

William M. Bass and the Development of Forensic Anthropology in Tennessee

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ABSTRACT: Twenty-two years of human identification cases have been analyzed with respect to the development of a forensic anthropology curriculum at the University of Tennessee under William M. Bass. Relationships forged with the State Medical Examiner and lecture programs for national, state and local law enforcement agencies and arson investigators have provided the necessary exposure that ensured the growth of Dr. Bass's caseload and program. Postmortem indicators for assessing time-since-death have been Bass's target research domain. The development of a donated body program with curation of those skeletons promises to keep his research perspective fueled. Finally, the formal establishment of the Forensic Anthropology Center at the University of Tennessee ensures the continued academic commitment to forensic anthropology.

KEYWORDS: physical anthropology, forensic anthropology, human identification, William M. Bass

William M. Bass received his initial exposure to forensic anthropology in 1954 with Charles E. Snow at the University of Kentucky (see [1]). Bass selected the University of Pennsylvania to continue this interest as part of his Ph.D. training under the tutelage of one founder of American forensic anthropology, Wilton M. Krogman. This relationship encouraged Bass to craft his career's trajectory towards the skeletal biology of prehistoric, historic and contemporary human populations. That career of 34 years of teaching with over 200 research publications has resulted in far-reaching influence (see [2] and [3] for example). In fact, as a result of Bass's academic appointments at the Universities of Kansas and Tennessee, nearly 39% of those practicing forensic anthropology in the United States today can trace some element of their academic ancestry through him (see also [4] and [5]). While the perspective of this paper concentrates on Bass's Knoxville years, it is important to realize that his previous academic and professional associations enhanced the career options of numerous students with forensic anthropology employment in federal, military, state and regional medical examiner's offices.

Furthermore, Bass's on-going relationships with a variety of national organizations, e.g., International Association of Arson Investigators, National College of District Attorneys, US Army Central Identification Laboratory and Air Force Mortuary Services, provide continual requests for identification consultations and hon-

ored speaking engagements (Fig. 1). Much of Bass's national appeal grew out of the forensic anthropology program at the University of Tennessee where he established the problem-oriented time-since-death research on the relatively unknown processes of human decomposition. This research foundation, in turn, provided for the exploration of the entomological perspective in estimating a postmortem interval (see [6] and [7]). His nationally-profiled "Professor of the Year" award in 1985 generated tremendous public and academic attention and some state and university funding for this new and daring, to most, unique brand of applied anthropology.

Historical Background

The roots of forensic anthropology in Tennessee as a partner to forensic pathological investigations are the brainchild of Dr. Jerry T. Francisco, a forensic pathologist at the University of Tennessee Health Sciences Center in Memphis. Francisco served as the Chief Medical Examiner for the State of Tennessee from 1966 to 1990 and was instrumental in accommodating Bass's specialty. Drs. Bass and Francisco knew each other while Bass was at the University of Kansas as Francisco was key in providing the pubic symphyses for Bob Gilbert's study under the late Thomas McKern (also at the University of Kansas). When Francisco learned Bass was coming to Knoxville in 1971, he approached him about providing human identification services for Tennessee. Upon arriving in Knoxville, Bass not only took over the reins of the Department of Anthropology at the University of Tennessee, but became the State Forensic Anthropologist. Bass has been a member of the State Medical Examiner staff ever since. Through Francisco's office, a per-case consultation budget was set up to provide Bass with some resource for replacing consumables necessary for his forensic anthropological exploits. Such money provided a token means to replenish the stock of surgical gloves, scalpel blades, body bags, photographic and radiographic film and provide for travel expenses to crime scenes. Unfortunately, this per-case economic arrangement, still in operation today, has not kept pace with the rising costs of running his operation.

Bass saw Tennessee as fertile ground to provide the necessary caseload for building a training program around forensic anthropology teaching and research within the University system. He realized from prior years of performing forensic anthropological autopsies in Kansas that he could not rely solely on Francisco or other medical examiners to provide human identification cases. He knew he would have to "court" local and state level law enforcement agencies to introduce himself and his human identification services to their investigations involving skeletonized and decomposing remains. With this objective, Bass forged a comprehensive lecture circuit including annual and bi-annual lectures to the Tennessee

¹Assistant Professor, Associate Director of the Forensic Anthropology Center, Department of Anthropology, 250 South Stadium Hall, University of Tennessee, Knoxville, TN.

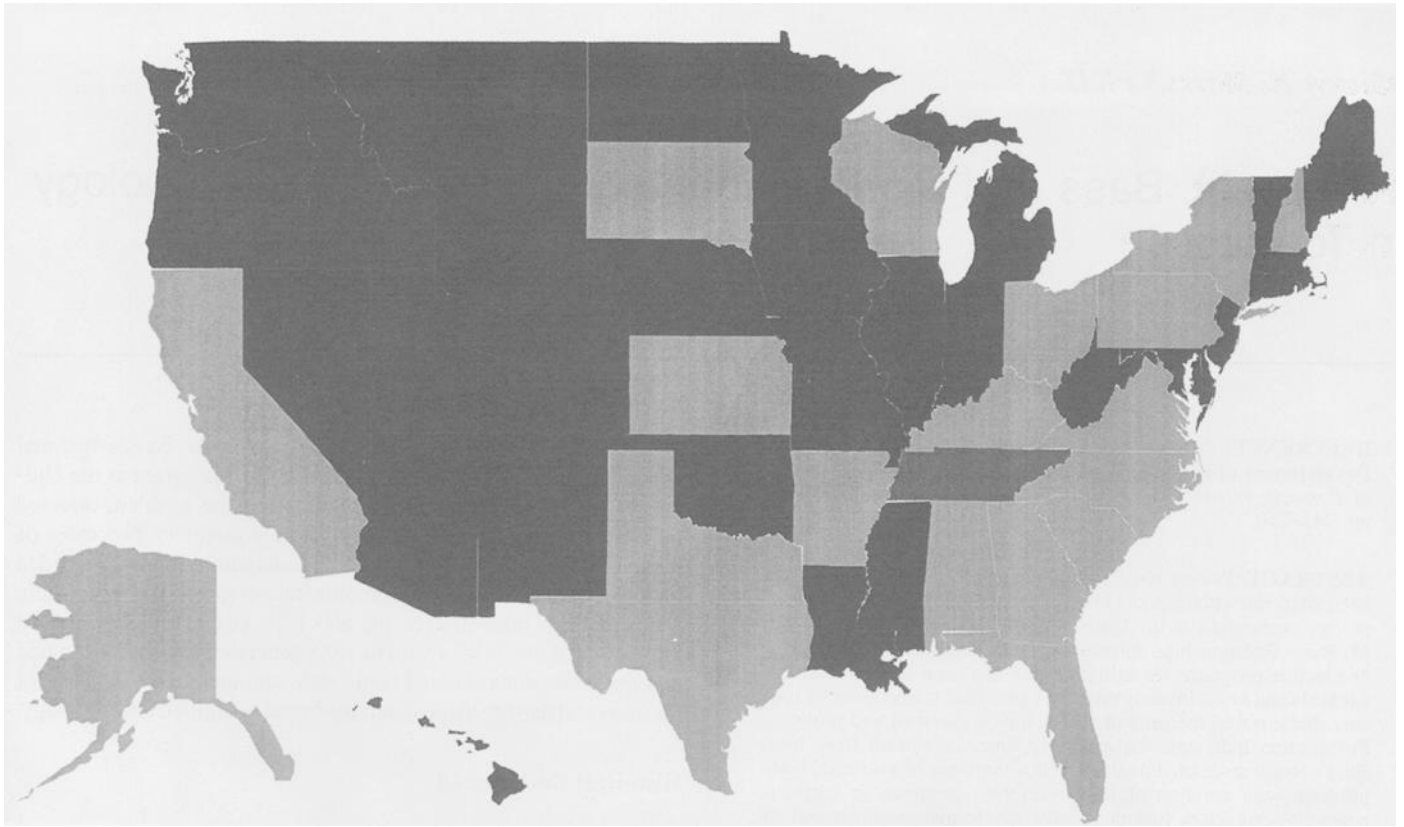


FIG. 1—States shaded light have requested Bass's human identification consultation services while at the University of Tennessee.

