

Chapter Fourteen

Development of Training Programs in Laboratory Animal Medicine

Alvin F. Moreland, DVM, MS
ACLAM Diplomate

The Early Period – 1940s and 1950s

Few veterinarians were dedicated to care (either husbandry or veterinary medical care) of animals used in research prior to 1945. This was probably because there was little opportunity for such employment. Laboratory animal medicine was unknown prior to that time. Simon D. Brimhall, VMD (1915), J. G. Hardenbergh, VMD (1922), and C. F. Schlotthauer, DVM (1927), who were successively employed by the Mayo Foundation to direct the management of animal resources, were exceptions (1) and there were likely a few others.

Training by Trial and Error

In 1945 a national policy was initiated to provide increased federal support of science. Concomitantly, there was increased emphasis on health research, and biomedical research expanded rapidly. It was quickly recognized that many animals used in research had significant health problems that might be reduced through professional veterinary medical assistance. Thus, in 1945, Nathan R. Brewer, DVM was employed by the University of Chicago, and was followed by others over the course of the next four years at other institutions. By 1949 five Chicago-area institutions employed veterinarians in laboratory animal management related activities: Dr. Brewer, DVM at the University of Chicago; Bennett J. Cohen, DVM at Northwestern University; Elihu Bond, DVM at the University of Illinois; Robert J. Flynn, DVM at Argonne National Laboratory; and Robert J. Schroeder DVM at Hektoen Institute for Medical Research of Cook County Hospital (1,2, 3). During the early years these veterinarians relied on their basic education



Dr. Thomas B. Clarkson initiated the first formal training program in laboratory animal medicine in 1959. This photograph, taken in his office at the Bowman Gray School of Medicine of Wake Forest University, depicts him and pictures of several of his early trainees.

in veterinary medicine, on what they could learn from other biomedical scientists, from one another, and by “trial-and-error.” The extant body of knowledge relating to husbandry and veterinary medical care of research animals was very small at that time and the veterinarians involved in the field began to feel that trial-and-error training was inadequate. They began to seek other means to enhance their knowledge.

On-the-Job Training (OJT)

Individual discussions and informal meetings between research veterinarian colleagues started and quickly expanded to include anyone with knowledge of husbandry or diseases of research animals. In 1950 the Animal Care Panel, which subsequently became the AALAS, was founded in response to the recognition by these Chicago area veterinarians of the need for additional information which would enable them and others to adequately provide for the care of “laboratory animals” (1,2,4).

The Second Period – 1960s and 1970s

Initiation of Formal Programs of Education and Training

Trial-and-error, on-the-job-training, and informal training through meetings and conventions continued as the primary means of training until 1959 when Thomas B. Clarkson, DVM initiated the first formal program to provide training in “laboratory animal medicine” at Wake Forest University’s Bowman Gray School of Medicine. (5) This program was funded by the Physiology Training Committee of the Institute of General Medical Sciences of the National Institutes of Health (NIH). The committee made the decision to fund such training in response to advice and urging by peer scientists who had recognized the potential animal health and other scientific benefits of the involvement of veterinarians trained in research and laboratory animal medicine. The committee’s decision was important, since for the first time training in laboratory animal medicine was placed on par with other areas of research training in the medical and biological sciences. In 1960, the second formal program was begun by Bennett J. Cohen, DVM, at the University of California at Los Angeles (and subsequently moved with Dr. Cohen to

the University of Michigan in 1962). By 1965, laboratory animal medicine training program responsibility had been transferred to the Division of Research Resources (DRR), now the National Center for Research Resources at NIH (5). In that same year, the Institute for Laboratory Animal Resources (ILAR) of the National Academy of Sciences sponsored a symposium on training and education in laboratory animal medicine which ultimately led to publication of *A Guide to Postdoctoral Training in Laboratory Animal Medicine* (Postdoctoral Guide) (6).

Defining the "Body of Knowledge." What is "Laboratory Animal Medicine?"

"Laboratory animal medicine" can be defined as the portion of veterinary medicine which is applied to the species of animals typically used in biological and medical research.

