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Part I

DEVELOPMENT OF THE WORLDWIDE MALARIA ERADICATION PROGRAM

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Eleven years ago this May, the World Health Assembly, meeting in Mexico City, made a dramatic move which embarked the nations of the world on a global malaria eradication program. In the words of the Assembly, "The World Health Organization should take the initiative, provide the technical advice, and encourage research and coordination of resources in the implementation of a programme having as its ultimate objective the world-wide eradication of malaria" (ICA Expert Panel on Malaria, 1961).

The World Health Organization (WHO) had very little in the way of financial resources to carry out this mandate for such a gigantic undertaking but did have an important coordination function and a staff of capable malaria specialists. As a result of the Assembly action that year, a Malaria Eradication Special Account (MESA) was established, which permitted nations, organizations, and individuals to make contributions for the global attack against this disease. The United Nations Children's Fund (UNICEF) also supported the global program by provid-

ing certain commodities, such as insecticides and equipment, for the eradication program. The Pan American Sanitary Bureau (PASB), a leader in anti-malaria activities in the Americas even before WHO was organized, had worked for malaria eradication in the Western Hemisphere and continued its vigorous campaign against malaria. These international agencies provided great impetus to the program, but lacked the financial resources to carry out the job.

The United States Government, in 1956, through the International Development Advisory Board (IDAB), made a study of malaria eradication in connection with the U. S. foreign aid program (Fritz and Johnson, 1960). The IDAB recommended that all malaria CONTROL activities of the U. S. Government be converted to malaria ERADICATION programs, and that such activities be carried on both directly, through its own bilateral programs overseas, and indirectly, through multilateral agencies. Until that time, malaria control had been an important segment of the international health programs supported by the United States Government. Actually, malaria control as an international program of the U. S. was started through the Institute of Inter-American Affairs in

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1942, when U. S. assistance was given to eight Latin American countries² for malaria control activities.

Following up on the recommendations of the IDAB as well as the International Cooperation Administration (ICA), President Eisenhower, in a message to Congress on May 21, 1957 stated, "I should like to note especially one of these anticipated requirements (for special assistance funding). I refer to a program—malaria eradication—which will appear separately in the bill proposed to the Congress but will be financed from the special assistance fund.

"Malaria is today the world's foremost health problem. Each year it attacks 200,000,000 people, bringing death to 2,000,000 and causing enormous suffering and economic loss in many areas. Today it is practicable to end this scourge in large areas of the world. I propose that the United States join with other nations and organizations which are already spending over \$50,000,000 a year on anti-malaria activities. . . ."

The U. S. Congress acted upon the Presidential request, amending the Mutual Security Act of 1954 by the insertion of Section 420 which, in part, reads as follows: "The Congress of the United States, recognizing that the disease of malaria, because of its widespread prevalence, debilitating effects, and heavy toll on human life, constitutes a major deterrent to the efforts of many peoples to develop their economic resources and productive capacities and to improve their living conditions, and further recognizing that it appears now technically feasible to eradicate this disease, declares it to be the policy of the United States and the purpose of this section to assist other peoples in their efforts to eradicate malaria. . . ."

This action by Congress made it possible to increase the U. S. support to malaria eradication programs in many countries of the world. Therefore, starting with FY 1958, our anti-malaria assistance was made

available for malaria *eradication* activities only.

The average U. S. malaria eradication contribution to bilateral programs and the WHO and Pan American Health Organization (PAHO)³ programs for the years 1958–1962 was more than 30 million dollars annually. This provided great impetus to the global program, and malaria eradication activities were intensified substantially in many countries. The major known exception to this was in Africa south of the Sahara. Little is known, of course, as to what anti-malaria activities have been carried on in mainland China, North Korea, and North Vietnam.

WHO provided technical guidelines for the development of malaria eradication programs and, through its Expert Committees on Malaria, set the international standards for malaria eradication. WHO has provided the necessary international coordination and undoubtedly will continue to do so until the world is free from this disease. In the Americas, PAHO provides this coordination for intercountry programs. AID has worked closely with both organizations, as well as with UNICEF, in carrying out the major role played by the U. S. Government. No one organization can possibly do the job alone. Only by close cooperation between these agencies and the countries themselves can eradication be accomplished.

