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# NAGPRA IS FOREVER: Osteology and the Repatriation of Skeletons

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## ABSTRACT

The 1990 Native American Graves Protection and Repatriation Act requires universities, museums, and federal agencies to inventory their archeological collections to prepare for the repatriation of skeletons to their Native American descendants. The loss of these collections will be a detriment to the study of North American osteology, but the inventory and repatriation process has increased the number of skeletons studied from about 30% to nearly 100%. The availability of funds stimulated by this law produced osteological data collection and systematization unprecedented in the history of osteology. The possibility of forming partnerships between Native Americans and osteologists has the potential of producing a vibrant future for North American osteology and the new bioarcheology.

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## INTRODUCTION

In 1971, archeologists excavating near Glenwood, Iowa, decided to rebury 26 European American skeletons and curate two Native American skeletons in a local museum (61). The Native American community was upset. Subsequently, confrontations between Native Americans and archeologists in Iowa, California, and the Dakotas contributed to the formation of several organizations such as American Indians Against Desecration and the Native American Rights Fund, among others. Two decades of lobbying efforts by Native American groups resulted in passage of the Native American Graves Protection and Repatriation Act (NAGPRA) in 1990 (PL 101-601). This fed-

eral legislation propelled the archeological and museum professions into a national inventory process to prepare vast collections of Native American skeletons and specific types of cultural items for repatriation.

The passage of NAGPRA has ushered in a period of change and uncertainty for scholars who study human skeletal remains, namely osteologists (bone experts) and bioarcheologists (those who study adaptation through bones—see below). The new law raises important questions. Does NAGPRA and the ongoing process of repatriation and reburial ring the death knell for bioarcheology as a research paradigm and profession? Will we lose the capability of discerning, for instance, the reasons for the development of agriculture and its impact upon the health and longevity of the adopting populations? The answer to these questions is no. On the contrary, NAGPRA will allow bioarcheology to emerge as a vigorous and possibly more publicly relevant and responsible profession. What we must understand is that NAGPRA is not an event. There is no post-NAGPRA. “NAGPRA is forever” (MK Trimble, personal communication).

To establish this conclusion we examine the condition or quality of osteology and bioarcheology before NAGPRA. To understand NAGPRA we must know where skeletons came from, how many there are, and what osteologists have been doing with them. After this brief history we describe the most salient portions of the law. Finally, we describe the ongoing NAGPRA compliance efforts and attempt to predict the future of North American bioarcheology.

## OSTEOLOGY BEFORE NAGPRA

### *Origin of the Skeletons*

Nineteenth- and early twentieth-century archeological excavations are the foundation of the large museum skeleton collections of today. For example, CB Moore, sponsored by the Philadelphia Academy of Science, cruised the southeastern rivers on his steamboat excavating hundreds of large mortuary sites to obtain museum-quality artifacts. He succeeded in collecting 12 skulls and a number of pathological bones from the 1908 excavation of two sites along the Arkansas River. The skulls were sent to Aleš Hrdlička at the US National Museum (Smithsonian Institution), and the pathological specimens were sent to the US Army Medical Museum (Armed Forces Institute of Pathology). The bones were analyzed and a report included as an appendix in CB Moore's (36) publication of his excavations. So begins the history of bioarcheology in the state of Arkansas.

Simply by changing names and dates in this story one can describe the early history of osteology anywhere in the United States (2, 10, 60). In most cases, archeologists simply selected some of the skeletal material for shipment to

museums, while in other cases osteologists requested the skeletons for use in teaching and research, as did Samuel Morton in the mid-nineteenth century (13). In Arkansas and Louisiana, 41.6% of the 4759 documented skeletons were collected between 1880 and 1919 (51).

The history of archeology and osteology elsewhere is the same as it is in North America. In Egypt, Flinders Petrie excavated hundreds of tombs during most field seasons at the turn of the century, keeping only some of the skulls for craniometric analysis. When the statistician Karl Pearson needed skulls for his mathematical treatment of evolution (43), Petrie, his next door neighbor, excavated several hundred from the Giza plateau adjacent to the pyramids (17).

The Great Depression contributed significantly to the collection of human osteological remains. Works Progress Administration (WPA) funds were used to hire unemployed archeologists and local laborers to excavate on a "heroic" scale (24, 50). Thousands of human skeletons were excavated from hundreds of mortuary sites. In Arkansas and Louisiana, for example, 22.2% of the excavated skeletons were acquired during the Depression (51). Few osteological analyses were conducted by WPA personnel. A rare example is Goldstein's (21) publication on cranial deformation in the *American Journal of Physical Anthropology*.

After World War II, the military engaged in massive flood-control projects. Salvage excavations organized as River Basin Survey projects (Inter-Agency Archaeological Salvage Program) produced thousands of skeletons—23.4% of the Arkansas and Louisiana collections (49–51). William Bass was hired by the River Basin Survey to study the Missouri River skeletons (4), which began the long-term Plains osteology studies by Bass and his students at the Universities of Kansas and Tennessee that continue to this day [for a review, see Bass (5)].

There was an almost seamless transition of personnel and activities from reservoir salvage to highway salvage excavations needed to build the interstate system conceived by the Eisenhower administration, which was eventually funded with passage in 1966 of PL 89-670, or the Department of Transportation Act (19). The highway salvage programs provided the context for development of national conservation legislation, modern cultural resource management (CRM) practices (19), and continued growth of skeletal collections. At this time, professional archeologists were also excavating skeletons as part of their academic research, but the number of skeletons they produced is dwarfed by the number excavated in the federally funded projects.

