ANALYSIS OF HUMAN SKELETAL REMAINS FROM THE HISTORIC EUROAMERICAN RHOADS CEMETERY (12-Ma-777), INDIANAPOLIS, MARION COUNTY, INDIANA

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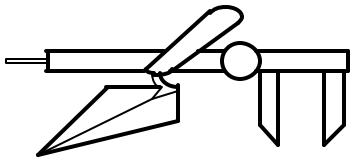

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ABSTRACT

This report summarizes the analysis of human remains from a 19th century cemetery in central Indiana, excavated in late 1996 and early 1997 by contract archeologists. A total of 43 inhumations and one cremation were removed and subsequently processed and examined by osteologists at the University of Indianapolis Archeology & Forensics Laboratory. The condition of the remains is typical of 19th century coffin interments in northern and central Indiana, with numerous subadults and adults being well-preserved. No unusual taphonomic processes were identified, although two children interred in iron sarcophagus coffins still presented traces of soft tissues and displayed exquisite preservation of fragile skeletal structures. Biological analysis indicates that 31 individuals are subadults and 13 are adults. The majority of subadults fall in the one to two year age range, and only one adolescent is represented in the assemblage. The adults fall primarily in the middle to older adult age range and include both males and females. All available indicators suggest that the interred are of European ancestry and are of average body size and robusticity for 19th century American populations. Only a few pathological conditions are noted, the most severe of which is a case of osteomyelitic infection of the pelvis of an older adult female. Seven adults and three subadults display mild, remodeled periostitic lesions, expressed primarily on the long bones of the lower extremities. Cribra orbitalia is seen in orbits of five of the subadults, suggesting slight anemic conditions. Little antemortem trauma is present in the assemblage. Growth disruptions of the tooth enamel (hypoplasias) are common but not particularly marked when present. Carious lesions and antemortem tooth loss are common in the adults. In general, the pathological and dental data suggest that the Rhoads individuals were relatively healthy, experiencing only mild to moderate bouts of inadequate nutrition and disease. Our conclusion is that the assemblage offers much for future research, and we assign it a high scientific value.

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EDITOR'S NOTE

This report was originally included as an appendix to the comprehensive site report prepared by NES. In 1999, at the request of Duke Realty, all of the remains and artifacts from the Rhoads Cemetery were reburied in Crown Hill Cemetery in Indianapolis.

Kreinbrink J (1999). The Rhoads Cemetery, Marion County, Indiana. Report submitted to Duke Realty Investments Inc., & the Division of Historic Preservation & Archaeology of the Indiana Department of Natural Resources, Indianapolis IN. Natural & Ethical Environmental Solutions.

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I. INTRODUCTION

The senior author was first contacted in August 1996 by archeologists from NES Inc., a consulting firm in Blue Ash, Ohio. Assistance was requested in the analysis of remains from an abandoned historic cemetery located near the Indianapolis International Airport, just east of I-465 in Wayne Township. Disturbed headstone fragments believed to represent up to 6 burials had been located during a survey of the property, which was slated for development by Duke Realty Investment Inc. Background research had provided little information on a cemetery at that spot.

Excavation at the site began on November 5 under Permit No. 96-0062 from the Division of Historic Preservation and Archaeology of the Indiana Department of Natural Resources, issued to NES. Our associated case number is UI-43-96. Nawrocki was retained as site osteologist, and students from the University of Indianapolis assisted in the fieldwork. By mid-December, 36 burials had been removed from the site, including one commercial cremation and two iron sarcophagus caskets (Table 1). One of the 36 (Burial D12) contained no surviving human bone. In February 1997, NES returned to the site and removed an additional 9 burials, which were transferred to the University of Indianapolis in March. During the course of our analysis we therefore examined a total of 43 skeletonized inhumations and one cremation.

With only 3 exceptions, all of the human remains were recovered from their primary interment spots. Portions of Burial D13 were recovered *ex situ* after inadvertent disturbance by the backhoe. In addition, on April 24 1997, Nawrocki accompanied Indiana State Archaeologist Dr. James Jones to the site and found a handful of bone fragments on the surface of a backdirt pile near the southeast corner of the site. We have assigned the letter "G" to these remains. Finally, on August 4 1998, Jones and Nawrocki recovered a single juvenile cranial fragment ("H") along the southern edge of the site.

All of the burials appear to have been typical 19th century EuroAmerican interments, oriented in an east-west direction with their heads to the west. A total of 6 distinct rows of burials were uncovered, with Row A being the eastmost row and Row F being the westmost row. Burials within each row were denoted with the row letter and a number (i.e., A3, or F5). A mix of both hexagonal wooden coffins and rectangular caskets were present, some having been placed within a rectangular shipping crate. A number had glass viewing windows, and an array of coffin hardware items and personal belongings were recovered during the excavation.

This report, which only addresses the analysis of the skeletal remains, is divided into two main parts. The first presents our analysis of the Rhoads assemblage as a whole. Our methods and results are generally interwoven in the narrative rather than being separated into different sections, a strategy that we think helps to establish continuity between our theoretical orientations and the resulting interpretations. When a specific researcher contributed significantly to a particular aspect of the analysis, he or she is identified in the relevant section. The second part of the report gives, in appendix format, more detailed descriptions and findings for each burial separately. The great mass of raw metric and discrete data that has been collected to date on each skeleton has not been included but may be made available to researchers on request.

TABLE 1: Summary of Burials from the Rhoads Cemetery.

Burial	Bones?	Status	Excavated	Notes
A1	yes	subadult	Nov 1996	
A3	yes	subadult	Feb 1997	
B1	yes	adult	Nov 1996	
B2	yes	subadult	Nov 1996	
B3	yes	subadult	Nov 1996	
B4	yes	adult	Feb 1997	
B5	yes	subadult	Nov 1996	
B6	yes	subadult	Feb 1997	
B7	yes	subadult	Feb 1997	
B8	yes	subadult	Feb 1997	
B9	yes	subadult	Nov 1996	
B10	yes	adult	Feb 1997	
C1	yes	subadult	Dec 1996	
C2	yes	adult	Feb 1997	
C3	yes	subadult	Feb 1997	
C4	yes	subadult	Nov 1996	
C5	yes	adult	Feb 1997	Plaque: "John Rhoads / Died Nov. 23 1860"
C6	yes	subadult	Nov 1996	
D1	yes	adult	Dec 1996	Glass viewing window
D2	yes	adult	Dec 1996	
D3	yes	subadult	Dec 1996	
D4	yes	subadult	Dec 1996	Glass viewing window
D5	yes	adult	Dec 1996	
D6	yes	subadult	Nov 1996	Iron sarcophagus coffin
D7	yes	subadult	Nov 1996	Iron sarcophagus coffin
D8	yes	subadult	Nov 1996	
D9	yes	adult	Dec 1996	
D10	yes	subadult	Dec 1996	Glass viewing window
D11	yes	subadult	Dec 1996	Glass viewing window

TABLE 1: Summary of Burials from the Rhoads Cemetery (continued).

Burial	Bones?	Status	Excavated	Notes
D12	no	subadult?	Dec 1996	Artifacts only, no remains recovered
D13	yes	subadult	Nov 1996	Partially disturbed by backhoe
D14	yes	adult?	Nov 1996	Cremation, urn reads "Wm. Rhoads / 1906"
E1	yes	adult	Nov 1996	Glass viewing window
E2	yes	subadult	Nov 1996	
E3	yes	subadult	Nov 1996	Glass viewing window
E4	yes	subadult	Nov 1996	
E5	yes	subadult	Nov 1996	
E6	yes	adult	Nov 1996	Glass viewing window
E7	yes	adult	Nov 1996	Glass viewing window
E8	yes	subadult	Dec 1996	
F1	yes	subadult	Nov 1996	
F2	yes	subadult	Nov 1996	
F3	yes	subadult	Nov 1996	
F4	yes	subadult	Nov 1996	
F5	yes	subadult	Nov 1996	
G	yes	mixed	Apr 1997	Bone fragments recovered *ex situ* east of A-row
H	yes	subadult	Aug 1998	Bone fragment recovered *ex situ* south of B-row

II. GENERAL PROCEDURES

1. Basic Laboratory Processing

Cleaning. Upon arrival at the lab, all bones and artifacts were first assessed for immediate stabilization needs. Packaging that might have retained moisture (plastic, aluminum foil) was exchanged for breathable paper. Adhering soil matrix was removed with wooden probes or, if very muddy, rinsed off with tap water and cleaned with soft bristle and sponge brushes. The bones were then allowed air-dry on screens for at least a day before being repackaged. Damp paper sacks were traded for fresh ones, although relevant provenience information written on each original sack was clipped and kept with the remains. Each burial was given its own box for temporary storage, with paper sacks remaining open at the top to facilitate air flow.

Once stabilized, remains were allowed to dry thoroughly before being processed again, usually for a period of weeks or months. Complete drying allows the bone to regain some of its original hardness, helping it to survive further processing. As little water as possible was used in the final cleaning process, to minimize additional degradation. Those skeletons that had arrived in a muddy state had already undergone significant cleaning and generally did not require as much work as burials that had arrived dry.

All cleaned bones greater than about one centimeter in size were numbered with an accession number to facilitate tracking and inventory in the lab. The accession number "96.40" was assigned to the assemblage, with an additional suffix denoting the burial number (i.e., "96.40.E2"). The "96" prefix denotes the year, while the "40" denotes the 40th assemblage accessioned into the University collection in that year. Numbers were written in black ink, using either a 005 Micron Pigma pen or a quill pen and India ink.

Some burials were accompanied by various amounts of burial matrix that had been collected along with the bones in the field. This soil was screened through 1/4" and 1/8" wire mesh in order to recover small bone fragments and tiny artifacts. Soil samples taken for pH testing were allowed to air-dry thoroughly and were then stored in plastic film canisters.

Preservation. After numbering, the skeletal remains were preserved in a solution of Acryloid B-72 plastic consolidant using acetone as the solvent. Perfusion was conducted for at least 30 minutes under a light vacuum that was produced with a manual food processing pump. The vacuum was increased slowly until the specimens stopped releasing bubbles, indicating that the solution had entered the cell spaces deep within the bone. Some bones (such as complete adult femora) were too large to fit into the vacuum chamber, so these were conserved by brushing the preservative directly onto the bones or by letting them soak overnight in an open container in a closed fume hood. Most elements were preserved using a 7 to 10% solution by weight. However, especially fragile bones received a second treatment with a 15% solution. Many of the broken ends of the long bones of both subadults and adults were dipped into the thicker solution to stabilize the spongy bone. A sample of bone from each burial (usually undiagnostic rib fragments) was left unpreserved for possible future biochemical or trace-element analysis.

While time-intensive, preservation in a quality consolidant adds considerably to the curational life of the specimens. The repeated handling and jostling during the analysis phase of the project invariably degrades the bones surfaces and edges, resulting in irreplaceable biological data loss. If needed, the plastic can be removed by soaking the bones in acetone. If applied properly, Acryloid remains non-sticky, does not yellow, and does not produce undue glare on the surface of the bone.

Articulating bone fragments were glued together with Duco cement. Since Duco dissolves in acetone,

refitting was conducted only after remains had been conserved in Acryloid. Most of the reconstruction effort focused on specific diagnostic elements. For example, much more attention was given to the cranial vault and face, the jaws, long bones, and the pelvis than was devoted to ribs, vertebrae, or the hands and feet.

Iron coffin burials. Subadult Burials D6 and D7 were transferred directly to the lab still enclosed in iron coffins. The seals had been compromised and so both had a considerable amount of water and fine sediment within. The small metal faceplate and glass viewing plate of Burial D6 was loose, allowing entry at the head end of the coffin. The sediment and remains were gently removed with a scoop and immediately placed in a sink on 1/8" wire mesh. Adhering particles were rinsed off with tap water and the remains were transferred briefly to a bleach-water solution, to kill any viable pathogens. Then the bones and artifacts were placed in a moving water bath for 15 minutes to wash out the bleach. After cleaning with soft brushes, the bones were immersed in a 50% ethyl alcohol solution for 10 minutes and then again in a 95% solution, to help remove the water. Finally, all elements were allowed to air-dry on screens. No additional cleaning was needed before preservation and reconstruction. Biohazard precautions (gloves, masks) were used at all times.

