

FORENSIC ANTHROPOLOGY AT THE SMITHSONIAN INSTITUTION

by David Hunt



Bones, CSI and similar TV programs have introduced a broad general public to forensics—the application of science or technology to the investigation and establishment of facts or evidence in a court of law. Forensic anthropology is a specialty within the larger field of forensics.

For decades physical anthropologists in the Smithsonian's Department of Anthropology have assisted law enforcement agencies and medical examiners in the retrieval, evaluation, and analysis of human remains in order to identify the victims. These remains usually are decomposed to the point that a normal autopsy cannot be performed. Forensic anthropologists use their knowledge of skeletal biology to give investigators information about a victim's age, sex, ancestry or "race," and height. A victim's medical history may be reflected in pathological conditions and trauma to the bones. Muscle markings on the bone can also indicate the kinds of activities the victim was engaged in during her lifetime (such as dance, horseback riding, playing a musical instrument), to aid further in the identification. The National Museum of Natural History, where the Department of Anthropology is located, is down the street from the Federal Bureau of Investigation (FBI) and the Department of Justice, enabling a close working relationship between these agencies and the physical anthropologists in the Department.

In addition to forensic expertise, the Anthropology Department holds one of the world's premier human comparative skeletal collections. For almost a century the Department has been a world center for research in skeletal biology and human variation. The information from these studies enables forensic anthropologists to assess unknown skeletal materials.

Assisting physical anthropologists in the study, interpretation, and preservation of human skeletal remains are new chemical, electronic and laboratory technologies (CT scanning, DNA analysis, isotopic studies, pathological research, stereo-lithographic reproduction). Smithsonian forensic and archaeological investigations include human skeletal remains in mid-nineteenth century iron coffins and

in historic cemeteries (Ubelaker and Jones 2003), mummified remains from Mongolia (Frohlich et al. 2005), and the well publicized 9,100 year-old "Kennewick Man" found in Washington State (Owsley et al. 2006).

The Collections

The skeletal collections of the Department's Division of Physical Anthropology, founded in 1904, come from archeological excavations through the Smithsonian's Bureau of American Ethnology (which became part of the Department in 1965) and from skeletal remains collected through the Army Medical Museum. Ales Hrdlicka, the Division of Physical Anthropology's first curator, significantly augmented the human skeletal collections in his travels around the world during the first half of the twentieth century. Excavations in the mid- to the end of the century, under the funding and auspices of the Works Projects Administration, Civilian Conservation Corps, River Basin Survey, National Geographic Society and various federal agencies, also greatly contributed to the strength of the Department's collections.

The over 30,000 cataloged remains currently housed in the Department's collections have provided the foundation for assessing morphological (shape) and metrical (mea-



Dave Hunt measuring a skull.

asurable) features of the skeleton. The international standards used today in forensic cases (including mass disasters) for estimating sex, age, ancestry, disease history and trauma are largely derived from the Smithsonian's physical anthropology collections.

Beginnings of Smithsonian Forensic Anthropology

Ales Hrdlicka (Hurd-LITCH-ka) and the FBI

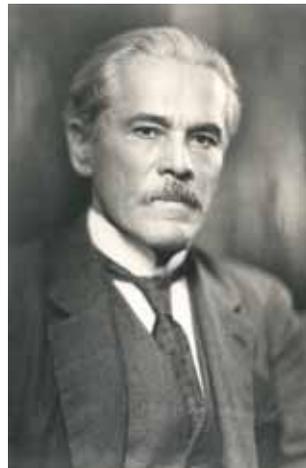
Ales Hrdlicka, a driving force in the development of physical anthropology, was hired as the Smithsonian's first physical anthropologist in 1903. Even before arriving at the Smithsonian, Hrdlicka was providing testimony at trials on questions concerning the insane and behavior abnormalities. In 1897 he published on the medico-legal aspects of a case concerning the mental state of Maria Barbella, an epileptic accused of murder (Hrdlicka 1897; Ubelaker 1999). Hrdlicka's papers in the National Anthropological Archives indicate he was involved in personal identification of a rancher in Argentina and the examination of the purported skeleton of the explorer Pizarro (Ubelaker 1999:727).