Law Enforcement Training Academy, the Tennessee Bureau of Investigation, and the Tennessee Fire Marshals and State Arson Investigators. Such a focused, recurring lecture base provided the exposure which catapulted Bass to popularity, prominence and legend among local, county and state law enforcement agencies. Bass explains that "There is hardly a police department in the state that does not know me and what we can do" (Bass, personal communication).

The Tennessee Bureau of Investigation (TBI) is an umbrella organization that orchestrates multicounty criminal investigations. In the mid-1970s, Bass testified for the state in a homicide case whose prosecutor later became director of the TBI. Bass was subsequently appointed as a consultant to that agency in 1978 and is only one of four non-special agents to carry the TBI badge. This relationship with the TBI was crucial in the Forensic Anthropology Center obtaining recent financial support, transportation (the vehicle assigned to the forensic investigation team has radio contact with all TBI agents) and supplies for his expanding program to the eventual development of the Forensic Anthropology Center. Through Bass's efforts, the Tennessee Fire Marshals and State Arson Investigators have been properly trained, partially through their classroom contact with Bass, to contact the Forensic Anthropology Center for the investigation of all fire scenes suspected of involving humans. In fact, all fire scenes are left entirely virtually undisturbed until Bass and his team complete their investigation and remove any skeletal remains.

The relationship between Bass and Francisco was again strengthened in 1980 when Francisco was attempting to re-structure morgue operations at his Shelby County/State Medical Examiner's Office. Francisco asked Bass about employing one of his recent Ph.D.'s to serve as morgue director who might possess the skills to direct such an operation. Since Hugh Berryman was "next in line," Bass

approached him with the proposition of practicing forensic anthropology in the Tennessee Medical Examiner's system. Berryman's hire represents the first full-time employment of an anthropologist within the Tennessee Medical Examiner system and the second full-time forensic anthropologist, after the late David Wolf, in the United States to be independent of academia. Under the guidance of Berryman and Dr. Steven A. Symes, Assistant Director, another University of Tennessee-trained forensic anthropologist and Dr. O'Brian C. Smith, a forensic pathologist, many of Bass's graduate students perform summer internships at the Regional Forensic Center in Memphis. This opportunity allows them first-hand participation in the relationship of anthropology and forensic pathology and a solid appreciation of the soft tissue mechanisms of trauma and how these may result in the tell-tale skeletal signatures they are more familiar with. Similarly, several students have received forensic pathological training from Dr. Frank King, a forensic pathologist at the Hamilton County Medical Examiner's Office in Chattanooga, TN and anthropological/autopsy training from Mr. Craig Lahren, the forensic anthropologist and Coordinator of Forensic Services for the Hamilton County Medical Examiner's Office. Other graduate students have received thesis and dissertation guidance from associations with Dr. William F. McCormick, Deputy Chief Medical Examiner in the Department of Forensic Pathology at the Quillen College of Medicine at East Tennessee State University in Johnson City, TN and from Dr. Cleland C. Blake, a forensic pathologist in Morristown, TN.

In 1994, the University of Tennessee Medical Center Knoxville, hired Dr. Sandra K. Elkins as the Director of Autopsy Services and Forensic Pathology Division. Dr. Elkins is a graduate of the forensic pathology program at the University of Tennessee Health Sciences Center, Memphis, under Dr. Francisco. Part of her responsibilities include designing a new 10,000 square foot Regional

Forensic Center that will include a 2000 square foot forensic anthropology laboratory. Bass is also a member (joint professorship) in the Department of Pathology of the University of Tennessee Medical Center.

Bass realized during his tenure at the University of Kansas during the 1960s that physical anthropology was “reproducing itself faster than there were jobs” and “felt guilty imposing the incredible time, financial and emotional commitments on students required of graduate school to have no possibility of employment in the traditional academic setting” (Bass, personal communication). Bass understood that this specialized applied branch of skeletal biology he provided in anthropology may fit well into the local, state, and possibly, national medical examiner system of the United States. From his extensive casework and subsequent courtroom associations he nurtured relationships with numerous medical examiners and forensic pathologists that he introduced to many of his students. In fact, Bass retains a joint professorship appointment in the Department of Pathology at the University of Tennessee Medical Center.

Demographics of Caseload

The state of Tennessee is divided into three geographical regions: the west Mississippi River delta (21 counties), central Cumberland plateau (41 counties) and the eastern Smoky Mountain region (33 counties). The majority of Bass’s identification cases originate from the eastern third (Fig. 2). This is not surprising given Bass’s accessibility through a high media profile and guaranteed same-day or within 24-hour response. The number of cases in the east Tennessee counties have risen from 50% of the cases during the 1970s to 60% in the 1980s and early 1990s. The 11% caseload from west Tennessee in the 1970s reflects referrals of skeletal

materials by Dr. Francisco. The central region of the state has remained the most steady source throughout Bass’s Tennessee tenure. The location of the state medical examiner’s office in Nashville since 1990 has provided not only active forensic cases requiring analysis, but a steady supply of donated and unclaimed and unknown bodies that have been particularly valuable for time-since-death research. Today, Drs. Berryman and Symes perform virtually all forensic anthropological analysis on west Tennessee cases.

Without a doubt, the ever-increasing caseload has grown out of Bass’s training of law enforcement as they have become familiar with the scope of his services through both his lecture series and crime scene associations. After only several years, these agencies came to appreciate and rely upon the detailed degree of analysis and valuable conclusions that Bass could provide from burned and decomposed bodies as well as those he routinely performed on skeletal remains. Figure 3 displays the percentage of skeletal, decomposed/fresh (including river floaters) and burned remains. During the 1970s the majority of Bass’s caseload was skeletal (including advanced decomposed with desiccated soft tissue). These remains comprised 75 to 95% of all cases. In the 1980s, by virtue of his successful time-since-death data and the entomological indicators that chronologically correlate those events, a rise in the examination of decomposed/fresh bodies to 20 to 30% of the caseload resulted. As this research expanded Bass’s investigative power and appeal to those agencies routinely depending upon his services, there was also an increase during the 1980s in the frequency of burned bodies requiring Bass’s services. Such investigations into the specifics of time since death estimations at crime scenes and burned bodies created more unique and varied cases that, in turn, enriched and enlivened his lectures to law-enforcement

