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Human Bones and Archeology

Cultural Resource Management Studies

HUMAN BONES AND ARCHEOLOGY

Douglas H. Ubelaker
Smithsonian Institution
Washington, D.C.

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FOREWORD

To the public, one of the most provocative but least understood aspects of archeology is the excavation and study of human skeletons. In order to clarify the motives and methods behind such studies we requested the help of the Smithsonian Institution in preparing this short explanation, and we hope it helps eliminate some of the misunderstandings that surround such work.

Human bones represent only a small part of our nation's cultural heritage, a part of the utmost significance but one that cannot be understood outside its archeological context. This country's archeological remains are a rich source of information on the past, but they are fragile and irreplaceable. To protect this record of the past is a primary mission of the Heritage Conservation and Recreation Service (HCRS), and our success requires the cooperation of the public. A major problem in protecting archeological sites is locating worthy properties. Any person who knows of an archeological site can help in our conservation effort by contacting the State Historic Preservation Office in the state capital.

By recording sites, protecting them against disturbance, and--when absolutely necessary--excavating them with professional expertise, we can ensure that future generations will have knowledge of their past.

Bennie C. Keel
Departmental Consulting
Archeologist and
Chief, Interagency
Archeological Services
Heritage Conservation and
Recreation Service

July 11, 1980

Preface

Mankind has had a long past in North America. Our history and prehistory includes a vast number of ethnic groups which, in their own ways, have contributed to our nation's cultural heritage.

The United States government long has recognized an obligation to protect and conserve this heritage. Since 1906 several pieces of federal legislation have been advanced to define federal responsibilities to cultural resources endangered by federal projects or located on federal land. These laws include the Antiquities Act of 1906 (Public Law 59-209; 34 STAT. 225), the Historic Sites Act of 1935 (Public Law 74-292; 49 STAT. 666), the Reservoir Salvage Act of 1960 (Public Law 86-523; 74 STAT. 220), the National Historic Preservation Act of 1966 (Public Law 89-665; 80 STAT. 915 as amended by Public Law 93-54, Public Law 94-422, and Public Law 94-458), the National Environment Policy Act of 1969 (Public Law 91-190; 83 STAT. 852), Executive Order 11593, the Archeological and Historic Preservation Act of 1974 (Public Law 93-291; 88 STAT. 174), and the Archeological Resources Protection Act of 1979 (Public Law 96-95; 93 STAT. 721).

These laws recognize that many federal programs and projects, although developed for the greater public good, often are destructive to cultural resources, including archeological sites. Such sites are very fragile, and once the ground they are in is disturbed the information that they harbor is lost forever. Archeological sites are nonrenewable resources and their number declines daily.

To determine whether archeological sites are in the path of federal projects and whether the projects will be detrimental to the sites is the responsibility of the federal agency invoved. Such agencies usually contract the services of archeologists to determine the kind of cultural resources present in a project area. Archeologists identify, inventory, and assess the archeological resources to be affected by the proposed project. Depending upon what the nature of the resources found, their significance, and the importance of the federal project a set of procedures is followed to either continue with the project or preserve and/or recover the information that are contained within the sites.

When data recovery is required, elaborate investigative techniques are used to gain important information from archeological evidence left to use by our ancestors. By applying modern methods and techniques archeologists are able to understand how our ancestors adjusted to their environment, and the effect the environment had on their culture. As for biological remains of our ancestors, great care is taken in their removal from the path of destruction. Through such special methods described in this book, researchers often can identify the age at death, the sex, the height, any evidence of disease, and the cultural affiliation of the individuals unearthed in a project area. Although these people died long ago they still can relay to us important information about their life, and may provide us with guidance in our adjustment to today's world.

Introduction

Although people have lived in the Americas for thousands of years, written history did not begin until the 15th century with the journals of the European explorers. If we are to know about American people before that time we must use the techniques of archeology. Most people think of archeology as collecting "arrowheads" or digging in old ruins, but there is more to it than that. Archeology uses a variety of complex methods to excavate and analyze evidence of past human activity. This evidence consists not only of arrowheads and houses, but other stone tools, food remains, clothing, pottery, and anything else left behind that may offer clues to past life-ways. Even pollen in the soil can be used to reconstruct the climate of a site at the time of human occupation, and small pieces of charcoal can be used to determine the approximate age. With techniques of modern archeology nearly all things found at an archeological site have a story to tell, especially skeletons of the people themselves.