Hrdlicka was involved in human personal identification for the FBI as early as 1932 with a skull sent to him from Phoenix, Arizona. He employed the method of photo super-imposition (overlying photos of the skull to antemortem photographs) in this investigation, one of the earliest reported utilizations of this technique (Ubelaker 1999:728). In his 1939 edition of *Practical Anthropometry*, he shows the use of skeletal morphology and the application of anthropometric measurements for the identification of individuals in legal and medical situations. He also described forensic methods of differentiating human and non-human remains.

Hrdlicka's service to the FBI was personally acknowledged by J. Edgar Hoover in a letter to Hrdlicka's widow dated September 8, 1943, stating; "He will always be remembered for his outstanding contributions to the science of crime detection and for his gracious and spirited willingness to help us at every turn" (cited in Ubelaker 1999:729).

T. Dale Stewart and U.S. Soldier

With Hrdlicka's retirement in 1942, T. Dale Stewart (who started his career at the Smithsonian in 1927) became the Physical Anthropology Division's consultant to the FBI. Stewart was not aware of Hrdlicka's involvement with the



Ales Hrdlicka

FBI until after Hrdlicka's retirement, most likely because Hrdlicka considered these cases too confidential to be discussed even with close colleagues. As sole consultant for the FBI and for approximately 85 other law enforcement agencies, Stewart reported on no fewer than 169 cases from 1943 to 1969 (Ubelaker 2000:248). He was distinctly aware of the responsibility that anthropologists undertake when they become involved in a legal investigation. In *Essentials of Forensic Anthropology* (1979), he states that the role of the physical anthropologist must be one of objectivity and accuracy. In his own reports, Stewart was always concise and non-speculative in his presentation of his findings.

In 1948, Stewart was asked by the Quartermaster's Corps to assist in the identification of remains of WWII soldiers. He realized that the standards for assessing personal identification used by the military were deficient. In an editorial in *Science* (1953), he identified a need for research in physical anthropology/skeletal biology to revise and improve accuracy in determining sex, age and ancestry from the skeleton for the identification of the war dead. The next year, the Army sponsored a study of 375 positively identified skeletons from American war dead, result-



T. Dale Stewart (left) receiving an FBI award.

ing in the landmark report *Skeletal Changes in Young American Maless* (McKern and Stewart 1957).

During the Viet Nam conflict, the military again requested Stewart's assistance to improve the Army's identification methods. In 1968, Stewart organized a second research study in the problems of skeletal identification. This study culminated in an edited volume, *Personal Identification in Mass Disasters* (1970), an essential handbook for forensic anthropologists.

J. Lawrence Angel or "Sherlock Bones"

When Stewart became director of the National Museum of Natural History in 1962, J. Lawrence Angel was hired as curator and took over Stewart's forensic anthropology responsibilities. Although Angel had not previously worked as a forensic anthropologist, he was intimately familiar with pathology and autopsy from his anatomical teaching at Jefferson Medical College and quickly adapted to the role. Angel excelled in the methods and analysis of forensic anthropological investigation and was called "Sherlock Bones" by the popular press (Ubelaker 1989:6). During his tenure at the Smithsonian, Angel was involved in no fewer than 565 cases (Ubelaker 1990:194). He was always excited to take on forensic cases and enjoyed involving others in the work, including the collections manager, Lucille St. Hoyme, who originally came to the department as an aide to Hrdlicka in 1939, and Donald J. Ortner, who was hired as Angel's assistant in 1962. Promoted to assistant curator in 1969, Ortner focuses on bone biology, histology and paleopathology, and produced a seminal work, the *Identification of Pathological Conditions in Human Skeletal Remains*.

