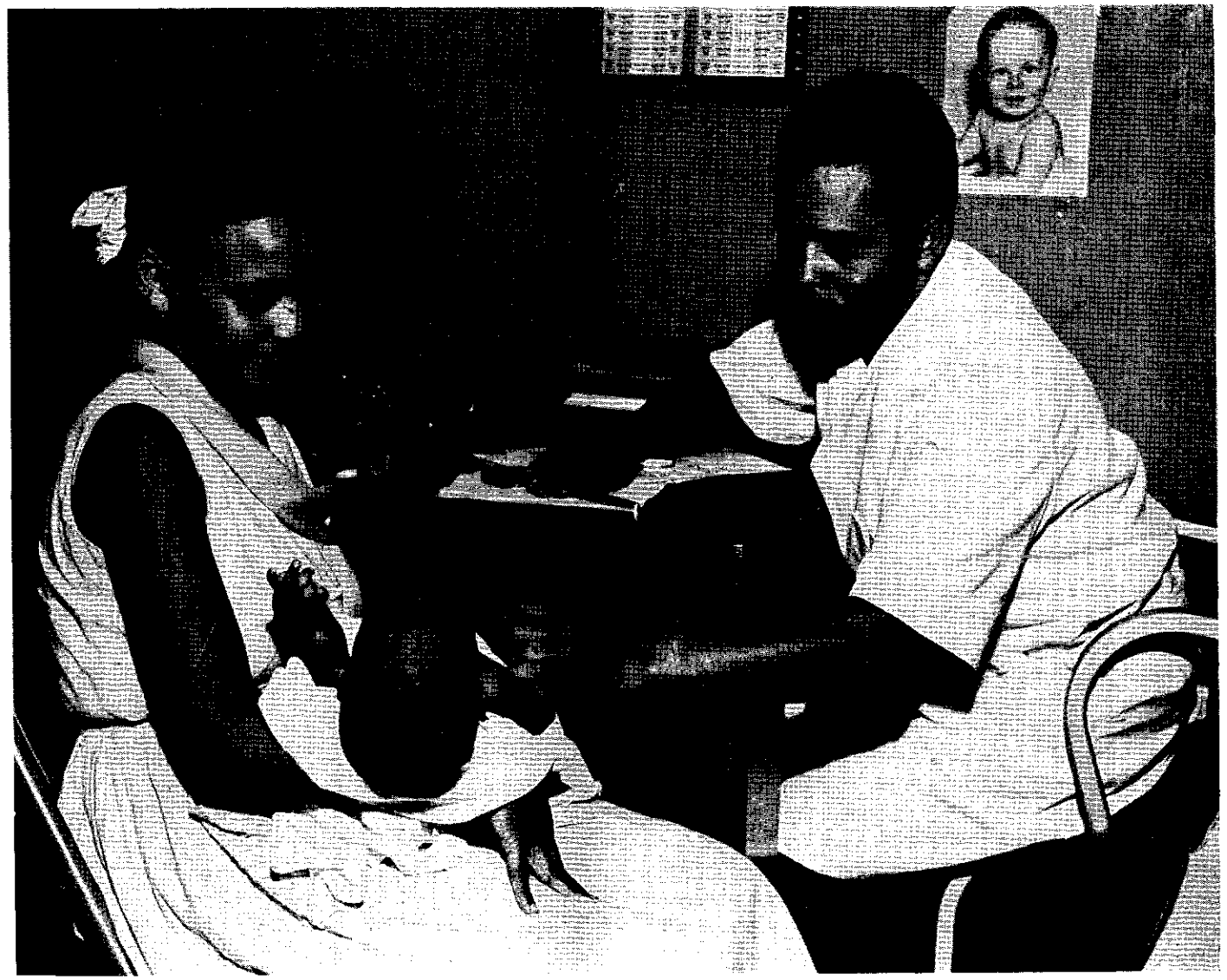
The Demonstration Center for Care of Premature Infants (Chile-12) has been able to achieve a high standard of premature care as evidenced by the marked reduction in the mortality figures. This is a project in which the Government of Chile, WHO, and UNICEF are collaborating to: (1) lower the mortality rate among prematurely born infants; (2) establish a demonstration and training center for professional and auxiliary personnel; (3) develop norms and procedures; and (4) integrate the services for the care of premature infants with those for improved care of the newborn and into the general plan for family health services.

The Bureau has awarded fellowships to the medical director and the chief nurse of this center for study abroad of modern methods. Supplies provided by UNICEF for the existing center have been delivered. Students were accepted early in 1956. A nursing adviser was assigned by the Bureau to assist in the work of the center from mid-1955 to the end of 1956 when the development of home care services for prematures was initiated. In both teaching and services the program has gone beyond the objective of the development of adequare care of the premature in the center and is now a comprehensive program which embraces all areas ranging from coordination with ma-

ternity services to the collection of statistical data including both prenatal and pediatric factors. This program embodies such elements as hospital care of all degrees of prematurity in line with currently accepted good practices, using types of equipment that vary from ideal to improvised; an effective parent teaching program within the hospital before discharge of the infant geared to needs of individual families; and a working referral system integrating the work of the center with that of health centers in an effort to reduce morbidity and mortality not only of prematures discharged from the unit, but other prematures non-hospitalized or hospitalized in maternity services for short periods. A successful follow-up program with collection of data on what happens to the prematures after discharge has also been included. There are contemplated, in addition, projected scientific investigations which should add to the available knowledge in the field. There is strong emphasis on better care for all newly born infants.

The work of the center promises to demonstrate a high standard of nursing service and could be well used as a practice area in administration and supervision in nursing for even those nurses not primarily concerned with premature infants. This project witnessed a good demonstration of teamwork using auxiliary personnel.

Former PASB fellow, serving as pediatrician in the San Cristobal Health Center, The Dominican Republic, discusses the growth progress of a child with the mother



Public Health Nursing

In assisting governments to strengthen health services during 1956, 20 international nurse advisers were employed in integrated health projects, one in a premature care program and one in BCG campaign activities. A review of activities in public health nursing and related fields shows many developments.

During the year, preliminary surveys of nursing resources and needs have been made as part of national and local health planning in Mexico (Mexico-22), Venezuela (Venezuela-1), Colombia (Colombia-4), Argentina (Argentina-7), and Barbados (Barbados-2). Others are in progress in Bolivia (Bolivia-10), Ecuador (Ecuador-4), Honduras (Honduras-4), and Peru (Peru-22).

Without exception, these surveys have pointed up the acute shortage of prepared nursing personnel to carry out functions related to public health services as well as patient care in hospitals. This shortage has been further aggravated by increasing demands for personnel for expanding health programs and hospital facilities. Better preventive and curative services are contributing to the natural increase in population and are creating still further needs for nurses in programs directed at promoting health as well as caring for and rehabilitating the sick. At the same time medical care is becoming more complex, requiring greater skills from the members of the health team, in which the nurse is gradually assuming a prominent role.

The extent of the problem varies from country to country. In a study of all the countries in the Region based on 1952 or the most recent data, the rates of nurses per 10,000 population ranged from 0.2 in Brazil to 30.8 in Canada, or expressed in another way, there was one nurse per 50,000 population in Brazil and one per 324 in Canada.

To provide nursing services in the face of these urgent needs, most countries have resorted to the employment of untrained or partly trained auxiliary nursing personnel. An analysis of the functions carried out by such personnel has demonstrated activities ranging from simple housekeeping duties to those ordinarily reserved for medical personnel. A study of the distribution of graduate nurses in most countries showed a concentration in urban communities with few, if any, employed in rural areas. Auxiliary personnel, in these circumstances, in the vast majority of cases work quite independently of nursing supervision. As one national Latin American nurse so clearly stated: "Auxiliary personnel are auxiliary only when supervised by graduate nurses; when not so supervised, such personnel replace (or substitute for) graduate nurses."

In an attempt to improve services under present conditions, in-service and other training programs have been set up for auxiliary nursing personnel in the various countries. In integrated public health projects such programs were carried out in 1956 as shown in Table 10. These efforts constitute only a drop in the ocean in terms of over-all needs, but they keep pace with progress in reorganization of health services and with availability of graduate nurse supervision.

A nurse records her observations on the patients' charts

Child care includes giving medicine plus a daily bath at Pediatrics Pavilion, Asuncion, Paraguay

TABLE 10. TRAINING ACTIVITIES IN 1956 FOR AUXILIARY PERSONNEL

Project	Type of Program		No. of Students	Status
	In-service	Special Course		
Colombia—4		x	12–15	Planning
Dominican Republic—4		x		Planning
Ecuador—4		x		Planning
El Salvador—5	x		All staff in area of project	Continuous
Guatemala—8		x	10	Planning
Honduras—4		x		Planning
Mexico—22		x	25	Completed
Paraguay—10	x		All staff in area of project	Continuous
Uruguay—5		x	16	Completed
Venezuela—1		x		Planning

TABLE 11. LOCAL TRAINING ACTIVITIES IN 1956 IN PUBLIC HEALTH NURSING

Project	Length of Course	Number of National Students or Graduates	Status
Colombia—4	10 mos.	9	Completed
	10 mos.	10	In progress
Dominican Republic—4	6 mos.	15	In progress
El Salvador—5	11 mos.	12*	Completed
Guatemala—8	8 mos.	10	In progress
	8 mos.	8	Completed
Mexico—22	4 wks.	8	Completed
Panama—1	5 mos.	10	Completed

* Includes 5 fellowship students: 3 from Honduras, 1 from Nicaragua, and 1 from Panama.

Programs of training for graduate nurses in public health nursing have also been carried out as shown in Table 11.

As public health services have developed in the various countries, it has been necessary to evaluate and re-define objectives and course content for the various programs. In this respect, the program in Colombia for graduate nurses in public health nursing and midwifery has been particularly interesting. Organized in 1952 as a program for midwives, it has evolved through stages of emphasis on midwifery per se, training of lay midwives, family oriented public health nursing, and finally, supervision and administration in public health nursing in health centers and departmental health services. More emphasis in the future will be given to the in-service training of auxiliary nursing personnel in health centers and rural health posts.

In addition to the development of training courses, attention has been given in the various countries to the improvement of health programs through better planning and administration of nursing services. National nurses together either in a nursing section of the health department, or in professional committees, working have brought about certain significant advances. In some of the countries, particular attention has been given to the study of nursing resources. These studies were stimulated by the technical discussions at the Ninth World Health Assembly in 1956 on "Nurses: Their Education and Role in Health Programs." The Panamanian Nurses Association, assisted by WHO nurse consultants, carried out a detailed study of resources including an analysis of findings with pertinent recommendations for improvement of nursing services. The Sub-department of Nursing in the Chilean National Health Services also has made such a study and has prepared a working document establishing recommendations for standards of nursing service based upon immediately available personnel and resources. Brazil (Brazil-22, Nursing Education) has also initiated a survey of nursing resources, and a number of other countries, including Colombia, Paraguay, and Peru, have become interested in establishing a register of nursing personnel as a first step toward sound planning.

In a number of the countries, nursing sections at the national level in health services have been established. In other countries, nurses are employed in sections primarily concerned with the administration of local health services, or services related to special fields in public health. Nurses have participated in national health planning in Chile, and to a limited extent in Colombia and Paraguay, where national planning committees are being formed.

National plans for improvement of nursing services for immediate implementation have been developed this year in Chile, Colombia, and Haiti. In Chile and Colombia these plans were studied in seminars or group-meetings attended by professional nurses brought in from the field for this particular activity. In Panama some of the recommendations for the improvement of nursing services formulated by the National Nurses' Association were immediately put into effect.

Definition and differentiation of roles of different levels of nursing personnel are always important in order that the limited number of professional personnel may be utilized most effectively. However, this definition and differentiation become particularly significant when there are a sufficient number of professional nurses to assume supervisory and teaching functions in a relatively large proportion of the health services. A study made in Mexico in 1955 revealed that nurses, in addition to carrying out functions in nursing care, nursing education, and administration were responsible for housekeeping duties and certain medical activities. Reassignment of these latter duties and activities were recommended to free available nurses for nursing functions. The Panamanian survey in 1956 suggested that 6.2 per cent of the activities performed by graduate nurses could be assigned to other professionals and an additional 12 per cent to secretarial personnel. This year the Sub-department of Nursing in Chile developed a detailed description of professional nursing functions in accordance with nurse positions and place of employment. In addition, it prepared a list of activities for three levels of nursing personnel in hospitals, viz. graduate nurse, auxiliary nurse, and "practicante" (ward-maid type employee who carried out some patient care).

Personnel policies for nurses influence nursing services in every country, and when there was significant improvement in salaries for hospital nurses in Panama early this year, a similar goal was sought by the public health nurse.

There is always a tendency for professional personnel to seek positions in urban areas where better salaries and living conditions are available. As health authorities begin to recognize the importance of nursing supervision of auxiliary personnel, nurses are assigned more and more

Preparing formulas—Pediatrics Hospital, Asuncion, Paraguay

to rural services. All of the countries have areas without available medical services, but Chile, Costa Rica, El Salvador, and Panama have made tremendous efforts to provide some nursing services outside the large urban communities. Colombia began this year to assign public health nurses to rural areas.

In order to improve nursing care with the present shortage of graduate nurses, auxiliary personnel are being prepared to give bedside care to patients in hospitals and to carry out limited, well-defined activities in public health services. To assure safe care for patients and families, the present graduate nurse staffs must be used for educational, supervisory, and nursing administration functions only. Reassignment of nurses employed in direct services in operating rooms, in blood-banks, and in giving anaesthetics is being studied in several of the countries.

Statistical data are available in most countries to demonstrate major health problems. Health authorities concerned with programs in many of the countries are beginning to encourage nursing leaders to evaluate activities of nursing personnel in terms of their possible contribution toward solving these problems. Nurses attending the First International Seminar on Control of Diarrheal Disease, in Chile, suggested possible activities for auxiliary personnel in promoting environmental sanitation and personal hygiene, in instructing mothers regarding feeding of infants and pre-school children, and in introducing early rehydration in cases of diarrheal diseases among children. Such an analysis of program activities by nurses results in the discarding of many traditional functions not pertinent at this time.

Availability and utilization of supplies and certain facilities necessarily influence service which nurses can offer. Programs depending upon extensive home visiting are effective only insofar as transportation needs are met. When means of transportation are limited, decentralized placement of auxiliary personnel has been found useful, as in El Salvador. However, supervisory nursing personnel must have transportation, even under such circumstances, and transportation independent of that needed by other professional personnel and for fellowship students.

A great deal of emphasis this year has been given to establishing work standards at local levels, especially where public health services are being initiated. This is an important step preliminary to training programs, especially for auxiliary personnel whose pre-job preparation is based on actual functions to be carried out in the field. It is also an area for continuous evaluation and readjustment. El Salvador (El Salvador-5) has carried out such an evaluation which showed a more realistic number of visits made and services received in terms of resources than had been projected.

Integrated Health Services

For more than five years the Bureau has been collaborating with various governments in integrated health projects as a major activity throughout the Hemisphere. During this time there has been a steady increase both in the number and the scope of these projects concurrent with clearer and more detailed definition and understanding of objectives and the methods of achieving them.

Fifteen integrated health projects were in operation in 1956, including as many countries and/or territories. Total expenditures in these projects amounted to approximately $700,000.

The map on p. 86 shows the distribution and duration of the various integrated health projects and the personnel assigned to them at the end of 1956. Also indicated are projects in the planning stage.

A most significant gain has been the growing realization of the interdependence of the central and local aspects of a well-balanced national health service. Slow but steady progress continues toward the goal of a well-trained, adequately paid, full-time public health career service as the cornerstone of success.

An integrated health program may originate from a single activity as a starting point or may be planned as such from the beginning. It may also integrate several established activities to achieve coordination and avoid overlap.

Youngster makes his first visit to Health Unit in Chame, Panama

Argentina, for example, requested the collaboration of the Bureau during 1956 for a study of its public health services as a basis for reorganization (Argentina-12). In addition to the collaboration of the Bureau in that study preliminary steps are being taken to set up early in 1957 model health services in the province of El Chaco, integrating central, provincial, and local resources. There is a marked trend in Argentina toward decentralization of health services from the federal to provincial governments. Health authorities in several provinces have made considerable progress in planning for the reorganization and enlarging of their services.

In Uruguay, planning and initiating local health work in rural districts took place during the year (Uruguay-5). The Bureau provided technical guidance, material assistance, and educational facilities for these developments.

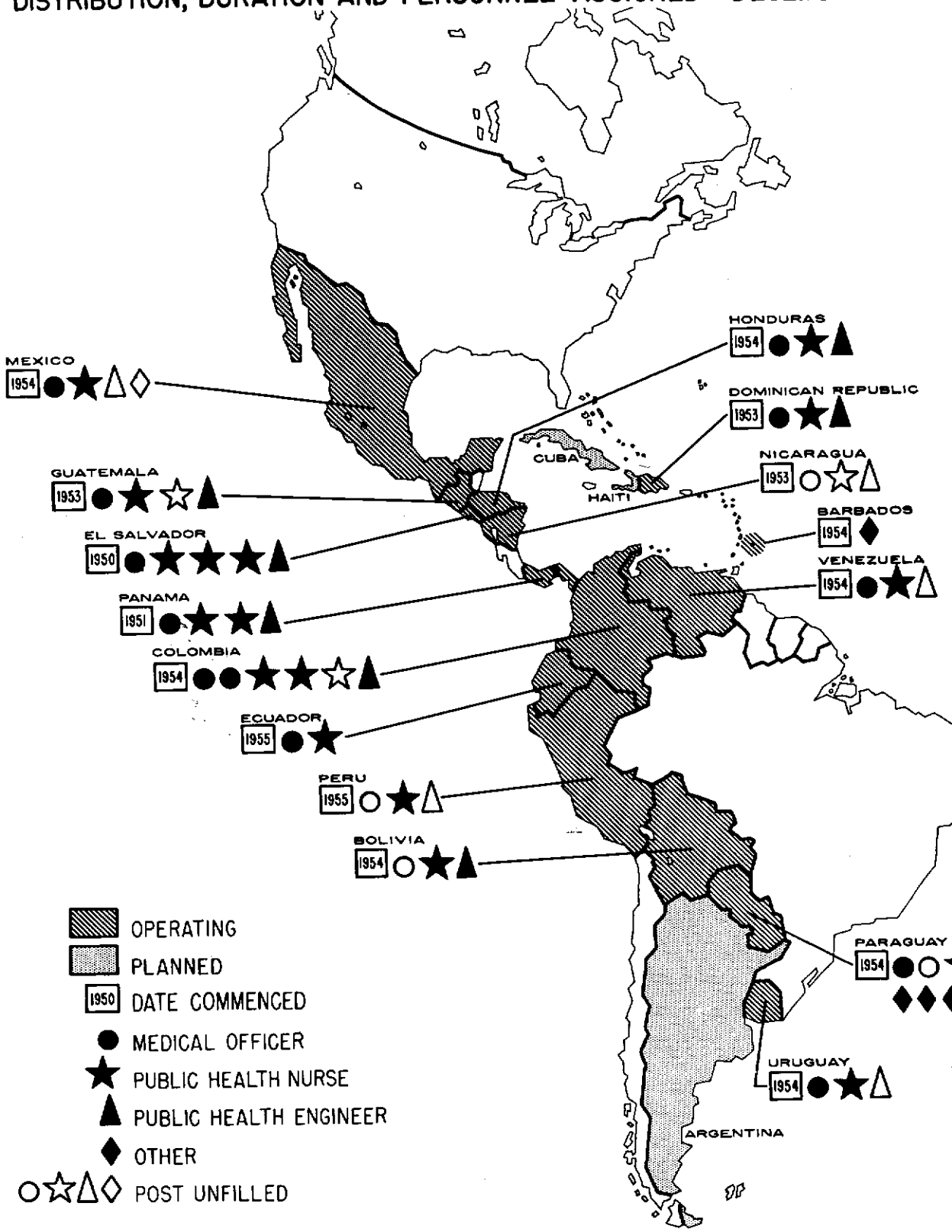
Both the Argentina and Uruguay projects are examples of recent developments in this field.

An illustration of an older, more consolidated project is the one in Paraguay (Paraguay-10). This integrated health project operated under separate individual projects from 1950 to 1955 when the program was changed as a result of the progress made. (Allocations for health programs in the national budget have increased to three times the 1950 level and the principle of full-time service for professionals has been established.)

The Organization gives advice on the development of central and local services, while UNICEF provides supplies and equipment.

Experience acquired during the years has led to modifications in the agreements covering the integrated health programs so as to take better advantage of the services of consultants at the different levels of the national health services. Thus the training programs for personnel and the health demonstration areas tend to become integral parts of national health plans for reorganization of local, regional, and central services. In this process, the consultants, individually or in teams, have acquired valuable experience, which can be analyzed and shared with benefit to the Organization. Constant review of the successes and failures of international civil servants, of diverse professional and cultural backgrounds, in the application of methods to varied conditions constitutes a necessity within PASB, where every working system is subject to constant revision. Furthermore, the Bureau has felt the necessity of creating an opportunity for free communication and examination of principles, objectives, and procedures. The success of the discussions held by the consultants in insect control in 1954, for example, and the desire to accumulate additional experience for seminars among the countries in public health administration, supported the decision to call a meeting in this field during the year. The purpose was to bring together doctors, engineers, nurses, and other integrated project personnel, as well as personnel belonging to Headquarters and Zone Offices, for a frank exchange of views on integrated public health programs.

The Meeting of International Advisers to Integrated Health Projects was held in Antigua, Guatemala, October 13-18, 1956. Participating in this meeting were 33 staff members from eight projects in Middle America and the Caribbean, from Zone Offices II and III, and from the



Washington Office. The participants included 10 medical officers, seven sanitary engineers, and eight public health nurses.

The major topics discussed were: (1) the role of the international consultant in the strengthening of health services; (2) the planning and development of integrated health programs; and (3) the training of personnel.

For nearly two years prior to the meeting, ideas and views were exchanged regarding the subject matter and procedure. Based upon the suggestions received several agenda and programs were proposed, circulated, improved, and circulated again before a final conclusion was reached.

At the opening session the group discussion method was briefly described. Each project was summarized by the team-leader in a form previously agreed on and this brought everyone up-to-date on the general experiences in various countries and on the individual activities of the participants. Extensive and frank discussion constituted an important, and perhaps unique, bringing together of a wide range of organizational experience in a broad field of activity.

During 1957 there will be a similar meeting of the international advisers to the eight integrated health projects in South America. Also in 1957 a formal evaluation of one such project, El Salvador-5, should serve to establish valuable guidelines for assessing objectives, methodology, and progress.

Planning plays a key role in the development of integrated health services. Every health agency operates, of course, on a budget of expenditures which is in itself a plan. So also, therefore, does every health ministry or department. But planning necessarily includes broader aspects. The planning process, so vital to successful integrated health services, must incorporate: (1) a study and analysis of the problems and their relative importance in a country; (2) a study and analysis of resources, immediate and future, in personnel, facilities, and funds; (3) a definition of short-term and long-range objectives and establishment of priorities; (4) a formulation of programs of services, standards, and methods; and (5) continuous evaluation.

International agencies can assist the countries of the Americas in the preparation of their national health plans, for planning is a field pre-eminently suited to international collaboration. The Bureau, by giving aid in this direction, is working toward the attainment of its goal of strengthening national health services.

Veterinary Public Health – Aftosa

This relatively new service in the field of public health has made steady progress in program development since the Bureau first appointed a Veterinary Public Health Adviser in 1949. The establishment of such service in the National Ministry of Health of many of the countries of the Region led to the expansion of the Bureau's program in this field to the Zone level where presently there exists a V.P.H. Adviser for each two Zones.

Initial activity of the program was devoted to advice and assistance to the work in communicable disease control in regards to the zoonoses with particular emphasis on such diseases as rabies, brucellosis, hydatidosis, bovine tuberculosis, virus encephalitides, and leptospirosis. Contributions have been made also to the Bureau's programs in jungle yellow fever and sylvatic plague.

The increased importance given by national health services to control of the zoonoses has placed many calls on the Bureau for assistance in training national personnel, in developing field control programs, and for laboratory diagnosis for the production of biologicals. The accumulating demands for improvement in the national services for zoonoses control, there being 85-90 of these diseases communicable from animals to man, led to the establishment, in September 1956, of the Pan American Zoonoses Center which is located in Azul, Argentina (AMRO-81). This center, devoted to both the human and the animal phases of the zoonoses, will give attention to all aspects of the work in this field, primarily through training, and will provide services to both the ministries of health and the ministries of agriculture.

The Bureau's program of assistance to countries in problems of the zoonoses soon implicated the work in food control. Many of the steps necessary to ascertain the presence of certain zoonotic diseases and to prevent their transmission to the human population involve the public health control of meat, milk, and other foods. Assistance has been provided to countries, to improve attention to statutory responsibilities of the national ministries of health

in food control. Generally speaking, these national services are not adequate, both in the number of personnel for this work and their training, or in the legislation governing food control.

During 1956, a number of fellowships were provided for the public health training of key personnel employed in the national veterinary public health services. One of the important problems in the development of the new service has been the lack of properly trained personnel. To assist in overcoming this deficiency and to facilitate a better usefulness to the public health cause of the work done by veterinarians, special consultants were provided to assist deans of schools of veterinary medicine in the re-organization of the teaching for the incorporation of more veterinary hygiene and public health.

Another important activity in the veterinary public health program has been attention to the Bureau's responsibilities in connection with the operation of the Pan American Foot-and-Mouth Disease Center located near Rio de Janeiro, Brazil. While not a direct public health problem, the Bureau was assigned the conduct of this program covering all phases of anti-foot-and-mouth disease work in all of the countries of the Americas. The program is financed from Technical Assistance funds of the Organization of American States (AMRO–77).

This center was established to make possible a continent-wide attack against foot-and-mouth fever (aftosa), a highly contagious livestock disease. The disease is widely distributed throughout the Americas, where it affects human nutrition by reducing supplies of meat and milk.

The center provides needed services not available at the national level in most of the countries. These services include: (1) providing diagnostic services for countries submitting specimens to the center; (2) providing advisory and consultative services for countries helping to develop their programs to combat or prevent the introduction of foot-and-mouth disease in these countries; (3) training courses and/or seminars; and (4) research in the nature of the foot-and-mouth disease virus and other allied virus diseases, and development of studies in the field of immunity with respect to these viruses.

Two training courses were held at the Aftosa Center during 1956. The VII Training Course for Mexico, Cuba, Guatemala, El Salvador, Nicaragua, Costa Rica, Panama, and Ecuador had the attendance of fellows from each of these countries plus one from Brazil.

The VIII Training Course was held for the countries and territories of North America and the Caribbean area (U.S.A., Canada, Mexico, Puerto Rico, Martinique, British Guiana, French Guiana, and Jamaica) and had an attendance of nine participants.

Diagnostic services continued to be furnished on a greatly accelerated basis due to the many more requests from the countries in the Americas. During the year the center received 379 samples from seven countries for tests. Many countries in which the disease is found have sent specimens to the center for confirmatory diagnosis, while several aftosa-free countries have relied on the center for diagnosis of suspected outbreaks. Rapidity and accuracy of diagnosis is of the utmost importance where the suspected outbreak occurs in a country which is presently free of the disease. The success of control often depends on the center's diagnosis.

Consultation through field visits and correspondence was provided by the center's staff to countries. Sixteen countries and two dependencies were visited.

Research work continued to progress throughout the year. New serological methods of diagnosis were developed; experimental type vaccines are being developed and are now under trial. The pilot vaccine production plant has been completed and experimental trial batches of vaccine have been made. It is anticipated this pilot plant will be used for full-teaching purposes.

In February 1956, a meeting of the Food and Agricultural Organization on Animal Quarantine Regulations was held in Paris. The Director of the Pan American Foot-and-Mouth Disease Center attended. Discussions took place at this meeting on quarantine laws and international quarantine regulations. One of the main aims of the meeting was to explore means of reducing the restrictions to commerce in livestock and meat products caused by animal disease control methods and regulations. Much groundwork was accomplished that should prove a good basis for future alterations and improvements in methods and regulations concerned.

Study was also made of the special report made as a result of representation at the Segunda Reunión del Comité Internacional Regional de Sanidad Agropecuaria (CIRSA) held in San Jose, Costa Rica, during January 1956. CIRSA meets every six months, attended by the Ministers of Agriculture of Mexico, the Central American countries, and Panama. The committee has established an operational organization (OIRSA) with a full-time executive director and a budget derived from quota contributions from the participating countries. One of the major interests of OIRSA is an aftosa prevention program. Among the plans of this program is the conduct of a mock aftosa outbreak to take place at a selected site in Central America, to afford practical organization of a plan for mutual defense against this disease. CIRSA and OIRSA have requested the Aftosa Center and the Bureau to provide collaboration as far as possible in all matters of mutual interest, e.g., aftosa, brucellosis, and other zoonoses, production of biologicals, food production, and certain aspects of veterinary medical education.

A survey was carried on, through correspondence, with all of the countries in the Americas, resulting in a report of the present status of foot-and-mouth disease in the Americas. The information gathered through these surveys constitutes important basic data for planning the future activities of the center. The surveys also assist in developing an efficient and reliable reporting system of aftosa and other vesicular diseases.

Nutrition

By fundamental investigations in the field of nutrition, by stimulating and guiding work in applied nutrition, and by training large numbers of students from both the Central American area and other parts of the world, the Institute of Nutrition of Central America and Panama (INCAP) constitutes an important instrument of PASB/WHO nutrition policy and is making a contribution, not only to the countries of Central America and Panama, but also to the other underdeveloped areas of the world which have similar nutrition problems (AMRO-54).

In 1946, the representatives of the five Central American countries, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and of Panama, met with representatives of the Pan American Sanitary Bureau and the W. K. Kellogg Foundation to found this unique cooperative nutrition venture. INCAP's mission was to study the nutrition problems of the area, work out ways in which they might be solved, and then help the countries to apply these solutions. INCAP was to have the central laboratories and a corps of well-trained nutritional workers which would be beyond the resources of any one country.

From the beginning, the W. K. Kellogg Foundation was to assist with funds for fellowships to train key personnel and for basic equipment, while the Pan American Sanitary Bureau was to furnish technical guidance and serve as the administrative agency. The offer of the Government of Guatemala to construct the necessary building was accepted and accordingly Guatemala became the site of the Central Institute. Although the representatives of all of the countries signed the agreement it was ratified at first only by Guatemala, El Salvador, and Honduras. Physicians, nutritionists, and biochemists from these countries were given the opportunity for a year of training in the United States; equipment was ordered and the construction of the building begun. The Institute was formally inaugurated on September 15, 1949, the anniversary of Central American independence.

Initial Programs

Because so little was known of the dietary habits, nutritional deficiencies, and composition of local foods, studies along these three lines became the first task of INCAP. With the cooperation of Dr. Robert L. Harris, Professor of biochemistry of nutrition, Massachusetts Institute of Technology, complete equipment had been selected for food analysis and purchased with funds provided by the W. K. Kellogg Foundation, while Dr. Guillermo Arroyave of Guatemala, Dr. Salvador Pizzati of Honduras, and Dr. Andrés Campos of El Salvador were trained in food analysis techniques in the M.I.T. laboratories.

These three biochemists, with two more U.S.-trained Guatemalan chemists, Lic. Francisco Aguirre and Lic. José Méndez de la Vega, began an intensive study of the edible foods of the area. By combining their results with analyses of Central American foods done in the laboratory of Dr. Harris at M.I.T., the first edition of a food composition table for Central America and Panama was completed by autumn of 1952. By this time both Costa Rica and Panama had become active members of INCAP, although Nicaragua did not become a member until 1954.

Dietary surveys were carried out in Guatemala, Honduras, and Costa Rica even before the inauguration of the Institute; similar surveys were done in El Salvador and later in Panama. In 1954, the first dietary surveys were organized in Nicaragua. Local personnel assisted in all of these surveys. The results were similar in showing a relative deficiency of protein of good quality, vitamin A., and riboflavin. The great majority of the diets of the Central American countries tended to be very monotonous, with a very high percentage of the total diet coming from corn, and to a lesser extent from beans, vegetables, and flour. These surveys have furnished a basis, not only for the preparation of nutrition education material and the training of auxiliary workers in nutrition, but also for the formulation of advice on economic and agricultural policy calculated to improve the nutritional status of the populations of the member countries.

The third of the basic activities of INCAP, the clinical surveys, were carried out by physicians in each country, but the work done in Guatemala, El Salvador, and Honduras, gave the first detailed knowledge of the nutritional status of people in the area. They showed a markedly slower growth and maturation, and a smaller final stature and weight for Central Americans, than for persons in more highly developed areas. Signs suggestive of vitamin

A deficiency were also particularly common. A clinical biochemistry laboratory, which was established, showed the blood serum levels of vitamin A and its precursor, carotene, to be low. Other biochemical measures suggestive of nutritional deficiencies were encountered. At the same time laboratory facilities were established in each member country to determine the presence of intestinal parasites, malaria, and anemia as part of the clinical surveys. The results of these studies show an almost universal incidence of *Ascaris lumbricoides*, a significant amount of hookworm in lowland areas, and a high general incidence of multiple parasitic infestation. Among the parasites commonly present were *Trichuris trichiuria*, *Strongyloides stercoralis*, *Giardia lamblia*, and *Endamoeba histolytica*. Anemia was frequently present and tended to be normocytic or macrocytic in character, although severe microcytic types were common in areas with hookworm and malaria.

Endemic Goiter

With the visit of a WHO consultant in 1950, surveys were initiated which soon showed endemic goiter to be a serious public health problem in Guatemala. Ultimately, it was found that the average incidence in the whole country was 38 per cent and that only one department had an over-all incidence of less than 20 per cent. El Salvador and Honduras were next examined and in both countries endemic goiter was found to be widespread, the incidence being 29 per cent in the two countries.

Subsequently, surveys in Costa Rica have shown an incidence of 17 per cent and, in Nicaragua, an incidence of 28 per cent. Incidence figures in excess of 40 per cent for several provinces of Panama have also been shown; occasional cases of cretinism are reported in these provinces too. Throughout the area deaf-mutism and feeble-mindedness, which frequently appear associated with endemic goiter, are relatively frequent.

The prevention of goiter in highly developed countries is carried out by the iodization of salt with potassium iodide. However, this requires refining, drying, stabilizing, and special packaging. Much of the salt that is consumed in Central America is crude, moist, sea salt. Its iodization with potassium iodide would be economically prohibitive and the resulting product would not be familiar to the people. Trials of a more stable iodine compound, potassium iodate, were initiated in Guatemala and El Salvador. These trials, showed that potassium iodate was as effective as potassium iodide in reducing the incidence of endemic goiter in school children and that both were highly effective for this purpose. A pilot plant was then secured by INCAP, and potassium iodate added to crude Central American salt proved to be stable over long periods of time.

Using this method to iodate the crude salt, Guatemala, Costa Rica, and now Panama have legislation requiring the iodization of all salt for human consumption. The remaining countries of El Salvador, Honduras, and Nicaragua are expected to follow suit shortly. In developing this method for Central America, INCAP has made a contribution toward the control of endemic goiter in many areas of the world where climatic conditions are adverse for the stability of iodine in salt and where crude salt forms a major proportion of the total production and consumption.

Kwashiorkor

Attention was first called to the nature and importance of kwashiorkor in Africa by the report of WHO consultant Dr. John F. Brock, in collaboration with a staff member of FAO, Dr. Marcel Autret. With the publication of their report, there was a strong suspicion that cases described by a number of Central American authors under names such as Síndrome Policarencial de la Infancia were identical with kwashiorkor. This was definitely established by the survey of WHO consultant, Dr. Moisés Béhar, in collaboration with Dr. Autret. Their report, "Síndrome Policarencial de la Infancia (Kwashiorkor) en la América Central", established its importance, and INCAP began studies on this disease.

Kwashiorkor is now known to be due to protein deficiency and is characterized clinically by edema, pigmented skin lesions, changes in the color and texture of the hair, anorexia, and apathy. The blood serum levels of total protein, albumin, and a number of vitamins and enzymes are lowered. There is also greatly decreased activity of the enzymes in the small intestine and in liver tissue.

INCAP field studies have demonstrated the prevalence of shigella infection and diarrheal disease due to shigella in the child population of Central America, and established their importance as causative factors of kwashiorkor in children already chronically malnourished. Other precipitating factors are any type of acute or chronic disease, disruption of the family by death or desertion of a parent, and sudden adverse changes in the economic status of the family.

In addition to basic studies of the characteristics, treatment, and epidemiology of kwashiorkor, INCAP is making progress toward its prevention. As a supplement to basic nutrition education material, training courses and special lectures directed toward the prevention of kwashiorkor, INCAP has been working on the development of a suitable mixture of vegetable proteins for the supplementary and mixed feeding of infants and children. Such a mixture ought to be based on local products which are easy to transport and store and much less expensive than milk.

Using a suitable mixture of dry corn flour, sesame meal, cottonseed meal, ramie, and dry yeast, INCAP has developed a preparation which is economical and highly palatable and which has protein of a quality quite comparable to that of milk. It is expected that an increase in the production of animal protein plus the widespread availability of a product of this source will lead to the eventual elimination of kwashiorkor as a public health problem.

Improvement of Corn

In the area of Central America, depending on the country, from 30 to 40 per cent of the protein intake of the people in rural areas comes from corn alone, most of which is consumed in the form of lime-treated corn or tortillas. The quality of the protein in this corn and in the total diet is so poor that despite the fairly high protein intake, the population as a whole, and particularly the children, do not get enough of the essential amino acids which protein must supply.

