

vectors as menaces to the good health and comfort of the public. The problems of pest control are many. Research is constantly solving some of them, but new ones constantly develop. Nevertheless, progress is being made both in procedures

and organization. It is recommended that succeeding vector control committees of the American Public Health Association work toward determining how health workers best can participate in and advance this work."

INSECT CONTROL IN MODERN MILITARY PREVENTIVE MEDICINE

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"Sir: In my letter of June 19 (1864) I stated . . . that indications had forced me to the conviction that we were to have a season of yellow fever in this port (Key West, Florida). . . . It was evident that the first precaution to be taken was to get the vessels away from Key West, the center of the disease, as quickly as possible. . . . The vessels that have been detained here performe have suffered severely. The steamer NITA was under repairs that rendered it impossible for her to get away. Every person on board but two officers has been taken ill of the fever and so far some ten or more have died. . . . I, myself, had the disease in a severe form. . . . The mortality on the island I am told has reached as high as 12 to 15 in a day. I concluded early in the program of the disease that it would be best for me to remain at this station. It is the only one from which the movements of the squadron can be properly directed or communication kept up with the North." This was written by Acting Rear-Admiral Theodoros Bailey, U. S. Navy, 27 July 1864.

A few years later, 1867, at Fort Jefferson on Dry Tortugas, our Military Preventive

Medicine was sorely tried. "On September 2, the hospital at the fort contained 26 patients of whom 7 died. Major Stone, Commander of the fort, placed Dr. Mudd in charge of the hospital on September 6 and had him released from chains. . . . On September 13 every officer was ill except Major Stone. On September 15 Dr. Smith's son, 3 years old, became ill and died on September 18. . . . Major Stone, after this death, sailed for Key West with his two year old son to save him from the yellow fever. While enroute Major Stone became ill and died one day after reaching Key West. . . . The total number of cases was 270 with 38 deaths." This abstract is taken from the historical research material at Fort Jefferson.

At this time in American history the 39th parallel had taken on new significance and had been named the Mason-Dixon line. Less than a century later we are concerned over the bloody 38th parallel, only about 70 miles south of the Mason-Dixon line though several thousand miles west in Korea. North-south distribution is believed to be of minor importance in the distribution of insect life and it might be of relatively little importance politically as evidenced here. We must always be vigilant, however, and discontinuous distribution should ever be suspected. Many barriers and limitations which we thought impregnable have failed. Certain environ-

* The opinions or assertions contained herein are the private ones of the writer and are not to be construed as official or reflecting the views of the Navy Department or the Naval service at large.

mental conditions which we think to be restrictive may give us a false sense of security due to our lack of conclusive direct evidence. Occasional *A. albimanus* along the south of Florida may be an example of this situation. "Seventy-five percent man hours lost due to mosquito bites" was reported in this state less than one hundred miles from this meeting ten years ago. Eighty-five percent of each regiment was reported ill with acute malaria at the fall of Bataan according to several observers. The cost of our lukewarm attitude toward malaria, early in the Korean campaign, is being paid at home as evidenced by the 1952 episode in California. Sylvan yellow fever which originated in Panama in 1948 is reported to be moving steadily in a north-west direction, practically unchecked. Infantile paralysis epidemics in Florida and Texas during 1946 and 1947 provided studies relating insect control to this disease. Insect control following the 1951 floods in the Kansas City area gave proof of our unpreparedness in this phase of health insurance.

Dr. J. C. Geiger, Oakland (California) Health Officer reported in August 1952, "The human encephalitis situation in the valleys of California so publicized at the present time is another shining example of delayed but obviously necessary public health work. In other words, often quoted, 'It is doing too little, too late,' an old public health custom in the United States."