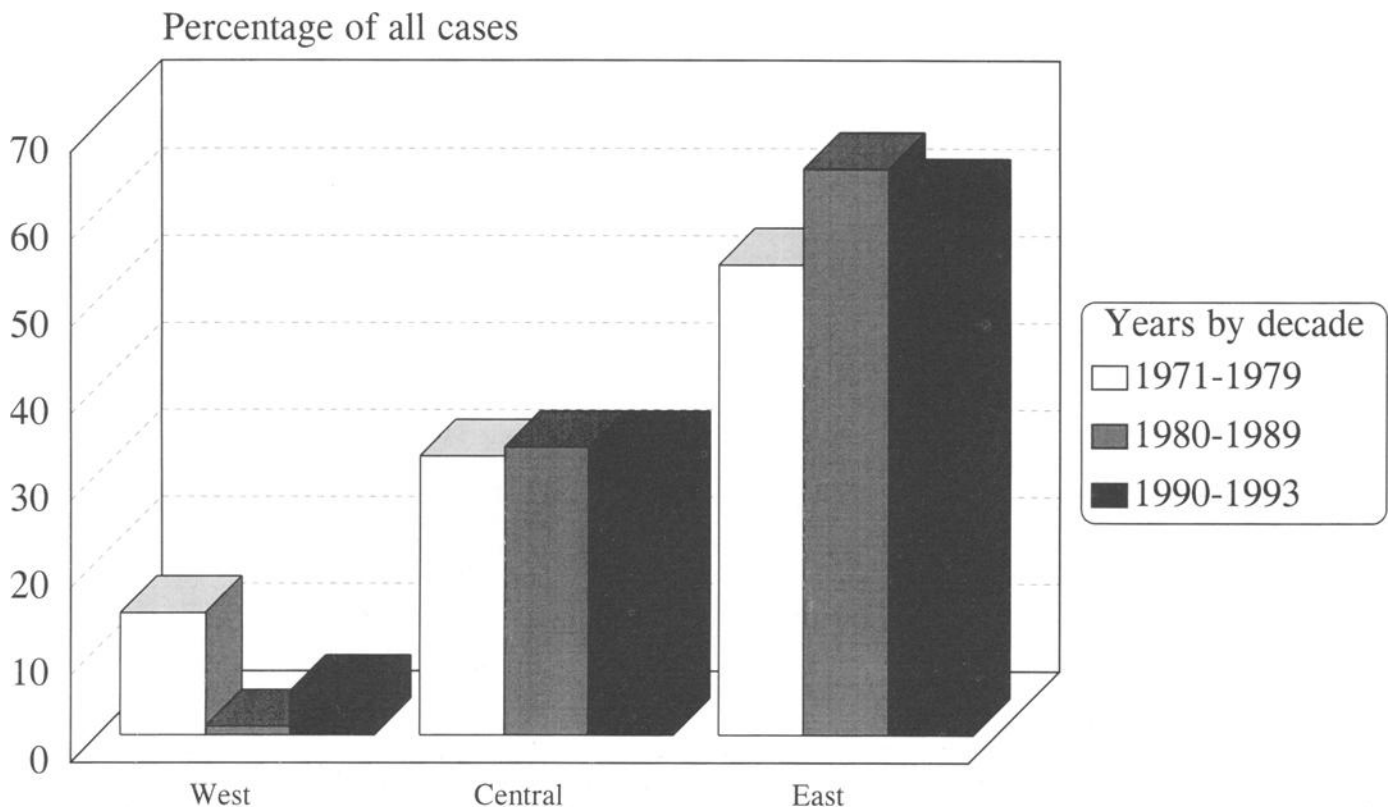


FIG. 2—Percentage of Bass’s human identification by decade and region in Tennessee.

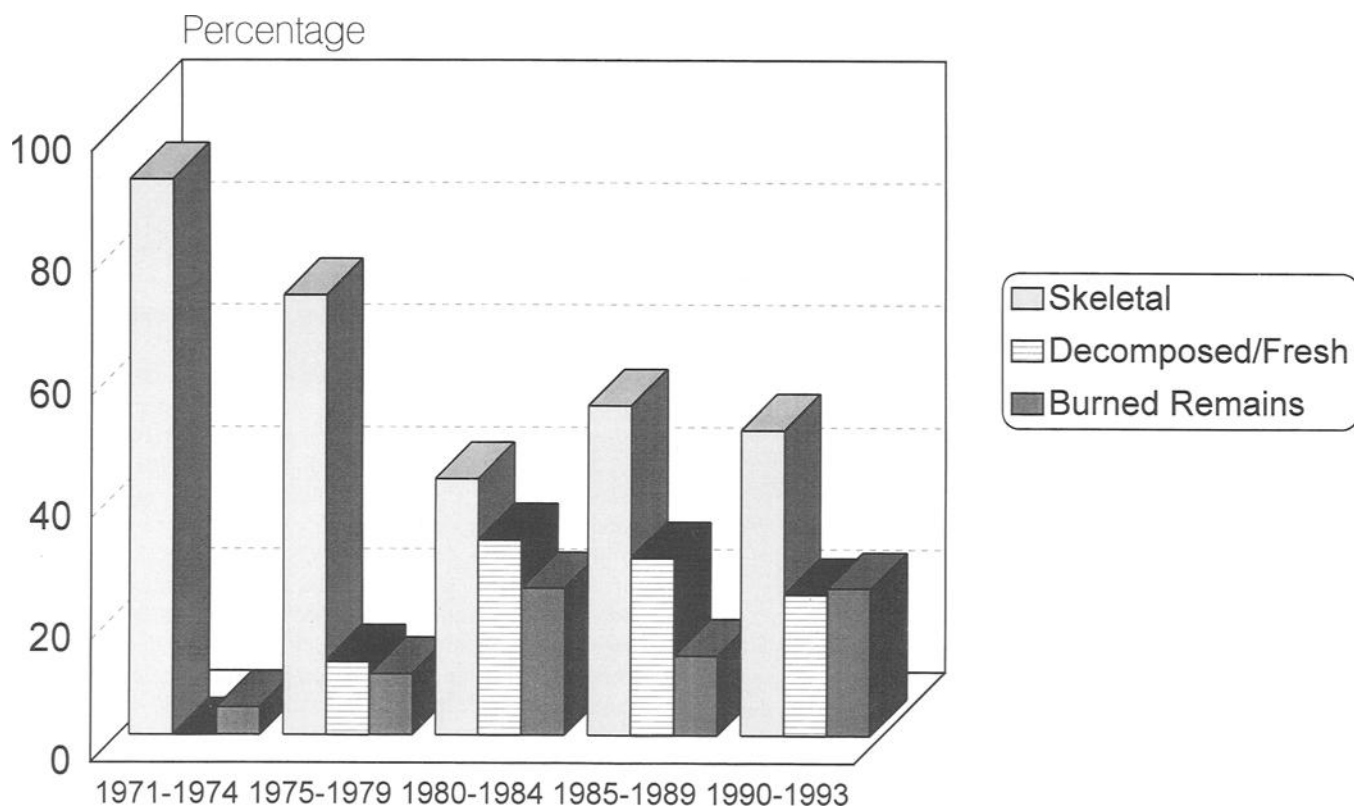


FIG. 3—Percentage of Bass' human identification cases representing skeletal, decomposed/fresh (including river floaters) and burned.

personnel. Today, near equality exists among this triad of Bass' caseload though skeletal remains have always outnumbered the specialized investigations he performs on decomposed and burned remains.