Although most archeology involved Native American skeletons, those of other peoples were not neglected. Shapiro's (55) excavation and analysis of "Old New Yorkers," whose cemetery was being destroyed by subway con-

struction, is just one example (see 41). Historic cemetery excavations increased after publication of the June 1982 *National Register*, which clarified the status of historic cemeteries within CRM procedures (33). Analysis of historic skeletons and cemeteries has been prolific during the past two decades (22, 41, 52).

### *Number of Skeletons Excavated*

We will probably never know precisely how many skeletons have been excavated by archeologists, and we will almost certainly never know the number of graves opened by looters and "pot hunters," which may number two, three, or more times those excavated by archeologists. However, the number of excavated skeletons can be estimated from an archeological and bioarcheological overview conducted for the Southwestern Division of the US Army Corps of Engineers (referred to here as the southern overview) that covers Arkansas, Louisiana, Texas, Oklahoma, New Mexico, and portions of Missouri, Kansas, and Colorado (1). In 1988, when data collection for the overview ceased, 142,202 archeological sites were reported, of which 2205 had produced 26,823 individual human skeletons. An ongoing overview funded by the Department of Defense Legacy Program and conducted by the Arkansas Archeological Survey (referred to here as the northern overview) covers Wisconsin, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas, Montana, Wyoming, and the portion of Colorado not covered in the previous overview. A total of 2919 mortuary sites have been identified to date by the overview and have produced 25,717 skeletons. Although the vast majority of the skeletons are Native American, those of European, African, and Asian descent are well represented.

In summary, between the Mississippi River and the Continental Divide and the Canadian and Mexican borders, 5124 excavated mortuary sites have so far produced the remains of 52,540 individuals. Until overviews are conducted of the remaining 45% of the continental United States we do not have comprehensive figures for total excavated skeletons. Because these are conservative figures and only report clearly identified skeletons, the total number of individuals actually excavated is certainly larger, and the total for the United States will probably be more than four times larger.

### *Number of Skeletons Curated*

According to a questionnaire survey conducted by El-Najjar (18), museum skeleton collections include 14,150 Native American skeletons from the continental United States. A comparison of El-Najjar's (18) figures with those in the two overviews shows that only 7.8% (4124) are in museums. We know this inventory is incomplete, but it is the only one extant. There are many esti-

mates, e.g. 600,000 curated skeletons (66), but none are based on inventories. We will know the total number of curated Native American skeletons in three to five years when the results of the NAGPRA compliance inventories are definitively tallied.

### *Progress in Osteological Research*

Archeologists have spent more than a century accumulating skeletal remains because they were an important source of knowledge, and osteologists have been busy studying what they have found. The full history of osteological and paleopathological research has been discussed elsewhere (2, 10, 12, 29, 60), but a couple of recent retrospective studies provide revealing evidence of its impact. Lovejoy et al (34) performed a content analysis of the *American Journal of Physical Anthropology* published between 1930 and 1980 and reported that 44.4% of the 2239 articles therein concern osteology. The percentages vary little over time and range between 33.7% and 51.3% by decade.

Buikstra & Gordon (13) performed a content analysis of *American Journal of Physical Anthropology*, *American Antiquity*, and *Human Biology* between 1950 and 1980 to establish the importance of curated skeletal collections for research. They noted that skeletons collected before 1930 were used more during the 1970s than in the past and that older skeletal series appear to be just as useful for technical research as those collected more recently. They also reported that 32% of the analyses went back to skeletal collections that had already been studied, and that in 62% of these cases the investigators reached new or different conclusions from those previously published. 25.8% of the studies employed new techniques unavailable when the skeletons were excavated.

These two studies clearly demonstrate four important points: (a) osteology is a popular research endeavor; (b) skeleton collections have contributed significantly to the total research effort of biological anthropologists; (c) skeleton collections have current research value regardless of excavation date; and (d) skeleton collections are repeatedly restudied, especially when new techniques become available.

Modern bioarcheology, a new subfield derived from these earlier osteological efforts, is concerned with reconstructing dietary and activity patterns, estimating genetic affiliation, and employing demography and paleopathology to evaluate the adaptive success of particular cultures to their environments. It builds specifically on two other research paradigms, paleoepidemiology and paleodemography, each with its own relatively recent origins. Paleoepidemiology arose from the slow transformation of paleopathology from a descriptive to an analytical orientation. A critical event was the paleopathology conference convened on January 14, 1965 by Jarcho (29), where the idea to use the

frequency of pathological lesions in skeletal samples to infer the degree of adaptive success was discussed (for bibliography, see 12). Interpretive analysis of demographic data had an early beginning, but its widespread integration into archeological and osteological research stems from a 1973 *Society for American Archaeology Memoir* by Weiss (64) and a later memoir edited by Swedlund (56).

Bioarcheology itself began with a key symposium of the 1976 annual meeting of the Southern Anthropological Society, at which the importance of regional research designs and area studies, ecology- and population-based research, and most importantly the collaborative development of research designs by osteologists and archeologists was espoused (6). Transformed from a descriptive endeavor, osteology hereby joined the rest of biological anthropology in adopting an evolutionary framework. An evaluation almost 13 years after the 1976 conference indicated an increase in successful collaborations between archeologists and bioarcheologists (11).

