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SKELETAL ANALYSIS OF THREE BLUFF SHELTER BURIALS

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INTRODUCTION

The following data and descriptions come from three multiple bluff shelter burials. The first two were excavated with no provenience control and collected by Glen Clark of Springdale, who presented them to the University of Arkansas Museum. They came from the vicinity of War Eagle Cave and Peterbottom Cave and were dug by some individuals apparently searching for artifacts. The burials are extremely fragmentary and consist of at least four individuals, which will be described at greater length.

The other burial comes from 3WA143 northwest of Fayetteville on the Illinois River and was excavated by John Clark and William Westbury, both graduate students in anthropology at the University of Arkansas. This burial consists of two individuals with enough skeletal material from both to be able to determine sex and age. All three burials are now stored with the University of Arkansas Museum.

John Clark and Dr. William W. Klusmeier helped with this paper immeasurably. Mr. Clark helped with a bibliography, measuring of the bones, and supplying forms from the University of Texas on which to record the data. Dr. Klusmeier, an orthodontist from Fort Smith, listened to the original hypotheses concerning the pathology of the skull of Burial III. He added comments of his own, some of which were incorporated with his permission. Both men were invaluable.

ARCHEOLOGICAL BACKGROUND

There is no material of archeological significance with any of these burials. The first two were presented to the museum with no context at all and no information except for the general area of their burial. Some cracked stones, mussel shells, and a deer mandible along with a few other animal bones is all that was received with these.

The burial from 3WA143 had been dug up by some persons who, for some reasons, decided they no longer wanted it and reburied it. They had glued the mandible to its articulation surface of the skull before redeposition. This destroyed all context, making archeological interpretation impossible. Found with this burial was a fill of ash mixed with soil, leaves, ovate scats, hackberry seeds, acorn fragments and a massive roof fall.

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DESCRIPTION OF BURIALS I AND II

The first two burials were so fragmentary that measurements were almost impossible. Out of 110 identifiable bones and bone fragments only two left and one right femurs and part of one reconstructed skull were measurable. The breakdown is shown in Table I:

HUMAN	
Skull	2
Mandible	2
Fragments	2
Vertebrae:	
Atlas	2
Cervical	7
Thoracic	9
Lumbar	10
Clavicle	1
Fragments	1
Scapula (Fragmentary)	4
Humerus:	
Right	2
Left	2
Fragments	2
Ulna	7
Radius	8
Carpals	2
Metacarpals and	
Metatarsals (no distinction made)	9
Pelvis (fragmentary)	6
Sacrum (fragmentary)	1
Femur:	
Right	1
Left	2
Epiphyses	2
Fragmentary	3
Patella	1
Tibia:	
Right	3
Left	2
Epiphyses	1
Calcaneum	8
Talus	4
DEER	
Mandible:	
Fragments	2
Other	2
OTHER	
Unidentified	1

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Besides these there are numerous unidentifiable fragments and ribs that were not counted. The small sampling of measurable material made it difficult to reach any conclusions through measurements. Those that were obtainable are listed in Table II: (measurements after University of Texas)

TABLE II

SKULL		
Maximum Length	170 mm.	
Maximum Breadth	125 mm.	
Left Parietal Thickness	3 mm.	
Foramen Magnum:		
Maximum Basion-Opisthion	33 mm.	
Maximum Transverse Diameter	23 mm.	
FEMUR		
LEFT		
	1	2
Bicondular Length	393 mm.	460 mm.
Morphological Length	401 mm.	466 mm.
Maximum Diameter of Head	41 mm.	47 mm.
Subtrochanter Anterior-Posterior	29 mm.	30 mm.
Subtrochanter Lateral	20 mm.	21 mm.
Middle Anterior-Posterior	25 mm.	27 mm.
Middle Lateral	20 mm.	24 mm.
FEMUR		
RIGHT		
Subtrochanter Anterior-Posterior	27 mm.	
Subtrochanter Lateral	21 mm.	
Middle Anterior-Posterior	24 mm.	
Middle Lateral	19 mm.	

The skull is probably male, as are the two left femurs. Judging from the thinness of the left parietal and the openness of some of the sutures, this particular individual was probably an adolescent. The femurs appear to be from three different individuals. Left femur 1 is probably from a male younger than left femur 2 because of the difference in size and because there appears to be more matrix in 1 than 2. The right femur is judged to be female because it is less robust than the other two, even though its measurements almost coincide with 1. The lesser trochanter is little more than a bump while the greater trochanter is smoother than that in 1 (Edwards, 1963: 219).

The other skull is smaller than the one measured, but it is much more fragmentary. It was probably an immature individual and may have been male. It is doubtful if any of the femurs went with it, since they appear to be older. The number of radii show a min-

imum of four people, possibly more. It is my opinion that these burials contain probably no more than parts of four individuals. This is borne out by eight radii and calcanea, conveniently in four lefts and four rights. Of course, it could be that they do not go together, but, if that is the case, a few extra arms and feet would have been thrown in at the time of the burial. There are five tibia, three right and two left, with the left probably going with the right, in at least one case, making a maximum of four. In no other case are there enough bones that could conceivably surpass four individuals. It was interesting to note there was no pathology with any of the bones in Burials I and II.