Angel also felt the need to provide education in forensic anthropology. Beginning in the 1970s, he taught a course on the techniques and application of skeletal biology in forensic anthropology, primarily targeted to pathologists but also to anthropologists and law enforcement personnel. Angel estimated that over 50% of the medical examiners in the US had taken his course. He also taught an annual course on the anthropology of the skeleton at George Washington University.

Despite the notoriety, Angel described his forensic anthropology work as "consultant work," not as research or fieldwork. He clearly saw his role as a community public service to assist with crime investigation. But Angel was aware of the research potential of his work as well, a way to obtain an understanding of contemporary

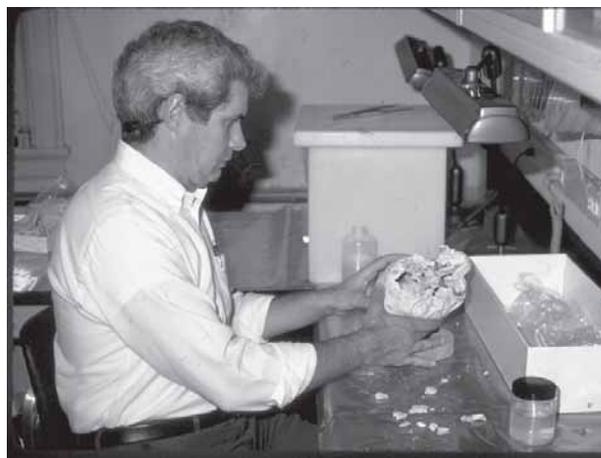


Lucille St. Hoyme, J. Lawrence Angel, and T. Dale Stewart with the 171/2 ft. beard of Hans Langseth (b. 1846, Norway).

population variation (see Angel 1976; Kelley and Angel 1987). Angel died in 1986, leaving a void in the Division of Physical Anthropology and the anthropological community as a whole.

The Tradition Continues

Douglas Ubelaker assumed the role of primary consultant to the FBI in 1977, when Angel took a sabbatical year to focus on his scholarly research. Ubelaker has been involved in more than 750 FBI cases and consults on non-FBI cases as well. His publication, *Human Skeletal Remains*, is one of the most widely used references in human skeletal investigation. Like Angel, Ubelaker is dedicated to disseminating



Donald Ortner

knowledge to future physical anthropologists by teaching courses at George Washington University and also to members of the law enforcement agencies.

From his research on the FBI case load, Ubelaker notes a significant increase in FBI case activity in the 1970s. He attributes this increase to the inclusion of Physical Anthropology as a section in the American Academy of Forensic Sciences and the increased awareness of the science to law enforcement and medical examiners offices. A notable decrease in FBI cases in the 1980s was due, he thinks, to the growing number of forensic anthropologists in the U.S. who are consulted within their own region, rather than the cases being sent to the FBI and subsequently to the Smithsonian. In the early 1990s, the number of cases again increased, due partly to greater media attention to criminal investigations and identification of human remains, and partly to changes in financial resources and/or crime activities at the regional level, leading to the need for federal involvement (Grisbaum and Ubelaker 2001:12).

In 1985 Douglas Owsley joined the Department as curator. He was a university professor and practicing forensic anthropologist and relieved Ubelaker of the non-FBI caseloads. Owsley, became involved in notable cases such as identification of missing press reporters in Guatemala and the remains of Jeffrey Dahmer's victims. He also