In modern military preventive medicine we emphasize insect control in relation to the prevention and/or control of disease among members of our military forces and the conservation of health and physical fitness of troops. With few exceptions, this is analogous to the public health activities of our home space communities. In the examples which are cited in this paper, the close relationship of preventive medicine, *per se*, and military preventive is established. Some of you, either in uniform or in a civilian status, have volunteered or have been called to assist in various phases of military insect control. All of us look to the U. S. Public Health Service, the

U. S. Department of Agriculture and other organizations for protection from insect disease vectors and pests. This symmetry of need brings us to a common appreciation of our problems. Through military service, many Americans are found around the world where they are faced with the difficulties of world health. It is impossible to find any group of people more highly trained and conscientious about their personal health than our men in service. As they practice preventive medicine in uniform, they are less likely to accept the explanation that "Our industry breeds flies, we will always have flies during this season," or "This city has always had mosquitoes and it always will." As these people return to their homes, they will be ardent believers in insect controls.

Malaria, bacillary dysentery, infectious hepatitis, dengue and filariasis are diseases of major importance to Naval personnel. Cholera, plague, amebiasis, typhus fever, schistosomiasis and relapsing fever are listed as diseases of secondary importance. Of these twelve diseases, arthropod vectors are known for at least nine. There is still some question as to the mode of transmission of some of these diseases just as there are some diseases which we have failed to recognize. "Mosquito-bite fever" and "sand-fly" fever are names of illnesses which, lacking known parasites, have not been accepted.

The incidence of intestinal diseases can be reduced to negligible proportions by environmental sanitation and immunization; vaccination will prevent smallpox; chemical prophylaxis affords a method of checking venereal disease; and, in fact, the only important epidemic diseases for which no positive control measures are available are certain of the respiratory infections. As for insect borne diseases, they can be practically eliminated by the application of insect control measures.

Our medical officers and your public health directors are faced with the proper control of many new toxic chemicals to prevent serious accidents due to negligence or ignorance of those who use these powerful insecticides. Fortunately there have

been very few known deaths reported to have resulted from many of our new insecticides. Military preventive medicine has established certain regulations in keeping with available test data so that only those who are qualified may be trusted to handle and use these poisons. In some instances these limitations have been too restrictive but in other cases we have been very lax. The American Mosquito Control Association can be a valuable source of information and assistance in bringing these safe practices into the techniques of the operators.

We have reached a new emphasis for Insect Control in Modern Military Medicine. The importance of producing the best combatant and preserving his health is paramount in our up-to-date military organization. To teach him personal protection against insect borne diseases is a vital part of his preparation. As he is sent from one situation to another he is informed of the known diseases in the new environment and the best methods of self protection. He is aware that everything possible is being done to protect him while in these varying positions. He is taught to recognize many of the common ecological associations and can evaluate these for himself. If military maneuvers preclude the practice of modern environmental sanitation, he is prepared to maintain his good health by proper clothing, repellents and suppressives. Medical schools are increasing their instruction in medical entomology and the effects of this training are noted in the field.

Our military aircraft fly many scheduled and unscheduled flights around the world. Most of these airplanes are equipped with the very best and latest instruments and engines. Some of these have complete installations for instant and simultaneous disinsectization of all compartments, wing spaces, tail sections, bilges and wheel wells. Those that have not

been so outfitted are treated by conscientious orderlies of crew captains. Many of our continental and overseas bases are practising the most efficient permanent insect control measures as directed from within the military and as recommended from civilian experts and advisors. Temporary control techniques are programmed and directed by specially trained and experienced personnel. The most effective insecticide dispersal gear is in use on military aircraft where large areas require treatment. Ground equipment is still lacking on some bases but continued procurement is constantly relieving this shortage. Since many of these installations are operated in coordination with a foreign country, an excellent opportunity for coordination in insect control is present. To discuss mosquito control with Moroccans, Libyans, Koreans, Panamanians, Hawaiians and Japanese has been an exciting education. Insect control is one phase of preventive medicine which is simple to demonstrate and which proves its benefits rapidly. In fact, DDT is almost a universal introduction to conversation in any country today.

Prior to the advent of modern military preventive medicine, the concentration of any considerable number of troops, especially recruits, was in most instances accompanied by the occurrence of epidemics. In many campaigns, insect borne diseases prevented the full achievement of the military mission and even led to defeat. Where typhoid fever and dysentery raged practically unchecked, where typhus and plague marched with the warriors, where malaria and dengue caused more casualties than the enemy, modern military preventive medicine has found its place. The chapter on insect control, though it may contain some uncertainties, is worthy of its high position in preventive medicine in combat and at home.