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A Career Takes Form: Ellis Kerley's Tenure at the Armed Forces Institute of Pathology (1957–1966)*

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ABSTRACT: From 1957 to 1966, Ellis Kerley was employed at the Armed Forces Institute of Pathology (AFIP) in Washington, DC. Kerley worked in the Orthopedic Pathology section under the supervision of Lent C. Johnson, MD. As the only staff anthropologist at the AFIP, he lectured, conducted research, and consulted on forensic cases. His best-known research completed during these years was the osteon aging technique. He also conducted research and lectured on paleopathology and skeletal identification. Kerley's AFIP experience aided him in pursuing a distinguished career as a forensic scientist, within both academia and the federal government.

KEYWORDS: forensic science, Ellis R. Kerley, forensic anthropology, history

A long, productive career in science leaves evidence, some obscure and some easily accessible. Publications are easily located and are important measures of a scientific career. Personal papers, institutional paperwork, and other byproducts of scientific research, although difficult to locate and interpret, can shed a more personal light on the often impersonal information found in a publication.

Ellis Kerley's time at the Armed Forces Institute of Pathology (AFIP) strongly influenced his career. As a founding scientist in forensic anthropology, Kerley used his time at the AFIP to expand his research into forensic anthropology, paleopathology, and primate skeletal anatomy and to learn new analytical microscopic methods. Kerley's interests were well-supported by his time at the AFIP. Indeed, the AFIP has a long history of anthropological research dating to the post-Civil War period, when staff anthropologists and anatomists worked closely with pathologists on a range of topics (1,2).

Many documents and other materials related to Kerley's AFIP tenure exist. Records, papers, correspondence, microscope slides, tissue blocks, and bone samples are maintained in the Orthopedic Pathology Collection of the National Museum of Health and Medicine and the Department of Orthopedic Pathology of the AFIP. AFIP annual reports also contain information regarding Kerley's work. The records of Dr. Lent C. Johnson, Kerley's supervisor, contain pertinent information as well.

Ellis Kerley came to the AFIP in 1957. In the three years before he arrived, he identified Korean War casualties at the US Army Central Identification Laboratory in Kokura, Japan (1954 to 1955) and served as a teaching fellow and research assistant in the heredity clinic and physical anthropology laboratory at the University of Michigan (1956 to 1957), where he earned his masters degree in 1956.

Officially, Kerley was an employee of the Veterans Administration. The VA had several staff positions at the AFIP. VA employees worked alongside military personnel and civilian employees. Kerley was assigned as a researcher in the Department of Orthopedic Pathology. The head of the department was Dr. Lent C. Johnson, an energetic and professionally intense pathologist, who also had a great knowledge of physical anthropology. Kerley's research into bone aging and pathology overlapped with Johnson's areas of interest. In his curriculum vitae from the early 1990s, Kerley listed his research topics he became involved with while at the AFIP: age-related histological bone changes, body constitution and stress fractures, evolutionary patterns of bone, body type, bone growth and morphology in chimpanzees, nutritional stress effects on the primate skeleton, skeletal identification, and paleopathology.

Forensic Consultation and Teaching

Kerley's focus on forensic anthropology and issues of human identification was an integral part of his position as "anthropologist" at AFIP. Although he was a member of the Orthopedic Pathology Division, he worked closely with the Forensic Pathology and Aerospace Pathology Divisions. As the only anthropologist on staff during these years, he was often called upon to lend his expertise in a variety of arenas.

In 1959, the Forensic Pathology Division arranged with the "anthropology division" to share information on forensic problems and the use of skeletal collections for training. In this year, he started consultations with the AFIP Forensic Pathology and Aerospace Pathology Divisions on cases for the FBI and other federal and military agencies.

Starting in the mid-1960s, he began lecturing at AFIP and other forensic seminars and courses around the country. In 1961, he presented at the AFIP Forensic Pathology course on "The Role of the Anthropologist in ID." The course faculty included Abel M. Dominguez (AAFS Distinguished Fellow of the American Academy of Forensic Sciences and Gradwohl Laureate), Pierre Finck (who was present at John Kennedy's autopsy), and Milton Helpern (past president of the American Academy of Forensic Sciences and then Chief Medical Examiner for New York City). In addition, he spoke at the AFIP Forensic Science symposium (1964),

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the AFIP postgraduate courses in forensic pathology (1960 through 1965), the AFIP aerospace pathology course (1964), the Harvard/Glessner Lee Seminar in Homicide Investigation (1964 through 1966), and an aerospace pathology course at Maxwell Air Force Base (1966).

