The Multiplying Mosquito

J. B. KENDRICK JR.
Vice President
Agricultural Sciences
Director, Agricultural Experiment Station
University of California

THE BIOLOGICAL WORLD includes many species of life forms that contribute to or are essential to man's well-being. That flying hypodermic needle, the mosquito, doesn't make the list. It will never make the endangered species list, either. It ranks high on another list, and in fact is credited with killing more people than all our wars put together.

But for the last several decades in the United States at least, the mosquito hasn't been the menace it once was. In California, for example, although a number of outbreaks of malaria and encephalitis, have occurred, there has been a high level of mosquito control and relative freedom from epidemics of mosquito-borne disease during the past 30 years.

Now the age-old war between man and mosquito has taken a new turn. According to an expert panel convened last year by the National Academy of Sciences, "mosquito control today is in a state of crisis." The adaptability that has helped the mosquito survive for millions of years —in environments as diverse as the tropics and areas north of the Arctic Circle—has enabled the hardy insect to counter some of man's most effective weapons. In several areas, mosquitos have developed resistance to many chemical insecticides. The panel pointed to the situation in California, where the encephalitis-transmitting mosquitos in some areas have become resistant to "virtually all larvacides," as one example of the crisis facing control programs. The existance of large and expanding areas in California in which chemical control is no longer an effective weapon means that man must do some "adapting" too. The best means of adaptation in this case must be increased research to find new weapons.

Insecticide resistance in mosquitos calls for new and more complex control strategies, and the University is continuing to respond to the needs of mosquito control agencies, with research efforts directed to the development of alternative control methods. Scientists in various disciplines within the Division of Agricultural Sciences, together with researchers in the School of Public Health, are working in close cooperation with regional and state agencies to meet the developing situation.

Because of the mosquito's adaptability, division scientists continue to work on many fronts to develop control programs based on a combination of methods (biological, chemical, physical, and autocidal). They are studying the behavior and life cycles of mosquito populations, and better water management practices; they are screening potentially useful chemical compounds, developing and testing new ground and air application equipment. Because of the resistance problem, a major emphasis is being placed on biological methods—including the use of predators, pathogens, and parasites.

An interesting example of the use of predators is the attempt to help stop the northward march of Venezuelan equine encephalomyelitis (VEE), the mosquito-borne disease that killed 12,000 to 15,000 horses in Mexico in 1970–71. Riverside scientists are stocking the Mexican lakes and irrigation ditches nearest to Southern California with fish that are voracious eaters of the mosquitos that carry VEE.

Among the most promising of the biological insecticides are the juvenile hormones being tested in laboratory and field studies by researchers at the Davis and Riverside campuses and the U.C. Mosquito Control Research Laboratory at Fresno. The compounds are based on natural growth-controlling chemicals. In field tests, one of them has controlled strains of mosquitos resistant to conventional insecticides with doses as low as .025 pounds per acre applied by aircraft.

The mosquito control effort illustrates that solutions to today's increasingly complex problems often require a wide range of capabilities, from practical engineering skills to an understanding of fundamental life processes. It is another example of the fact that agricultural research is directed toward solving problems that affect the welfare and quality of life of all citizens.