The screws that hold the faceplate of Burial B7 in place could not be loosened. University maintenance personnel used a rotary saw to cut through the bolts that hold the top half of the coffin onto the lower half. The lid could then be removed in its entirety, completely exposing the remains within, which were processed as described above.

Soil pH. A number of soil samples had been taken from the burials, primarily from below the thorax and pelvis. All samples were tested by a single researcher (Thew). First the dried soil was broken into small fragments and any pebbles and roots were removed. Each sample was then weighed and mixed with an equal amount of distilled water in a clean beaker. From 5 to 50 grams of soil was used in each test. Each solution was allowed to sit for 30 to 60 minutes and was tested with a Fisher digital pH meter or litmus paper, depending on how much solution was available (the meter was not reliable on the smallest samples). The meter sensor wand was placed in the solution for up to 20 seconds, until the reading stabilized. The meter was recalibrated with a 7.00 pH neutral buffer solution after every 5 sample readings. Between readings the sensor wand was placed in distilled water, which gave a variable reading ranging from 6.83 to 7.03.

We have used this method of establishing the pH of a soil sample for a number of historic cemeteries in the Midwest (Nawrocki & Thew, n.d.). The method differs slightly from that employed by Gordon & Buikstra (1981), who used twice as much water as soil. To compare the two methods, we randomly re-tested 5 of the Rhoads soil samples using one part soil to two parts water. The re-test results are provided in Table 2. Two of the samples produced slightly higher pH values, two produced slightly lower pH values, and for one sample the test / re-test values were identical. Thus we conclude that no significant bias is introduced by using less water.

Nonhuman remains. Two burials produced non-human skeletal remains. Burial C1 includes a complete radius, metacarpal, and two fragments of ulna from a small adult mustelid, probably a skunk. Burial E6 includes two articulating, butchered (sawed) fragments of the right premaxilla of a juvenile pig. An unerupted tooth is still present in the jaw.

2. Scope & Organization of the Skeletal Analysis

In general, we follow the protocol for osteological data collection and analysis as outlined by Buikstra & Ubelaker (1994), with additional guidelines provided by Moore-Jansen et al. (1994). Modifications to this protocol are made according to the specific skills and research interests of the lab personnel, the availability of specialized equipment, funding and time constraints, and the specific circumstances of the case at hand.

The analysis of the Rhoads assemblage was conducted with the following goals in mind:

(1) to prepare an inventory of the remains;

(2) to describe the condition of the remains;

(3) to provide basic biological information on each individual;

(4) to identify unique or interesting patterns of morphological variation;

(5) to determine the age and sex distribution of the sample;

(6) to assess patterns of health and disease in the sample;

(7) to determine if the identities of the interred can be ascertained;

(8) to assess the overall scientific value of the assemblage and its future research potential.

To these ends, our analysis of the Rhoads skeletons includes, when possible, a reconstruction of the taphonomic and biological profiles of each individual as well as an informal assessment of the demographic profile of the sample.

The taphonomic profile. 'Taphonomy' is the study of the forces and events that come to bear on animal remains at and after the time of death, and how these forces remove biologically-meaningful information from the remains (Nawrocki 1995). A 'taphonomic profile' is thus a reconstruction of the postmortem history of the remains. Taphonomic analysis is used to separate perimortem trauma from postmortem 'pseudotrauma,' to identify specific cultural interment practices, and to help assure that the biological and (especially) demographic profiles are unbiased.

The biological profile. Osteologists construct a series of parameters for a skeleton, based on its morphological characteristics, which are used to describe the probable biological traits of the living individual. This 'biological profile' typically includes an assessment of sex, ancestry (race), age at death, stature, body size and robusticity, pathological conditions, antemortem trauma, and dental health.

The demographic profile. When the biological profiles are assembled for all of the skeletons, one can construct a 'demographic profile' for the sample as a whole, which may include an assessment of the age and sex distributions, fertility, and mortality. The demographic profile may allow one to infer something about the structure and health of the parent population from which the study sample was derived. Demographic inferences are presented at relevant points during the presentation of the biological data.

III. TAPHONOMIC PROFILING

Since the majority of the Rhoads skeletons were recovered from intact, intentional subsurface coffin interments, the nature and range of taphonomic forces coming to bear upon them is somewhat different than we might expect to see in highly disturbed contexts (Nawrocki 1995). Issues of differential preservation -- both within the cemetery and compared to other cemeteries in the Midwest -- become the primary focus of the taphonomic profile.

1. Overall Preservation

Methods. Three aspects of overall bone preservation are reported on here: condition, completeness, and delamination. A single researcher (Weiler) examined and scored the **condition** of each skeleton according to the following criteria:

(1) **Excellent:** all regions of the skeleton are present with little or no fragmentation or erosion; major diagnostic elements, if broken, can be fully reconstructed with minimal distortion; numerous standardized measurements, particularly long bone lengths, pelvic, and scapular measurements, can be taken. This category does not necessarily imply perfect preservation (numerical score = 4);

(2) **Good:** all regions of the skeleton are present, although some regions may be poorly represented due to missing pieces; fragmentation and erosion is present but not severe; some measurements can be taken but are limited primarily to midshaft diameters (numerical score = 3);

(3) **Fair:** all or most regions of the skeleton are present but many bones are highly fragmented; erosion is moderate; only a few measurements can be taken (numerical score = 2);

(4) **Poor:** regions of the skeleton are missing; elements are highly fragmented; erosion is severe; no measurements can be taken (numerical score = 1).

Criteria for adults and children differed slightly but followed the same basic principles. Since all skeletal regions are present in nearly every adult, more attention was paid to the number of measurements that could be taken and the amount of fragmentation. Skeletons with little or no bone remaining were assigned a numerical score of '0.'

Completeness is an estimate of the percentage of bone mass that is still present, whether the individual elements are whole or fragmented. A single researcher (Williamson) scored each burial for completeness, rounding the estimates to the nearest 5%.

Delamination is a specific condition that may occur when wet bone dries rapidly. The cortical bone in the shafts of long bones is formed from two different layers. The outer layer is relatively thin and is comprised of circumferential lamellae that wrap continuously around the shaft, like the bark on a tree. The deeper, more substantial part of the cortical bone is comprised of numerous osteons or tiny cylinders of bone that are densely packed. The interface between these two layers becomes unstable when the outer circumferential layer dries more quickly than the deeper layer. Differential contraction occurs, producing

longitudinal, superficial cracking along the length of the shaft. The circumferential layer begins to flake off of the deeper osteon bone, producing splinters that are typically a few centimeters long, half a centimeter wide, and a millimeter thick. Delamination was scored for each burial by a single researcher (Weiler) as **absent** (numerical score = 0), **slight** (numerical score = 1), or **severe** (numerical score = 2).

Scores for condition, completeness, and delamination for each Rhoads individual except the cremation (Burial D14) are summarized in Table 2, along with depth and pH data. The "Preservation" subheading included on the burial forms in the appendix provides more specific information about each skeleton, including the condition of the cranium and long bones, the presence of teeth, and an identification of missing body regions. A summary of any unusual findings may be given under the "Taphonomy" subheading.

Results. Fortunately, a large number of the skeletons (n = 23) are in excellent or good condition, permitting thorough biological analysis for over half of the assemblage. Many of these (n = 17) are subadults, which would be expected to survive less well than adults because of their small size and incompletely ossified skeletons. Burials D10 and D12 were scored as '0' because of their extremely poor preservation.

Following a method presented elsewhere by the senior author (Nawrocki 1995), we tested the effects of different variables on preservation with ANCOVA (ANalysis of COVAriance), using the statistical package SYSTAT 5.2.1 for the MacIntosh. The model employed is:

CONDITION = STATUS + DEPTH

where CONDITION (scored from 0 to 4) is the dependent variable. The independent variables include the main effect STATUS (scored as "subadult" or "adult") and the DEPTH of the base of the burial below ground surface (measured in centimeters, as provided by NES), entered as a continuous covariate. Burials D6 and D7 were excluded from the analysis because they were interred in iron coffins and thus decomposed under very different conditions compared to the wooden coffin burials. Depths were not available for Burials C1 and D13 and these were excluded as well. Thus the total sample is 40 skeletons. The results are as follows:

Variable	F-ratio	p-value
STATUS	0.627	0.434 (not significant)
DEPTH	1.678	0.203 (not significant)

It does not appear that either STATUS or DEPTH significantly influences the conditions of the skeletons within the Rhoads assemblage.

Some statisticians would probably consider this ANCOVA model to be a rather weak test of associations because the dependent variable, while theoretically modeling a continuous distribution, is really categorical. Being a percent, the completeness variable, however, is continuous, and it can be used as the dependent variable in an identical ANCOVA analysis:

COMPLETENESS = STATUS + DEPTH

TABLE 2: Summary of Preservation, pH, & Depth for Each Burial. Burial D14 (the cremation) is not included. pH values in parentheses indicate re-test samples, while those followed by an "L" indicate samples tested with litmus paper (see text). Depth values are in centimeters below surface.

Burial	Condition	Completeness	Delamination	pH	Depth
A1	4	80	0	-	121
A3	1	30	0	7.61	124
B1	2	70	1	-	130
B2	4	90	2	-	125
B3	3	70	2	7.52	129
B4	3	90	2	7.58	139
B5	1	10	1	-	103
B6	2	90	1	7.45	129
B7	1	40	1	-	109
B8	1	30	0	7.67	109
B9	2	40	0	7.15	112
B10	0	90	2	7.58	129
C1	3	40	0	7.26	-
C2	4	75	1	7.56	96
C3	2	75	2	7.55	100
C4	1	50	0	7.23 (7.23)	113
C5	2	60	2	7.36	98
C6	4	80	0	7 L	68
D1	3	90	0	-	107
D2	4	90	0	7.53 (7.68)	85
D3	1	40	2	6.5 L	121
D4	1	30	0	7.53 (7.39)	56
D5	1	60	2	7.47	121
D6	2	90	0	-	-
D7	4	90	0	-	-
D8	3	80	0	7.34	77

TABLE 2: Summary of Preservation, pH, & Depth for Each Burial (continued).

Burial	Condition	Completeness	Delamination	pH	Depth
D9	1	85	2	7.43	122
D10	0	1	-	-	66
D11	1	40	1	-	68
D12	0	0	-	-	67
D13	3	75	1	-	-
E1	2	90	0	7.53 (7.38)	135
E2	3	80	0	6.3	86
E3	4	90	1	6.84	61
E4	4	90	2	-	41
E5	4	90	0	-	54
E6	1	70	0	7.3	70
E7	4	95	0	-	92
E8	4	80	1	7.19	86
F1	4	75	0	7.1	48
F2	4	90	2	7.28 (7.36)	42
F3	3	80	1	-	55
F4	1	15	1	-	36
F5	3	90	0	-	59

Because the same burials were excluded, the sample size is identical to that used in the previous test (n = 40). The results are as follows:

Variable	F-ratio	p-value
STATUS	4.929	0.033
DEPTH	0.090	0.765 (not significant)

In this test STATUS reaches significance (as indicated by its p-value of less than 0.05) while DEPTH does not. The adjusted least squares means for the two subgroups of burials in the STATUS variable are:

Subgroup	Mean	N
Subadults	56.37	28
Adults	79.64	12

where "Mean" is the average completeness (percent of bone present) for each subgroup. The results indicate that subadults are significantly less well preserved than adults.

The data for delamination indicate that a little more than half (n = 22) of the scorable burials (n = 42) display at least slight splintering, with subadults (15 of 30) and adults (7 of 12) being affected about equally.

A total of 26 burials are accompanied by soil samples (Table 2). Obtained pH values vary from 6.30 to 7.67, with a mean of 7.30. These values range from slightly acidic (less than 7.0) to slightly basic (greater than 7.0), with the majority (22 of 26) falling in the latter category. Because acids in the soil dissolve the mineral component of bone, a slightly basic microenvironment should result in better skeletal preservation, all else being equal.

