

VECTORBORNE DISEASE CONTROL AND RESEARCH AT CDC—CURRENT TRENDS¹

ROBERT L. KAISER, M.D.,

Director, Bureau of Tropical Diseases, Center for Disease Control,
Public Health Service, U.S. Department of Health, Education, and Welfare
Atlanta, Georgia 30333.

I am particularly pleased to have the opportunity to address the American Mosquito Control Association at this time because I believe that all of us who share a common interest and stake in vector-borne diseases and their control will in the next decade be faced with major challenges which will severely test our skills and resourcefulness. I am referring, of course, to an expanded and accelerated effort on the part of the developed world to reduce the staggering burden of misery and disease borne by the developing nations which in so many ways impedes their ability to attain self sufficiency and true independence. I need not detail to this audience the profound role vector-borne disease plays within the spectrum of health problems facing the developing world. The previous speaker has more than adequately covered this topic.

In his address to the World Health Organization's Medical Society in May of 1977 Senator Edward Kennedy of Massachusetts remarked—

"Today, the United States spends vast sums to develop cures for our own self-inflicted wounds—the diseases we cause to ourselves by the excesses in our lifestyle and the damage to our environment. The gap is too great; the need is too enormous. It is unreasonable and unfair for the United States to devote so little research attention and resources to the diseases of developing nations. Even a modest shift in the current balance could bring great benefits to other lands."

Recognizing that gaps in our knowledge and a lack of proved technology are not the only problems confronting us, he suggested that—

"There should be a major cooperative international effort to adapt our available knowledge and technology to the special circumstances of developing nations. It is not enough to have a new drug—as we now do—for schistosomiasis. We must also learn how to use it and distribute it. We must ensure that it is taken with proper doses and procedures. The same is true for other skills and products. We must adapt them to the circumstances in which people live if we expect them to be effective."

That the Public Health Service and the Center for Disease Control will take an important part in this new international effort is clearly indicated.

In his address to the American Public Health Association on October 31, 1977, entitled "U.S. Global Health Strategies in an Age of Interdependence" Dr. Peter G. Bourne, Special Assistant to the President for Health Issues stated—

"The United States should strengthen its existing research centers in foreign countries, now numbering 15, including Department of Defense's research laboratories, National Institutes of Health's centers for medical research, and Center for Disease Control's research station in El Salvador."

He goes on further to state—

"There are capabilities and expertise within HEW that are unduplicated anywhere in the world; however, these resources have not been fully mobilized in the cause of international health."

Now, in the context of CDC vector-borne disease activities the question of how such international situations relate to our domestic program responsibilities might be raised. Another consideration is the Center's capacity to undertake such expanded efforts. I will address the latter issue now and take up the former in another segment of this presentation.

¹ Invitational paper, Chicago meeting, April, 1978.

From time to time reports are brought to my attention indicating that the vectorborne disease capabilities of the Center are in a state of profound decline. Only recently an article in a well known pest control trade publication related the demise of the Public Health Service—purportedly part of a sinister plot carried out by the past 3 administrations (Anon. 1978). With this assumption great concern was expressed over the health and security of our country "should the United States experience an epizootic of malaria-carrying mosquitoes or plague-infested rodents." In order to reassure any who are concerned over this matter, I am pleased to report that the Public Health Service is alive and well and that its vectorborne disease control capabilities are trim, fit and replete with a healthy layer of muscle.

These reports remind one of the familiar childhood fable of Chicken Little, who you will recall, while walking through the woods one day had an acorn fall on her head. She concluded that the sky was falling and rushed off to tell the King. On the way she met a variety of barnyard characters who were convinced by her story that the sky indeed was falling and joined in her entourage to warn the King of this catastrophic event. The King never did learn that the sky was falling for on the way the panicked group was joined by a fox who volunteered to show them the way to the King. Distracted by their single-minded concern over this apparent disaster, and abandoning their natural senses and reasoning powers they, one by one, fell prey to the fox who devoured them all.