Bioarcheology has made significant progress in producing so-called processual research. In fact, the literature has exploded. Researchers have used skeletal data to explore such fundamental research questions as the origins of agriculture (16) and the impact of European conquest upon Native Americans (32, 63). Regional syntheses of skeletal data are being produced, such as *Skeletal Biology in the Great Plains* (42). Edited monographs detailing new osteological methodologies are rapidly emerging (20, 28, 53, 65, to list just a few).

### *Quality of Osteological Research*

Any examination of the quality of osteological research by individual researchers shows it to be very good, especially with theoretically important issues. Individual researchers select a problem, set up testable hypotheses, select suitable skeletal samples, and then design data collection protocols for hypothesis testing (2, 12, 13, 60).

However, a quality examination from a regional perspective yields entirely different conclusions. In particular, we mean an examination of our knowledge base for all time periods, cultures, and ecological zones within a particular region such as the Lower Mississippi Valley, without regard to specific research paradigms and investigators. The southern overview (exclusive of New Mexico) indicates that 20,947 skeletons were excavated but that 64% have not been studied even to determine age and sex. Of 10,896 skeletons from Arkansas and Louisiana, 70.3% of the skeletons have not been analyzed at all, only 23.4% have been analyzed beyond age and sex, and even then the data usually consist only of gross pathological lesion descriptions. This record is poor and

clearly indicates that our bioarcheological knowledge of these states is deficient.

Owing to lack of time and funds, many skeletons in the southern overview remain unstudied. Funding agencies, including those available in the CRM process, did provide resources for excavation, but they expected that anthropology students would analyze the skeletons for theses and dissertations. Some of this did occur, but there were never enough students to keep up with the huge quantity of curated skeletons. To show how extensive osteological analyses can be, the approximately 1050 skeletons excavated from the Dickson Mounds site located in Fulton County, Illinois, have been the subject of at least 57 theses, dissertations, meeting papers, and publications (14).

In the northern overview area the situation is slightly better: Only 37.3% of the 25,717 skeletons have ever been analyzed. When examined by state the percentages of analyzed skeletons range from 16.4% in Missouri to 97.9% for Iowa, which has the oldest state reburial law. These data are complete up to early 1995 and clearly reflect the ongoing analyses associated with the earliest phases of the repatriation movement.

Switching from numbers of skeletons to the bioarcheological history of specific regions, we find additional problems. Two bioarcheological overviews of the Mississippi Valley in the states of Missouri, Arkansas, and Louisiana (24, 39) reveal large gaps in our knowledge of the temporal trends. Certain sites were never excavated because skeletal preservation was poor, the culture was considered impoverished, or the artifacts were too mundane (37, 38). In addition, many skeletons were never included in problem-oriented osteological research. Today, analysis of biocultural processes—such as infectious-disease trends with the adoption of agriculture—is often impossible because osteological data sets and scoring methodologies differ from study to study. Sometimes the number of skeletons examined was simply not recorded, so that rates cannot be calculated. At other times, two, three, or more data-recording protocols were used by different investigators. Thus, even when the skeletons were analyzed, the data could not be used to compare skeletal series with one another.

### *Ethics of Osteology*

Osteological research has mostly been ethical, and there is no difference in the treatment of prehistoric skeletons and modern forensic or medico-legal analyses. However, treatment of skeletons is not always controlled during and after excavation. Treatment is often determined by archeological customs, museum or repository policies, various state and national laws, and even the whims of politicians.

Western bioarcheologists cite numerous advances in knowledge obtained from the study of human remains and claim that this knowledge is useful and



beneficial to the living, especially Native Americans (7, 30, 61). However, bioarcheology, like all other academic research, is driven by the pursuit of knowledge and truth for its own sake. Recent years have seen the advent of rules and regulations about the use of human beings and other organisms in research that require all research proposals to be examined by review committees. It has also been argued that anthropologists must conduct their activities within the best interests and beliefs of those under study and that this ethic should be extended to past cultures and the ancient deceased (for discussion and references, see 30).

Control of the historical record is an important component of the political process and though hard to understand at first glance, the dead can be used to harm the living. At present, bioarcheologists control the record of biological history of Native Americans. Meanwhile, some Native Americans contend that their oral histories contain all the relevant knowledge of their past and that they do not need the information provided by skeletal analysis (61). This situation might change on both sides if Native Americans were able to participate in the design and content of research (see also accompanying chapter by TJ Ferguson, this volume).

## NAGPRA: THE LAW

### *History of Repatriation Legislation*

On November 16, 1990, George Bush signed the Native American Graves Protection and Repatriation Act, the culmination of over two decades of lobbying effort by Native American groups for the return of human remains and objects of cultural and religious significance. This event was preceded by numerous state laws and considerable federal activity (58, 61, 66).

As Native Americans' lobbying efforts for repatriation of skeletal remains increased, many states enacted laws that included protection for unmarked grave sites. These laws afforded prehistoric graves protection similar to the type granted to marked cemeteries. In general, state unmarked-burial laws created guidelines to be followed when burial sites were discovered and further disturbance was required by construction. Permit systems and burial boards were established to notify and involve Native American descendants in the disposition of the human remains and grave goods from burial sites. In almost every state, reburial laws pertained to current or future excavations (61). Several states recently extended these laws to include repatriation of previously excavated skeletons. An example of this is Nebraska's 1989 Unmarked Human Burial Sites and Skeletal Remains Protection Act, which requires state-recognized museums to repatriate, upon request, reasonably identifiable human remains and grave goods to the related tribes (58, see also 45).