Regardless of the nature of their discovery, males have always outnumbered females in the enumeration of Bass' cases. Furthermore, beginning in the 1980s, there has become an increasing disparity between gender (Fig. 4). Such a trend is equally manifest during the first four years of this decade when males account for nearly twice that of females. National crime statistics reveal a similar near 2-1 ratio of males over female victims, yet, the traditional investigations undertaken by forensic anthropologists, that is, skeleton in the woods, presents a unique brand of crime where there has been some attempt to conceal, disguise, dismember or bury the victim. This characteristic of criminal behavior may invalidate comparisons to overall homicide mortality data. Regardless of decade, male age at death (Fig. 5) for Bass' forensic anthropological cases peak between 30 and 39 years. Females show a much younger peak age at death at less than 20 years. This female age peak corresponds to national crime statistics that target young females in the 15 to 30 year age group as most vulnerable.

The demographic distribution of the population for the state of Tennessee is 83% Caucasian and 16% African-American. Yet, East Tennessee and Knoxville are predominantly Caucasian (95%) with only 3.5% representing African-Americans. Bass' caseload (Fig. 7) reveals a disproportionate number of African-Americans (15 to 20%) related to current East Tennessee census figures [7].

Between 7 and 12% of Bass' cases consist of Native American remains (Fig. 8). The frequency of these relatively isolated burials from disturbed bluff shelter interments and water erosion along reservoir banklines has remained virtually unchanged. These discoveries exclude multiple interments from burial mounds and vil-

lage or bluff-top cemeteries disturbed from large-scale land development. Such discoveries come under the auspices of the State Archaeologist's Office. Included, however, in this enumeration are the donation of Native American skeletal collectors (or their wives, typically) who opt for donation. Most of these burials were removed during unauthorized excavation and found their way into the hands of collectors. The discovery of these human remains has remained steady and has not kept pace with non-human discoveries of bone.

Since 1975, Bass has consistently averaged positive identification in half of his cases (Fig. 9). This increase seen from the early 1970s can probably be attributed to his long-term training of law enforcement for the essential materials required in making positive identification, that is, dental, skull and postcranial radiographs. In essence, it took him roughly three years to get his protocol in place outlining his requirements for positive identification. On average, using the results of a questionnaire sent to many practicing forensic anthropologists in the United States, most achieve a positive identification rate approaching, on average, only 25 to 30%.

Finally, the percentage of non-human bones confused as human remains has risen to nearly 30% of the caseload during the first four years of this decade from a previous frequency of between 17 and 25% (see Fig. 10). This is presumably due to arousing the public's morbid curiosity most recently highlighted by popularized literary accounts of forensic investigations involving skeletal remains, for example, Ubelaker [9], media attention, and network television's portrayal of such remains [14-16]. Table 1 displays the raw numbers of identified non-human skeletal elements received. Like human skeletal and decomposed remains, most nonhuman bones are discovered during the cooler months of the year when hunters and hikers become more active in rural areas. The frequency of deer (from processing out of doors and parceling),

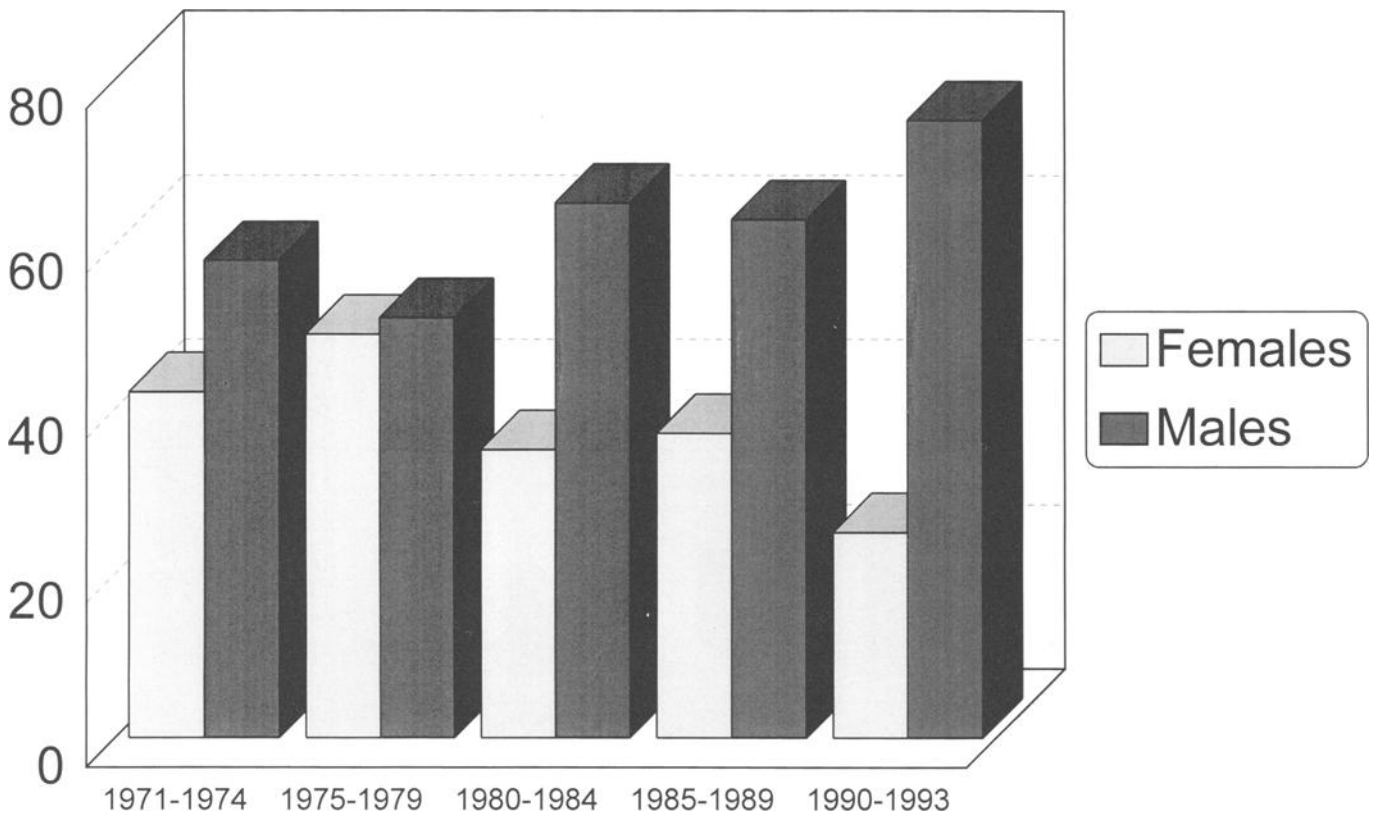


FIG. 4—Percentage of Bass's human identification cases representing males and females per five year increment. These values exclude Native Americans and individuals under 15 years of age.