With the large consumption of corn, anything which would serve to improve its nutritive value, and particularly the quality of its protein, would have a profound effect

Purification by column absorption is necessary before thiamine and riboflavin can be determined in food samples—INCAP food analysis laboratory

on the total nutritive value of the human diet. For this reason, INCAP is engaged in a cooperative study with the Rockefeller Foundation and the Agricultural Experiment Stations of Central America, Panama, Mexico, and Colombia, to select varieties of corn which are not only higher in yield but also of better nutritional value. The results to date have proved the practicality of this project.

Since beans are the next largest source of protein in the diets, similar work has been carried out with this food. Other studies have resulted in the development of inexpensive means of enriching tortillas which form such a large proportion of the local diets. INCAP studies carried out in cooperation with the National Agricultural Institute of Guatemala have shown that the addition of a small amount of sesame meal, and a still smaller amount of leaf meal, will greatly improve the nutritive value of tortillas.

Other Cooperative Work with Agricultural Agencies

INCAP has also carried out many other cooperative projects with agricultural institutions in its member countries. One example of the value of such work is the demonstration that the plant ramie (*Boehmeria nivea, Gaudichaudia*), formerly grown only as a fiber crop, can also be grown as a forage crop. INCAP studies in cooperation with the National Agricultural Institute of Guatemala have shown that the leaves of this plant, when young, are relatively free from fiber and have a nutritive value equal or superior to that of alfalfa. Since ramie grows well in tropical areas where alfalfa does poorly, it promises to become the "alfalfa" of the tropics. The plant is now in use as a forage in a score of countries and promises to be a significant factor in increasing animal protein production in tropical areas. Work with other potential forage crops continues.

A different line of work with the same end in mind has been the assistance given in the development of poultry and other animal rations which make maximum use of local plant products. Cooperative studies with the National Agricultural Institute of Guatemala have also included the evaluation of the effect of fowl infections such as coryza, cholera, and Newcastle's diseases on the nutritive status of the hen, and have led to the discovery that vitamin A deficiency reaches critical proportions in affected birds. Trials of the effectiveness of increasing resistance to these infections by increasing the amount of vitamin A activity in the diet are now underway. Similar studies have been carried out regarding the effect of high environmental temperature on nutritional status.

Effect of Vitamin B12 and Antibiotics on Child Growth

Because vitamin B12 and certain antibiotics have been shown to improve the growth of animals fed vegetable rations, the incorporation of these substances into human diets has been suggested. Where the protein was predominantly of vegetable origin and where marked retardation in growth and development were present, this seemed a particularly attractive possibility. However, INCAP studies carried out in Guatemala and El Salvador showed that the growth of children was improved by properly balanced supplementary feeding whether animal protein or appropriate vegetable protein combinations were used, but that this effect was not enhanced by the addition of B12. The conclusion was drawn that either the small amount of animal protein received by children was enough to provide the vitamin B12 required or sufficient intestinal synthesis of B12 was taking place so that there was no need to add it to the diet.

Trials with the antibiotics, penicillin and aureomycin, were also carried out, because in animals the inclusion of these substances in the ration seems to have a beneficial effect on the availability of vitamin B12. However, the effect in humans was shown to be of very little quantitative importance in the case of aureomycin and to disappear in a few months. In the case of penicillin, no effect, or possibly a negative effect, was observed when small quantities were included in the diets of children consuming predominantly vegetable protein.

Atherosclerosis

A recent field of INCAP's interest which shows much promise is the study of the relation of diets to atherosclerosis in the area of Central America and Panama. Studies

INCAP nutrition research, Central America. Dietician stays with family for seven days, records children's daily food intake

by an INCAP pathologist, in cooperation with a PASB consultant, have shown that severe aortic atherosclerosis is much slower in developing in persons from poor urban and rural groups in Central America than in routine autopsies in the United States. It takes the lower income Central Americans 20 to 30 years longer to develop the same degree of aortic atherosclerosis.

Significantly, heart disease regarded as a major complication of severe coronary atherosclerosis is almost unknown among this population group, while it is a very common cause of death among both the upper-income groups in Central America and the populations of the United States and Western Europe. As a matter of fact, it has become a leading cause of death in most of these countries and is a subject of great research.

It has been thought for some time that blood levels of cholesterol and certain combinations of fat and protein were related to the development of atherosclerosis. When the serum cholesterol levels of Central Americans were studied by INCAP, the levels in both adults and children in poor urban and rural groups were very low in comparison with those in upper-income groups, or in the United States population. This was paralleled by major differences in some of the types of protein-fat combination in the blood serum.

It is evident from this work and from other studies in other parts of the world that environmental factors must be primarily responsible for these differences. The identification of these environmental factors is of enormous importance. Among the differences between the upper and lower-income population in Central America are: the amount and kind of fat; the relative amounts of animal and vegetable protein; the relative physical activity of the two groups; and differences in tendency toward fatness or leanness.

From among these and other factors, INCAP studies are endeavoring to sort out those of greatest importance in determining the frequency of occurrence of clinical heart disease.

Nutrition Education

On the basis of its survey results and other studies, INCAP has placed a great deal of emphasis on the development of basic material for nutrition education. Among these are a series of 14 concise and authoritative pamphlets on "Nutrition Problems" which summarize such topics as kwashiorkor, malnutrition, vitamin A deficiency, maternal and child nutrition, parasitism, diarrhea, endemic goiter, and pellagra for the health educator, public health nurse, school teacher, and social worker. An earlier series on local foods was designed for the same groups. In order to help in the use of material various publications are being distributed in series entitled, "Learning Nutrition" and "Teaching Nutrition". Another bulletin serise, "Clinical Nutrition Summaries for Physicians", gives detailed information on such subjects as the nature and treatment of kwashiorkor, endemic goiter, and pellagra.

Sketches for nutrition posters are also supplied for adaptation in the member countries. Nutrition education material is distributed monthly by INCAP with a bulletin of the nutrition education section, explaining the nature and recommending the use of the accompanying material. Other nutrition education activities include the organization of courses, workshops, and seminars for health educators, public health nurses, home economists, agricultural extension agents, public health physicians, and the like. Exhibitions on varied nutritional problems are also prepared for circulation among the member countries.

Fellowship and Training Programs

INCAP has set up programs for the practical training of physicians in clinical-nutrition surveys; for the training of dietary survey workers; and for the instruction of biochemists in laboratory techniques, in food chemistry, and in clinical biochemistry. It also provided training in nutrition surveys, nutrition education, and short courses for nutritionist aides during the year. Upon special arrangement, experience in animal nutrition and in various other fields of INCAP work are provided.

In the training program, fellows have been received in INCAP for periods ranging from a few days to a year or more, for persons from every country of the Western Hemisphere as well as persons from Angola, Ceylon, Egypt, England, French West Africa, Kenya, Mozambique, Philippines, South Africa, Uganda, and others.

In addition to the nutrition education publications, INCAP contributes annually a large number of technical articles and has arranged for their publication in both English and Spanish. Every two years these INCAP articles not available elsewhere in Spanish are translated and published in a special supplement to the *Boletín* of the Pan American Sanitary Bureau, entitled, "Publicaciones Científicas del Instituto de Nutrición de Centro América y Panamá". The second of these volumes was published in December 1955.

The number of INCAP scientific articles in English now totals 73 and in Spanish 135, although many of the latter are translations of the articles previously published in English. These articles cover the complete range of activities of INCAP and are supplemented by a variety of mimeographed documents as well as quarterly and annual reports.

The library of INCAP is the most complete in the Central American area for medical and biochemical work and may well become a bibliographic reference center of major importance in the field of nutrition.

Annual Technical Meeting

The VII Meeting of the Technical Advisory Committee of INCAP, held in Guatemala City, August 22 to September 7, 1956 highlighted the progress made during the year.

It was noted in particular that studies on kwashiorkor have progressed on all fronts—clinical, biochemical, pathological, and therapeutic. Progress of investigations in the epidemiology of protein malnutrition and the dietary of weanlings and pre-school children has been so great that hopes now exist that methods of assessing the level of protein nutrition within a population, and a differential test separating kwashiorkor from marasmas might eventually be evolved.

The committee recommended that high priority be given to the program of research aiming at correction of diets deficient in protein. This includes the determination of amino acid deficiencies associated with the diets of Central America, the search for dietary protein and amino acid supplements to correct those deficiencies, and the development of vegetable protein mixtures for the prevention and cure of protein malnutrition.

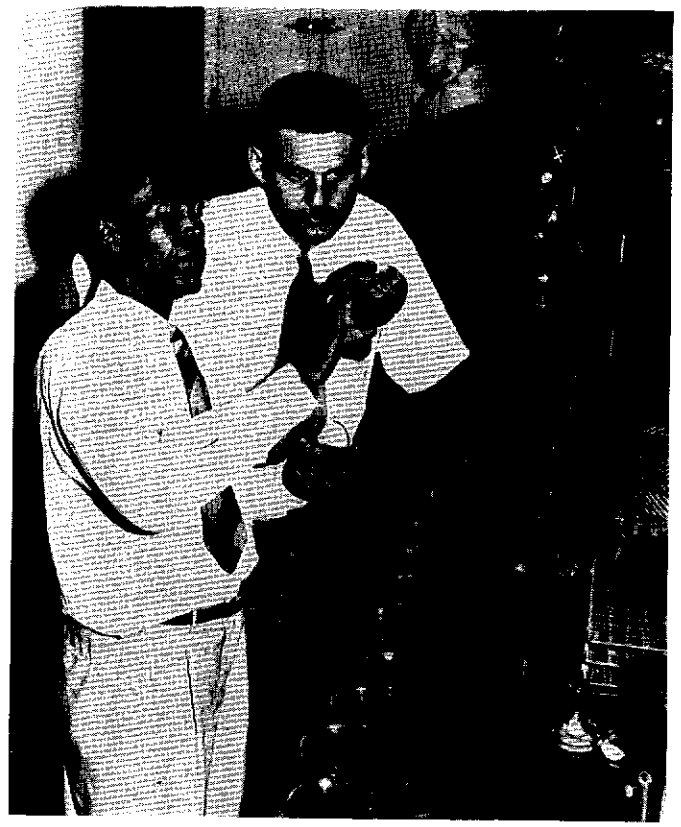
It pointed the way for INCAP's future activities: (1) by urging cooperation in study programs with agricultural agencies within countries; (2) by stressing research in the relationship between diarrheal diseases and protein malnutrition; (3) by recommending that the Institute convene a regional conference of technical workers in food analysis in order to appraise critically the existing data and identify the additional work needed to be done through food analysis laboratories in the Region of the Americas; and (4) by urging that investigation of the biochemical, clinical, and pathological changes associated with atherosclerosis be continued to elucidate the low incidence of this condition reported in some areas of Central America.

Public Health Laboratories

Efficient public health laboratory services are especially needed if an individual country program in communicable disease control is to be well founded and capable of sound expansion. The Bureau has been assisting several of the countries in the Region to establish or improve public health laboratories.

In Haiti, efforts in 1956 have been devoted to making the public health laboratory (Haiti-9) an integral part of the public health services. Among its three sections, the parasitology section contributed effectively toward this end in collaboration with the four health centers in the Port-au-Prince area. The serology section continued to assist in the training of medical students in serology. A limited number of technicians received some degree of training in bacteriology. Efforts in 1957 will be concentrated on centralizing the work of the public health laboratory, the SCISP Laboratory and the laboratory work of the health centers in Port-au-Prince. A tentative plan has also been drawn up for a four-year training program, in the first year of which about 12 technicians from laboratories in Port-au-Prince will be trained. Additional courses are also planned for technicians from rural areas or to be sent to rural districts.

In Paraguay, as part of the Paraguay-10 project, organizational and operational plans for a central public health laboratory were approved by the Ministry of Health during the year. A budget for the new laboratory for 1957 was included in the ministry budget. The objective is to incorporate the several specialized laboratories in the country into one coordinated central unit, on a national level, thereby eliminating duplication, increasing efficiency, and reducing costs. It will be located in the Institute of Hygiene. Major functions include: (1) the provision of diagnostic services in the fields of bacteriology, serology,



Director of Public Health Laboratory, Port-au-Prince, Haiti, discusses new techniques in enteric bacteriology with PASB medical adviser

parasitology, pathology, entomology, virology, mycology, and chemistry; (2) health maintenance services, including bacteriological and chemical examination of water, milk, and other foods, and potency tests on vaccines; (3) investigations in collaboration with other dependencies of the Ministry of Health; and (4) training and educational facilities and activities.

In the Caribbean islands work continued during the year in the improvement of public health laboratory work in serology as part of the yaws eradication and syphilis control program (AMRO-47). Grenada, St. Kitts, and St. Vincent, and the two islands comprising the Presidency of St. Kitts-Nevis and Anguilla have completed their serologic studies for the first part of the yaws eradication and VD control program in 1957. A total of 13,644 VDRL tests (qualitative and quantitative) were run for serologic studies during the program. In each of the islands in which mass treatment for yaws has been carried out or is contemplated, PASB/WHO has been providing advisory and consultant services to the public health laboratories, including in-service-training of technicians. The Caribbean Medical Center in Trinidad will serve in the future as a reference VDRL laboratory for the laboratories of the British West Indies.

The Government of Surinam has for several years been interested in centralizing and strengthening public health laboratory services. In 1956, following the request of the government, PASB/WHO provided a laboratory consultant to review the existing facilities and resources, to study the present and future laboratory requirements of the health services, and to assist in the planning of an integrated centralized service. The Bureau consultant completed his report and recommendations in November and these were submitted to the government at the end of the year. The government plans to act on the recommendations of the consultant early in 1957.

As part of the local health services in Barbados (Barbados-2), plans are going forward for the development of a centrally located public health laboratory. Operation is expected to begin in 1957.

In Panama the central laboratory has been reorganized and its functions enlarged (Panama-1). The number of examinations has doubled over 1955, providing services for the anti-tuberculosis campaign, and for the various activities of the national health centers.

During 1956 the Bureau continued its cooperation with the Venezuelan Government in strengthening the venereal disease laboratories (Venezuela-52). The Organization has provided the services of a consultant, and furnished equipment and supplies for the central training laboratory. Plans were completed to begin the evaluation of some 59 provincial laboratories in the country. This was done in order to promote the standardization of all serological laboratories in Venezuela.

The project, AMRO-45, functioned during the year by providing technical advice for the improvement of public health laboratory facilities through short-term consultant services. This project was originally planned to assist national services in the establishment of reliable and disease-free animal colonies. Many of the colonies are not properly housed, reproduction rates are low, and diseases often kill off the animals faster than they can be replaced.

Arriving in Zone II in August of 1956, a consultant engaged in developing a model mouse colony at the public health virus laboratory in Mexico City and in training the personnel of the breeding colonies at the laboratories of the Institute of Tropical Diseases, Institute of Hygiene and the Animal Research Laboratory at Palo Alto. A series of conferences and lectures was given in addition to a four-week training course which was conducted at the Veterinary School of the University of Mexico.

As countries develop their disease eradication and control programs, efficient laboratory services become all the more essential.

Public Health Dentistry

Efforts toward the development of an international dental health program in the Americas continued during 1956. In September the Bureau's dental consultant completed an over-all survey of dental public health activities, dental practice, and dental education in the Hemisphere (AMRO-72). Beginning in October 1955, he visited all the countries in the Region as well as the islands of Trinidad, Barbados, and Jamaica.

The objective of this survey was to gain some insight into the dental problems of the Region and the current approach used by member countries toward their solution. An attempt was also made to determine in which activities international cooperation might be indicated in the field of public health dentistry.

Although different stages of development of dentistry can be found in various countries of the Region, there are no basic differences in the nature of the dental problems or in the indicated approaches to their solution. Uniformly a situation is found where dental defects occur at a rate that far exceeds the capacity of the dental profession to repair them. Data from surveys among school children from several countries have shown that even when the number of dentists in private practice is above average, the amount of dental care received by children is very small. The manpower available for school dental services is limited and in most situations only token amounts of work can be done.

Current Types of Dental Services

The most important types of dental services in Latin America fall under three main categories, all differing in scope, source of funds, and clientele: (1) services under the national health departments; (2) school dental services; and (3) "social security type" of health services.

Services under the national health departments are the only ones in existence in some countries. They usually consist of emergency services for poor people and extractions and fillings for children and expectant mothers. Fillings usually represent a very small percentage of the total work. The services are commonly rendered in health units, in fewer cases in hospitals and special dental clinics, and exceptionally in mobile units and the dentist's private office.

The school dental services in the large cities are often under the Ministry of Education (Bogota, Buenos Aires, Havana, Mexico, Montevideo, Rio de Janeiro, São Paulo). In the majority of cases, however, they come under the national health department, when the services are provided either by dentists specially assigned to the school health service or by dentists who work in health units and devote only part of their time to school children.

The dental services usually consist mostly of extractions. Only rarely do the fillings outnumber the extractions. A few of the large cities provide, to a very limited extent, complete dental care (including root canal treatments, prosthetic and orthodontic services). Specific caries preventive measures, like topical application of fluorides, are used in few services and only to a negligible extent. Dental health education is used to some extent in the larger services.

The dental health services in the "social security" organizations, although of recent origin, have developed considerably and, in many countries, are larger than dental services in the national health departments. The dentists usually work longer hours and both facilities and salaries are better. The scope of the services rendered varies from "emergency services only" to "complete dental care", with several intermediate situations.

The clientele is usually composed of one or more of the following groups: workers; employees; and civil servants. Usually the members of the family are also entitled to dental care. When the scope of dental services is wide a limitation is usually established on the types of services rendered to the members of the family.

The dental services provided by "social security" are growing and show indications of becoming an important source of dental care in the future. In one country (Chile) the health services of "social security" and the "national health department" are now combined.

Position of Dentistry in the Health Structure

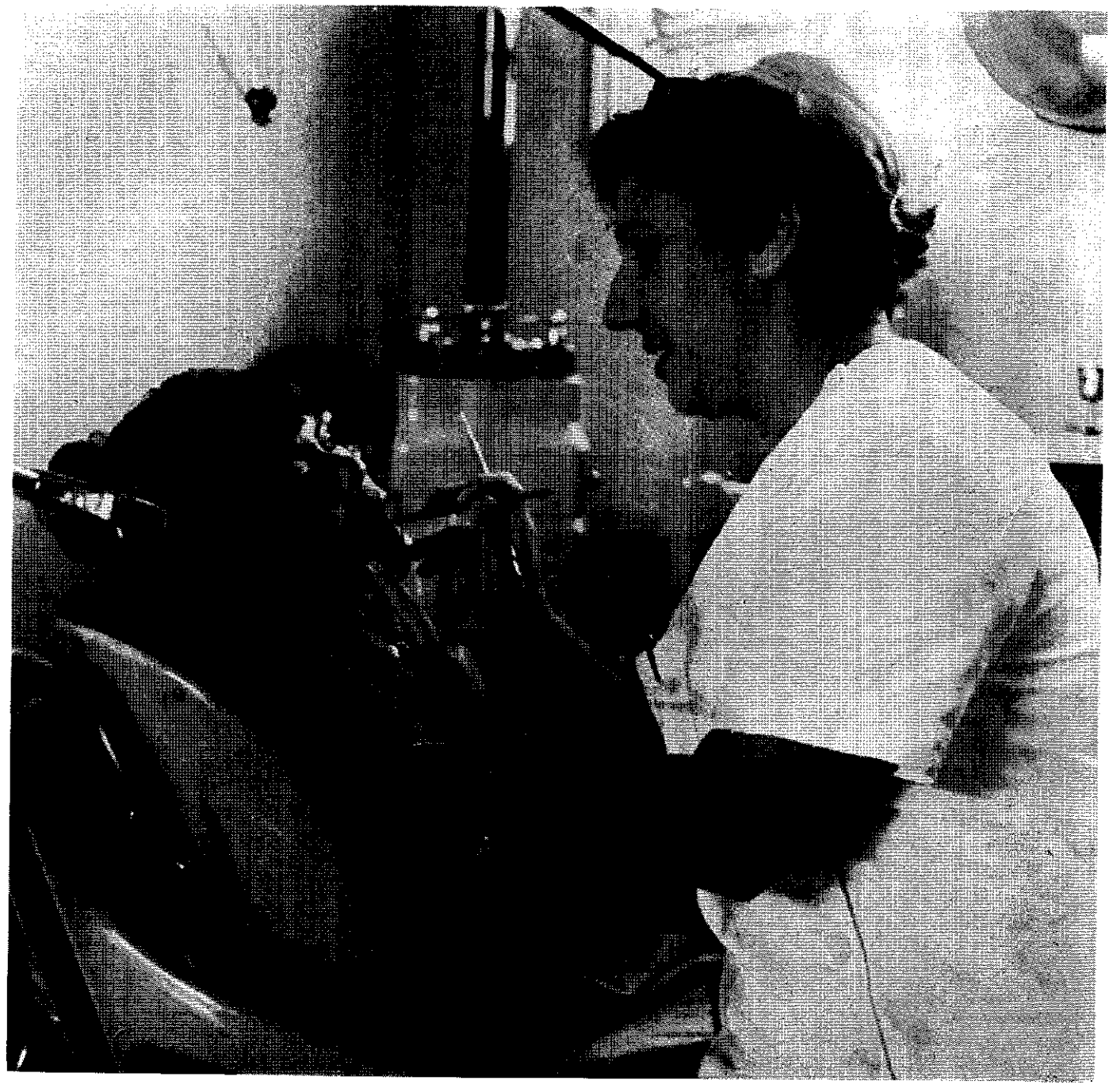
There is a great variation in the status of dental services in the countries, due more to distinctive stages of an evolutionary process than to differences of opinion. In a few countries the services are in a very rudimentary stage and consist of a few dentists working for a few hours in their own offices or in health units, without any dentists in an administrative capacity. In others, the services are a little more developed and there is already a low ranking administrative unit or a dental adviser at the headquarters level. In still others, there is already a high ranking administrative unit with division or equivalent status. In some of the larger countries (Argentina, Brazil, Colombia) there are many intermediate level political units (provinces, states, or departments) with relatively well-developed dental services, independent of the national health department.

Personnel

An efficient dental service calls for the participation of three types of personnel: the dental administrator; the dental clinician; and the dental auxiliary. In general, it can be said that there will be a need for more and better dental administrators in the Americas in the near future. It is hoped that public health training for dentists will be developed in one of the Latin American schools of public health to serve the needs of the Region.

The number of dentists working for health departments is usually very small in relation to the needs. Furthermore, as a result of lack of emphasis on preventive dentistry in the dental schools, the knowledge of the dental clinician about preventive techniques is usually very limited.

Dental care is one of the services given by the Health Unit of La Chorrera, Panama



Better orientation in dental public health and continuous improvement in clinical instruction in the dental schools are necessary for improved dental programs. These can also be strengthened through the promotion of wider and more efficient utilization of auxiliary personnel.

Preventive Measures

Only a few demonstration projects of water fluoridation are in operation in the Region (Table 12). Water fluoridation is the best preventive measure now in our hands. It can reduce by about 60 per cent the incidence of dental caries in persons using fluoridated water from birth. Its utilization calls for good standards in public waterworks and firm support from public administration and public opinion. Water fluoridation may be a premature health development for many Latin American communities; however, it should be strongly recommended when a community is ready for it. Teaching of fluoridation techniques to sanitary engineers and waterwork operators is desirable.

TABLE 12. WATER FLUORIDATION PROJECTS IN LATIN AMERICAN COUNTRIES

Country	City	Date Started	Population
Brazil	Baixo Guandu	Oct. 1953	5,000
Chile	Curico	Sept. 1953	27,000
Colombia	Girardot	May 1953	40,000
El Salvador	Santa Ana	Jan. 1956	97,000
Panama	Balboa and Panama	—	250,000
Venezuela*	Guanare	May 1952	3,500

* Venezuela has also one installation for removal of excessive fluorides in Lagunillas.

Topical application of fluorides, which ranks second only to water fluoridation in its caries-reducing potential (40 per cent) and applicability in public health, is practically not used in Latin America. Its usefulness lies in the fact that the applications can be made by auxiliary personnel. There is much misinformation concerning this method, especially its cost. By using auxiliaries it is economically sound. The development of a special type of auxiliary personnel, below the level of the dental hygienist in the United States, but above that of the Latin American dental assistant, should be a step forward in promoting the utilization of the topical applications as a public health measure.

Dental Education

There are 69 dental schools in the Region, with courses which vary from three to six years (Table 13). In most of the countries the course is of five years duration.

In the economically more developed countries of the Region evolution of dental education from a system of apprenticeship to a fully-developed professional course with university status took half a century or more. From the status of a simple craft, several evolutionary stages were passed through, in which clinical instruction, basic dental techniques, dental specialties, and basic medical sciences were progressively emphasized in the dental curriculum. Gradual increase in curriculum content was accompanied by lengthening of the dental course as new subjects were introduced.

Some countries in which formal dental education started just recently have established, from the beginning, curricula used in schools in more advanced evolutionary stages. The problem of teaching staff for certain subjects (dental specialties and basic sciences) has remained essentially unsolved and the teaching of these subjects is usually deficient.

It frequently happens in places where sophisticated systems of dental education are introduced, without preceding evolutionary development, that the dentists turned out by the school are not of the type needed by the country in general. They are usually few in number and tend to remain clustered in the big cities, drawing their patients mostly from the upper-income segment of the population. Suggestions for shorter dental courses would be resented by dental educators in these countries. They have usually taken their own courses in well-developed schools in foreign countries and feel that it would be a setback to professional prestige if a shorter curriculum were offered in the dental school.

The length of the dental course seems to influence, to a certain extent, the dental manpower in the country. Guatemala has the longest dental course in the Region (six years) and one of the smallest dentist-population ratios (1/23,677). Brazil has one of the largest ratios (1/2,782) and also the shortest dental course (three years).

Illegal Practice

Almost without exception, organized dentistry in Latin America rates illegal practice its number one problem. Illegal practitioners usually come from two different sources. In urban areas, they usually start as dental technicians or assistants; in rural areas, they are true native practitioners who have been learning procedures from other practitioners for generations. The problem seems to be more serious in countries where the level of living is lower and the population per dentist is larger.

At one time or another, governments have licensed unqualified practitioners; some governments continue to do so.

The problem of the illegal practice of dentistry has deep economic roots. Usually unqualified practitioners, using

cheaper materials and more primitive and less time-consuming techniques, offer services of the same general type for about half the price charged by the graduate dentist; in some places, where they outnumber the qualified dentists, they may lower the standards of dental work in general. To face competition the dentist has to change his more precise and elaborate technical procedures and adopt the shortcuts used by the unqualified practitioner. This situation is found in places where there are no dental schools and where the dentists are graduates of foreign schools where highly precise techniques are taught.

Social Security

In recent years the health services provided by social security and welfare programs have developed considerably and today represent an important source of health care.

In some countries the dental services have progressively enlarged in scope and now certain types of tooth replacement services (full-dentures) are provided free or for a small charge. In these countries the social security program

TABLE 13. NUMBER AND DISTRIBUTION OF DENTAL SCHOOLS IN LATIN AMERICA

Country	Number of Dental Schools	Total Number of Years of Previous Education	Number of Years in Dental School	Average Number of Graduates in Recent Years
Argentina	3	12	5	520
Bolivia	3	12	5	30
Brazil	30	12	3*	—
Chile	3	12	5	—
Colombia	4	11	5	80
Costa Rica	1	12	5	10
Cuba	1	13	5	60
Dominican Republic	1	12	5	—
Ecuador	3	12	5	30
El Salvador	1	11	5	4
Guatemala	1	11	6	6
Haiti	1	13	4	10
Honduras	1	11	5	—
Mexico	9	12	5**	—
Nicaragua	1	11	5	—
Panama	0	—	—	—
Paraguay	1	12	5	—
Peru	1	11	4	90
Uruguay	1	12	5	43
Venezuela	3	11	5	65

* Six schools now have "four-year curriculum".
** Some schools still have a "four-year curriculum".

is drawing patients from the same segment of population which receives services from the private practitioner and is offering a type of service which is the source of a substantial amount of the dentist's income. To compensate for the decreased demand for his services the dentists try to secure part-time employment in government services.

The impact produced on dental practice by social security and welfare programs is felt much less than in medical practice. The volume of work to be done and the small part of it that can be offered by such programs still leave a great amount of work for the private practitioner. But organized dentistry is now trying to resist any further loss of patients from the adult middle-class group. No opposition is usually felt against free or low-cost services for children and low-income groups.

The problem of public health as a competitor to private practice is brought to light whenever government services are offered to groups who are actual or potential patients of private dentists. The trend in Latin America indicates that "social security type" of dental services will continue to grow, expanding in scope and being extended to larger segments of population. A better orientation in dental public health in the dental schools seems to be necessary to eliminate, in the long run, many of the problems which arise in the relationship of public health to private dental practice.

Dental Research

Pilot research projects in school health services in Brazil and the United States have shown that one full-time dentist can take care of the incremental needs of 600 to 1,500 children per year, depending on caries incidence rates and such factors as equipment and auxiliary personnel. All the factors which increase the dentist's work output should be utilized to the greatest possible extent, as a way of stretching the present limited amount of dental manpower. Although the day when dental manpower will meet dental needs is far off in the future, efficiency of dental services could be considerably increased if precepts now well-established about dental productivity were put into practice.

The limitations in the applicability of water fluoridation in insufficiently developed countries make desirable the search for other methods of supplementation of fluorides in the diet.

Cooperation with Other Agencies

Since 1942 the Kellogg Foundation has been assisting dental schools in Latin America through a fellowship program, complemented in some cases with emphasis on teaching equipment. The Foundation is assisting the Bureau in the first two years of the activities of the dental consultant; this period will terminate in June 1957. The

International Cooperation Administration of the United States also aids several of the countries in the Region, through the "Servicios Cooperativos", in the development of dental health services, training of personnel, and utilization of preventive measures against dental caries. The Bureau maintains close relationships with both these agencies, thus avoiding overlapping and increasing the efficacy of international assistance in this field.

Plans for the Future

Considering the interest manifested by several member countries, the importance of oral health and the continually expanding activities in the field of health promotion, the Bureau is planning to focus the attention of its dental program initially on the following major areas:

a) Training of dental professional and auxiliary personnel to work at different levels of health services;

b) Teaching of preventive dentistry and public health in dental schools;

c) Assistance to national health departments in strengthening their dental programs.

Four fellows (from Guatemala, Mexico, Paraguay, and Venezuela) are now studying in the United States under PASB auspices in this field.

Other Activities

Health Education

Health Education has been classified by the WHO Expert Committee on public health administration as one of the five "basic services" regardless of the situation of any national or local health units. (The others are maternal and child health, environmental sanitation, communicable disease control, and medical care.) While health education is important in every aspect of public health services, it is essential for the success of certain activities. One of the most obvious is in the field of nutrition wherein certain population groups, because of traditions, cultural differences, and other reasons refuse to accept a change to an improved diet.

Now that eradication programs of major importance with tremendous financial implications have been embarked upon, there comes into sharper focus the role of the health educator and health education in these programs. There can only be acceptance of the fact that where an operation has to be total and complete, as in house-spraying with residual insecticides for malaria eradication, proper understanding of the service by operator and recipient alike is a compelling need.

It is an accepted principle in public health that an essential feature of any service, be it a physician examining a patient, a nurse giving home care, an engineer supervising the boring of a well, the sanitarian setting up a latrine, the auxiliary nurse drawing blood for serological testing, or the inspector spraying a house, each service must carry with it an element of health education of the recipient of the service. In this light the difference between health education and the health educator becomes readily apparent. In the several services described above the educator role was played by different types of personnel. It follows that the greatest contribution of the professional health educator is to advise and guide the other health workers in order to promote an understanding of the principles and techniques of his discipline for application in their work.

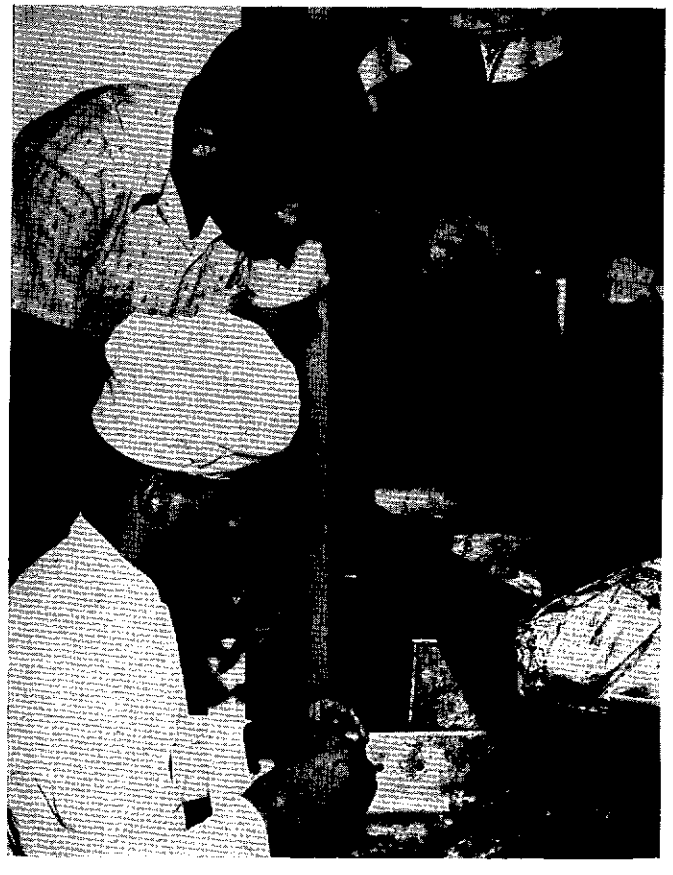
Another important principle is that work in a country in a particular field must be carried out through the appropriate established government agency. The creation of special conditions and preferential treatment for an activity will often create a barrier to smooth absorption into regular services and proper continuity of effort.

As in any other specialty, PASB/WHO has a responsibility to provide expert consultation to Member Governments in the field of health education. The way in which this can best be done depends on several factors, among which are the financial and personnel resources, the need in the countries, and the activities of other agencies in the same field.

It is quite evident that the provision by the Bureau of professional health educators to individual countries is beyond present means. Cooperation with other agencies, therefore, plays a prominent part in this activity. Whereas the Bureau is presently providing health education advice in the Central American countries and Mexico, the health educator stationed in Mexico as Zone adviser is the regional adviser in health education for the Bureau. Since the Bureau has no health education advisers in South America the ICA has agreed to make the services of its health education personnel available to the Bureau.

The developments in health education reflect the achievement of closer collaboration with ICA in this and other fields. It is felt that the staff of either agency can and should be used by the other in giving service to the several countries. Examples of such mutual arrangements are the services being rendered by the Zone II health educator to the ICA in Mexico and the placing of the ICA health educator in Uruguay at the disposal of the PASB/WHO consultants to the project, Uruguay-5, Rural Health Services.

Sanitation inspector discusses refrigeration of meat with a food handler, Ciudad Trujillo



Food and Drug Services

The PASO as the specialized health agency of the OAS discussed this topic at the 28th Meeting of its Executive Committee, and on June 11, 1956 adopted a resolution approving the objectives of the Pan American Medical Confederation, and requesting the Director of the PASB to consult PAU, WHO, and, as appropriate, the International Union for the Protection of Industrial Property, to determine the most suitable procedures for obtaining uniformity in national legislation on registration of drugs.

Since then this matter has been under study in the Washington Office, and various types of international activities have been considered. The proposals have been discussed with food and drug service authorities in the U.S.A. and Canada, and full documentation on the subject has been sent to WHO Geneva for study and comment.

For more than a decade the PASO has been considering ways and means of improving food, drug, and cosmetics controls in the Americas. The XII Pan American Sanitary Conference, held in January 1947, devoted a number of sessions to this topic and adopted 12 recommendations, the most significant of which reads:

> That the Pan American Sanitary Bureau create and establish a Committee on Drugs and Foods, composed of representatives of each of the American countries, and a Central Office, the primary function of such a committee being to study problems arising from the exportation, importation, manufacture, and supply of drugs, food and cosmetics.

In October 1955, the IV General Assembly of the Pan American Medical Confederation also discussed this topic but limited its consideration to the problem of inter-American regulations on registration of drugs. The Confederation adopted a motion which among other things directed its Executive Committee to approach the Organization of American States for the purpose of calling an inter-American convention to formulate a code that will fulfill the objective of uniformity of national legislation dealing with drug registration.

Mental Health

In addition to the two principal obstacles to be overcome in developing mental health programs in the Americas—the shortage of trained personnel and the gross lack of understanding of the basic causes of mental illness—there is a third problem—the almost complete absence of information with regard to the extent and seriousness of the problem.

A mental health consultant visited the Washington Office in June 1956, at the end of his assignment as PASB special consultant to the U.S. Public Health Service in mental retardation (United States-8). He reported on the results of his tour of duty in the U.S.A. where he visited

several schools of medicine, public health departments, hospital and rehabilitation centers, as well as the federal and state services concerned with mental retardation. He drew an interesting comparison between the development of the services in both the United States and the United Kingdom, while acknowledging the active interest in this problem at the federal and state levels in the United States, and the excellent work being presently carried out in some of the university centers. Nonetheless, he was struck by the fact that in the United States the program on the whole is still essentially centered around very large state training centers which continue to harbor a relatively great proportion of high grade mentally subnormal children. In the United Kingdom the program is at present developing in a community-centered program with reduction as far as possible of the use of institutional care for the mentally subnormal. It was his view that this was due to the differences in demography, social structure, and culture in the two countries. The community-centered program had been much easier to develop in the United Kingdom, a smaller country with a long tradition and uniformity of culture, and with a settled social structure. In the U.S.A., on the other hand, the development of a community-centered program is much more difficult in a country where distances are often enormous, and with a population that is essentially mobile and has great disparities in culture and social structure area-wise. Referring to the preventive aspects of the program, the consultant expressed the opinion that knowledge of the mechanisms of organic defects that result in mental deficiency was accumulating rapidly, thus making the prospects for preventive action much more hopeful than one or two decades ago. Opportunity for preventive action would obviously be very important for program planning in economically less-developed areas with restricted financial and personnel resources.

