

Laboratory Animal Medicine Education and Training in the Uniformed Services: A Brief History

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The history of laboratory animal medicine education and training for uniformed (U.S. Army, U.S. Air Force, and U.S. Public Health Service) veterinarians is reviewed from the beginnings in 1961 at the U.S. Air Force School of Aerospace Medicine. Of the 636 currently listed diplomates of the American College of Laboratory Animal Medicine, at least 208 (32.7%) received specialty training or experience in this discipline while on extended active duty in one of the uniformed services. The evolving "climate" has led to the establishment of the most recent program within the uniformed services at the Uniformed Services University of the Health Sciences in Bethesda, Maryland.

Physiological experiment on animals is justifiable for real investigation, but not for mere damnable and detestable curiosity.—Charles R. Darwin (letter to E. Ray Lankester).^{1,a}

Introduction

The historical development of education and training in laboratory animal medicine has been provided by others.²⁻¹⁰ Coverage for academic offerings of the uniformed services, i.e., the U.S. Army, the U.S. Air Force (USAF), and the U.S. Public Health Service (USPHS), is less well defined. The present article addresses the latter.

The first two laboratory animal medicine courses in the civilian sector (at Bowman Gray Medical School and UCLA Medical School) were established in 1960. One year later, a fixed series of studies was put into place at the USAF School of Aerospace Medicine (USAFSAM) at Brooks Air Force Base, San Antonio, Texas. About this same time, informal undertakings were also begun at several U.S. Army installations.

A Critical Expertise Requirement Met by Federal Funding

As in the civilian community, most individuals in the uniformed services have taken the position that a bona fide laboratory animal medicine veterinarian is one who has been certi-

fied by the American College of Laboratory Animal Medicine (ACLAM). To acquire veterinarians for the uniformed services with the required expertise, it has been necessary for the services to provide some of its members with the proper preparatory education, training, and experience. This expenditure of U.S. Government resources has resulted in individuals falling into four categories: those who have (1) received government sponsored long-term training at civilian institutions; (2) received training while being assigned to "in-house" duty billets identified as "training slots"; (3) labored in "educating themselves," like many of their civilian counterparts, while on active duty and carrying out regular full-time duty assignments (these latter so-called OJT [on-the-job]-trained and educated individuals are herein designated as being qualified by "experience" [EXP]); and (4) received training at their own expense before entering active duty but needed additional experience before qualifying to take the ACLAM board examination. This last category, i.e., those paying for their own formal education, are also enumerated in the tables herein (Tables I-IV). However, the tables do not include the names of civilian veterinarians who used U.S. Government resources in acquiring their ACLAM qualifying credentials before entering active duty. Thus, anyone who received any part of his or her education, training, or experience at U.S. Government expense while on active duty is enumerated in Tables I to IV. Furthermore, the tables do not include the names of some civilian veterinarians who may have used U.S. Government resources in acquiring a portion of their ACLAM qualifying credentials while completing selective service requirements of military service by way of active duty.

U.S. Air Force Program

In 1961, in consultation with the faculty and staff of Texas A&M University, the curriculum for the U.S. Air Force program was developed by Robert L. Hummer and Frank H. Krewaldt. The 2-year offering included course work at Texas A&M University and 15 months of instruction, residency training, and thesis research at USAFSAM.^{11,12} Courses at Texas A&M included statistics, microbiology, physiology, parasitology, pathology, and some electives. The 15 months of training at USAFSAM are described in Table V. Upon completion, the student was awarded a Master of Science degree in laboratory animal medicine from Texas A&M and a certificate of residency training from USAFSAM. The program was discontinued in 1975 after an evaluation indicated that it was more cost-effective for the USAF to send the relatively small number of students each year to a civilian university that was not part of the USAFSAM/Texas A&M partnership. The last residents graduated from the USAFSAM/Texas A&M undertaking in 1977. Graduates are listed in

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^aDr. William H. Welsh argued that the main cause of the unparalleled progress in physiology, pathology, medicine, and surgery had been the fruitful application of the experimental method of research, the same method that had been the great lever of all scientific advance in modern times. He presented this view in opposition to antivivisection legislation before the 56th Congress in 1900 and cited Darwin's support.