Our ability to learn about prehistoric burial customs and biology (physical appearance, disease, life expectancy, and so on) is dependent upon a specialized aspect of archeology: the excavation and analysis of human skeletons. In this work archeologists are assisted by experts in human biology called physical anthropologists. Similarity in language or culture of different groups may suggest past biological relationships, but only careful study of well excavated and well documented skeletons can verify them. Archeological studies dealing with artifact change through time may suggest that a population was isolated, or that there was intermarriage with a neighboring group, but again these suggestions can only be resolved by careful study of the skeletons. Journals of early explorers and oral history can suggest that certain diseases or burial practices occurred, but only skeletal analysis can confirm this. Human skeletons offer direct and important information, especially when they are well-preserved, carefully excavated, and thoroughly examined by trained professionals.

Skeletal analysis is useful primarily to archeologists and other anthropologists, but it can also provide information needed in other areas of science. Studies of disease in prehistoric times enable scientists in the medical profession to trace the history of disease and learn how various diseases affected past populations. This information gives them a better understanding of present diseases and may suggest how they can be treated or avoided.

Prehistoric skeletons give valuable information on levels of trace elements and chemicals in human bone. Comparison with modern populations enables scientists to see how people are affected by our changing environment, especially increased chemical pollutants of the industrial age.

Studies of the variability which exists in skeletons of different populations enable physical anthropologists to distinguish disease or abnormal conditions from normal variation. For example, in some populations many people have a normal division in the frontal bone of the skull. The division easily could be

mistaken for a skull fracture if we did not know that it is commonplace in some groups. Also comparative studies of dental and skeletal development enable medical doctors and dentists to evaluate growth more effectively in children with different racial backgrounds.

Techniques developed for determining age, sex, height and other information concerning archeological skeletons also can be used in contemporary medical or legal cases to identify bones. Physical anthropologists are highly qualified to make such determinations and cooperate with local, state, and federal legal authorities on a routine basis.

Unfortunately, nearly all prehistoric human skeletons discovered are destroyed by construction equipment, by natural forces of erosion, or by vandals or curiosity seekers (see figure 1). Once found, few skeletons are preserved in the ground for professional excavation and analysis, and even fewer are encountered directly by archeologists in their excavations. This causes permanent loss of valuable information on our past.

How Burials are Excavated

Burials encountered by professional archeologists are excavated with great care. Usually the first step is to identify the outline of the original burial pit, if there is one (see figure 2). Once removed, soil can never be returned and placed exactly as it was originally, so differences in color and consistency between soil inside and outside the old pit can be detected in careful excavation. The visibility of these pit outlines, sometimes called features, will vary considerably with different soils, but when this can be observed the outlines offer data on the size and shape of the grave.

The soil inside the pit is slowly removed until the bones and artifacts are exposed (see figures 3 and 4). Special tools such as trowels, small picks, and brushes are used to remove the soil without disturbing the bones or any artifacts associated with the burial. Eventually all the bones can be seen in their original arrangement. This allows observations on burial position, artifact locations within the grave, and even the arrangement of beads, rings or other items which were on the body or clothing at the time of burial.

Once completely exposed the bones and artifacts are photographed, usually with both color and black and white film, for a permanent record. Detailed notes and measurements are taken for an accurate record of the burial position and artifact locations. A record is made of the orientation of the body, its position (on back, on the left side), its arrangement (right arm flexed 30°, left leg semiflexed 100°), and depth of the skeleton from the original and the present ground surface. Preliminary observations are made on any evidence of disease, any perishable materials which may have survived such as cloth or leather, and any features of the soil which may be useful in later interpretation. At this time all available information should be collected, no matter how trivial. Since the opportunity to observe is unique to the moment, thoroughness must be the rule. Notes on nearby rodent burrows may

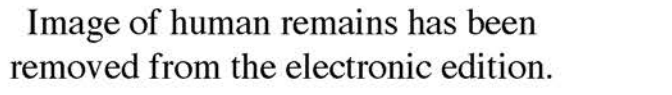

Figure 1. Adult skeleton from South Dakota, partially disturbed by vandals looking for skulls. Careful excavation shows that only the upper portion of the skeleton has been disturbed.

Figure 2. Large pit outline visible in the horizontal section of a burial pit in Maryland. Note the bones visible in the vertical section.

Image of human remains has been
removed from the electronic edition.

Figure 3. Same view of Maryland burial as in figure 2, but after removal of soil.

Figure 4. A well-excavated skeleton from south Dakota. soil has been carefully removed without moving the bones. The label identifies the site number, burial number, date and funding agency. The arrow points north.

seem unimportant at the time, but they later may prove valuable in explaining the presence of other materials in the pit, or why some small bones are missing.

When photographs, measurements and notes are completed, the pit usually is recorded on a map of the site which will later show the site organization and spatial relationships of individual features. Surveying instruments are used so that the locations of features can be plotted accurately.