In the early days of formal training, veterinarians often attempted to define the body of knowledge—the veterinary clinical, technical, and managerial skills which constituted laboratory animal medicine. These attempts often ended in frustration as the field seemed to encompass an endless array of knowledge and skills. Likewise, confusion arose over the term "comparative medicine," particularly with regard to whether it and laboratory animal medicine encompassed the same body of knowledge and skills. One notion held that laboratory animal medicine primarily included the applied clinical veterinary medical aspects; while comparative medicine included the clinical aspects and, in addition, had a major focus on academic investigation which "compared" the diseases and pathology of research animals to those of other species, including humans. From the outset, however, all laboratory animal training programs emphasized the value of research training as a part of the training process. They required both clinical residency training to acquire clinical and managerial skills; and either a research project of sufficient quality for the results to be published in a refereed academic journal, or the trainees to concurrently enroll in graduate education programs which included a research project resulting in a thesis or dissertation.

The *Postdoctoral Guide* was an attempt to define, as best as could be done, what knowledge and array of skills constituted "laboratory animal medicine"—core subjects, clinical residency training, and research training. Through updates and revisions, the guide has served those involved in providing such training (6, 7, 8). The most recent edition was published in 1979.

The early programs, in general, were developed and directed by the sole veterinarian involved at the respective institutions. As time passed, institutional animal resources expanded and program directors became more and more involved with day-to-day management and clinical veterinary care. Thus, in time, all developed the need for professional assistance and expanded the postdoctoral training programs by adding other professionals to the training program staff. Each institution was unique, and the structure of the program reflected the ingenuity of the program director. Some offered clinical residency training augmented by seminars and didactic course work on subjects which, in the director's opinion, required special emphasis. Others petitioned their graduate school for addition of courses to the curriculum in special laboratory animal related subjects and required the trainees to enroll and take these courses for credit toward an advanced degree. Such courses were often taught by the laboratory animal veterinarian, but occasionally were taught by other qualified faculty. In addition, trainees who were degree candidates enrolled in other academic course

work which qualified them for advanced degrees in recognized disciplinary areas such as physiology, microbiology, and pathology which augmented their knowledge of human biology and pathology and research methodology.

All program directors seemed to agree that the pathology of laboratory animal diseases was an area requiring special emphasis. Efforts were made to provide experience and training in pathology. Necropsy of laboratory animals became routine, as did clinical chemistry and hematology. Histopathologic examination of animal tissues formed an important part of the pathology training. Most of the training program directors were generally trained in veterinary medicine and were not specialists in pathology. It is perhaps because expertise in histologic examination requires special training and expertise that a pathologist was usually the first professional staff position recruited. Since disease diagnosis often involves identification of infectious agents, others found it expedient to add staff personnel trained in microbiology.

Often the degree programs were offered within the framework of existing departments and the training program directors held academic faculty appointments within these departments or other university departments. However, as the number of professional staff personnel involved in the training program reached a critical mass, which varied from institution to institution, the decision was occasionally made to form academic units for laboratory animal medicine, comparative medicine, or comparative pathology. Since all of the desired disciplinary areas were usually not represented by full-time members on the laboratory animal training staff, these disciplines were provided by faculty personnel from other academic disciplines who were given joint appointments or courtesy appointments on the laboratory animal or comparative medicine faculty.

Some of the early programs were labeled as training programs in laboratory animal medicine and others as training programs in comparative medicine and/or comparative pathology. Some provided a certificate upon completion; others provided an academic degree. Indeed, the question as to whether the training is "laboratory animal medicine" or "comparative medicine" remains and the terms continue to be confused. Perhaps it is this confusion that has led some academic institutions to develop academic sections, divisions or departments of laboratory animal medicine, comparative medicine, or comparative pathology; while others have chosen to ignore the issue and have provided the training within the framework of existing academic departments. It would appear that, in the opinion of most academic administrators, this field of endeavor has not yet been sufficiently defined or matured to be awarded academic section, division or department status.