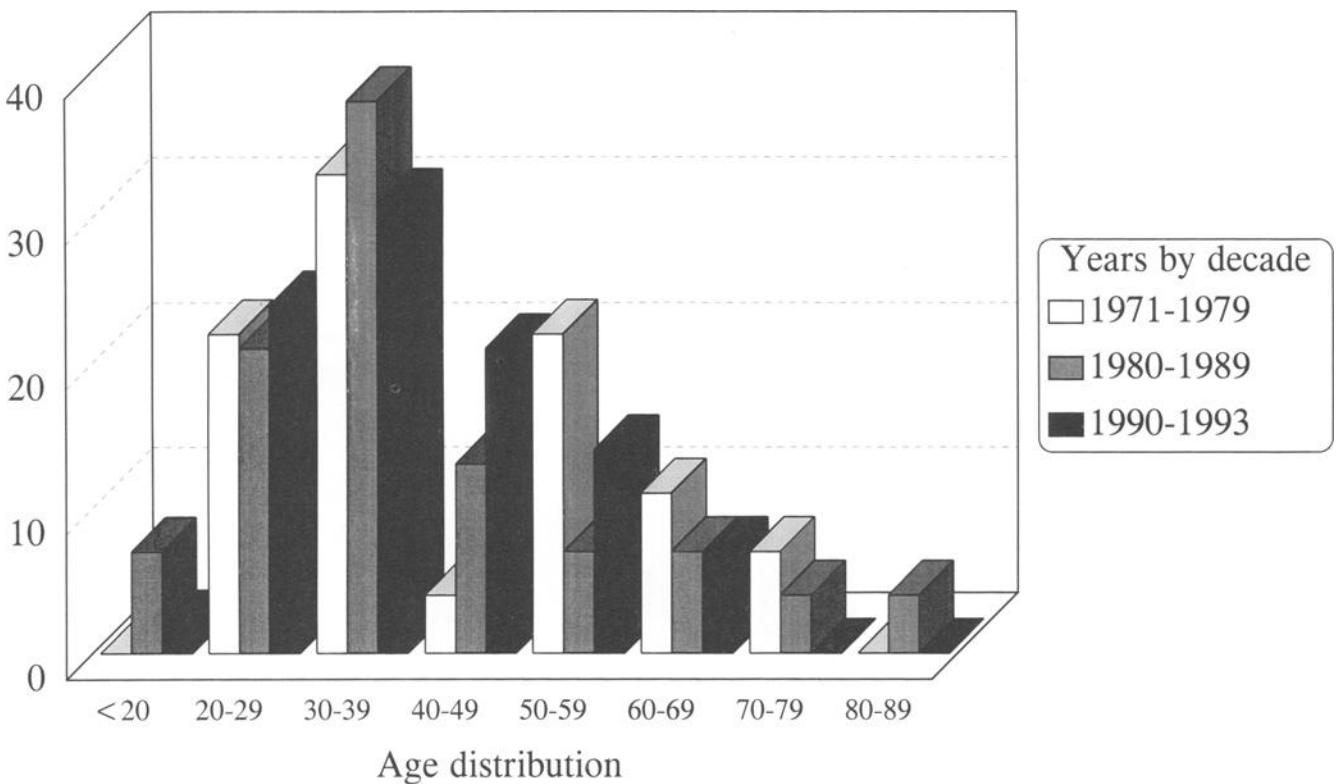


FIG. 5—Percentage distribution of males, by age and decade of Bass's human identification cases.

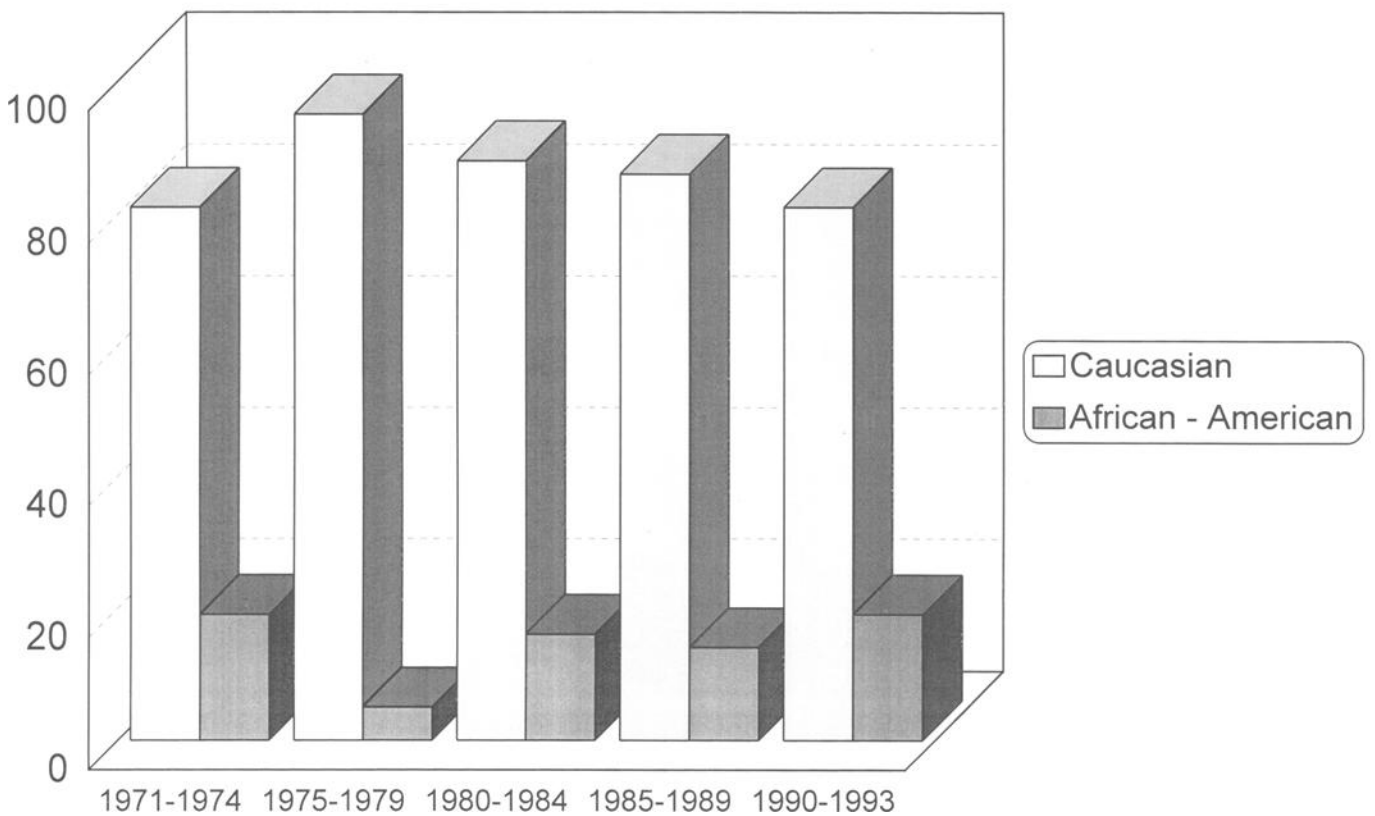
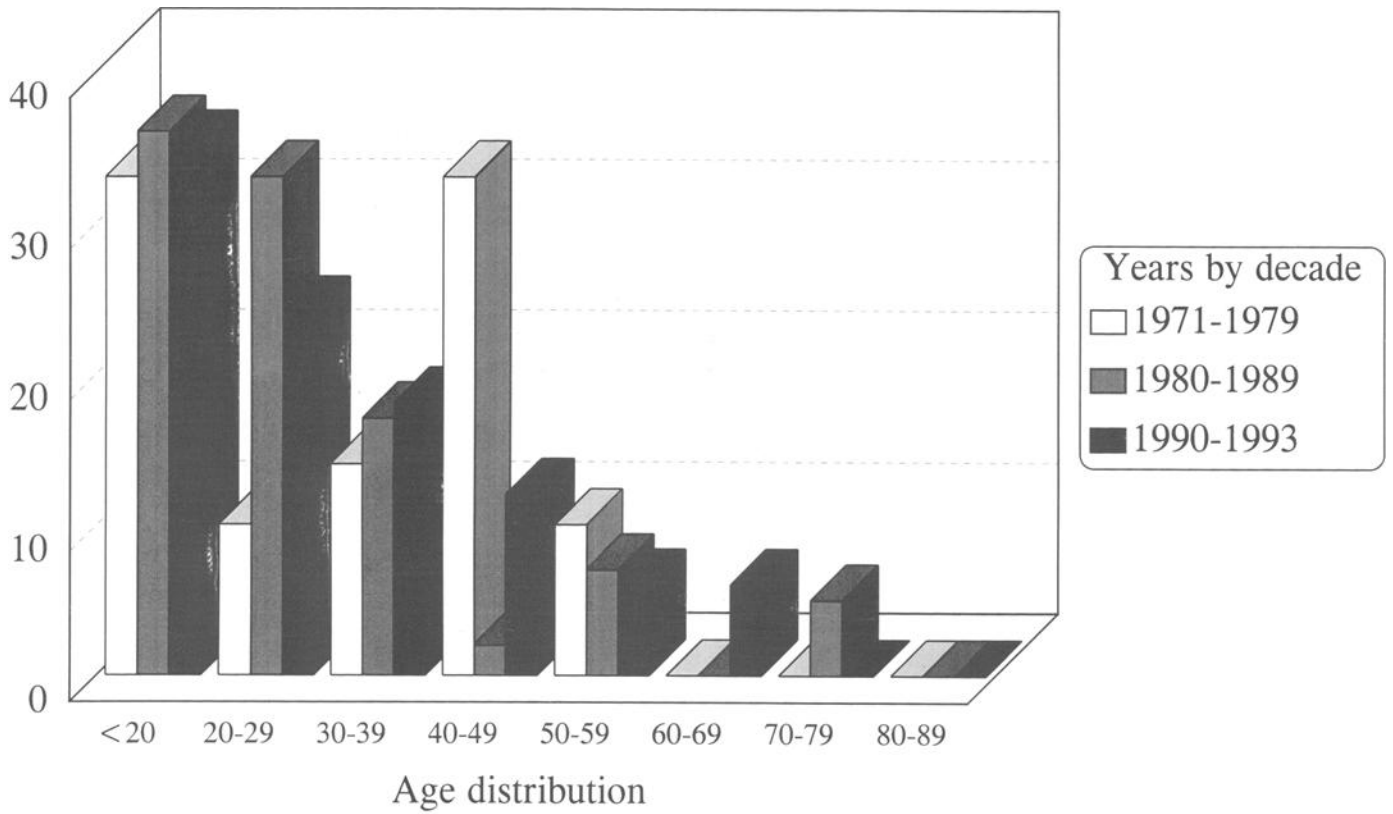