Doug Owsley and his assistant Kari Bruwelheide

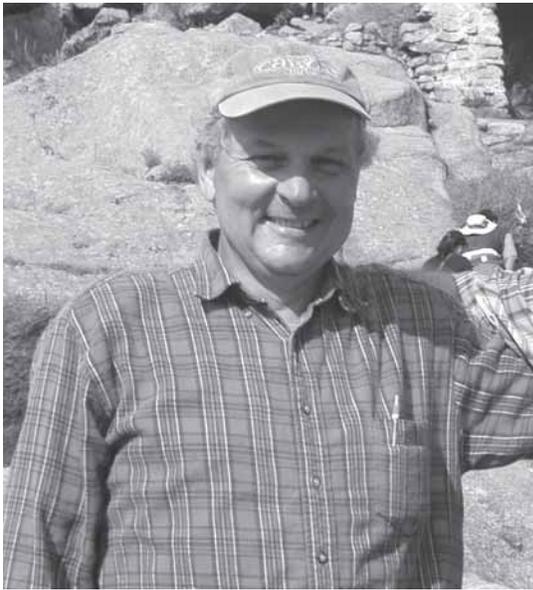
has been involved in working on mass graves in Croatia and historic identification cases such as the Civil War submarine, *The Hunley*, and Jamestown settlers.

In 1989, I (Dave Hunt) joined the department as Collections Manager for the Division of Physical Anthropology. In the mid 1990s, Ubelaker turned over to me cases from the Washington D.C. Office of the Chief Medical Examiner, and I have since been involved in forensic identification cases for the local U.S. Park Police and the National Center for Missing and Exploited Children. I am also a member of the Disaster Mortuary Operational Response Team (DMORT), a forensic anthropology team that follows up on disasters such as 9/11. Like Angel and Ubelaker, I teach future physical anthropologists as an instructor in the annual Forensic Anthropology training course administered by the National Museum of Health and Medicine/Armed Forces Institute of Pathology, and as an adjunct professor at George Washington University

In 1992, Bruno Frohlich was hired into the Department. He is the on-call forensic anthropologist for the State of Vermont and an adjunct teacher at Hobart and William Smith Colleges and the Henry C. Lee Institute of Forensic Sciences. His multi-disciplinary approach to research includes archaeology, skeletal biology, statistics, and the use of computerized tomography. His research on mass graves in Mongolia is described elsewhere in this issue.



Douglas Ubelaker with T. Dale Stewart, whom Ubelaker considered a guiding force in his professional development.



Bruno Frohlich

Mass Disasters: A “New Age” in the U.S.

Although America has experienced loss of life from anarchists’ bombs in the past, disasters on a mass scale have become more frequent in the US as well as abroad since the early 1990s. Smithsonian forensic anthropologists have been asked to assist in several of these mass disasters. In 1993, an incident in Waco, Texas, involving the Branch Davidian cult led by David Koresh, ended with about 100 people dying when the cult’s compound was engulfed in fire. Ubelaker was asked by the FBI to assemble a team to assist federal and local authorities in the retrieval and identification of the remains from the compound. This mass disaster involved most of the Department’s physical anthropologists (including Ubelaker, Owsley and Bruwelheide), over several weeks of field retrieval and laboratory analysis. Resulting publications describe this difficult investigation and the essential role of the forensic anthropologists (Owsley et al. 1995; Ubelaker et al. 1995).

Natural disaster struck the Midwest in the fall of 1993 with extreme flooding of the Mississippi and Missouri rivers. The affected regions were identified as federal disaster areas and both the living and the dead required federal assistance. Significant water erosion unearthed a large cemetery outside Hardin, Missouri. The National Disaster Medical Services branch of Department of Health and Human Services established a multi-faceted organization called the Disaster Mortuary Operational Response Team

(DMORT) to deal with mortuary services. DMORT brought together specialists in mortuary care, personal effects documentation, family assistance, radiography, and experts in forensic pathology, forensic odontology (analysis of dental records), fingerprinting (FBI), and forensic anthropology. DMORT members and volunteers spent months retrieving skeletal remains and caskets located downstream from the cemetery. The results from sorting and examining the remains led to the identification of a significant number of caskets and remains from the post 1950 cemetery burials. Most of the remains coming from the earlier part of the century were not identifiable due to lack of information for personal identification from medical or family records (Sledzik and Hunt 1997).



Hardin, Missouri

One year later, flooding in Albany, Georgia, caused by a hurricane, resulted in dam overflow that flooded the main city cemetery, and over 769 caskets were disinterred from their sealed containers. DMORT was again activated. We were able to positively identify the majority of remains and re-interred them to their original resting place.