Expansion / Proliferation of Formal Training Programs

The increased emphasis on biomedical research occurred simultaneously in the civilian sector and in the uniformed services. The need for laboratory animal veterinary medical services was apparent in both sectors. While the first civilian training program began in 1959, the first formal training program in the uniformed services was begun in 1960 by Col. Robert Hummer and Frank Krewaldt, DVM at the US Air Force School of Aerospace Medicine, Brooks Air Force Base, San Antonio, Tex., and was followed in 1968 by a program begun by Robert J. Whitney, DVM at the US Army's Edgewood Arsenal, Md. Several military installations have been sites for clinical residency training for members of the uniformed services. Also, several of the training programs within

the uniformed services have been associated with institutions within the civilian sector both for formal course work leading to a degree and for clinical residency training (9).

Following the initial civilian sector programs, others developed rapidly. NIH sponsored programs started at Tulane University (1963, K. F. Burns), Stanford University (1965, O. A. Soave), University of Florida (1965, A. F. Moreland), Johns Hopkins University (1968, E. C. Melby), and University of Missouri (1968, C. C. Middleton). The Veterans Administration initiated a program at Hines VA Hospital (1966, Robert F. Locke) (3).

Concurrent with the development of NIH sponsored training, many academic research institutions initiated institutionally sponsored, formal training programs usually as clinical residencies. NIH sponsored *and* institutionally sponsored programs originally required two or three years for completion and graduates were usually awarded a master of science degree or certificate of completion of residency. Most of these programs have continued; however, some of the NIH sponsored programs eventually were discontinued, while some of the institutionally sponsored programs obtained NIH funding for their continuation and expansion. Other institutions have since initiated programs to the extent that formal training programs currently recognized by American College of Laboratory Animal Medicine (ACLAM) are in 33 civilian sector institutions in 18 states. Three programs for the uniformed services are in Maryland and the District of Columbia (10). Numerous other training opportunities not certified by ACLAM also exist.

The Third Period – 1980 to Present

Academic Laboratory Animal Medicine

During the early decades the practice of laboratory animal medicine mainly involved the management of animal facilities and the clinical veterinary medical care of animals used in research. While the mission of the laboratory animal veterinarian always included the triad of service, teaching, and research; the latter rarely received much attention. Of course, in those institutions which began laboratory animal training programs, the veterinarian was significantly involved in teaching. In other institutions courses on laboratory animal biology, techniques of animal experimentation, or experimental methodology, were offered to graduate students and medical students. Informal teaching of research technicians and other research staff was always a duty of the laboratory animal veterinarian.

By the early 1980s laboratory animal medicine had matured to the point where more rapid expansion of the field of knowledge had become imperative. While some institutions had established academic departments with research into laboratory animal problems as a major mission, most had not. Veterinarians graduating from programs with research degrees who assumed duties as directors of institutional laboratory animal programs, in general, were not successful in establishing research programs of significant dimensions. In 1983, during an ACLAM Forum on Biomedical Research held at Howey-in-the-Hills, Fla., representatives of the DRR staff and the postdoctoral training program directors assembled for a meeting. Various training program concerns were discussed, however, the program directors were reminded that NIH sponsored training programs were for the purpose of *research* training, not *professional* training. While all laboratory animal medicine veterinarians were involved in providing biomedical research support and, as such, were members of the overall biomedical research force, most were not directly involved in

operating *research* programs and, thus, their training may be construed to be professional training. This meeting made it clear that the early programs were not succeeding in producing sufficient numbers of individuals dedicated to laboratory animal research careers. The program directors received a clear message from DRR that changes were needed to place more emphasis on research training, while acknowledging the need for clinical specialty training. As a result several NIH sponsored programs underwent modifications designed to provide in-depth research training. Most of these program directors concluded that more time would be needed to produce research veterinarians and expanded the programs to require four or five years for completion. Most trainees completing these expanded programs receive a PhD degree upon completion.