FIG. 7—Percentage distribution of racial composition with sexes combined of Bass's human identification cases per five year increment. Includes both positively identified remains and osteologically assessed race.

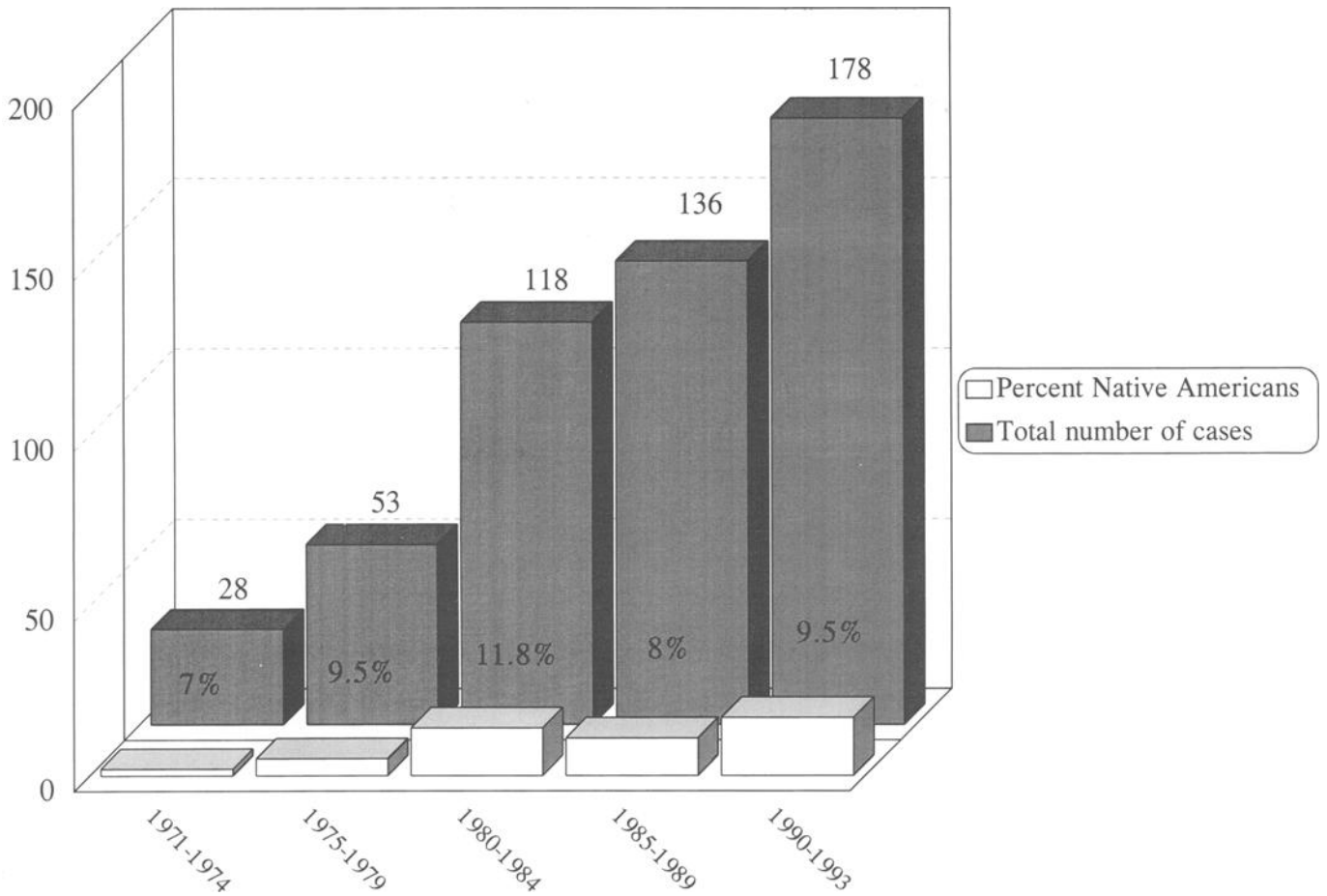


FIG. 8—Percentage of discoveries of Native Americans per five year increment of Bass's human identification cases. Most cases represent more than one individual.

dog, pig and cow easily outnumber the rest of the nonhuman skeletal remains submitted.

The Donated Skeletal Collection

Bass realized while at the University of Kansas that the availability of archeological skeletal material may not always be assessable for teaching aids in his human osteology course. He envisioned not only the technical difficulty this lack of bone might create,

but how the effectiveness and eventual enrollment of his course might be affected. During this period he and Ellis Kerley were developing a course in forensic anthropology they titled "The Human Skeleton in Forensic Medicine" (after Krogman's 1962 text on the subject). For this new perspective to skeletal biology, Bass recognized the comparative value of providing contemporary skeletons of Caucasians and African Americans. Yet, even beyond the classroom value these type of remains afford, he foresaw the wealthy research potential such a collection might possess.