Following this, bones and artifacts are removed for processing and more detailed analysis. Soil from around each specimen is carefully loosened allowing removal without breakage. As specimens are removed soil particles are cleaned away, and the bones and artifacts are carefully packed in labeled containers. The remaining soil is then sifted through a fine screen to collect any small bones and artifacts.
In the laboratory the specimens are unpacked and prepared for study. Most bones are cleaned using water and a soft brush, although some exceptionally fragile ones may require preservatives or other special treatment. When clean and thoroughly dry, specimens are marked with a permanent number which will allow researchers to relate any specimen to information recorded in the field or in the lab. Throughout the process human bones are handled carefully and treated with respect.

How Burials are Analyzed

Skeletal analysis is designed to learn as much as possible about each individual as well as about the population as a whole. For each skeleton it usually is possible to learn the sex, age at death, height, approximate weight, and whether the individual had certain diseases, growth or dental problems, or broken bones. Measurements and observations on bone size and shape allow comparison with other skeletons in the same and different groups, and when information on all skeletons from a site is collected, valuable information about the population can be ascertained. This knowledge can concern a population's health, life expectancy, physical appearance, disease, and relationships to other groups. Here are examples of some basic techniques of analysis:

Sex Determination

Skeletons of adult males differ from those of females in size (males usually are larger) and shape. Size differences occur on most bones of the skeleton, but are especially marked on the skull and long bones. Male skulls usually have larger ridges above the eye openings, larger mastoid processes (the projections of bone behind the ears) and more obvious muscle markings. Shape differences between the sexes occur primarily in the pelvis; the female pelvis is broader than that of the male and displays several details related to childbirth. These traits may give very accurate estimates of sex, but are not sufficiently pronounced until the age of 18 years. Before that age, usually no accurate determination of sex can be made from the skeleton alone.

Determination of Age at Death

Methods for determining the person's age at death have been developed from studies of skeletons of known

age at death, and the methods vary for children and adults. Our most accurate method for children involves the stage of development of the milk and permanent teeth. Through studies of living children we know about what age each tooth develops and emerges through the gums to become visible. Using x-rays, we can compare teeth in a skeleton with this information to estimate age. The method is quite accurate from the time of birth until about 20 years, when all teeth are fully formed and have erupted through the gums.

If the teeth are not present in the skeleton of a child we can turn to other but less accurate methods. Age can be estimated by measuring the length of long bones such as the femur (thigh bone) and comparing the results to measurements of children of known ages. Just as all children of the same age are not of the same height, bones from children of the same age are not the same length, so this method is not as reliable.

Epiphyseal closures or unions offer additional information on age at death for subadult skeletons. Most growing bones consist of a central shaft (diaphysis), with separate bones (epiphyses) attached to the ends by soft tissue. As a child matures these parts unite to make a single bone, and unions of the many different epiphyses throughout the skeleton occur at different ages. For example in males, epiphyses around the ankle unite at about 16 years while those in the knee unite at about 17, those at the wrist at about 19, and one on the collarbone at about 20. If a male skeleton were found with united epiphyses on the ankle bones, but not on the bones of the knee, wrist, or collarbone, an age at death between 16 and 17 years would be suggested. Unfortunately the timing of epiphyseal union varies considerably among different individuals and between sexes. This especially is a problem in analyzing young skeletons for which sex cannot be determined reliably.

Different methods are used to estimate age at death in adult skeletons. At present, one of the most accurate methods involves cutting very thin slices from the middle of the long bones and counting internal bone structures through a microscope (see figure 5). Throughout life the internal stuctures of bones and teeth are constantly changing. Structures called osteoclasts make tiny tunnels in the bone, and the tunnels are then partially filled to form osteons. With increasing age more and more osteons are formed at the expense of the original bone present, so counts of the osteons allow estimates of age. A similar technique can be used for teeth. These methods offer great accuracy, but require expensive equipment and some destruction of the bone. For these reasons they have had only limited use.

A more rapid procedure involves examining the area where the two pubic bones of the pelvis meet in the front. These bone surfaces change with age in a reasonably predictable manner from a very rough furrowed appearance to a smoother surface with defined edges. Separate standards of evaluation exist for males and females. This method also is not always accurate, especially for persons over the age of 40 years.

Figure 5. Microscopic view of internal bone structure. The round or oval structures are called osteons and are useful in estimating the age at death.

Other methods for estimating adult age at death include study of the union of cranial sutures (lines between individual bones of the skull), the extent of wear on the teeth; the degree of wear on long-bone joint surfaces; and other, more technical methods. Most researchers use several methods to make the age estimate as accurate as possible.

Estimation of Living Height

The height of the individual can be estimated by using published equations and measurements of the long bones. These equations have been developed from studies of bodies in medical schools, and allow stature estimates which usually are accurate to within 5 centimeters (2 inches). For example if a femur from a white female measured 40 centimeters, it would suggest a height of 153 centimeters (5 feet). Also observations on bone size and ruggedness relative to height can provide an estimate of body size and weight.