Other activities in mental health during the year included a survey by a Bureau consultant on alcoholism (Chile-15). An important part of this project has been the steps taken so far for the training of clinical personnel for alcoholic rehabilitation centers.

EDUCATIONAL AND PUBLICATION ACTIVITIES

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Medical Education

Necessity for adequate preparation of personnel at all levels of health work, as a prerequisite for sound services, is universally recognized, and the Bureau's efforts in this field have therefore continued to expand. Education and training were basic components of most projects throughout various specific fields of Bureau activity. Of fundamental importance, however, is basic and graduate training of physicians, nurses, sanitary engineers, veterinarians, and other health personnel, to which the Bureau dedicates preferential attention.

A major focus of the Bureau's educational program lies in promoting group activities involving the whole Region or several countries. Particular examples of this in 1956, described at greater length below, were the completion of two planned seminars on teaching of preventive medicine in medical schools and further progress in the survey of pediatric education. In addition, there have continued to be efforts in assisting individual schools through technical advice, consultations, and fellowships.

In the first part of this chapter will be found in some detail the Bureau's activities concerning medical, nursing, and public health education and training, and fellowships. The other part will deal with informative material published by the Bureau, exhibits and other visual aids, and public information activities.

To the Bureau's current activities in the educational field, there needs now to be added dental education and preventive dentistry. A survey highlighting the educational trends in this field is presented earlier in this Report in the section on dental public health under public health administration and presages direct effort with dental education institutions in the future.

Inter-Country Seminars

Increased recognition of the role played by the individual physician in health promotion, as well as disease prevention, and greater attention to the sociological implications of medical practice were among the important trends motivating the seminars on the teaching of preventive medicine. Held in two parts, each to accommodate about half the schools, the seminars reached every area of Latin America.

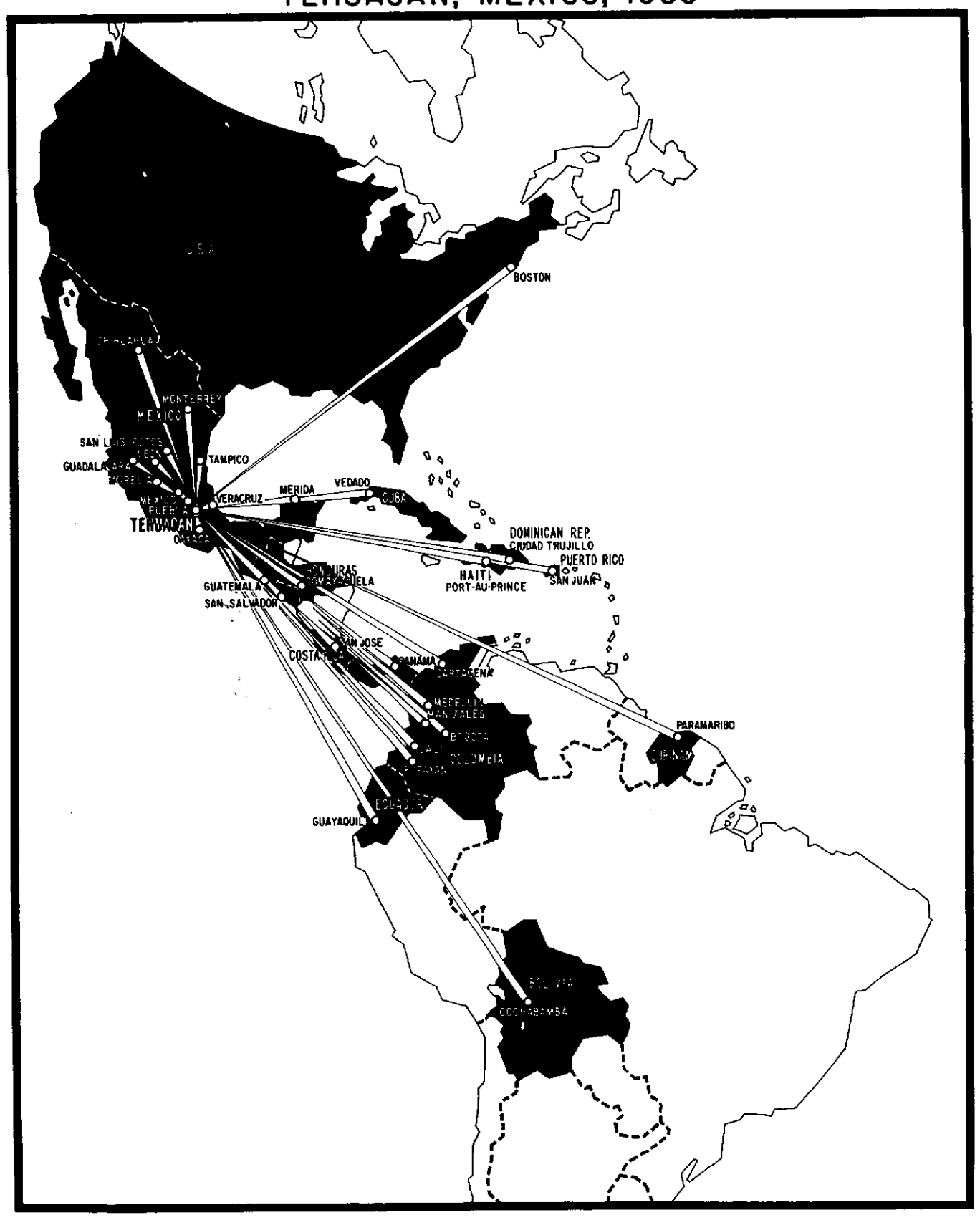
The general purpose of both seminars was, through interchange of experiences, ideas and plans, to strengthen the teaching of prevention throughout the medical curriculum in medical schools.

Specific objectives were to provide for an exchange of ideas as to content and methods of teaching of preventive medicine; organization of the department of preventive medicine and its relationship with other departments of the medical school; and the way the department of preventive medicine and community health resources may be of service to each other.

During preparations for the seminar in 1956 (AMRO-49.2) for the more northerly group of schools it was encouraging to continue to receive follow-up reports of direct and positive accomplishments on the seminar (AMRO-49.1) which took place in Viña del Mar, Chile in 1955 for the southern group. It was evident from these reports that medical teaching throughout Latin America had been influenced by that seminar to a far greater extent than was expected. Changes reported varied from major reorganization of the whole curriculum to modern orientation of the specific teaching program in preventive medicine.

The 1956 seminar was held at Tehuacán, Puebla, Mexico, April 23-28. Participants included representatives from schools in Colombia, Costa Rica, Cuba, the Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Mexico, Nicaragua, Panama, Bolivia, Puerto Rico, and Surinam. In addition to medical schools in this region, two representatives came from Costa Rica where establishment of a school is being planned. There was also representation from the Rockefeller Foundation and the Institute of Inter-American Affairs in Mexico, El Salvador, Co-

PARTICIPATION IN THE SEMINAR ON PREVENTIVE MEDICINE TEHUACAN, MEXICO, 1956



lombia, and Washington, as well as the regional consultants group in Lima. A representative of Harvard University attended at the request of the University, which is starting a special program for the training of professors of preventive medicine. In all, there were 22 deans and 41 professors (representing 90 per cent of Latin American Schools), and 13 representatives of foundations and other organizations.

The site of the seminar proved to be nearly ideal. Pleasant and commodious physical arrangements contributed to stimulate active participation of the entire group. Again there was clear evidence of the value of a technique which dispensed with formal presentations and yet was prepared and guided so that all could both contribute and learn. For the most part, the program followed the outline of that in Viña del Mar with one important revision. Instead of holding the plenary on the same topic the next day, as was done in Viña, necessitating all night work by the drafting group of the editorial committee, the seminar proceeded to group work on the next major topic. Thus a day's interval was provided to allow the drafting group, with more leisure, to collect the group reports and prepare a draft joint report, which, after critical review and modification by the editorial committee, was presented to the groups and later the plenary on the following day.

General conclusions of this seminar were not very different from those of that in Chile. Both seminars had decided opinions about the necessity for not admitting more students than could be handled by available teaching facilities, emphasizing need for expanding these facilities when the country needed more physicians. Among other conclusions were: emphasis should be put on using the family unit, as a focal point for teaching by having the student act as observer and medical adviser for a limited number of families in the community; teaching of preventive medicine should be considered as a plan of studies, not just as a course; there should be a separate department of preventive medicine responsible for its own teaching and for coordinating the preventive aspects of teaching in other departments; the professor of this subject should have a solid foundation and experience in public health as well as clinical medicine; there should be close relations between the department of preventive medicine and other departments of the medical school for the full training of the physician; to develop in the students the concept of the relationship between the individual and his environment, the community constitutes a vital laboratory of the department of preventive medicine; and time spent by students in rural work at the end of their academic training may be made a useful educational experience, as well as providing good service to the community, when the medical school shares in the responsibility for management of this program.

Completion of the later of the pair of seminars was a significant landmark and aroused the same kind of interest and attention as the one at Viña del Mar. The enthusiasm engendered at the Tehuacan seminar when added to that at the earlier one indicated the great resources of leadership in the medical schools of Latin America, as well as the importance of the meeting technique which permitted very general participation.

Stimulated at least in part by the Viña del Mar seminar both as to subject and technique, the Brazilian Medical Association, with support from the Rockefeller Foundation, held a national seminar on medical education immediately prior to its annual meeting in October 1956. From 110 to 120 persons, including representation from every school in the country, health departments, medical societies, and national organizations related to medical education attended. A representative of the Bureau was present and assisted in the management of the seminar. This meeting followed closely the techniques used at the inter-country seminar in Chile. The participants enthusiastically answered questions posed and returned to their schools with a renewed zest for needed changes.

Pediatric Education

A survey of pediatric education in the Latin American countries (AMRO-68) was initiated in 1955 in close collaboration with the International Pediatric Association and the American Academy of Pediatrics. A consultant surveyed the situation in some leading medical schools, and a questionnaire was sent to all schools. On the basis of the Organization consultant's narrative report and of the statistical analysis derived from questionnaires completed by 52 of the 78 Latin American medical schools, a preliminary report was prepared.

Some highlights of the data in the preliminary report are:

a. The number of the students in the year in which pediatrics is taught varies tremendously, from a high of 720 students to a low of eight. In the former the class is too large for an adequate standard of pediatrics to be taught, while in the latter it is so small that it is difficult to obtain the necessary resources to teach pediatrics at an acceptable level.

b. The total hours of pediatric teaching varied from over 400 to fewer than 80, with a median of 252 hours. In considering the low number of hours devoted to pediatrics it is important to remember that pediatric care occupies at least one-third of the time of the general practitioner. In general the schools having the lowest number of hours of pediatric teaching are the ones that devote the fewest hours to practical individual instruction in the hospital or outpatient department. Although there is no lack of clinical material for teaching, 11 of the schools reported no practical pediatric experience for students in hospitals and 18 reported no pediatric outpatient experience.

c. Teaching time per student: Totalling all the hours devoted to pediatric teaching by all faculty members and dividing these by the number of students in the class, it was found that hours of instruction per student varied from more than 250 to fewer than five. Only one school had full-time teaching personnel in pediatrics. Only five schools used health services in instruction.

A report on preliminary results of the survey was made at the 8th International Congress on Pediatrics, held in Copenhagen, Denmark, July 22-27, 1956, at which PASB/WHO was represented by the Chief of the Division of Education and Training, who was also a member of the secretariat for a WHO Study Group on Pediatric Education, which met in Stockholm, Sweden immediately following the congress, July 30–August 4, 1956. The group, with representation from all regions of the world, reviewed both undergraduate and postgraduate pediatric education.

At the 3rd Central American Pediatric Congress, the stimulus provided by the PASB/WHO Survey of Pediatric Education (AMRO-68) led to inclusion of a round table for discussion of pediatric education. The Organization was asked to plan and manage this round table which offered an opportunity to bring the results to a key group. Invited to the round table were the professors of pediatrics in the five Central American countries and Panama, and visiting professors from Mexico and Switzerland.

The plan devised was a combination of the seminar technique and the preparation done for the WHO Study Group on Pediatric Education in Stockholm in August. Questions prepared for this meeting were added to and made more specific and were distributed to all participants well before the meeting. The Organization's consultant in the AMRO-68 survey acted as consultant (AMRO-18) for this meeting and reported a most successful round table. The report has been received and is being prepared for early publication.

Medical Education Information Center

In 1952 it was decided to establish at the Bureau a Medical Education Information Center (MEIC), with the objective of bringing together information on what governmental and nongovernmental agencies and foundations are doing in the development of medical education and fellowship programs in Latin America.

At the January 1956 meeting of MEIC at the Bureau in Washington, an annotated bibliography on examination methods was distributed to the cooperating agencies.

For the first time since MEIC was established and because of increasing need for closer contact a second meeting was held in September 1956. Plans to carry out a survey of the teaching of basic sciences in Latin American medical schools were discussed at this meeting, in addition to the regular review of activities by countries of the participating agencies. For better utilization of the cumulative information on fellowships, the group asked for a yearly analysis of fellowships by countries, field of interest, and categories.

The quarterly report of MEIC consists of a tabulation of fellowships begun during the quarter.

Specific Aid to Schools

Toward the end of the year the first items of the list of supplies ordered for the University of Chile through a special allocation under the United Nations Technical Assistance program began to arrive. This order, first of its kind, had been a long time in negotiation due to problems of correlating desired specifications with the limited variety of supplies available.

In other instances collaboration with specific schools consisted of assistance in acquisition of teaching aids and advice on certain teaching programs.

Assistance was again given to the establishment of a school of medicine in Costa Rica through a study by the Director of the Division of Education and Training at WHO Headquarters in Geneva, who spent about four weeks in analyzing the pertinent resources in that country and the advisability and feasibility of founding a medical school. His observations are contained in a report in which the geographical, cultural, and economic characteristics of the country and of the health situation and health services are discussed. The establishment of a medical school is considered in the light of its financial implications and of the country's need for doctors. The report contains a most thoughtful discussion of the aims of modern undergraduate medical education, its program, curriculum, and teaching methods.

A study of the School of Medicine in Haiti was undertaken in January 1956 by the Chief of the Section of Aid to Educational Institutions, WHO, Geneva, who spent two weeks in Port-au-Prince. In his report, the consultant emphasized development of key teaching personnel and reconstruction of teaching facilities. An orderly series of steps was proposed to build up a nucleus of full-time persons in the basic sciences and to remodel essential buildings.

Following study of this report the Dean asked help for its implementation from a number of sources. To exercise its function to promote coordination, the Organization assisted the Dean in arranging for a meeting of representatives of various agencies, at Port-au-Prince, October 16-18, 1956, to discuss problems connected with the teaching at the school. The Faculty of Medicine of the University of Haiti was represented by the Dean and the Chairman of the Faculty's Committee on Medical Education. The Bureau was represented by the Chiefs of the Division of Education and Training and the Professional Education Branch and by the Zone II Representative. Other agencies participating were the USPHS, ICA, and the Rockefeller Foundation.

Discussion followed the outline of the report on the January 1956 study. Topics discussed dealt with curriculum, the library situation, adaptation of present building facilities for teaching of basic and preclinical sciences, necessity for competent, adequately prepared staff with a nucleus of full-time teaching personnel, importance of developing the Department of Preventive Medicine, improving the out-patient department of the hospital and the health centers, integration and coordination between teaching blocks, necessity for drawing up a series of regulations and procedures for the faculty which will help to develop administrative responsibility of department heads, urgency of an increase in the budget, and the necessity for improvement in the hospital and out-patient services.

A tentative plan of cooperation, following the suggestions in chapter VII of the report, included adoption by the government of a specific program and commitment necessary for increased budgetary appropriation, a systematic plan for fellowship training with special emphasis on the basic sciences, and for visiting professorships (the first in the field of physiology) to assist in organization of departments and planning of teaching programs. First steps would include: (1) immediate reconstruction of the physiology laboratory as described below; (2) provision for a full-time professor in physiology and search for candidates for fellowships; (3) provision for a new library installation; and (4) necessary commitment from the Ministry of Health for long-range development of this program. The latter would assure the various agencies that full-time personnel and adequate budgets will be available for continued development of the school. With these evidences of a definite program, outside help from the cooperating agencies as outlined by each one would be forthcoming.

Just prior to the meeting the Chief of the Professional Education Branch studied in detail the teaching laboratories for physiology-pharmacology and for chemistry-biochemistry in the medical school and suggested plans for reconstruction along efficient modern but inexpensive lines. Related to these changes are suggested significant modifications of the curriculum. Physiology, biochemistry, and general chemistry, each of which had extended over two years, can be concentrated in one year with greater efficiency in use of space and teaching time. The professors agreed that this could be achieved provided teaching methods are changed and that more textbooks are made available to students. In addition to the sketches of the new teaching laboratories recommended, a detailed description of installations, and lists of equipment and supplies considered necessary for their operation were prepared.

The Chief of the Laboratory of Pathology and Histochemistry of the National Institutes of Health of the U.S. Public Health Service lectured in several countries of South America. In Argentina, he gave a planned series of lectures on his subject as an essential part of a postgraduate course on cancer.

Distribution of Key Materials

The Bureau, as formerly, was actively promoting distribution of key teaching materials in the field of medical education to schools of Latin America. WHO publications, WHO Expert Committee Reports, Spanish, French, and Portuguese translations of the 1955 revision of the "Control of Communicable Diseases in Man", bibliographies, and special studies of educational procedures were included in the literature sent.

The *Boletín* of the Pan American Sanitary Bureau continues to include each month the section on education, which constitutes a major source of new material and information of interest in that field.

Public Health Schools

As each year goes by, stability grows in the schools of public health in Latin America accepting international students. The Bureau continues to send large numbers of students in the major fields of public health to the schools in Santiago, Chile; São Paulo, Brazil; and Mexico, D.F., Mexico. Fellowships for students in themselves constitute an important support for the existence of any educational institution. Other forms of assistance have included provision of visiting professors in biostatistics and sanitary engineering, provision of essential teaching supplies in small quantities, and a number of fellowships.

The visiting professor of biostatistics was particularly helpful in advising on the teaching of this subject at the School of Public Health in São Paulo and in improving correlation between the school of public health and the medical school of the university in this important field. As part of the same assignment, he also visited and consulted at the schools in Santiago and Mexico. A working knowledge of biostatistics is an essential in the armamentarium of a professional public health worker and it is satisfying to note the steady progress made in all the schools in the teaching of this subject.

Activities of the visiting professor in sanitary engineering at the University of Chile are described more fully in the section on Education in Environmental Sanitation, but it is to be noted that he helped considerably in strengthening the major courses for physicians and nurses at the institution. Similarly, a junior sanitary engineer on PASB/WHO assignment has worked to strengthen the practical experience in the training center at Araraquara, of the School of Public Health of the University of São Paulo.

Fellowships have been directed particularly at strengthening teaching in essential subjects. For example, the Assistant Director of the School of Public Health of Mexico, who teaches public health administration and maternal and child health, visited several schools of public health in Europe and the United States. A teacher of health education in the same school spent three months in the United States observing teaching techniques and organization of health education programs.

Another part of the fellowship program for faculty members of schools receiving international students has been travel grants to visit the countries from which their students come. During 1956, faculty members of five schools carried out such travel with uniformly interested reception of their reports on return to their own faculties. In addition, two further awards were made at the end of 1956 for travel in early 1957.

The need for strengthening purely national schools of public health in those countries where they exist has been pointed out in previous reports. Progress can be demonstrated in 1956 in Argentina and Brazil. In the former, the School of Public Health of the University of the Litoral, formerly in Santa Fe, has been transferred to Rosario, in closer relation to the school of medicine of the university. The faculty of this school of public health had suffered losses in recent years, but a determined effort has now been started to rebuild. Visits by Bureau personnel have resulted in plans for consultant aid and award of fellowships to strengthen the faculty.

In a field with as many international implications as the teaching of public health, it is inevitable that association among the schools should progress. For some years there has been in existence an Association of Schools of Public Health involving those schools in the United States and Canada. This Association has shown considerable interest in assisting the schools of public health elsewhere in the Americas and has invited attendance at annual meetings. Bureau personnel, particularly those concerned with fellowships, have regularly attended annual meetings.

Environmental Sanitation Training

Fellowships for sanitary engineers to receive training abroad are included in many projects of assistance to integrated health programs as a part of the help in staffing these programs with competent professionals. Additional fellowships are available to sanitary engineers under the project AMRO-1, Environmental Sanitation Training, which also provides fellowships for sanitation officers other than engineers, who occupy key positions in connection with the supervision and training of sanitary inspectors in the member countries. Assistance already furnished to the Schools of Public Health in Santiago, Chile, São Paulo, Brazil, and Mexico City, as well as to the engineering school in Mexico has included consultant services, travel grants for staff members and supplies and equipment.

A professor of Johns Hopkins University in the United States served as a consultant to the School of Public Health of the University of Chile in Santiago from June 1955 to May 1956 during which period progress was made toward further coordination of the work of the school of engineering and the school of public health in training of sanitation personnel. The first course for sanitary engineers at the latter school which began in March 1956 and ended in December was attended by four students on WHO fellowship awards. Eight sanitary inspectors from other countries were also studying at this school in 1956 on WHO fellowships.

Two members of the teaching staff of that school were enabled, by WHO travel grants, to visit, during the first several months of 1956, a number of other countries where they observed sanitary problems faced by former and future students of the courses at Santiago as well as becoming familiar with other training programs for sanitation personnel.

At the School of Public Health in São Paulo, Brazil, three sanitary engineers and six sanitary inspectors from abroad studied in 1956 under fellowships awarded by WHO. The Organization also provided a junior sanitary engineer to collaborate in supervising field training at the field center at Araraquara used by the school.

Teaching supplies and equipment as well as consultation service by the Zone II engineering consultant were provided to the course operated by the School of Sanitary

Field training in plane surveying, part of course given to class of sanitary inspectors, Guatemala

Engineering of the National University in Mexico. Four graduates of this course were awarded travel grants enabling them to make field visits in Texas at the end of their academic training.

A special training course in waterworks operation was carried out in Mexico under the joint sponsorship of the school of sanitary engineering, the school of public health, and WHO which furnished two consultants for three months. The first part of the course lasting four weeks in September 1956 was attended by 26 students, 18 of whom, from Cuba, Haiti, the Dominican Republic, and Mexico, were awarded fellowships by WHO. Seven students were awarded WHO fellowships for an additional one-month advanced training course to prepare them to assume responsibilities for organizing national training courses in subsequent years. This second course was also attended by four students on fellowships awarded by the Secretaría de Recursos Hidráulicos de México.

Assistance in teaching public health and sanitation aspects of housing was given, as in previous years, to the Inter-American Housing Center (CINVA) in Bogota by the assignment of a regular member of the staff to the center for approximately three weeks.

Public Health in Veterinary Medical Education

Diseases transmissible between animal and man (the zoonoses) and food hygiene are two important fields of interest both to public health and agriculture. Among the international organizations the United Nations Food and Agriculture Organization (FAO) is directly concerned with the entire problem of veterinary medical education. In addition to sound basic training in veterinary medicine, the public health veterinarian needs to be thoroughly familiar with public health problems and procedures. Veterinarians undertaking full-time work in a Ministry of Health generally complete the postgraduate studies for the Master's degree in public health.

On the other hand, experience has shown that the public health program at all levels benefits if all veterinarians in their undergraduate studies are taught the basic principles of public health and preventive hygiene. Thus the Organization has been interested in requests from veterinary medical schools for assistance on this important field.

During 1956, the services of a special consultant were provided to two schools in the Region, the Faculty of Veterinary Medicine of the University of Uruguay in Montevideo, and the Faculty of Veterinary Medicine of the University of São Paulo, Brazil. In each case the consultant, himself the dean of a school of veterinary medicine, visited the school to make a thorough study of present teaching facilities and methods. He discussed with the dean and the faculty members the curriculum changes to be made in order that the students receive a proper orientation in the subjects basic to public health and preventive hygiene. His report contained recommendations not only for establishment of departments of public health and hygiene but included additions that should be made in other courses, such as bacteriology, parasitology, and biochemistry, to teach students those phases of pertinent interest to public health.

These reports were well received, as was the report made in 1955 as a result of similar consultation to the School of Veterinary Medicine of the National University of Mexico. A number of requests of the same nature have been received from other countries and it is expected that this type of assistance will help make all graduating veterinarians more conscious of the role they play in the broad public health program.

This effort by WHO in its particular field of interest, will, it is hoped, serve to bolster FAO's program for general strengthening of the veterinary schools.

Nursing Education

Signs of advancement in nursing education were evident in Latin America: requirements for entrance into schools of nursing were made higher; and the curricula of many nursing schools were revised.

Schools in an individual country in Latin America should not necessarily be patterned, for example, after United States schools or those in Canada, but the school program should be designed to prepare nurses for the actual type of nursing activity to be required of them in their own country after graduation. Bedside care, generally speaking, in Latin American countries, is done not by the graduate nurse but by practically untrained personnel. The graduates assume supervisory and teaching positions. A realistic change, therefore, in the curriculum in several countries was the introduction of a course in principles of teaching and supervision.

Another outstanding change in the curriculum is inclusion of adequate practice in actual deliveries in the program of obstetrical nursing to enable graduates to meet emergencies.

Stress is on the preparation of nurses to meet health needs of their own countries. As nursing leaders from many countries brought together in workshops and congresses for discussion of nursing problems learn of changes made in other countries and recognize deficiencies in their own preparation of nurses, an incentive is created for studying their resources and needs and for revising the curriculum of their schools accordingly. An advanced course in nursing education is given in one country of Latin America (Chile) for preparation of nursing administrators and educators.

In programs receiving the support of PASB/WHO in Latin America, the present pattern is preparation of nursing personnel on three distinct levels: university nurses, to be instructors in schools of nursing and administrators; graduate nurses who will be head nurses or supervisors in hospitals and public health nursing services; and nursing auxiliaries to form the large army for direct service. The latter generally have completed only six to 18 months preparation in nursing, for which the educational prerequisite is usually no more than completion of primary schooling (six years). In actual practice the first two groups are merged to form the professional or leadership group in the countries where there are both groups, for the university nurses constitute a small minority made up principally of nurses who have had fellowship study abroad. However, there is a growing trend for a small number of schools, mainly in Brazil, Chile, Colombia, Costa Rica, Ecuador, and Peru, to fulfill the university requirements of their countries. In other countries, although the school may be attached to a university, the teaching is still on the graduate nurse level.

With present limitations in numbers of adequately prepared candidates for any level of nursing instruction, it is important to study the use to which the many auxiliaries trained are being put and to evaluate what modifications may be made in this training procedure. Nursing in the modern sense includes emotional, mental, and spiritual care of the patient in addition to physical care, and implies much health teaching. Whether these concepts can be adequately taught to a girl with limited previous education and in a short course, remains to be investigated.

In the technical discussions at the Ninth World Health Assembly in which the regional adviser in nursing education participated as a member of the Secretariat, certain attributes of nurses were emphasized: that they are integral members of the health team; that they are entitled to the best education that each country can afford; and that nurses need to direct nursing services and to participate in the planning of national health programs. From the Region of the Americas three countries included a nurse in their delegations to the Assembly: Canada; Haiti; and the United States.

Nursing Literature in Spanish

Unending efforts to obtain more adequate nursing literature in Spanish have continued and the Kellogg Foundation has been in the forefront of this activity. In the immediate future dependence will be on translations for which commercial support will be needed. It has been ascertained that publishing houses will undertake this type of venture if they can be assured of a minimum sale. Measures are being studied to provide such assurance as an incentive to this approach.

Help provided in the United States by the Rhode Island Student Nurses Association and the Garfield Memorial Hospital School of Nursing, Washington, D.C., resulted in distribution of needed books to a limited number of schools in Latin America.

Fourth Regional Nursing Congress

During the week of September 9-15, 1956, the Fourth Regional Nursing Congress (AMRO-23.4) took place in Mexico City, under the auspices of PASB/WHO, in cooperation with the Government of Mexico and the Mexican Nurses Association. The International Cooperation Ad-

ministration (United States) also collaborated by sending seven nursing consultants to act as resource personnel during the group discussions.

In all, there were approximately 600 persons who attended the congress, 300 of whom participated in the round-table discussions. Those attending were from Argentina, Brazil, Chile, Colombia, Costa Rica, Cuba, El Salvador, Guatemala, Haiti, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, the United States, Uruguay, Venezuela, French Guiana, Guadeloupe, and Martinique. The International Council of Nurses, the Catholic International Committee of Nurses and Medical Social Workers, and the Rockefeller and Kellogg Foundations sent representatives.

National Nurses Associations in 19 countries in Latin America participated in the planning of the congress, and nurses from all countries of the Americas had a part in selection of the topic for discussion: *Administration in Nursing*.

Officers presiding over a plenary session of the IV Regional Nursing Congress in Mexico, September 1956

Nine papers on various aspects of the theme were prepared, upon request, by nurses, administrators of hospital nursing services, public health nursing services, and schools of nursing, from a wide geographical distribution of American countries. These papers were circulated for study and were discussed by national nurses associations before the congress so that the nurses in attendance might reflect more fully the opinions of their associations. At the congress the subjects rather than the papers themselves were discussed by 15 groups of approximately 20 nurses each. The papers were published in the PASB *Boletín*.

As a result of the group discussions many recommendations were approved by the plenary sessions of the congress. They covered administration of nursing services, both in hospitals and in public health, of schools of nursing, and of courses for nursing auxiliaries. The most important of the recommendations were: (1) that each country make a survey of its nursing resources and needs; (2) that each country create a national department of nursing directed by nurses prepared to carry out policy making, technical and advisory functions, and to collaborate in nursing administration and education; (3) that the opinion of nurses be sought when buildings for health purposes are being constructed in order to ensure appropriate facilities for nursing services; (4) that salary scales for professional nurses and for nursing auxiliaries be set up in accordance with the preparation of each and the functions they are to perform; (5) that nursing services be entrusted to competent graduate nurses who should, if possible, have had graduate preparation in administration; (6) that the basic course in nursing include principles of administration and, where resources allow, that a more advanced course in this subject be set up; (7) that principles of public health be taught in schools of nursing from the very first days or that this teaching be intensified where it already is being undertaken; and (8) that in the education of nursing personnel the following three levels be established:

(a) predominantly practical training for the preparation of personnel to work under the supervision of the nurse;

(b) professional education to prepare personnel as graduate nurses who with limited supervision will be able to cooperate efficiently on health teams and to supervise auxiliary nursing personnel; and

(c) higher professional education to prepare nurses to assume leadership positions in the various fields of nursing.

Congresses such as this one offer priceless opportunity for exchange of experiences between nurses from countries where the profession is in various stages of advancement.

Advanced Nursing Education

Postgraduate study for nurses, both national and from other countries of the Americas, continued in the School of Public Health of Chile (AMRO-28).

Although the theoretical program of the first course under this project ended in December 1955, the first three months of 1956 were utilized to give all students, and especially the foreign nurses, field practice and observation in various fields of nursing, according to their interests and the positions they are to occupy.

For the school year beginning April 2, 1956, there were six WHO fellows (two each from Nicaragua and Peru and one each from Panama and Venezuela). It was planned to broaden the program still further to meet the individual needs of each student, with administration, supervision, and teaching to continue the same but each student having practical experience in the field of nursing for which she was being prepared. Chilean nurses in the course numbered 12, thus making a total of 18 in the second course, ending in December 1956. A special summer program for observation and practical experience was designed for each student to meet her individual needs and interests.

The first year this course was given (1955), students from foreign countries were given a three-month period of clinical experience in hospitals in Santiago before beginning the theoretical part of the course. In 1956,

Student nurses from the Military Hospital in Mexico City attending inaugural ceremony of the IV Regional Nursing Congress, Mexico City, 1956

another method was tried. Students were accepted at the beginning of the school year to start immediately in classes. It was found that the former method was better since it allowed time for the students from other countries to adapt themselves to Chile and to new ways of thinking in nursing before they began classes.

The first phase of the 1956 school year, of 25 weeks, comprised education, administration, and supervision of nursing. The students joined the physicians and sanitary engineers in the courses in public health, administration, in nutrition, and in statistics. The theoretical part of the course in principles and methods of teaching was increased and, as practical application, projects of in-service education were developed. The second phase of the course, lasting two and one-half months, was in communicable diseases, and included both theory and practice.

Nursing Education in Individual Countries

The project on nursing in Costa Rica (Costa Rica-3) concluded its fifth and final year of operation. During the year, the four WHO nursing advisers terminated their assignments at different times and the project was officially closed in December 1956. Thus another milestone has been reached.

The school's curriculum has been entirely revised to conform to modern standards of nursing education which stress social and health aspects, as well as curative aspects of nursing; a faculty of national nurses has been prepared for the specialties they are teaching; the student body now consists of young women with full secondary education; physical facilities for teaching, including classrooms, laboratories, and ward classrooms have been improved; and an independent budget for the school, to which all agencies employing graduate nurses contribute, has been obtained. In addition, a continuing course for nursing auxiliary personnel has been established on a decentralized basis and a postgraduate course for nurse-midwives has been organized.

Under the reorganized program of the School of Nursing, major activities centered around revision of educational programs in accordance with the recommendations made during the evaluation seminar of July and August 1955. Instructors and international advisers met biweekly from January through September 1956 for the purpose of making adjustments to improve the integration of the mental, social, and public health aspects in the nursing programs, to eliminate repetition of material within the various courses of study, and to foster improved methods of teaching.

An activity considered as one of the priorities and still of major concern to the authorities and personnel of the School of Nursing is recruitment. During 1956, plans were intensified and put into action to interest young women and the community in nursing. An interest in the program was believed to be awakened as indicated in the fact that 28 students had already matriculated for the 1957 class, two months earlier than former years. It is calculated that total matriculation will exceed 40.

During 1956, four instructors completed fellowships abroad and returned to Costa Rica to reassume their positions with the faculty of the School of Nursing. The national staff is now well prepared and organized and capable of carrying on the operation of the school in a satisfactory manner.

Mention should be made of the fact that this school is already serving as a center for preparing nurses from other countries. During 1956, grants to foreign nurses for preparation as instructors or for short-term observation included: three fellowships of 12 months; one of eight months; and five short-term grants.

A consultant on relationship of the School of Nursing to the University in Costa Rica recommended, "that a joint committee be formed comprising members of the Board of Trustees of the School of Nursing and of the University Council to study and propose a way to carry out the conditions for definitive integration of the school as a faculty of the University, with all the duties and rights of the other faculties..." It was recognized that such integration would require some time and further study by the University.

A survey of nursing resources in Brazil, conducted by the Brazilian Nurses Association, with funds supplied by the Rockefeller Foundation, was under way with the assistance of a PASB/WHO nursing consultant. The survey will give a sorely needed picture of the current situation (Brazil-22). In a country the size of Brazil this is not an easy task. The planning phase of the survey has been nearly completed and the various accomplishments so far include: appointment of three nurses to the central office; setting up of committees with collaboration of the principal health, educational, and statistical authorities of the country; compilation of lists of hospitals and public health units, of graduate nurses, and of auxiliary nursing personnel; and drawing up of all questionnaires and records considered necessary for the survey.

Special attention has been given to the planning of activities in nursing education projects in three countries: Argentina; Bolivia; and Ecuador.

In Argentina, the creation of a corps of nurses to assume teaching, supervisory, and administrative positions to begin the over-all improvement of hospital nursing services and to initiate work in public health has become an urgent problem. At the request of the government, it is planned to assist in this task by extending aid to several schools, beginning with the Schools of Nursing of the University of Cordoba and of the Chaco, and later including at least two more schools in different parts of the country (Argentina-3).

In Bolivia and Ecuador steps were taken to enlist the interest of health agencies other than the National Department of Health in cooperating with the latter to finance the schools of nursing, thus spreading the considerable expense of organizing and maintaining them.

The objectives of the project in Bolivia (Bolivia-5) are to improve the teaching of nursing and augment the number of graduates by developing a good school of nursing. The number of supervisory nurses of the school was increased to six, which permitted closer contact with students. A revised curriculum for the National School of Nursing, designed to meet the needs of the country, was under preparation, with the assistance of PASB/WHO nurse educators. Two PASB/WHO fellows continued their basic nursing studies of four years in Chile, and three returned to Bolivia on completion of these studies. They will be appointed instructors in the school.

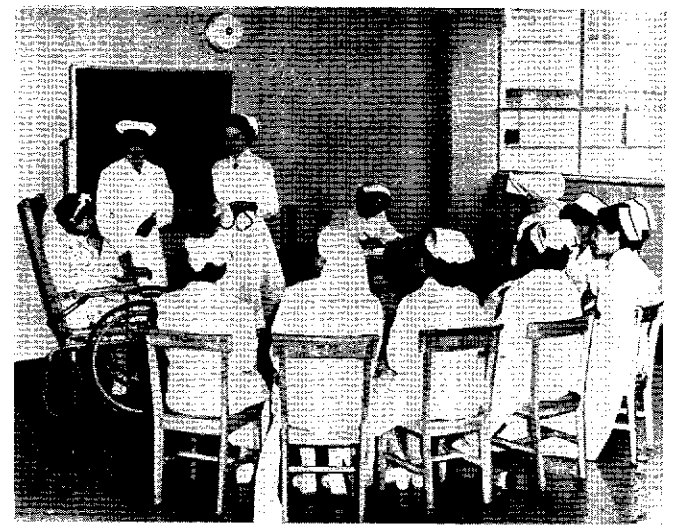
Progress was made in Nicaragua in developing a faculty of nursing and in improving facilities for clinical training of student nurses (Nicaragua-5). PASB/WHO provided three nurse educators for this project. The national staff of the school was augmented by the return to the country of several nurses who had received training under the auspices of the Organization.