A Spearman's ranked correlation between pH and condition does not reach statistical significance (rho = -0.25, n = 26, $p < 0.4$), nor does a Pearson's correlation between pH and completeness (r = -0.02, n = 26, p = 0.916). Simultaneously controlling for STATUS and DEPTH using an ANCOVA model with either condition or completeness as the dependent variable does not produce significant results for pH, although the sample size is admittedly small. Thus soil pH does not appear to strongly affect the preservation of individual skeletons within the Rhoads Cemetery.

2. Iron Coffin Burials

The iron coffins created an interesting set of postmortem environmental conditions that led to a very different pattern of preservation of individuals D6 and D7. For example, while many of the bone surfaces of these two children display erosion of the cortical surfaces (caused by immersion in water?), a large number of very tiny epiphyses, comprised primarily of spongy bone, were recovered intact. The fragile bones of the facial skeleton, including the nasal conchae, ethmoid, and sphenoid, are exquisitely preserved. These various elements are only rarely encountered in wooden coffin interments. Many of the bones display reddish iron-staining on some surfaces. In addition, a blue crystalline precipitant formed on the remains as they were drying. This material has not yet been analyzed, but it may be a byproduct of an interaction between the bleach we rinsed the remains in and a latent chemical in the bones, such as embalming fluid.

Also present in the iron coffins were traces of soft tissues. As the water and sediment was being screened, we noted a significant amount of greasy, clumpy material that probably represented rehydrated

tissues and decomposition fluids. Brain material was also present in the cranial cavities, being pinkish-gray and having a consistency of soft cheese. All of these soft tissues disintegrated upon examination and could not be preserved. However, clumps of light-colored, slightly curly hair measuring a few inches in length could be saved from Burial D6. The hair was air-dried and packaged in plastic. A few hair fibers were also noted in Burial D7 but could not be saved. Burial D6 contained a fragments of soft, cream-colored friction skin with many of the ridges still identifiable, probably from a foot. We tried to save it by immersing it in a special preserving fluid (ethyl alcohol, distilled water, & sodium carbonate), developed for forensic casework (Schmidt, Nawrocki, & Williamson 1996). Unfortunately, over a period of months the tissue began to mechanically disintegrate under its own weight at the bottom of the vial, and it was eventually discarded. However, three toenails were salvaged from the tissue and remain in good condition.

After burial, it is likely that the iron coffins retained their integrity for some years, allowing the remains to mummify slowly in a fashion commonly seen in above-ground burial vaults. Dehydration would have been accelerated if the bodies had been embalmed, a process that removes water from the tissues. Skin, hair, muscle tissue, and internal organs would have survived in this microenvironment. When the seals around the lid and faceplate finally began to leak, most of the tissues would have become rehydrated, initiating another phase of decomposition.

Interestingly, a number of fragments of hardened, brittle material were recovered from both coffins. This substance is brownish-red and has irregular surfaces but tends to be flattened. We believe that the material is hardened effluent from the decomposing bodies. As the fluid seeped from the soft tissues, it interacted with the iron base of the coffin and eventually dried. For some reason the iron content inhibited rehydration and softening in the water. No soft tissues were noted for individuals buried in the wooden coffins.

3. Other Observations

Other postmortem processes were at work at the Rhoads Cemetery. Burial E6, an adult, displays significant rodent gnawing of the right femur and tibia. A rodent's nest was noted intruding into the coffin during its excavation. Copper-staining of the bone surfaces, caused by contact of artifacts with the skeleton, is present in Burials D2 and E1 (both adults). Root damage is generally minimal. Sunbleaching whitened some of the bone fragments found on the surface (G & H). No evidence of carnivore gnawing or damage from heavy excavation equipment was noted.

An additional phenomenon was observed but not systematically scored. "Coffin wear" can occur in historic burials where the bones rest against the floors of the coffins. The pressure at the interface, caused by the mere weight of the bone combined with moisture, erodes a flat spot on its lower surface. Coffin wear was noted to varying degrees on a number of burials, particularly at the shoulder (dorsal scapula & proximal humerus) and the knee (distal femur & proximal tibia).

The color of the Rhoads remains is typical of historic burials interred in wooden coffins. The bone surfaces are stained a medium to rich chocolate brown, although considerable variation is seen across the assemblage. We believe that this color pattern is caused by leaching tannins from the surrounding wood, carried by groundwater into the bone. The teeth display little mineral staining, which is sometimes observed in cemeteries in southern Indiana.

The cremation (Burial D14) appears to have been commercially prepared, as evidenced by the very small size of the fragments. Commercial cremations are generally ground after being removed from the furnace, to reduce fragment size and to allow efficient packaging in the urn. No diagnostic elements were

recovered, and thus the biological profile for this individual contains minimal information (see appendix). No other indications of burning or cremation were noted in the assemblage.

4. Comparisons with Other Cemeteries

In general, the pattern of preservation of the Rhoads assemblage is quite similar to what we have observed at other historic cemeteries in central and northern Indiana (Nawrocki & Williamson 1995; Nawrocki & Schultz 1998; Judd & Nawrocki 1998). While fractured and mechanically eroded, the bones are solid with minimal chemical erosion and diagenesis. This pattern contrasts sharply with that seen in southwestern Indiana (Nawrocki & Williamson 1993, 1998; Nawrocki, Judd, & Smith 1998; Nawrocki, Schmidt, & Williamson 1996; Nawrocki et al. 1996; Schmidt et al. 1995). In the corridor between Terre Haute and Evansville, historic burials are typically very poorly preserved, with skeletons turning to highly decomposed 'bone meal' that cannot retain its shape or integrity after excavation. Sometimes only tooth crowns survive in this region. We believe that the combination of high soil acidity, poor drainage, and heavy compaction of the clay subsoils produces rapid degradation of bone in the southern part of the state.

No relationship was found between soil pH and bone preservation within the Rhoads Cemetery, although the range of obtained pH values is probably not large enough to have produced a significant effect. When one places Rhoads into the larger context of Indiana cemeteries whose soil matrices vary significantly between them, pH appears to take on a more important role. Soil pH values at cemeteries in the southwestern part of Indiana typically range in the 4.0 to 5.5 (highly acidic) range, and the skeletal remains are generally in poor condition, if present at all. Soil pH values at cemeteries in central and northern Indiana tend to fall in the same neutral to slightly basic range as seen at Rhoads, where the preservation is substantially better (Nawrocki & Thew, n.d.).

A significant relationship between bone preservation and depth below surface has been demonstrated for the Oneida historic cemetery in upstate New York, where deeper burials were much better preserved than shallow burials (Nawrocki 1995). Shallower burials are thought to be differentially affected by plant activity and freeze-thaw cycles. While no such relationship can be demonstrated for the Rhoads Cemetery, the range of depths (36 to 139 cm) was somewhat lower than that observed at Oneida (39 to 170 cm). In addition, nearly all of the New York skeletons were adults, providing a more homogeneous sample with which to test hypotheses. It is possible that simply being a subadult has such a greater effect on preservation that other, more subtile effects (such as those that might be caused by depth and pH) are missed in small samples.

IV. BIOLOGICAL PROFILING

1. Ancestry

Methods. Unfortunately, the detailed assessment of ancestry (geographic origin, or "race") is generally neglected in studies of archeologically-derived skeletal samples. However, careful examination of skeletal characteristics can provide important biological information that augments assessments of ethnic origin based entirely on archeological evidence and historic context. Specific historic cemeteries in North America are known to have contained individuals exclusively of European, West African, Native American, or Southeast Asian ancestry, to list a few of the possibilities. If nothing else, it is appropriate to try to exclude non-

European contributions to a 19th century historic cemetery via biological analysis.

In a modern forensic case, the anthropologist would use both metric and discrete morphological traits to determine ancestry. Metric measurements of the cranium and postcranial elements would be analyzed with computerized discriminant analysis. The results would be augmented or modified through a visual inspection of mid-facial and dental morphology. Unfortunately, it is not always appropriate to apply this highly successful method to historic or ancient remains. Modern computer analysis of metric data is based primarily on 20th century populations, whose body shapes and sizes may differ considerably from groups of people living in the same regions of the world as little as 100 years previously. It is difficult to predict without carefully-controlled studies how accurately the metric data will determine ancestry in these situations.

The fallback method is simply to use discrete traits of the face and teeth, which appear to be less sensitive to short-term (secular) trends in body size and shape. Unfortunately, the facial skeleton is perhaps the least likely part of the body to survive burial, and the use of discrete traits in rapidly-growing juveniles necessitates considerable caution. In the end, ancestry becomes the most difficult part of the biological profile to determine.

When possible, we looked at the following discrete traits in the Rhoads adults: nasal bridge contour, nasal bone projection, nasal aperture width, interorbital distance, nasal sill and spine formation, maxillary alveolar projection, zygomatic projection, zygomaxillary suture form, palatine suture form, oval window visibility, posterior mandibular ramus inflection, incisor shoveling, molar cusp pattern and expression, anterior dental occlusal pattern, and gross dental macrowear pattern. Basic information for each adult is listed on the burial forms in the appendix, under the "Ancestry" subheadings, and the results are summarized in Table 3. Subadults were examined for ancestral traits during the dental analysis and our conclusions incorporate these observations, but the data are not listed in the appendix.

Results. Only a few Rhoads adults preserve enough of the facial skeleton to permit a determination of ancestry. Burials C2 and E7 (a female & male, respectively) are clearly European, while Burials E1 and E6 (both females) and C5 (male) appear to be European but with less certainty. Analysis of the dental remains indicates a low frequency of incisor shoveling in the assemblage and high prevalence of 4-cusped mandibular 2nd molars, accessory (Carabelli's) cusps on the upper molars, aberrant (asymmetrical or vestigial) 3rd molars, and maxillary overbite and overjet. These characteristics tend to rule out Native American ancestry and are consistent with a European derivation. Thus while we cannot completely exclude the possibility that individuals of non-European ancestry may be mixed into the Rhoads assemblage, the overall constellation of facial and dental traits suggests that most are of predominantly European derivation.

2. Sex

Methods. Sex was determined for the Rhoads adults by observing primarily discrete traits of the skull, pelvis, and long bones, as described by standard textbooks on human osteology (i.e., Buikstra & Ubelaker 1994; Bass 1995). These include the following features:

(1) **Skull:** brow development, glabellar projection, mastoid size, supramastoid crest development, nuchal rugosity, external occipital protuberance projection, palate size, chin shape, corpus robusticity, & gonial flare;

(2) **Pelvis:** pubic length, subpubic arch shape, ischiopubic ramus robusticity, ventral arc expression, greater sciatic notch breadth, auricular surface shape and elevation, dorsal pubic pitting, preauricular sulcus expression, & sacral width;

(3) **Long bones:** shaft diameter, cortical thickness, bone mass, & rugosity of muscle & ligamentous attachments.

Generally, traits of the pubic bone are the most reliable. Unfortunately, because of their fragility and position in the body, these elements are frequently broken and unobservable. For reasons described in the previous section, computerized analysis of metric data was not employed to determine sex.

Subadults display little sexual dimorphism before puberty, making sex determination extremely difficult. Two of the authors (Baumann & Nawrocki) attempted to seriate the subadult sample using the elevation of the auricular surface of the ilium and the shape of the chin, traits that have been used with limited success by other researchers to determine the sex of subadults. Unfortunately, we did not feel that these methods could be employed on the Rhoads assemblage with any degree of confidence, and so the attempt was abandoned. Basic information for each adult is listed on the burial forms in the appendix, under the "Sex" subheadings, and the results are summarized in Table 3.

Results. All of the 12 known adults can be sexed with good confidence, with 7 of the burials being female and 5 being male. Pubic bones are available for only 4 individuals (C2, D2, D9, & E1, all females). The remainder of the burials were assessed primarily on cranial and pelvic morphology. Our impression is that the level of sexual dimorphism expressed by the Rhoads adults is consistent with that seen in other 19th century Euroamerican populations.