Evidence of Disease

Each skeleton is examined thoroughly for evidence of disease. This procedure is complicated and requires special training since many of the diseases that leave evidence on the skeleton have the same or similar effects. Usually it is not possible to diagnose a particular disease from skeletal evidence alone, although it may be possible to assign a particular kind of skeletal injury to a category of disease. For example, it may be possible to designate an injury as arthritis, but it may not be clear just what type of arthritis it is. Arthritis represents the most common ailment found on the skeleton, usually taking the form of small bony extensions on the spine and/or pitting and breakdown of the long bone joint surfaces. When it occurs after age 40, it represents a normal aspect of aging.

Other forms of disease and injury seen on the skeleton are fractures, dislocations, infections (see figure 6), genetic defects, tumors, tooth decay, and others. All of these offer important information about the individual, and sometimes about certain aspects of the environment that may have caused or influenced them.

Artificial Modifications of Bone

Frequently bone alterations are found which could not be produced by disease or other biological processes, and these modifications may offer clues about human behavior. A resting or working position which requires squatting or kneeling can produce changes in bones of the legs and feet. In some cultures, parents tie cloth or boards to the heads of their children to produce a more desirable appearance and this practice creates a very different skull shape. Teeth sometimes are modified for similar reasons, especially among prehistoric populations in Central and South America.

Changes in bones after death are quite varied and often accidental. Frequently rodents will gnaw on skeletons, leaving characteristic marks. In some cultures flesh is removed from the bone before burial leaving tell-tale cut marks on bone surfaces. Scalping, beheading, and other body mutilation usually leaves some evidence in bone--even routine cleaning of the teeth can leave