In Uruguay, the program in nursing consists mainly in the awarding of fellowships to key instructors in the Carlos Nery School (Uruguay-4).

The first stage of the project in Mexico to strengthen the professional education of nurses and midwives in the National School of Nursing and Midwifery (Mexico-12) was completed. This covered a rapid survey of nursing needs in Mexico and the drawing up of a modern curriculum for the school of nursing in the University of Mexico. Two nurse fellows returned from study abroad and the two nurse educators provided by PASB/WHO completed their assignment.

The main objectives have been to study the nursing needs of Mexico and to formulate a teaching program that will meet these needs. The curriculum integrates the social and public health aspects of nursing and is aimed at broadening the scope of preparation of nurses and midwives. It is hoped that the National School of Nursing and Midwifery of Mexico will prepare the nursing faculties for schools in the different states of the country. In the immediate future assistance will consist of granting fellowships for preparation of nursing instructors for the school.

Recent statistics show that a substantial percentage of the high infant mortality in Chile is due to causes related to pregnancy, delivery, and puerperium. Many maternal deaths are preventible and infant mortality data show



Nursing arts class, Mexico

that prematurity and congenital debility are leading causes of infant deaths. In Chile, as in many other countries in Latin America, most of the deliveries are handled by midwives, the majority of whom are essentially untrained. Furthermore, the modern concept of a midwife's duties includes care, not only during delivery, but also during the pre- and postnatal period, as well as ability to give general health education to mothers and to collaborate in the broad maternal and child health program. While a theoretical course in nursing of 60 hours has been added to the three-year program in midwifery given at the University of Chile, more public health content is still needed, as well as more coordination with the public health program.

The government requested PASB/WHO collaboration to: improve, expand, and develop the teaching of obstetrics and puericulture in the country; furnish supplementary training for midwives already in service; and establish programs for supplementary training for auxiliary personnel now working in maternal and child health services.

PASB/WHO has provided the services of a nurse midwife (Chile-20), who started work on the project in August 1956, to improve maternal-infant care in Chile through educational programs for midwifery personnel. This adviser in education of nurse midwives began by helping national authorities survey the situation in Chile with regard to the education and functions of midwives as well as the number of lay midwives. Based on the findings of this study specific steps will be taken to prepare realistically midwives or nurse-midwives for positions in the field of public health as well as for hospitals.

The project in Haiti for the training of midwives (Haiti-10) continued from 1955 with services of a nurse educator provided by PASB/WHO until May 1956. The principal aim of this project is to reduce neonatal and maternal mortality and morbidity by training local traditional birth attendants to give better care, and by providing well-trained public health nurse-midwives to supervise them. A PASB/WHO fellowship of 12 months of study in midwifery in the United States was completed.

In the training of nursing auxiliaries in Guatemala (Guatemala-6), for which project PASB/WHO provides a nurse educator, the instructors' course of 10 months including practice teaching and supervision of a group of nursing auxiliaries was completed in November 1956.

Of the auxiliary nursing trainees, 101 completed the six-month course satisfactorily. Placement of these nursing auxiliaries was being arranged, with the advice of national health authorities and international health advisers stationed in the country.

Class in visual aids, course for nursing instructors, Mexico

Fellowships

There has been a continuation in the steady increase in numbers both of fellowships awarded in the Americas (approximately six per cent increase) and of fellows from other Regions for study in the Americas (some 20 per cent increase).

Fellowships awarded by PASB/WHO from December 1, 1955 through November 30, 1956 numbered 430. Included in this number were participants who attended seminars or group training programs organized by or with the assistance of PASB/WHO. (Table 14—Fellowship Awards and Participant Awards in the Americas by Country of Origin and Type of Training.)

The number of fellows from other Regions for study in the Americas increased both for academic studies and travel grants. (Table 15—Fellows from Other Regions Commencing Studies in the Americas, by Type of Training.)

Use of places of study similar to the students' own situations continued to develop. Approximately 80 per

TABLE 14. FELLOWSHIP AWARDS AND PARTICIPANT AWARDS IN THE AMERICAS DURING 1956* BY COUNTRY OF ORIGIN AND TYPE OF TRAINING

Country of Origin	Total Awards	Courses Org. or Ass't. by WHO/PASB		Other Courses	Other Arrangements
		Special courses and Seminars	Within Teaching Institutions		
Total all Countries	430	229	33	89	79
Argentina	22	9	5	6	2
Bolivia	11	3		6	2
Brazil	23	19	2	1	1
Canada	1	1			
Chile	21	14		1	6
Colombia	37	21	2	11	3
Costa Rica	12	7	2	2	1
Cuba	8	8			
Dominican Republic	7	5		1	1
Ecuador	14	9	2	2	1
El Salvador	9	5	2	1	1
Guatemala	30	9	2	3	16
Haiti	11	5		4	3
Honduras	14	6	1	4	2
Mexico	68	41	4	7	16
Nicaragua	12	5	1	4	2
Panama	23	8	2	13	
Paraguay	15	4	3	7	1
Peru	19	12		5	2
United States	9	5			4
Uruguay	14	7	4	3	
Venezuela	21	12	1	2	6
British Terr.	24	9		6	9
French Terr.	4	4			
Netherlands Terr.	1	1			

* This table covers activities for a 12-month period—December 1, 1955, to November 30, 1956.

TABLE 15. FELLOWS FROM OTHER REGIONS COMMENCING STUDIES IN THE AMERICAS IN 1956*—BY TYPE OF TRAINING

Region of Origin	Total	Courses Org. or Assisted by WHO/PASB	Other Courses	Other Arrangements
All Other Regions	114	nil	48	66
Europe	29	—	8	21
South East Asia	20	—	16	4
Eastern Mediterranean	16	—	10	6
Western Pacific	23	—	9	14
Africa	26	—	5	21

* This table covers activities for a 12-month period—December 1, 1955, to November 30, 1956.

cent of the individuals awarded PASB/WHO fellowships carried out their studies or observation within Latin America. Interestingly enough, the year 1956 also saw other Regions requesting the Fellowships Branch of the Washington Office to place a greater number of their fellows for study in Latin America. This applied particularly to Africa, some fellows from there having been enrolled in academic courses to begin early in 1957. On the other hand, only eight fellows from the Americas traveled to other Regions, six to Europe and one each to the Western Pacific and Southeast Asia. (Table 16—Fellowships Awarded and Participants in the Americas by Country of Origin and Country or Region of Study.)

Member Governments collaborated generously in making available facilities for fellows. With regard to traveling fellows visiting various countries in the Americas, the several governments made available facilities of special

TABLE 16. FELLOWSHIPS AWARDED AND PARTICIPANTS IN THE AMERICAS BY COUNTRY OF ORIGIN AND COUNTRY OR REGION OF STUDY*

Country of Origin	TOTAL, STUDENTS	Country of Study** in the Americas																						Other Regions		
		Argentina	Bolivia	Brazil	Canada	Chile	Colombia	Costa Rica	Cuba	Ecuador	El Salvador	Guatemala	Haiti	Honduras	Mexico	Nicaragua	Panama	Paraguay	Peru	United States	Venezuela	British Terr.	French Terr.	Netherlands Ter.	Europe	Western Pacific	So. East Asia
Total all Countries	430	1	2	42	6	96	9	16	1	3	18	12	23	1	110	1	21	3	29	69	43	4	2	2	6	1	1
Argentina	22					12	1	1				1			1				3	4	2						
Bolivia	11					6		1							1				2		2						
Brazil	23			4		8							4						2	1	4						
Canada	1			1																							
Chile	21		1	2		10	4			2	1						1	2	2	6	4		1		2		
Colombia	37			4		5					1	1	2		15		1		4	2	4						
Costa Rica	12			1	1	2									4				1	3	2						
Cuba	8			1									1		4						1						
Dominican Republic	7						1								8												
Ecuador	14			2		3							1		2				2		3						
El Salvador	9			2		2		1				1			2		1		1	1							
Guatemala	30			1		3	3	9		1	9				7		9			4	3						
Haiti	11				1										8					1	1						
Honduras	14					2					1	1			8					1	1						
Mexico	68	1		3		8		1	1		3	5	2		34		7		2	17	4	1			2		
Nicaragua	12			2		2		1							4		1				3						
Panama	23			1	1	2									7					10	2						
Paraguay	15			4		6									1					2	2						
Peru	19			1		7							2						4	2	3						
United States	9		1	5		1		2			1	2		1	2	1		1	3						1	1	1
Uruguay	14					10													1	1	2						
Venezuela	21			4		7					2	1	2		1		1		2	6							
British Terr.	24			2	3								7							8		3	1	1	1		
French Terr.	4			2									2														
Netherlands Terr.	1														1												

*This table covers activities for a 12-month period—December 1, 1955, to November 30, 1956.
**The totals for country of origin are unduplicated. The totals for each country of study (in the Americas and for Other Regions), however, include all those who studied there as some of the fellows studied in several countries.

TABLE 17. FELLOWSHIPS AWARDED IN THE AMERICAS IN 1956* BY COUNTRY OF ORIGIN, FIELD OF STUDY, AND TYPE OF TRAINING

Field of Study and Type of Training	TOTAL	Country of Origin																								
		Argentina	Bolivia	Brazil	Canada	Chile	Colombia	Costa Rica	Cuba	Dom. Rep.	Ecuador	El Salvador	Guatemala	Haiti	Honduras	Mexico	Nicaragua	Panama	Paraguay	Peru	United States	Uruguay	Venezuela	British Terr.	French Terr.	Netherlands Ter.
Total—Fellows	276	13	8	6	1	8	16	10	4	7	8	6	28	9	12	39	12	21	11	11	7	9	11	17	2	...
Public Health Administration:	(41)																									
Other Courses	33	3				1	8							1	3		2	3	5	2		2		3		
Other Arrangements	8						1									3	1				1		1	1		
Sanitation:	(48)																									
Courses organized or Assisted by WHO/PASB	36	3		2			1		2	5	1	2	1	3	1	8		1	2			3	1			
Other Courses	3																	2					1			
Other Arrangements	9		1			1							1		1	4								1		
Nursing:	(43)																									
Courses organized or Assisted by WHO/PASB	9										1	1	1							3		2	1			
Other Courses	20	1	6					2					1	1		2	1	3				1		2		
Other Arrangements	14							1				1	9			2							1			
Maternal and Child Health:	(6)																									
Other Courses	5					1					1					2		1								
Other Arrangements	1															1										
Other Health Services:	(39)																									
Courses organized or Assisted by WHO/PASB	29	2				1	1	4	1		2		3			6	3	3	1	1		1				
Other Courses	7										1		1			2		1	1	1						
Other Arrangements	3	2																					1			
Communicable Diseases:	(90)																									
Courses organized or Assisted by WHO/PASB	34			2	1			3	1		1	1	4		4	2	3	4			3		1	2	2	
Other Courses	22	2		1			3			1		1	1	1	2	1	1	3	1	2			1	1		
Other Arrangements	34		1	1			2			1	1		6	3	1	5	1		1	1			3	7		
Medical Sciences and Education:	(7)																									
Other Arrangements	7					3										1					3					
Clinical Medicine:	(2)																									
Other Arrangements	2					1														1						

*This table covers activities for a 12-month period—December 1, 1955, to November 30, 1956.

programs for observation purposes. This required expenditure of considerable time by local health personnel. Among these programs may be mentioned malaria and waterworks operation in Mexico, yaws in Haiti, rural health administration in El Salvador, and smallpox in Peru. Special mention should be made of the Institute of Malariology at Maracay, Venezuela, which has not only continued its program of fellowships for all the countries of the Americas, but has now planned special courses to help meet the urgent need for trained personnel to further the continent-wide malaria eradication program. Special mention may be made also of the cooperation given to the Bureau by three public health schools in Latin America (in Chile, Brazil, and Mexico) accepting international students in connection with the formal teaching given to physicians, engineers, sanitary inspectors, nurses, and statisticians. These courses have served to fulfill a great need for training in public health and its related activities under conditions similar to, and in the language of, the fellow's own country.

In the total number of placements of fellows from the Americas and other Regions, the United States continued to have the most students. The Bureau had close and valuable relations with various public health schools in the United States and with the Education and Training Branch of the Division of International Health of the U.S. Public Health Service, which handles placement arrangements for many of these fellows, and with which the Bureau collaborates in planning field programs for fellows who have finished academic courses. In connection with this cooperative planning, the Bureau appointed two training officers of USPHS as short-term consultants the latter part of 1956, so that they could observe some of the public health programs and problems in selected countries of Latin America (AMRO-18). This travel also gave the

training officers the opportunity to meet with individuals who had completed their fellowships (both PASB/WHO fellows and those of various projects of the United States including ICA) to discuss the relative value of individual training programs or periods of observation.

The field of training continued to show wide variation. Chief change in this respect was further increased emphasis on communicable diseases, notably malaria in keeping with this highest priority in the Bureau program, but affected also by the holding of seminars on smallpox and diarrheal diseases. Strong emphasis continued also on public health administration, sanitation, health statistics, and nursing. (Table 18—Fellowships Awarded and Participants in the Americas and Fellows from Other Regions Commencing Studies in the Americas, by Field of Study).

Table 17 shows fellowships awarded in the Americas by country of origin, field of study, and type of training.

Table 19 shows fellowships awarded for courses organized or assisted by WHO/PASB in the Americas and participants in seminars, by country of origin and field of study and project.

Continued concern for improvement and enlargement of the fellowship program was expressed at the regular meetings during the year of the Executive Committee and the Directing Council. After studying the Director's report on the present situation, the Council noted the need for expanded training of personnel to carry out the important programs to eradicate in the Americas such diseases as malaria, smallpox, and yaws; to fight other diseases such as poliomyelitis, infant diarrheas, and yellow fever; and to improve conditions with respect to such problems as cancer, malnutrition, and high infant mortality. The Council, therefore, recommended again that Member Governments continue the salaries and perquisites of the positions of government employees who go abroad for training or advanced study. Governments were urged to allocate special budgetary funds in order to make it easier for a larger number connected with public health and preventive medicine services to go abroad for that purpose. The Director was specifically requested to transmit this Resolution to Member Governments to emphasize its importance.

The Council then requested the Director to make a study for presentation to the Executive Committee of the possible creation of various types of fellowships, taking into consideration: (1) the professional or academic status of the fellow; (2) his professional experience and number of years of postgraduate studies; (3) the length and type of studies he is going to undertake; (4) whether or not he is engaged exclusively in public health work or preventive medicine, in an administrative, a hospital, or a teaching post; (5) the number of his dependents; and (6) the financial arrangements made by the respective countries of fellows.

Initial efforts to draw up such a plan have run up against the complication of multiple sources of funds for fellowships administered by the Bureau. Current fellowship procedures of WHO do not permit this type of classification, yet uniformity in fellowship procedures is an obvious need.

TABLE 18. FELLOWSHIPS AWARDED AND PARTICIPANTS IN THE AMERICAS AND FELLOWS FROM OTHER REGIONS COMMENCING STUDIES IN THE AMERICAS IN 1956* BY FIELD OF STUDY

FIELD OF STUDY	Awarded in the Americas	Arrived from Other Regions
Total—All Fields of Study	430	114
Public Health Administration	41	8
Sanitation	48	14(1)
Nursing	43	18
Maternal and Child Health	6	4
Other Health Services:	39	22
Mental Health		2
Health Education	2	5
Occupational Health (Industrial Hygiene)		2(2)
Nutrition	2	7
Health Statistics	30	2
Dental Care & Hygiene	4	1
Rehabilitation	1	2
Control of Pharmaceutical Prep.		1
Communicable Diseases	184	35
Medical Sciences and Education	67	2
Clinical Medicine	2	11

* This table covers activities for a 12-month period—December 1, 1955, to November 30, 1956.

(1) Includes two persons concerned with problems of radioactivity in connection with sanitation.

(2) Includes one person concerned with problems of radioactivity in connection with industrial hygiene.

TABLE 19. FELLOWSHIPS AWARDED FOR COURSES ORGANIZED OR ASSISTED BY WHO/PASB IN THE AMERICAS FOR 1956* AND PARTICIPANTS IN SEMINARS, 1956; BY COUNTRY OF ORIGIN AND FIELD OF STUDY AND PROJECT

Field of Study and Project	Country of Origin: TOTAL	Argentina	Bolivia	Brazil	Canada	Chile	Colombia	Costa Rica	Cuba	Dom. Rep.	Ecuador	El Salvador	Guatemala	Haiti	Honduras	Mexico	Nicaragua	Panama	Paraguay	Peru	United States	Uruguay	Venezuela	British Terr.	French Terr.	Netherlands
Total, Fellows and Participants	262	14	3	21	1	14	23	9	8	5	11	7	11	5	7	45	6	10	5	12	7	11	13	9	4	1
Fellows	108	5	...	4	1	1	2	7	4	5	5	4	9	3	5	16	6	8	3	4	3	6	3	2	2	...
Sanitation:	(36)																									
AMRO-1—Env. Sanit.[a]	18	3	...	2	...	...	1	...	...	...	1	2	1	...	1	...	...	1	2	...	...	3	1	...	...	...
AMRO-17.3 Waterworks[b]	18	...	...	...	...	...	...	2	5	...	...	...	...	3	...	8	...	...	...	...	...	...	...	...	...	...
Nursing:	(9)																									
AMRO-28—Advanced Nursing Education[c]	9	...	...	...	...	...	...	...	...	...	1	1	1	...	...	...	...	...	...	3	...	2	1	...	...	...
Other Health Services:	(29)																									
AMRO-10—Statistics[d]	15	2	...	...	...	...	1	2	...	...	1	...	1	...	...	4	1	1	1	...	...	1	...	...	...	...
AMRO-85.2 Classification of Diseases[e]	14	...	...	...	...	1	...	2	1	...	1	...	2	...	...	2	2	2	...	1	...	...	...	...	...	...
Communicable Diseases:	(34)																									
AMRO-7—Malaria Eradication[f]	6	...	...	...	...	...	...	...	...	...	...	...	3	...	2	...	...	1	...	...	...	...	...	...	...	...
AMRO-77.7—Aftosa[g]	11	...	...	2	...	...	...	1	1	...	1	1	1	...	...	1	1	1	...	...	...	...	1	...	...	...
AMRO-77.8—Aftosa[h]	9	...	...	...	1	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	3	...	...	2	2	...
AMRO-90—Malaria Eradication[i]	8	...	...	...	...	...	...	2	...	...	...	...	...	...	2	...	2	2	...	...	...	...	...	...	...	...
Participants	154	9	3	17	...	13	21	2	4	...	6	3	2	2	2	29	...	2	2	8	4	5	10	7	2	1
AMRO-60—Smallpox Eradication[j]	19	3	...	2	...	...	2	...	1	...	1	1	...	...	...	1	...	...	...	4	1	1	2	...	...	...
AMRO-91.2—Application of Sanit. Reg.[k]	21	2	2	4	...	3	2	...	...	...	2	...	...	...	...	...	...	...	...	2	2	2	...	...	...	...
AMRO-94—Control of Diarrheal Diseases[l]	31	4	...	7	...	10	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	2	6	...	...	...
AMRO-103—Treponematosis Eradication[m]	23	...	...	4	...	...	2	...	1	...	1	...	...	...	...	2	...	...	...	1	...	...	2	7	2	...
Medical Sciences and Education:																										
AMRO-49.2—Prev. Med.[n]	60	...	1	...	...	...	15	2	2	...	2	2	2	2	2	26	...	2	...	...	1	...	...	...	...	1

*This table covers activities for a 12-month period-December 1, 1955 to November 30, 1956.

(a) *AMRO-1:* Environmental Sanitation, School of Public Health, Brazil 1, 6 Sanitary Inspectors (3 San. Eng. also studied in Brazil—*awarded* 1955); School of Public Health, Chile 12 (8 Sanitary Inspectors, 4 Engineers).
(b) *AMRO-17.3:* Waterworks Training Course in Mexico from September 1 to November 1, 1956.
(c) *AMRO-28:* Advanced Nursing Education in Chile, 12 months.
(d) *AMRO-10:* Vital Statistics in Chile CIB—9-½ months course.
(e) *AMRO-85.2:* Classification of Diseases held in Venezuela, August 20 to August 31, 1956.
(f) *AMRO-7:* Malaria Eradication held in Mexico, February 2 to April 12, 1956.
(g) *AMRO-77.7:* Aftosa Training Course, held in Brazil, April 16 to June 8, 1956.
(h) *AMRO-77.8:* Aftosa Training Course, held in Brazil, November 5 to November 30, 1956.
(i) *AMRO-90:* Malaria Eradication, held in Mexico, April 23 to June 30, 1956.
(j) *AMRO-60:* Small pox Eradication, held in Peru, August 19 to August 25, 1956.
(k) *AMRO-91.2:* Application of Sanitary Regulations to be held in Venezuela from January 21 to January 25, 1957.
(l) *AMRO-94:* Control of Diarrheal Diseases, held in Chile, November 5 to November 10, 1956.
(m) *AMRO-103:* Treponematosis Eradication, held in Haiti, October 20 to October 27, 1956.
(n) *AMRO-49.2:* Teaching of Preventive Medicine, held in Mexico, from April 23 to April 28, 1956.

Publications

Periodical Publications

The *Boletín*, an official organ of the Bureau, was issued monthly in 1956, as in previous years, giving information on latest developments in public health science, for the benefit of all the countries of the Americas, principally in Spanish, although English, Portuguese, and French were also employed. The *Boletín* was issued in 1956 in two volumes, one for each semester with its own index.

With regard to the content of the *Boletín* in 1956, the following two tables show the sections of the publication and subjects covered in articles included.

TABLE 20. SUBJECTS COVERED IN ARTICLES PUBLISHED

Aëdes aegypti
- Eradication
- Monthly report

Brucellosis
Cancer
Diphtheria toxoid
Education and training
Environmental sanitation
Epidemiology
Food poisoning
Health statistics
Insecticides
Malaria
Mental health
Nursing
Nutrition
Onchocercosis
Public health education
Poliomyelitis
Public health administration
Prevention of dental cavities
Pinta
Rabies
Rheumatic diseases
Schistosomiasis
Traumatism and rehabilitation
Tetanic toxoid
Vaccinations
Venereal diseases and treponematoses
Veterinary (public health)
Yellow fever

TABLE 21. SECTIONS BY SUBJECTS

Original Articles
- Diverse subjects
- Monthly report of *A. aegypti*
- Nursing

Education and Training
Nutrition
Editorials
Abstracts of Current Medical Literature
- a) Journals
- b) Books

General Information
Library
National Health Authorities of the American Republics
Regulations for publication of original articles
Indexes

Other periodical publications of the Bureau are the Monthly Calendar of Selected International Meetings, Weekly Epidemiological Report, Health Statistics, and PASB Quarterly.

Special Publications

A number of special publications were issued in three series: Official Documents; Scientific; and Miscellaneous Publications. A list of the 25 such publications issued in 1956 appears on page 126.

"Health Hints for the Tropics," a 21-page supplement to *Tropical Medicine and Hygiene News*, was reprinted by PASB. This booklet has found wide acceptance among visitors to tropical areas for its valuable comments on climate, water, food, and vaccination requirements.

Distribution of Publications

The following table shows the average monthly distribution of the PASB *Boletín* by country during 1956.

TABLE 22. AVERAGE MONTHLY DISTRIBUTION OF THE *Boletín* DE LA OFICINA SANITARIA PANAMERICANA JANUARY - DECEMBER 1956

Country	Number of Copies
Argentina	640
Bolivia	126
Brazil	846
Canada	26
Colombia	565
Costa Rica	148
Cuba	379
Chile	209
Dominican Republic	146
Ecuador	199
El Salvador	144
Guatemala	176
Haiti	56
Honduras	82
Mexico	682
Nicaragua	95
Panama	177
Paraguay	107
Peru	328
Puerto Rico	70
United States	736
U.S. Territories	3
Uruguay	176
Venezuela	668
Barbados, Bermuda, British Guiana, Belize, Jamaica, Windward Islands, Leeward Islands, Bahamas, Trinidad	46
Guadaloupe, French Guiana, Martinique	8
Curaçao, Surinam	8
Countries from other Continents	310
Total	7,247

Distribution and sale of publications are summarized in the table which follows.

TABLE 23. PUBLICATIONS

	NUMBER OF COPIES
Periodical Publications	
Boletín of the Pan American Sanitary Bureau	89,200
Monthly Calendar of Selected International Meetings	4,913
Weekly Epidemiological Report	26,000
Health Statistics Quarterly	2,400
PASB Quarterly	950
Special Publications	
Scientific	14,086
Official Documents	4,533
Miscellaneous	25,566
Other Publications and Documents	2,708
	170,356*

* This total is exclusive of material distributed by the Office of Public Information.

TABLE 24. SPECIAL PUBLICATIONS RELEASED DURING 1956, BY SERIAL NUMBER AND TITLE, NUMBER OF PAGES, AND COPIES

Serial Number	Title	Number of Pages	Number of Copies Issued
	1. *Scientific Publications*		
21	El control de las enfermedades transmisibles en el hombre.	243	5,000
23	Técnicas de laboratorio aplicadas a la rabia.	156	1,000
24	Condiciones sanitarias de los países de América.	174	2,000
25	Health conditions in the Americas.	142	2,000
26	Situación de la lucha antimalárica en las Américas.	36	1,000
27	Status of antimalaria campaign in the Americas.	36	1,000
	2. *Official Documents*		
15	Informe financiero del Director e Informe del auditor externo, 1955.	54	500
	Financial report of the Director and report of the external auditor, 1955.	54	500
16	Informe anual del Director de la Oficina Sanitaria Panamericana, Oficina Regional de la Organización Mundial de la Salud, 1955	160	1,000
	Annual report of the Director of the Pan American Sanitary Bureau, Regional Office for the Americas of the World Health Organization, 1955.	151	2,000
17	Proyectos de programa y presupuesto. OSP, 1957; OMS, Región de las Américas, 1958; OSP, Anteproyecto, 1958.	219	350
	Proposed program and budget estimates. PASO, 1957; WHO, Region of the Americas, 1958; PASO, Provisional Draft, 1958.	219	350
	3. *Miscellaneous Publications*		
23	Pan American Sanitary Bureau. Half century of health activities.	101	1,000
24	La fiebre aftosa (Adapted for the countries free of aftosa).	12	20,000
25	A febre aftosa (Portuguese edition of the pamphlet in Spanish No. 19).	12	2,000
26	Guía de los Informes de la Campaña de erradicación del *A. aegypti* en las Américas (Revised edition of the miscellaneous publication No. 7).	23	300
27	Guide for the reports on the A. aegypti eradication campaign in the Americas. (Revised edition of the miscellaneous publication No. 8).	23	200
28	XIII Curso Internacional de Malaria y Otras Enfermedades Metaxénicas.	11	600
29	Intercambio de notificaciones de casos y contactos de enfermedades venéreas en las Américas.	18	950
30	Exchange of reports of cases of venereal diseases and contacts of cases in the Americas.	18	100
31	Echange de déclarations des cas de maladies vénériennes et des contacts des malades dans les Amériques.	18	450
32	Informe Anual del Centro Panamericano de Fiebre Aftosa—1955.	36	1,000
33	Annual Report of the Pan American Foot and Mouth Disease Center—1955.	36	1,000
34	O Relatório Anual de Centro Pan Americano de Febre Aftosa—1955.	36	1,000
35	XIV Curso Internacional de Malaria y Otras Enfermedades Metaxénicas.	12	600

Public Information and Exhibits

Based on the Bureau press releases (38 in English, Spanish, and Portuguese in 1956), and on other information furnished on request, over 4,000 clippings from newspapers and periodicals were received during the year from all over the Americas, although the Bureau subscribes to no clipping service.

Translation of the WHO Newsletter into Spanish and Portuguese continued to be handled by the Bureau. Editions in the four languages (English, Spanish, Portuguese, and French) were distributed throughout the Americas. Newsletter distribution at the end of the year amounted to 44,700 copies per issue, as compared with 35,200 at the end of 1955.

The celebration of World Health Day on April 7 of each year is now a firmly established event in almost every country in the world. In the Americas where the chief of state often lends his prestige to the celebration, the occasion has proved an unusual opportunity to highlight the public health problem selected for the year far beyond the few days of the official celebrations. Each country adapts the annual theme to local conditions.

World Health Day in 1956 offered as formerly a good opportunity to arouse the interest of the public in international public health work. By means of national and local celebrations of the occasion in the various countries of the Americas, impetus was given to efforts to improve the level of health of the people. The theme was "Destroy Disease-Carrying Insects!" A number of governments gave prime emphasis to the need to eradicate malaria.

To assist countries in their celebrations of World Health Day throughout the Americas, the PASB Office of Public Information distributed to health administrations, editors, leaders of civic and religious groups, and national Red Cross societies, a selection of articles written by experts in the insect-borne diseases, posters designed at the Washington Office, and photographic prints illustrating WHO and PASB activities in that field. In all, 11,000 sets of articles and 20,000 posters were issued.

Throughout the Americas the ceremonies included addresses by Ministers of Health, radio and television broadcasts, meetings and rallies, sometimes opened with the United Nations hymn, film showings, essay contests, poster displays, official press releases and radio announcements, publication of articles and photographs, insecticide displays in drug stores, special programs in universities and schools, public insecticide-spraying demonstrations by health officers, and exhibits. Many of the radio broadcasts were retransmissions of special programs originally broadcast in various languages by United Nations Radio in New York. The World Health Day messages of the Director-General of WHO and the Director of the Bureau, and a number of the World Health Day articles, were widely reproduced in countries of the Americas. Several hundred newspaper clippings received by the Bureau attested to their wide use.

Bureau exhibits display during the International Symposium on Venereal Diseases and Treponematoses, Washington, D. C., May 1956

Over 80 feature stories were prepared by writers, columnists, and editors based on information supplied to them by the Bureau on their request, compared with 66 during the previous year.

One editor in particular traveled in Latin America to gather first-hand field material on the work of the Bureau in the field, for use in a series of three illustrated articles scheduled to appear in a mass-circulation magazine in the United States early in 1957.

In collaboration with the U. S. Government's Voice of America, production of two films was arranged. These were shown over most of the television stations of Latin America; one was in Spanish on the medical uses of atomic energy, and the other, in Portuguese for Brazil, dealt with the work of PASB/WHO, with emphasis on malaria eradication.

Twenty lectures and informal talks were made by members of the Bureau Headquarters staff on the program and activities of PASB/WHO, on the invitation of schools, religious institutions, and civic organizations.

There was a considerable increase in the circulation of 16 mm. motion picture films during the year, there having been 110 film showings, as compared with 30 during the previous year. Several of these were also used on TV programs. In addition to this, the WHO film *Somewhere in India* was shown in 35 motion picture theaters throughout Costa Rica, accompanied by a broad propaganda campaign in press and radio on PASB/WHO activities, carried out by the theater enterprise.

Twenty-five tape recordings of statements made by Representatives at the IX Directing Council Meeting in Guatemala in September were broadcast over principal radio stations and networks throughout the Americas.

On the request of periodicals and newspapers, 800 photo prints were distributed for publication during 1956, in comparison with 300 so distributed in 1955.

Requests numbering 7,129 for general information and for services including speakers, films, photographs, exhibits, and other informational assistance, and specific data on various aspects of the Bureau technical programs were received in the mails and processed. The 7,129 are in comparison with 3,034 such requests received in 1955, an increase of over 100 per cent. This snowballing increment in popular inquiries is the result of the growing use of Bureau information in all the media, both graphic and the spoken and printed word. In this connection, over one million separate items of literature were supplied by the Bureau to over 400,000 individuals during 1956. The task of dissemination to individuals was aided more than ever by cooperating civic groups, schools, and other public and private organizations.

Visual presentation, through drawings, maps, and photographs, of the programs and activities of the Organition received constant attention during the past year. The ever-increasing demand for visual material over the years continued to provide clear evidence of the value placed upon this media by the members of the staff engaged in organizing programs.

Exhibits were displayed at congresses, meetings, and scientific gatherings. Among such meetings were: the Annual Meeting of the American Medical Association, Chicago; the International Symposium on VD and Treponematoses, Washington; and the American Public Health Association Meeting, Atlantic City, New Jersey.

An exhibit uniquely demonstrating the aim of WHO toward world-wide eradication of malaria was set up in the United Nations Headquarters in New York City.

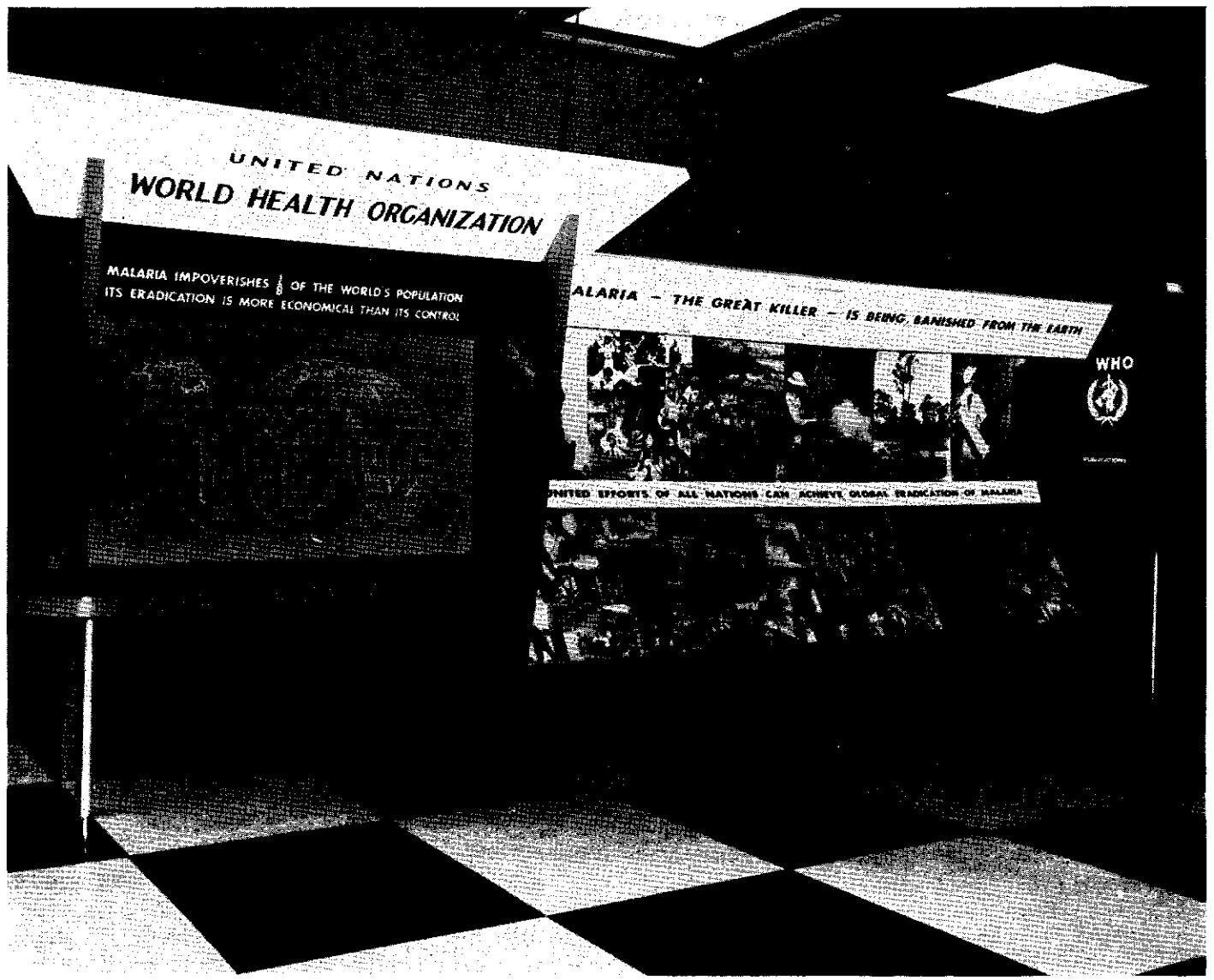
An innovation was the display of a large exhibit showing activities in international public health at the Pennsylvania Railroad station in Philadelphia during UN Week celebrations. Much popular interest resulted from this showing.

Another example of a popular exhibit was that on schistosomiasis control displayed in connection with World Health Day at the Ministry of Health of Brazil, where the exhibit remained for a week. At least 40,000 people a day entered the building. That exhibit was then displayed at the National Department of Endemic Diseases and at the Department's Schistosomiasis Seminar. During the remainder of the time the exhibit was shown at the Zone V Office.

In addition, special exhibits for use at technical meetings were prepared in collaboration with technicians on the PASB staff.

These exhibits and visual aids achieve real results in making new friends for the Bureau by attracting in this manner their attention to our activities.

Exhibit prepared by Bureau on "Eradication of Malaria", shown in United Nations Headquarters, N. Y., in 1956



PART III—ZONE AND FIELD OFFICES

ZONE AND FIELD OFFICES

To ensure that planning and implementation of programs of the Bureau achieve maximum effectiveness in meeting the needs of Member Governments, a decentralization of activities from the Washington Office to Zone Offices had been put into effect. All of the Zone and Field Offices were established by 1952. This decentralized scheme was continued in 1956, with the Americas divided geographically into six Zones.