3. Age at Death

Methods. The estimation of age at death involves a two-part process. First, the remains are examined and specific features are assigned a stage or phase score based on established studies of skeletal development and degeneration. This is the descriptive part of the age estimation process. These descriptive scores can be treated as final data in and of themselves. For example, a group of individuals can be ranked (seriated) according to their dental eruption scores, which arranges them in the presumed order of their ages at death on a scale of dental development. The numerical ranks can be analyzed statistically as if they were actual age data, for example in an analysis of the association of grave goods or pathological conditions with different individuals. The drawback is that the ranking provides only a relative assessment of age at death, not a true chronological age estimate, the latter of which at least in western society is an important component of an individual's social and legal identity.

The second part of the age estimation process involves the assignment of an actual chronological age to an individual based on the developmental traits she expresses. While seemingly a simple step of logic, this task opens the door for considerable error and bias. For example, most studies of human skeletal development are based on 20th century western populations, using rather small sample sizes. These samples may display growth patterns and rates that are very different from other populations around the globe or that have existed through time. Unfortunately, it is nearly impossible to assess whether or not our aging methods are applicable to extinct populations because they rarely include known age at death information. The only recourse is to rely exclusively on seriated ranks and ignore age, or to broaden the

TABLE 3: Summary of Biological Characteristics for Rhoads Adults.

Burial	Ancestry	Sex	Age Range	Target Stature
B1	-	female	35 to 49	5'4"
B4	-	male	20 to 34	5'10"
B10	-	female	20 to 34	5'6"
C2	European	female	35 to 49	5'5"
C5	European?	male	50+	-
D1	-	male	35 to 49	5'9"
D2	-	female	35 to 49	5'6"
D5	-	male	50+	-
D9	-	female	50+	-
D14	-	-	adult?	-
E1	European?	female	50+	5'4"
E6	European?	female	50+	5'3"
E7	European	male	35 to 49	5'10"

likely error ranges of the age estimate to accommodate possible sources of bias.

Because the Rhoads assemblage is rather large, we are able to employ both approaches. Subadults have been ranked in a relative fashion, and the raw rank scorings are provided on each burial information sheet in the appendix. To generate the ranking, all subadult individuals were laid out in the lab and were seriated first via dental development and then by long bone length, epiphyseal development, and petrous bone size. The two rankings were compared and then were assimilated in to a final, combined ranking. The teeth were allowed to contribute more heavily in the rankings, because (1) good comparative data are available in the literature for dental development, (2) dental development can discriminate between different age categories well, and (3) teeth survive better than any other part of the skeleton. At least partial dentitions are available for 26 of the 31 Rhoads subadults. While long bone (diaphyseal) length is a good indicator of age, only about a dozen of the Rhoads subadults had at least one complete humerus or one complete femur, and the other long bones are even more poorly preserved. Midshaft diameters are better represented, with nearly two dozen individuals having this measurement for at least one femur. However, since midshaft measurements are much smaller and cover a much narrower absolute range, discrimination between individuals is more difficult, resulting in numerous ranking ties.

For ranking subadult dentitions, we employ a chart that is commonly used in by osteologists (Ubelaker 1989). This method is summarized in Table 4. A letter or number has been assigned to each stage. The

TABLE 4: Dental Development Stages. After Ubelaker's (1978/1989) modification of the Schour & Massler (1941/1944) visual assessment system of dental development. We have assigned numbers to each postnatal stage. Abbreviations: m = months, y = years; negatives (-) refer to prenatal months.

Dental Stage	Target Age	Error Range	Key Indicators
Deciduous Dentition:			
A	-5 m	+/- 2 m	anterior crowns present; dm1 cusps not coalesced
B	-7 m	+/- 2 m	dm1 cusps coalesced
1	birth	+/- 2 m	dm2 cusps coalesced
2	0.5 y	+/- 3 m	1st adult crowns present (I1 & C1); no eruption yet
3	0.75 y	+/- 3 m	M1 cusps coalesced; di1 crowns erupting
4	1 y	+/- 4 m	di2 crowns erupting
5	1.5 y	+/- 6 m	dm1 then dc1 crowns erupting
6	2 y	+/- 8 m	dm2 crowns erupting
7	3 y	2 to 4 y	dm2 crowns in occlusion; P crowns present
8	4 y	3 to 5 y	M2 cusps coalesced
9	5 y	3.7 to 6.3 y	clefts & roots present on M1
Mixed Dentition:			
10	6 y	4 to 8 y	M1 crowns erupting
11	7 y	5 to 9 y	I1 erupting; M1 crowns in occlusion
12	8 y	6 to 10 y	I2 erupting
13	9 y	7 to 11 y	I2 crowns in occlusion; clefts & roots present on M2
14	10 y	7.5 to 12.5 y	M3 crowns coalesced; P3 & lower C erupting
Permanent Dentition:			
15	11 y	8.5 to 13.5 y	P4 & upper C's erupting; no deciduous teeth
16	12 y	9 to 15 y	M2 crowns erupting; all P's & C's in occlusion
17	15 y	12 to 18 y	M2 crowns in occlusion; M3 crowns erupting
18	21 y	--	M3 crowns in occlusion

mean age at death for each stage becomes the target age for an individual at that level of dental development. Target ages are provided along with the age ranks under the "Target Age," "Dental Stage," "Dental Rank," "Overall Age Rank," and "Age at Death" subheadings on the burial information forms in the appendix. Error ranges for each stage are presented in Table 4.

Adults have been ranked using auricular surface morphology (Lovejoy et al. 1985). These raw rank scorings are provided on each burial information sheet in the appendix. A complete or nearly-complete auricular surface is available for 11 of the 12 non-cremated adults in the assemblage. Our final estimates of

adult age at death commonly took into account a number of other skeletal indicators, including pubic symphysis morphology, cranial suture closure, degree of arthritic degeneration (vertebral spondylitis and diarthrodial osteoarthritis), general bone texture, and dental macrowear. Because it is more difficult to estimate age at death in adults than in subadults, target ages are not given. Rather, a broad life stage is assigned to each skeleton that most likely includes the individual's actual age at death. Definitions of these life stages are given in Table 5. Life stage estimates are also provided for the subadult burials.

Results. The results for adults are presented in Table 3, while those for subadults are presented in Table 6. Data for the whole assemblage are given in Table 7. It is readily apparent that the age distribution is heavily skewed towards young subadults, particularly individuals in the one to two year age range. Very few individuals fall into the older child or young adolescent categories, and none fall in the older adolescent category. This demographic pattern is quite common in 19th century EuroAmerican cemetery populations. Mortality is highest in early childhood, probably reflecting a combination of susceptibility to disease and weaning stress. The large number of subadults, however, is probably more a reflection of high fertility in these rural farming families than it is a reflection of poor childhood health and differential mortality per se. Demographers have recognized that the greater the number of infants being produced, the greater the number of very young individuals who die and are buried in cemeteries. The adult distribution is slightly skewed towards the middle and older age ranges, with only two individuals being classified as young adults. We did notice that the pubic symphysis (available for Burials C2, D2, D9, & E1, all females) tended to produce a higher estimate of age compared to the auricular surface, but the reason for this difference is unknown.

4. Body Size

Methods. Two aspects of body size are addressed in this study: stature and robusticity. Stature (height) was estimated for all adults with at least one complete long bone. While some researchers have developed methods of stature estimation using fragmented long bones, we feel that the error ranges are too wide to provide biologically meaningful information. The choice of regression formulae in the estimation of stature is critical. While state-of-the-art computer applications are frequently employed in forensic casework, these formulae are based primarily on 20th century western populations. During the past 100 years, stature has systematically increased, suggesting that methods based on modern populations will tend to overestimate the stature of 19th century populations. For this reason, in this study we used older equations developed by Trotter & Gleser (1952, 1958), which are based in part on 19th century American samples. We did not correct target estimates for age-related decreases in stature because maximum expressed skeletal stature is a more meaningful biological parameter than corrected statures (correction factors introduce additional estimation error and are only justifiable in forensic situations). Target estimates (rounded to the nearest inch) and likely error ranges are provided under the "Target Stature" and "Body Size" subheadings on the burial information forms in the appendix.

Skeletal robusticity was assessed informally for each adult individual by observing points of muscular insertion, bone density, and cortical thickness. The presence of enthesopathies, or calcifications of the tendons of muscular insertion, was recorded. Any relevant details are provided under the "Body Size" subheading on the burial information forms in the appendix.

TABLE 5: Major Age-Life Stages Employed in this Study.

Stage	Age Range	Duration	Dental Stages	Major Characteristics
fetal	(prenatal)	9 m	A & B	oxygen supplied by mother body supported in fluid large portion of skeleton is cartilaginous
infant	0 to 11 m	1 y	1 to 3	complete dependency on adults many ossification centers still forming limited mobility primitive communication primitive immune & nervous systems
young child	1 to 5 y	5 y	4 to 9	independent mobility / onset of walking molars available / reliance on solid foods rapid body growth continues language development active immunities build
older child	6 to 10 y	5 y	10 to 14	body form similar to the adult permanent teeth begin to erupt slowed body growth reading/writing/ schooling begins beginning contribution to family economy
young adolescent	11 to 14 y	4 y	15 & 16	onset of growth spurt onset of pubescence all deciduous teeth have been lost reproduction possible for first time adult socialization begins
older adolescent	15 to 19 y	5 y	17	completion of full adult dentition attainment of skeletal maturity cessation of body growth social & economic responsibilities approach expectations for adults may begin a family
young adult	20 to 34 y	15 y	18	lack of bony degeneration continued reproductive activity physical strength peaks
middle adult	35 to 49 y	15 y	-	onset of bony degeneration slowing of reproductive activity decrease in physical strength increasing social standing & responsibility
older adult	50+ y	-	-	accelerated bony degeneration no reproductive activity increasing susceptibility to disease decreasing contribution to family economy

TABLE 6: Seriated Ranks of Subadults via Dentition & Overall Development. Burial D10 is not included in the rankings because of poor preservation, but it is clearly an early subadult and would probably rank among the youngest 10 individuals. Burial C1 has only a single tooth and thus it was not assigned a dental stage. In postcranial development it is most similar to Stage 6 individuals.

Burial	Dental Stage	Dental Rank	Overall Rank	Life Stage
B9	-	-	1	fetal
F4	-	-	2	infant
A1	1	1	3	infant
D8	1	2	4	infant
B5	-	-	5	infant
A3	-	-	6	infant
D4	2	3	7	infant
C4	3	4	8	infant
B8	3	5	9	infant
D7	4	6	10	young child
E2	4	7	11	young child
D6	4	8	12	young child
D11	4	9	13	young child
E8	5	10	14	young child
F5	5	11	15	young child
D3	5	12	16	young child
F1	5	13	17	young child
D13	6	14	19	young child
F3	6	15	18	young child
C6	6	16	20	young child
B7	6	17	21	young child
C1	-	-	22	young child
B6	8	18	23	young child
E4	8	19	24	young child
B3	8	20	25	young child
C3	10	21	26	older child
E5	10	22	27	older child
F2	11	23	28	older child
B2	12	24	29	older child
E3	16	25	30	young adolescent

TABLE 7: Age Distribution of Individuals by Life Stage.
Burial D14 is not included, but Burial D10 has been listed as an infant.

Stage	# of Burials	Burial #'s (in numerical order)
fetal	1	B9
infant	9	A1, A3, B5, B8, C4, D4, D8, D10, F4
young child	16	B3, B6, B7, C1, C6, D3, D6, D7, D11, D13, E2, E4, E8, F1, F3, F5
older child	4	B2, C3, E5, F2
young adolescent	1	E3
older adolescent	-	-
young adult	2	B4, B10
middle adult	5	B1, C2, D1, D2, E7
older adult	5	C5, D5, D9, E1, E6

Results. Results for the 9 adults for whom stature can be estimated are provided in Table 3. The three males cluster closely around 5'10", while the 6 females range from 5'3" to 5'6". Although the sample size is too small to permit significant comparison with other skeletal samples from that time period, these results suggest that the Rhoads adults were of average height by modern standards. Postcranial robusticity is similar to what we have observed in other 19th century Midwest populations. In general, both males and females are robust, with marked points of muscular attachment. Enthesopathies are common, particularly at the proximal humerus, where the anterior shoulder muscles (such as the pectoralis major and deltoid) attach. A number of individuals display greater than average ridging along the lateral epicondylar crest of the humerus, where the brachioradialis and forearm extensor muscles originate.