With this knowledge in mind for many years, Bass discovered in the early 1980's that the state of Tennessee Medical Examiner system might prefer to donate the bodies and remains of unclaimed and unknown individuals rather than assume the expense of their burial or disposal. He found, also, that while certain individuals donated their remains to science for research and/or tissue bank services, some families chose to donate directly to the Forensic Anthropology Center in avoidance of funeral costs. And, while skeletal remains were initially the ultimate goal of the donated body collection, decomposition and time-since-death projects (see [17,18]) became possible to perform. Donated bodies have been steadily supplied through the University of Tennessee, Knoxville, Medical Center, the State Medical Examiner's Office, and nursing homes and funeral homes.

Bass began building this skeletal collection in 1981 with four donations which had grown to 43 donated in 1993 (Fig. 11). Full facial and profile color slide and black and white photographs

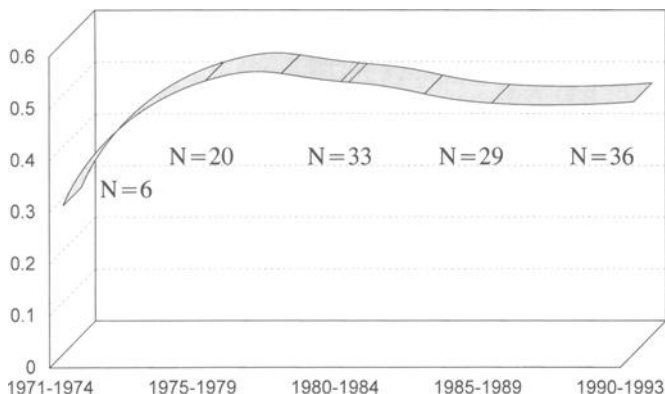


FIG. 9—Percentage of positive identification per five year increment of Bass's human identification cases.

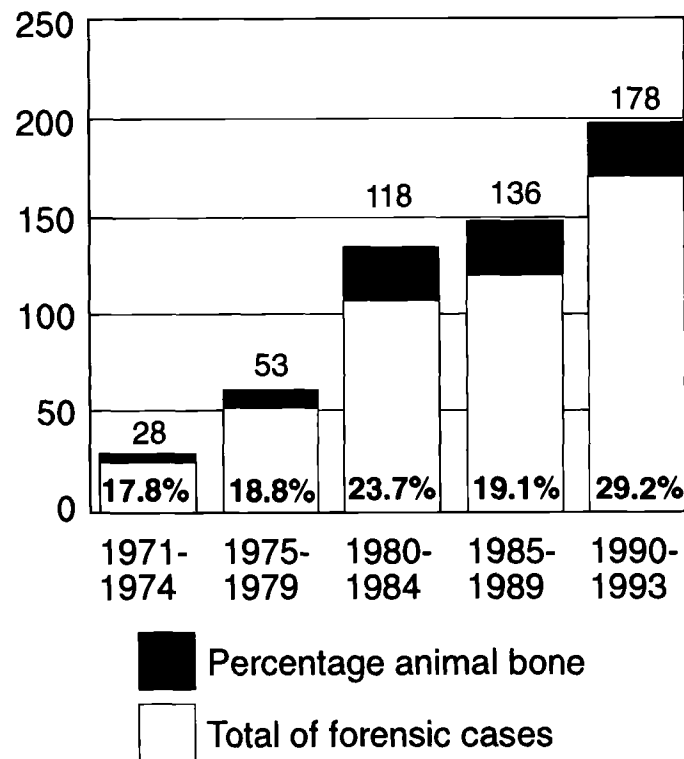


FIG. 10—Percentage of nonhuman skeletal remains per five year increment of Bass's human identification cases.

TABLE 1—Number of each animal.

Deer	36	Turkey	3
Dog	31	Catfish	2
Pig	23	Raccoon	2
Cow	22	Cat	2
Chicken	9	Duck	1
Horse	5	Box turtle	1
Bear	5	Goat	1
Calf	5	Gray fox	1
Rabbit	4	Mule	1
Sheep	3	Toad	1
Rat	3	Vole	1
Opposum	3	Non human hair	1
Woodchuck	3	Pleistocene jaguar	1

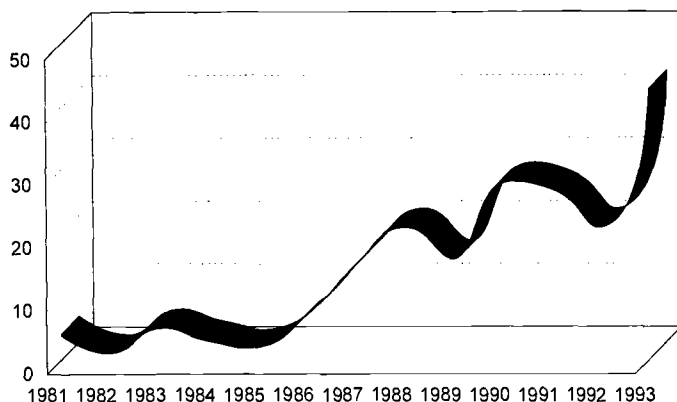


FIG. 11—Yearly increase of number of Bass's donated skeletal collection since 1981.

with scale are taken of each individual to document perimortem surface detail and preservation quality and entire body photographs are taken to document overall body condition. A graduate assistantship has been added to the Forensic Anthropology Center to assist Bass in managing the research facility that processes and curates these donated bodies. The addition of medical records for the majority of bodies enhances their research potential for particular forensic and skeletal biological projects, for example, biochemical, histological.

The racial composition of this collection closely mirrors the forensic databank skeletal collection by being heavily weighted towards Caucasian males (Fig. 12). Sixteen neonatal bodies ranging from 5 fetal months to 9 extra-uterine months of age have been donated from the State Medical Examiner's Office and the Knox County morgue. These include spontaneous abortions, healthy and stillborn term newborns and later newborns. Typically, these remains are accompanied by well-documented medical records. The age profile of the donated collection mirrors the mortality profile from lower socioeconomic levels (Fig. 13) while the racial composition of the donated collection differs somewhat from the racial composition of the forensic collection. The enumeration of African Americans more closely approximates their census values from Central and East Tennessee. Yet, even with age and racial bias, the donated collection will continue to increase and provide a major source of contemporary human skeletal remains for research.

Conclusions

While at the University of Tennessee, Bass has developed a program in forensic anthropology whose success has paralleled, in part, the growth of the Department of Anthropology. Through long and on-going relationships meticulously and methodologically forged with numerous law enforcement agencies and forensic

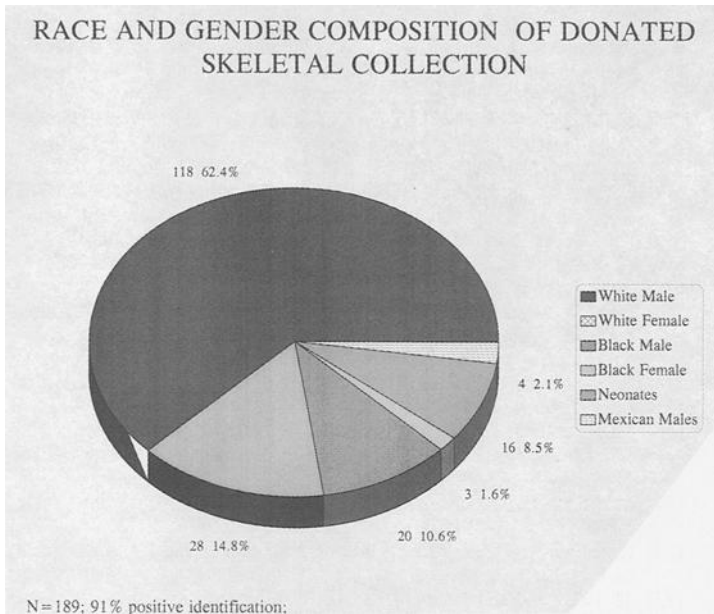


FIG. 12—Percentage of racial and gender composition of Bass's donated skeletal collection. Of the 189 donated skeletons, 91% are positive identifications.