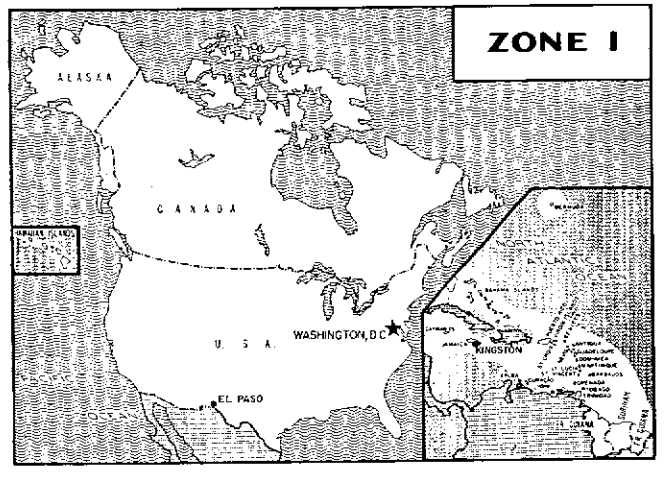
The Zone Offices, headed by Zone Representatives, who represent the Director of the Bureau, are responsible for operational activities of programs in the respective Zones, both in provision of direct technical advice to health administrations and in the field planning and operation of projects. This system has had the advantage of making the technical advice of Zone staff continuously available to governments. Further, it assures that projects will be planned in cooperation with national health personnel who will be responsible for the execution of the programs in a manner appropriate to local conditions. Continuous contact and advice to governments and professional individuals and associations in general matters is just as important as it is in specific programs.

The Zone Offices also have an important function in the coordination of health activities between countries.

Zone I

Zone I is under the supervision of the Washington Office, the Assistant Director being the responsible officer.

This Zone comprises Alaska, Canada, the Falkland Islands and their Dependencies-Hawaii (provisionally assigned to the Region of the Americas by the Sixth World Health Assembly), the United States, and territories in the Region not responsible for conduct of their foreign relations, with the exception of British Honduras, which is included in Zone III.



Within Zone I, activities are further decentralized to two Field Offices: the Field Office for the Caribbean and the Field Office, El Paso, Texas.

The Field Office for the Caribbean, in Kingston, Jamaica, B.W.I. continued its collaboration in health activities with the British, Dutch, French, and United States Caribbean territories. In general, in the Caribbean area, the greatest contribution of PASB/WHO to the strengthening and improvement of public health services in 1956 was through mass campaigns against several communicable diseases. There were seven programs with individual governments, and four regional programs.

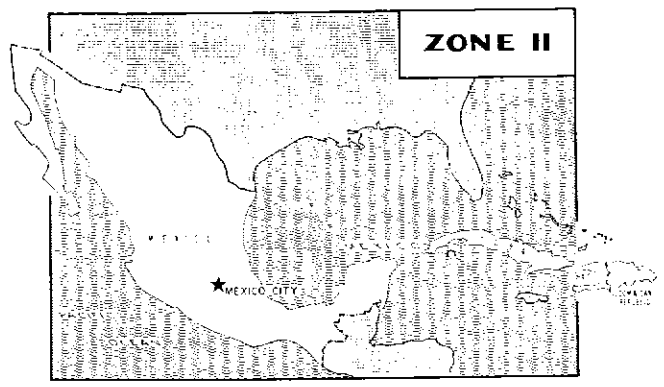
The Chief of this Field Office has an Administrative Officer on his staff; international staff on projects numbered 12. At the end of 1956 recruitment was under way to fill five posts on projects, and planning was undertaken for a substantial increase in personnel for malaria eradication programs in 1957.

The Field Office in El Paso, Texas coordinates the health activities of Mexico and the United States along the 2,000-mile border between the two countries, in an effort to resolve common health problems. This Office provides means for establishing liaison in public health matters among border health officers, and functions: (1) to promote joint consideration and planning of health activities in border communities for mutual improvement of their health services and solution of their health problems; and (2) to provide a channel for exchange of epidemiological and other public health information among border health departments. An outstanding activity of the El Paso Field Office is in connection with the United States-Mexico Border Public Health Association, of which the Chief of the Office is Executive Secretary.

Zone II

Zone II serves Cuba, the Dominican Republic, Haiti, and Mexico, with the Zone Office in Mexico City.

Besides the Zone Representative, the Zone Office was staffed in 1956 with the following international personnel: a Medical Officer (vacant part of the year); a Public Health



Engineering Consultant; an Adviser in Veterinary Public Health; a Consultant in Health Education; an Adviser in Nursing (vacant part of the year); and an Administrative Officer. At the end of the year there was a total of 75 posts authorized for projects in the Zone. Only nine of these posts remained unfilled.

Projects in which the Zone Office had a major concern numbered 24, of which 19 were country programs and five intercountry programs.

The Zone Office assisted in arranging three outstanding meetings in 1956: the Second Seminar on Preventive Medicine, held at Tehuacan, Puebla, Mexico, April 23-28; the Fourth Regional Nursing Congress, in Mexico City, September 9-15; and the Seminar on Treponematosis Eradication, in Haiti, October 21-27.

A major preoccupation of the Zone II Office was with the malaria eradication program. The program of malaria eradication in Mexico, due to its magnitude, received special attention.

In close relation with this program in Mexico is the field study of Dieldrin and other insecticides in that country.

As in former years, one of the most important activities of the Zone was education and training of public health personnel. Courses, seminars, fellowships, and travel grants contributed to the improvement of the quality of personnel who work in the health agencies of the four countries of the Zone. Mexico is becoming a center of study and training for the countries of Zones II and III, with the School of Public Health playing a major role.

An international course for operators of waterworks was successfully given in Mexico during the year.

Zone III

Zone III, for Central America and Panama, serves Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama, and British Honduras, with the Zone Office in Guatemala City.

During the major part of the year the Zone III Office had a full staff, headed by the Zone Representative and including a Medical Officer (who resigned October 31, 1956), a Sanitary Engineer, a Public Health Nurse, and an Administrative Officer. The international staff on projects in the majority of cases was at full strength during most of the year.

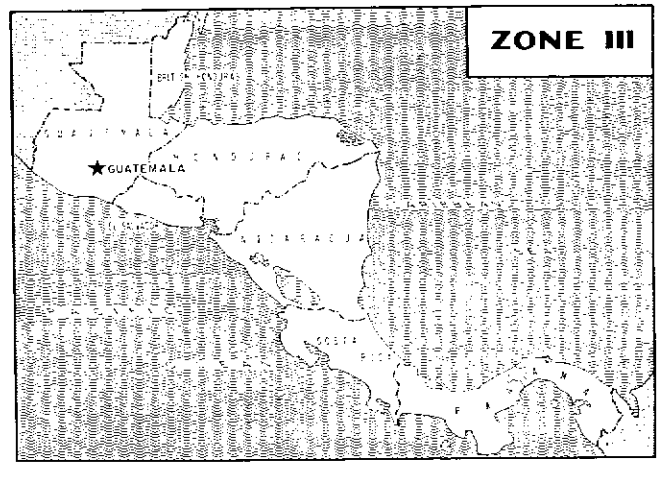
Country projects in operation in 1956 in Zone III numbered 16; and intercountry projects with which the Zone Office had a major concern, five.

As the September 1956 PASO organizational meetings were held in Antigua, Guatemala, this Zone Office had a considerable role to play in arrangements for the meetings. Another meeting in Antigua was that of International Advisers to Integrated Health Projects, October 8-13, 1956.

One of the oldest projects, with the largest staff, in Zone III is the Institute of Nutrition of Central America and Panama, which continued to carry out field and laboratory studies to be applied in improving the nutrition of the people, particularly in Central America and Panama.

Zone IV

Zone IV serves Bolivia, Colombia, Ecuador, Peru, and Venezuela.



Besides the Zone Representative, the principal staff of the Zone Office consisted of five members: a Medical Officer, a Sanitary Engineer, a Public Health Nurse (transferred to project Ecuador-4 in February 1956), a Public Health Veterinarian (appointed in the middle of the year), and an Administrative Officer.

Country projects in operation in 1956 in Zone IV totalled 16, and intercountry projects in which the Zone Office had a major concern, five.

In 1956, an important international seminar was held in Lima, Peru, on smallpox vaccination.

The recent naming of a statistician for the Zone assures an improvement in the epidemiological data on problems in communicable diseases.

The Bureau continued giving assistance to the Carlos Finlay Institute in Colombia, in development of its activities concerning yellow fever.

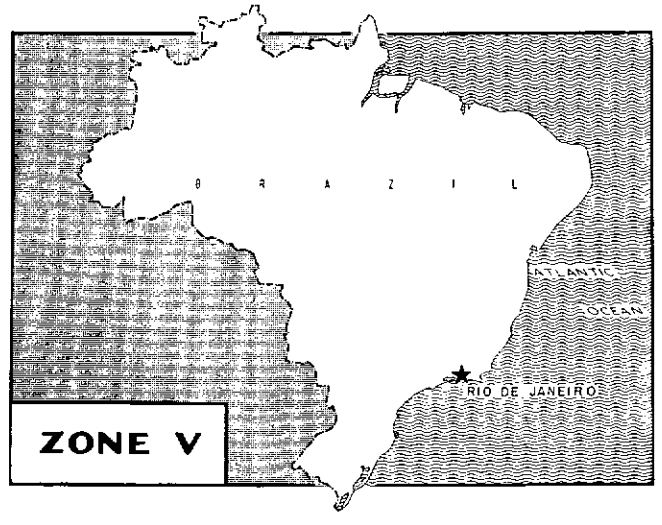
Among the intercountry projects were: the Joint Field Mission on Indigenous Populations, Bolivia, Ecuador, and Peru; Housing Sanitation, Colombia; and the Latin American Center for Classification of Diseases, in Caracas, Venezuela, where the second annual course in classification of diseases took place from August 20 to September 1, 1956.

Zone V

The Zone V office in Rio de Janeiro, Brazil, covers Brazil alone. This Office serves the 20 states, Federal District, and five territories of the country. The WHO/Brazil Basic Agreement was signed by the President of that country in 1956.

The Zone V Office was staffed during 1956 by the Zone Representative and Administrative Officer. The position of Public Health Engineer was vacant during the entire year.

Seven country projects and one intercountry project were in operation in 1956 in Zone V.



A project of importance in this Zone is the Pan American Foot and Mouth Disease Center. The Center had, in 1956, six international staff members; there were three posts vacant. The Center has an approved establishment of 48 local posts, and the active strength was 45 with three vacancies.

Mention may be made here also of the Yellow Fever Laboratory in Brazil, where yellow fever vaccine continued to be produced and made available to governments as required, with the assistance of the Bureau.

Important activities are the collaboration of the Bureau with the School of Public Health in São Paulo and with regard to an increasing number of fellows from many parts of the Americas in a variety of fields.

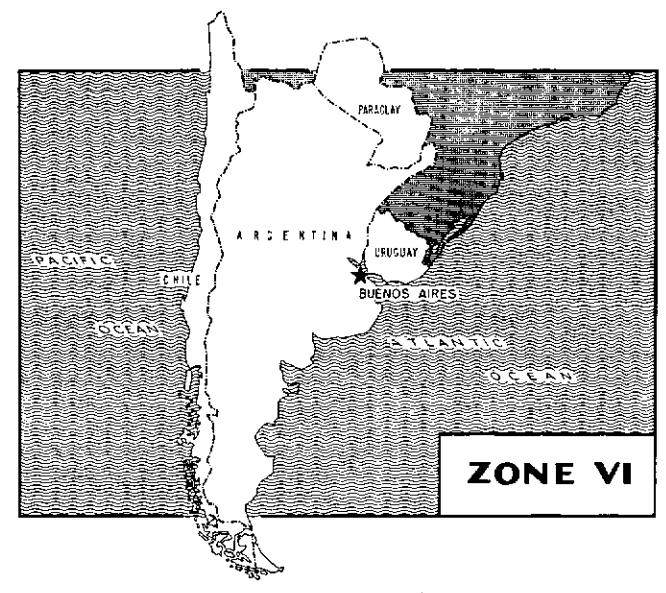
The close of the year marked the end of active participation of the Zone V Office in the schistosomiasis control program after five years of cooperation with the government.

Another achievement during 1956 was the initiation of the country-wide program for the study of nursing facilities and needs of the country.

Zone VI

Zone VI serves Argentina, Chile, Paraguay, and Uruguay.

The increasing volume of activities in this Zone was absorbed by a reduced staff. The Medical Officer (Assistant to the Zone Representative) was assigned full-time to the organization of health services of Argentina in May, with no replacement for him named. Other Zone staff members were a Public Health Veterinarian, a Public Health Nurse, and an Administrative Officer.



Country projects in operation in 1956 numbered 16, and intercountry projects of major concern to the Zone VI Office, four.

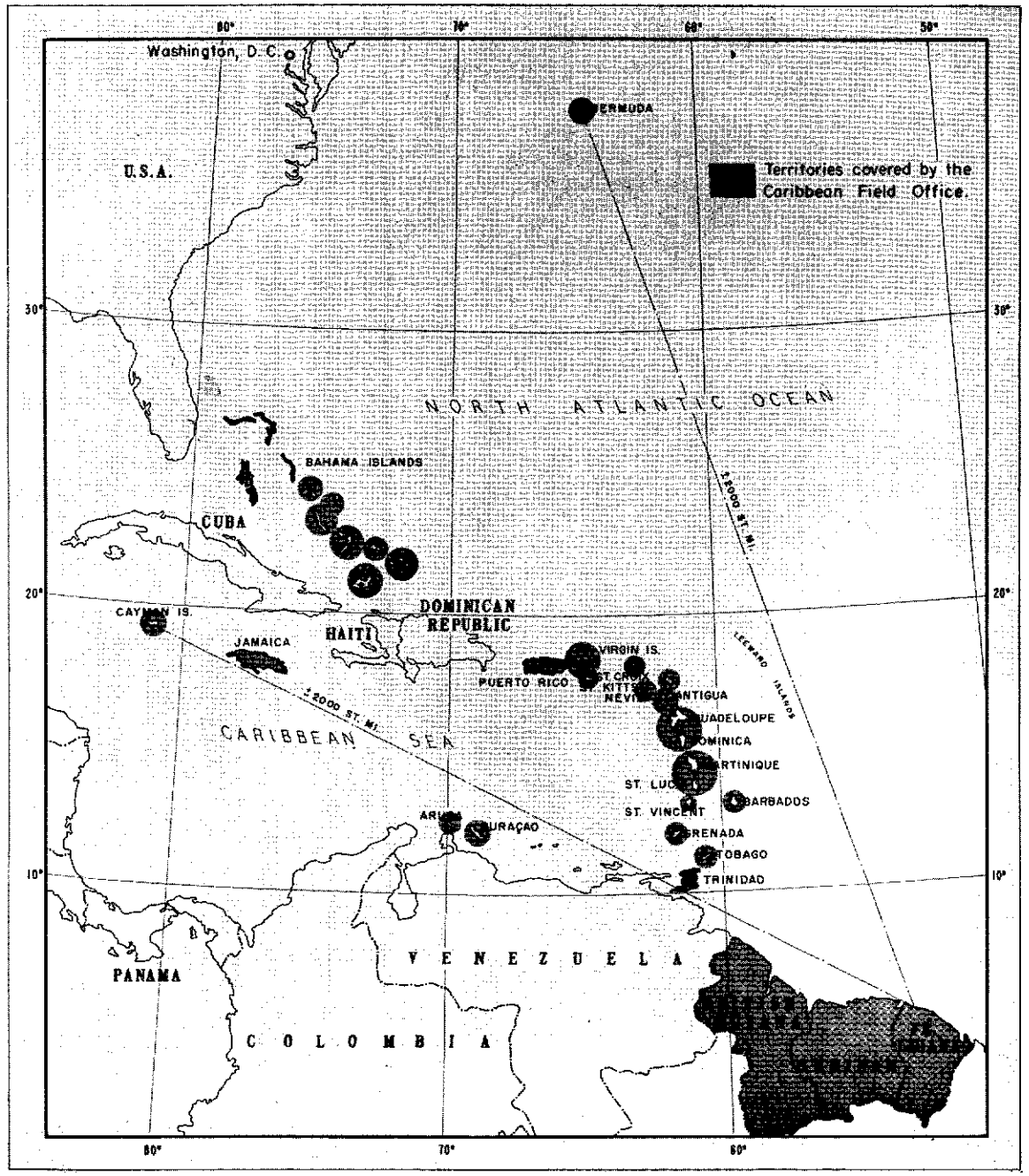
Outstanding activities were the collaboration with the School of Public Health in Chile and with regard to a great number of fellows from the various parts of the Americas in a variety of fields.

A 1956 development in this Zone that may be mentioned was the beginning of the Pan American Zoonoses Center in Azul, Argentina.

The Seminar on Control of Diarrheal Diseases in Childhood, held in Chile with the participation of Argentina, Brazil, Chile, Paraguay, Uruguay, and Venezuela, was organized from the administrative standpoint by the Zone VI Office.

The Zone VI Office, working in close conjunction with the Zone V Office, acted in a coordinating capacity between the signatory governments of the River Plate Frontier Sanitary Agreement. The bulk of these endeavors concerned suggestions and plans for the IV Meeting of those countries, early in 1957 in Porto Alegre, Brazil.

Another frontier sanitary activity was concerned with the health problem associated with the annual mass migration of some 30,000 Bolivian laborers to Argentina. A representative of the Bureau participated in the meeting called by the Bolivian and Argentinian health authorities to discuss this question.



Main building of the Pan American Sanitary Bureau, Washington, D. C.

PART IV—ORGANIZATIONAL MEETINGS AND TRANSACTIONS

ORGANIZATIONAL MEETINGS AND TRANSACTIONS

The IX Meeting of the Directing Council of the Pan American Sanitary Organization, VIII Meeting of the Regional Committee of the World Health Organization, held in Antigua Guatemala, Republic of Guatemala, September 16-27, 1956, was the principal PASO meeting of the year. The meeting was attended by representatives of 23 governments, including France, the Netherlands, and the United Kingdom, attending on behalf of their territories in the Western Hemisphere. Canada sent an official observer. Observers were also sent by UNICEF, the Organization of American States, and a number of non-governmental organizations maintaining official relations with WHO.

All representatives reported on the status of malaria eradication in their respective countries or territories; 23 of them presented oral reports and 19 supplemented this information by statistical reports. The reports indicated that in less than two years since the decision taken by the XIV Pan American Sanitary Conference (1954), the majority of the countries and territories have already converted, or are in the process of converting, their control programs into eradication programs. The Chief of the PASB Coordination Office for the Malaria Eradication Program (COMEP) gave a comprehensive report on the extent of the malaria problem, country by country, throughout the Americas, and the Regional Director of UNICEF for the Americas reviewed that agency's part in the malaria eradication program.

The Council considered the increasing importance of the leprosy problem in the Americas and recommended to the countries that national programs against this disease be revised in accordance with modern concepts and practices

ATTENDANCE AT MEETINGS OF THE DIRECTING COUNCIL REGIONAL COMMITTEE OF THE WHO

MEMBER COUNTRIES	MEETINGS									
	I BUENOS AIRES 24 SEPT.-2 OCT. 1947	II MEXICO, D.F. 8-12 OCT. 1948	III LIMA, PERU 6-13 OCT. 1949	IV CIUDAD TRUJILLO 25-30 SEPT. 1950	V WASHINGTON, D.C. 24 SEPT.-3 OCT. 1951	VI HAVANA, CUBA 15-24 SEPT. 1952	VII WASHINGTON, D.C. 9-19 OCT. 1953	XIV * PAN AMERICAN SANITARY CONF. SANTIAGO, CHILE 1-22 OCT. 1954	VIII WASHINGTON, D.C. 9-21 SEPT. 1955	IX ANTIGUA, GUATE. 16-27 SEPT. 1956
ARGENTINA	■	■	■	■	■	■	■	■	■	■
BOLIVIA	■	■	■		■			■	■	■
BRAZIL	■	■	■	■	■	■	■	■	■	■
CHILE	■		■	■	■	■	■	■	■	■
COLOMBIA	■	■	■		■	■		■	■	■
COSTA RICA	■	■	■	■	■	■		■		■
CUBA	■	■		■	■	■		■	■	■
DOMINICAN REPUBLIC	■	■	■	■	■	■	■	■	■	■
ECUADOR		■	■	■	■	■	■	■	■	■
EL SALVADOR	■	■	■	■	■	■		■	■	■
FRANCE		■	■	■	■	■	■	■	■	■
GUATEMALA	■	■		■	■	■	■	■	■	■
HAITI	■		■	■	■	■	■	■	■	■
HONDURAS	■	■		■	■				■	■
MEXICO	■	■	■	■	■	■	■	■	■	■
NETHERLANDS		■	■	■	■	■	■	■	■	■
NICARAGUA		■	■	■	■	■	■	■	■	■
PANAMA	■	■	■	■	■	■	■	■	■	■
PARAGUAY	■	■	■	■	■	■	■	■	■	■
PERU	■	■	■	■	■	■		■	■	■
UNITED KINGDOM		■	■	■	■	■	■	■	■	■
UNITED STATES OF AMERICA	■	■	■	■	■	■	■	■	■	■
URUGUAY	■	■		■	■	■	■	■		
VENEZUELA	■	■	■	■	■	■	■	■	■	■

■ ATTENDING ☐ ABSENT

*IN ACCORDANCE WITH RESOLUTION VIII OF THE XIII PAN AMERICAN SANITARY CONFERENCE (CIUDAD TRUJILLO, 1950), MEETINGS OF THE DIRECTING COUNCIL ARE HELD ONLY IN THOSE YEARS IN WHICH THE CONFERENCE DOES NOT MEET.

ATTENDANCE AT MEETINGS OF THE DIRECTING COUNCIL REGIONAL COMMITTEE OF THE WHO

OBSERVERS	MEETINGS									
	I BUENOS AIRES 27 SEPT.-2 OCT. 1947	II MEXICO, D.F. 8-12 OCT. 1948	III LIMA, PERU 6-13 OCT 1949	IV CIUDAD TRUJILLO 25-30 SEPT. 1950	V WASHINGTON, D.C. 24 SEPT.-3 OCT 1951	VI HAVANA, CUBA 15-24 SEPT. 1952	VII WASHINGTON, D.C. 9-19 OCT. 1953	XIV * PAN AMERICAN SANITARY CONF. SANTIAGO, CHILE 7-22 OCT 1954	VIII WASHINGTON, D.C 9-21 SEPT. 1955	IX ANTIGUA, GUATE. 16-27 SEPT. 1956
CANADA										
INTERGOVERNMENTAL ORGANIZATIONS										
ECONOMIC COMM FOR LATIN AMERICA										
FOOD AND AGRICULTURE ORGANIZATION										
INTERNATIONAL LABOR ORGANIZATION										
ORGANIZATION OF AMERICAN STATES										
UNESCO										
UNICEF										
UNITED NATIONS										
UNITED NATIONS TECHNICAL ASSISTANCE BOARD										
WORLD HEALTH ORGANIZATION										
OBSERVERS NONGOVERNMENTAL ORGANIZATIONS										
AMERICAN COLLEGE OF CHEST PHYSICIANS										
BIOMETRIC SOCIETY										
INTERNATIONAL ASSOCIATION FOR THE PREVENTION OF BLINDNESS										
INTERNATIONAL BLOOD TRANSFUSION SOCIETY										
INTERNATIONAL COMMITTEE OF CATHOLIC NURSES AND MEDICO-SOCIAL WORKERS										
INTERNATIONAL COUNCIL OF NURSES										
INTERNATIONAL DENTAL FEDERATION										
INTERNATIONAL HOSPITAL FEDERATION										
INTERNATIONAL HYDATIDOLOGICAL ASSOCIATION										
INTERNATIONAL LEAGUE AGAINST RHEUMATISM										
INTERNATIONAL LEPROSY ASSOCIATION										
INTERNATIONAL PEDIATRIC ASSOCIATION										
INTERNATIONAL SOCIETY FOR THE WELFARE OF CRIPPLES										
INTERNATIONAL UNION AGAINST CANCER										
INTERNATIONAL UNION AGAINST TUBERCULOSIS										
INTERNATIONAL UNION AGAINST VENEREAL DISEASES AND TREPONEMATOSES										
LEAGUE OF RED CROSS SOCIETIES										
MEDICAL WOMEN'S INTERNATIONAL ASSOCIATION										
PAN AMERICAN MEDICAL CONFEDERATION										
ROCKEFELLER FOUNDATION										
WORLD FEDERATION OF MENTAL HEALTH										
WORLD FEDERATION OF UNITED NATIONS ASSOCIATIONS										
WORLD MEDICAL ASSOCIATION										

ATTENDING ABSENT

*IN ACCORDANCE WITH RESOLUTION VIII OF THE XIII PAN AMERICAN SANITARY CONFERENCE (CIUDAD TRUJILLO, 1950), MEETINGS OF THE DIRECTING COUNCIL ARE HELD ONLY IN THOSE YEARS IN WHICH THE CONFERENCE DOES NOT MEET.

of diagnosis, treatment, prevention, and rehabilitation. The Director was requested to continue studies to determine the extent of the problem in the Americas, to provide the fullest possible facilities for the training of personnel of national leprosy services, and to promote exchange of experience among professionals.

Importance was also given in the Council's discussions to the fellowship program. There was general recognition of a shortage of experts in all branches of public health and preventive medicine, making it difficult to carry out and to further health programs. Thus, it was again recommended to Member Governments that they take all possible measures to facilitate the award of fellowships for training their national public health personnel. Specific recommendations were made on measures to improve the financial situation of fellows.

Among the administrative and financial matters considered by the Council were the Director's financial report and the external auditor's report for 1955, and other reports on quota collections, building fund, and emergency revolving fund. A special resolution was passed on the use of surplus funds. Conditions of employment of personnel was the subject of another resolution.

Regional Committee matters included the topics on rights and obligations of Associate Members of WHO, future studies on regionalization by the WHO Executive Board, and other resolutions of regional interest adopted by the World Health Assembly and Executive Board. Concerning the first of those topics, the Directing Council expressed the wish that no measures be taken to change the present situation with regard to the Regional Committee of the Americas. As to the second topic, the principle of regionalization was reaffirmed and it was recommended that: (1) the existing pattern of regional organization, as provided for in the WHO Constitution, be continued without modification; and (2) the Executive Board, in its study of regionalization, direct its attention to the day-to-day operation and administration of WHO programs, with a view to improving the functioning of both headquarters and regional offices, in order to increase the effectiveness of international health programs.

The Council adopted a resolution authorizing the Director to establish a reserve fund for the purpose of equalizing the PASO budget appropriations for organizational meetings held over a four-year period, so that the additional costs of holding meetings away from Headquarters may be distributed evenly in each of those four years.

A budget of $2,400,000 for the Pan American Sanitary Organization for 1957, $200,000 more than that for 1956, was adopted by the Council. Of the amount approved for 1957, $2,300,000 is to be financed by contributions from the PASO Members and $100,000 by other income. Budget details are furnished later in this section. As Regional Committee, the Council studied and approved transmittal to the WHO Director-General of the 1958 proposed program and budget for the Region of the Americas, for his consideration when drawing up the 1958 budget of WHO. The Council also took note of the provisional draft of the 1958 PASO budget estimates which will not be formally considered until 1957.

In the detailed discussions on program and budget matters, the Council gave special attention to the subject of extrabudgetary funds, and, under a special topic, "Financial Resources of the Pan American Sanitary Organization," considered the problems created by the fact that the funds available to the Organization for health work in the Americas are received from so many different sources. Resolutions were adopted on this topic: (1) instructing the Director to inform the UN Technical Assistance Board, through the appropriate channels, of the view of the Directing Council that there is need for simplifying the programming method in use at present in such a way as to increase the amounts devoted to health; (2) inviting the attention of the highest authorities of the Member States to the fact that economic development depends on the health and vigor of the people, which can be progressively improved by methods that are readily available at low cost; and (3) requesting the Director to study the means whereby the need for improving health conditions will be given adequate consideration by the governments at the time they formulate their requests for Technical Assistance.

A resolution on the UN Technical Assistance Program was also adopted approving the regional projects that will be financed in 1957 with funds from the UN Expanded Program of Technical Assistance.

The technical discussions held during the Council meeting were on "Methods for the Preparation of National Public Health Plans." These discussions were focused, from a practical point of view, on the search for general principles and methods that might be applied in any country, with emphasis on determination of criteria for priority, international collaboration, and coordination with other national activities; the discussions stressed the primary responsibility of health authorities in initiating the preparation of national plans. It was also affirmed that responsibility in this process falls upon technical experts and personnel of the health service who will execute the plan, and upon representatives of other educational, economic, and social activities and agencies, as well as on the public, whose active and informed participation is indispensable to the success of any plan.

During the 1956 technical discussions, planning experiences dealing with both general and particular problems at the national or local level, were presented by several of the participants. The discussions emphasized the value of a planning process on an ascending scale, from the

health officials and others in direct contact with problems and with the public to the highest coordinating authority that is to finance the plan (Director, Minister, Congress, or the President). Since these authorities are aware of the financial needs, they can negotitate the required financing with the treasury authorities. The reader is referred to the Introductory Review for elaboration on this topic. In view of the interest aroused by the discussions, a related topic, "Bases and Methods for the Evaluation of Health Programs," was selected for the discussions during the X Meeting of the Council.

Guatemala and Peru were elected by the Council for a period of three years to the Executive Committee of PASO, in place of Argentina and the United States, whose periods of office had terminated.

Three meetings of the Executive Committee of PASO took place in 1956: the 28th Meeting in Washington, June 5-13; and the 29th and 30th Meetings in Antigua, Guatemala, immediately preceding and following the IX Meeting of the Directing Council. The Executive Committee, at its 28th Meeting, studied the provisional draft of the Program and Budget of PASO for 1957, and, after proposing certain modifications, instructed the Director to present this document for the approval of the IX Meeting of the Directing Council.

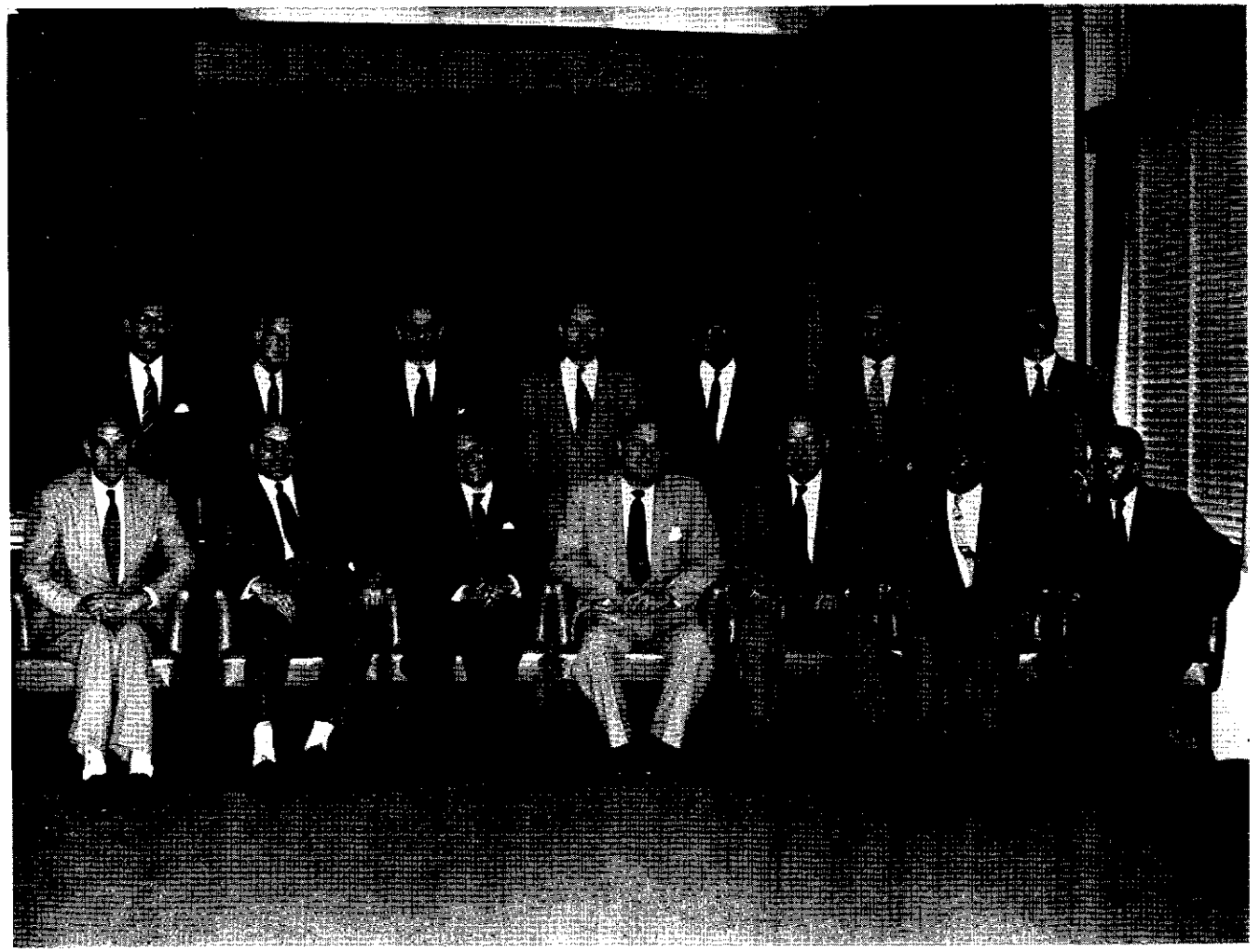
At its 29th Meeting the Executive Committee, after reviewing the Proposed Program and Budget of WHO for the Region of the Americas and Provisional Draft of the Program and Budget of PASO for 1958, approved the latter as a provisional draft and the former for transmittal to the Directing Council.

The report on the activities of the Executive Committee during the year was presented to the Directing Council by the Chairman of the Committee.

A chart on p. 144 shows the membership of the Executive Committee since 1947.

COMPOSITION OF THE EXECUTIVE COMMITTEE FROM 1947 TO 1957

COUNTRY	TERMS										
	FROM JANUARY 1947 TO OCTOBER 1947	FROM OCTOBER 1947 TO OCTOBER 1948	FROM OCTOBER 1948 TO OCTOBER 1949	FROM OCTOBER 1949 TO SEPTEMBER 1950	FROM SEPTEMBER 1950 TO OCTOBER 1951	FROM OCTOBER 1951 TO SEPTEMBER 1952	FROM SEPTEMBER 1952 TO OCTOBER 1953	FROM OCTOBER 1953 TO OCTOBER 1954	FROM OCTOBER 1954 TO SEPTEMBER 1955	FROM SEPTEMBER 1955 TO SEPTEMBER 1956	FROM SEPTEMBER 1956 TO SEPTEMBER 1957
ARGENTINA											
BOLIVIA											
BRAZIL											
CHILE											
COLOMBIA											
COSTA RICA											
CUBA											
DOMINICAN REP.											
ECUADOR											
EL SALVADOR											
GUATEMALA											
HAITI											
HONDURAS											
MEXICO											
NICARAGUA											
PANAMA											
PARAGUAY											
PERU											
UNITED STATES											
URUGUAY											
VENEZUELA											



28th PASO Executive Committee Meeting, June 5-13, 1956, Washington, D. C.

PART V—ORGANIZATION AND ADMINISTRATION

ORGANIZATION AND ADMINISTRATION

ORGANIZATION AND ADMINISTRATION

Structure and Function

Office of the Director

On February 1, 1956, Dr. Fred L. Soper began his 10th year as Director of the Pan American Sanitary Bureau, WHO Regional Director for the Americas.

The other principal officers of the Bureau during 1956 in the Office of the Director were the Assistant Director and the Secretary General.

Because of the necessarily complex financial arrangements made with cooperating agencies, the need continued during the year for an Office of Coordination which is directly responsible to the Office of the Director.

The function of this Office of Coordination is to serve as a central point for information and procedures concerning projects to facilitate their execution and to assist other offices of the Bureau.

Likewise, coordination continued to be essential in the planning of future activities, especially in the preparation of the program and budget, which constitutes specific advance planning for a two-year period. Emphasis was placed on consultation with governments as this facilitates and encourages both international and national planning.

This office is responsible for the final drafting and preparation for signature of project and grant agreements.

A project list continued to be prepared periodically, giving summary information on the status of projects.

Other Services

Under the Office of the Director there were other essential services.

The Conference Services Section had responsibility for the planning, organization, and management of the meetings of the PASO governing bodies during the year: the 28th Meeting of the Executive Committee in Washington, D.C.; the IX Meeting of the Directing Council; and the 29th and 30th Meetings of the Executive Committee in Antigua Guatemala, Republic of Guatemala. During the meetings, the regular staff of the section served as a trained cadre, assuming responsibility for the training, supervision, and control of the staff of the secretariat services, which included preparation of official records, language services, processing and distribution of documents, and other technical services.

Besides the services for PASO meetings, the Conference Section provided assistance in organizing a number of seminars and other meetings held under PASB auspices, such as the VII Meeting of the INCAP Council (San Jose, Costa Rica, December 3-6, 1956). For this meeting, a new method of preparing the Final Act was suggested by the Conference Section and approved by the INCAP Council. The précis minutes were eliminated and, in their place, a summary of the working document and of the discussion on each topic, along with the resolution adopted thereon, were incorporated in the Final Act. The method successfully simplified the secretariat services and considerably reduced the costs.