To shift from fable to the realities of 1978 and as a measure of the Center's current level of effort in the field of vectorborne disease control and research, a budget analysis shows that a total of nearly 3,428,000 dollars annually are devoted to support domestic vectorborne disease control, research, training, and surveillance. This includes ongoing programs within CDC's Bureau of Epidemiology, the Ft. Collins, Colorado

and San Juan, Puerto Rico field stations of the Bureau of Laboratories, the Bureau of Training's homestudy program and the Bureau of Tropical Diseases domestic efforts. This total constitutes 4.4% of the total CDC internal operating budget base.

Comparing the level of effort devoted to domestic vectorborne disease (\$3,428,000) with the level apportioned to hepatitis (\$1,600,000) we see a greater than two-fold difference in favor of domestic vectorborne disease support. It should also be borne in mind that the 10-year annual average number of cases of hepatitis is 57,000 where the comparable figure for all the domestic vectorborne diseases excluding dengue fever is 2,680. Reporting of dengue cases is probably less certain, but during recent years major outbreaks have occurred in Puerto Rico in 1965, 1975 and 1977 with up to 20,000 cases.

It is evident from these figures that the Center's efforts in vectorborne disease control and research are not inconsequential—either on an absolute or relative basis. That the Center will continue its commitment to this important public health area was reaffirmed recently by the Director of the Center for Disease Control, Dr. William Foege, who in his April 12, 1978, message to the Biennial Vector Control Conference stated—

"As American society changes, so will the Center change to keep up with the public health needs of that society. We will be involved in developing approaches to making life-style choices to protect health, we will be involved in control and prevention of diseases throughout the world—we will add to our challenges, but we will continue the historic interests we share with you in riding the world of vectorborne diseases."

Having clarified these fundamental points, a general review of the Center's current activities in vectorborne disease control and research seems appropriate.

CURRENT ACTIVITIES

The complexities involved in the detec-

tion, epidemiological assessment, prevention, and control of vectorborne diseases require a varied but coordinated program within the Center's framework. Thus, we have laboratories at Ft. Collins, Colorado, dedicated to disease ecology, with emphasis on viruses as causative agents, working largely with encephalitis, but also with Colorado Tick Fever and plague as a function of the geographical distribution of the diseases; a laboratory at San Juan, Puerto Rico, uniquely equipped to study dengue fever and schistosomiasis; a field station in El Salvador devoted to dealing with such vectorborne disease problems as malaria, Chagas' disease, and *enochocerciasis*; and professional staff in Atlanta operating within 3 of the 8 principal units of CDC, including the Epidemiology Bureau for surveillance of vectorborne diseases; the Training Bureau offering the popular homestudy course on vectorborne disease control; and the Bureau of Tropical Diseases containing the Center's expertise in vector control.

The domestic component of the Bureau of Tropical Diseases is the Vector Biology and Control Division at Chamblee, Georgia, near CDC's Atlanta headquarters. The tropical counterpart is the Central America Research Station in El Salvador, previously mentioned. The Vector Biology and Control Division consists of 3 branches whose titles describe their function—Medical Entomology Branch, Pesticides Branch, and Host Parasite Studies Branch.

Routine and emergency vector control and domestic program activities are conducted by the Medical Entomology Branch. The functions of this group include developmental activities (research), training, and consultation, normally through State or local health departments.

A review of the Vector Biology and Control Division activities for a 3-year period, 1975–1977, shows a total of 695 direct responses to requests for some type of vector control assistance. Requests come from private citizens, industry, physicians, hospitals/clinics, federal, State

and local agencies, international agencies, and Congress. The requests originated in 36 States, the District of Columbia, Puerto Rico, and the Virgin Islands. This does not include requests for training, epidemic assistance, or major consultation.

Field training and/or technical consultation involving direct assistance and technical expertise was provided to 26 different States, Puerto Rico, Guam, and the Virgin Islands during the same 3-year period and included assistance in the control of SLE, WEE, Rocky Mountain spotted fever, dengue fever, as well as general vector control. Major involvement was with SLE and WEE during the 1975 season, and dengue in Puerto Rico and the Caribbean in 1976 and 1977. Special assistance was rendered in vectorborne disease control to the Vietnamese Refugee Operation in 1975 and to the National Boy Scout Jamboree in 1977. Additional support was given several mosquito abatement districts and the Environmental Protection Agency, Atlanta Region, during 1977.