5. Pathological Conditions & Antemortem Trauma

Methods. All bones were first examined by a paleopathologist (Williamson), then checked by the senior author. Standard guidelines for the identification and description of pathological conditions (i.e., Ortner & Putschar 1985) were followed. Because arthritis is a nearly universal age-related degenerative process, it was not addressed as a pathological condition per se. Dental disease is discussed in a separate

section.

Results. Some subadults in the Rhoads assemblage display signs of cribra orbitalia, characterized by excessive porosity of the orbital plates of the frontal bone, against and immediately above the eyeballs. The condition is most marked and active in Burial F2, but can also be seen to various degrees in Burials B6, C3, E3, and F5. Cribra orbitalia has been associated with nutritional deficiencies, most specifically iron-deficiency anemia. The spongy bone of the skull expands to meet the needs of increased red blood cell production, affecting the orbital plates from above. Most of the observed lesions were remodeling (healing) and of only mild extent, suggesting that any nutritional deficiencies were not particularly severe. No porotic hyperostosis of the upper vault bones (another sign of anemia) was noted in any subadult.

In the 12 scorable adults, periostitis is the most common pathological condition affecting the skeleton. Periostitis is an infection that occurs below the periosteum, the tough fibrous membrane that surrounds a bone. Bacterial secretions push against the membrane, elevating it above the bone surface and stimulating the production of disorganized woven bone beneath, which is eventually remodeled (smoothed) after the infection wanes. The remodeled bone takes on an appearance that may range from a thin, low plaque to an elevated bulge or lump, with or without surface irregularities and increased porosity. (We do not generally consider 'striated cortical defects' as indicative of periostitis. Only those lesions that exhibit a clear secondary deposit of bone were scored as periosteal lesions).

Periostitis is present in 7 Rhoads adults (Burials C5, D1, D2, D9, E1, E6, & E7). Nearly all of the lesions are remodeled or healing and are found primarily on the lower long bones (femur, tibia, fibula). Periostitis is observable in only three subadults. Burials E2 and F5 have mild infections of the tibial shafts, while Burial F1 displays a thin plaque in the roof of both orbits, which probably is not related to cribra orbitalia. While some studies have demonstrated elevated frequencies of periostitis in populations that were undergoing chronic nutritional or disease stress, we believe that the pattern and severity of subperiosteal infections displayed in the Rhoads assemblage is not unusual for an otherwise healthy population living before the availability of antibiotics and sterile medical care.

Burial D9, a female, displays a non-specific chronic infection of the right hip that had migrated into the interior of the bone, destroying the spongy material and producing deep pockets of effluent (pus). Know as osteomyelitis, this condition is a serious health risk and resulted in extensive remodeling of all parts of the bone, which is swollen compared to the left side.

Schmorl's depressions ('nodes') result from the herniation of the central core (nucleus pulposus) of the intervertebral disk into the surrounding surfaces of the vertebral bodies. These features are thought to result from heavy lifting and manual labor, but do not necessarily reveal anything specific about the types of activities engaged in. Depressions are present in three Rhoads adults (Burials B4, C2, & D2).

Healed fractures are rare in the Rhoads assemblage, being completely absent among the subadults and present in only four adults (Burials C2, D1, E1, & E6, some of which are questionable). None of the presumed fractures are particularly marked, and none produced severe infections or disabilities.

In general, our impression is that the individuals who comprised the Rhoads population were relatively healthy. While the presence of cribra orbitalia and linear enamel hypoplasias (see later) broadly suggest that children experienced some nutritional and/or disease stress when young, this is not to be unexpected given the time period. Indicators of more severe nutritional stress (i.e., porotic hyperostosis or rickets) were not found. The direct causes of death of these individuals cannot be determined from their skeletal remains, but if the Rhoads population is representative of mid- to late-19th century American society, then most of the deaths probably occurred from fast-onset communicable infectious diseases (influenza, smallpox) that would

have left no marks on the bones. There is no evidence of slow-onset, long-term infectious diseases that would have affected the skeleton, such as tuberculosis or treponemal disease (syphilis). No major developmental anomalies are present. Antemortem trauma is rare and of low significance when present. No perimortem trauma was noted.

6. Dental Health

Methods. A dental anthropologist (Schmidt) analyzed the dentitions and jaws of all Rhoads individuals. Basic indicators of dental health and variability were scored, including:

(1) **LEH's** (Linear Enamel Hypoplasias): defects in the formation of the enamel coating of a tooth, expressed as a thin, elongated horizontal depression or as an irregular pit. They are most commonly seen on the labial (lip) side of the anterior teeth (incisors & canines). Multiple defects may be present on a single tooth. In general, LEH's indicate a metabolic disturbance during the formation of the tooth crown.

(2) **Carious lesions** ("cavities"): defects of the enamel and underlying dentin caused by acids, which are produced by oral bacteria as they break down sugars from ingested foods. Lesions commonly occur on the occlusal (grinding) surface, or interproximally where two adjacent teeth come into contact, or at the juncture of the crown and the root (the neck or 'cervix' of the tooth).

(3) **Abscessing:** a pocket of infection at the tip of a tooth root, eroding a cavern in the bone of the jaw. An abscess can occur if a carious lesion becomes severe enough to allow the introduction of bacteria down into the pulp chamber and root canal of the tooth.

(4) **Periodontitis** ('gum disease'): resorption and recession of the alveolar bone surrounding the root of a tooth, caused by bacterial activity. The process may ultimately result in tooth loss.

(5) **Calculus:** hardened deposits that form along the gumline and necks of the teeth, produced by the chemical interaction of plaque and salivary enzymes.

(6) **AMTL** (Antemortem Tooth Loss): the loss of a tooth before death through, for example, abscessing or periodontitis. The socket heals over and resorbs with time.

Basic information for each individual is listed on the burial forms in the appendix, under the "Dentition" subheading. It should be noted that, in all likelihood, the counts and observations for dental diseases are underestimated because some tooth positions on some individuals are unobservable due to antemortem loss and postmortem damage.

Results. LEH's are fairly common among the Rhoads subadults, with 9 of 23 individuals falling into dental Stages 3 or higher displaying at least one affected tooth (individuals below Stage 3 could not be scored). Of those affected, three individuals (Burials B2, C3, & E3) display lesions of the unerupted adult teeth only. No subadults have LEH's of both the deciduous and the adult teeth simultaneously. Among the Rhoads adults, 8 of 10 individuals with scorable teeth had at least one affected tooth. Most of the LEH's on the Rhoads teeth are only mildly expressed and, when present, occur singly on the tooth rather than as

multiple, successive events.

Carious lesions are infrequent in Rhoads individuals younger than three or four years old. Only one individual through dental Stage 6 (Burial D13) is affected. Lesions become more frequent by Stage 8, with 7 of the 8 oldest subadults having at least one lesion for a mean of 3.1 lesions per person in that age span (range = 0 to 7 lesions per person). Of those affected, most have occlusal caries, although some cervical and interproximal lesions are also present. No abscesses or pathological AMTL were noted for any subadults.

Carious lesions are common among the Rhoads adults. Of the 10 individuals with scorable teeth, all have at least one cervical lesion. Occlusal lesions are less common, with only two individuals affected. The mean is 6.6 lesions of any type per person (range = 1 to 16 lesions per person). Of the 12 scorable adults, four have at least one abscess (Burials B10, D2, E6, & E7). All 12 adults have at least 1 instance of AMTL, with an mean of 9.7 teeth lost per person (range = 4 to 20 teeth lost per person). While we have not calculated frequencies of periodontitis and dental calculus, both are commonly expressed at the mild to moderate level in many Rhoads adults.

Informal examination of occlusal tooth wear indicates an average and moderate amount of macrowear for a 19th century American population, with wear rates greater than those seen in modern Americans but less than those seen in most Native American populations. Dental macrowear is closely associated with both the age of the individual and the amount of fiber and ambient grit in the diet. No highly unusual dental morphological variants were noted.

In general, the dental health of the Rhoads individuals is typical of 19th century American populations. The frequency and expression of LEH's indicates that infants and young children were subjected to mild to moderate metabolic stresses during growth, probably originating from a combination of disease and poor (or inconsistent) nutrition. Attention to dental care appears to have been rather low. Poor cleaning habits allowed plaque and bacteria to accumulate between the teeth, resulting in periodontal disease, cervical caries, abscessing, and antemortem tooth loss.

7. Identification

Methods. The biological profile in and of itself is generally not sufficient to provide a positive identification of a skeleton, even in a modern forensic case. Positive identification requires (1) the presence of highly unique, idiosyncratic morphological variants, and (2) some form of antemortem documentation of those variants, such as dental or medical radiographs. In the absence of this information, the best that can be established is a "presumptive" identification that is consistent with the known biological characteristics of the deceased but which would probably not stand up if challenged in court.

Because antemortem data are normally not available, positive identifications of historic individuals are not common and usually occur only when DNA can be extracted and compared to that of living descendants. While headstones and inscribed plaques provide compelling circumstantial evidence, these data do not themselves establish positive identification of the bones in a medicolegal sense. They do, however, establish working hypotheses that can be tested with biomolecular methods if needed.

For this study, demographic data were derived from the available headstones and from other burial artifacts recovered at the cemetery site. Some of this data was augmented by information obtained through historical research by NES. The biological profiles of the Rhoads skeletons were then compared to the headstone data to look for possible matches.

Results. The following comparisons can be made:

(1) An inscribed metal plaque in Burial C5 indicates that the interred is John Rhoads, who died in 1860. While his age cannot be read, research by NES suggests that John was about 70. Our analysis of Burial C5 is consistent with this information. The individual is male and of advanced age, as indicated by auricular surface morphology (Phase 8, 60+ years). Although this does not attain the level of a positive identification, it does constitute a strong presumptive identification.

(2) The inscribed metal cremation urn designated as Burial D14 indicates that the individual is William Rhoads, who died in 1906. No age is given on the urn, but research by NES suggests that he was 65. Unfortunately, while the raw amount of cremated bone is consistent with an adult, no meaningful biological information can be derived from the tiny fragments and thus the identification remains a weak presumption.

(3) A partial headstone for the "wife of James Rhoads" appears to refer to Hanna Rhoads, who died in 1849 at the age of 85 (data courtesy of NES). Of the females in the Rhoads assemblage, Burials D9, E1, and E6 are the most likely candidates.

(4) A partial headstone describes an adult Rhoads family member who died in 1857 at the age of 51 years 8 months. Burials B1, C2, C5, D1, D2, D5, D9, E6, and E7 are possible matches.

(5) A partial headstone describes an individual who died at the age of 14 (?) years 3 months (a crack in the stone partially obscures the age). If the translation is accurate, individuals in dental Stages 16 and 17 are possibilities. Only Burial E3, the oldest subadult recovered at the site, falls into this range. However, this evidence is not sufficient to establish a presumptive identification.

(6) The headstone for Emma Rude indicates that she died in 1862 at the age of 1 year 8 months. Individuals in dental Stages 5 and 6 are the most likely candidates, including Burials B7, C1, C6, D3, D13, E8, F1, F3, and F5. Due to the degree of overlap in the age ranges, none of these burials is any more likely to be Emma than the others if we go only by the biological data.

(7) The headstone for William H. Rude indicates that he died in 1866 at the age of 7 years 2 months. Individuals in dental Stages 10, 11, 12, and 13 are the most likely candidates, including Burials B2, C3, E5, and F2. Burial B2 (Stage 13) is at the very edge of the error range and is thus the least likely of the group. If we assume that the Rude children were originally buried near each other in the same row, then Burial F2 (for William) and Burials F1/F3/F5 (for Emma) seem to make the most reasonable match.

Of course, these speculations are based on a few tacit assumptions. First, we assume that buried individuals were not being disinterred and reinterred in different cemeteries, as sometimes occurs when families move their homesteads. We assume that burials had not eroded from the south edge of the cemetery into Marrs Ditch below, leaving behind no traces of their existence. Finally, we assume that all burials were recovered in the mitigation effort and that none remain at the site.