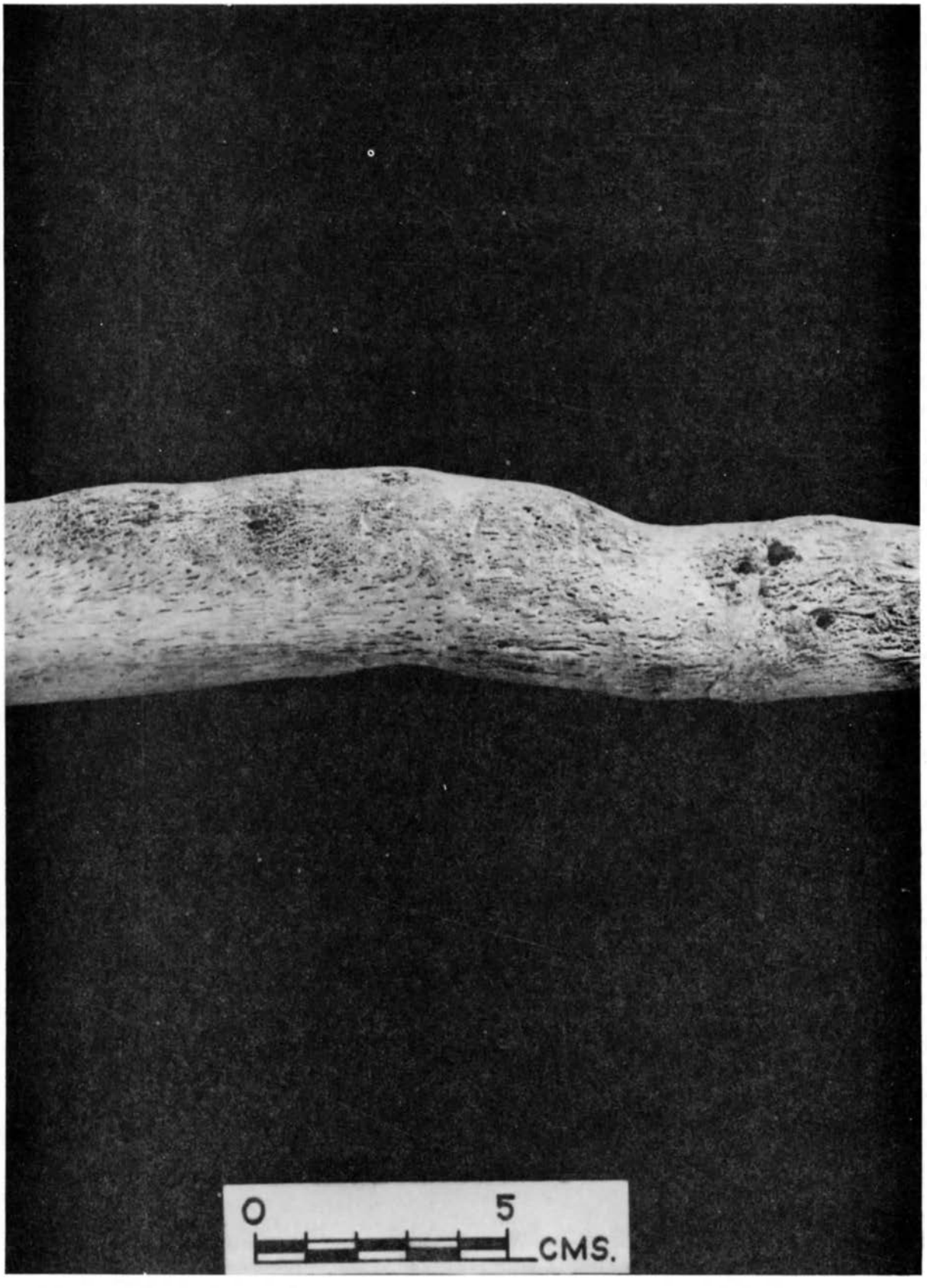

Figure 6. Prehistoric human tibia from Maryland showing evidence of infectious disease.

characteristic marks. Some attempts to treat diseases or injuries can be detected, such as setting of broken bones or even primitive cranial surgery (see figure 7).

Information From Analysis

Many people wonder why so many skeletons need to be examined; why aren't one or two skeletons sufficient? The answer involves a method of analysis called sampling statistics. Before conclusions about a population can be made an adequate portion of that population must be examined. One skeleton may be male, five feet five inches in height, of average build with a broken right arm, but this would not mean that all members of the population were males or had broken right arms. The true frequency of all traits can only be found by examining a large number of skeletons from a population. A variety of important conclusions can then be made, and the following case studies offer some examples.

Ossuary from Maryland [1]

Several years ago, Smithsonian colleagues and I excavated and analyzed a prehistoric burial pit or ossuary in Maryland containing skeletal remains of at least 188 individuals (see figure 8). From early historical records and comparison to known practices of related groups, we knew that these people had the custom of placing their dead first in "death houses" and later burying the skeletal remains after the flesh had decomposed. It seems that a burial ceremony took place every few years, at which time all persons who had died since the last ceremony were buried together in a large pit. Our excavation of such a pit not only revealed details of the pit and bone placement, but also produced a skeletal sample of nearly everyone who had died during that period of time. Ages at death were determined using the microscopic method, and the analysis revealed a population with a life expectancy at birth of about 23 years (compared to over 70 years in contemporary United States), with about 30 percent of the population dying before the age of five. An adult 20 years of age could expect to live only about 18 more years, and no one lived past the age of 70. It also was possible to estimate the size of the living population and compare this estimate to others made using different kinds of evidence. Such information is very useful in answering more general questions such as the density of the population, how successfully people exploited their environment and what problems were brought on by their way of life. These answers can be used in dealing with problems arising within our own culture; for example, we know that in our country women generally live longer than men, but is this a result of biology or a more competitive, stressful life-style for males? Information from the past can help us solve a problem such as this by allowing a comparison between modern American male/female deaths and deaths in a totally different cultural setting.

Cemetery Analysis in Coastal Ecuador

When different cemetery sites within one geographical area are carefully excavated and dated, it may be possible to determine biological changes that took place through time. In 1973, I excavated and later analyzed a large cemetery site

Figure 7. The large hole in the frontal of this Peruvian skull was produced by primitive surgery called trephination. The operation is done on living persons by cutting, scraping or drilling.

Figure 8. Large concentration of human skeletons in Maryland ossuary. Note how most bones are not in anatomical order.

on the coast of Ecuador. Here the excavations located 81 burial units, including 54 large jars or urns containing human bones (see figures 9 and 10), 25 individual skeletons outside the jars, and two groups of disarticulated bones (bones not in anatomical order). Study of the relationship between the burials and the different soil layers at the site suggested that the individual skeletons were probably older than the jars and that both types were buried in a pre-existing village area. This relative dating was confirmed by radiocarbon dating of the bones themselves and associated charcoal samples, which suggested that the jars dated between A.D. 700 and A.D. 1600 and the other burials dated between 500 B.C. and A.D. 1155.

Forty-one of the urns were carefully excavated, removed and analyzed. An inventory of all bones present revealed that at least 384 individuals were represented, an average of over 9 persons per jar. Actually the number varied considerably, with one jar containing no individuals and another as many as 25. Futhermore, the size of the urn varied with the amount of bone within. This suggested either that jars were made or selected to accommodate the quantity of bones to be buried or that bones were accumulated to the needed quantity for the size of the jar available.

The number of different bones present also varied. Large bones (arm bones, skull, leg bones) were most common, while fewer of the small, easily lost bones of the hands and feet were present. For example 147 adults were represented by the upper arm bone, while only seven were represented by bones from the middle of the toes. With subadult bones, 140 individuals were represented by thigh bones, but only three by kneecaps. This suggests that many small bones were lost when the skeletons were transferred from their original deposit where the flesh had decomposed.