In 1987, public reporting of the many Native American remains held at the Smithsonian Institution served as a catalyst for passage of federal repatriation legislation (27). Hearings held by the Select Committee on Indian Affairs revealed that 42.5% of the 34,000 human remains at the Smithsonian are of Native American ancestry, and an additional 11.9% are individuals of Aleut, Eskimo, or Koniag heritage (27). A year later, testimony heard by the Select Committee on Indian Affairs concerning Senate Bill 187 prompted a decision to create a discussion forum for Native American representatives, museums, and scientific communities concerning the appropriate disposition and treatment of human remains and cultural artifacts (58). A year-long dialogue in 1989, hosted by the Heard Museum in Arizona, resulted in the drafting of recommendations for the Select Committee that included a call for developing "judicially-enforceable standards for repatriation" and repatriation policies.

Also in 1989, Senator Inouye of Hawaii introduced Senate Bill 978, The National Museum of the American Indian Act, which addresses the proper treatment and repatriation process for human remains and funerary objects at the Smithsonian Institution. The substance of PL 101-185, signed November 21, 1989, was combined with recommendations from the Panel for a National Dialogue on Museum/Native American Relations to become the framework for the Native American Graves Protection and Repatriation Act. This law effectively extended the provisions of the National Museum of the American Indian Act to include all federal agencies and other institutions receiving federal funds.

### *NAGPRA: Requirements of the Law*

NAGPRA extends to Native American and Native Hawaiian graves of any age the general principles of American common law, namely, that human remains do not belong to individuals or to governmental or institutional organizations and that artifacts placed in human graves as funerary offerings belong to the deceased (66). Following American common law, NAGPRA asserts that descendants have the right to determine the disposition of the human remains and associated funerary objects (66) and hence can claim custody of these items. Because of the sanctity of private property in the United States, the law applies only to Native American and Hawaiian skeletons and funerary objects excavated on federal and tribal land or currently housed in museums that receive federal money. It does not apply to private collections. Following the NAGPRA implementing regulations (62), 43 CFR Part 10, all institutions with Native American skeletons and funerary objects that receive federal funds or are part of an institution receiving federal funds are considered museums. This definition includes all universities in the United States and all state and local governmental museums.

NAGPRA does not prohibit archeological excavation of or scientific research on Native American skeletons. NAGPRA does require, as well as do the 1992 amendments to the National Historic Preservation Act of 1966 and many state grave protection laws, consultation with Native Americans concerning the excavation, treatment, and disposition of Native American skeletons. Through the consultation process, agreements concerning scientific analysis can be reached. Many tribes and Native Hawaiian organizations will prohibit and have prohibited any scientific research on skeletons (3), but many have also consented (8). Osteologists seeking permission to conduct scientific research on Native American skeletons must now follow procedures analogous to those required of biologists and social scientists conducting human-subject research in a university setting (i.e. review by committee) and show evidence of consent by the descendants of the skeletal populations they wish to study.

NAGPRA does not require the reburial of Native American or Hawaiian skeletons, although reburial is the expected outcome of the repatriation process by most tribes.

Because the descendants have the right to determine treatment and disposition of Native American skeletons and cultural items, NAGPRA sets forth detailed procedures to determine custody of these items. Determining which tribe (the National Park Service compiled a list of 759 Native American tribes, Native Alaskan entities, and Native Hawaiian organizations) is the appropriate custodian of any human remains and cultural items recovered from federal or tribal land is no easy task. The law, however, does provide criteria to aid in this determination. Direct lineal descendants are given first priority. If a skeleton is found on tribal land and lineal descendants cannot be found, then the tribe receives custody. If a skeleton is found on federal land and lineal descendants cannot be found, then the tribe with the closest cultural affiliation assumes custody. If cultural affiliation cannot be determined and if the human remains were discovered inadvertently—that is, accidentally through construction or by exposure by natural forces—on federal land, and if the federal land was determined by the Indian Claims Commission to be the aboriginal land of a particular tribe, then that aboriginal tribe has custody, unless another tribe can demonstrate a stronger cultural relationship with the human remains. This last section applies only to inadvertent discoveries; lineal descendants or cultural affiliation is used to assign custody for intentional excavations.

The law and the implementing regulations also specify a process to determine which tribe should have custody of existing skeletal collections and cultural items now housed in museums and federal agency repositories. All federal agencies and museums must prepare a detailed inventory listing each and all human remains and associated artifacts curated by an institution. This inventory was due November 16, 1995. This report is to be submitted to lineal

descendants, if known, and to tribes thought to be culturally affiliated with any of the human remains. If any of the human remains, funerary objects, sacred objects, or objects of cultural patrimony are claimed by lineal descendants or culturally affiliated tribes, the law prescribes a very detailed repatriation process including notification of the Departmental Consulting Archeologist in the Department of Interior and publication of intent to repatriate in the Federal Register (for examples, see 40). After the notification procedures are completed, repatriation can proceed.

The determination of which tribe or tribes are culturally affiliated with the skeletal remains and associated artifacts is the most difficult problem for both institutions and tribes. Cultural affiliation is defined in the regulations as "a relationship of shared group identity which can reasonably be traced historically or prehistorically between members of a present-day Indian tribe or Native Hawaiian organization and an identifiable earlier group" (62). Evidence for this relationship can be based on geography, kinship, biology (osteology), archeology, linguistics, folklore, oral tradition, historical evidence, or other information. The theoretical and methodological issues associated with identifying archeological cultures are enormous. In addition, the need to operationalize, in an applied sense, the vagaries of archeological cultural typologies to identify relationships with present-day tribes makes the identification of cultural affiliation a monumental task in most parts of the United States. Fortunately, the law does permit an institution to list cultural affiliation of specific skeletons or collections as "unknown" when circumstances demand. Scientific certainty is not required in the determination of cultural affiliation, a "preponderance of the evidence" is the legal test, and biological (genetic or osteological) information can be used and gathered to help determine the cultural affiliation of human remains. A section of NAGPRA's implementing regulations is reserved for the disposition of human remains and cultural items where cultural affiliation cannot be determined.

