

Raton, Fla.: CRC Press, 2007. Comprehensive volume discusses common issues in forensic pathology, including determination of instruments in blunt force trauma situations.

Ferllini, Roxana, ed. *Forensic Archaeology and Human Rights Violations*. Springfield, Ill.: Charles C Thomas, 2007. Collection of essays by experts in various disciplines includes discussion of the forensic examination of bodies subjected to blunt force trauma and other deadly injuries in human rights violation cases.

Moore, Ernest E., Kenneth L. Mattox, and David V. Feliciano. *Trauma Manual*. 4th ed. New York: McGraw-Hill, 2003. Focuses mostly on trauma surgery, but discusses blunt force trauma in surgical situations.

Shkrum, Michael J., and David A. Ramsay. *Forensic Pathology of Trauma: Common Problems for the Pathologist*. Totowa, N.J.: Humana Press, 2007. Addresses common trauma patterns, including determination of blunt force trauma, in forensic settings.

Wilson, William C., Christopher M. Grande, and David B. Hoyt, eds. *Trauma: Critical Care*. Vol. 2. New York: Informa Healthcare, 2007. Discusses the determination of types of blunt force trauma and wound analysis.

**See also:** Antemortem injuries; Blood residue and bloodstains; Blood spatter analysis; Child abuse; Crime scene investigation; Defensive wounds; Driving injuries; Forensic anthropology; Osteology and skeletal radiology; Peruvian Ice Maiden; Physical evidence; Skeletal analysis.

## Body farms

**Definition:** Outdoor facilities that allow forensic anthropologists to study postmortem decomposition of human remains.

**Significance:** Research conducted at body farms helps the practitioners of a number of forensic disciplines—including medical examiners, crime scene investigators, and law-enforcement personnel—with the identification of human remains.

The first body farm was established in 1972 by Dr. William M. Bass at the University of Tennessee in Knoxville. Shortly after he moved to Tennessee, Bass was asked to join the staff of the state's medical examiner's office as state forensic anthropologist. Part of Bass's duties in this position included consulting on death investigations being conducted by federal, state, and local law-enforcement agencies. Although Bass had extensive training in forensic anthropology, he did not have a lot of knowledge about or experience with the decomposition of human remains. In addition, research in this area was nearly nonexistent. This need led Bass and his colleagues to open the University of Tennessee Anthropological Research Facility, which came to be known as the Body Farm.

### Purpose of Body Farms

The research conducted on body farms allows forensic anthropologists to study the postmortem decomposition of human remains. This work is important for a number of reasons. First, it helps scientists to gain a more comprehensive understanding of what occurs to the body after death and thus to develop better methods of determining the "time since death" in specific cases. Time since death, or the postmortem interval, is a critical element in homicide investigations, as law-enforcement officers or crime scene investigators must often confirm or disprove the alibis of potential suspects.

Second, the research on body farms provides information that is useful to forensic anthropologists and medical examiners who must identify bodies from skeletal remains. By examining a set of skeletal remains, a forensic anthropologist or medical examiner can determine a great deal about the decedent, including age, sex, stature, ancestry, and the presence of unique features. Body farm research also provides information that can help examiners to determine the cause of death in individual cases. In homicide investigations, law-enforcement officers or crime scene investigators need to know whether the decedents have died of natural causes or whether they have been the victims of foul play.

When the University of Tennessee's Anthropological Research Facility first began its work, almost no research had been done documenting



Author Patricia Cornwell, whose best-selling crime novels feature forensic pathology, shakes hands with Dr. William M. Bass, founder of the first body farm in the United States, the University of Tennessee Anthropological Research Facility. Cornwell is wearing a special outfit because of her participation in a mock airplane crash event staged for a crime scene investigation training exercise in July, 2005. (AP/Wide World Photos)

what happens to the human body after death. Even the most rudimentary questions—for example, When do blowflies show up on a body? How long does it take for a corpse to become a skeleton?—could not be answered. As the Body Farm's studies progressed, the questions became more sophisticated: How do decomposition rates differ between sunshine and shade? How do climate differences (cool versus hot) affect decomposition rates? How is decomposition affected when bodies are buried in shallow graves as opposed to left on top of the ground? Do bodies decompose faster in water than they do on land? How do bodies decompose in vehicles? What effects do other variables—such as clothing, body weight, and condition of the body—have on rates of decomposition?

### What Happens to Bodies

The University of Tennessee's body farm occupies a three-acre tract of land situated near the University of Tennessee Medical Center; it is surrounded by razor wire and a wooden privacy fence. When a corpse arrives at the facility, it is assigned an identification number to ensure the confidentiality of the donor. The body is then examined and its condition is thoroughly documented. Bodies are placed in various environmental conditions across the property. For example, some bodies are placed in car trunks, some are left lying in the sun or shade, some are buried in shallow graves, some are covered with brush, and some are submerged in water.

Two things happen when a body decays. At death, enzymes in the digestive system, having

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no more nutrition, begin to eat on the body and the tissues liquefy. This process is known as putrefaction. Insects gather on the body, and maggots consume the rotting flesh. At the University of Tennessee, forensic anthropologists Dr. Richard Jantz and his wife, Dr. Lee Meadow Jantz, document such insect activity and how long it takes the insects to do their work. Most of the characteristics used to determine time since death are related to insect activity.

After the bodies at the Tennessee facility have completed the decomposition process, the bones are cleaned and measured, and the data are entered into the University of Tennessee's Forensic Anthropology Data Bank, which was created by Dr. Richard Jantz. This database is the primary tool that forensic anthropologists use to determine age, sex, stature, ancestry, and other unique characteristics from skeletal remains. The database is the central component of a computer program called FORDISC (for Forensic Discrimination). The FORDISC software is used all over the world as a tool to assist in the identification of bodies. For example, a medical examiner or anthropologist can enter a few skeletal measurements and the program can predict with a fairly high degree of accuracy the age, race, sex, height, and ancestry of the decedent. The bones are then cataloged and added to the William M. Bass Donated Skeletal Collection, which is the largest modern bone collection in the United States.