The 1962 AFIP annual report indicates that Kerley started to research the interpretation of X-rays of abused infants. His interest was in pre-existing disease as a potential source of misinterpretation. Johnson wrote, "A special study began on the over-interpretation of X-rays of infants where parental brutality is alleged. Preliminary studies revealed identical X-ray patterns for an unknown medical disease and for documented brutality" (3). The outcome of this research resulted in two publications in the 1970s (4,5).

In 1969, shortly after departing the AFIP, he published a "Syllabus of Identification of Skeletal Remains" through the AFIP (6). This set of sixty-four 35 mm slides and associated booklet were loaned to forensic scientists for study. In the introduction, Kerley wrote: "It is difficult for anyone who has not been confronted by the task of identifying the skeleton, or parts thereof, to appreciate the problems and potentialities of identifying skeletal remains. The identification of skeletal remains becomes important in times of war; in times of any mass casualty, such as aircraft crashed, fires, hurricanes, and floods; or at any time that unidentified parts of a skeleton or skeletons are discovered" (6).

Kerley's AFIP work allowed him to become a consultant on government forensic issues later in his career. Among these were the identification of the Challenger astronauts for the National Aeronautics and Space Administration in 1986, identification of Josef Mengele's remains for the United States Marshals in 1985, and the investigation of the Philadelphia MOVE victims in 1985. He also served as consultant to the US Army Central Identification Laboratory, and as the lab's director from 1987 to 1988. In 1978 he became a special consultant to the House Select Committee on Assassinations to review evidence in the Kennedy assassination. Kerley was at the AFIP at the time of the assassination in 1963, and knew Pierre Finck, head of the trauma missile branch at AFIP and one of the pathologists present at Kennedy's autopsy.

Orthopedic and Paleopathologic Research and Teaching

Kerley's appointment to the Orthopedic Pathology Department allowed him access to the latest in pathological techniques and equipment and to a staff of several orthopedic pathologists. He became involved in a variety of research topics, including the effects of semistarvation on bone and joint structures, histogenesis of stress fractures, the structural analysis of scoliosis, and the topic of paleopathology. In 1964, Kerley lectured at a weekly course in bone and joint pathology for AFIP radiology residents. He was almost certainly taking, if not lecturing in, the six-week orthopedic pathology course given by the department.

Kerley's paleopathological research was an outgrowth of his orthopedic interest. Joe M. Blumberg, who was AFIP director from 1963 to 1967, and Kerley published a chapter in *Human Paleopathology,* edited by Saul Jarcho (7). The chapter references the use of Kerley's osteon aging method to determine the age of an unidentified fibula from an air crash. Also, in 1962, he contributed a chapter on a possible case of syphilis to Charles E. Snow's publication on Native American burials from St. Petersburg, FL (8).

Chimpanzee Research

One interesting aspect of Kerley's AFIP research involved skeletal age changes and the effects of starvation on the chimpanzee skeleton. Johnson and Kerley arranged a research program with the Yerkes Lab of Primate Biology in Orange Park, FL, and the Delta Regional Primate Research Center at Tulane University to obtain skeletal and soft tissues specimens. They received NIH funds for their research, which included assessment of chimp body type and comparison with human somatotype variations; examination of age-related microscopic bone size differences; and comparison between body type, skeletal type, organ type, and growth patterns. In 1965, Johnson wrote "The chimp skeletons are rapidly yielding important information on primate skeletal behavior that is difficult to get from human skeletons because of their general lack of availability, particularly during the critical stages of development after birth" (9). This research resulted in a publication examining skeletal age changes in chimpanzees (10).