Albany, Georgia

In 1994 the Asociación Mutual Israelita Argentina, in Buenos Aires, was blown up by an ammonium nitrate bomb placed in a van. Three hundred people were injured and 85 people were killed in the blast, the largest single incident against Jewish people since WWII. The Argentinean government requested U.S. assistance in the mortuary needs of this tragedy, including body retrieval and forensic investigation. The Office of the Armed Forces Medical Examiner (OAFME) sent a group of pathologists and anthropologists (including myself) to Buenos Aires, where we re-assembled the body parts and identified individuals from the burned and fragmentary remains.

Nine months later in Oklahoma City, an ammonium nitrate bomb in a van extensively damaged the Murrah Federal Building. Over 800 people were injured and 168 people were killed in the bombing. The magnitude and the emotional devastation of this event prompted immediate action by federal agencies. All available specialists, including Smithsonian anthropologists, were asked to assist in the efforts to search for survivors, investigate the incident, retrieve the bodies of the victims, and re-assemble and identify the mostly fragmentary and partial remains.

The blackest day in recent American history was September 11, 2001, when all specialists and experts in mass fatality situations were called to assist in New York (World Trade Towers), Washington, DC (Pentagon) and Somerset, Pennsylvania (United Flight 93). All members of the Division of Physical Anthropology were involved at some level in this disaster, from consultation to field retrieval and laboratory analysis. Owsley and Ubelaker were sent to Dover, Delaware, to work with remains coming from the Pentagon. Several physical anthropologists working in the Department's Repatriation Office (Marilyn London and Erica Jones) were activated through DMORT and sent to Somerset to provide their expertise in field retrieval and forensic anthropology.

A Continuing Legacy

The activities in forensic anthropology by the Smithsonian's Division of Physical Anthropology reflect the historical progress of forensic anthropology in America in meeting the social, legal and federal needs for forensic investigations. The Physical Anthropology Division staff and the invaluable resource of the diverse skeletal collections curated by this division have been and will continue to be dominant for research contributions in skeletal biology and fo-

rensic anthropological methodology. These skeletal collections are continuously employed by the Physical Anthropology staff as well as over 60 visiting scientists each year. They form the basis for re-assessing morphometric and anthroposcopic techniques, as well as for rigorous evaluation of new techniques, methodologies, and equipment to improve the identification of sex, age, ancestry, and cause and manner of death from skeletal remains. The Division of Physical Anthropology and the Smithsonian Institution are dedicated to the advancement of skeletal biological research in the human skeleton and the applied utilization of these methods for assisting law enforcement agencies in the identification of missing persons and victims of crimes and mass disasters.

References cited

- Angel, J. L. 1976. Colonial to modern skeletal changes in the USA. *American Journal of Physical Anthropology* 45: 723-735.
- Frohlich, B., N. Bazarsad, D. R. Hunt, and N. Batbold. 2005. Human mummified remains from the southern Gobi Desert. Preliminary report on the finds of ten executed individuals dating to the end of the great Mongolian Empire. In: Massa ER, ed., *Proceedings of the 5th World Conference on Mummy Studies*. Universita degli Studi di Torino, Turino, Aitalia.
- Grisbaum G., and D. H. Ubelaker. 2001. An analysis of forensic anthropology cases submitted to the Smithsonian Institution by the Federal Bureau of Investigation from 1962 to 1994. *Smithsonian Contributions to Anthropology* No. 45.
- Hrdlicka, A. 1897. The medico-legal aspect of the case of Maria Barbella (with anthropometric data on twenty Calabrian women). *State Hospital Bulletin, NY* II: 231-299.
- Hrdlicka, A. 1939. *Practical Anthropometry*. Wistar Institute of Anatomy and Biology.
- Kelley, J. O., and J. L. Angel. 1987. Life stress of slavery. *American Journal of Physical Anthropology* 74: 199-211.
- McKern T. W., and T. D. Stewart. 1957. *Skeletal Age Changes in Young American Males*. Quartermaster research and Development Center. Environmental Protection Research Division; Report No. EP-45.
- Ortner, D. J., and G. J. Putschar. 1985. Identification of Pathological Conditions in Human Skeletal Remains. *Smithsonian Contributions to Anthropology, No. 28*. Smithsonian Institution Press.