### Sources of Bodies

The bodies studied at body farms come from three primary sources. First, bodies are often donated through state medical examiners' offices. For instance, if a body comes through a county medical examiner's office and it ends up unclaimed—either because the decedent is never identified or because the decedent had no friends or relatives to claim the body—the medical examiner may choose to send it to a body farm for decomposition re-

search or for addition to the facility's skeletal collection. Second, family members who are aware of the valuable research conducted at body farms and who are genuinely interested in furthering the cause of science may choose to donate the bodies of loved ones. Third, some people make the decision before their deaths to donate their bodies to body farms; by completing donor consent forms, they ensure that their wishes are carried out.

Body farms do not accept the corpses of persons who were infected with the human immunodeficiency virus (HIV), with hepatitis, or with antibiotic-resistant bacteria. These facilities will accept the donation of anyone's bones, however.

### Impact of the University of Tennessee's Body Farm

The success of the research conducted at the Body Farm in Tennessee inspired the opening of other body farms in the United States and abroad. Western Carolina University in Cullowhee, North Carolina, created a body farm in 2006 as part of the Western Carolina Human Identification Laboratory. The facility is run by the university's forensic anthropology program on several acres of land near the campus. Like the original Body Farm, the North Carolina facility studies the decomposition of human remains. Researchers at the facility hope to learn more about the decomposition of bodies in the

### The Body Farm in Popular Culture

The University of Tennessee's Anthropological Research Facility came to widespread public attention, and gained its nickname, with the 1994 publication of Patricia Cornwell's novel *The Body Farm*. In 2003, the nonfiction book *Death's Acre: Inside the Legendary Forensic Lab the Body Farm Where the Dead Do Tell Tales*, by Bill Bass and Jon Jefferson, increased the public's knowledge of the work done on body farms. In addition, author Mary Roach visited the Tennessee facility and included discussion of its work in a chapter of her 2003 nonfiction book *Stiff: The Curious Lives of Human Cadavers*. Since coming to the attention of television writers, body farms have figured as settings in several episodes of crime and suspense shows, including *CSI: Crime Scene Investigation*, *Law & Order: Special Victims Unit*, and *The Dead Zone*.

western Carolina mountain terrain, which is very different from the terrain of eastern Tennessee. They are interested in discovering whether these differences may affect rates of decomposition and suggest that it is important to study postmortem decomposition in a variety of geographic locations.

Texas State University planned to have a body farm operational by the fall of 2007, but completion of the facility, which will be run by the San Marcos Department of Anthropology, part of the Forensic Anthropology Center at Texas State, was delayed by objections from residents in the area and concerns about the presence of buzzards, which might interfere with flight operations at a nearby airport. Researchers at Texas State are interested in learning about rates of decomposition in Texas, where both geography and climate are significantly different from those of western Carolina and eastern Tennessee. Differences in climates may well be found to affect the rates of decomposition in human remains.

Other body farms are in various stages of planning and development across the United States, including in California, Florida, Kansas, and Iowa. In India, a student, Roma Kahn, who received a master's degree in forensic archaeology from Bournemouth University in England, has been conducting preliminary work on the decomposition of cattle. She hopes to open a facility to study human decomposition in India, modeled along the lines of the body farms operating in the United States.

Dr. Bass and the faculty of the University of Tennessee's Department of Anthropology have played a key role in shaping the field of forensic anthropology. It has been estimated that as of 2007, the University of Tennessee was responsible for the education of some 25 percent of the board-certified forensic anthropologists in the United States. Entry into the forensic anthropology program at the University of Tennessee is highly competitive, with roughly sixty students applying for the fewer than ten doctoral positions available annually.

The University of Tennessee's Forensic Anthropology Center also inspired the formation of the National Forensic Academy (NFA), one of the leading law-enforcement investigation

training centers in the United States. The NFA offers an intensive ten-week training program designed to educate law-enforcement agents in evidence identification, collection, and preservation. The primary goal of the NFA is to prepare law-enforcement officers to recognize crucial components of crime scenes and improve the process of evidence recovery and submission.

### Opposition to Body Farms

Although the research conducted at body farms has undoubtedly contributed a great deal to the field of forensic anthropology, some people are disturbed by the idea of such facilities in their neighborhoods. At the heart of many debates is the placement of body farms. Residents who live near proposed sites often protest the opening of these facilities for a variety of reasons, including fears that insects will be attracted to the area or that scavenging animals will carry off body parts, perhaps dropping them in residents' backyards. When Texas State University proposed placing its body farm about two miles from the San Marcos Outlet Mall, one of the biggest tourist attractions in the area, local government officials objected, saying that the mall's businesses would likely be hurt by their proximity to such a facility.

The University of Tennessee's Body Farm was subject to similar opposition in its early days. Members of a local health care advocacy group called Solutions to Issues of Concern to Knoxvilleans (SICK) protested at the research facility, holding up signs proclaiming, "This makes us SICK." A number of local residents also complained about the odor emitted from the Body Farm. The primary point of contention, however, was that the facility was not completely fenced in, and some people could see the decaying bodies from their homes. The university solved this problem by agreeing to install a privacy fence.

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### Further Reading

Bass, Bill, and Jon Jefferson. *Beyond the Body Farm: A Legendary Bone Detective Explores Murders, Mysteries, and the Revolution in Forensic Science*. New York: William Morrow, 2007. Examines the forensic science em-