V. SCIENTIFIC VALUE

It is our practice to evaluate the scientific value of any assemblage of human remains that we analyze. This assessment can be used to help determine whether the remains should be studied further, curated permanently at an appropriate educational facility, or repatriated. The general guidelines we follow in assessing scientific value have been appended to the end of this report

We believe that the Rhoads assemblage represents a unique and highly valuable collection of human skeletal remains and burial artifacts from the 19th century. We have therefore assigned it a designation of "Extremely High Value." We base our assessment on the following observations:

(1) The study of historic EuroAmerican populations has greatly increased during the past decade, as evidenced by numerous publications devoted specifically to this subfield of osteology (for example, Bell 1994; Saunders & Herring 1995; Grauer 1995).

(2) The size of the sample adds considerably to its scientific vazlue. To our knowledge, it is the largest (if not the only) collection of 19th century skeletons and associated artifacts currently being curated in Indiana.

(3) The number of well-preserved juveniles, especially infants, is unprecedented and offers a unique opportunity to examine the health and lives of the children of historic farming communities in the Midwest.

(4) While the identities of the deceased are still in question, the dating of the cemetery is reasonably well understood and the collection fills a gap that is poorly represented in the osteoarcheology of Indiana.

A number of additional studies can be conducted using the Rhoads assemblage, all of which fell beyond the scope of the current project. A small sampling of these would include:

(1) histological examination of bone thin-sections, to analyze disease processes, growth rates, and aging processes;

(2) biochemical and trace-element analysis to look for systematic indicators of diet and environmental exposure to heavy metals;

(3) statistical analysis of patterns of variation in discrete dental and skeletal traits, to help establish patterns of filial relationship within the cemetery;

(4) comprehensive correlational studies of the different age indicators in the subadults, to compare patterns and rates of growth in different body regions with modern populations;

(5) scanning electron microscopic examination of dental microwear, to learn more about diet.

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VII. CRITERIA FOR ASSESSING SCIENTIFIC VALUE

Our assessment of the scientific value of an assemblage of human skeletal remains is a general estimate of the quantity and quality of scientific data that would be lost upon reburial. The four broad categories that follow are cumulative in nature, although not all points in a particular category may apply equally in a given case. It is the overall constellation of traits that is most important.

Our assessment assumes that all standard data recovery procedures (as outlined by Buikstra & Ubelaker 1994) will be completed before repatriation and that samples of bone will be permanently retained for future study. To the extent that these standards are **not** followed, the scientific value of the remains will **increase** because they will still contain retrievable scientific data. Our assessment **does not** take into account the value of the remains as instructional (anatomical) specimens. To incorporate instructional value, one should increase the scientific value by at least one category.

1. MINIMAL VALUE

- few elements are present
- bones show high fragmentation, poor preservation, or extensive diagenesis
- important biological parameters (sex, age) are unknown due to lack of diagnostic elements
- mixing of individuals is possible and they cannot be clearly separated
- the archeological / temporal context is uncertain or unknown
- **no significant loss of scientific data if repatriated**

2. MODERATE VALUE

- many elements are present, but the skeleton is still incomplete
- bones show fair to good preservation and many can be reconstructed if fragmented
- many diagnostic elements are present and most important biological parameters are known
- the number of individuals is known and most can be separated with confidence
- the archeological / temporal context is known
- **loss of some scientific data if repatriated**

3. HIGH VALUE

- most bones are present and show good to excellent preservation
- all important biological parameters can be ascertained
- interesting elements (such as pathological conditions or unusual variants) may be present
- **significant loss of scientific data if repatriated**

4. EXTREMELY HIGH VALUE

- applies primarily to large collections of well-preserved skeletons but may also include:
- remains from archeological / temporal contexts that are unstudied or under-represented, OR
- skeletons that are positively identified and thus have securely known biological parameters
- **extensive loss of unique scientific data if repatriated**

SPN 7-20-98

Rhoads Cemetery Burial Information Form

BURIAL:	A1	**STATUS:**	subadult
EXCAVATED:	November 1996	**LIFE STAGE:**	infant
CONDITION:	Excellent	**TARGET AGE:**	0 months
COMPLETENESS:	80%	**DENTAL STAGE:**	1
ANCESTRY:	-	**DENTAL RANK:**	1
SEX:	-	**OVERALL AGE RANK:**	3

PRESERVATION: Long bones, teeth, and petrous bones are present.

AGE AT DEATH: Based primarily on dental development. This is the youngest individual with teeth.

PATHOLOGY: Nothing noted.

DENTITION: All teeth are unerupted and are not developed enough for study.

Rhoads Cemetery Burial Information Form

BURIAL:	A3	**STATUS:**	subadult
EXCAVATED:	February 1997	**LIFE STAGE:**	infant
CONDITION:	Poor	**TARGET AGE:**	6 months
COMPLETENESS:	30%	**DENTAL STAGE:**	-
ANCESTRY:	-	**DENTAL RANK:**	-
SEX:	-	**OVERALL AGE RANK:**	6

PRESERVATION: No dental remains or complete long bone shafts are present.

AGE AT DEATH: A femoral shaft fragment is larger than those from Burials A1 and D8 (which are scored as dental Stage 1) but smaller than those from Burials C4 and B8 (which are scored as dental Stage 3). The petrous bone is similar in size to that from Burial B5, which has no surviving teeth but is similar in postcranial size to Burial D4 (which is scored as dental Stage 2). The target age for Burial A3 has thus been extrapolated as if the individual was in dental Stage 2.

PATHOLOGY: Nothing noted.

Rhoads Cemetery Burial Information Form

BURIAL:	B1	**STATUS:**	adult
EXCAVATED:	November 1996	**LIFE STAGE:**	middle adult
CONDITION:	Fair	**AGE RANGE:**	35 to 49 years
COMPLETENESS:	70%	**AURICULAR STAGE:**	4
ANCESTRY:	-	**AURICULAR RANK:**	5
SEX:	female	**TARGET STATURE:**	163 cm (5'4")

PRESERVATION: The cranial vault is reconstructed although the base and face is fragmented. Long bone shafts are good, with a few attached epiphyses.

ANCESTRY: Cannot be determined from discrete traits due to fragmentation.

SEX: Based on cranial and pelvic morphology (no pubic bones).

AGE AT DEATH: Based primarily on auricular surface degeneration. Minimal osteoarthritis, some cranial suture fusion. Lower half of middle adult age range is likely.

BODY SIZE: Stature calculated from maximum length of R femur (440 mm), with a +/-2 s.e. range of 155 to 170 cm (5'1" to 5'7"). The long bones are gracile indicating normal muscularity for a female.

PATHOLOGY: Nothing noted.

ANTEMORTEM TRAUMA: Nothing noted.

DENTITION: AMTL of 4 mandibular teeth. LEH's of 6 mandibular teeth. Cervical carious lesions of 7 maxillary teeth. No abscesses. Calculus is heavy on the maxillary and slight on mandibular teeth. Slight periodontitis.

Rhoads Cemetery Burial Information Form

BURIAL:	B2	**STATUS:**	subadult
EXCAVATED:	November 1996	**LIFE STAGE:**	older child
CONDITION:	Excellent	**TARGET AGE:**	8 years
COMPLETENESS:	90%	**DENTAL STAGE:**	12
ANCESTRY:	-	**DENTAL RANK:**	24
SEX:	-	**OVERALL AGE RANK:**	29

PRESERVATION: Long bones and teeth are present.

AGE AT DEATH: Based primarily on dental development. This is the 2nd oldest subadult in the assemblage.

PATHOLOGY: Nothing noted.

DENTITION: LEH present on 1 permanent mandibular canine. Small occlusal carious lesions of 3 teeth. No abscesses or periodontitis.

Rhoads Cemetery Burial Information Form

BURIAL:	B3	**STATUS:**	subadult
EXCAVATED:	November 1996	**LIFE STAGE:**	young child
CONDITION:	Good	**TARGET AGE:**	4 years
COMPLETENESS:	70%	**DENTAL STAGE:**	8
ANCESTRY:	-	**DENTAL RANK:**	20
SEX:	-	**OVERALL AGE RANK:**	25

PRESERVATION: Long bones and teeth are present.

AGE AT DEATH: Based primarily on dental development.

PATHOLOGY: Nothing noted.

DENTITION: LEH's on the deciduous maxillary central incisors and the mandibular L central incisor are expressed as gross pitting of the coronal-most 3rd of the crowns, leading to significant malformation. The mandibular R canine displays typical localized hypoplasia of the primary canine (LHPC). No LEH's of the (unerupted) permanent teeth. No carious lesions, abscesses or periodontitis. Calculus is slight.

Rhoads Cemetery Burial Information Form

BURIAL:	B4	**STATUS:**	adult
EXCAVATED:	February 1997	**LIFE STAGE:**	young adult
CONDITION:	Good	**AGE RANGE:**	20 to 34 years
COMPLETENESS:	90%	**AURICULAR STAGE:**	2
ANCESTRY:	-	**AURICULAR RANK:**	1
SEX:	male	**TARGET STATURE:**	177 cm (5'10")

PRESERVATION: The cranial vault is reconstructed although the base and face is fragmented. Long bone shafts are good, with a few attached epiphyses.

ANCESTRY: Cannot be determined from discrete traits due to fragmentation.

SEX: Based on cranial and pelvic morphology (no pubic bones).

AGE AT DEATH: The auricular surface is youthful but the vault displays considerable cranial suture fusion. Minimal osteoarthritis. Upper half of young adult age range or lower half of middle adult age range is likely.

BODY SIZE: Stature calculated from maximum length of L femur (480 mm), with a +/-2 s.e. range of 169 to 185 cm (5'6.5" to 6'1"). Average robusticity for a male.

PATHOLOGY: Schmorl's depressions on nearly all thoracic and lumbar vertebral bodies.

ANTEMORTEM TRAUMA: Nothing noted.

DENTITION: AMTL of 1 maxillary and 3 mandibular teeth. LEH of 1 mandibular tooth. Cervical carious lesions of 6 teeth. No mandibular abscesses. Calculus is moderate. Periodontitis at 6 of 11 alveoli.

Rhoads Cemetery Burial Information Form

BURIAL:	B5	**STATUS:**	subadult
EXCAVATED:	November 1996	**LIFE STAGE:**	infant
CONDITION:	Poor	**TARGET AGE:**	6 months
COMPLETENESS:	10%	**DENTAL STAGE:**	-
ANCESTRY:	-	**DENTAL RANK:**	-
SEX:	-	**OVERALL AGE RANK:**	5

PRESERVATION: No dental remains or complete long bones are present.

AGE AT DEATH: The long bone shaft fragments are too small to identify securely. The petrous bone is slightly larger than those from Burials A1 and D8 (which are scored as dental Stage 1) and similar in size to that from Burial A3, but smaller than those from Burials C4 and B8 (which are scored as dental Stage 3). The target age for Burial B5 has thus been extrapolated as if the individual was in dental Stage 2.

PATHOLOGY: Nothing noted.

Rhoads Cemetery Burial Information Form

BURIAL:	B6	**STATUS:**	subadult
EXCAVATED:	February 1997	**LIFE STAGE:**	young child
CONDITION:	Fair	**TARGET AGE:**	4 years
COMPLETENESS:	90%	**DENTAL STAGE:**	8
ANCESTRY:	-	**DENTAL RANK:**	18
SEX:	-	**OVERALL AGE RANK:**	23

PRESERVATION: Long bones and teeth are present.

AGE AT DEATH: Based primarily on dental development.

PATHOLOGY: Mild to moderate porosity and diploic expansion in both orbits (cribra orbitalia).

DENTITION: LEH's (LHPC) of both deciduous mandibular canines, expressed as semi-lunar pits on the buccal aspects of the crowns. No LEH's of the (unerupted) permanent teeth. Interproximal carious lesions of 7 deciduous teeth. No abscesses, periodontitis, or calculus.

Rhoads Cemetery Burial Information Form

BURIAL:	B7	**STATUS:**	subadult
EXCAVATED:	February 1997	**LIFE STAGE:**	young child
CONDITION:	Poor	**TARGET AGE:**	2 years
COMPLETENESS:	40%	**DENTAL STAGE:**	6
ANCESTRY:	-	**DENTAL RANK:**	17
SEX:	-	**OVERALL AGE RANK:**	21

PRESERVATION: Long bones and teeth are present.