AGE DISTRIBUTION OF DONATED SKELETAL COLLECTION
All sex and gender

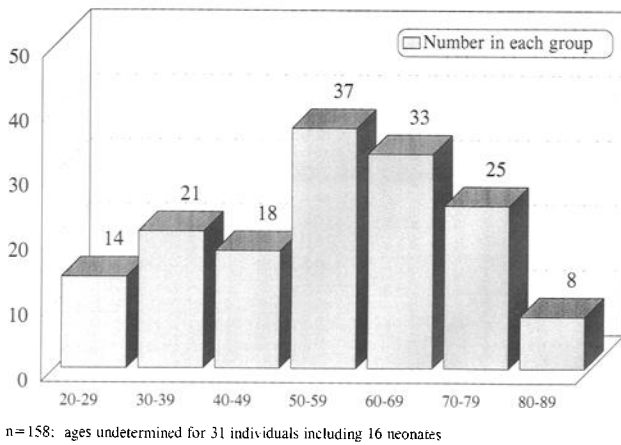


FIG. 13—Age distribution (by decade) and number of individuals in Bass's donated skeletal collection. Race and gender are combined. Of 158 adult donated skeletons, age is undetermined for 30 individuals and 16 neonates.

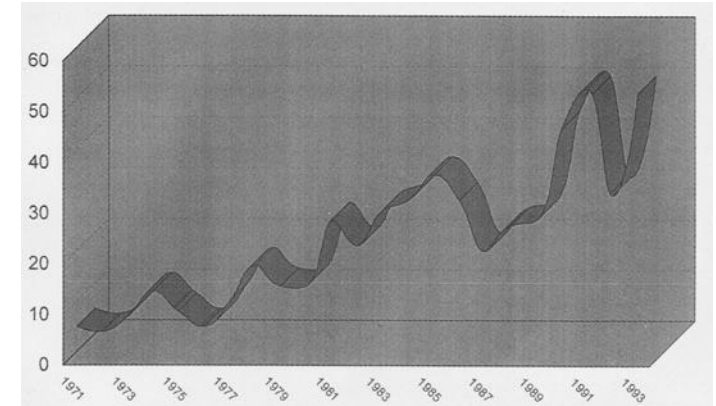
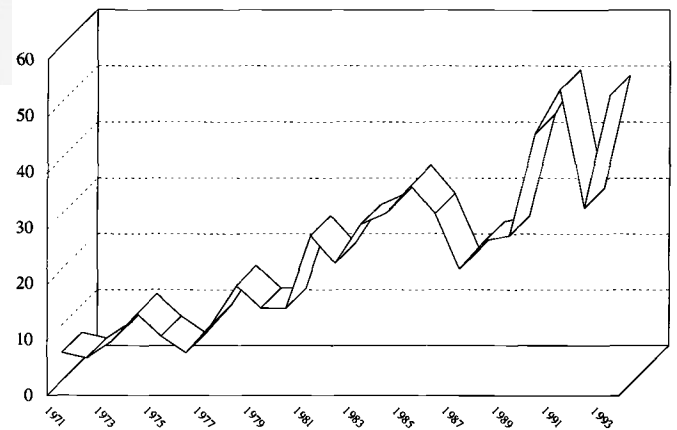
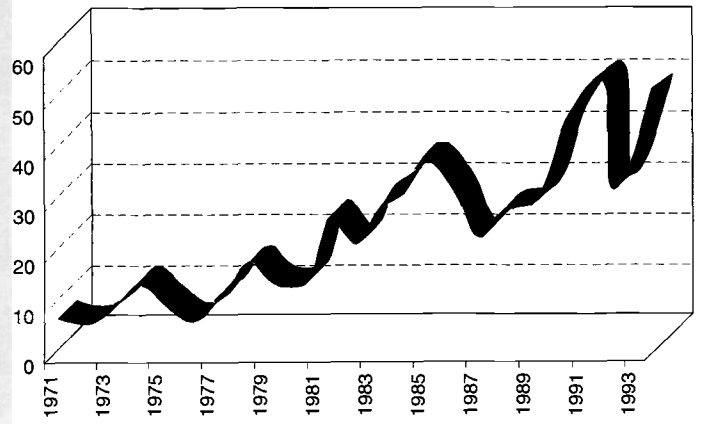


FIG. 14—Yearly increase in number of Bass's human identification cases since 1971.

pathologists within the state, Bass has designed an efficient network through the State Medical Examiner's Office and particular state and local law enforcement agencies. These relationships will assure his Forensic Anthropology Center a constant and flourishing caseload (Fig. 14) that is presently averaging about one case per week. Bass admits his overall success is also the result of nearly 25 years of exhaustive teaching and training of countless graduate students who have assisted him over the years in many aspects of his investigations. It is difficult to equate the rising number of human identification cases, in Tennessee or elsewhere, with specific causes. As Bass and Driscoll [10] illustrated, public exposure to Bass and the contribution of forensic anthropology to medico-

legal investigations have worked in concert to provide a relationship between state and university. Though mentioned numerous times throughout this paper, the University of Tennessee officially recognized Bass's expertise, tenacity and devotion to forensic anthropology in October, 1992 with the formal development of the Forensic Anthropology Center. The Center maintains a separate existence and budget from the Department of Anthropology to act as one of the greatest public services provided by the University of Tennessee. Increased public awareness of this type of service are nurtured by popularized factual and fictionalized literary accounts [9, 11-13] that highlight the value of skeletal remains in criminal investigation. And,

because the public has always held a morbid fascination for the mystery of homicide, this brand of forensic science will always be popular. A brand of science made possible and a crucial aspect of forensic investigations because of the tremendous influence of William M. Bass.

Acknowledgments

Many thanks to Dr. William Bass for allowing me access to numerous recollections about his role in the development of forensic anthropology. I would also like to thank the following practicing forensic anthropologists who generously completed a questionnaire detailing the particulars of their own forensic anthropology experience and caseload: Drs. Ken Bennett, Hugh Berryman, Walter Birkby, Sheilagh Brooks, Mehmet Iscan, Alison Galloway, George Gill, Dave Glassman, Ken Kennedy, Linda Klepinger, William Maples, Doug Owsley, Ted Rathbun, Kathleen Reichs, Sam Stout, Judy Suchey, Robert Sundick, Steve Symes, Doug Ubelaker, Bruce Wheatley and P. Willey. Peggy Caldwell-Ott, Mary Manhein, and Mary Trudell supplied similar information regarding their programs and caseload. Ms. Melissa Muendel provided valuable assistance on the design quality of the figures.

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Address requests for reprints or additional information to
Murray K. Marks, Ph.D.
Department of Anthropology
250 South Stadium Hall
University of Tennessee
Knoxville, TN 37996-0720
MMarks@UTKVX.UTK.EDU