

THE CHANGING ROLE OF THE PROFESSIONAL ENTOMOLOGIST IN MOSQUITO CONTROL AGENCIES

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Since the first organized mosquito control districts were formed in California, their numbers have increased steadily as agriculture and the human population expanded. Mosquito control has become more complex, requiring better trained personnel. To better meet the need, many districts have selected managers with formal training in entomology. Other districts have responded by employing full-time entomologists. The following table shows the recent increase in entomologically-trained personnel. (These data were kindly supplied by Dr. W. Donald Murray, Secretary-Treasurer, CMCA.)

Year	Agencies	No. of Agencies Having:	
		Manager- Entomologist	Separate Entomologist
1964	56	12	7
1974	62	23	21

Many districts also employ separate technicians with biological or entomological specialties, including fish biologists and research technicians. There are now approximately two dozen managers or entomologists with advanced degrees in entomology and zoology, six of whom have Ph.D. degrees. These resident scientists represent an extraordinary capability for applying analytical techniques to control operations and for evaluating program efficacy. Although the entomologist's role varies substantially from one district to another, it is probable that the professional entomologist will have a major influence on guiding mosquito control in California in the future. The purpose of this paper is to offer a broad yet realistic definition of the entomologist's role in a modern abatement district, under the direction of or in collaboration with the manager.

TRAINING OF PERSONNEL. The entomologist should have responsibility for training other employees. His training equips him to teach in a classroom setting facts and concepts that field personnel need to cope with field situations they are likely to encounter.

New seasonal employees should be taught mosquito biology, control methodology and safety procedures. The entomologist should utilize training aids, including formal lectures, training manuals, slides, preserved specimens of mosquitoes and their predators, and live specimens. Classroom instruction should be followed by field demonstrations of sampling and control techniques. This phase of training may be delegated to the operator's field supervisor, under direction of the entomologist.

Prior to the mosquito season, refresher seminars should be given permanent field personnel. Recent developments in control techniques and new methods which are to be used should be explained. Mosquito identification should be reviewed.

The entomologist should conduct study sessions to help employees prepare for state certification examinations, using the training manual as a guide.

ROUTINE TECHNICAL DUTIES.—The entomologist should be responsible for assessing progress of technical operations. The manager should be kept aware of the current status of control efforts and of adjustments that are needed. Consistent and comprehensive field sampling should be maintained, combined with a valid laboratory bioassay program adequate to detect control failures quickly, and to allow early corrective action to be applied effectively.

Seasonal surveillance through larval and adult sampling should be included, with sufficient trained technical personnel available to do the necessary analysis of entomological and chemical-resistance samples required. Several of the larger districts now maintain comprehensive technical program analysis to guide field operations.

Winter routine duties include preparation of seasonal reports, supervising equipment calibration, planning strategy for the coming year, and planning and preparing public information programs.

TECHNICAL CONSULTATION. In addition to routine duties such as advising the manager of day-to-day control problems and their alternatives, it is the entomologist's duty to make certain that the manager is accurately informed of the pest situation and the entomological ramifications of alternative courses of action.

The entomologist may also be called upon by the manager to provide technical information to the Board of Trustees on the prevailing entomological situation through periodic reports. The Board should also be informed of trends and findings in mosquito research, and how these pertain to their respective districts.

The entomologist is often asked for entomological information and advice. Agricultural concerns may want to know the possible aquatic side effects of a pesticide application. Radio, television or newspaper personnel often request information for the public media. It is the entomologist's responsibility to provide factual information.

RESEARCH.—Research traditionally has been considered a primary prerogative of the universities, with relatively little need for ongoing research programs by local agencies. Also, until the California Legislature assigned mosquito research exclusively to the University of California in 1966, the State's Bureau of Vector Control engaged in research on mosquitoes. Many abatement districts formerly functioned only as operational entities and were dependent upon the state agencies for guidance. Recent developments have significantly altered this pattern.

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²As a consequence of increasing budgetary constraints

long-term concerns with the state, although some pure academic research still continues. Many districts have therefore initiated field research and technical development seeking solutions to immediate problems, in some cases arising from past inattention due to the lack of technical personnel. The need for immediate research attention is aggravated by increased community awareness by taxpayers who expect corrective action when necessary, for example, when the agency is confronted by insecticide resistance. Thus, the district that has technical expertise to practice control through pragmatic and methodical efforts, not by crisis, will be in a much better position to operate successfully during the years ahead.

The scope of an active research program within an abatement district should be determined by the agency's needs and resources. When university personnel may not be able to become physically involved with the research problem, they are usually more than willing to provide advice and guidance. This resource should be utilized. Also, abatement district entomologists with research backgrounds may be able to apply for grants as co-investigators on research grant proposals with university research workers.

Research findings should be published promptly. Several entomological journals should be utilized to broaden the channels of communication. Publication costs should be borne by the district.

OTHER PROFESSIONAL OBLIGATIONS.—It is the entomologist's duty to keep well informed of advances in his field. The district should subscribe to the major entomological publications, but the entomologist should subscribe to journals he wishes to retain for his personal library. The entomologist should be granted library leave time. Local college and university libraries should be utilized for searching out topics of interest and perusing biological journals.

Some districts have an education policy permitting employees to enroll in job-related courses. These districts may be willing to grant educational leave to the entomologist for periodic courses and could provide for fees and incidental expenses.

The entomologist should participate in extracurricular scientific functions, for it is imperative to maintain a constant flow of thought and interchange of ideas. The cumulative results of these efforts will benefit participating districts. He should be an active member of the California Mosquito Control Association and the American Mosquito Control Association. Both organizations sponsor annual meetings where the entomologist has an opportunity to present reports on his studies and to be updated on the work of others. The CMCA Entomology Committee also presents an intrastate program each year, which affords in-depth reviews on major topics of concern. Most districts currently underwrite the cost of travel by the entomologist to these meetings.

Local colleges and universities, public schools, youth groups, and other organizations afford an excellent opportunity for the entomologist to acquaint others in the community with his science and its significance in their daily lives.

Mosquito control is evolving rapidly toward a sophisticated technology requiring a more thorough understanding of the natural and physical sciences. Districts which employ a professional entomologist should consider a person with a postgraduate degree, and should be prepared to provide full support, including an adequate budget and a trained technician.

Key responsibility for insuring that mosquito control districts move forward on a firm scientific basis lies primarily with the entomologist. His guidance is essential if new technology is to progress efficiently from development to application.