The training activity, in its effort to promote sound vector control practices among the vector control community, organized and conducted 27 courses during the 3-year period involving 553 students from State and local health departments, industry, and mosquito abatement organizations. Included were 10 formal courses offered at CDC headquarters; 9 field courses in various States suited to specific needs; 2 Peace Corps groups preparing for malaria control assignments overseas; 2 special courses on the safe handling of pesticides in the Pakistan Malaria Program; and 2 courses in Puerto Rico and the Virgin Islands in English and Spanish to vector control workers concerned with dengue control.

Vector control activities of the Center, by mandate, are directed toward vectorborne disease control. Thus, you have seen in the recent past the appearance of the *Vector Topics* series with such titles as "Control of St. Louis Encephalitis" and "Control of Dengue." In preparation are

similar publications, e.g., "Control of Western Equine Encephalitis" and "Control of Plague." Other topics in this series will be offered to meet the needs of the vector control community.

Manuals and technical papers of broad interest to the field of public health are produced relating to the control of vectorborne diseases. A concerted effort is under way to update the CDC series of instructional manuals. This series includes such topics as "Mosquitoes of Public Health Importance," "Insecticides and Their Application," and "Epidemiology and Control of Vectorborne Diseases."

In addition to activities in Atlanta, the staff participated in cooperative developmental work with various State and local vector control organizations. Some examples include: Vector ecology studies on the *Culex pipiens* complex in relation to SLE in West Tennessee with the Memphis-Shelby County Health Department and the Ft. Collins Laboratory; development of a contingency plan for control of dengue in Puerto Rico with the Puerto Rico Health Department and the San Juan Laboratories; development of a systemic insecticide bait system for use in plague control in the southwest with the Ft. Collins laboratory; efficacy studies on the use of aerial ULV against *Aedes aegypti* in urban situations with the New Orleans Mosquito Control Commission; evaluation of new survey tools with the Birmingham, Alabama Health Department, with the Chatham County (Georgia) Mosquito Control Commission, and with the Gorgas Memorial Laboratory in Panama; insecticide susceptibility investigations with the Harris County (Texas) Health Department and with the Memphis-Shelby County (Tennessee) Health Department.

FUTURE TRENDS AND DIRECTIONS

The Center's efforts in vectorborne disease control and research will continue, their character and magnitude contingent on the nature of the problems and specific needs requiring attention. Histor-

ically, one of the unique capacities of the Center has been its ability to respond to a wide range of public health needs. Numerous examples of this quality are evident in its history beginning with efforts in malaria control in the 1940's. Following successful conclusion of that program, other needs in vectorborne disease were recognized and programs embarked upon—plague in the western United States, encephalitis, dengue fever and then returning to malaria in an international context. The ability to respond to problems was recently demonstrated by the intensive effort resulting in successful resolution of the enigma of Legionnaires' Disease. Throughout its better than 30 years of experience, CDC has taken great care to develop and retain competence in order to rapidly respond to a spectrum of public health needs.

Major challenges confront us in coping with vectorborne diseases on the global front. We recognize that domestic and international problems and efforts are really intimately related. What we have learned about the control of vectorborne disease in the United States has important application overseas, and what we learn from some of the new and innovative approaches to control of vectors of trypanosomiasis, malaria, yellow fever, etc. will doubtless prove beneficial to our domestic needs.

Several priority areas are identified for current and future attention. These include:

1. Establishment of preventive health standards at the community level with assurance that vector control interests are included.

2. Providing assistance to State and local governments in the identification of vectorborne disease risks and assessing local resources for dealing with them.

3. Providing continued improved technical support to local vector control programs through vigorous activities in training, research and consultation through the State health departments.

4. Providing general support to intercommunication through conferences,

workshops, special training and dissemination of technical information.

5. Undertaking efforts to obtain the necessary resources for emergency control of vectorborne diseases in situations not qualifying for disaster relief assistance.

In concluding I wish to reaffirm CDC's

commitment to vectorborne disease control and research, and to assure you that we have the required support, determination and skills to fulfill this obligation.

References Cited

Anonymous. 1978. Editorial: How much do we sell? *Pest Control*, February, p. 22-26.