Another function of this section is to prepare the *Monthly Calendar of Selected International Meetings*. As in preceding years, this was issued to keep the Member Governments, Zone Offices, and interested organizations apprised of international and national meetings of all kinds on matters of interest to medicine and public health.

Translation, a major duty of the Conference Section, was provided in respect of all documents for PASO organizational meetings. These documents are issued in both

English and Spanish. During the periods of the meetings, the staff of the unit performed specialized secretariat services, including preparation of précis minutes, translating and interpreting, and editorial work required for the documentation. Throughout the year the unit served all offices of the Bureau, providing translations into English, French, Portuguese, and Spanish. The translation into Spanish of technical and informational reports of both WHO and PASB, for distribution in Latin America, continued during the year.

Spreading information concerning the Bureau is carried out through the Office of Public Information by means of press releases on current developments and meetings, by aiding in distribution of PASB and WHO publications, answering requests for general information, and through other media including radio, television, films, photographs, exhibits, speeches, and assistance to writers and editors. Details on the work of this office have been given on p. 127

The Reports Office was set up principally to prepare and publish the Annual Report of the Director and a periodical issued quarterly in 1956.

The establishment of that office marked the beginning of a reorganization of the publications activities of the Bureau in order to coordinate the various informational services.

Published technical information is provided to member countries through the Editorial Section. Its principal publications are the PASB *Boletín* issued monthly, official documents, plus both a special and a miscellaneous series of publications. Reference to these series is presented in detail in an earlier section of this Report.

The specialized collection in the library of the Washington Office is aimed at satisfying the needs of the staff of the entire Bureau (including the requirements of the widely scattered Zone and Field Offices) for reference data pertinent to the various fields of public health.

Headquarters Divisions

Division of Public Health

The Division of Public Health has a professional and technical staff which plays a major role in planning programs, guiding the activities of the Bureau in public health, and giving advisory services both directly and by special assignment to the field, and indirectly from Washington Headquarters to Member Governments and projects in their countries. The Division has three branches: the Communicable Diseases Branch; the Health Promotion Branch; and the Environmental Sanitation Branch.

Attached to the Office of the Chief of the Division during the year was the adviser on Aëdes aegypti eradication. Also attached was the special coordinating unit for malaria eradication programs with headquarters during 1956 in Mexico City (COMEP).

Under the Communicable Diseases Branch is the Section of Epidemiology and Statistics, whose activities, vital to most programs, are more fully covered in another section of this Report.

Planning in connection with public health activities of the Bureau is one of the major responsibilities of the Division.

Advisory services to the field continued to expand as new developments in many health activities made it necessary to keep personnel of the Bureau and national officials abreast of progress. Malaria, poliomyelitis, leprosy, tuberculosis, diarrheal diseases, and viruses have been the main subjects of information provided on new measures for prophylaxis and treatment. The staff of the Division has given continuous support to the field activities through the preparation of seminars, by participating in the preparation of plans of operations in the field, and by means of the analysis and dissemination of information on yaws, smallpox, vaccination, training facilities for auxiliary nursing and sanitation personnel, hospitals, preservation of food, public health dentistry, health problems in atomic energy, and other matters.

The application of the new International Sanitary Regulations has called for continuous advice to Member Governments as well as to the staff in the countries; the changes in the Regulations have also stimulated preparation of a second seminar, including discussion on improvement of reporting of communicable diseases.

A full account of the work of the Division of Public Health is contained in earlier sections of this Report.

Division of Education and Training

While in the broadest sense all endeavors of the Organization have an educational objective, certain projects have education and training as their chief focus. Whether through general advisory services or specific projects, the activities of the Bureau in the educational field may be considered under five major headings: (1) basic medical education; (2) education in public health administration and allied fields; (3) education in environmental sanitation; (4) veterinary public health education; and (5) nursing education. The first of these is, by definition, an exclusively professional field; the others involve training of auxiliary as well as professional personnel.

A major function of the Division of Education and Training is the development of means of strengthening educational institutions in the field of health in Latin American countries. The Division carries out its program through cooperation given to schools of public health, medicine, nursing, and sanitary engineering in such areas as curricula and methodology; through a program of seminars; through a fellowships program; and also through a Medical Education Information Center (MEIC) which coordinates information concerning activities of the various groups interested in promoting medical and related education in the Americas.

The organizational structure of the Division of Education and Training consists of the Office of the Chief, the Professional Education Branch, and the Fellowships Branch.

Details of the work of this Division are given in another section of this Report.

Division of Administration

The objectives in the field of administration for 1956 were: (1) to provide management advice and assistance to the Director and to program officials in planning and carrying out Bureau activities; (2) to continue efforts to produce economies in all operations; and (3) to provide more effective administrative services.

These efforts toward economy, efficiency, and service of an increasingly high quality, took place during a period of expanding program and workload. During the year the total Bureau staff, of some 590 persons, rose to the highest point in the history of the Organization; and there was an expenditure of funds almost three times as great as in 1951. In the period from 1951 to 1956 the staff of the Division was reduced from 129 to 95.

A major activity of the Division in connection with the first objective centered around the planning for the stepped-up malaria eradication campaign sparked by the special contribution of $1,500,000 announced by the U. S. Government in September 1956. In close collaboration with the Division of Public Health, the Zone Representatives and officials of COMEP, a budget for the malaria eradication program of the Bureau was prepared. This included the amounts to be provided for international personnel to advise and assist governments in malaria eradication campaigns, training facilities and fellowships, equipment needs of international staff, technical conferences, technical manuals and bulletins, investigations, evaluation surveys, and technical direction and coordination including supplementary supporting and administrative services at Headquarters and in the Zone Offices.

In addition, a proposed outline of first steps in the possible development of an international food and drug service was developed in collaboration with the Division of Public Health and other technical staff of the Bureau. The guide lines and budget instructions for preparation of the 1958 budget and provisional draft of the 1959 budget were developed in collaboration with the Divisions of Education and Training and Public Health, and other staff of the Bureau, including the Zone Representatives. A major organizational study of the Division of Public Health was begun. This involves a complete reassessment of the current organizational structure and methods, operating relationships, attitudes of staff toward their work and the way they are performing it, and the speed and efficiency with which the Division is achieving its established goals. The survey is being conducted in close collaboration with the senior staff of the Division of Public Health and includes field studies of project and other program operations and relationships in the countries, Zone Offices, and at Headquarters.

The second objective, economy, has been pursued through the inauguration of a complete review of all work methods and operations of the Division of Administration to determine those which duplicate or overlap similar activities carried out in the Zone Offices and to determine any duplication or overlap which should be eliminated. This led to the development of a general plan for further delegation of authority in the field of administrative management and greater decentralization of administrative operations to the Zone Offices. The specific objective in this effort is to effect economies in administrative operations at both Headquarters and the Zone Offices and to provide more efficient and effective administrative services by moving them as close to field projects as is economically feasible. The planning stage of this effort was completed in 1956. The administrative services planned for decentralization include routine allotment controls and accounts, certain routine personnel processing, purchasing where it can be done as inexpensively locally, property management of field supplies and equipment, including inventory controls, certain entitlements of staff members, and the like.

The Division has also pursued its second objective through advice and assistance on the day-to-day operating problems that are referred to it by the program units and through participation in the regular meetings of the

executive staff of the Bureau. These opportunities are continually exploited as a way of introducing economies in all operations of the Bureau ranging from a policy review of our public information and reporting services to the operation of the fellowships program.

Achievement of more effective administrative services, the third objective, is the continuing responsibility of the Division's branches and offices. These handle the day-to-day serving of the Zone Offices, field projects, and Headquarters units in all the administrative support necessary to their efficient functioning. They are described under each of the organizational segments of the Division of Administration outlined below.

Significant advances were made in 1956 in simplifying procedures and facilitating services. It was apparent early in the year that rapid increases in workload in many operating units of the Bureau had produced an imbalance in staffing as related to work requirements. Accordingly, surveys were undertaken of the Office of Public Information, Fellowships Branch, and Editorial Section, with a view toward determining the effectiveness of the work process, extent of workload, and related matters. In all studies, recommendations were offered on the basis of detailed review, and changes were made in structural organization and work methods in order to facilitate operations and to provide more effective service.

In addition, a survey was undertaken, in cooperation with the consultant on reports, of the Bureau's activities in the reports, exhibits, information, editorial, publications, and translations fields in an effort to effect closer coordination of the activities in these areas and to permit interchangeability of the skills among the several operating units.

A new budgeting method was devised covering the entire procedure from the establishment of the budgetary ceiling through the call for preparation and review of estimates, submission and justification of the estimate to the governing bodies, establishment and control of operating budget, and analysis of obligation and expenditure.

Considerable progress was achieved in a new effort to codify, bring up-to-date, and prepare manuals on all administrative policies and procedures of the Bureau. Basically this involves extensive supplementation of the WHO Manual issuances to provide detailed and authoritative information and instruction to Zone Offices and operating units of the Bureau. It is expected that the initial overhaul, bringing up-to-date of all the issued rules regarding policy and procedure, will be completed early in 1957, with only the relatively minor task of maintenance of the system left for the future. This is a prerequisite to implementation of the Bureau decentralization program in 1957.

Personnel

The year 1956 marked much study and discussion of salaries and conditions of employment for PASB/WHO staff. WHO, and the Bureau through WHO, contributed to the study made by the UN Salary Review Committee set up by the General Assembly. In the meantime, the PASO at both Executive Committee and Directing Council meetings, kept track of these developments in the hope that more favorable and uniform conditions of employment would result. At the year's end the studies had not been completed, but decisions were expected early in 1957.

During the year, studies were undertaken and changes were made in the local wage scales for FOC, FEP, and Zones III-VI. Scales were adjusted upward to meet the exigencies of the economic situation in the several cities where the offices are located.

Cost-of-living studies were undertaken for Mexico City, Lima, and Guatemala City. A revision of the cost-of-living adjustment in Guatemala City resulted from the survey, placing the city at plus 10 per cent. Remedial action was close to authorization for the rise in the cost of living in Rio de Janeiro, and there was under review a possible cost-of-living adjustment.

The recruitment of staff with the required skills is vital to the carrying out of the PASB program. Some success was achieved in recruiting by special arrangements for the seconding of certain personnel from Member Governments and by increasingly more intensive efforts through contact with national and local government agencies, professional organizations, and universities.

Supplies

One of the most unique and important services provided to Member Governments is the procurement of supplies and equipment. This function continued during the year. While the dollar volume was greater in 1956 than in the previous year for such procurement plus purchasing for projects and other needs of the Bureau, the number of orders placed was actually reduced. This resulted principally from the employment of a series of blanket purchase orders to cover the administrative requirements of the Washington Office. The dollar value reached $1,923,227 for 7,204 line items as compared to the 1955 dollar value of $1,681,821. The cost estimates provided to Member Governments for budgetary and planning purposes totalled $3,657,916, for 3,695 line items, an increase in value of about 12 per cent over the previous year. Shipments in 1956 numbered 1,512.

Construction of a Building for the Washington Office

Because of inadequate housing of the Headquarters staff, plans for the proposed Headquarters building of the Bureau were developed further with a formal approach to the United States for reconsideration of a site in Washington.

The IX Meeting of the PASO Directing Council approved the assignment to the building fund of the surplus of $123,524 from the 1955 appropriation. Thus, the total in the fund was raised to $223,524, $100,000 having been added to the Building Reserve Fund bringing it to a total of $200,000, and the other $23,524 having been put into a special account for architectural services to be expended when a site is determined and construction plans must be made.

Budget and Finance

The revised estimates for 1957 and the proposed program and budget estimates for 1958 were presented to the PASO Executive Committee and Directing Council for appropriate action. At the 28th Meeting of the Executive Committee a proposal was submitted by the Director for an increase of $200,000 in the 1957 budget. This increase covered the cost of certain statutory increases and the initiation and continuation of a number of programs. The Executive Committee recommended the appropriation and the IX Meeting of the Directing Council confirmed this action. The increase brought the appropriation to $2,300,000. With additional expected miscellaneous income of $100,000, it is planned to operate on a budget of $2,400,000 in 1957. It is anticipated that the current ceilings for WHO, WHO/TA, OAS/TA, and INCAP will continue at approximately the same levels in 1957 and that the total budget for 1957 will reach approximately $5,027,000, exclusive of any possible grants or surpluses. With the addition of the $1,500,000 contributed by the United States for the malaria eradication program, the total budget will represent an increase of about 36 per cent over expenditures for 1956.

The proposed program and budget estimates for 1958, as presented at the 29th Meeting of the Executive Committee and the IX Meeting of the Directing Council, called for an expansion of the program and a consequent requirement of an increase of $600,000, or 25 per cent, in the budget to meet the cost of this expansion (exclusive of the United States contribution of $1,500,000 in 1957 for malaria eradication). This increase brought the sum requested from appropriations to $2,900,000. With the addition of anticipated income of $100,000, plans were laid for a program and budget of $3,000,000 from PASO funds. The organizational bodies reviewed this draft of the PASO budget and took note of the items presented as a provisional draft budget.

The estimates for WHO, Region of the Americas, for 1958 were presented to the Regional Committee. These estimates called for an allotment of $1,352,310 in WHO funds and $1,041,530 in WHO/TA funds, both representing increases over 1957: WHO, an amount of $165,000 over 1957; and WHO/TA an amount of $13,410 over the previous year. The total budget for 1958, including OAS and INCAP, was for a program estimated at $5,831,250 (exclusive of any possible special malaria eradication contribution). The Regional Committee approved the transmittal to WHO Headquarters of the Proposed Program and Budget of the World Health Organization for the Region of the Americas for 1958.

Expenditures and Sources of Funds

PASB/WHO expenditures in 1956 by source of funds were as shown in the table below.

TABLE 25. PASB EXPENDITURES IN 1956 BY SOURCE OF FUNDS

Pan American Sanitary Bureau—REG. . .	$2,199,965.00
Other Extra Budgetary Funds—PASB. . .	173,914.00
World Health Organization—REG.	1,153,206.00
World Health Organization—Tech. Assistance.	1,191,763.00
UNICEF (Reimbursement for WHO personnel).	4,125.00
OAS/Technical Assistance.	217,517.00
INCAP.	74,835.00
Grant to INCAP.	89,124.00
Total.	$5,104,449.00

The following table shows quota assessments for the year in the Americas.

TABLE 26. PASO 1956 QUOTA ASSESSMENTS AND SIMILAR WHO ASSESSMENTS IN THE AMERICAS

Country	Amount	
	PASO	WHO
Argentina	$ 155,400	$ 172,460
Bolivia	6,510	6,760
Brazil	168,420	172,460
Canada*		326,820
Chile	38,220	41,420
Colombia***	52,290	
Costa Rica	5,040	4,310
Cuba	38,220	28,740
Dominican Republic	6,510	4,310
Ecuador	5,040	4,310
El Salvador	7,770	5,920
France**	5,044	
Guatemala	9,030	5,920
Haiti	5,040	4,310
Honduras	5,040	4,310
Mexico	102,060	67,630
Netherlands**	2,488	
Nicaragua	5,040	4,310
Panama	6,510	4,310
Paraguay	5,040	4,310
Peru	22,890	19,450
United Kingdom**	15,000	
United States of America	1,386,000	3,410,040
Uruguay	22,890	17,750
Venezuela	47,040	31,280
Total.	$2,122,532	$4,341,130

*Does not belong to the Pan American Sanitary Organization.
** On behalf of its territories in the Western Hemisphere.
*** Does not belong to WHO.

APPENDIX

Project List

The project list furnishes essential information on the various projects in operation during the year. These data are presented in alphabetical and numerical order.

The reader will note that Zone designations for the inter-regional projects are left blank as these are world-wide projects with the Bureau providing general supervision insofar as they concern the Americas.

By "Technical Branch" is meant the unit primarily concerned with the project at the Washington Office. Abbreviations used in this column are:

HOC	Division of Public Health
HCD	Communicable Diseases Branch
HCE	Epidemiological and Statistics Section
HES	Environmental Sanitation Branch
HHP	Health Promotion Branch
EOC	Division of Education and Training
EFS	Fellowships Branch
EPE	Professional Education Branch
WO	Washington Office

Other abbreviations used in the list are repeated here for convenience:

WHO	World Health Organization
PASB	Pan American Sanitary Bureau
UNICEF	United Nations Children's Fund
USPHS	United States Public Health Service
UN/TA	United Nations Technical Assistance
UNESCO	United Nations Educational, Scientific, and Cultural Organization
ICA	International Cooperation Administration
ILO	International Labor Organization
FAO	Food and Agriculture Organization
GML	Gorgas Memorial Laboratory
KF	Kellogg Foundation
OAS/TA	Organization of American States Technical Assistance

Project List

Code	Title	Duration	Funds in 1956	Cooperating Agency	Technical Branch	Zone
Argentina–4	Malbran Institute	1956–	WHO		HCD	VI
Argentina–6	WHO-Public Health Administration Fellowships	1954–	WHO		EFS	VI
Argentina–12	Survey of Health Services	1956–	PASB		HHP	VI
Argentina–51	A. aegypti Eradication	1950–	PASB		HOC	VI
Barbados–2	Local Health Services	1955–	UN/TA	UNICEF	HHP	I(FOC)
Bolivia–4	Malaria Eradication	1953–	UN/TA	UNICEF	HOC	IV
Bolivia–5	Nursing Education	1953–	UN/TA WHO		EPE	IV
Bolivia–6	Study of Water Supply (La Paz)	1954–56	UN/TA		HES	IV
Bolivia–10	Public Health Services	1955–	PASB	UNICEF	HHP	IV
Brazil–16**	UN/TA Public Health Administration Fellowships	1954–56	UN/TA		EFS	V
Brazil–17	Hydatidosis Control	1956–	UN/TA		HCD	V
Brazil–20	Yaws Eradication	1956–	UN/TA		HCD	V
Brazil–22	Nursing Education	1956–	PASB		EPE	V
Brazil–26**	WHO Public Health Administration Fellowships	1955–56	WHO		EFS	V
Brazil–51	Yellow Fever Laboratory	1950–	PASB		HCD	V
Brazil–53	Schistosomiasis	1951–56	PASB	USPHS	HCD	V
British Guiana–3**	WHO Public Health Administration Fellowships	1955–56	WHO		EFS	I(FOC)
British Honduras–3**	UN/TA Public Health Administration Fellowships	1955–56	UN/TA		EFS	III
British Honduras–4	WHO Public Health Administration Fellowships	1955–	WHO		EFS	III
Chile–10	Tuberculosis Control (BCG)	1954–	WHO	UNICEF	HCD	VI
Chile–12	Demonstration Center for Care of Premature Infants	1954–56	WHO	UNICEF	HHP	VI
Chile–15	Control of Alcoholism	1956–	WHO		HHP	VI
Chile–17	University of Chile Medical School Laboratory	1956–	UN/TA		EPE	VI
Chile–18**	UN/TA Public Health Administration Fellowships	1955–	UN/TA		EFS	VI
Chile–20	Midwifery Education	1956–	WHO		EPE	VI
Chile–25	WHO Public Health Administration Fellowships	1955–	WHO		EFS	VI
Colombia–4	Public Health Services	1951–	UN/TA	UNICEF	HHP	IV
Colombia–5	Malaria and A. aegypti Eradication	1951–	UN/TA PASB[1]	UNICEF	HOC	IV
Colombia–15	Tuberculosis Control (BCG)	1954–56	UN/TA	UNICEF	HCD	IV
Colombia–52	Yellow Fever, Carlos Finlay Institute	1950–	PASB		HCD	IV
Costa Rica–3	Nursing Education	1951–	UN/TA		EPE	III
Cuba–1	A. aegypti Eradication	1952–	PASB		HOC	II
Cuba–3*	Public Health Services	1955–	PASB		HHP	II

* Zone and/or Washington Office advice only in 1956.
** Under previous years' awards.
[1] Special fund for malaria.

Project List—Continued

Code	Title	Duration	Funds in 1956	Cooperating Agency	Technical Branch	Zone
Dominican-Republic–2	Malaria and A. aegypti Eradication	1952–	UN/TA PASB[1]	UNICEF	HOC	II
Dominican Republic–4	Reorganization of Local Health Services	1953–	PASB	UNICEF	HHP	II
Dominican Republic–7**	UN/TA Public Health Administration Fellowships	1955–	UN/TA		EFS	II
Dominican Republic–52	Venereal Disease Control	1953–	PASB		HCD	II
Ecuador–4	Rural Public Health Services	1953–	PASB WHO	UNICEF	HHP	IV
Ecuador–11	National Institute of Health	1952–	UN/TA		HCD	IV
Ecuador–14	Malaria Eradication	1956–	PASB[1]	UNICEF	HOC	IV
Ecuador–17	UN/TA Public Health Administration Fellowships	1956–	UN/TA		EFS	IV
Ecuador–53	National Institute of Nutrition	1950–	UN/TA	KF[2]	HHP	IV
El Salvador–5	Health Demonstration Area	1951–	UN/TA	ILO/FAO UNESCO	HHP	III
El Salvador–8**	WHO Public Health Administration Fellowships	1955–56	WHO		EFS	III
French Guiana–1*	Maternal and Child Health	1956–	WHO	UNICEF	HHP	I(FOC)
Guatemala–6	Training of Nursing Auxiliaries	1955–	WHO		EPE	III
Guatemala–7**	UN/TA Public Health Administration Fellowships	1955–	UN/TA		EFS	III
Guatemala–8	Rural Public Health Services	1954–	WHO	UNICEF	HHP	III
Guatemala–11	BCG Vaccination	1956–	UN/TA	UNICEF	HCD	III
Haiti–1	Yaws Eradication and Syphilis Control	1950–	WHO/ PASB	UNICEF	HCD	II
Haiti–2*	Local Health Services	1954–	UN/TA		HHP	II
Haiti–4	Malaria and A. aegypti Eradication	1953–	UN/TA PASB[1]	UNICEF	HOC	II
Haiti–9	Public Health Laboratory	1953–	PASB		HHP	II
Haiti–10	Training of Midwives	1955–	WHO	UNICEF	EPE	II
Haiti–11	Physical Rehabilitation	March–Sept. 1956	WHO	ICA	HCD	II
Honduras–4	Rural Public Health Services	1955–	UN/TA	UNICEF	HHP	III
Honduras–5	BCG Vaccination	1956–	UN/TA	UNICEF	HCD	III
Jamaica–5**	UN/TA Public Health Administration Fellowships	1954–	UN/TA		EFS	I(FOC)
Jamaica–7	WHO Public Health Administration Fellowships	1956–	WHO		EFS	I(FOC)
Mexico–12	National University School of Nursing	1954–	PASB		EPE	II
Mexico–13*	Venereal Disease Training Course	1953–	PASB		EPE	II
Mexico–15*	Maternal and Child Health Services	1954–	WHO	UNICEF	HHP	II
Mexico–18	WHO Public Health Administration Fellowships	1954–	WHO		EFS	II

* Zone and/or Washington Office advice only in 1956.
** Under previous years' awards.
[1] Special fund for malaria.
[2] Grant for equipment from Kellogg Foundation.

Project List—Continued

Code	Title	Duration	Funds in 1956	Cooperating Agency	Technical Branch	Zone
Mexico–20	Virus Center	1954–	WHO		HCD	II
Mexico–22	Integrated Health Services (Guanajuato)	1955–	WHO	UNICEF	HHP	II
Mexico–53	Malaria and A. aegypti Eradication	1949–52 1954–	UN/TA PASB[1]	UNICEF	HOC	II
Nicaragua–3	Rural Public Health Services	1954–	UN/TA	UNICEF	HHP	III
Nicaragua–5	Nursing Education	1955–	WHO		EPE	III
Nicaragua–6**	WHO Public Health Administration Fellowships	1955–	WHO		EFS	III
Panama–1	Public Health Services	1952–	UN/TA	UNICEF	HHP	III
Panama–7**	WHO Public Health Administration Fellowships	1955–	WHO		EFS	III
Paraguay–1	Malaria Eradication	1948–	UN/TA	UNICEF	HOC	VI
Paraguay–7	BCG Vaccination	1954–56	WHO	UNICEF	HCD	VI
Paraguay–9	Leprosy Control	1954–	WHO	UNICEF	HCD	VI
Paraguay–10	Public Health Services	1955–[3]	UN/TA	UNICEF	HHP	VI
Peru–13*	Public Health Demonstration and Training Center (Callao)	1952–	UN/TA	UNICEF	HHP	IV
Peru–16*	Diphtheria-Pertussis Vaccination	1953–	WHO	UNICEF	HCD	IV
Peru–21**	WHO Public Health Administration Fellowships	1954–	WHO		EFS	IV
Peru–22	Public Health Services	1956–	UN/TA		HHP	IV
Surinam–3	BCG Vaccination	1955–	WHO	UNICEF	HCD	I(FOC)
Trinidad–5	UN/TA Public Health Administration Fellowships	1956–	UN/TA		EFS	I(FOC)
United States–6	Treponema Pallidum Immobilization Test (TPI Study, Health Research Inc.)	1953–	PASB		HHP	I(WO)
United States–7	WHO Public Health Administration Fellowships	1955–56	WHO		EFS	I(WO)
United States–8	Mental Health	April-June 1956	WHO		HHP	I(WO)
Uruguay–5	Rural Health Services	1955–	UN/TA	UNICEF	HHP	VI
Venezuela–1	Local Health Services	1955–	UN/TA		HHP	IV
Venezuela–4**	UN/TA Public Health Administration Fellowships	1954–	UN/TA		EFS	IV
Venezuela–52	Venereal Disease Laboratory (2nd phase)	1955–	PASB		HCD	IV
AMRO–1	Environmental Sanitation Training	1952–	WHO		EPE	WO
AMRO–6	Joint Field Mission on Indigenous Populations	1952–	UN/TA	UN ILO/FAO UNESCO	HHP	IV
AMRO–7	Malaria and A. aegypti Eradication (Central America and Panama)	1950–	UN/TA PASB[1]	UNICEF	HOC	III
AMRO–8	Malaria and A. aegypti Eradication (Caribbean)	1952–	UN/TA	UNICEF	HOC	I(FOC)

* Zone and/or Washington Office advice only in 1956.
** Under previous years' awards.

[1] Special fund for malaria.
[3] Formerly operated from 1950 under separate projects.

Project List—Continued

Code	Title	Duration	Funds in 1956	Cooperating Agency	Technical Branch	Zone
AMRO–10	Inter-American Program for Education in Biostatistics	1952–	UN/TA		HCD HCE	WO–VI
AMRO–17.3	Waterworks Training Course	Sept.-Oct. 56	WHO		HES	WO–II
AMRO–18	Medical and Public Health Education	1953–	WHO		EPE	WO
AMRO–23.4	Fourth Regional Nursing Congress	Sept. 9-15, 1956	WHO		EPE	I(WO)
AMRO–28	Advanced Nursing Education	1955–	WHO		EPE	WO–VI
AMRO–29	Cultural Anthropology (Central America and Panama)	1953–56	WHO		HHP	III
AMRO–35	Fellowships (Unspecified)	1953–	PASB		EFS	WO
AMRO–43*	Hydatidosis Control	1953–	PASB		HCD	VI
AMRO–45	Laboratory Services	1955–	WHO		HCD	WO
AMRO–47	Yaws Eradication and Syphilis Control (Caribbean)	1954–	UN/TA	UNICEF	HCD	I(FOC)
AMRO–49.2	Seminar on Teaching of Preventive Medicine	April-May 1956	WHO		EOC	WO–II
AMRO–50	Fluoridation of Water	1956–	UN/TA		HES	WO
AMRO–54	Assistance to INCAP	1949–	PASB WHO		HHP	III
AMRO–57	Yellow Fever Studies	1952–	PASB	GML	HCD	III
AMRO–58	Leprosy Control (Caribbean)	1955–	WHO		HCD	I(FOC)
AMRO–60	Smallpox Eradication	1951–	PASB	UNICEF	HCD	WO
AMRO–61	Rabies Control	1954–	WHO		HCD	WO–II
AMRO–67	Veterinary Medicine Education	1955–	WHO		HCD	WO
AMRO–68	Survey of Pediatric Education	1955–56	WHO		EOC	WO
AMRO–72	Dental Health	1954–	PASB	KF	HHP	WO
AMRO–74	Plague Investigation	1954–	PASB		HCD	IV
AMRO–76	Vaccine Testing	1954–	WHO		HCD	WO
AMRO–77	Pan American Foot and Mouth Disease Center	1951–	OAS/TA		HCD	WO–V
AMRO–81	Zoonoses Center for the Americas	1956–	UN/TA	FAO PASB	HCD	WO–VI
AMRO–83	Typhus Control (Bolivia-Peru)	1951–	PASB	UNICEF Tulane Univ.	HCD	IV
AMRO–84	Zoonoses Control	1955–	UN/TA		HCD	VI
AMRO–85	Latin American Center for Classification of Diseases	1955–	WHO		HCD HCE	WO–IV
AMRO–86	Health Statistics	1955–	WHO		HCD HCE	WO
AMRO–88	A. aegypti Eradication	1954–	PASB		HOC	WO

* Zone and/or Washington Office advice only in 1956.

[4] Grants received in 1956 from: E. I. duPont de Nemours and Co.
Howard University
Instituto Agropecuario, Guatemala
Kellogg Foundation
Merk and Company
National Institute of Health
Nutrition Foundation
National Livestock and Meat Board
National Research Council
PASB
Rockefeller Foundation
SCIDA
Williams Waterman Fund
WHO

Project List—Continued

Code	Title	Duration	Funds in 1956	Cooperating Agency	Technical Branch	Zone
AMRO–90	Eradication of Malaria (COMEP)	1955–	PASB		HOC	WO
AMRO–91	Seminar on Application of International Sanitary Regulations	1955–	WHO		HCD HCE	WO–IV
AMRO–92*	Poliomyelitis	1955–	PASB		HCD	WO
AMRO–93	Health Education	1955–	WHO	ICA	HHP	WO
AMRO–94	Diarrheal Diseases in Childhood	1956–	PASB		HHP	WO
AMRO–95	Environmental Sanitation (Caribbean)	1956–	UN/TA	UNICEF	HES	I(FOC)
AMRO–103	Seminar on Treponematosis Eradication	Oct. 21-27, 1956	WHO		HCD	WO
AMRO–105	Field Studies of Dieldrin and Other Insecticides	1956–	PASB	SHELL Co.	HOC	WO–II
AMRO–106	Meeting of International Advisers to Integrated Health Projects	1956–	PASB		HHP	WO–III
AMRO–108	Sanitation of Travel Centers	1956–	PASB		HES	WO
AMRO–109	Malaria Eradication—Supplemental Assistance to Country Projects	1956–	PASB		HOC	WO
AMRO–112	Fundamental Education Training Center (CREFAL)	(1951–1953) 1956–	UN/TA	UNESCO ILO/FAO UN/OAS	HHP	WO–II
Inter-Regional–7	Field Trials in Rabies Treatment	1952–	WHO	USPHS	HCD	
Inter-Regional–8	Brucellosis Centers	1951–	WHO		HCD	
Inter-Regional–10	Influenza Centers	1948–	WHO		HCD	
Inter-Regional–11	International Treponematosis Centers (Johns Hopkins, Baltimore)	1953–	WHO		HCD	
Inter-Regional–13	International Shighella Centers	1954–	WHO		HCD	
Inter-Regional–14	Poliomyelitis	1954–	WHO		HCD	
Inter-Regional–15	Standardization of Virus and Rickettsial Tests	1954–	WHO		HCD	
Inter-Regional–18	Malaria Conference AMRO/EURO (Athens)	June 11-19, 1956	WHO		HOC	
Inter-Regional–38	Anti-malaria Drugs in Food	1956–	WHO	USPHS	HOC	

* Zone and/or Washington Office advice only in 1956.

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SUGGESTED CRITERIA FOR EVALUATING CERTAIN TYPES OF TECHNICAL ASSISTANCE PROGRAMS

NEAR EAST FOUNDATION
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FOREWORD

Those responsible for technical assistance operations are inevitably faced with the problem of how properly to evaluate their programs. For only through sound evaluation can they discover what actually has been accomplished and determine future refinements.

Since technical assistance programs must be adapted to and are influenced by, the circumstances of the particular communities they serve, they must take into account two important factors. One is that a rigidly detailed plan of operations designed in advance to guide the work may be insensitive to experience and opportunities which are only uncovered as the program unfolds. The other is that the exigencies of the local situation may induce an operation actually at variance with the goals the technician believes he is pursuing.

To avoid these dangers it is necessary continuously to appraise program effectiveness. The statement that follows is a brief presentation of Near East Foundation's practices in this field. It is built upon the organization's twenty-six years of experience in twelve Near Eastern countries. Most of the programs have been in the field of rural development, since it is the farm and village population that supports the national economy and comprises nearly 85% of the area's inhabitants.

Although these criteria are oriented toward the rural problem, in principle they have been found applicable to many other types of technical assistance effort. While they are still far from perfect the Foundation has found them useful and effective in appraising its own work.

The approach followed in developing these criteria is that of having the operator state his own program procedures and objectives and then appraising his effectiveness in attaining these goals. Other forms of evaluation may use different methods but Near East Foundation has found the one presented on the following pages quite useful for most of its needs. We are happy to share this experience with others who face similar responsibilities.

John S. Badeau
President

February, 1957

NEAR EAST FOUNDATION

SUGGESTED CRITERIA FOR EVALUATING CERTAIN TYPES OF TECHNICAL ASSISTANCE PROGRAMS

The following outline presents briefly suggested criteria for evaluating the effectiveness of technical assistance programs of the type normally undertaken by Near East Foundation.

I. Program Objectives as stated by the Operating Agency

A. Long range objective

1. To raise the level of live in under-developed areas through assisting the local government and/or the community to develop its own indigenous services for social betterment

B. Immediate objectives

1. Through pilot projects (in specially designated fields) conducted in cooperation with local government and community agencies, to discover and demonstrate the techniques effective in raising the living standards of the area by -

a. Improving the economic situation (the agriculture in rural sections)

b. Reducing the incidence of disease through elemental sanitation measures

c. Raising the standard of home and family life

d. Reducing illiteracy (where this is a factor)

e. Meeting some of the cultural and leisure-time needs through appropriate recreational activities (reading rooms, community centers, youth clubs, dramatics, slides or moving pictures, athletics etc.)

The extent to which the above goals are reached serves as an indication of the effectiveness of the type of services demonstrated

II. Procedures followed in attaining these objectives

A. Working cooperatively - helping people to help themselves

1. At the government level

a. Official invitation required from Government before undertaking work in an area

b. Invitation supplemented by a memorandum of agreement thus involving the local ministries and services on an increasing scale and insuring maximum cooperation from the beginning

2. At the community level

a. Requiring maximum participation of labor and supplies in all home, farm and community activities

II. Procedures followed in attaining these objectives (continued)

B. Conducting all major programs in the form of demonstrations or pilot projects in restricted areas

1. Within this area, instruction carried directly to the people where they live through appropriate forms of extension-education

a. Making available to the people basic information already at hand

b. Engaging in experimentation and research only when the most basic information is either lacking or too unreliable for program purposes

2. The various elements of improvement added one by one until a fully rounded, comprehensive approach is attained

a. The order of these steps is dictated primarily by the conditions and needs to be found in the demonstration area. Nevertheless, experience has shown that the economic factor is basic and usually needs to be included in the first steps of program construction, while home improvement, which may be affected by the religious heritage, can frequently be left until later

3. Once the complete program is functioning all the forces of improvement are focused simultaneously in a unified, co-ordinated manner on the program of improvement within the demonstration area or areas

C. Normal evolution of most programs

1. The exploratory stage - during which the work is kept fluid while the local situation is carefully studied and a practical approach to the over-all problem is determined

2. The period of demonstrations - during which the essential features of a fully rounded program are gradually incorporated, a methodology developed and leaders trained

3. The period of integration - when chief emphasis is given to the task of assisting in the development of appropriate government agencies to become progressively able to assume responsibilities for a national service in the particular field or fields under consideration

It is important to keep in mind that there is no clear-cut line of demarkation between each of the above stages but rather twilight zones running throughout. The beginnings of step three may in the fact be made during the first stage or even before that in the preliminary arrangements

II. Procedures followed in attaining these objectives (continued)

D. During demonstration stage, training of local staff a major activity in order to insure skilled field workers and capable directors for the continuing work

1. For such training the technique of in-service or on-the-job instruction has been found to be most effective for retarded areas

2. Selected products of such training after several years of successful experience sent on for advanced education to higher institutions of the country or to America (for not more than one year)

III. Questions by which theeffectiveness of program activities may be evaluated

A. To what extent are the various forces of improvement focused on the people within a restricted area and to what extent are these forces scattered, thus negating a balanced or comprehensive approach even though on paper this principle appears to be carried out

1. Example: Agricultural work in one place and sanitation in another

B. To what extent is experimentation and/or research restricted to the basic operational needs of the program

C. To what extent are demonstrations that are conducted located on the farms or in the homes of the villagers themselves and made an integral part of the extension program

D. To what extent do the local workers in the various aspects of the program (agricultural, sanitation, home welfare etc.) live among the people they are attempting to serve

E. In dealing with people at the community and home level to what extent do the field workers appear to understand the philosophy of starting where the people are and utilizing such resources of labor, materials and supplies as they have

F. In carrying out the program activities is the local staff dependent on motorized transportation to such an extent that the government will have difficulty in financing such work when it is applied on a country wide basis

G. To what extent are the extension methods that are in process of development not only effective but economical in cost of application

1. If the program is at such a stage that the methods are not yet sufficiently refined for countrywide application, is practicability and economy of application obviously an objective in the minds of the American directors

III. Questions by which the effectiveness of program activities may be evaluated (continued)

H. To what extent are the services that are being demonstrated or integrated designed anew as a result of outside or American influence instead of revitalizing or redirecting or broadening the objectives of traditional services; in other words, proceeding with what is found at the government level very much as is done at the field level

I. Where would the service that is being demonstrated or integrated fall in the following classification

1. Very largely a reproduction of the American system

2. Comparatively new structure designed by foreigners (Americans) and supported by nationals who see in this development new openings created, better salaries for themselves or greater opportunities for professional advancement

3. A revitalizing or redirection of traditional services drawing upon certain modern features adapted from American or European systems as a result of well-trained and experienced nationals combining forces with well-trained, experienced and objective Americans

J. To what extent is the N.E.F. dollar supplemented and/or multiplied within the demonstration area?

1. If N.E.F. funds are supplemented to any considerable degree (within the demonstration) does the organization still retain control of the program?

a. Is the central government or the local community financing the project to such an extent that N.E.F. ought to relinquish more or all of the responsibility for the activity?