TABLE I

U.S. ARMY VETERINARIANS WHO HAVE RECEIVED U.S. GOVERNMENT-SPONSORED LABORATORY ANIMAL MEDICINE TRAINING/EXPERIENCE

ACLAM			ACLAM		
Diplomate	Training		Diplomate	Training	
Norman H. Altman	1971	EXP ^a	Samuel M. Kruckenberg	1968	EXP
Ralph O. Anslow	1961	EXP	C. Max Lang	1966	EXP/Bowman Gray
Karyn L. Armstrong ^b	CT ^c	USUHS/WRAIR	Noel D. M. Lehner	1967	EXP
Meivin W. Balk	1974	Penn State	Stanley P. Liebenberg	1980	Edgewood
Ron E. Banks	1990	WRAIR	Jeffrey M. Linn	1979	Edgewood
John L. Bartholomew ^b	NB ^d	Edgewood ^e	James G. MacMillan	1988	WRAIR
Robert J. Beattie	1971	Edgewood	Allan G. Manus	1969	EXP/Stanford
Gene A. Bingham	1966	EXP	Denver D. Marlow	1991	Detrick
Sheldon W. Bivin	1969	EXP	Dale G. Martin	1989	WRAIR
John A. Bley, Jr.	1992	WRAIR	David P. Martin	1974	EXP
Edward J. Briand ^b	CT	USUHS/WRAIR	J. Edward Martin	1972	Edgewood/Penn State
William W. Brinkley	1995	EXP	Thomas W. Mayer ^b	1997	Edgewood
James M. Bryant ^b	NB	Detrick ^f	Albert H. McCullen	1986	WRAIR
Kevin C. Buchanan ^b	CT	USUHS/WRAIR	Ronald M. McLaughlin	1975	Edgewood
Kenneth F. Burns	1961	EXP	George McNamee ^b	NB	Detrick
Terry K. Bushe	1996	Detrick	Richard D. Montrey	1973	Edgewood/Ohio State
Craig Calamato ^b	NB	Edgewood	James M. Morris	1968	EXP
Calvin B. Carpenter ^b	CT	Detrick	John H. Morris	1964	EXP
Larry B. Carpenter ^b	NB	Detrick/Colorado State	John B. Mulder	1972	EXP/University of Missouri
Frank E. Chapple, III	1976	USAFSAM/Texas A&M	Brent C. Morse	1996	WRAIR
Amjad M. Chaudry ^b	CT	USUHS/WRAIR	Ronald E. Nielsen ^b	CT	Edgewood
Russel J. Christie	1970	EXP	L. Lane Norlund ^b	CT	Detrick/University of Washington
Terri R. Clark	1996	Edgewood	Patricia C. Nossov	1996	WRAIR
Rebecca A. Cockman-Thomas	1994	WRAIR	Kevin C. O'Hair	1987	WRAIR
William C. Cole	1971	Edgewood	Alexander D. Ojerio	1971	EXP/Stanford
Bobby R. Collins	1981	EXP	Steven P. Pakes	1967	EXP
Kevin D. Corcoran	1990	Edgewood	William R. Parrish, Jr.	1994	WRAIR
Stephen L. Denny	1993	Detrick/University of Missouri	John H. Parrish	1995	Edgewood/University of Alabama (Birmingham)
Cheryl D. Dicarlo	1996	EXP	Samuel S. Peabody, III ^b	NB	Detrick
Robert S. Dixon	1987	Detrick/Colorado State	Theopolis Peace	1972	Edgewood/Stanford
Raymond D. Edlger	1972	EXP	Nathaniel J. Powell, Jr.	1992	Detrick
Carol L. Eisenhauer	1996	EXP	Charles P. Raffo	1974	Edgewood/Ohio State
James J. Elliott	1995	Detrick	Michael S. Rand	1989	WRAIR
Stephen K. Fisk	1975	EXP/Stanford	Gilbert L. Raulston	1967	EXP
Newton H. Foster, IV	1995	WRAIR	Jack A. Reynolds	1979	Detrick/Bowman Gray
James G. Fox	1973	EXP	Lowery L. Rhodes, Jr. ^b	NB	Detrick
Annette K. Freeman ^b	CT	USUHS/WRAIR	Robert L. Ridgway	1989	Detrick
Patricia E. Fritz	1987	Detrick/Penn State	Clifford R. Roberts	1974	Edgewood/Baylor
William I. Gay	1962	EXP	Harry Rozniarek	1971	Edgewood/Ohio State
Mark B. Gold	1994	Edgewood	David L. Rubie	1994	Detrick
Jerome A. Goldsboro, Jr.	1974	Edgewood	Gaye R. Rubie	1996	EXP
Bradford S. Goodwin, Jr.	1984	Edgewood	Bruce A. Scharf ^b	1995	EXP
Susan D. Goodwin ^b	CT	Detrick	J. Matthew Schech ^b	1997	WRAIR
Ross Graham ^b	NB	Detrick	Peter J. Schultheiss	1995	WRAIR
Randall E. Greenfield	1984	WRAIR	Stephen K. Scott	1978	EXP/Penn State
Vincent C. Gresham	1995	Aberdeen/Penn State	James T. Sheets ^b	CT	USUHS/Detrick
Robert T. Habermann	1958	Charter ^g	Bernard H. Skold	1958	Charter
Clayton L. Hadick	1985	EXP	Edmond C. Staley ^b	NB	Detrick
Mark Haines ^b	NB	Detrick	Jack S. Stanton	1970	WRAIR/Ohio State
Alec S. Hail ^b	CT	Detrick	Harold F. Stills	1980	EXP/Bowman Gray
Robert D. Hall ^b	1973	WRAIR/Ohio State	Shannon A. Stutler ^b	CT	USUHS/Detrick
Thomas E. Hamm, Jr.	1974	Edgewood/Bowman Gray	James R. Swearengen	1994	WRAIR
Martina A. Hanes	1995	EXP	M. Michael Swindle	1982	Edgewood/Johns Hopkins
James S. Harper, III	1983	EXP	Dewayne G. Taylor ^b	NB	Detrick
Donald G. Harrington	1979	Detrick/Tulane	James F. Taylor	1975	EXP
Linda "Dawn" Harris ^b	CT	USUHS/WRAIR	Kerry L. Taylor	1993	Detrick/University of London
Richard D. Harris ^b	NB	EXP	Steven W. Tobias ^b	CT	Penn State
H. Hugh Harroff, Jr.	1987	EXP	David A. Valerio	1969	EXP
Michael D. Hayre	1987	WRAIR	Gerald L. Van Hooster, Jr.	1988	EXP
Gregory B. Heisey	1979	Detrick/Penn State	Kim D. Vlach ^b	CT	Detrick
Jack R. Hessler	1969	EXP/University of Florida	Robert J. Veenstra	1958	Charter
Thomas E. Hickey	1976	EXP	George S. Ward	1978	Edgewood/Colorado State
Robert L. Hickman	1971	EXP/Stanford	Charles E. Watson ^b	NB	WRAIR
John R. Hofmann	1986	Edgewood	Jack M. Wedam ^b	NB	WRAIR
Billy W. Howard ^b	NB	WRAIR	Richard B. Westcott ^b	1966	Detrick
Howard C. Hughes, Jr.	1971	EXP/Penn State	Paul E. Whippo ^b	NB	WRAIR
David K. Hysell	1967	EXP/University of Michigan	Andrew C. Wilkinson ^b	CT	WRAIR
Gerald P. Jaax	1984	Detrick	Norman D. Wiltshire	1995	Edgewood
Robert K. Jackson	1990	EXP	Claude L. Woodard, Jr. ^b	NB	Edgewood
Don Johnson ^b	1970	EXP	Robert H. Yager ^b	1982	EXP
Michael D. Kastello	1979	Detrick	Anthony Yancy ^b	NB	WRAIR
Stephen T. Kelly	1982	Kansas State	Leslie W. Yarbrough	1987	Edgewood
Cornel L. Kittell	1993	WRAIR	William P. Yonushonis	1988	WRAIR

^aEXP (experience/on-the-job training): Individual who qualified to take the American College of Laboratory Animal Medicine examination while at the same time carrying out regular full-time duty assignments.