To mediate disputes between institutions and tribes or between tribes about aspects of NAGPRA, the law established a seven-member review committee composed of Native Americans, Hawaiians, and representatives from the archeological and museum community (for the current list, see 35). The recommendations of the review committee are not binding, but the records and findings of the committee can be used in federal courts as evidence. To date, the committee's recommendations have been followed by the disputing parties (35). These procedures can also be used by tribes that share a common cultural affiliation to claim groups of skeletons or artifacts that cannot be associated with any one present-day tribe.

While NAGPRA permits future scientific excavation and analysis of Native American skeletons, it establishes stringent requirements for intentional exca-

vation of Native American graves on federal or tribal land. Before a permit for archeological excavation is issued, as required by the Archeological Resource Protection Act, the federal agency must notify in writing the Native American tribes or Hawaiian organizations culturally affiliated with the skeletons or the archeological site. This notice must describe the site, the excavations, and the reasons for believing human remains will be found; identify the likely tribe who will be custodians of the remains; and propose a time and place to discuss in person the excavations, treatment, and disposition of human remains. Although the law and the implementing regulations are silent on this point, agreements on what scientific analyses will be allowed would presumably be settled before permits are issued. If the excavations are on tribal land, consent of the tribe is required. If the excavations are on federal land, consultation is required but not the consent of the culturally affiliated tribes.

NAGPRA's requirements for intentional excavation apply to federal and tribal land, which is approximately one third of the United States. Excavations on state and private lands are regulated by state laws. Thirty-two states have laws protecting in some manner Native American or Hawaiian unmarked graves. Most of these laws require consultation, but not necessarily consent, with tribal authorities before intentional excavation of Native American skeletons is permitted, and most require repatriation of the skeletons to the appropriate tribes (54). Even in those states that do not have laws requiring consultation with tribes before excavation or scientific analysis is permitted, once the skeletons and associated funerary objects are excavated they will most likely be transferred to an institution receiving federal money and hence will come under the provisions of NAGPRA. The law is unclear about what will happen to these collections, but the regulations do have a section entitled Future Applicability (62) that will address treatment and disposition of future acquisitions. Currently, there are very few situations where the excavations of Native American skeletons are permitted without consultation with Indian tribes.

## NAGPRA AND OSTEOLOGY

### *Methodological Syntheses and Data Standardization*

Osteologists responded to the threat of repatriation by publicizing the utility of their profession and the knowledge it provides archeologists, government officials, the general public, and Native Americans. These efforts included methodological syntheses by Huss-Ashmore et al (26), Larsen (31), and Buikstra & Cook (12). Ubelaker (59) prepared a pamphlet for the Interagency Archeological Service describing what osteology can offer the archeologist. Even avocational archeologists were being informed of the importance of bioarcheology to archeology (44). All these efforts contributed significantly to an overall

improvement in the quantity and quality of bioarcheological analyses, especially those conducted as CRM mitigation projects.

The threat of repatriation provided the motivation and financial resources for osteologists to resolve problems of data incompatibility and noncomprehensive analyses of excavated skeletal remains. In 1988, the Paleopathology Association directed an ad hoc committee to develop osteological data collection standards to ensure that a minimum set of essential data categories were collected and that the data were collected using the same protocols from all skeletal series. After debate and approval by the Paleopathology Association membership, the *Skeletal Database Committee Recommendations* (referred to here as the *Paleopathology Standards*) were published as a supplement to the *Paleopathology Newsletter* (46) and widely distributed to archeologists in various state and federal agencies. Subsequent translation and publication in both Spanish and French (47, 48) enabled international distribution. Shortly after, these recommendations were included (or cited) in federal CRM "scopes of work" as the procedures that must be followed for osteological analyses.

In 1989, the Field Museum of Natural History in Chicago was actively negotiating with the Blackfeet tribe over the disposition of the Blackfeet skeletal remains. The Museum's Vice President for Collections and Research, Jonathan Hass, obtained funding from the National Science Foundation to design a minimum set of osteological data collection standards (15). With Buikstra and Ubelaker, Hass organized a workshop to develop a comprehensive set of data collection recommendations (referred to here as the *Skeletal Standards*), which include detailed definitions, instructions, illustrations, data codes, and recording forms, subsequently published in 1994 (15). It is doubtful whether the NSF would have funded such an endeavor if national legislation enabling repatriation of human skeletal remains had not existed. These new unified standards have gone through two printings, which demonstrates that they are being used, and university bookstore orders indicate their use as a textbook (ML Kennedy, personal communication). They appear to have replaced the *Paleopathology Standards* as the data collection standards for NAGPRA skeletal inventory contracts.