K. What activities are undertaken outside of the demonstration area

1. In case of such outside activities who finances the project - N.E.F. or local sources

2. To what extent are the American specialists used to foster such expanding influence through advice and counsel

L. How much of the N.E.F. overseas budget (of a given area) goes into operations and how much into overhead?

1. Office, clerical staff, transportation, etc.

III. Questions by which the effectiveness of program activities may be evaluated (continued)

M. Relative to programs which are said to be in the demonstration stage, what point have these reached in their development

1. Have all elements of the program been added or are certain features still lacking - if so, what

2. In the case of the various features that are included in the program, to what extent are they reaching all corners of the demonstration area

N. In the case of projects that are considered to be ready for integration

1. To what extent is the program of a type that is likely to be taken over and promoted by the government in the near future

2. What measures are being taken to get the work incorporated into the government system

3. What follow-up is provided or visualized in order to protect the work through this delicate period of transferring responsibility to government

4. To what extent has the demonstration produced highly skilled nationals to be bequeathed to the country as capable directors and field workers for the continuing programs

O. In the case of the Iran demonstration, what should be the role of the foreign agency (Near East Foundation) if Iran should come into possession of considerable sums from one source or another for technical developments
(Assuming that the Foundation has the means to render whatever service is indicated)

H. B. Allen
Director of Programs
Near East Foundation

February, 1957

WORLD-WIDE MALARIA DISTRIBUTION, PREVALENCE, AND CONTROL

PAUL F. RUSSELL
The Rockefeller Foundation

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WORLD-WIDE MALARIA DISTRIBUTION, PREVALENCE, AND CONTROL[1]

PAUL F. RUSSELL

The Rockefeller Foundation

Among all the plagues that afflict mankind, malaria has long been a leader. Today it is under an attack so widespread and determined that one can safely predict an early end to its supremacy. This paper discusses the world distribution and prevalence of malaria and the status of its control.

WORLD DISTRIBUTION

Very likely, malaria reached its maximum world coverage sometime between 1880, when it was endemic in southern Canada, and 1920 when it approached the Arctic Circle in Russia. Hirsch (1883) set the northern limit of malaria in the Americas at Kingston, Ontario, on the shore of Lake Ontario (48° 8′ N.) with occasional epidemics at Lake St. Peter on the St. Lawrence River (48° 10′ N.). Davidson (1892) stated that "Kingston and Toronto, situated on Lake Ontario, are undoubtedly malarious, although in a minor and diminishing degree." Hackett (1949) noted that during the unusually hot summers of 1920–21 malaria occurred on the Dvina River near Archangel (64° N.); also that each year between 1935 and 1938 more than a thousand fresh infections were reported from Krasnoborsk (61° 30′ N.). Since that pandemic, malaria has been retreating in Europe and also in America, notably during the past ten years, even dramatically in some areas.

At present the front lines of malaria are deployed somewhat as follows:

North America: The northern limit of malaria endemicity today may be said to be along the Rio Grande River at about 30° N. latitude.

South America: Malaria is not endemic in Uruguay and has only minimal prevalence in northeast Argentina. It still occurs in southeast Brazil but has been eradicated from Chile. Latitude 30° 20′ S. is approximately the southern limit.

Europe: Malaria is mildly endemic in the Netherlands and Germany, at approximately 52° 30′ N. Whether or not malaria now occurs in the USSR north of this latitude, I do not know.

Asia: Paucity of data makes it difficult to determine the northern limit of

[1] Malaria data in this paper refer to 1955 and often do not take note of considerable advances in 1956. It must also be emphasized that most malaria statistics are not accurate. Estimates from official sources vary remarkably for the same areas and time periods. Consequently, the figures given in this paper are to be taken as *indices* of the malaria situation in each country. The author made sustained efforts to obtain through personal visits, personal communications, a search of reports published and unpublished, and conferences with officials of governments and of WHO, UNICEF, and ICA, the most reliable estimates possible for each country. He believes that although the figures themselves are seldom strictly accurate, they do in fact give a reliable indication of the malaria situation as it was at the end of 1955.

malaria in Asia. But in the past it has been endemic in Irkutsk on Lake Baykal, at approximately 52° 30′ N.

Africa: The southern limit of malaria endemicity is probably about 29° 30′ S. on the Umvoti River, just south of Stanger, in eastern Natal. Malaria is endemic in the Canary, Cape Verde, Madagascar, Comoro, Réunion, and Mauritius Islands. The Medical Department of the Seychelles has reported that there are no anophelines and no malaria in the islands.

Australia: Malaria is only mildly if at all endemic in northern Australia at the present time. Certainly, it does not occur south of 20° S.

Oceania: In the central and south Pacific region, such islands as the Galapagos, Marquesas, Fiji, Samoa, Tonga, Cook, Hawaiian, New Caledonia, New Zealand, Marshalls, Marianas, and Carolinas are entirely without *Anopheles* and so are free of malaria. On Guam, *Anopheles subpictus indefinitus* appeared during World War II but no malaria transmission has occurred there. Most other islands of Oceania are highly malarious.

Malaria has occurred as high as 2770 meters (9086 feet) in the Cochabamba region of Bolivia, at 2591 m. (8500 ft.) near Londiani in Kenya, and at 2850 m. (9348 ft.) in Tadzhik SSR, south central Asia. It is still endemic in the Dead Sea basin at 400 m. (1312 ft.) below sea level.

WORLD PREVALENCE

As to the prevalence of malaria, the reliability of data is often so poor that one must take into account personal acquaintance and collateral evidence as well as formal reports. In the world's total population of some 2.653 billions, I estimate that, including communist China and the countries behind the Iron Curtain, probably no fewer than 1,070.280 millions live in areas where malaria is still, or has been within recent years, endemic. (See Table No. 1).

According to reports and estimates it seems that, throughout the world in 1955, some 375 millions were being routinely protected to some degree from malaria. (See Tables 1, 2, 5–14, 16–18.) This control varied from minimal to complete. How many cases of malaria occurred in 1955 among the some 695 millions living in unprotected or poorly protected endemic areas, we can only guess. We know that in the 1930's, when India's population was about 350 millions and malaria control was not common, competent observers like Sinton were estimating that some 100 million cases of malaria occurred each year, resulting in a million deaths. This was an incidence rate of about 29 per cent. All degrees of endemicity were known, under a great variety of climatic conditions. If we use this percentage figure as a basis, we may estimate that nearly 200 million cases of malaria occurred among the 695 millions exposed. Allowing for cases in so-called protected areas, it seems not unreasonable to estimate that in 1955 there were from 200 to 225 millions of cases of malaria in the world, with more than 2 million deaths due to the disease. Previous estimates have ranged from 250 to 350 million cases (Russell, 1952; Pampana and Russell, 1955).

TABLE 1

Malaria estimates: world summary

Locality	Population	Population in Malarious Areas	Population Routinely Protected	Population Poorly or Not at all Protected
North America	216.739	79.779	62.061	17.718
West Indies	17.537	8.491	5.266	3.225
South America	121.018	51.698	27.369	24.329
Totals, Americas	355.294	139.968	94.696	45.272
Northern and Northeastern Africa	73.347	35.308	14.536	20.772
Central and Western Africa	84.251	82.513	7.726	74.787
Southern Africa	32.843	21.445	6.893	14.552
Eastern Africa	20.375	17.862	.780	17.082
Totals, Africa	210.816	157.128	29.935	127.193
Totals, Europe	404.829	41.991	34.666	7.325
Near East	57.257	37.908	20.257	17.651
Arabian Area	13.272	9.840	1.122	8.718
Middle Asia	533.239	373.097	125.142	247.955
Far Eastern Asia	849.582	258.629	31.598	227.031
Totals, Asia	1,453.350	679.474	178.119	501.355
Totals, Oceania	14.268	1.719	.097	1.622
Totals, USSR	214.500	50.000	37.000	13.000
Totals, World	2,653.057	1,070.280	374.513	695.767

Notes: 1. Figures in millions.
2. Data summarized from Tables 2, 5–14, 16–18.

REGIONAL DISTRIBUTION, PREVALENCE, AND CONTROL

North America (Table No. 2)

Canada: malaria is no longer endemic in Canada although the vector *quadrimaculatus* is found in the southern fringes of Quebec and in Ontario from the Ottawa Valley southwards to Lake Erie. *Freeborni*, another vector, is present in small numbers in British Columbia.

United States: malaria has almost completely ceased to be endemic in the continental United States, although the former vectors, *quadrimaculatus* in the southeast and in the Mississippi Valley, and *freeborni* in California, are still prevalent. During 1954, there were only 8 confirmed primary indigenous cases and in 1955, only 4 (provisional figure). This is in sharp contrast to the findings

of von Ezdorf (1915, 1916) some 40 years ago, when 11 southern states reported a total of more than 780,000 cases of malaria. Von Ezdorf estimated that malaria deaths varied from one in each 50 cases in highly endemic areas, to one in every 300 cases where endemicity was mild. The following tables, Nos. 3 and 4, display data for the years 1948–1955. (Courtesy CDC, USPHS.)

TABLE 2

Malaria estimates: North America

Locality	Population	Population in Malarious Areas	Population Routinely Protected
Alaska	208	0	—
Bermuda	40	0	—
British Honduras	77	75	40
Canada	15,195	0	—
Canal Zone	54	54	54
Costa Rica	915	350	265
El Salvador	2,122	1,282	1,282
Greenland	25	0	—
Guatemala	3,149	1,374	557
Honduras	1,608	1,203	316
Mexico	28,849	16,000	836
Nicaragua	1,202	1,000	670
Panama	886	650	250
U.S.A.	162,409	57,791	57,791
Totals	216,739	79,779	62,061

Notes: 1. Figures in thousands.
2. Population data from *U.N. Demographic Yearbook*, 1955. These are estimated 1954 mid-year, unless otherwise noted.
3. Malaria data from Alvarado (1954) and others.

TABLE 3

Malaria morbidity reported and cases appraised in the United States, 1948–1955

Year	Number of Cases Reported (a)	Cases Appraised		
		Number	Fully confirmed as malaria	
			Total	Primary indigenous malaria
1948	9,797	770	242	—
1949	4,231	514	60	17
1950	2,227	713	30	6
1951	5,600	1,874 (c)	1,272	14
1952	7,023	3,098 (c)	2,707	33
1953	1,310	449	217	29
1954	715	130	97	8
1955	477 (b)	64 (b)	29 (b)	4 (b)

(a) Source-National Office of Vital Statistics, USPHS.
(b) Provisional only.
(c) Majority of cases were US Army Korean veterans.

TABLE 4

Location of confirmed primary indigenous cases of malaria in United States, 1953–1955. (Courtesy CDC-USPHS.)

Year	State	Cases	Comments
1953	California	24	Camp Fire Girls. Source-Korean veteran
	California	1	Source unknown
	Georgia	1	Source—Georgia
	Maryland	1	Source—Maryland
	Mississippi	1	Source—Mississippi
	S. Carolina	1	Source—Unknown
1954	Arizona	4	Children of one family. Source Korean veteran
	Arizona	1	Not associated with preceding
	S. Carolina	1	Source—Alabama?
	Mississippi	1	Source—Mississippi or Alabama
	Mississippi	1	Source—blood transfusion
1955	California	2	Separate in time and place. Source?
	Arizona	1	Source?
	Illinois	1	Source—blood transfusion

Mexico: the most extensive and severe malaria problem of the Americas is found in Mexico where 836 thousands of the estimated 16,000 thousands living in endemic areas have been under routine protection. Average annual malaria death rates in excess of 200 per 100,000 population have been noted in some States. Over 22,000 malaria deaths were reported in 1953. The vectors are *albimanus* in the coastal lowlands and in the valleys of large rivers; *darlingi* suspected in Yucatan; *aztecus* transmitting on the tableland; *pseudopunctipennis* at low and moderate elevations under semiarid and subtropical conditions. Roughly two-thirds of Mexican malaria is due to *P. vivax* and most of the rest to *P. falciparum*. A nation-wide malaria eradication project was inaugurated in Mexico in 1955 that will eventually involve the residual spraying of some 3.098 million homes and the expenditure of some $6.773 millions, in the years of maximum endeavor.

Guatemala: some 557 thousands of the 1,374 thousands living in malarious areas of Guatemala are under routine protective DDT spraying. The disease is endemic in all regions of the country, transmitted chiefly by *albimanus* and *pseudopunctipennis*, with some assistance from *darlingi*.

British Honduras: malaria has been a serious problem in British Honduras but is now under strong attack and is decreasing rapidly in incidence. More than half of those living in malarious areas are under routine protection. *Albimanus* has been the chief vector, with assistance from *darlingi*.

Honduras: in 1942–43, malaria was first among causes of death in Honduras and the disease has been widely and severely prevalent. But routine DDT house-spraying of more than 50,000 homes has sharply reduced malaria morbidity. *Albimanus* has been the chief vector.

El Salvador: all of the 1,282 thousands living in malarious areas of El Salvador are under routine protection by DDT spraying. The disease, formerly widespread,

has been sharply curbed. The vectors have been *albimanus* and *pseudopunctipennis*. A country-wide reconnaissance in 1940 indicated a fairly even division in the relative prevalences of *P. vivax*, *malariae*, and *falciparum*.

Nicaragua: more than half of those exposed to malaria in Nicaragua are under some DDT residual-spraying protection. The vectors are *albimanus* and *pseudopunctipennis*.

Costa Rica: malaria has been widely endemic in Costa Rica and it has sometimes been the second most important cause of death. A DDT residual spraying project was started in 1946 and now covers some 75 per cent of all malarious communities. There has been a sharp drop in incidence; for instance, malaria cases treated dropped from 3,222 in 1942, to 283 in 1952. *Albimanus* has been the chief vector. A country-wide reconnaissance in 1939 indicated that *P. vivax*, *malariae*, and *falciparum* are about equal in prevalence in the country.

Panama: malaria is now uncommon in the Canal Zone and in the urban areas of the Republic but is still prevalent in rural areas. However, active DDT residual spraying has greatly reduced the incidence. The program covers 44,000 houses, protecting some 250 thousands. *Albimanus* and *punctimacula* have been the chief vectors (Dehne, 1955)

West Indies (Table No. 5)

Bahamas: the Bahamas (and Bermuda) have always been relatively exempt from malaria although imported cases have not been uncommon.

Barbados: malaria is not endemic now in the Barbados.

Cuba: malaria has not been a major problem in Cuba, although yearly epidemics have occurred in localized areas. The disease still persists in some areas involving a population of some 650 thousands and controlled to some extent by drainage and larviciding. Rapid eradication seems possible if, as planned, residual DDT spraying is applied to some 120,000 homes. *Albimanus* has been the chief vector, possibly assisted at times by *crucians* and *vestitipennis*. Infections have been nearly evenly divided between *P. vivax* and *falciparum*.

Dominican Republic: malaria is no longer a serious problem in the Dominican Republic where some 160 thousand homes are routinely sprayed with residual DDT, protecting half the population at risk. Eradication should be achieved in the next few years. *Albimanus* has been the vector and *falciparum* malaria has predominated. In some areas *P. malariae* has constituted 10 per cent of the infections.

Guadaloupe: malaria in Guadaloupe is transmitted by *aquasalis*, *albimanus*, and *argyritarsis*. Some 200,000 live in endemic areas and the disease has been a serious problem. A control project was started in 1950 that included not only DDT and BHC house-spraying but also larviciding in water-courses and marshes, and some active chemoprophylaxis, which in 1952 was applied to 24,257 children. Results have been excellent, worker output has improved, and absenteeism has decreased (Sautet and Aldighieri, 1954).

Haiti: there is still a large malaria problem in Haiti, where some 1,007 thousands of the 1,700 thousands at risk are being protected with residual DDT spraying. Financial considerations have delayed expansion of the control program. *Albimanus* is the chief vector. Parasite indices have been as high as 50 per cent, with *P. falciparum* predominating.

TABLE 5

Malaria estimates: West Indies

Locality	Population	Population in Malarious Areas	Population Routinely Protected
Bahamas	90	0	—
Barbados	225	0	—
Cuba	5,807 (a)	650	50
Dominican Republic	2,347	2,200	1,100
Guadaloupe	229	200	78
Haiti	3,506	1,700	1,007
Jamaica (b)	1,533	1,250	910
Leeward Islands (c)	124	20	20
Martinique	239	230	100
Netherlands Antilles	184	0	—
Puerto Rico	2,229	1,280	1,280
St. Pierre and Miquelon	5	0	—
Trinidad and Tobago	698	698	592
Virgin Islands (d)	24	0	—
Windward Islands (e)	297	263	129
Totals	17,537	8,491	5,266

Notes: 1. Figures in thousands.
2. Population data from *U.N. Demographic Yearbook*, 1955. These are estimated 1954 mid-year, unless otherwise noted.
3. Malaria data from Alvarado (1954) and others.
4. (a) 1953; (b) including Cayman Islands, Turks and Caicos Islands; (c) including Antigua, Montserrat, St. Kitts-Nevis and Anguilla, and Virgin Islands (U.K.); (d) U.S.A.; (e) including Dominica, Grenada, St. Lucia, and St. Vincent.

Jamaica: malaria is still endemic, but mildly so, on Jamaica where nearly all who live in endemic areas are under routine protection. *Falciparum* and quartan malaria have predominated but *vivax* infections have been uncommon. *Albimanus* is the most common anopheline and the chief vector.

Windward Islands (Grenada, St. Vincent, St. Lucia, and Dominica) and *Leeward Islands* (Antigua, Montserrat, Anguilla, and St. Kitts-Nevis): In these two groups of islands, the chief vector is *aquasalis*, possibly assisted in the Leeward Group by *albimanus*. *Plasmodium falciparum* predominates but *malariae* is common while *vivax* is not. Grenada, St. Lucia, Dominica, and Antigua have been the most malarious, with parasite rates of 8.7, 12.9, 10.4, and 7.8 per cent, respectively. St. Kitts-Nevis, and St. Vincent, have been only mildly malarious, with parasite rates of 1.9, 0.0, and 2.2 per cent, respectively. Montserrat, normally not malarious, experienced an epidemic in 1938–39 (Charles, 1952). Good control with residual spraying is routine. Malaria eradication is almost complete in Antiqua and should be possible throughout the Islands within a few years.

Martinique: there have been serious endemic foci of malaria in Martinique but a residual spraying project including some 24,000 homes is reducing the malaria problem. *Albimanus* is not found in Martinique where the vector is *aquasalis*.

Netherlands Antilles: malaria is not endemic in the Netherlands Antilles.

Puerto Rico: malaria in 1931 was responsible for 3,208 deaths and 47,656 cases, in a population of 1.58 millions but now has been all but eradicated from Puerto Rico. The vector was *albimanus*. In 1954, only 13 cases were reported, 5 in Korean veterans and 3 in sailors in transit. No primary indigenous case was found. Control has been based on residual DDT, case finding, and treatment, aided by some major drainage during World War II.

Trinidad and Tobago: malaria incidence in the Colony of Trinidad and Tobago has sharply declined in the past 10 years under a strong attack that has included DDT residual spraying against *aquasalis* and *albitarsis*, and the spraying of copper sulphate solution on bromeliads on Trinidad to control *bellator* (*neomaculipalpis* may be a minor vector). There was an interesting change in the ratio of *falciparum* to *vivax* on Trinidad from 80.7/18.2 in 1952, to 61.75/36.5 in 1953. The percentage of parasite-positive slides declined from 19.4 to 11.5 per cent. On Tobago, where *falciparum* malaria predominates, and where *aquasalis* is the vector, spleen rates that exceeded 20 per cent in 1941 have fallen to nil in many cases. Residual spraying, larviciding, permanent elimination of major breeding places, antimalaria treatment have all but ended malaria transmission. *Albimanus* does not occur on Trinidad or Tobago.

Virgin Islands: malaria is not endemic in the Virgin Islands.

South America (Table No. 6)

Colombia: the malaria problem in Colombia is the second largest of the Americas, but some 3,100 thousands of the 7 millions at risk are now under more or less routine protection. In the Llanos, *darlingi*-transmitted malaria has long been severe, with natural fluctuations due to periodic waxing and waning of the vector. Residual spraying has reduced spleen and parasite indices in some areas to single figures within a four-year period. *Albimanus*, *albitarsis*, *pseudopunctipennis*, and *punctimacula* all have had a part in the transmission of malaria in Colombia.

Venezuela: malaria was the chief public health problem in Venezuela until recently. It was the chief cause of death annually from 1905 until 1945. But this country has led the way in planning nation-wide malaria eradication and the entire population at risk is now under routine protection. A well-organized Malaria Institute has been the power house of the project. This Institute has also trained a majority of the professional malariologists of Latin America. Great progress has been made towards eradication since the nation-wide project started in 1945. In one large north-central area, where severe and often epidemic malaria, predominately *falciparum*, was transmitted by *darlingi*, *albimanus*, and *albitarsis*, the disease has now been eradicated. Careful and prolonged surveys have checked this area (Gabaldon and Berti, 1954).

British Guiana: the only vector in British Guiana has been *darlingi* which now seems to have been eradicated from the coastal areas by means of residual DDT house-spraying. Consequently, malaria has been all but eradicated in the Counties of Demerara, Beabice, and Essequibo, where 95 per cent of the country's population resides. Small numbers of *darlingi* reappeared in 1951 near a new drainage and irrigation scheme. The reinvasion was quickly stopped with DDT residual spraying but it illustrated the fact that so-called "end points" are deceptive and that sustained surveillance for a number of years is essential before eradication can safely be proclaimed (Giglioli, 1954).

TABLE 6

Malaria estimates: South America

Locality	Population	Population in Malarious Areas	Population Routinely Protected
Argentina	18,742	1,855	1,855
Bolivia	3,162	1,300	411
Brazil	57,098	30,893	13,650
British Guiana	497	430	400
Chile	6,447	0	—
Colombia	12,382	7,000	3,100
Ecuador	3,567	1,420	887
Falkland Islands	2	0	—
French Guiana	28	28	28
Paraguay	1,530	510	25
Peru	9,213	3,773	2,544
Surinam	220	200	180
Uruguay	2,525 (a)	0	—
Venezuela	5,605	4,289	4,289
Totals	121,018	51,698	27,369

Notes: 1. Figures in thousands.
2. Population data from *U.N. Demographic Yearbook*, 1955. These are estimated 1954 mid-year, unless otherwise noted.
3. Malaria data from Alvarado (1954) and others.
4. (a) 1953.

Surinam: malaria is still a problem in Surinam. *Aquasalis* is a probable vector in coastal areas and *darlingi* in the interior, along the savannah belt and near the sea in the extreme east. In coastal regions, *vivax* malaria predominates in some areas and *malariae* in others. Severe *falciparum* malaria is prevalent in the interior. The DDT spraying project does not yet cover half the population at risk.

French Guiana: malaria was severely endemic in French Guiana prior to 1949, affecting the entire coastal population and forested interior. The annual cost of hospitalization for malaria was about a million francs and the disease was responsible for economic stagnation. A DDT residual spraying project was started in 1949 and has been dramatically successful. Malaria hospitalization costs in 1953, for example, had fallen to the low figure of some 65,000 francs. There has been a 98.9 per cent reduction in positive blood smears, and the economic stagnation has vanished. The total costs of the program up to 1954 had been some 8.1 millions of francs and the savings in hospital care and wages earned had been estimated for 1951 alone as some 25 million francs (Floch, 1954).

Brazil: DDT residual spraying has had good success in Brazil against the chief vectors, *darlingi*, *tarsimaculatus*, *albitarsis*, *cruzii*, and *bellator*. An over-all decrease of 95 per cent in malaria incidence has been estimated as due to this spraying program. In coastal regions, malaria eradication has followed two sprayings a year for three years. However, in some areas of the central plateau, *darlingi* attacks man in the open and, moreover, in the west many inhabitants live in wallless shelters. These conditions and in some areas, the out-door resting and feeding habits of *bellator* and other Kertészia species greatly reduce the effectiveness of residual spray. Another problem is found in the western part of the Amazon region where a scattered, primitive population is relatively inaccessible. Here chloroquine has been added to the Government table-salt, the only salt available to the people. This measure has had some initial success (Pinotti, 1954, 1955).

Ecuador: malaria is prevalent throughout the coastal provinces of Ecuador and in many of the interior valleys. *Albimanus* is the chief vector in low-lying coastal areas, assisted by *pseudopunctipennis* and *punctimacula*. In the valleys of the Andes Provinces, *pseudopunctipennis* is the chief and perennial vector. A national antimalaria campaign was started in 1946 and as a result of DDT residual spraying twice a year, malaria incidence and severity have declined considerably. More than 60 per cent of those living in malarious areas are under routine protection. In the low-lying provinces, *P. falciparum* predominates, but *vivax* is most prevalent in the Andean areas, with *malariae* fairly common (Montalván, 1952).

Peru: there is still a severe malaria problem in Peru where the vectors are *pseudopunctipennis*, *albimanus*, and *punctimacula*. Some 2,544 thousands of the 3,773 thousands estimated to be at risk are now under more or less routine protection by residual spraying and in some areas incidence and intensity of the disease have sharply declined.

Bolivia: malaria has long been severe in all but the highest areas of Bolivia. The chief vectors have been *darlingi* and *pseudopunctipennis*. Some 411 thousands of the 1,300 thousands at risk are now under routine DDT spraying protection and malaria indices have sharply fallen.

Paraguay: malaria data from Paraguay are insufficient to make the malaria situation clear but it is estimated that some 510 thousands are at risk and that of these some 25 thousands have had a certain amount of protection. Malaria vectors have not been definitely incriminated but it seems likely that *albitarsis* and *darlingi* are involved. Spleen indices above 50 per cent have been reported.

Chile: malaria used to be endemic in northern Chile, transmitted by *pseudopunctipennis*. An antimalaria campaign was begun in July, 1937, and by 1941 covered the entire endemic area. The advent of DDT helped to consolidate the complete success of the project. Not a single autochthonous case of malaria has been diagnosed in Chile since April, 1945 (Neghme *et al.*, 1955). No adults of the former vector species have been caught since the fall of 1948 but there have been and may still be a few foci of larvae near the Peruvian border.

Argentina: malaria was formerly endemic in northeastern and northwestern Argentina. It has now been eradicated from the Provinces of La Rioja, San Luis, Cordoba, San Juan, and Catamarca, and all but eradicated from the rest of the area. *Pseudopunctipennis* has been the vector and *P. vivax* the predominating parasite.

Uruguay: malaria is not endemic in Uruguay.

Europe (Table No. 7)

Malaria has sharply retreated in Europe during the past 75 years. Hardly a country on the continent was free of endemic malaria in the 19th Century. Sweden, for instance, prior to 1880, often had 5,000 or more cases a year and the disease afflicted Finland and the Baltic States. World Wars I and II resulted in some resurgence of the intermittent fevers in Scandinavia but at present they are rarely seen in Western Europe north of The Netherlands. France and Belgium were highly malarious in some areas before 1875 but only sporadic cases have occurred in the past few years. The marshy region between the estuaries Charent and Seudre on the west coast of France was heavily infested with intermittent fevers during the 17th, 18th, and 19th centuries. Rochefort suffered severely. In a recent period of 15 years some 34 locally contracted *vivax* infections were noted and the vector, *atroparvus*, is still common (Bonnin *et al.*, 1952). The disease remains endemic in Corsica where *labranchiae* is the chief vector, but the incidence has been much reduced in recent years. Switzerland was malarious in certain valleys 75 or 80 years ago but is now free of the disease. Marsh areas of the British Isles, even into Scotland (but never in Ireland), were once quite malarious. There were brief and circumscribed malaria episodes in some of the old foci in England after the World Wars but it is doubtful if the disease can now be called endemic in the United Kingdom. However, between 1917 and 1952, some 566 cases of indigenous malaria were recorded in the British Isles, all but one due to *P. vivax*. The chief vector appears to have been *atroparvus* but no sporozoites have been found in wild-caught specimens. Tree-hole breeding *plumbeus* (or perhaps *claviger*, breeding in tanks) may have transmitted *falciparum* malaria in one case in Liverpool in 1920 and *vivax* malaria in two cases in London in 1953 (Shute, 1954).

Only a single focus of malaria now exists in Western Europe north of the Alps. This is an area of *atroparvus*-transmitted malaria between Amsterdam and Wilhelmshaven in The Netherlands provinces of North Holland, Friesland, Zeeland, and in German East Friesland. North Holland reported 26 autochthonous cases in 1953, 15 in 1954, and 11 in 1955 (Swellengrebel, 1955, 1956, personal communication). No locally contracted cases were reported elsewhere in The Netherlands in 1953 and 1954. Following World War II, more than 100 autochthonous cases of malaria were noted in German northern Westphalia but this focus appears to have faded out.

Portugal and Spain still have endemic, *atroparvus*-transmitted malaria and there is a localized persistent focus of *labranchiae* malaria in a small area of southeast Spain. In Portugal, *vivax* malaria predominates in the north but, frequently, *falciparum* in the south. Over the entire Iberian Peninsula malaria has retreated in response to recent control measures. Spain reported 6,624 cases of malaria in 1953 and 4,340 in 1954 with no malaria deaths (Clavero, 1955, 1956, personal communication). Portugal reported 15,200 positive cases in 1948, 608 in

TABLE 7

Malaria estimates: Europe

Locality	Population	Population in Malarious Areas	Population Routinely Protected
Albania	1,260	1,000 (e)	500 (e)
Andorra	5	0	—
Austria	6,969	0	—
Belgium	8,819	0	—
Bulgaria	7,500 (a)	2,000	2,000
Channel Islands	103	0	—
Czechoslovakia	12,952	1,000	1,000
Denmark (b)	4,439	0	—
Finland	4,190	0	—
France (c)	43,000	145 (d)	145 (d)
Germany	70,000	1,000	1,000
Gibraltar	25	0	—
Greece	7,901	4,500	4,500
Hungary	9,691	1,500 (e)	1,000 (e)
Iceland	154	0	—
Ireland	2,933	0	—
Italy	47,665	10,000	10,000
Liechtenstein	14	0	—
Luxembourg	306	0	—
Malta and Gozo	320	0	—
Monaco	22	0	—
Netherlands	10,615	2,696	2,696
Norway	3,392	0	—
Poland	26,500 (a)	1,000 (e)	500 (e)
Portugal	8,693	950	375
Roumania	17,150	3,000	3,000 (e)
Saar	983	0	—
San Marino	13	0	—
Spain	28,751	8,000	2,750
Sweden	7,214	0	—
Switzerland	4,923	0	—
United Kingdom	51,059	0	—
Vatican City	1	0	—
Yugoslavia	17,267	5,200	5,200
Totals	404,829	41,991	34,666

Notes: 1. Figures in thousands.
2. Population data from *U.N. Demographic Yearbook*, 1955. These are estimated 1954 mid-year, unless otherwise noted.
3. Malaria data from WHO, from personal communications and, as noted, by author's estimates.
4. (a) 1953; (b) including Faeroe Islands; (c) excluding North Africa. See table No. 11; (d) Malaria data refer to Corsica; (e) Author's estimate.

1953, 409 in 1954, and 184 in 1955 (Roque, 1955, personal communication). The disease is still endemic in Spain's Canary Islands but the Balearic Islands, once severely infested, are now nearly free of the disease.

Malaria remains endemic in Poland, Czechoslovakia, Hungary, Bulgaria, Roumania, Jugoslavia, Albania, and the USSR. Data are scarce from these countries but observers have noted that malaria is under attack in each country with some house-spraying and with considerable reliance on compulsory case-reporting, clinical and suppressive treatment. In these countries, it seems likely that *messeae* is the chief vector. In Albania, *sacharovi* and *superpictus* are important and this is also true to some extent in Bulgaria and Roumania.

In Albania, prior to 1933, some 500,000 cases of malaria occurred annually. Spleen rates often exceeded 50 per cent. Residual spraying with DDT has been employed since 1947 and considerable use is made of prophylactic chlorguanide. Spleen rates have fallen sharply in several areas. Some DDT larviciding is done in urban and suburban areas.

Bulgaria also used to have half a million or more cases of malaria yearly but has been using DDT residual spraying since 1949–50 and has enforced compulsory malaria therapy as a prime measure of control. All cases are supposed to receive therapeutic doses of quinine, quinacrine, or Plasmocid (a Russian product resembling plasmochin and probably identical with Rhodoquine). This therapy is followed by two years' prophylactic treatment with Quinoplasmine (a quinine-plasmochin combination). Great reduction in malaria incidence is claimed.

In 1948, Roumania reported some 338,000 cases of malaria. Since then incidence has steadily fallen and in 1954 only 916 cases were recorded (Pampana 1955, 1956, personal communication). All residents of endemic areas are under routine protection by a combination of residual DDT or BHC spraying, therapeutic measures, and mass drug prophylaxis. Quinacrine, chlorguanide, or chloroquine are used therapeutically and collective use of prophylactic quinacrine or chlorguanide is standard practice in all communities exposed to infection.

The USSR (Table No. 8) has been highly malarious in the past in the great river basins extending from the Black and Caspian Seas almost to the Arctic Ocean. In Azerbaidzhan, *maculipennis, superpictus,* and *claviger* (*bifurcatus*) are vectors, chiefly of *vivax* malaria. Elsewhere in the USSR the chief vector is *messeae*. Indirectly, we know that considerable progress has been made in malaria control through compulsory reporting and treating of cases, "collective drug prophylaxis," some house-spraying with BHC or DDT, and some larva control

TABLE 8

Malaria estimates: USSR

Locality	Population	Population in Malarious Areas	Population Routinely Protected
USSR—Europe and Asia	214,500	50,000	37,000

Notes: 1. Figures in thousands.
2. Population data from *U.N. Demographic Yearbook*, 1955.
3. Malaria data are author's estimates, in thousands.

with drainage and larvicides. Residual spraying is sometimes "nidal" or "focal," applied only to houses of malaria patients; sometimes "barrier," applied only to houses nearest a swampy area; and sometimes "blanket," applied to all structures in a community. In some areas, cattle have been sprayed with DDT as a measure of malaria control.

Great strides towards full control of malaria have been made in Yugoslavia, formerly highly malarious in some areas. There were only 992 microscopically diagnosed cases in 1953 and 2,155 in 1954, the increase being largely in Macedonia (Djordjevic, 1955, personal communication). This is in striking contrast to the several hundred thousand cases formerly reported annually.

Italy has practically eradicated malaria. Only 9 primary cases were reported in 1953, 6 in 1954, and in 1955 only 5, of which 2 were quartan malaria following transfusions (Raffaele, 1956, personal communication). These reports covered not only the mainland but also Sicily and Sardinia.

Greece was once one of the most malarious countries outside the Tropics. In 1932 there were 7,042 deaths from malaria with 1,408,400 cases and in 1942 the death toil was 1,856. The incidence of the disease has been greatly reduced by residual spraying. Parasite indices in children averaged 17.2 per cent, 1933–1945 but had fallen to 0.09 per cent in 1954. Laboratory-proven cases totalled 399 in 1952, 1,403 in 1953, 2,350 in 1954 and 1,624 in 1955, the increase after 1952 being due to development of DDT resistance by *sacharovi* (*elutus*). The total number of cases estimated for 1953, and again in 1954, were 12,000 to 15,000. Two malaria deaths each year in 1953 and 1954 were reported from towns of over 5,000 population. In 1955 no deaths from towns of 10,000 or more were reported up to the end of August (Belios, 1955, 1956, personal communication). The vectors are *sacharovi* along the coast, *maculipennis* in the valleys and plains, and *superpictus* along stream beds.

Near East (Table No. 9)

Cyprus: some 500,000 of the 514,000 inhabitants of Cyprus live in areas formerly malarious. In 1937, 18,273 cases were reported and in 1945, 7,686 cases. But the disease was eradicated during a special project started in 1946 and ended in 1950. No autochthonous case has been reported since 1951. Annual parasite indices have been nil since 1953. The chief vectors were *superpictus, sacharovi* and *claviger*. *Sacharovi* appears to have been eradicated. No adult *superpictus* have been taken since 1953 but small numbers of larvae are still found.

Turkey: in times past Turkey has suffered greatly from *sacharovi* and *superpictus* malaria but an extensive control program in operation since 1925 has greatly reduced the incidence in some 14,000 of 30,000 villages where the disease is endemic. Yearly incidence of malaria in the hospitals of the villages under control has declined from some 17,000 in 1942 and again in 1943, to 4,887 in 1953 and 4,229 in 1954. Malaria deaths recorded were 600 in 1942 and 818 in 1943 but had dropped to 19 in 1953 and 21 in 1954 (Pek, 1955, personal communication).