^bIndividual is not listed in the ACLAM directory of members for 1997.

^cCT: Individual who is currently in a training program.

^dNB: Individual is not an ACLAM diplomate.

^eEdgewood: Laboratory animal medicine training at Edgewood before 1978 was conducted at the U.S. Army Biomedical Laboratory. In 1981, the laboratory's present name of U.S. Army Medical Research Institute of Chemical Defense was adopted.¹⁴

^fDetrick: The laboratory animal medicine training before 1974 was conducted at the "Animal Farm," a part of the U.S. Army Medical Unit, then the U.S. Army Medical Research Institute of Infectious Diseases when the latter was established in 1969.¹⁵

^gCharter: One of the "founding fathers" involved in establishing the American College of Laboratory Animal Medicine in 1957.

TABLE II

U.S. AIR FORCE VETERINARIANS WHO HAVE RECEIVED U.S. GOVERNMENT-SPONSORED LABORATORY ANIMAL MEDICINE TRAINING/EXPERIENCE

	ACLAM Diplomate	Training
George L. Anstadt	1979	USAFSAM/University of Penn
Alexandra C. Bakarich	1984	Trinity
Michael B. Ballinger	1987	Texas A&M
August R. Banknieder	1969	USAFSAM/Texas A&M
Mark S. Bloomberg ^a	NB ^b	USAFSAM/Colorado State
Lee Booker ^a	NB	USAFSAM/Colorado State
Richard A. Boster ^a	1976	USAFSAM/Texas A&M
Dale D. Boyd	1966	USAFSAM/Texas A&M
William E. Britz, Jr.	1967	USAFSAM/Texas A&M
Charles C. Burgoon ^a	NB	Penn State
Thomas M. Butler	1969	USAFSAM/Texas A&M
Bobby L. Caraway ^a	1969	USAFSAM/Texas A&M
James R. Cooper	1980	USAFSAM/Texas A&M
Stephen H. Cramlet ^a	1974	USAFSAM/Colorado State
Tony D. David	1973	USAFSAM/Texas A&M
Phillip W. Day ^a	NB	EXP ^c
Dock F. Dixon, Jr.	1966	USAFSAM/Texas A&M
Jerry Fineg ^a	NB	University of Southern California
Frank C. Fraunfelter ^a	NB	USAFSAM/Texas A&M
Benjamin D. Fremming	1958	Charter ^d
James F. Gaines	1974	USAFSAM/Texas A&M
John G. Golden	1981	Penn State
Harry A. Gorman ^a	1958	Charter
Thurman S. Grafton	1966	EXP
Richard J. Haines, Jr.	1976	Ohio State
Rodney D. Hartshorn	1980	Penn State
Roger C. Harvey ^a	1982	USAFSAM/Texas A&M
Linda M. Hermann	1983	Penn State
Gene B. Hubbard	1977	USAFSAM/Texas A&M
George W. Irving, III	1972	USAFSAM/Texas A&M
Eugene Jessup, Jr. ^a	NB	Tulane
Earl Jones ^a	1974	USAFSAM/Colorado State
Jerry Z. Kendrick	1970	USAFSAM/Texas A&M
Wayne O. Kester	1961	EXP
Franklin H. Kriewaldt ^a	1965	EXP
James L. Kupper	1971	USAFSAM/Texas A&M
John T. LaCroix	1967	USAFSAM/Texas A&M
Robert M. Letscher	1973	Texas A&M
Hubert E. Pete McKinney ^a	NB	USAFSAM/Texas A&M
Douglas K. Obeck	1973	USAFSAM/Texas A&M
Jere M. Phillips	1969	USAFSAM/Texas A&M
William J. Pryor, Jr.	1967	USAFSAM/Texas A&M
Robert J. Russell	1972	USAFSAM/Texas A&M
Paul W. Schilling	1970	USAFSAM/Texas A&M
Richard C. Simmonds	1970	USAFSAM/Texas A&M
Alvin E. Smith ^a	1969	USAFSAM/Texas A&M
Jim A. Stunkard	1969	USAFSAM/Texas A&M
Gale D. Taylor	1967	USAFSAM/Texas A&M
Charles E. Thalken	1972	USAFSAM/Texas A&M
John D. Toft, II	1973	Bowman Gray
Donald C. Van Riper	1966	USAFSAM/Texas A&M
DeWayne H. Walker	1975	USAFSAM/Texas A&M
David H. Wood	1969	USAFSAM/Texas A&M
Robert J. Young	1961	Charter
Ralph F. Ziegler	1966	USAFSAM/Texas A&M

^aIndividual is not listed in the ACLAM Directory of Members for 1997.

^bNB: Individual is not an ACLAM diplomate.

^cEXP (experience/on-the-job training): Individual who qualified to take the American College of Laboratory Animal Medicine examination while at the same time carrying out regular full-time duty assignments.

^dCharter: One of the "founding fathers" involved in establishing the American College of Laboratory Animal Medicine in 1957.