With the regular use of computers by osteologists since the 1970s, there have been frequent attempts to convince osteologists to adopt one or another of the many database systems designed by various osteologists. Unfortunately, the great variation in both hardware and software made widespread adoption of any particular database financially impossible for poorly funded osteologists in anthropology departments. The passage of the National Museum of the American Indian Act required the Smithsonian Institution to inventory its skeletal collections in preparation for potential repatriation. Funds provided along with this directive enabled the Repatriation Office (Museum of Natural

History, Smithsonian Institution) under the direction of John Verano to complete a computerized osteological database system that follows the *Skeletal Standards*.

Development of the *Skeletal Standards* and the passage of NAGPRA encouraged the Center for Advanced Spatial Technologies of the University of Arkansas to obtain funding from NSF to develop a “stand-alone” computerized osteological database titled *Standardized Osteological Database* (referred to here as *SOD*) that follows the *Skeletal Standards* in virtually all respects (25). Cooperation by the Smithsonian Repatriation Office (sharing of their file codes and structures) ensured that the two databases are as compatible as possible despite their having been written with different software. None of this progress toward standardization of osteological data would have been possible without extensive funding, which would not have been available without the stimulation of required inventories and potential repatriation.

### *The Skeletal Inventory Process*

NAGPRA requires federal agencies and other institutions receiving federal funds to conduct inventories of their curated Native American skeletal collections and to consult with the appropriate descendants about their ultimate disposition. The sources of funding and procedures for conducting the inventories have varied considerably, and specific cases from federal agencies, CRM contracting firms, and universities are used to illustrate this range of variation.

**FEDERAL AGENCIES** The combined branches of the Department of Defense have the largest aggregate skeletal collection in the United States, and the US Army Corps of Engineers’ Mandatory Center for Expertise for Archeological Curation and Collections Management is responsible for meeting the NAGPRA requirements (MK Trimble, personal communication). Inventories of the relatively small Army, Navy, and Air Force collections are being conducted with in-house staff that includes four osteologists. The US Army Corps of Engineers, with its 36 districts, has the largest skeletal collections. Twelve of the districts, using their own funds, had completed a significant portion of their inventories before the Corps was provided NAGPRA funds, and they will continue this process while compliance will be centralized for the remaining districts.

For example, the Tulsa district let a competitive contract in 1994 to a private CRM firm to conduct its inventory. Its NAGPRA coordinator identified the skeletal collections housed throughout the region under various curation contracts, and teams from Geo-Marine Inc. performed the inventories and analyses. This process identified a number of skeletal collections that had neither curation agreements nor an official listing about their locations. These collections were located and retrieved, thus illustrating a benefit of NAGPRA—the relocation of “missing” skeletal collections.

The other 24 Corps districts will be inventoried through a centralized process. The United States was divided into three regions (east, central, west) and six-year competitively-bid blanket contracts for total collections management, including NAGPRA inventories, were let for each region. The inventory and recording protocols (*Skeletal Standards* and *SOD* software) will be standardized for the entire country. The coordinating office in St. Louis has two or three coordinators for each of the three regions who will accompany the recording teams provided by the contracting firms. The use of these standardized protocols and their own coordinators will guarantee that all data collected during the inventory process will be consistent and compatible. Other federal agencies such as the Park Service have taken a decentralized approach. The Mesa Verde National Park, for example, has contracted out its inventory as a competitive bid (D Martin, personal communication). The *Skeletal Standards* and *SOD*, with modification, were employed.

CRM CONTRACTING FIRMS Geo-Marine Inc., Cultural Resources Division of Plano, Texas, won contracts from both the Tulsa and Fort Worth districts of the US Army Corps of Engineers that include the NAGPRA compliance efforts of taking inventory of human remains and artifacts recovered during Corps mitigation projects. This required Geo-Marine personnel to visit multiple repositories, conduct collection and site documentary research, and inventory identified collections. Geo-Marine added one master's level project manager with several years experience as a bioarcheological specialist at Zuni Pueblo for these projects. Additional personnel were hired for the Tulsa district NAGPRA contract. This included one full-time master's level osteologist, one temporary (project-specific) master's level osteologist, one temporary master's level archeologist, and one temporary bachelor's level osteologist. These individuals were all experienced in NAGPRA and other repatriation efforts.

Before Geo-Marine's efforts, these two districts' skeletal collections had received varying levels of osteological analysis ranging from comprehensive to none. The Fort Worth district's collections had been the subject of substantial and extensive examinations, while the Tulsa district's collections had received relatively little analytical attention.

The Fort Worth contract required Geo-Marine to follow the *Paleopathology Standards*, but when the *Skeletal Standards* was published the Fort Worth district permitted a change in the data collection protocol. A portion of the osteological inventory was subcontracted to the University of Arkansas anthropology department and the *Skeletal Standards* and *SOD* database were specified as the required protocols. The Tulsa district inventory was performed by Geo-Marine staff, which employed the *Skeletal Standards* and *SOD* database. In this case, the protocol was abbreviated to comply with contract specifications and Native American concerns. In all, 17 repositories in Kansas,



Oklahoma, and Texas were visited by Geo-Marine staff. The end result was an expanded and standardized database for both districts' collections. New or refined techniques, specified in the protocols, used to reexamine previously documented mortuary samples improved the identification and documentation of individuals. The reanalysis permitted recording of these collections in a manner more appropriate for complying with the reporting procedures specified in the proposed NAGPRA Regulations (62) and section 5 of NAGPRA.