Lebanon: malaria is under good control and should soon be eradicated in 750 villages of Lebanon in which the disease is endemic. The vectors have been

TABLE 9

Malaria estimates: Near East

Locality	Population	Population in Malarious Areas	Population Routinely Protected
Cyprus	514	500	500
Iran	20,721	12,000	3,885
Iraq	4,948	3,000	2,900
Israel	1,688	1,773	1,630
Jordan	1,384	1,185	200
Lebanon	1,383	300	262
Syria	3,670	1,150	240
Turkey	22,949	18,000	10,640
Totals	57,257	37,908	20,257

Notes: 1. Figures in thousands.
2. Population data from *U.N. Demographic Yearbook*, 1955. These are estimated 1954 midyear, unless otherwise noted.
3. Malaria data from personal communications and WHO.

sacharovi and *superpictus* perhaps associated with *claviger* in some areas. *Sergenti*, of importance in Jordan and Israel, has not been proved to be a vector in Lebanon. Prior to 1946 spleen indices were frequently between 70 and 90 per cent. In over 9,000 blood films examined in 1955, only 30 were positive—one *falciparum* and the others *vivax*.

Syria: malaria is still common in Syria but an eradication scheme is now being organized. The vectors are *sacharovi*, *superpictus*, and in the south, *sergenti*. The large cities of Damascus and Aleppo are not malarious but in the rural areas some 1,150 thousands of the 3.67 million population live in malarious areas.

Jordan: some 1,185 thousands of Jordan's 1.38 million population live in malarious areas and the disease is one of the most important causes of morbidity. Control measures are being organized. *Sergenti* presents a real problem in the Yarmouk and Jordan valleys because it seldom enters houses but prefers caves and thus is not amenable to residual spraying. It transmits in October and November principally. *Sacharovi* is the spring and summer vector, *superpictus* transmits chiefly between July and September. *Claviger* is not a vector of any importance in Jordan.

Iraq: some 3 millions of Iraq's 5 millions live in malarious areas but the disease is coming under effective control. Areas under routine protective measures have a population of some 2.9 millions. The principal vectors in Iraq are *stephensi, sacharovi, superpictus,* and *maculipennis*. Formerly, both *stephensi* and *sacharovi* were active in the Shatt al-Arab and Hamman areas of south Iraq, but *sacharovi* has disappeared there since 1948, following control measures. Elsewhere throughout Iraq, *superpictus* is the chief vector, except above 3,000 feet where *maculipennis* alone transmits. *Sacharovi* is important in the alluvial plain and sub-montane communities of central and south-central Iraq. It is often an autumnal vector and in some areas transmits throughout the mild winters (Pringle, 1954, 1955).

Israel: malaria incidence is much reduced in Israel, the total incidence in 1955 being only 94 cases, (Mer, 1956, personal communication). Formerly, malaria occurred in two waves, with peaks each year in July and November. Now the disease has only one peak, coming in October. *Sacharovi* in the coastal zones, which was largely responsible for the summer epidemic, has nearly disappeared. *Superpictus*, the summer vector in hilly areas, has been greatly reduced in numbers. But *sergenti* has increased following development of irrigation and fish ponds. As in Jordan, so in Israel, *sergenti* is little affected by DDT residual spraying because it does not rest on treated surfaces, preferring to rest in caves, although it feeds both indoors and outdoors. September–October is the time of its greatest activity.

Iran: some 12 of Iran's 20.7 millions live in malarious areas and the disease is one of the country's chief health problems. The vectors are *maculipennis* in the northeast, north, northwest, and west; *sacharovi* in the north, northwest, and west; *culicifacies* in the southwest, south, southeast, east, and central; *stephensi* in the southwest, south, southeast, and central; *superpictus* here and there throughout the country. *Fluviatilis*, *multicolor*, and *pulcherrimus* are under suspicion in some communities. A malaria eradication project is being implemented and gives promise of success.

Arabian Area (Table No. 10)

Data are incomplete for the Arabian area so that only wide estimates can be offered as to malaria incidence. The anopheline fauna is African in the west, with *gambiae* an important vector, assisted by *sergenti* and *pretoriensis*. *Culicifacies*, *stephensi*, *sergenti*, and *fluviatilis* are vectors in the east.

Of the 7 millions resident in Saudi Arabia, some 5 millions are nomadic, the rest living in cities and towns. Some 6 millions of the total population are subject to the risk of malaria infection. The Aramco Health Section in Dharhan has carried out good malaria control since 1948 among some 250,000 population. On the west coast, a WHO team began a malaria control demonstration in 1952 and in 1955 did residual spraying in rural towns having a total population of some 100,000 and also did larviciding in Mecca and Gedda for the protection of some 500,000 population (Farid, 1956, personal communication).

TABLE 10

Malaria estimates: Arabian Area

Locality	Population	Population in Malarious Areas	Population Routinely Protected
Aden and Protectorate	800	400 (b)	150
Bahrain Islands	112	110 (b)	100 (b)
Kuwait	200	0	—
Muscat and Oman	550	300 (b)	10 (b)
Qatar	30	0	—
Saudi Arabia	7,000	6,000 (b)	850 (b)
Trucial Oman	80	30 (b)	1 (b)
Yemen	4,500 (a)	3,000 (b)	11 (b)
Totals	13,272	9,840	1,122

Notes: 1. Figures in thousands.
2. Population data from *U.N. Demographic Yearbook*, 1955. These are estimated 1954 midyear, unless otherwise noted.
3. Malaria data from personal communications and WHO.
4. (a) 1949; (b) author's estimate.

Malaria has not been a serious problem in Aden and its Protectorate but there are occasional localized epidemics. The disease is still common in Muscat and Oman but is under good control in the Bahrain Islands. There appears to be no malaria in Kuwait and Qatar. Malaria is one of the principal causes of sickness and death along the Trucial Coast and in Yemen. The disease is most severe in the middle heights, next in the lowlands and least in the highlands. Among the anophelines there, only *gambiae* has been found infected but *adenensis* and *sergenti* are under suspicion (Mount, 1953).

Northern and Northeastern Africa (Table No. 11)

In the Moroccos, Algeria, and Tunisia, the chief vector is *labranchiae*, found in fresh and brackish waters of rivers and marshes. In desert oases *sergenti* is the usual vector, sometimes assisted by *multicolor* which is occasionally the only

TABLE 11

Malaria estimates: Northern and Northeastern Africa

Locality	Population	Population in Malarious Areas	Population Routinely Protected
Algeria	9,369	3,500	1,407
British Somaliland	640	640	10
Egypt	22,651	12,000	8,000
Eritrea	1,000	500	50
Ethiopia	15,000 (a)	5,000 (b)	20 (b)
French Somaliland	63	63	35
Italian Somaliland	1,269	1,200	125
Libya	1,092	300 (b)	15 (b)
Morocco	8,340	2,600	1,936
Spanish Morocco	1,017	75 (b)	10 (b)
Spanish North Africa	143	20 (b)	1 (b)
Sudan	8,900	8,500	2,337
Tangier	183	0 (b)	—
Tunisia	3,680	910	590
Totals	73,347	35,308	14,536

Notes: 1. Figures in thousands.
2. Population data from *U.N. Demographic Yearbook*, 1955. These are estimated 1954 midyear, unless otherwise noted.
3. Malaria data from personal communications and WHO and, as noted, by author's estimate.
4. (a) 1951; (b) author's estimate.

vector, as in the Algerian Quargle Oasis. Malaria is now prevalent and sometimes severe in the coastal belt but also occurs in the high valleys of the Atlas Mountains up to 8,000 feet, probably transmitted by *hispaniola*. Libya has less rainfall and less malaria. *Labranchiae*, present in the northwest is not found in eastern Libya where *sergenti* is the chief vector.

Malaria incidence has declined considerably since World War II in all of these countries. For instance, in Algeria the percentage of malaria cases diagnosed among all cases seen at clinics dropped from 14.33 in 1950 to 7.79 in 1954. Primary malaria cases reported in 1948 totalled 12,741 but were 4,413 in 1954 (Andarelli, 1955, personal communication). In Morocco, 246,171 cases of malaria were reported in 1948 but this figure had fallen to 49,085 in 1954. In every 1,000 consultations in 1948 there were 28.5 diagnoses of malaria but in 1954 only 2.6.

Egypt: malaria is still moderately endemic in Egypt but some 8 of the 12 millions who live in exposed areas are under routine protection. The devastating epidemic due to *gambiae* in 1942–1943 was exceptional. Since February, 1945, when the last *gambiae* was found in south Egypt following an intensive eradication project, this species has not been a source of malaria in the country. The principal oasis vector is *sergenti*, breeding in waste well-water and canals. A secondary vector in oases and the prime carrier elsewhere in Egypt is *pharoensis*, found in still rice-field and surface water. Adults of *pharoensis* are less given to house-haunting in the daytime than those of *sergenti* (the latter is not house-haunting in Jordan). *Multicolor* has often been suspected in Egypt but has not been definitely incriminated.

Sudan: of the 8.9 millions living in Sudan, some 8.5 millions are in areas where malaria is endemic and about 2.3 millions are under routine protection. Malaria remains a serious problem in some parts of this young nation.

Ethiopia: malaria is rare in Ethiopia above 6,500 feet and is not abundant in the 5,500–6,500 foot zone, although epidemics may occur. Below 5,000 feet the disease is widespread and often highly endemic. Spleen rates above 60 per cent are common. The principal season is that following the southwest monsoon, *i.e.*, from late September to mid-December. The disease is predominately epidemic in form except in the relatively few areas where perennial breeding places of the vector exist. Proximity to streams and river beds usually determines the degree of endemicity (Covell, 1955, personal communication). The principal vector appears to be *gambiae* with assistance from *funestus*, *pharoensis*, and *d'thali* in some areas. *P. falciparum* is the predominant parasite.

Africa South of the Sahara (Tables Nos. 12–14)

In most of Africa, south of the Sahara and north of the Union of South Africa, the climate is such that malaria vectors and parasites have assistance throughout the year and transmission is perennial wherever rainfall is well distributed. As latitude increases north and south and as wet zones become savannah and desert, transmission decreases. In general, malaria transmission is perennial along the East and West Coasts and in much of the center where altitude is below 1,400 meters and the latitude between 10° N. and 10° S. The cold Benguela current

TABLE 12

Malaria estimates: Central and Western Africa

Locality	Population	Population in Malarious Areas	Population Routinely Protected
Angola	4,243	4,243	1,300
Belgian Congo	12,264	12,154	1,000
British Cameroons	1,460	1,441	100
British Togoland	423	416	10
Cape Verde Islands	166	111	86
French Cameroons	3,121 (b)	3,121	260
French Equatorial Africa	3,480 (a)	3,480	1,115
French Togoland	1,031 (b)	1,031	56
French West Africa	14,938 (a)	14,500	1,060
Gambia	273	273	20
Gold Coast	4,125	4,125	415
Liberia	1,250	1,250	150
Nigeria	30,300	30,300	1,542
Portuguese Guinea	535	535	10
Ruanda-Urundi	4,262	3,250	462
São Tomé and Principe	53	53	50
Sierre Leone	2,040	2,025	80
Spanish Guinea	205	205 (c)	10
Spanish West Africa	82	0 (c)	—
Totals	84,251	82,513	7,726

Notes: 1. Figures in thousands.
2. Population data from *U.N. Demographic Yearbook*, 1955. These are estimated 1954 midyear, unless otherwise noted.
3. Malaria data from personal communications and from WHO; also, as noted, by author's estimate.
4. (a) 1937; (b) 1952; and, (c) author's estimate.

along the West Coast shortens the transmission season in some areas. From about 1,800 meters to 2,000 meters, malaria is more often epidemic in type.

As Macdonald has pointed out, the most notable aspects of the epidemiology of malaria in equatorial Africa are the intensity and the stability of the disease, due to a short extrinsic incubation period of the parasite and the highly susceptible, relatively long-lived anophelines that regularly feed on man. Malaria is highly endemic along the West Coast from latitude 8° N. southwards to about 10° S.; in the southern part of French Equatorial Africa and the Congo; the central Congo and northwest Angola; in the swampy northern Ovamboland and Okavango areas of South West Africa; in Uganda, Kenya, and Tanganyika below 1,400 meters; in Nyasaland and northern Mozambique below about 1,000 meters; along the East Coast to Natal; in the low veld of the Transvaal and in the bush veld area of Swaziland; in areas of Madagascar. Basutoland has never been malarious. Due to high altitude the climate is cold and malaria vectors are not found (DeMeillon, 1956, personal communication). Endemicity is intense in the greater part of the

TABLE 13

Malaria estimates: Southern Africa

Locality	Population	Population in Malarious Areas	Population Routinely Protected
Basutoland	588	0	—
Bechuanaland	295	180	33
Comoro Islands	169	100	10
Federation of Rhodesia and Nyasaland	6,876	6,200	1,395
Madagascar	4,540 (a)	4,540	3,663
Mozambique	5,975	5,975	622
Réunion	274	230	230
St. Helena	5	0	—
Seychelles	37	0	—
Southwest Africa	447	100 (b)	20 (b)
Swaziland	212	120	120
Union of South Africa	13,425	4,000	800
Totals	32,843	21,445	6,893

Notes: 1. Figures in thousands.
2. Population data from *U.N. Demographic Yearbook*, 1955. These are estimated 1954 midyear, unless otherwise noted.
3. Malaria data from WHO and personal communications, and, as noted, by author's estimate.
4. (a) 1953; and, (b) author's estimate.

TABLE 14

Malaria estimates: Eastern Africa

Locality	Population	Population in Malarious Areas	Population Routinely Protected
Kenya	5,947	4,200	50
Mauritius	530	400	400
Tanganyika	8,196	8,000	230
Uganda	5,425	5,100	50
Zanzibar	277	162	50
Totals	20,375	17,862	780

Notes: 1. Figures in thousands.
2. Population data from *U.N. Demographic Yearbook*, 1955. These are estimated 1954 midyear.
3. Malaria data from WHO and personal communications.

western zone in North Nigeria, Dahomey, Ivory Coast, Gold Coast, French Guinea, and eastern Portuguese Guinea, and in the greater part of Rhodesia.

The Cape Verde Islands are highly malarious, *P. vivax* predominating, transmitted by *gambiae*. It is reported that this species has been eradicated from the island of Sol, the most northeasterly of the group, by DDT residual spraying. Malaria has been reported to be endemic in Teneriffe, Canary Islands, transmitted probably by either *sergenti* or *hispaniola*, both of which are common (Galvan, 1952).

The three most important African vectors are *gambiae*, *gambiae melas*, and *funestus*. Judging by behavior characteristics, *gambiae* may be a complex of species although only *melas* has thus far been differentiated with certainty. Seven others, of the 30 Ethiopian anophelines, have local or secondary importance in malaria transmission, although they are greatly overshadowed by the big three. The seven are *A. brunnipes*, *hancocki*, *hargreavesi*, *moucheti*, *nili*, *pharoensis*, and *rufipes*.

Data regarding morbidity and mortality from malaria in Tropical Africa (see Tables 12–14) are thoroughly inadequate, which is not surprising in view of the inadequacy of medical personnel and facilities. Bruce-Chwatt (1954) in a notable review of the subject reported that investigations in Nigeria indicated that the age-specific mortality figures expressed per 1,000 Africans exposed to risk were as high as 12.5 in infants, 7 in small children, and about 0.5 in older children, adolescents, and adults. On this basis, among the 150 million population some 175,000 children below the age of 15 die each year directly of malaria. What this means as regards morbidity can only be imagined.

Considerable progress in malaria control has been made in the Union of South Africa, Swaziland, in Southern Rhodesia, Madagascar, Mauritius, Réunion, and Egypt but elsewhere the disease is under minimal and often only experimental attack.

TABLE 15

Malaria morbidity and mortality in certain African areas

Country	Year	Malaria Cases	Malaria Deaths
Angola	1952	80,696	292
Bechuanaland	1953	1,865	3
Belgian Congo	1953	279,000	1,190
Cape Verde Islands	1954	6,135	241
French Equatorial Africa	1953	141,001	323
French West Africa	1953	759,310	2,573
Gold Coast	1952	137,265	179
Kenya	1953	7,138	245
Madagascar and Comoros	1953	603,967	307
Mauritius	1942	58,983	3,054
Mauritius	1953	61	2
Mozambique	1950	1,102	30
Nigeria	1952–53	157,701	348
Northern Rhodesia	1953	5,068	98
Nyasaland	1954	50,789	67
Ruanda-Urundi	1953	342,266	604
Southern Rhodesia	1953	3,899	82
Tanganyika	1952	121,757	?
Uganda	1953	91,935	219

Data obtained from reports submitted to the WHO Conference on Malaria in Africa, held at Lagos in November–December, 1955. No claims were made that the malaria reports were complete for the countries concerned.

Mauritius has practically eradicated malaria. The disease was introduced, with the vectors *gambiae* and *funestus*, soon after 1850 with disastrous consequences and prevailed almost unchecked until 1948 when an eradication scheme was started. The first objective was elimination of the vector but this was changed to malaria eradication and has been very closely approached, chiefly through residual spraying, with some larviciding. *Funestus* is now a rare mosquito on Mauritius but *gambiae* remains abundant, although not often taken now in houses. Malaria incidence has dropped to a low level.

In Madagascar prior to 1949 malaria was highly endemic in most areas. A modern control scheme was begun in 1949 and has made great progress. Dwellings are sprayed with residual insecticides, chemoprophylaxis is applied to the entire child population of the island, and larviciding is practiced in urban areas. More than 1.28 million houses were sprayed with DDT in 1954 and some 760,000 children included in the chemoprophylaxis program, using nivaquine (chloroquine). Malaria intensity has sharply declined, as shown by the following data (Joncour, 1955).

Degree of Malaria Endemicity	Number of Districts	
	1949	1955
Hypoendemic	—	50
Mesoendemic	27	30
Hyperendemic	42	—
Holoendemic	11	—
Total	80	80

Réunion has been moderately malarious with spleen rates up to about 30 per cent. The only vector is *gambiae*. A DDT residual spraying project was begun in 1948 and the results have been excellent (Hamon and Dufour, 1954).

Middle Asia (Table No. 16)

Afghanistan: malaria is one of the principal diseases of Afghanistan. The chief vectors have been *superpictus* and *culicifacies*. In Kabul, at 6,000 feet altitude, *superpictus* is a vector of *vivax* malaria from July to September. Data are incomplete, but there have probably been well over a million cases a year on the average. Recently the disease has been well controlled in some areas by residual spraying.

Pakistan: many highly malarious areas are found in Pakistan, particularly in East Pakistan. Case incidence has probably been as high as 25 millions in average years. Control measures have been quite successful in some areas, especially in the West. The vectors are chiefly *superpictus* in the far west, *culicifacies* in Sind, *stephensi* to a limited extent in the south of West Pakistan, *philippinensis* and *sundaicus* in the south of East Pakistan and *minimus* in the north of East Pakistan.

India: there has long been a colossal malaria problem in India with probably 300 millions living in endemic areas. The vectors include all that have been named above for Pakistan excepting *superpictus* and with the addition of *fluviatilis*, a

TABLE 16

Malaria estimates: Middle Asia

Locality	Population	Population in Malarious Areas	Population Routinely Protected
Afghanistan	12,000 (a)	2,500	1,400
Bhutan	300	100 (b)	10 (b)
Burma	19,242	7,500	2,800
Ceylon	8,385	3,000	3,000
India	377,000	300,000	98,000
Malaya Federation	5,889	5,000	4,000
Maldive Islands	88	70	40
Nepal	8,432	3,000	300
Pakistan	80,167	40,116	7,140
Portuguese India	643	111	52
Singapore	1,168	1,100	1,100
Thailand	19,925	10,600	7,300
Totals	533,239	373,097	125,142

Notes: 1. Figures in thousands.
2. Population data from *U.N. Demographic Yearbook*, 1955. These are estimated 1954 midyear unless otherwise noted.
3. Malaria data from WHO and personal communications, and also, as noted by author's estimate.
4. (a) 1951; and, (b) author's estimate.

foothill breeder along the Eastern and Western ghats and *leucosphyrus* in parts of Assam. The percentage prevalence of malaria plasmodia in India in 1950 was as follows: *P. vivax* 54.0; *P. falciparum* 40.1; and *P. malariae* 5.9 (Singh *et al.*, 1952). A tremendous nation-wide malaria control project is in progress and it has had notable success (Rao, 1955).

Ceylon: only *culicifacies* has carried malaria in Ceylon and this anopheline, which has been responsible for the principal health problem of the island, is highly amenable to control by residual spraying. A nation-wide malaria eradication project has been highly successful and all 3 millions of those who live in endemic areas are under routine protection either by spraying or by organized surveillance following cessation of spraying. The decline in malaria morbidity is shown in the following table from the 1955 annual report of the Superintendent of the Antimalaria Campaigns.

Year	Estimated Population Millions	Malaria Cases	Morbidity Rate per 1,000
1936	5.63	2,947,555	523
1940	5.95	3,413,618	574
1944	6.28	1,672,478	266
1948	7.10	775,276	109
1952	7.94	269,024	34
1953	8.10	91,990	11
1954	8.39	29,650	3.5
1955	8.59	7,317	0.85

Burma: malaria is a major health problem in Burma where there have been some 6 million cases on the average per year. The chief vectors are *sundaicus* along the coast and *minimus* elsewhere. Widespread control operations are being started.

Maldive Islands: malaria is endemic in the Maldive Islands where *tessellatus* is the vector. Spleen rates up to 70 per cent have been found (Iyengar *et al.*, 1953).

Malaya: malaria has long been one of the principal causes of morbidity and mortality in Malaya but the disease has been under strong attack in Singapore and in urban and estate areas of the Peninsula for over 40 years. Today malaria is uncommon on Singapore Island and there has been an accelerating decline in other areas. Probably at present some four-fifths of the 5 millions living in malarious areas are under routine protection. The chief vectors have been *sundaicus* in brackish sunlit pools and drains along the coast, *maculatus* in sunny foothill streams, springs, and seepages, and *umbrosus*, *letifer*, and *barbirostris* on the flat coastal plains in slow, stagnant water, often shaded.

Thailand: at least 10.6 millions of Thailand's nearly 20 million population live in areas where malaria is endemic. But over 7 millions are now under routine protection by residual spraying which has proved quite successful, particularly in areas where *minimus* is the vector.

Far Eastern Asia (Table No. 17)

Indochina: Cambodia, Laos, and Vietnam have always been highly malarious and remain so. Political upheavals have delayed the application of modern control measures. Some 1.2 millions of the approximately 7 millions living in endemic areas are under some protection from malaria at the present time. Malaria is especially abundant in foothill regions where *minimus* is the vector. Other species that have been found naturally infected are *sundaicus*, *sinensis*, and *tessellatus*. Malaria prevalence is highest from July to September and December to March, at the beginning and end of the monsoon rains. The great deltas of the Mekong and Red Rivers are relatively free of the disease.

China—mainland: no reliable data are available as to recent malaria incidence and distribution in Communist China. In the past, malaria was not found north or west of a line running southwards from Wanchuan (Kalgan), Central Shensi and southern Shensi, then running westwards through central Kansu. The disease was highly endemic from the lower Yangtze valley extending southeast to and including Hainan; in southwest Yunnan, especially adjacent to Burma; in the upper Yangtze valley; and in the Amur River basin. Elsewhere in Manchuria endemicity was slight as also in Hunan Province. The foothills of South China have always been highly malarious due chiefly to *minimus*. The less intense malaria of the plains of South China has been maintained by the ricefield breeder *sinensis*. In North China *pattoni* has been incriminated and on the high plateau of Northwest China, *sacharovi* has been involved (Covell, 1949).

Visitors to Communist China in 1955 report having seen a malaria control center in Szemao, southwest Yunnan Province, where successful operations included environmental sanitation, drainage, insecticidal spraying, and in selected spots, the use of quinine and chlorguanide (Singh, 1956, personal communication).

TABLE 17

Malaria estimates: Far Eastern Asia

Locality	Population	Population in Malarious Areas	Population Routinely Protected
Brunei	55	40	32
Cambodia	4,100	1,500	180
China (mainland)	582,603	200,000 (b)	10,000 (b)
Hong Kong	2,277	2,277	2,277
Indonesia	81,100	30,000	5,277
Japan	88,000	517	388
Korea	30,000 (a)	5,000	500
Laos	1,360	1,000	10
Macau	200	75	50
Mongolian Peoples' Republic	920	0 (b)	—
Netherlands New Guinea	700	700	80
North Borneo	364	290	24
Philippines	21,440	6,300	6,000
Ryukyu Islands	778	40 (b)	40 (b)
Sarawak	602	550	50
Taiwan (Formosa)	8,617	5,640	5,640
Timor	466	200	50
Vietnam	26,000	4,500	1,000
Totals	849,582	258,629	31,598

Notes: 1. Figures in thousands.
2. Population data from *U.N. Demographic Yearbook*, 1955. These are estimated 1954 midyear, unless otherwise noted.
3. Malaria data from WHO and personal communications, and also, as noted, by author's estimate.
4. (a) 1953; and, (b) author's estimate.

Macau: prior to World War II malaria was an important problem in Macau. The chief vector has been *minimus* with assistance from *sinensis* and the main breeding places have been located just across the border in China. There has been a sharp decline since 1950. Hospitals and dispensaries have reported malaria as follows (Dy, 1956, personal communication).

1950	1,092 cases	45 deaths
1951	570	6
1952	510	8
1953	164	4
1954	89	4

The reduction in incidence indicated by hospital reports but not yet by surveys, has been due in part to restriction of traffic with China and in part to control by residual spraying with DDT and BHC.

China—Taiwan: Formosa has long been highly malarious with *minimus* and *sinensis* the chief vectors. An energetic control project in recent years has

greatly reduced the incidence. Very likely some 5.64 of the 8.617 millions in Formosa live in endemic areas and practically all of those exposed are now under protection by residual spraying.

Japan: malaria has never been common in Japan although there are some *vivax* endemic areas in the southern islands where *sinensis* is the vector. Some localized epidemics followed the return of civilians and soldiers at the end of World War II. The disease is only mildly endemic in Okinawa.

Korea: malaria is highly endemic in southern Korea but much less so in the north. The vectors are *minimus* and *sinensis*.

Indonesia: the archipelago of the Republic of Indonesia is highly malarious, the chief vectors being *sundaicus* along the coast, and *aconitus* in rice fields, with assistance from *maculatus* in some areas. In Sumatra, *sinensis* plays a part, and in the Celebes *farauti* is a vector, while in Borneo *leucosphyrus* probably is chiefly responsible. A nation-wide control project is in progress. Some 5.28 millions of the 30 millions exposed are now under protection.

The Philippines: malaria in the Philippines is a disease of the foothills below 2,000 feet altitude and transmitted by *minimus, flavirostris* and *mangyanus*, found chiefly in small streams. The coastal areas are entirely free of the disease unless the foothills are close by. It has been estimated that 2 to 4 million cases occurred annually, with 10 to 20,000 deaths from malaria. Financial losses due to this disease have been put at $100 million or more per year. But a nation-wide eradication project has already reduced the incidence markedly in some areas and there is good reason to believe that the disease will be completely controlled in the next few years (Ejercito *et al.*, 1954).

Hong Kong: malaria is endemic in Hong Kong where *minimus* and *jeporiensis candidiensis* are the chief vectors with assistance from *maculatus*, and *sinensis*. But today the disease is under firm control.

British Borneo: malaria prevalence in Sarawak and Brunei is surprisingly low in many areas. It is highly endemic in the hilly and mountainous sections. A WHO survey by Zulueta showed that the seminomadic Dayak, Kayan, and Kenyah, who make temporary shelters each year while planting their rice, are more malarious than the Chinese and Malays. Inland rural Malays are more often infected than those who live along the coast or great rivers. The vector in Sarawak and Brunei is *leucosphyrus leucosphyrus* and in British North Borneo, *leucosphyrus balabacensis*. Sporozoite infections in *A. l. balabacensis* have been found as high as 10 per cent in the Tambunan district by Chang, a WHO entomologist. Among some 7,568 *A. l. leucosphyrus* dissected by the WHO unit in Sarawak, there was a sporozoite index of 0.40 per cent. *Barbirostris* is occasionally a secondary vector in Sarawak (Dy, 1954, 1955).

Australia and Oceania (Table No. 18)

Australia: malaria today is only mildly if at all endemic on the Australian mainland. There are possibly some residual foci along the northeastern coast of the Northern Territory and in the northern projection of Queensland. Foci of *falciparum* malaria, transmitted by *farauti*, are known in the Torres Straits Islands,

TABLE 18

Malaria estimates: Oceania

Locality	Population	Population in Malarious Areas	Population Routinely Protected
Australia	8,987	100	80
Australian New Guinea	1,207	1,100	7
Fiji Islands	328	0	—
French Oceania (a)	45 (b)	0	—
Gilbert and Ellice Islands	40	0	—
Guam	35	0	—
Hawaii	522	0	—
New Caledonia	21 (b)	0	—
New Hebrides	50	48	6
New Zealand	2,093	0	—
New Zealand Oceania (c)	23	0	—
Papua	495	375	3
Samoa (U.S.)	114	0	—
Solomons	103	96	1
Tonga	52	0	—
U.S. Pacific Islands (d)	61	0	—
Western Samoa	92	0	—
Totals	14,268	1,719	97

Notes: 1. Figures in thousands.
2. Population data from *U.N. Demographic Yearbook*, 1955. These are estimated 1954 midyear, unless otherwise noted.
3. Malaria data from WHO and personal communications.
4. (a) Austral, Gambier, Marquesas, Rapa, Society and Tuamoto Islands; (b) 1937; (c) Cook, Niue, and Tokelau Islands; and, (d) Carolinas, Marianas, and Marshall Islands.

especially in the Western group. In the past the disease occurred in Western Australia as far south as Fitzroy Crossing at latitude 18° S., often in epidemic form; in the Northern Territory it was endemic as far as Wave Hill at latitude 17° 30′ S.; and in Queensland it reached 19° S. on the coast (Black, 1954; Ford, 1954, personal communications).

Oceania: Anopheles farauti is an important vector in New Guinea, the Solomons, Hebrides, and from New Britain to the Eastern Celebes. It frequently transmits when feeding out-of-doors. Also an effective transmitter is *punctulatus* in New Guinea, and from the Solomons to Halmahera. In Netherlands New Guinea, *karwari* is also a vector. Malaria is highly endemic in the New Hebrides (except Futuna Island), the Trobriands, New Britain, New Ireland, the Admiralty Islands, New Guinea, and the Solomons. All three plasmodia, *vivax, falciparum*, and *malariae* are present. Not much control is in progress. Experiments with DDT residual spraying in Netherlands New Guinea have given promising results.

CONCLUSIONS

A world survey of malaria and its control reveals that there has been a tremendous acceleration in the attack on this disease during the past few years and that for many countries eradication is technically and economically practicable within the next ten years. But the data, imperfect though they are, refute the notion that the sun has now set on malaria and malariologists. One might more truly say that the morning's work has been well started but that it is not yet high noon for malariology. There still remains an exceedingly large task involving both research and control on a higher rather than a lower scale.

It seems logical to close this review with a list of some of the principal needs in the world-wide campaign against malaria.

1. Better measurement of the effect of malaria eradication on the health, social, and economic status of a community.

2. More effective measures for eradicating malaria among primitive and relatively inaccessible peoples in such areas as exist, for example, in parts of Amazonia, Borneo, and New Guinea.

3. Basic investigations of African *A. gambiae* to clarify its position as a species or as a complex and to determine the behavior characters of the insect as they relate to malaria and its eradication.

4. Clearer understanding of the prime causes and practical implications of anopheline resistance to insecticides.

5. More effective and frequent use of antimalaria therapy to eradicate the parasite from communities.

6. Practical measures for dealing with the terminal phases of nation-wide eradication projects as regards measures both of attack and of assessment.

REFERENCES

ALVARADO, C. A., 1954. *La Situación de la Lucha Antimalarica en las Americas*. PASB Document CSP 14/36. 5 Oct.

BONIN, H., MORETTI, G. F., AND LEPROUX, P. H., 1952. Le pauldisme autochtone en Charente-Maritime, *J. Med. de Bordeaux*. **129:** 918–23.

BRUCE-CHWATT, L. J., 1954. Problems of malaria control in Tropical Africa, *Brit. Med. J.* Jan. 23. pp. 169–174.

Bureau of Malaria and Insect Control, 1955. Malaria control in Puerto Rico, *Bol. Off. San. Pan Americana* **39:** 489–493.

CHARLES, L. J., 1952. Malaria in the Leeward and Windward Islands, British West Indies, *Am. J. Trop. Med. & Hyg.* **1:** 941–61.

COVELL, SIR G., 1949. Malaria incidence in the Far East, *Boyd's Malariology*, Vol. II, pp. 810–19.

DAVIDSON, A., 1892. *Geographical Pathology*. Vol. II. p. 793. Young J. Pentland, Edinburgh.

DEHNÉ, E. J., 1955. Fifty years of malaria control in the Panama area, *Am. J. Trop. Med. & Hyg.* **4:** 800–11.

DY, F. J., 1954. Present status of malaria control in Asia, *Bull. WHO* **11:** 725–63.

DY, F. J., 1955. Malaria in Sarawak and Brunei, *Chron. WHO* **9:** 329–334.

EJERCITO, A., HESS, A. D., AND WILLARD, A., 1954. The six-year Philippine-American malaria control program, *Am. J. Trop. Med. & Hyg.* **3:** 971–80.

FLOCH, H., 1954. La lutte antipaludique en Guyane Française, *Bull. WHO* **11:** 579–633.

GABALDON, A., AND BERTI, A. L., 1954. The first large area in the tropical zone to report malaria eradication: North-Central Venezuela, *Am. J. Trop. Med. & Hyg.* **3:** 793–807.

GALVAN, G. R., 1952. El paludismo en Tenerife, *Rev. Sanidad e Hig. Púb.* **26:** 301–16.

GIGLIOLI, G., 1954. Malaria control in British Guiana, *Bull. Wld. Hlth. Org.* **11:** 849–53.

HACKETT, L. W., 1949. Conspectus of malaria incidence in northern Europe, the Mediterranean Region and the Near East, *Boyd's Malariology*, Vol. II, pp. 788–99.

HAMON, J., AND DUFOUR, G., 1954. La lutte antipaludique à la Réunion, *Bull. Wld. Hlth. Org.* **11:** 525–56.

HIRSCH, A., 1883. *Handbook of Geographical and Historical Pathology*. Vol. I, p. 227. New Sydenham Soc. London.

IYENGAR, M. O. T., MATHEW, M., AND MENON, M. A., 1953. Malaria in the Maldive Islands, *Ind. J. Mal.* **7:** 1–3.

JONCOUR, G., 1955. Present situation in regard to malaria control in Madagascar, *WHO/Mal/150 Lagos Conf.*

MONTALVÁN, C. J. A., 1952. Campaña antipalúdica en el Ecuador, *Rev. Ecuadoriana de Hig. y Med. Trop.* **8/9:** 34–90.

MOUNT, R. A., 1953. Medical mission to the Yemen, Southwest Arabia, 1951. I. Geomedical observations, *Am. J. Trop. Med. & Hyg.* **2:** 1–12.

NEGHME, A., GUTIÉRREZ, J., AND ALÉE, R., 1955. Attempt to eradicate *Anopheles* in the malaria zone of Chile, *Am. J. Trop. Med. & Hyg.* **4:** 1114–18.

PAMPANA, E. J., AND RUSSELL, P. F., 1955. Malaria: a world problem, *Chron. WHO* **9:** 31–96.

PINOTTI, M., 1953. Chemoprophylaxis of malaria by the association of an antimalarical (sic) drug to the sodium chloride used daily in the preparation of meals. Ctes. Rendus des Vmes Congrès Internat. de Med. Trop. et du Paludisme. Istanbul II pp. 248–58. (See also 1955, *Trop. Dis. Bull.* **52:** 10–11.)

PRINGLE, G., 1954. A summary of malaria and malaria control in Iraq before 1946, *Bull. End. Diseases, Baghdad.* **1:** 1–45.

PRINGLE, G., 1955. The national campaign against malaria in Iraq. Progress report, 1946–1952, *ibid* **1:** 87–117; 187–236.

RAO, B. A., 1955. The national malaria control program of India, *Ind. J. Malariol.* **9:** 313–325.

RUSSELL, P. F., 1952. The present status of malaria in the world, *Am. J. Trop. Med. & Hyg.* **1:** 111–123.

SAUTET, J., AND ALDIGHIERI, R., 1954. La lutte antipaludique à la Guadeloupe, *Bull. Wld. Hlth. Org.* **11:** 557–577.

SINGH, J., KRISHNASWAMI, A. K., AND RAMAKRISHNAN, S. P., 1952. The distribution of human plasmodia in India, *Ind. J. Malariol.* **6:** 415–33.

SHUTE, P. G., 1954. Indigenous *P. vivax* malaria in London believed to have been transmitted by *Anopheles plumbeus*, *Month. Bull. Ministry Health and P. H. Lab. Ser.* **13:** 48–51.

United Nations, 1955. *Demographic Yearbook*. New York.

VON EZDORF, R. H., 1915. Malaria in the U. S., *Public Hlth. Rep.* **30:** 1603.

VON EZDORF, R. H., 1916. Endemic index of malaria in the U. S., *ibid* **31:** 819.

World Health Organization, 1951. *Malaria Conference in Equatorial Africa*, Tech. Rep. Series No. 38. Geneva. 72 pp.