DESCRIPTION OF BURIAL III

Burial III was in much better condition than the others and had fewer bones; however, those that it had were measurable. Those bones present and measurements of each, with exception of the skull and mandible which will be treated separately, are listed as follows in Table III:

The main aging and sexing techniques used were comparing the public symphysis with the component outline in Brothwell's *Digging Up Bones*, pp. 64-65, viewing the general robustness of the bones, measuring the greater sciatic notch and looking for the amount of matrix.

The humera obviously belonged to two different individuals, but both were robust and probably male. The pelvises belonged to two different individuals on the basis of the comparison of the public symphyses. The left pelvis belonged to a male probably 22 to 25 years of age while the right was probably a male, although that could not be ascertained with as much definitiveness as the other, and was from 28 to 36 years of age. The sacrum, due to the sharp curve starting at the fourth segment and complete closure of all the segments was judged to be a male over 25 years old. The femur and tibia were all robust. There is pathology present in the smaller humerus. It appears that it was broken because the distal end is much thicker and rougher than is normal.

The skull is that of a male probably between 35 and 40. This was determined by the sutures and the wearing of the teeth. His teeth were worn down to a flat and smooth surface on one side and on the other side to an acute angle that would have taken a minimum of 30 years to wear so completely (Brothwell: 68).

There was much pathologically wrong with this individual, which is what prompted the writing of this paper. Before the pathology is described, it would be better to enumerate the measurements

TABLE III

BONE	L R CONDITION		MEASUREMENTS TAKEN	MEASUREMENTS	
	L	R		L	R
				1	2
Scapula	1	broken	unmeasurable		
Humerus	2	good	maximum length	285 mm.	302 mm.
			maximum middle diameter	18 mm.	21 mm.
			minimum middle diameter	16 mm.	17 mm.
			maximum diameter of head	38 mm.	38 mm.
Ribs	1 2	broken	were not measured		
Pelvis	1 1	broken	maximum pelvic height	18.6 mm.	nothing
			diagonal conjugate diameter	164 mm.	present but
			normal conjugate diameter	150 mm.	acetabulum
			sagittal diameter of pelvis		and pubic
			inlet	155 mm.	symphysis
Sacrum	1	in good condition	sacral height	96 mm.	
			sacral breadth	105 mm.	
			maximum diameter of superior body	46 mm.	
Femur	2 1	broken	unmeasurable		
Tibia	1 1	left broken	morphological length		363 mm.
			nutrient foramen lateral		67 mm.
Calcaneum	1	good	maximum length	63 mm.	
			maximum breadth	38 mm.	

There were other bones and bone fragments that were measurable but not measured.

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TABLE IV

CRAINAL MEASUREMENTS AND INDICES

PALATE

length	53 mm.
breadth	36 mm.
depth	16 mm.
maxillo-alveolar length	55 mm.
maxillo-alveolar breadth	58 mm.

CALVARIA

maximum length	90 mm.
maximum breadth	125 mm.
basion-bregma height	133 mm.
minimum frontal breadth	90 mm.

FACE

total height	140 mm.
upper height	74 mm.
basion-nasion	110 mm.
basion-nasosopinale	94 mm.
basion-prosthion	97 mm.
prosthion nasosopinale	15 mm.

ORBITS

height L	36 mm.
height R	37 mm.
breadth L	40 mm.
breadth R	38 mm.
interorbital breadth	24 mm.
biorbital breadth	93 mm.

NOSE

height	62 mm.
breadth	22 mm.
upper breadth	20 mm.
lower breadth	22 mm.

FORAMEN MAGNUM

basion-opisthion	38 mm.
transverse diameter	31 mm.
mean	34.2 mm.

MANDIBLE

bicondylar diameter	112 mm.
height of left ascending ramus	60 mm.
minimum breadth of left ascending ramus	31 mm.
length of mandibular body	
between M1 and 2L	23 mm.
angle	62°

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INDICES

cranial index	73 mm.
length-height index	77 mm.
breadth-height index	93 mm.
total facial index	78 mm.
nasal index	35 mm.
orbital index L	90 mm.
orbital index R	97 mm.
palatal index	67 mm.
maxillo-alveolar index	94 mm.
skull capacity	1298.49 mm.

Unfortunately, these measurements and indices do not mean very much since there is no other skull to compare them with. From the indices it is possible to determine this was a dolichocranic (long headed), euryposopic (broad and low faced), leptorrhine (high and narrow nosed) individual with a leptostaphylic or long and narrow palate, and a small cranial capacity or oligocephalic (University of Texas). There is no way to determine if this is the norm or if this was a variant individual. He was certainly variant pathologically, however.