TABLE III

U.S. PUBLIC HEALTH SERVICE VETERINARIANS WHO HAVE RECEIVED U.S. GOVERNMENT-SPONSORED LABORATORY ANIMAL MEDICINE TRAINING/EXPERIENCE

	ACLAM Diplomate	Training
Samuel R. Adams	1982	EXP ^a
Ervin J. Baas	1974	EXP
John D. Bacher	1977	EXP/Colorado State
Andrea K. Barnes	1994	EXP
Kathryn A. Bayne	1993	EXP
Gene A. Bingham	1966	Detrick
J. Roger Broderson	1975	EXP/Alabama
Joseph L. Bryant	1983	EXP/University of Missouri
Marlene N. Cole	1986	EXP
Duane F. Ford	1969	Edgewood
Diane B. Forsythe	1992	EXP/Michigan
Nelson L. Garnett	1987	Johns Hopkins
Mary F. Goelz	1990	EXP/University of Missouri
Joe R. Held	1978	Honorary
Shelly Hoogstraten-Miller	1995	EXP/University of Northern California
Donna M. Jarrell	1996	EXP
Martin F. Kriete	1995	EXP/University of California (Davis)
Grace M. Lidl	1996	EXP/University of Missouri
Charles W. McPherson	1965	EXP
Carl E. Miller	1964	EXP
Cynthia L. Pond	1983	EXP/Michigan
Stephen Potkay	1976	EXP
Cherie Reid Quinn ^b	NB ^c	EXP/Penn State
Muriel M. Slatum	1989	EXP/University of Wash
J. David Small	1971	EXP/Johns Hopkins
Janice L. Southers	1989	EXP/University of California (Davis)
Kimberly S. Waggle	1985	University of Missouri
Barton G. Weick	1995	EXP
Clara J. Witt	1989	Johns Hopkins

^aEXP (experience/on-the-job training): Individual who qualified to take the American College of Laboratory Animal Medicine examination while at the same time carrying out regular full-time duty assignments.

^bIndividual is not listed in the ACLAM Directory of Members for 1997.

^cIndividual is not an ACLAM diplomate.

Tables I, II, and IV. A total of 39 individuals completed this curriculum. Program directors are listed in Table VI.

U.S. Army Programs

At Detrick and Edgewood—the U.S. Army Beginnings

The discipline of laboratory animal medicine forged by the U.S. Army evolved at different U.S. Army locations during a period of at least 30 years. The plan initially put into place was less structured than that of the USAF. Training and experience were provided at locations where biomedical research with animals was being conducted. This veterinary supported research was in place as early as the 1950s. In the early 1960s, a more structured but still informal OJT-type training at Fort Detrick, Maryland^b was mentored by one of the ACLAM "founding fa-

^bThe laboratory animal medicine training before 1974 was conducted at the "Animal Farm," a part of the U.S. Army Medical Unit, then the U.S. Army Medical

TABLE IV

UNIFORMED VETERINARIANS WHO HAVE RECEIVED U.S. GOVERNMENT-SPONSORED LABORATORY ANIMAL MEDICINE TRAINING/EXPERIENCE WHO SERVED IN MORE THAN ONE SERVICE

	ACLAM	
	Diplomate	Training
From U.S. Army to U.S. Public Health Service		
Milton April	1981	EXP ^a
Alan L. Chedester	1990	WRAIR
Judith A. Davis	1990	WRAIR/Missouri
John C. Donovan	1983	Detrick ^b
William R. Elkins	1996	EXP
B. Michael Flynn	1989	EXP
Donald J. Gardner, Sr.	1994	EXP
Robert F. Hoyt	1986	Colorado State/WRAIR
Nathaniel N. Jackson ^a	1984	WRAIR
Dennis O. Johnsen	1966	Ohio State
John G. Miller	1979	Detrick
Charles A. Montgomery, Jr.	1981	EXP
Martin L. Morin	1975	Edgewood ^d
Arthur W. O'Brien	1981	WRAIR
Douglas A. Powell	1991	EXP
David M. Renquist	1971	WRAIR/Stanford
William S. Stokes	1983	Detrick
Stanley N. Wampler	1970	EXP
William T. Watson	1972	Ohio State
Robert M. Werner	1977	Edgewood
Robert A. Whitney	1966	EXP/Ohio State
From U.S. Air Force to U.S. Public Health Service		
Richard P. Bradbury	1970	USAFSAM/Texas A&M
Bobby G. Brown	1974	USAFSAM/Col State
Patricia A. Brown	1984	Penn State
Delwin K. Buckhold	1975	USAFSAM/Col State
George L. Clarke	1969	USAFSAM/Texas A&M
James F. Harwell, Jr.	1969	USAFSAM/Texas A&M
Donald K. Hinkle	1974	USAFSAM/Texas A&M
David K. Johnson	1970	USAFSAM/Texas A&M
Keith L. Kraner	1966	EXP
Albert E. New	1966	USAFSAM/Texas A&M
Arthur D. Schaedel	1985	Penn State
Thomas L. Wolfe	1966	EXP
From U.S. Air Force to U.S. Army		
Andre A. Darrigrand	1984	WRAIR/Penn State
Robert D. Gunnels	1981	EXP/University of Wash
James E. Hall	1981	Penn State
Creighton J. Trahan	1986	Detrick
From U.S. Public Health Service to U.S. Army		
Gary P. Goldberg ^c	NB ^e	EXP
George W. Lathrop, Jr. ^c	NB	EXP/Louisiana State

^aEXP (experience/on-the-job training): Individual who qualified to take the American College of Laboratory Animal Medicine examination while at the same time carrying out regular full-time duty assignments.

^bDetrick: The laboratory animal medicine training before 1974 was conducted at the "Animal Farm," a part of the U.S. Army Medical Unit, then the U.S. Army Medical Research Institute of Infectious Diseases when the latter was established in 1969.¹³

^cIndividual is not listed in the ACLAM Directory of Members for 1997.

^dEdgewood: Laboratory animal medicine training at Edgewood before 1978 was conducted at the U.S. Army Biomedical Laboratory. In 1981, the laboratory's present name of U.S. Army Medical Research Institute of Chemical Defense was adopted.¹⁴

^eNB: Individual is not an ACLAM diplomate.