Careful observation of the bones during excavation allowed some interesting interpretations of burial customs. Fifteen jars contained some bones which were articulated: that is, they were in proper anatomical position (see figure 11). This means that at the time of burial these bones were still held together by flesh or ligaments. Several of these articulations involved bones of the lower leg, upper leg, and pelvis, but not the vertebrae. This is somewhat unusual since in normal decomposition, spinal articulations are much more common than articulation of the pelvis and legs. This pattern could represent ceremonial defleshing, but no cut marks were found on the bones. It also could be produced if the lower half of the body were tightly wrapped and decomposition were allowed to proceed normally before burial.

Many of the jars were covered with another jar turned upside down. In excavating one of these, we found bones trapped between the urn and the jar covering (see figure 12). From observations of the pit outline, we could say that the bones could be in that position only if the jar covering had been used as a container to transport the bones to the lower jar. As bones were dumped in, some were trapped between the two vessels.

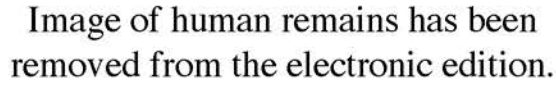

Figure 9. Cross-section of burial urn from coastal Ecuador showing its content of human skeletons.

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removed from the electronic edition.

Figure 10. Collection of skulls and other bones inside another urn from Ecuador. This one contained 13 individuals, five adults and eight subadults.

Figure 11. Articulated bones of pelvis, legs, and feet found within an urn.

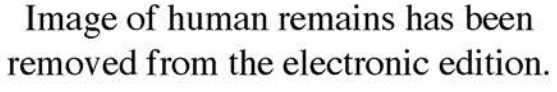

Figure 12. Bones trapped between the upright urn and the inverted urn covering. These suggest the inverted urn was used to transport the bones.

Several urns contained bones showing evidence of exposure to fire. Some bones from six jars showed charring on a limited area of the bone surface, along with other indications that the burning had occurred after flesh had decomposed. In nine other urns bones were white, warped, and displayed a fracture pattern charcteristic of bone which has been burned with flesh still attached. Most of these burned fragments showed more intense firing on the back sides of the bones, suggesting the body may have been placed on its back atop the crematory fire.

This all suggests that after death bodies were stored for a period of time and some individuals or bones were cremated. Later most bones, but especially the large ones, were gathered and placed in a large jar. The jar then was carried to the burial ground and turned upside down over another jar buried in the ground. The inverted jar was left in place and covered with soil.

Recently several other skeletal samples older than the urn burials have been excavated in the same area. One site even extends back prior to the use of pottery, some 8,000 to 9,000 years ago. Comparison of data from these new sites with the urn samples suggests that although height and some other measurements of the skeleton changed little through time, other traits changed considerably. There was an increase in the frequency of infectious disease, broken bones (especially those probably caused by falls), and cultural modifications of the skeleton such as head deformation and altered teeth. Life expectancy decreased, with a rise in infant mortality. It appears that with the development of intensive agriculture larger communities formed, and crowding soon added to the likelihood of infectious disease. Through such a study it is possible to determine when customs such as head deformation and tooth alteration began, and what age and sex groups were involved. These practices also may be explained by the increasing population density. As the population grew larger and more complex, some individuals began to distinguish themselves physically from others to demonstrate their special status. Such differences in dress and behavior characterize most complex societies, even our own modern cities where upper, middle, and lower classes can frequently be distinguished by dress, hairstyles, language, and other forms of behavior. In prehistoric Ecuador some of these differences are preserved in the skeleton.

Nutrition and the Skeleton in Illinois [2]

Skeletal samples sometimes can be used to examine rather complex problems regarding the relationship of disease to nutrition and culture. One condition frequently found on prehistoric skulls is porotic hyperostosis. This term refers to a variety of disease changes occurring inside the upper eye orbits and on top of the skull. The appearance ranges from tiny pin point holes to large, spongy-looking deposits. In the past, researchers have guessed that such lesions were produced by a genetic blood problem, pressure from surrounding bones, or nutritional disorders. More recent investigations have suggested that iron deficiency anemia is the probable cause. More specifically,

an overdependence on corn in the diet may bring on the iron deficiency. Apparently corn not only is low in iron, but also contains a substance which reduces the body's ability to utilize iron from other sources in the diet.