There was concern on the part of the training program directors that veterinarians trained to this level would not seek positions which involved management of laboratory animal programs or the provision of clinical veterinary medical care. The program directors thought the veterinarians would seek positions in academic departments as instructional faculty who conduct research as a major part of their faculty assignments and would be lost from the field of laboratory animal medicine. Although the final result of these changes is not yet totally clear; it is clear that, while some have joined departments outside the field of laboratory animal medicine, a few of these research veterinarians are accepting faculty positions in those institutions with academic sections, divisions, or departments of laboratory animal medicine, comparative medicine, or comparative pathology and are successfully developing research programs. Their research is usually focused on diseases of laboratory animals; the development of animal models for the study of human diseases; the development of less expensive animal models for diseases of more expensive animal species; or, development of animal models for animal species more difficult or impractical to work with in the research laboratory. Others, unfortunately find the competition for research funds and the intensity of a research career not to their liking and seek positions in management or veterinary medical clinical care of laboratory animals.

In 1957, the American Veterinary Medical Association's committee on veterinary medical specialties recognized the American Board of Laboratory Animal Medicine, changed in 1961 to the American College of Laboratory Animal Medicine (ACLAM). Its objectives are (1) to encourage education, training, and research in laboratory animal medicine; (2) to establish standards of training and experience for qualification of specialists in this field; and (3) to recognize qualified specialists by certification (11). Detailed history of the ACLAM is set forth in chapter four.

The ACLAM has had a major impact on the development of training programs in laboratory animal medicine. Early on, its leaders established requirements that, after slight revisions and modifications, over the ensuing years, are in effect at present. Before a candidate will be certified as a Diplomate the candidate must: have completed a formal laboratory animal medicine training program and have a minimum of four years of combined training and experience in laboratory animal medicine following receipt of the veterinary medical degree, as approved by the Credentials Committee; or applicants may qualify to take the examination after six years of full-time experience in laboratory animal medicine as approved by the Credentials Committee. A maximum of one year experience will be allowed for clinical practice or other professional veterinary medical experience other than laboratory animal medicine, on the basis of one month

for every six months of practice or other professional veterinary medical experience, or one year for six years of practice. Candidates must also have had an article on some phase of laboratory animal medicine accepted for publication in a refereed journal. The candidate must have made a major contribution to the work and be the first author of the article. They must also have successfully completed comprehensive written and practical examinations and have satisfactory moral and ethical standing in the profession. Candidates shall not be eligible to take the written or practical examinations until they have completed the required training or experience and publication requirements. Certification of successful candidates requires a majority affirmative vote by the Board of Directors (12).

After its formal recognition, it took a few years to complete establishment of the ACLAM infrastructure. The certifying examination that had been developed before the *Postdoctoral Guide* was prepared diminished in usefulness. In 1967, ACLAM President Tom Clarkson appointed Dr. A. F. Moreland as chairman of the Examination Committee with instructions to update the examination and develop a process to ensure a comprehensive examination. The previous examination was abandoned and a new set of questions was developed which covered the areas included in the *Postdoctoral Guide*. The committee requested and received travel funding from the college to allow a meeting of the committee to review and prepare a new examination each year that included reworking of questions from the previous year, as well as the addition of a significant number of new questions received upon solicitation of the Diplomate membership each year. An annual examination review by the Diplomates of the College (including the training program directors) was also initiated for the purpose of their continuing education and to assist the examination committee by further refining the questions and removing ambiguous questions. ACLAM quickly established a reputation for thoroughness in its certification procedures and soon academic administrators were seeking ACLAM "certified" or ACLAM "eligible" individuals for employment and were willing to compensate them with significantly larger salaries. Thus, formal training allowed a quicker achievement of higher salary.