The U. S. Government, with its Congressional mandate and subsequent statements from Presidents Eisenhower, Kennedy, and Johnson in strong support of malaria eradication activities, has, since the program started in 1958, provided direct U. S. assistance to 28 countries⁴ and to

³ The secretariat of the PAHO now is known as the Pan American Sanitary Bureau. PASB is also the Regional Office for the Americas of the WHO.

⁴ *Far East*—Cambodia, China (Taiwan), Indonesia, Laos, Philippines, Thailand, Vietnam.

Near East—South Asia—Ceylon, India, Iran, Jordan, Nepal, Pakistan.

Africa—Ethiopia, Liberia, Libya.

Latin America—Bolivia, Brazil, Colombia, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Nicaragua, Paraguay, Peru.

² Bolivia, Brazil, Ecuador, Guatemala, Haiti, Honduras, Nicaragua, Peru.

both the WHO and PAHO special malaria funds.

The world malaria eradication program has made tremendous progress in its less than a decade of concerted activity. Cooperation in border areas between many countries has been established where such cooperation previously had not existed. Countries politically antagonistic toward each other usually cooperate in a splendid manner when it comes to matters of malaria eradication, since malaria is a common enemy.

The U. S. Government has continued its assistance to malaria eradication programs through the Agency for International Development (AID). U. S. assistance has included trained personnel, research, training, and provision of commodities such as insecticides, sprayers, drugs, and certain other equipment.

In some countries, U. S.-owned or -controlled local currencies have been utilized to finance the actual program operations. At the present time, 15 countries—Brazil, Ecuador, El Salvador, Ethiopia, Guatemala, Haiti, Honduras, India, Jordan, Nepal, Nicaragua, Pakistan, Philippines, Thailand, and Vietnam—are receiving assistance on either a grant or loan basis, or a combination of both.

Another significant step has just been taken pertaining to U. S. participation in the global program. On March 3, 1966, AID and the Public Health Service (PHS) signed an agreement under which PHS assumes responsibility for administration of the malaria eradication program, which AID currently is supporting and intends to support until the program is completed. PHS is to establish a full-time headquarters staff, which will provide overall direction and administration of the program and maintain continuing liaison with AID. AID malaria eradication personnel are to be transferred to PHS.

PHS will assume responsibility for commodity procurement in order that the DDT, vehicles, sprayers, drugs, and equipment required for the malaria eradication program may continue to be provided to the various countries in accordance with

existing agreements. PHS also will be responsible for U. S. participation in the Malaria Eradication Training Center in the Philippines and for the training of U. S.-funded participants in the malaria eradication program. PHS will explore areas where research can be done to increase the efficiency and economy of the malaria eradication program, and will be responsible for all research activities funded by AID.

As part of its responsibility, PHS will systematically evaluate progress and performance toward the attainment of malaria eradication. PHS may utilize special assessment groups in conjunction with WHO, PAHO, or other agencies in providing objective evaluations of the programs of individual countries. PHS will maintain a close relationship with AID and the international agencies in all matters regarding projects of mutual concern in relation to malaria eradication.

Although a great many countries have made tremendous progress toward malaria eradication, the nations of the world still have a great deal to accomplish before final eradication is attained. Table 1, prepared from data released by WHO (1965), summarizes the worldwide status of malaria eradication.

Of the 1,586,000,000 people living in the originally malarious areas of the world, 529,000,000, or 34 percent, live in areas where operations have already reached the final maintenance phase. This means that in these areas no further eradication measures are necessary to maintain a malaria-free condition. Instead, normal health services of the country are expected to detect any relapsed or imported cases and to prevent any spread.

An additional 356,000,000 of these people, or 22 percent, live in areas that are now in the consolidation phase, when principal reliance for protection is placed on surveillance measures. During this time the houses are visited regularly by surveillance workers. Appropriate drug treatment and focal insecticidal spraying usually are carried out in an area where a positive case occurs.

The people living in areas now in the

TABLE I.—Worldwide status of malaria eradication.