To examine this disease-diet interaction in prehistory, anthropologists studied four large, well excavated samples of child skeletons from Illinois. Careful archeological research previously had determined that one sample came from a group which probably had a well-balanced diet based on hunting and gathering wild foods; the second sample represented a period of transition between hunting and gathering and corn agriculture; and the final two samples represented populations relying on corn agriculture and living in permanent communities. Analysis revealed that all varieties of porotic hyperostosis occurred more frequently among groups with intensive corn agriculture. These groups also showed higher frequencies of infection.

In a later study of the same skeletons, anthropologists have shown that increased nutritional stress associated with a corn diet also can affect the teeth. It seems that the frequency of certain dental defects, infectious disease and childhood death increased along with greater reliance upon corn. These studies and others show us the hazards of over-reliance on one food source, and why modern nutritionists recommend a balanced diet. They also may change our view of prehistoric people and our opinions of why they behaved as they did. Until recently, it was believed that in prehistoric times increased reliance on agricultural products such as corn was progress, giving a more dependable food supply and allowing a happier, more trouble-free life-style. Through archeology we now know that these changes in life-style also had substantial negative effects that probably were not foreseen until it was too late to return to the old hunting and gathering life.

A similar process is taking place in our own culture, where the use of petroleum has revolutionized our methods of transportation, housing and agriculture. Just how drastic these changes would be certainly was not anticipated when the Model-T was introduced, or when chemical fertilizer first was made available. These innovations then were seen as improvements on the existing life-style, but in fact they acted to extingush that life-style and usher in a new one. The costs of the new life-style are only now being calculated, after it is too late to return to the old.

The wide use of petroleum products has affected our biological nature too, and the extent of this change is not fully clear. Certainly respiratory ailments and stress-related diseases increase in crowded, smoggy cities; and urban, mobile living serves to spread communicable diseases. The mass marketing made necessary by city living, and made possible by modern transportation, encourages use of various food additives which now are being studied for their effect on the body. Other changes may be beneficial, including the elimination of seasonal food shortages and the breakdown of the regional physical types created by generations of inbreeding within

isolated communities. If we, like the Illinois Indians, had no written record of such changes these still would be recorded in the bones of our people, clues to the long-range results of culture change.

History of Disease [3]

The study of disease in ancient human skeletons is hampered by the fact that much of the evidence for disease is lost when soft tissues (skin, muscles, ligaments) decay. In Peru, Egypt, and several other areas of the world, climatic conditions and special burial customs sometimes cause the preservation of soft tissue, even after thousands of years. Bodies so preserved are called mummies and, when properly studied, can offer extensive information about disease.

Since 1970 Dr. Marvin Allison of the Medical College of Virginia has studied mummies from Peru and Chile in an attempt to document diseases of prehistoric times, and how the environment and social customs changed the appearance of particular illnesses. His findings are numerous and fascinating. Convincing evidence of tuberculosis was found in mummies as old as 3,000 years, showing that the disease was present in the Americas long before Columbus. Studies of preserved intestines reveal that numerous parasites, including hookworms, were present. Mummies of workers in silver mines showed particles of silver mixed with copper and iron on their lungs, evidence of black lung disease similar to that found today among coal miners. Mine workers also showed enlarged hearts, hernias and premature joint problems which probably were caused by heavy labor. Dissection of the gallbladder revealed gallstones in many mummies, possible evidence for a high-cholesterol diet.

All this information can be related to archeological information on diet, housing, and social organization to produce a more complete picture of the interaction between disease, environment, and culture in ancient times, and provide guidelines for studying such interactions in our own times.

Skeletons and Social Structure [4]

Human burials can even be used to examine kinship and residence patterns in past societies. One such study examined 290 skulls from 5 closely related cemeteries in New York. Assuming that the groups represented in the cemeteries were interbreeding, and that the populations were patrilocal (family lives in the father's settlement), males in any one cemetery would be more alike than females because more men would be related to one another than women. Logically, it follows that females from neighboring towns would show greater variability than the males within any one cemetery because the probability that they were related would be much less. If residence were matrilocal (family lives in settlement of the mother) the reverse pattern should prevail; within any one cemetery, males would show more variability than females. The study team examined 33 traits on the 290 skulls. The results showed the pattern produced by patrilocal residence (less male than female variability) supported historical evidence for a shift to patrilocal residence through time. Such evidence allows anthropologists to explore possible causes for changing informal rules about where couples live.

Such a change has occurred recently in our own culture: in 19th century America most newly married couples took up residence at the home of the husband so that he could work with the family farm or business. Analysis of those family cemeteries would probably produce findings similar to those in the New York examples. What would a study of cemeteries in modern U.S. cities show? What would that say about modern residence customs?