In order to maintain high standards for laboratory animal medicine training and to further ensure that candidates were appropriately prepared for certification, in 1993 ACLAM established a process to recognize formal training programs in laboratory animal medicine. Recognition as a formal training program means that individuals successfully completing the program can satisfy the "training and experience" requirement to sit for the certifying examination with a total of four years training and experience. Otherwise six years of relevant experience is necessary to meet this requirement. These requirements are rigorous and specific. While meant to be subject to change as the field evolves, the ACLAM Training Program minimal standards are as follows:

- I. The sponsoring institution must provide the name of the training program; and the name, address, phone and fax numbers of the program director.
- II. The institution or affiliation of institutions that comprise the resources included in the training program must provide all the minimum training components described in the following standards.
- III. Trainees must complete at least 24 months of formal training in laboratory animal medicine.
- IV. The sponsoring institution must provide a statement of objectives of the training program. A description of the program should be provided which includes specific areas of training

emphasis. The training program must provide documentation of satisfactory completion of the training program, i.e., certification of residency, graduate degree, etc.

- V. An ACLAM Diplomate must serve as director of a training program for individuals using the standard route to certification. ACLAM requires that programs have at least one affiliated Diplomate per three residents in the program. Oversight of the program must be provided by an ACLAM Diplomate for at least 24 months of the program. Additionally, Diplomate and non-Diplomate faculty must, in the aggregate, possess competency in all the diverse requirements for credentialing.
- VI. Recognizing the need in the credentialing process for a publication, the training program must include the preparation of a paper suitable for publication in a refereed journal. The trainee must serve as first author. The paper may be a research report, case report, retrospective review, technical report, or a literature review, any of which must make an original contribution to the body of knowledge in laboratory animal medicine. (Programs for trainees taking the ACLAM certifying examination in the year 2003 and thereafter must include preparation of an original article which demonstrates application of the scientific method in the biological sciences [or in the physical sciences or other scientific area if relevant to laboratory animal medicine]).
- VII. Biomedical research programs supporting the training effort must be AAALAC accredited. In those instances in which several animal use programs reside within the primary institution or affiliated institutions, the majority of such programs must be accredited. Canadian Council on Animal Care (CCAC) compliant institutions are exempt from the requirement for AAALAC accreditation for the purpose of providing an ACLAM recognized training program.
- VIII. The training program must include a didactic component consisting of seminars and/or courses covering the following areas: laboratory animal biology, zoonoses, medicine, surgery, and pathology; laboratory animal resources management; and animal experimentation. Minimally the didactic program will consist of at least 200 hours of direct faculty involvement during the course of the training program.
- IX. Training must include supervised experience in the practice of laboratory animal medicine. This should include clinical experience with rodents, rabbits, primates, and other species which fairly represent the current practice of laboratory animal medicine. Training must include diagnosis, treatment, prevention, and clinical and diagnostic pathology. The supervised experience should also include participation in the administration of the institutional animal care and use program including interaction with investigators and the Institutional Animal Care and Use Committee.
- X. Training must include a research component which involves the application of the scientific method as applied to a basic or clinical research project. The trainee may fulfill this requirement either through the conduct of an independent, original project or as a collaborator working with an established investigator.

Currently 36 programs are certified (10).

Regulatory Laboratory Animal Medicine

In other chapters in this publication the history of the Animal Welfare Act (Chapter 20), the Public Health Service Policy on the Humane Care and Use of Laboratory Animals (Chapter 21),

the Association for Assessment and Accreditation of Laboratory Animal Care (AAALAC) [Chapter 6], and the Institute for Laboratory Animal Resources (ILAR) [Chapter 7] is set forth. Each has had a major impact on the role and responsibilities of laboratory animal veterinarians. Thus, training programs have been modified to provide training with regard to these laws, policies, guidelines and accreditation requirements.

Numbers of Laboratory Animal Specialists

The actual number of laboratory animal veterinarians who have received training in formal programs is unknown, but is estimated to be about 500. The 1997 ACLAM Directory lists 636 members (active, retired, honorary) (13). Of these, 428 received their training within civilian sector programs (or OJT) while 208 received their training through programs provided by the uniformed services (9). The AVMA professional activity analysis of its membership as of September 30, 1996, lists 824 veterinarians who reported their professional activity as laboratory animal medicine (12).

In conclusion, it may be safely said that training programs have played, and continue to play, a vital role in preparation of veterinarians for careers in laboratory animal medicine.

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