Bone Histology Research

Kerley's best known work in physical and forensic anthropology completed during his AFIP tenure was the osteon aging technique, sometimes known as the Kerley method (11). This research integrated closely with the research of Lent Johnson and fit easily into the types of microscopic analyses then being conducted at the AFIP. Thompson aptly described the method:

> "Kerley's method for estimating age at death in skeletons from the quantification of cortical bone microstructure permitted age determination for skeletal remains that were fragmentary or incomplete, a condition often encountered in forensic identification of skeletal remains. Kerley's method used thin sections of cortical bone from the midshaft of the femur, tibia, or fibula. Standard error ranged from 3.66 to 14.62 years, depending on the variable used for age estimation. The four cortical bone microstructural variables quantified by Kerley were (a) secondary osteons, (b) osteon fragments, (c) primary osteons, and (d) circumferential lamellar bone" (12).

In 1957, Kerley published an abstract in the *American Journal of Physical Anthropology* titled "The Presence of Organic Structure in Fossilized Bone" (13). It is unclear if this preceded his arrival at AFIP, but he must have been aware of the work of Lent Johnson. Johnson had published several papers on the histological aspects of bone growth and structure. He was an intense man, who demanded much from students seeking to learn orthopedic pathology. Kerley was certainly influenced by Johnson, both as his employee and as a scientist.

Kerley's time at AFIP afforded him access to technical expertise in microscopy and the knowledge of orthopedic pathologists. Many of his research protocols and preliminary findings exist in the Orthopedic Pathology Department records. A document dated January 1, 1960, titled "Bone Growth Study" (referring to his osteon age research) reveals his research in the previous year, with a focus on "determining age at death from microscopic examination of cross sections of the major long bones." Kerley noted his frustration with the study's small sample size and difficulties in obtaining additional samples, but remarked positively about the potential of the research: age differences exist and are observable microscopically. He devised a detailed two-page form to collect the osteon data, examples of which can be found in at least one later publication (14). His statistical analyses and graphs were done by hand. In addition, in the mid-1960s, IBM was working

with the AFIP to create a database of pathological case information. Kerley placed his osteon data on large-format punchcards for analysis, although it is unclear if analyses using the cards were done.

Kerley's osteon research allowed him to complete his Ph.D. from the University of Michigan in 1962 with a dissertation entitled "The Microscopic Determination of Age in Human Bone" (15). This research also resulted in a presentation at the 1962 annual meetings of the American Association of Physical Anthropologists, and the later seminal publications in the *American Journal of Physical Anthropology* (16) and the *Journal of Forensic Sciences* (17). The osteon research was also incorporated by Lent Johnson into a report entitled "The Kinetics of Disease and General Biology of Bone" published in 1964 (18). Kerley and others tested and modified this research, indicating the utility of this technique to forensic and bioarcheological analyses (19–22).

The applications of his histological work took at least one interesting turn. In 1961, Kerley and other orthopedic pathology staff met with NASA representatives concerning the issue of bone loss in space flight. NASA did not think this was a problem and believed they were taking steps to prevent adverse muscle and bone changes in astronauts. The issue came up again in 1962, when Lent Johnson cited Kerley's work in reference to "problems that will be encountered in long range immobility in space flight. A direct assessment was presented to a NASA committee that decided not to support the study because they believed that they would have a lab in outer space in a few years where these problems could be studied directly" (1). The loss of bone during space flight is still a concern to NASA, and the research still involves anthropologists, such as Christopher Ruff's work with the National Space Biomedical Research Institute (23).

Conclusion

Kerley's time at AFIP was important in several ways. Under the guidance of Lent Johnson, he was taught the rigors of scientific research within a research institution. He was exposed to the military system of human identification, to which he would return later in his career. He worked with important people in forensic science and worked to advance the field. He ably applied histological methods to forensic anthropology. In all, Kerley's AFIP tenure allowed pursuit of a distinguished career in academia and the federal government.

In the course of working on this paper and having the chance to study the history of forensic anthropology, I was struck by the absence of oral histories in forensic anthropology, and physical anthropology in general. The field is relatively young. Many of the founders are still alive, and recently deceased forensic anthropologists are within the memories of those still alive. I recommend that graduate students interview their professors in the field, inquiring about their experiences and thoughts about the field and how they achieved success in their careers. These oral histories could be stored in the National Anthropological Archives at the Smithsonian Institution or another suitable location. The field is growing rapidly, but we are still close to our past, close enough to learn from those who brought us to the present.

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