Stature and Status [5]

Careful cemetery excavation and analysis frequently allow interesting correlations of physical attributes and archeological observations. Using a large sample of skeletons excavated from eight sites in eastern Tennessee, archeologists studied the relationship between estimated height of individual skeletons and the status of the individual in that society. Status was indicated by the quantity and kind of artifacts buried with the person. Such rare and exotic artifacts as ceramic bottles, conch shell vessels, shell leg and arm bands, ceremonial flint blades, copper or mica ornaments, and ceremonial celts were found with some skeletons. Living stature was determined from long bone length measurements using the procedures described earlier. Analysis revealed that high status males were taller than low status males but the females of both groups were of about the same height. When the skeletons were excavated the location of each one was mapped relative to mounds on the site, and skeletons with unusual artifacts (probable indicators of high status) were found to cluster in the mounds. Status decreased as distance from the mounds increased, and stature also was greater for individuals found in or near the mounds.

Explanation? It is likely that high status males enjoyed a more varied and nutritous diet than the low status members of their society, and this superior diet probably contributed to their greater stature. Another explanation is that tall men were given more respect or status. So, instead of status making them tall (by providing more nutritious foods), being tall gave them status.

Can you see how analysis of the bones could show which explanation is correct? In our own cemeteries, status is sometimes judged from the size, complexity and cost of tombstones. Have you ever thought "Look at the size of that tombstone; he must have been important"? What would the bones found under such tombstones tell us about how status is achieved in our society?

Birds, Bones, and Burials in the Plains

Bones of animals found at archeological sites and with burials frequently provide clues regarding diet, season of burial and occasionally even rituals. Excavation of an 18th century cemetery in central South Dakota produced numerous bones of mammals and birds associated with the burials. While the material was being processed at a Smithsonian laboratory, it was noticed that the backs of several of the bird skulls had been cleanly cut away. Further analysis revealed that in addition to the skulls, only bones of the wings and feet were present, not bones of the body. The bones

obviously did not represent remains of meals but rather remains of bird pelts with attached skulls, wing and leg bones. The birds were later identified as crows, ravens, and various birds of prey (owls, hawks, falcons). A comparison with the field notes revealed also that the birds of prey generally were found with adult males while the black birds were with children. This association matches descriptions of Plains Indian men using birds of prey in their medicine bundles as personal charms to give the owner strength, quickness, or other special powers. Children were not allowed to carry birds of prey, but could carry other birds or small mammals for similar reasons. In this case, careful excavation and analysis revealed that the ritual use of birds extended back into prehistoric times, and that children were allowed to imitate adult behavior. It allowed us to learn something about the educational and socialization processes of these people as well as their religious beliefs, and to relate those to beliefs of other Plains Indian tribes.

Inferences from Tooth Wear--British Columbia [6]

In an analysis of skeletons from the Prince Rupert Harbour region of British Columbia in Canada, archeologists found some interesting modifications of the teeth. The front teeth in five female lower jaw bones displayed deep grooves cut into the chewing surfaces. The archeologists thought the grooves were probably produced by the abrasive action of a thin string-like material being pulled with some degree of force across the teeth, suggesting that the women probably were using their teeth to hold fiber while weaving. Such a practice had been observed among neighboring tribes during historic times, but this represents the first evidence for it in prehistory.

In the same sample, 12 lower jaws showed unusual wear on the front side of the front teeth. Normally wear occurs only on the chewing surface of a tooth and on the sides where it is in contact with neighboring teeth. These teeth showed wear on the front where it would be visible. Archeologists theorized that the unusual wear was produced by the long term wearing of labrets or lip plugs. Labrets, made of wood or stone, were inserted through a slit in the skin below the lower lip like cufflinks in a shirt. They were worn primarily for decoration, but also may have indicated special status. Numerous stone labrets were found in the excavation, with one in place in the mouth region of a skeleton which showed the peculiar wear on the teeth. One of the labrets found even showed tooth impressions on the surface that would have been in contact with the teeth.

Considered alone, this and the other discoveries described may be interesting, but can any really be called <u>important</u>? Can the wearing of labrets by an obscure group of long-dead people tell us anything about ourselves? The answer, as so often in science, is maybe. The occurrence of similar patterns of tooth wear in other groups, when detected, will show us the distribution of the practice in time and space. Then we can begin to ask questions such as what changes took place biologically and culturally, and to suggest why these changes

took place. It is such an understanding of the past that enables us to see the present in its proper perspective and even to predict the future. It is for these reasons that human burials are excavated and are given the attention and respect they justly deserve. The people of the past, our ancestors, gave us our customs, beliefs, language, even life itself; and now their giving continues through information coded in their bones, promising us a better understanding of the past, the present, and the future.

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The Heritage Conservation and Recreation Service, a non-land managing agency within the department, is responsible for assuring the identification, protection, and beneficial use of our important cultural, natural, and recreational resources. The service offers grant assistance, technical information, and guidance to those in the public and private sectors involved in conservation or recreation projects.

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