TABLE V

THE 15-MONTH TRAINING REGIMEN FOR LABORATORY ANIMAL MEDICINE RESIDENTS AT THE U.S. AIR FORCE SCHOOL OF AEROSPACE MEDICINE (BROOKS AIR FORCE BASE, TEXAS)^a

Subject	Classroom Hours
Laboratory Animal Medicine	38
Laboratory Animal Diseases	49
Animal Colony Management	422
Comparative Anatomy	40
Anesthesiology and Experimental Surgery	114
Clinical Laboratory Procedures	36
Comparative Pathology and Experimental Medicine	36
Bioinstrumentation	96
Experimental Design	20
Review of Current Scientific Literature	40
Electrocardiography	31
Enzymatic Pharmacology	16
Radiolotopes	22
Affiliate Training	40
Associate Training	176
Research and Thesis Preparation	800
Administrative Time	20

^aAfter the fashion of Taylor.¹¹

TABLE VI

DIRECTORS OF THE U.S. AIR FORCE LABORATORY ANIMAL MEDICINE RESIDENCY PROGRAM, U.S. AIR FORCE SCHOOL OF AEROSPACE MEDICINE AND TEXAS A&M UNIVERSITY

Franklin H. Kriewaldt	1961-1963
William R. Bilderback	1963-1965
Dale D. Boyd	1965-1967
Gayle D. Taylor	1967-1971
Thomas M. Butler	1971-1975
William E. Britz	1975-1977

thers," Melvin M. Rabstein. In 1966, a more formal program was proposed by Robert A. Whitney, Jr., while assigned to Edgewood Arsenal, Maryland.⁶ The evolving courses of study would not be officially sanctioned by the U.S. Army until 1968, when Wilson M. Osteen, then Chief of the U.S. Army Veterinary Corps, approved documentation that had been submitted by Whitney (personal communication). Until 1974, the Edgewood site was the primary location for producing laboratory animal medicine specialists for the U.S. Army.

Further Activities at Fort Detrick

The U.S. Army training became progressively more formal and is exemplified by the prospectus of study established by Harry Rozmiarek at Fort Detrick in 1976. He had served as director (1971-1972) of the Edgewood program. This initiative combined a "core" seminar series with clinical and administrative training in laboratory animal medicine. Rozmiarek also established a

Research Institute of Infectious Diseases, when the latter was established in 1969.¹³

^dLaboratory animal medicine training at Edgewood before 1978 was conducted at the U.S. Army Biomedical Laboratory. In 1981, the laboratory's present name of U.S. Army Medical Research Institute of Chemical Defense was adopted.¹⁴

formal liaison with the Pennsylvania State University Medical School at Hershey. In concert with university officials, individuals from the Fort Detrick course were allowed to attend, take formal class work, and gain credit over 12 to 18 months at Penn State. Students then returned to Fort Detrick, where they spent the balance of their 4-year training period receiving additional instruction. Evidence of work by each trainee in this joint Fort Detrick-Penn State venture was presented to the Penn State graduate committee as part of fulfillment of the requirements for a degree.

A Pivotal Role for the Walter Reed Army Institute of Research

A regimen of laboratory animal medicine education was started in 1974 at the Walter Reed Army Institute of Research (WRAIR) in Washington, DC.⁴ The "prime mover" was Robert J. Beattie, the initial WRAIR program director. Later, Beattie was joined by William C. Cole to fully implement the residency. The centerpiece of the undertaking was the "special topics" seminar series in which residents and invited speakers gave detailed reviews of new ACLAM texts and in-depth presentations on several current topics in laboratory animal medicine. By 1978, the educational experience closely resembled that of the laboratory animal residency training guidelines published by the National Research Council, Institute of Laboratory Animal Resources.¹⁶

An Overall Look at U.S. Army Programs

Until 1995, most of the U.S. Army laboratory animal medicine training programs were nondegree programs based heavily on practical experience coupled with a seminar series that covered "core materials." There were some notable affiliations with uni-

versity laboratory animal medicine programs, but the majority of training and experience occurred in Department of Defense (DoD) laboratories. Three separate "in-house" U.S. Army programs⁶ were in place: Edgewood,⁷ Fort Detrick, and WRAIR. In addition, six other DoD laboratories in the greater Maryland-Washington, DC, region—two additional locations at Edgewood and one each at the Uniformed Services University of the Health Sciences (USUHS; in Bethesda, Maryland), the Armed Forces Institute of Pathology, the Naval Medical Research Institute, and the Armed Forces Radiobiology Research Institute—were available to officers for training. Commonly, individuals in the laboratory animal medicine training program⁶ were assigned for at least 2 years to one of the three principal locations, i.e., Edgewood, Fort Detrick, or WRAIR. Through the years, many affiliations among the U.S. Army programs evolved to combine resources. Because of the close proximity of the three primary training sites, a joint venture was established in 1984 and designated the Combined Laboratory Animal Medicine Program. The elements of the "combined program," as it came to exist before merging with the curriculum developed at USUHS, are shown in Table VII.

During the lifetime of the laboratory animal medicine training program in the U.S. Army, more than 90 Veterinary Corps officers participated for at least 1 year in a program at one of the three major training locations. An additional 10 individuals participated but were assigned to other DoD activities within the

⁴A U.S. Army training program was defined as one (1) having an ACLAM board-certified training director and a specified curriculum; (2) requiring at least 2 years of training under an ACLAM board-certified director at one of three locations—Edgewood, Fort Detrick, or WRAIR; and (3) whose graduates are recognized by ACLAM to be board eligible after 4 years of training and experience.

⁶The formal program at Edgewood was discontinued in 1994.

⁷For U.S. Army trainees, the demarcation between individuals receiving training as "formal residents" and individuals being educated "on the job" was not exact. For the purposes of the present paper, Tables I and IV use a classification that enumerates these trainees as those who were (1) assigned to one of the nine regional laboratories for at least 1 year, and (2) either in the formal training program or closely associated with it.

