THE PATH OF LEAST RESISTANCE IN CALIFORNIA MOSQUITO CONTROL

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While the title of this paper has been inspired by that dilemma in insect control referred to as "resistance," I must confess in the beginning that I am using the word "resistance" and the phrase "the path of least resistance" with a somewhat different connotation. Actually, the resistance which we refer to in the sense of the adaptation or tolerance of insects to insecticides has in large part come about through the recent emphasis in control having followed the path of least resistance.

On the basis of early evidence, the chlorinated hydrocarbons with their residual characteristics certainly held spectacular prospects for keeping economic, noxious, and vector arthropods at levels of little or no consequence. For a limited period of time this interloping miracle did seem possible, leading even some of the most conservative environmentalists to wonder if the age-proven fundamentals of basic sanitation and clean cultural practices had gone out. However, it did not take long for arthropods, the product of millions of years of evolution, to adjust and to revert with a seeming vengeance. That nearly every mosquito control agency climbed aboard the chlorinated hydrocarbon bandwagon is not surprising for the degree of public reaction in favor of the program did provide the individual program administrator with the most vital reward of any public service effort—public support. Such a show of support in turn provided encouragement to this kind of public service. Regretfully, this desire to provide the public with what it, from outward appearances, wanted, has to a great degree caused irrationality with respect to program balance, at least temporarily. This accentuated insecticidal approach to mosquito control, while economical in a relative sense, contented itself all too completely with merely treating the environment to reduce mosquitoes rather than organizing the environment to prevent mosquitoes from occurring. While going along on this expedient program emphasis, mosquito control agencies have been accepting a secondary place in assisting to plan the environment for the long range economic good of the public.

Why has mosquito control been content to accept a secondary place in planning and organizing the environment with respect to water and its use? What other local interest in water besides mosquito control has so impartial and generally beneficial a relationship to the various other water use interests? Mosquito control is without question the most neutral medium which has within its power, through agricultural, industrial and community acceptance on the basis of compatibility, the opportunity for leadership on the rather tense and touchy subject of water where the great diversity of concern has led to anything but true cooperation. Water use with its underlying significance to domestic, agricultural, industrial, conservational, recreational and other interests certainly deserves more cooperative planning than it has received to date. Does not mosquito control possess the unique attribute which would allow for leadership in bringing about this cooperation? If mosquito control were to accept this potentiality for leadership in promoting cooperation in local water use, how may it prepare itself?

It would seem the first task would be to take inventory of its present and future ability to assume such a task. Then, if mosquito control is to accept this responsibility and the challenge contained, a long range course of action would, in most

cases, have to be developed in full recognition that:

1. Mosquito control personnel owe it to themselves and the public that they thoroughly understand the other interests concerned with water.
2. Eventual results will not come about by mosquito control working alone, but rather will most likely come through development of a generous spirit of cooperation among the various interests in water.
3. Such ends are not likely to be prompted by statute or enforcement methods but rather by applied education in its many ramifications as the very foundation of realizing this long range goal.
4. The personnel of mosquito control must be of such a caliber and selected with such care as to assure that each person can accomplish public education with each contact, as well as provide other water interests with the reliability of the action taken toward meeting the overall best use of water. This can only mean the gradual accentuation of professional services within the key functions of the mosquito control program.
5. The need for accurate record keeping of both operational and entomological types, based upon a system of mapping that is coherent to the various water use interests, is plainly obvious.
6. The emphasis of the program conducted in mosquito control must provide an underlying character about it which is going to promote efficient and as nearly total use of water as is possible. This can only mean an emphasis in mosquito control toward progressive reduction of mosquito sources, or the confining of water in such a way as to make it easily treated, or unsuitable to mosquito propagation.
7. Lastly, it would become the responsibility of mosquito control to pursue the scientific investigation of its unknowns in order that the courses of action taken will ultimately be based upon known fact consistent with a well organized environment.

If this inventory were to be accepted and the mosquito control program were to be dedicated toward assuming initiative and eventual leadership in preparing the environment for efficient all around water use, it follows that the direction of mosquito control must be toward the general field of preventive practices. The two avenues of realizing mosquito prevention would seem to lie in the development of better and more complete information on mosquito ecology and the devising of ways and means for mosquito source reduction.

We should seek to follow the late Professor W. B. Herms' advice of "know well the insect" in order that we may be assured of our control methods. Considerable investigational work is under way, aimed at providing both timing and placing of control effort where it will do the most good. Our definition of the ecological approach in investigations includes a comprehension of where and when naturalistic control, chemical control, crop management practices, engineering methods, and other potential new approaches to mosquito control can and should be used. By systematically organizing evidence which characterizes the individual mosquito species of concern we are confident that the studies and demonstrations developed through a long range investigational program will answer many of the unknowns to mosquito control. Through providing answers to the unknowns and with mosquito control accepting leadership in positively working toward organizing the environment for cooperation in water use, there exists a promising prospect for lessening the mosquito potential in the foreseeable future. As a result of such a combined program taking effect, we could certainly then be going along a path of least resistance.