Region (1)	Population in Thousands										
	Total (2)	Where malaria was never indigenous or disappeared without specific antimalaria measures (3)			Where malaria eradication is claimed (maintenance phase) (5)		Where eradication program is in progress			Total (9)	Where eradication program has not yet started (10)
		Of original malarious areas (4)	Where malaria eradication is claimed (maintenance phase) (5)	In the consolidation phase (6)	In the attack phase (7)	In the preparatory phase (8)					
African	211,319	16,301	195,018	3,226	2,657	579	3,236	188,556		
American	462,345	298,168	164,177	61,371	33,108	33,786	35,546	102,440	366		
South-East Asian	679,537	39,271	640,266	171,569	275,272	152,374	6,810	434,456	34,241		
European	733,541	405,743	329,798	268,207	29,422	8,979	38,401	21,190		
Eastern Mediterranean	236,601	59,872	176,729	6,389	11,620	54,349	26,935	92,904	77,436		
Western Pacific	231,197	148,781	82,416	18,305	4,311	4,663	8,974	55,135		
	(1,027,249) ^a										
Total	2,554,540	968,136	1,586,404	529,067	356,390	254,730	69,291	680,411	376,926		
	(3,350,592) ^a										

^a The figures in brackets include the estimated population (796,052,000) of China (Mainland), North Korea, and North Vietnam, from which no other information is available.

NOTE: From data provided by World Health Organization, 26 November 1965.

attack phase of the program total 255,000,000, or 16 percent of the population of the originally malarious areas. During the attack phase, which usually continues for a period of 3 or 4 years, the houses of all persons in the area normally are sprayed with residual insecticides.

The preparatory phase—the first stage of the program—accounts for 69,000,000 persons, which is 4 percent of those in malarious areas. During this phase, geographic reconnaissance is done; maps are made; houses are numbered; personnel are trained; commodities are procured; and plans are made for the subsequent program.

The portions of the world's malarious areas where the program has not yet been started have a population of 377,000,000, or 24 percent of the total originally at risk. Of this number, 189,000,000 are found in Africa. With the exception of Ethiopia and the southern portion of the continent, it is doubtful whether the program can be started in Africa in the near future, due to the very difficult problems prevailing there. These relate principally to the lack of trained personnel, unstable social and political conditions, and the lack of funds to carry out eradication activities. In addition, there are certain technical problems; e.g., no suitable methodology for interrupting transmission in the savannah areas of Africa has been developed. Pilot projects using residual insecticides have been carried out under the auspices of WHO, but these have failed to interrupt transmission. This failure appears to be due to behavioristic habits of *Anopheles gambiae*, including its avoidance of DDT. Continued studies will be made of other problems found in Africa and elsewhere.

Looking at the overall worldwide situation at present, the negative aspects just mentioned notwithstanding, there is much

optimism expressed for the future program. Three-fourths of the world already has made significant advancements toward eradication. Most of the protected areas formerly had serious malaria problems, but through the determined efforts of the nations themselves, malaria has decreased to a very low level in most of these countries, and each year the program comes closer to its goal of eradication.

Despite the prevailing obstacles—the inadequate numbers of trained personnel; the lack of funds, caused in part by competing programs; and the technical problems—malaria eradication is to continue as a major global effort. New methods and procedures will be found to overcome technical problems. Administrative methods are being improved; pressures from countries that have eliminated malaria more and more are being brought to bear on countries or portions of countries where malaria transmission continues. Public demand is great in malarious areas for elimination of this debilitating disease, so funds will be found to do the job. Cooperation between all governments and the various agencies involved will increase, and eventually, through a combination of all available resources, malaria will be eliminated, from even the most remote sections of the earth.

References

- FRITZ, ROY F., and JOHNSON, DONALD R. 1960. United States participation in a global program for malaria eradication. Proc. 37th Ann. Meet., N. J. Mosq. Exterm. Assoc., pp. 51-58.
- INTERNATIONAL COOPERATION ADMINISTRATION EXPERT PANEL ON MALARIA. 1961. Report and recommendations on malaria: A summary. Am. J. Trop. Med. & Hyg. 10(4):451-502.
- WORLD HEALTH ORGANIZATION. 1965. Report on development of malaria eradication programme. EB 37/10; Nov. 26, 1965. Mimeo. 70 pp.