TABLE VII

U.S. ARMY COMBINED LABORATORY ANIMAL MEDICINE RESIDENCY PROGRAM (1984-1995), WALTER REED ARMY INSTITUTE OF RESEARCH (WASHINGTON, DC), U.S. ARMY MEDICAL RESEARCH INSTITUTE OF INFECTIOUS DISEASES (FORT DETRICK, MARYLAND), AND U.S. ARMY MEDICAL RESEARCH INSTITUTE OF CHEMICAL DEFENSE (EDGEWOOD ARSENAL, MARYLAND)

General: A 4-year undertaking composed of a more structured 2-year education phase and then a 2-year experience phase.

Didactic: A core curriculum consisting of 48 weekly sessions in a lecture-type seminar format. Subjects include the biology, pathology, reproductive physiology, nutrition, genetics, immunology, gnotobiology, breeding, care, handling, identification, nomenclature, and diseases (viral, bacterial, mycotic, parasitic, neoplastic, metabolic, zoonotic) of various animal species: mice, rats, guinea pigs, rabbits, hamsters, gerbils, voles, nonhuman primates, cats, dogs, farm animals, marine mammals, fish, amphibians, unusual laboratory animals. Other materials: experimental surgery, animal models for research, animal welfare laws and GLPs, facilities design, biostatistics, quality control, instrumentation, protocol development and review and laboratory animal organizations, training programs, and sources of information.

Research: Students are required to develop a research protocol on some phase of laboratory animal medicine. The finished work must be suitable for publication.

Teaching: Students participate in relevant programs associated with the U.S. Army combined program institutions: Laboratory Animal Medicine seminars (see above), veterinary specialist schools, American Association for Laboratory Animal Science technician training course, Military Medical Science Fellowship program, Laboratory Animal Techniques and Handling workshops, investigator training sessions, Medical Management of Chemical Casualties course.

Clinical Rotation: Under the direct supervision of an ACLAM diplomate, residents are assigned on a rotating basis to duty positions in the major functional areas of their organizations to gain experience in animal and equipment procurement, facility and colony management, housing design, preventative, diagnostic, and therapeutic medicine, investigator interactions, experimental methods, surgical techniques, pathology, and radiology.

Washington, DC/Bethesda area. Many others acquired the necessary learning by studying on the job (EXP). Directors for the U.S. Army programs are listed in Table VIII.

Education and Training in the U.S. Public Health Service

The care of laboratory animals has been a principal concern at the National Institutes of Health (NIH) from its inception. According to McPherson,¹⁰ a major factor determining, in the mid-1930s, the location (Bethesda, Maryland) of the NIH was a strong desire to improve animal quality. Courses of study for laboratory animal medicine adopted by the USPHS in the 1960s are less structured than those described for the USAF. They are more akin to those initially put into place by the U.S. Army. Some individuals have been allowed to receive formal training at civilian institutions. However, much of the learning has been on the job (EXP) undertaking that has often been supplemented with seminars and other support extended by the U.S. Army and others. In addition, many veterinarians already trained by the U.S. Army, USAF, and others have been accepted into the USPHS. Thirty-three veterinarians trained in USAF or U.S. Army programs subsequently transferred to the USPHS. During the last 20 years, many USPHS career officers have been products of one of the DoD programs. USPHS officers who received formal civilian schooling and OJT/EXP at U.S. Government expense are listed in Tables III and IV.

TABLE VIII
DIRECTORS OF THE U.S. ARMY LABORATORY ANIMAL
MEDICINE PROGRAMS

Edgewood Arsenal, Maryland	
Robert A. Whitney	1966-1970
John H. Morris	1970-1971
Harry Rozmiarek	1971-1972
James M. Morris	1972-1975
William C. Cole	1975-1979
James F. Taylor	1979-1980
Robert J. Beattie	1980-1984
Richard D. Montrey	1984-1986
Gerald P. Jaax	1986-1989
James E. Hall	1989-1991
Dale G. Martin	1991-1993
Creighton J. Trahan	1993-1995
U.S. Army Medical Research Institute of Infectious Diseases ^a (Fort Detrick, Maryland)	
Harry Rozmiarek	1976-1983
William C. Cole	1983-1989
Gerald P. Jaax	1989-1994, 1995-1997
Albert C. McCullen	1994-1995
James R. Swearingen	1997-
Walter Reed Army Institute of Research ^a	
Robert J. Beattie	1974-1980, 1984-1987
Clifford R. Roberts	1980-1984
Charles P. Raslo	1987-1991
James E. Hall	1991
Judith A. Davis	1991-1993
Dale G. Martin	1993-

^aCurrently active in training.

The Uniformed Services' Association with Academia

During the lifetime of the USAF's laboratory animal medicine training program (1961-1982), individuals were sent through one of two formal academic curricula: the USAF School of Aerospace Medicine residency, with a Master of Science degree awarded from Texas A&M, or the comparable endeavor with the Pennsylvania State University. In contrast, during the entire period of the U.S. Army's efforts, fewer than 25% of the veterinarians were educated at civilian institutions. Before 1972, only a dozen or more U.S. Army officers were sent for civilian training. However, once in-house programs were well established, it became less common to send students outside. Still, the advantages of establishing ties with academic institutions were recognized. During the late 1970s, established programs were augmented by sending some trainees to civilian institutions, most notably the Pennsylvania State University at Hershey. Since 1994, all U.S. Army officers selected for laboratory animal medicine training have been designated to participate in the program established at USUHS.