**UNIVERSITIES AND MUSEUMS** Many institutions expected that federal funding would be available for complying with NAGPRA requirements. The first round of NAGPRA competition produced 107 proposals from Native American tribes and 113 from museums and other institutions worth a total of \$23 million. Only 41 grants worth \$2.14 million were awarded (35). A second competition funded approximately the same proportion of proposals. The Arkansas Archeological Survey completed its inventory with NAGPRA funding, while the Research Laboratories of Anthropology at the University of North Carolina at Chapel Hill used a NAGPRA grant to finish phase two of its compliance. With federal government funding only 10% of the perceived need, most institutions were left to their own resources.

A description of how the summaries and inventories were put together in Arkansas provides an illustration of variation in funding and staffing during university compliance activities. The majority of the archeological and osteological collections in Arkansas are curated by the University Museum and Department of Anthropology at the University of Arkansas, Fayetteville, and by the Arkansas Archeological Survey, a separate and independent unit of the University of Arkansas system. The three units curate 2700 Native American skeletons and thousands of other cultural items subject to NAGPRA. These items were collected over the past 65 years through academic and CRM archeological excavations, purposeful collection, and donations from the public.

The inventory of Native American skeletons and associated artifacts required considerable resources to accomplish. The University Museum received financial support from the vice-chancellor's office to prepare its inventory. This permitted hiring two half-time experienced undergraduate osteology students and purchasing osteometric equipment and laptop computers. Funds for additional personnel and equipment were diverted from other Museum budgetary categories. The department of anthropology used one graduate assistant diverted from teaching duties, unreleased faculty time, and some part-time student help. The Arkansas Archeological Survey received a NAGPRA grant to prepare its inventory and develop a guide for identifying cultural affiliation of skeletons in Arkansas. This grant funded hiring of one full-time

master's level osteologist, two half-time experienced undergraduate osteology students, and various part-time undergraduate students. All three units used the same inventory process. Each skeleton was analyzed using the *Skeletal Standards* and was then entered into the *SOD* database. Individuals analyzing the collections were trained by the same individual, and thus the descriptions are highly consistent and comparable. Because it is the intent of the tribes affiliated with this material to rebury the skeletons, this database will be the basic research tool for future research.

The NAGPRA grant to the Arkansas Archeological Survey was intended for the development of a biological system of indicators for identifying Caddo skeletal remains. The identification of Caddo skeletons was initially based on funerary pottery and other cultural traits in southwestern Arkansas, where there is established cultural continuity since AD 1000. While the core of the Caddo cultural tradition is easily identifiable, the geographical limits of the tradition are difficult to determine, and it was thought that osteological analysis would provide the key for determining the cultural affiliation of skeletons on the fringes of Caddo territory (up to half the state of Arkansas). In the core territory, Caddo skeletons are characterized by high percentages of unique characteristics such as extra teeth, failure of teeth to develop, depressed occipital bones of the skull, and depressions on the clavicles. These features were recorded during the inventory process for all skeletons from Arkansas. This constellation of traits does distinguish groups who are most closely related to those from the Caddo core area from those who probably have a stronger genetic affiliation elsewhere. The most important aspect of this project was its support by the Caddo and Quapaw tribes of Oklahoma. These two groups, along with the Tunica-Biloxi, are the most likely cultural affiliates for the majority of the Arkansas collections.

The complexity of funding, staffing, and conducting these inventories can be further illuminated by the osteological activities at the University of North Carolina at Chapel Hill. The Georgia state legislature appropriated funds for the osteological inventory and analysis of the University of Georgia skeletal collections, and this competitively bid project was completed by Larsen (personal communication). In addition, Larsen obtained a contract to inventory collections for the Universities of South Alabama and Auburn. However, the first phase of the University of North Carolina inventory was funded by the University and completed with a NAGPRA grant. In total, one PhD in osteology, three half-time osteology graduate students, and two half-time undergraduates were employed during these various inventory activities. A modification of the *Paleopathology Standards* were employed in these projects, which produced a large, internally consistent, osteological database.

### *New Alliances and Opportunities*

NAGPRA has produced alliances between Native American tribes and osteologists that have stimulated innovative research and provided a source of funding previously unavailable. At the request of the Omaha tribe, Reinhard and others (45) conducted extensive analyses of Omaha and Ponca skeletal remains for assessing the impact of trade and European contact on the health of women dying between 1780 and 1820. In addition to paleoepidemiological analysis of degenerative joint diseases and trauma, extensive dietary reconstruction using stable isotopes was initiated. Elemental analysis was used to assess the impact of toxic metals such as lead. Dietary reconstructions provided by stable isotope analysis were used in NAGPRA compliance determination of tribal affiliation. Having completed the dietary reconstructions for burials of known cultural affiliation, stable isotope data were used to distinguish Omaha from non-Omaha burials (primarily prehistoric Woodland) so that only Omaha skeletons would be repatriated to the Omaha (57). Funding for these analyses was provided first by the Vice Chancellor for Research at the University of Nebraska–Lincoln, and subsequently as part of the University of Nebraska–Lincoln's NAGPRA effort to determine cultural affiliation of burials with no or nondiagnostic grave furniture. These destructive analyses were conducted at the request of the Omaha.

An example of consultation under state law is the Buhl burial case from Idaho (23). In 1989, a well-preserved Indian skeleton was encountered in a gravel pit near Buhl, Idaho. The geomorphological setting of the burial indicated an extreme age, and following Idaho's grave protection act (1984), permission was requested of the Shoshone-Bannock Tribes of Fort Hall to use a portion of the humerus and ribs to obtain a radiocarbon date. Permission was granted by the tribal council, and it was dated to 10,675 radiocarbon years, which made it one of the best-preserved early skeletons from the Americas (23). In 1991, requests were made for additional bone for chemical and DNA analysis, to complete a comprehensive osteological analysis and for casting the artifacts found associated with the skeleton. The Shoshone-Bannock Tribes approved the additional analysis and casting of artifacts but denied further destructive analysis of bone. In addition, they requested that the skeleton be repatriated as soon as possible for reburial on the reservation. After analysis, the skeleton was returned in December 1991 and reburied.

