

MOSQUITO CONTROL AND ENGINEERING*

RALPH J. VAN DERWERKER

Sr. Sanitary Engineer, Federal Security Agency, Division of Sanitation, Public Health Service

Ample historical references illustrate Man's conflict with the mosquito, an insect which has influenced his selection of living, working and playing sites as much as any other single factor. Until the medical profession determined half a century ago that the mosquito was responsible for a number of annihilating disease outbreaks, the annoying nature of mosquito bites was insufficient for concerted and effective campaigns to eliminate the pest from the environment. However, as soon as the role of the mosquito in disease transmission was identified, community programs of mosquito control and extermination became a possibility and fact.

Entomologists furnished the knowledge of the life history of these insects, which made it possible to select the weakest point in the enemy's life cycle for extermination attacks. The weapons available at the time were most effective against the larval stage, which meant, in general, the elimination of breeding places or, where this was not possible, the extermination of larvae and pupae by chemical treatment. Elimination of breeding places meant removal of water or manipulation of water levels, and the skills needed for this type of work were found in the civil and sanitary engineering professions.

Large-scale programs of chemical applications and the vast marsh areas in New Jersey called for the development of special machinery not used in any other community work. The mechanical engineers came to the rescue with ditching machines, ditch-cleaners, special pumps, spraying and dusting equipment, mosquito traps and many special mechanical contrivances which contributed to the econ-

omy and effectiveness of mosquito control programs.

Engineering techniques in mosquito control have been primarily in the nature of an applied science. The most successful mosquito-fighting engineers have been and are those who expand their particular field of engineering to include basic elements of other sciences, such as entomology, chemistry, medicine, business administration, and many others. No professional man can be very successful in mosquito control work if he does not draw from other professions and skills. This is principally true in local campaigns which are restricted in scope by political boundaries and jurisdictions which, in turn, usually place a ceiling on available funds. As a result, existing mosquito control administration is limited to one or two professional employees who must resolve all the technical and administrative problems presented by the different fields of interest involved.

It is worthy of note here that, under the exigencies of World War II, the Public Health Service carried out a large-scale program against malaria which has virtually eliminated that disease from the United States through the use of teams of professionals—the doctor, engineer and entomologist. This was made possible through the availability of adequate funds.

The mosquito control program is in every sense an engineering problem. The planning, cost estimating, construction and operating techniques applied to the search for breeding places, to draining or filling, to impounded water control, and to chemical treatment of breeding areas or buildings depend essentially on engineering skills. Much equipment, material and labor is required to carry out the many operations required in an effective campaign. The engineer is trained from the outset to search for the most econom-

* Presented in panel on Mosquito Control at Annual Meeting of the Virginia Mosquito Control Association, January 25, 1952 at Norfolk, Virginia.

ical means to an effective solution and to weigh in every detail various plans to accomplish the desired result. He is also well trained to administer the execution of such plans and programs.

It has long been my considered opinion that a real need exists for engineering courses in mosquito control to equip graduating engineers with fundamentals in related sciences useful in mosquito control work. Sanitary engineering courses come closest to filling this need more because graduates of such courses have been exposed to the skills of many sciences than because they have been exposed to the specific sciences necessary to mosquito control. The broad scope of sanitary engineering training stimulates and equips the sanitary engineer for the multi-phase approach to mosquito control as no other technical education can. With the many positions in mosquito control work open in the United States and with the wide need for experts in this field throughout the world today, graduates of courses in mosquito control engineering should find no shortage of opportunities.

No community endeavor that neglects consideration of the mosquito menace is adequately protecting its own or its neighbor's interests. An engineer—municipal, highway or hydraulic—is usually involved in the conception of such public works and he cannot claim to be discharging his full responsibility when the impact of his plan on mosquito production is ignored. Impounded waters for water supply or electric power can, and frequently do, convert a healthy community to a malaria-ridden populace when the shore lines are not thoughtfully prepared beforehand. Highway and railroad culverts built a few inches too high can interrupt drainage

to create vast and extremely productive mosquito breeding areas. Even that popular and well-known domestic engineer, the housewife, must guard against the subversive habits of the yellow-fever mosquito in certain climates. Every engineer must share the responsibility for guarding against the mosquito menace by learning its breeding habits and planning his project in such a way as to minimize the mosquito's chances for survival.

I have heard expressed the opinion that engineers are not necessary to malaria control work since the new residual insecticides have changed the techniques of malaria control. It is true that the customary mathematical and engineering skills required for drainage works are not needed in a residual spraying program. On the other hand, I know of no other professional group so well equipped as the engineers for planning the equipment, material and personnel necessary to carry out such work with efficiency and economy. It is also rare to find a locale where reliance on chemical treatment alone will prove to be the wisest course. It is short sighted to spend thousands of dollars annually applying residual treatments to buildings when a few hundred dollars might remove the source of breeding for all time.

I have attempted to bring out the importance of engineering skills to mosquito control work, whether applied by an engineer or others versed in engineering methods. Graduates of mosquito control engineering courses would be invaluable to the work and will find many opportunities to practice their profession. All engineers must be alert to the impact of their plans and works on mosquito production.