The two most notable injuries are a depression on the right side at the juncture of the frontal and parietal bones and the odd wearing of the teeth on the left side. Besides these, one discovers on closer examination, a depression in the left orbit beside the upper part of the nose, extreme infection of the teeth, and a smaller depression behind the larger on the parietal bone.

It is impossible to determine what caused the trauma. About the only two things that can definitely be determined are that it happened a number of years earlier and was not trepanning. The reason these conclusions were reached is that the bone has healed over entirely, and a blow strong enough to cause such damage was probably strong enough to shatter it. If this were the case, it would take a number of years for the bone to grow back as well as it did. On the other hand, the bone was probably not totally destroyed because the suture is still intact. This is what leads me to believe trepanning is not the cause of the depression. If the section were totally removed, as it would have been with trepanation, then the suture would probably either be non-existent or very indistinct. Consequently, trauma of some sort is the logical conclusion.

In spite of having completely healed over, the bone is very thin here and the convolutions on the interior are indistinct. This led to the question of whether that blow may have caused paralysis or in some way affected the motor operations of this individual. This is a particularly valid question in light of the angular wearing of

the teeth on the left side which could have well been caused by motor disturbances causing the individual to chew in such a way as to use those teeth almost to exclusion. It is certainly a possibility, but, when one takes into consideration all the circumstances of the mouth, it does not seem to be the best one. Three of his palatal incisors are missing and apparently were lost at a very early age, since there is no sign of where the roots were in the bone. Consequently, the individual had a severe protrusion of the mandible, putting the mandibular incisors over where the palatal incisors would have gone. This threw his entire mandible out of normal occlusion, putting the outside cusps of the mandibular molars on the outside of the outside cusps of the palatal molars on the left side. This is completely the reverse of normal occlusion. With his left side so maloccluded, the molars would have worn each other down.

Another possibility is that he inherited his "jutting jaw" which would have caused the same process. If either of these were the case, which seems likely, his face would not have been thrown out of line, which it is not. Another reason why this would appear to be the case is that it would have taken practically his entire lifetime to wear his left molars down to that great an extent. I do not believe the trauma happened early enough to cause that. On the other hand, if a motor disturbance were the cause, his face would have a drastic alignment toward the left, which it does not.

Besides having a malocclusion, this individual had severe periodontal and periapical infection of the teeth. His left second and third palatal molars, all the right palatal premolars and molars, right mandibular molars and left first mandibular molar had severe periodontal infection. The left first palatal molar, second premolar, canine, right second premolar and first molar, and left mandibular second and third molars had periapical infection. The main difference between the two forms of infection is that periapical is infection of the nerve which eventually destroys all bone in contact with it and periodontal is infection of the gums and spongy bone beneath. This particular individual had lost six teeth to these infections and the only remaining teeth he had that were uninfected were the four mandibular incisors.

The last pathology to be brought up is that of the depression in the left orbit. There are three possibilities of what may have caused it. The first is that it could have been a tumor of the lachrymal gland. If that were the cause, it would have most likely been malignant and may have contributed to his death. However, this possibility is the least likely, simply because lachrymal tumors are rare, almost to the point of non-existence.

A second possibility is that a polyp could have grown from his nose into the orbital region. However, this would probably not have

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happened because polyps grow along the lines of least resistance, and to invade the orbital region, it would have to destroy bone. More likely it would have grown down the nose or the back of the throat.

The third alternative, and the one that best fits this case has to do with sinusitis. Sinusitis has been discovered to be one of the most prevalent diseases among Indians of this area. Since that is the case, this individual may well have had it (Wakefield and Dellinger: 1940). In severe cases, when the sinuses are infected continuously for long periods of time, the bone can be destroyed through decay from the infection. Often in a case like this, a benign tumor will invade surrounding areas. This particularly happens with frontal and maxillary sinuses (Thoma, 1946: 932).

The first two possibilities are not entirely out of the question, but since sinusitis was a common infection found in the native Americans of this area, the third alternative explains the orbital depression better. This is particularly so because the depression is immediately beside the left frontal sinus.

CONCLUSION

The first conclusion to be stated is that no conclusion can be drawn from these three burials, archeologically. Since the first two had no controls, they are practically useless except to study for whatever morphological, physiological, or genetical problems one may want to investigate concerning Indians of Northwest Arkansas. Although the third had controls, it had been redeposited, thereby destroying all context, so the same can be said about it.

In my observations I was able to determine the Burials I and II contained parts of probably four individuals, one of whom was female and all of whom were young. Since the burials were so fragmentary and lacking in pathology and context, little besides that can be said.

In concluding on Burial III I would add that the skull, sacrum, and right pelvis probably belong to each other, although that is not completely ascertainable. It seems logical, since there are only two individuals and those three parts are approximately the same age, that they would have gone together. As for the skull itself, it would be safe to say that this individual lived in severe pain all of his adult life. Why he did not die before he did is a point worth pondering.

The pathology of the skull is what prompted this paper and it has been intriguing following this through. It would be interesting to find another skull with similar oral pathology to compare this one with and find out if these theories have any substantiation.

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