The Program at the Uniformed Services University of the Health Sciences

In the years 1975 to 1977, an early period of the USUHS, Kenneth E. Kinnamon, Assistant Dean for Instructional and Research Support, spoke to several individuals, including Joe R. Held (Director, Division of Research Services, NIH) and Albert E. New (Director, Laboratory Medicine, National Cancer Institute), "casually" about the feasibility of having a laboratory animal medicine residency program at USUHS. This notion was enthusiastically pursued after the arrival in 1977 of Richard C. Simmonds as the Director of the Department of Laboratory Animal Medicine at USUHS. He reasoned that existing facilities, resources, and expertise at USUHS, NIH, WRAIR, Fort Detrick, Edgewood, the Naval Medical Research Institute, and the Armed Forces Radiobiology Research Institute were in place so that a broad-based program could be tailored for any special requirements specified by the uniformed services. Upon completion of the training, a Master's degree could be awarded.

The university president indicated that he would consider such an undertaking if it was requested by one of the uniformed services. Simmonds contacted individuals within the uniformed services. He found that the USAF had no interest because it would no longer be recruiting veterinarians (the USAF Veterinary Corps would be eliminated on March 31, 1980), the U.S. Army felt that programs at WRAIR, Fort Detrick, and Edgewood were adequate for its needs, and the USPHS was able to meet its requirements by recruiting trained personnel who had been educated in the U.S. Army, USAF, and elsewhere. Thus, in 1978, the idea of a USUHS-based program was shelved.

Upon his arrival in 1988 as the Assistant Dean for Teaching and Research Support at USUHS, Robert R. Jorgensen again pursued the matter. He canvassed the services to determine how they were to meet their laboratory animal medicine demands. As the immediate past Chief of the U.S. Army Veterinary Corps, he had been in an ideal position to see the overall needs of the services and could conceivably demonstrate to key persons in the uniformed services the merits of a program at

TABLE IX

COURSE OF STUDY AT THE UNIFORMED SERVICES UNIVERSITY OF THE HEALTH SCIENCES LABORATORY ANIMAL MEDICINE PROGRAM

Subject	Quarter Credit Hours	Subject	Quarter Credit Hours
Year One		Year Two	
Fall		Fall	
Biostatistics I	4	Health Services Organization	3
Microcomputing Fundamentals	2	Environmental Health	4
Epidemiology I	4	NHPs and Rabbits in Research	2
Introduction to Public Health	1	Laboratory Biotechnology	2
Rodents in Research	2	Selected Topics in Laboratory Animal Science	1
Research in Biostatistics	2	Practicum Modules	6
Technical Writing	1	Research Modules	2
Total	16	Total	20
Winter		Winter	
Biostatistics II	4	Health Services and Resources Management	3
Statistical Computing	2	Resource Management	2
Epidemiology II	4	Laboratory Animal Models and Research Support	2
Large Animals in Research	2	Selected Topics in Laboratory Animal Science	1
Animal Care and Use Prog Administration	2	Practicum Modules	8
Independent Project	1	Total	18
Electives	4		
Total	19		
Spring		Spring	
Behavior Science in Health Care	4	Laws, Regulations, and Policies	2
Laboratory Animal Preventive and Clinical Medicine	2	Techniques of Experimentation	2
Unusual Species in Research	2	Selected Topics in Laboratory Animal Science	1
Independent Project	2	Practicum Modules	8
Electives	6	Research Modules	2
Total	16	Total	15
Summer		Summer	
Current Problems and Practice in Preventive Medicine	2	Selected Topics in Laboratory Animal Science	1
Independent Project	4	Practicum Modules	8
Electives	10	Research Modules	2
Total	16	Total	11
Electives		Electives	
D&A of Follow-Up Studies (2)		Research in Epidemiology	
International Health (4)		Health Care Administration Directed Research	
Selected Topics in Occupational Health (1-2)		D&A of Case-Control Studies	
Changing Patterns of Arthropod-Borne Disease (4)		Epidemiology and Control of Infectious Disease (3)	
Critical Reading Seminar (2)		Epidemiology and Control of Noninfectious Disease (2)	
Information Gathering in Clinical Medicine (2-4)		Financial Management (2)	
Educational Methods (2)		Health Education and Health Promotion (3)	
Selected Topics in Laboratory Animal Science (1-3)		Quality Assurance and Risk Management (3)	
Complementary Medicine Seminar (1)		Law of Health Care (3)	
Great Books Seminar (1-2)		Topics in MCH Care Policy (1-3)	
Advanced Biometrics Tutorial		Occupational and Environmental Health Programs (3)	
Laboratory Animal Science Directed Studies		PM Tact Ops & Disaster Relief (3)	
Military Preventive Medicine Study Topics		Industrial Hygiene Field Studies (1)	
E/OH Directed Studies		Epidemiology and Control of Arbovirology (2-4)	
Directed Studies in Preventive Medicine		Vector Biology (2)	
Logistic Regression (3)		Malaria Epidemiology and Control (3)	
M'comp Apps/Tropical Medicine and Epidemiology (1)		Health and Medical Care in the Tropics (4)	
Advanced Epidemiologic Methods (4)		Tropical Medicine Rounds (2)	
Occupational and Environmental Health Epidemiology (2)		Medical Zoology Seminar (1)	
Decision Making in Health Management (2)		History of Preventive Medicine (2-4)	
Environmental Health and Sanitation (3)		Classic Studies in Epidemiology (1-2)	
Occupational Disease (3)		Health Policy Seminar (1)	
Industrial Hygiene I and Laboratory (4)		Tropical Medicine Research Tutorial	
Principles and Practice of Tropical Medicine (6)		Immunoparasitology Tutorial	
Medical Parasitology (2)		Technical Writing	
Biostatistics III (4)		Medical Acarology (4)	
Pharmacoparasitology Tutorial		Modern Techniques and Vector-Borne Disease (4)	
Directed TPH Laboratory Research		Medical Malacology (3)	
Essentials of Toxicology (4)		Epi&Prev Vac-prev Dis (1)	
Social Epidemiology (3)		Medical Threat Estimate (3)	
Clinical Decision Making (1)		Radiation Biology (2)	
Physical Parameters of Vector Comp (4)		Substance Abuse (3)	
Biosystematics in Medical Zoology (2)		Research in Epidemiology	
Medical Zoology Seminar (1)		Environmental Health Policy (3)	
Clinical Research Seminar (1)		Directed Clinical Research	
Introduction to Aerospace Medicine (2)		Directed Field Research	
Independent Study in Epidemiology			

USUHS. Additionally, he felt that in the 10 years since Simmonds' survey, the "climate" had probably changed. He coordinated with individuals critical to the decision-making process for the next 5 years. During this period, there was indeed a change in the official positions on the parts of individuals in the U.S. Army and the USPHS.