AGE AT DEATH: Based primarily on dental development.

PATHOLOGY: Nothing noted.

DENTITION: No LEH's, carious lesions, or abscesses of the deciduous teeth. Calculus is slight. The permanent dentition is not developed enough for study.

Rhoads Cemetery Burial Information Form

BURIAL:	B8	**STATUS:**	subadult
EXCAVATED:	February 1997	**LIFE STAGE:**	infant
CONDITION:	Poor	**TARGET AGE:**	9 months
COMPLETENESS:	30%	**DENTAL STAGE:**	3
ANCESTRY:	-	**DENTAL RANK:**	5
SEX:	-	**OVERALL AGE RANK:**	9

PRESERVATION: Long bones and teeth are present.

AGE AT DEATH: Based primarily on dental development.

PATHOLOGY: Nothing noted.

DENTITION: No LEH's.

Rhoads Cemetery Burial Information Form

BURIAL:	B9	**STATUS:**	subadult
EXCAVATED:	November 1996	**LIFE STAGE:**	fetal
CONDITION:	Fair	**TARGET AGE:**	3rd trimester
COMPLETENESS:	40%	**DENTAL STAGE:**	-
ANCESTRY:	-	**DENTAL RANK:**	-
SEX:	-	**OVERALL AGE RANK:**	1

PRESERVATION: No dental remains are present.

AGE AT DEATH: This skeleton is the smallest in the assemblage. The femur and the petrous bone are smaller than those from Burial A1, which is the smallest of the burials with teeth (scored as dental Stage 1). Unfortunately, since no complete long bones are present, a more precise estimate of age at death cannot be made, although it is clear that the individual had not reached full term and was somewhere in the 3rd trimester of fetal life.

PATHOLOGY: Nothing noted.

Rhoads Cemetery Burial Information Form

BURIAL:	B10	**STATUS:**	adult
EXCAVATED:	February 1997	**LIFE STAGE:**	young adult
CONDITION:	Good	**AGE RANGE:**	20 to 34 years
COMPLETENESS:	90%	**AURICULAR STAGE:**	2
ANCESTRY:	-	**AURICULAR RANK:**	2
SEX:	female	**TARGET STATURE:**	168 cm (5'6")

PRESERVATION: The cranial vault is reconstructed although the base and face is fragmented. Long bone shafts are good, with a few attached epiphyses.

ANCESTRY: Cannot be determined from discrete traits due to fragmentation.

SEX: Based on cranial and pelvic morphology (no pubic bones).

AGE AT DEATH: Based primarily on auricular surface degeneration. Minimal osteoarthritis, no cranial suture fusion.

BODY SIZE: Stature calculated from maximum length of L femur (460 mm), with a +/-2 s.e. range of 160 to 175 cm (5'3" to 5'9"). The long bones are especially gracile.

PATHOLOGY: Nothing noted.

ANTEMORTEM TRAUMA: Nothing noted.

DENTITION: AMTL of 12 teeth. LEH of 6 mandibular teeth. Cervical carious lesions of 1 maxillary and 7 mandibular teeth, with 3 mandibular abscesses. Calculus is moderate. Periodontitis at 2 of 2 scorable alveoli.

Rhoads Cemetery Burial Information Form

BURIAL:	C1	**STATUS:**	subadult
EXCAVATED:	December 1996	**LIFE STAGE:**	young child
CONDITION:	Good	**TARGET AGE:**	2 years
COMPLETENESS:	40%	**DENTAL STAGE:**	-
ANCESTRY:	-	**DENTAL RANK:**	-
SEX:	-	**OVERALL AGE RANK:**	22

PRESERVATION: No cranial remains are present, and only 1 tooth survives.

AGE AT DEATH: The completed but unresorbed root on the deciduous incisor indicates that the individual falls somewhere between dental Stages 6 and 8. In comparing the postcranial remains to burials in that age range, Burial C1 is most similar in size to Burials D13, F3, C6, and B7, which all score as dental Stage 6. The target age for Burial C1 has thus been extrapolated as if the individual was in dental Stage 6.

PATHOLOGY: Nothing noted.

DENTITION: The single tooth has no LEH, caries, or calculus.

NOTES: Includes skunk (?) forelimb bones.

Rhoads Cemetery Burial Information Form

BURIAL:	C2	**STATUS:**	adult
EXCAVATED:	February 1997	**LIFE STAGE:**	middle adult
CONDITION:	Excellent	**AGE RANGE:**	35 to 49 years
COMPLETENESS:	75%	**AURICULAR STAGE:**	3
ANCESTRY:	European	**AURICULAR RANK:**	3
SEX:	female	**TARGET STATURE:**	165 cm (5'5")

PRESERVATION: The cranial vault and base is largely intact, with part of the face in place. Long bone shafts are good, with a few attached epiphyses.

ANCESTRY: The nasal bridge is pinched, the upper nose is prominent, and the zygomaxillary suture is recurved.

SEX: Based on cranial and pubic bone morphology.

AGE AT DEATH: Based on auricular surface and pubic symphysis degeneration (the latter scores as Stage 5, mean age = 48 years, range = 25 to 83 years). Slight vertebral spondylitis, slight osteoarthritis, moderate cranial suture fusion.

BODY SIZE: Stature calculated from maximum length of L ulna (250 mm), with a +/-2 s.e. range of 156 to 173 cm (5'1.5" to 5'8"). Long bones are not robust.

PATHOLOGY: Schmorl's depression of 1 thoracic vertebra.

ANTEMORTEM TRAUMA: Middle and distal phalanges of 1 finger are ankylosed (fused) in a slightly flexed position, perhaps due to trauma?

DENTITION: AMTL of 12 teeth. LEH of 2 teeth. Cervical carious lesions of 3 maxillary and 2 mandibular teeth. No abscesses. Calculus is heavy. Periodontitis at 11 of 12 scorable alveoli.

Rhoads Cemetery Burial Information Form

BURIAL:	C3	**STATUS:**	subadult
EXCAVATED:	February 1997	**LIFE STAGE:**	older child
CONDITION:	Fair	**TARGET AGE:**	6 years
COMPLETENESS:	75%	**DENTAL STAGE:**	10
ANCESTRY:	-	**DENTAL RANK:**	21
SEX:	-	**OVERALL AGE RANK:**	26

PRESERVATION: Long bones and teeth are present.

AGE AT DEATH: Based primarily on dental development.

PATHOLOGY: Lateral parts of orbits are thickened but lack porosity, may be remodeled cribra orbitalia.

DENTITION: Among the unerupted permanent teeth, the mandibular R canine has several pinpoint hypoplastic pits on the buccal side of its crown. No LEH's of the deciduous teeth. Pinpoint occlusal carious lesions of a maxillary 2nd deciduous molar. No abscesses or periodontitis. Calculus is slight. Macrowear on the anterior teeth indicates that an underbite is present (the mandibular incisors project forward beyond the maxillary incisors).

Rhoads Cemetery Burial Information Form

BURIAL:	C4	**STATUS:**	subadult
EXCAVATED:	November 1996	**LIFE STAGE:**	infant
CONDITION:	Poor	**TARGET AGE:**	9 months
COMPLETENESS:	50%	**DENTAL STAGE:**	3
ANCESTRY:	-	**DENTAL RANK:**	4
SEX:	-	**OVERALL AGE RANK:**	8

PRESERVATION: Long bones, teeth, and petrous bones are present.

AGE AT DEATH: Based primarily on dental development.

PATHOLOGY: Nothing noted.

DENTITION: No LEH's.

Rhoads Cemetery Burial Information Form

BURIAL:	C5	**STATUS:**	adult
EXCAVATED:	February 1997	**LIFE STAGE:**	older adult
CONDITION:	Fair	**AGE RANGE:**	50+ years
COMPLETENESS:	60%	**AURICULAR STAGE:**	8
ANCESTRY:	European?	**AURICULAR RANK:**	10
SEX:	male	**TARGET STATURE:**	-

PRESERVATION: The cranial vault is reconstructed although the base and face is fragmented. Long bone shafts are good, but with no attached epiphyses.

ANCESTRY: The nasal sill is sharp, the nasal spine is prominent, and the zygomaxillary suture is recurved.

SEX: Based on cranial morphology.

AGE AT DEATH: Based primarily on auricular surface degeneration. Slight vertebral spondylitis, slight to moderate osteoarthritis, moderate cranial suture fusion.

BODY SIZE: Stature cannot be estimated, although the individual was not especially tall for a male. Robusticity is average for a male.

PATHOLOGY: Marked periosteal lesion on the anterior superior half of the R tibial shaft, swollen and remodeling, localized. Periostitis on posterior distal aspect of L tibial shaft, with smooth margins.

ANTEMORTEM TRAUMA: Nothing noted.

DENTITION: Fragments of the anterior mandible and anterior palate are edentulous and heavily resorbed, with AMTL of at least 20 teeth.

Rhoads Cemetery Burial Information Form

BURIAL:	C6	**STATUS:**	subadult
EXCAVATED:	November 1996	**LIFE STAGE:**	young child
CONDITION:	Excellent	**TARGET AGE:**	2 years
COMPLETENESS:	80%	**DENTAL STAGE:**	6
ANCESTRY:	-	**DENTAL RANK:**	16
SEX:	-	**OVERALL AGE RANK:**	20

PRESERVATION: Long bones and teeth are present.

AGE AT DEATH: Based primarily on dental development.

PATHOLOGY: Nothing noted.

DENTITION: No LEH's, carious lesions, abscesses, periodontitis, or calculus.

Rhoads Cemetery Burial Information Form

BURIAL:	D1	**STATUS:**	adult
EXCAVATED:	December 1996	**LIFE STAGE:**	middle adult
CONDITION:	Good	**AGE RANGE:**	35 to 49 years
COMPLETENESS:	90%	**AURICULAR STAGE:**	5
ANCESTRY:	-	**AURICULAR RANK:**	6
SEX:	male	**TARGET STATURE:**	175 cm (5'9")

PRESERVATION: The remains were received in a very waterlogged state. The cranial vault is reconstructed although the base and face is fragmented. Long bone shafts are good, with a few attached epiphyses.

ANCESTRY: Cannot be determined from discrete traits due to fragmentation.

SEX: Based on cranial and pelvic morphology (no pubic bones).

AGE AT DEATH: Based primarily on auricular surface degeneration. Slight to moderate vertebral spondylitis, slight to moderate osteoarthritis, extensive cranial suture fusion.

BODY SIZE: Stature calculated from maximum length of L femur (473 mm), with a +/-2 s.e. range of 167 to 183 cm (5'6" to 6'0").. The long bones are thick and robust, with strong muscle markings.

PATHOLOGY: Small patch of periostitis (osteoma? hematoma?) on distal medial surface of L tibial shaft.

ANTEMORTEM TRAUMA: Small (ca. 1 cm) depressed fracture, center of L temporal squama of cranial vault

DENTITION: AMTL of 9 mandibular and 1 maxillary teeth. LEH of 1 mandibular tooth. Cervical carious lesions of 5 of 6 mandibular teeth. No abscesses. Calculus is slight. Periodontitis at all 6 scorable mandibular alveoli.

Rhoads Cemetery Burial Information Form

BURIAL:	D2	**STATUS:**	adult
EXCAVATED:	December 1996	**LIFE STAGE:**	middle adult
CONDITION:	Excellent	**AGE RANGE:**	35 to 49 years
COMPLETENESS:	90%	**AURICULAR STAGE:**	3
ANCESTRY:	-	**AURICULAR RANK:**	4
SEX:	female	**TARGET STATURE:**	167 cm (5'6")

PRESERVATION: Cranium with partial facial skeleton intact. Long bone shafts are good, with a few attached epiphyses.

ANCESTRY: Discrete traits of the cranium are ambiguous. The nasal sill is slightly blunted.

SEX: Based on pubic bone morphology.

AGE AT DEATH: Based on auricular surface and pubic symphysis degeneration (the latter scores as Stage 6, mean age = 60 years, range = 42 to 87 years). Slight vertebral spondylitis, slight osteoarthritis, moderate cranial suture fusion.