- Ortner, D. J. 2003. *Identification of Pathological Conditions in Human Skeletal Remains*. Academic Press.
- Owsley, D. W., H. Berryman, K. L. Bruwelheide, D. R. Hunt, T. Stafford, C. W. Smith, and J. Chatters. 2006. Kennewick Man: Nowhere near the last word. *Paper presented at the 58th Annual Meeting of the American Academy of Forensic Sciences*. Seattle, WA.
- Owsley, D. W., D. H. Ubelaker, M. M. Houck, K. L. Sandness, W. M. Grant, E. A. Craig, T. J. Woltanski, and N. Peerwani. 1995. The role of forensic anthropology in the recovery and analysis of Branch Davidian compound victims: Techniques of analysis. *Journal of Forensic Sciences* 40(3): 341-348.
- St. Hoyme, L. E., M.Y. Iscan. 1989. Determination of sex and race: Accuracy and assumption. In M. Y. I^ocan and K. A. R. Kennedy, eds., *Reconstruction of Life from the Skeleton*, pp. 53-93. Alan R. Liss.
- Sledzik P. S., and D. R. Hunt. 1997. Disaster and relief efforts at the Hardin Cemetery. In D. A. Poirier and N. F. Bellantoni, eds., *In Remembrance. Archaeology and Death*, pp 185-198. Bergin and Garvey.
- Stewart, T. D. 1953. Research in Human Identification. *Science* 118(3061): 3.
- Stewart, T. D., ed. 1970. *Personal Identification in Mass Disasters*. Smithsonian Institution.
- Stewart, T. D. 1979. *Essential of Forensic Anthropology. Especially as Developed in the United States*. CC Thomas.
- Ubelaker, D. H. 1999. *Human Skeletal Remains*. 3rd ed. Taraxacum. (First Edition, 1978).
- Ubelaker, D. H. 1989. J. Lawrence Angel, 1915-1986. *American Antiquity* 54(1): 5-8.
- Ubelaker, D. H. 1990. J. Lawrence Angel and the development of forensic anthropology in the United States. In J. E. Buikstra, ed., *A Life in Science: Papers in Honor of J. Lawrence Angel*, pp.191-200. Center for American Archeology.
- Ubelaker, D. H. 1999. Aleš Hrdlicka's role in the history of forensic anthropology. *Journal of Forensic Sciences* 44(4): 724-730.
- Ubelaker, D. H. 2000. The forensic anthropology legacy of T. Dale Stewart. *Journal of Forensic Sciences* 45(2): 245-252.
- Ubelaker, D. H., and E. B. Jones, eds. 2003. Human remains from Voegtly Cemetery, Pittsburgh, Pennsylvania. *Smithsonian Contribution to Anthropology, No. 46*. Smithsonian Institution Press.
- Ubelaker, D. H., D. W. Owsley, M. M. Houck, E. A. Craig, W. M. Grant, T. J. Woltanski, R. Fram, K. L. Sandness, and N. Peerwani. 1995. The role of forensic anthropology in the recovery and analysis of Branch Davidian compound victims: Recovery procedures and characteristics of the victims. *Journal of Forensic Sciences* 40(3): 335-340.

Acknowledgements

I gratefully acknowledge the direction from and interviews with Douglas Ubelaker whose published references and personal knowledge were a significant part of this article. I also acknowledge the historical research and interviews of Donald Ortner, who has personally experienced the last 40 + years of change in the Division of Physical Anthropology.

David Hunt is physical anthropologist and collections manager, Division of Physical Anthropology, Smithsonian Institution and a Diplomat of the American Board of Forensic Anthropologists.