This "change in heart" was driven by a combination of events. The 1985 amendment to the Animal Welfare Act¹⁴ led to a greatly increased need for specially trained veterinarians in biomedical research institutions. This demand, in turn, created a very lucrative market for ACLAM diplomates, which caused a drain of qualified veterinarians from the uniformed services. This "cry" in industry and civilian academia, coupled with the continued need for support by the U.S. Army, USAF, NIH, U.S. Navy, the Food and Drug Administration, and the Centers for Disease Control and Prevention, spawned a near crisis in the veterinary ranks of the uniformed services. To exacerbate the problem even further, U.S. Army positions for laboratory animal medicine veterinarians were being decreased.

The recognition of the dire need and the move to alleviate matters was led by two consecutive consultants (Laboratory Animal Medicine) to the U.S. Army Office of the Surgeon General, Gerald P. Jaax and Dale G. Martin. Both Jaax and Martin became strong proponents of the USUHS program concept. They were instrumental in interacting with individuals in the U.S. Army, including Clifford I. Johnson and Paul L. Barrows, who were successive Chiefs of the U.S. Army Veterinary Corps. They felt that although the U.S. Army's courses of study had been adequate, newer realities dictated becoming directly involved at a university setting. Advantages of a new offering at USUHS were: (1) providing didactic courses previously not available to better equip graduates to be part of research teams as they subsequently interact with fellow scientists; (2) offering better opportunities for students to conduct research in pursuit of the ACLAM publication requirement; (3) awarding graduates a Master's degree, which would be more appealing for applicants in viewing their career progression; and (4) incurring firm commitments for payback purposes by participants to their parent service.

The position change by the USPHS during the Jorgensen "status check" was fostered by Robert A. Whitney, by then Deputy Surgeon General, USPHS. At his urging, the USPHS detailed Marlene N. Cole to USUHS in November 1993. Her charge was to investigate and identify resources that would "allow the USUHS to offer a degree conferring masters level program in the specialty of laboratory animal medicine, thereby ensuring maximum utilization of health science labor force, facilities, and equipment available within military departments worldwide."

Cole coordinated closely with the resident university faculty and staff and those of the U.S. Army and USPHS. Acting as the Laboratory Animal Medicine consultant to the U.S. Army Surgeon General, Martin spearheaded the U.S. Army's effort. Cole and Martin were the principals in forging a marriage between a largely established 1-year Master of Public Health curriculum at USUHS and the U.S. Army program described in Table VII. More specifically, an academic menu designated the Uniformed Services University-Laboratory Animal Medicine Residency Program was developed. The offering is an academic agenda con-

ducted and supervised by the Department of Preventive Medicine and Biometrics within the F. Edward Hébert School of Medicine. It consists of a course of study leading to a Master of Public Health degree and a certificate of residency training, which are conferred upon successful participants after they fulfill a 2-year undertaking. The first year requires candidates to finish a largely didactic phase. The second year is more "practicum" in nature and includes completing a master's thesis, preparing a "first-author" paper on some aspect of laboratory animal medicine that is suitable for publication, and, under close supervision, applying laboratory animal medicine knowledge and skills learned. The training regimen for the studies is listed in Table IX. After the 2-year endeavor at USUHS, graduates begin tours at a research animal facility, gaining the additional 2 years of experience required before "sitting" for the ACLAM boards. There have been three program directors: Marlene N. Cole (USPHS), Kerry L. Taylor (U.S. Army), and Stephen L. Denny (U.S. Army).

An Assessment

The uniformed services have been a major contributor to the ranks of those dedicated to the specialty of laboratory animal medicine. The current directory of the American College of Laboratory Animal Medicine¹⁶ lists 636 members (active, retired, and honorary). Of these, at least 208 (32.7%) received specialty training or experience in this discipline while on extended active duty in one of the uniformed services.

Of the 636 ACLAM members, 125 (19.7%) are products of the U.S. Army, 55 (8.65%) are products of the USAF, and 28 (4.4%) are products of the USPHS. The U.S. Army figure (125) includes 20 individuals who transferred from the U.S. Army to the USPHS. Likewise, the USAF figure (55) includes veterinarians who were trained by the USAF and then subsequently transferred to the USPHS (12) or the U.S. Army (4). Of all individuals who received training and experience while on extended active duty (including veterinarians listed in Tables I-IV not listed in the current ACLAM directory), at least 266 received U.S. Government-sponsored training or experience while on extended active duty as a uniformed member.

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¹⁴Animal Welfare Act, as amended (7 U.S.C., para 2131 et. Seq.).

College of Medicine, Houston, Texas; David M. Renquist, DVM MS, University of Tennessee Health Science Center, Memphis, Tennessee; Col Richard C. Simmonds, USAF VC (Ret.), Director, Laboratory Animal Medicine, University of Nevada, Reno, Nevada; Col Gale D. Taylor, USAF VC (Ret.), College of Veterinary Medicine, University of Illinois, Urbana, Illinois; Stanley N. Wampler, VMD MS, Stuart, Florida; RADM Robert A. Whitney, VC USPHS (Ret.), Stelacoom, Washington; and CAPT Thomas L. Wolfe, USPHS (Ret.), Institute of Laboratory Animal Resources, Washington, DC.

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