### *Future Skeletal Excavations and Osteological Analyses*

Clearly the vast majority of skeletal collections will be repatriated and most probably reburied. NAGPRA and most of the state laws require consultation concerning excavation, scientific analysis, and ultimate disposition of skele-

tons. They do not prohibit traditional bioarcheological or osteological research, and hence, consultation is the key to future research.

In Arkansas, agreements with tribes in advance of specific archeological excavations are becoming common. A written agreement with the Quapaw Tribe of Oklahoma was reached in 1991 over how to treat the excavation of human skeletons at Parkin State Archeological Park. The site is owned by the State of Arkansas, and excavations of Native American skeletons are regulated by Act 753 of 1991, which requires consultation with appropriate tribes and a permit from the State Historic Preservation Office. Skeletal research is an important part of the overall research design at this late prehistoric site and because of the spatial patterning of burials it is impossible to excavate without encountering a human skeleton. The agreement specifically allows osteological analysis and specifies reburial at the Park.

In contrast, an agreement was reached with the Caddo Tribe not to excavate any burials at the 1995 annual Arkansas Archeological Society training excavations. These excavations were held at five prehistoric and historic sites on the Little Missouri River on the Ouachita National Forest. NAGPRA provisions for intentional excavations applied. The agreement was based on the expectation that domestic features, the main focus of research, could be excavated without encountering burials. It is planned that programmatic agreements will be negotiated with tribes culturally affiliated with Arkansas archeological sites to cover a variety of excavation and research situations.

## NAGPRA: ITS CONTRIBUTIONS TO OSTEOLOGY

The repatriation movement and most recently NAGPRA have made significant positive contributions to osteology as a research enterprise and to the bioarcheology of North America. This is not to say that there are no negative aspects, but we are confident that time will show the overall results to be positive.

First, the inventory process is eliminating gaps in our knowledge of specific time periods and geographic areas. Skeletons untouched for decades are now being studied. NAGPRA funding has come from federal, state, and institutional sources, many of which had not previously considered osteology within their funding domain. A side benefit of the entire inventory process is that the location of all skeletal collections will be recorded and it will be possible for the first time to locate skeletal collections necessary for solving particular research problems.

Second, osteological analyses are more comprehensive in their data collection efforts than ever before. CRM "scopes of work" have most recently required comprehensive analysis of excavated skeletal remains. Osteologists

no longer collect only a select series of observations when doing a study but feel compelled to collect a broad range of data because they may not be able to return for reanalysis. More importantly, osteological studies are using uniform data collection protocols, and various funding agencies are specifying that standardized methods be used. The field is moving toward developing uniform, possibly even a national, osteological database system. This should make it possible for the first time to integrate and interpret osteological data produced by different researchers.

Third, rather than showing a decrease, osteological analyses and the development of new methodologies will increase. Very few of the skeletal collections have obvious relationships with specific Native American tribes, and osteological analysis will be required for determining which will have custody of the remains. This identification process will require the development of new techniques, the use of analytical methods in new ways, and the acquisition of additional data (for examples, see 40).

Fourth, certainly curation facilities for skeletons, never a high priority, will improve. The Army Corps of Engineers has instituted a uniform process for curation management, curation facility design, and a uniform inventory process for its collections. Institutions wishing to continue archeological research will not risk the unflattering publicity of having "disrespectful" curation facilities. Native American organizations may wish to have their collections curated, and institutions wishing to perform this service must offer a situation that meets established conservation standards.

Fifth, the bioarcheological process will become more ethical and fair to the dead. NAGPRA essentially requires the same consultation processes for the excavation, analysis, and disposition of prehistoric remains that are required for the relocation of historic cemeteries. Provisions of national and state laws regarding the study of human skeletal remains will eventually be incorporated within the human subjects review process of universities and research organizations. Thus, as Klesert & Powell (30) recommended, anthropology will have a uniform set of standards for the study of human subjects, and osteologists will follow the same procedures for the prehistoric dead as are now required for research on the living and the recently dead (e.g. autopsy studies).

On the negative side, these improvements in ethics will not remove osteological data from the political process but may increase the politicization of osteology. Disputes between curatorial organizations and various ethnic groups as well as between ethnic organizations themselves will increase, and the federal advisory committee will be occupied for decades resolving these. Not only will the custody of skeletons be important, but control over data and interpretations will be important as well. If identification of the skeletal remains has implications for the ownership or control over resources, then

financial considerations resulting from the past destruction of so many skeletons will be brought to bear upon the actual process of osteological research.

Sixth, the excavation and analysis of human skeletons will continue. Massive construction projects will increase in the face of a growing population, and skeletons will be uncovered. Whenever this happens during the CRM process, state laws and ultimately NAGPRA will come into force. Despite the fact that the inventory deadlines have passed, the inventory and tribal affiliation identification process will continue for years into the future. This has been clearly recognized by the Army Corps of Engineers, which has let its regional collections management contracts for a six-year period and by CRM firms that are adding osteologists as permanent members of their staffs. In short, NAGPRA is forever!

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