BODY SIZE: Stature calculated from maximum length of R ulna (256 mm), with a +/-2 s.e. range of 158 to 176 cm (5'2.5" to 5'9.5"). The long bones are of normal or slightly greater robusticity for a female.

PATHOLOGY: Faint, small patches of remodeled periostitis on distal R and L tibial shafts. Schmorl's depressions on a few lower thoracic vertebral bodies, with subchondral destruction.

ANTEMORTEM TRAUMA: Nothing noted.

DENTITION: AMTL of 16 teeth. LEH of 4 mandibular teeth. Cervical carious lesions of 7 maxillary teeth, with 2 maxillary abscesses. Calculus is slight. Periodontitis at all 12 scorable alveoli. Maxillary 3rd molars are congenitally absent.

TAPHONOMY: A green copper stain lies on the R ischium just below the acetabulum.

NOTES: This individual has 6 lumbar vertebrae.

Rhoads Cemetery Burial Information Form

BURIAL:	D3	**STATUS:**	subadult
EXCAVATED:	December 1996	**LIFE STAGE:**	young child
CONDITION:	Poor	**TARGET AGE:**	1.5 years
COMPLETENESS:	40%	**DENTAL STAGE:**	5
ANCESTRY:	-	**DENTAL RANK:**	12
SEX:	-	**OVERALL AGE RANK:**	16

PRESERVATION: Complete long bones and teeth are present.

AGE AT DEATH: Based primarily on dental development.

PATHOLOGY: Nothing noted.

DENTITION: No LEH's, carious lesions, abscesses, periodontitis, or calculus.

Rhoads Cemetery Burial Information Form

BURIAL:	D4	**STATUS:**	subadult
EXCAVATED:	December 1996	**LIFE STAGE:**	infant
CONDITION:	Poor	**TARGET AGE:**	6 months
COMPLETENESS:	30%	**DENTAL STAGE:**	2
ANCESTRY:	-	**DENTAL RANK:**	3
SEX:	-	**OVERALL AGE RANK:**	7

PRESERVATION: No pelvis, lower limbs, or petrous bones. Complete upper long bones are present.

AGE AT DEATH: Based primarily on dental development.

PATHOLOGY: Nothing noted.

DENTITION: All teeth are unerupted and are not developed enough for study.

Rhoads Cemetery Burial Information Form

BURIAL:	D5	**STATUS:**	adult
EXCAVATED:	December 1996	**LIFE STAGE:**	older adult
CONDITION:	Poor	**AGE RANGE:**	50+ years
COMPLETENESS:	60%	**AURICULAR STAGE:**	7
ANCESTRY:	-	**AURICULAR RANK:**	9
SEX:	male	**TARGET STATURE:**	-

PRESERVATION: The cranial vault is reconstructed although the base and face is fragmented. Long bone shafts are good, but have no attached epiphyses.

ANCESTRY: Discrete traits of the cranium are ambiguous. The nasal sill is blunted.

SEX: Based on cranial and pelvic morphology (no pubic bones).

AGE AT DEATH: Based primarily on auricular surface degeneration. Slight to moderate vertebral spondylitis, slight to moderate osteoarthritis, moderate to extensive cranial suture fusion, strong dental wear, texture of bone indicates advanced age.

BODY SIZE: Stature cannot be calculated. The long bones are robust with large articular surfaces. Marked enthesopathy of both olecranon processes of the ulnae (from triceps action) and on the middle of the L ramus of the mandible (from masseter action).

PATHOLOGY: Nothing noted.

ANTEMORTEM TRAUMA: Nothing noted.

DENTITION: AMTL of 5 teeth. No LEH's or abscesses. Cervical carious lesion of 1 mandibular tooth. Calculus is moderate. Periodontitis at 9 of 10 scorable alveoli.

Rhoads Cemetery Burial Information Form

BURIAL:	D6	**STATUS:**	subadult
EXCAVATED:	November 1996	**LIFE STAGE:**	young child
CONDITION:	Fair	**TARGET AGE:**	1 year
COMPLETENESS:	90%	**DENTAL STAGE:**	4
ANCESTRY:	-	**DENTAL RANK:**	8
SEX:	-	**OVERALL AGE RANK:**	12

PRESERVATION: Complete long bones and teeth are present. While some elements are eroded and very fragile, a number of tiny unfused epiphyses not normally recovered in buried remains are present, along with exquisitely preserved facial bones.

AGE AT DEATH: Based primarily on dental development.

PATHOLOGY: Nothing noted.

DENTITION: No LEH's.

NOTES: This individual was interred in an iron sarcophagus coffin immediately adjacent to Burial D7. Overall development is nearly identical to D7, and it is possible that the 2 represent twin siblings.

Rhoads Cemetery Burial Information Form

BURIAL:	D7	**STATUS:**	subadult
EXCAVATED:	November 1996	**LIFE STAGE:**	young child
CONDITION:	Excellent	**TARGET AGE:**	1 year
COMPLETENESS:	90%	**DENTAL STAGE:**	4
ANCESTRY:	-	**DENTAL RANK:**	9
SEX:	-	**OVERALL AGE RANK:**	13

PRESERVATION: Complete long bones and teeth are present. While some elements are eroded and very fragile, a number of tiny unfused epiphyses not normally recovered in buried remains are present, along with exquisitely preserved facial bones.

AGE AT DEATH: Based primarily on dental development.

PATHOLOGY: Nothing noted.

DENTITION: No LEH's.

NOTES: This individual was interred in an iron sarcophagus coffin immediately adjacent to Burial D6. Overall development is nearly identical to D6, and it is possible that the 2 represent twin siblings.

Rhoads Cemetery Burial Information Form

BURIAL:	D8	**STATUS:**	subadult
EXCAVATED:	November 1996	**LIFE STAGE:**	infant
CONDITION:	Good	**TARGET AGE:**	0 months
COMPLETENESS:	80%	**DENTAL STAGE:**	1
ANCESTRY:	-	**DENTAL RANK:**	2
SEX:	-	**OVERALL AGE RANK:**	4

PRESERVATION: Complete long bones, teeth, and petrous bones are present.

AGE AT DEATH: Based primarily on dental development.

PATHOLOGY: Nothing noted.

DENTITION: All teeth are unerupted and are not developed enough for study.

Rhoads Cemetery Burial Information Form

BURIAL:	D9	**STATUS:**	adult
EXCAVATED:	December 1996	**LIFE STAGE:**	older adult
CONDITION:	Excellent	**AGE RANGE:**	50+
COMPLETENESS:	85%	**AURICULAR STAGE:**	8
ANCESTRY:	-	**AURICULAR RANK:**	11
SEX:	female	**TARGET STATURE:**	-

PRESERVATION: The cranial vault is reconstructed although the base and face is fragmented. Some long bone shafts are complete, with a few attached epiphyses.

ANCESTRY: Cannot be determined from discrete traits due to fragmentation.

SEX: Based on cranial and pubic morphology. Moderate hyperostosis frontalis interna (HFI) is present on the endocranial surface of the frontal bone. This subclinical condition is common in postmenopausal females.

AGE AT DEATH: Based on auricular surface and pubic symphysis degeneration (the latter scores as Stage 5 or 6, mean ages = 48 or 60 years respectively). Slight to moderate vertebral spondylitis, slight to moderate osteoarthritis, extensive cranial suture fusion. This is probably the oldest individual in the Rhoads assemblage.

BODY SIZE: Stature cannot be calculated but the individual appears to be rather short. The long bones are moderately robust for a female.

PATHOLOGY: Remodeled, plaque-like periostitis on distal half of the R femoral shaft. While some postmortem erosion and damage is present, the entire R coxa (innominate) appears to exhibit chronic osteomyelitis and appears swollen compared to the L coxa. Pus cavities are present in the bodies of the pubic and ischium bones, surrounded by heavily remodeled trabeculae. Damage prevents the identification of clear cloacae. Involucrum is comprised of coarse woven bone covered with a reactive layer of, shiny, plate-like bone. The infection may have spread to the pubic body of the L coxa.

ANTEMORTEM TRAUMA: Nothing noted.

DENTITION: The fragment of anterior mandible present is edentulous, with AMTL of at least 14 teeth.

Rhoads Cemetery Burial Information Form

BURIAL:	D10	**STATUS:**	subadult
EXCAVATED:	December 1996	**LIFE STAGE:**	infant
CONDITION:	Poor	**TARGET AGE:**	-
COMPLETENESS:	<1%	**DENTAL STAGE:**	-
ANCESTRY:	-	**DENTAL RANK:**	-
SEX:	-	**OVERALL AGE RANK:**	-

PRESERVATION: The remains were received in a very waterlogged state. Only 5 small fragments of a single long bone shaft (possibly tibia) are present, all measuring <1 cm. No dental remains are present.

AGE AT DEATH: While bone thickness and size is broadly similar to other individuals falling in dental Stages 1 to 3, a precise estimate of age is not warranted. It would clearly rank in the 10 youngest individuals in the assemblage.

Rhoads Cemetery Burial Information Form

BURIAL:	D11	**STATUS:**	subadult
EXCAVATED:	December 1996	**LIFE STAGE:**	young child
CONDITION:	poor	**TARGET AGE:**	1 year
COMPLETENESS:	40%	**DENTAL STAGE:**	4
ANCESTRY:	-	**DENTAL RANK:**	9
SEX:	-	**OVERALL AGE RANK:**	19

PRESERVATION: The remains were received in a very waterlogged state. Complete long bones and teeth are present.

AGE AT DEATH: Based primarily on dental development.

PATHOLOGY: Nothing noted.

DENTITION: LEH's of 4 of 8 deciduous teeth. No carious lesions.

Rhoads Cemetery Burial Information Form

BURIAL:	D13	**STATUS:**	subadult
EXCAVATED:	November 1996	**LIFE STAGE:**	young child
CONDITION:	Good	**TARGET AGE:**	2 years
COMPLETENESS:	75%	**DENTAL STAGE:**	6
ANCESTRY:	-	**DENTAL RANK:**	14
SEX:	-	**OVERALL AGE RANK:**	19

PRESERVATION: Complete long bones and teeth are present.

AGE AT DEATH: Based primarily on dental development.

PATHOLOGY: Nothing noted.

DENTITION: The lingual aspects of the deciduous maxillary L incisors are eroded in such a way that suggests that the enamel was never fully developed. The phenomena are clearly antemortem, although we have not formally scored them as LEH's. Adjacent interproximal carious lesions of the same incisors. No other LEH's, abscesses, periodontitis, or calculus.

Rhoads Cemetery Burial Information Form

BURIAL:	D14	**STATUS:**	adult?
EXCAVATED:	November 1996	**LIFE STAGE:**	-
CONDITION:	Cremation	**AGE RANGE:**	-
COMPLETENESS:	-	**AURICULAR STAGE:**	-
ANCESTRY:	-	**AURICULAR RANK:**	-
SEX:	-	**TARGET STATURE:**	-

NOTES: The largest fragments of bone remaining are 4 tiny slivers measuring ~1 cm. Nothing diagnostic remains. No teeth can be identified. No artifacts were noted in the mix. Some bone fragments are stained green through contact with the metal urn. The cremated remains appear to have been commercially ground to result in such small fragments (a common practice today). Weights of sifted portions are as follows (screen sizes are given in parentheses):

627 g (held by 0.079" mesh)
527 g (held by 0.028" mesh)
267 g (passed through 0.028" mesh)
_____

1421 g total

Rhoads Cemetery Burial Information Form

BURIAL:	E1	**STATUS:**	adult
EXCAVATED:	November 1996	**LIFE STAGE:**	older adult
CONDITION:	Fair	**AGE RANGE:**	50+
COMPLETENESS:	90%	**AURICULAR STAGE:**	4?
ANCESTRY:	European?	**AURICULAR RANK:**	-
SEX:	female	**TARGET STATURE:**	159 cm (5'4")

PRESERVATION: The cranial vault is reconstructed although the base and face is fragmented. Some long bone shafts are complete, with a few attached epiphyses.

ANCESTRY: The nasal sill is sharp.

SEX: Based on cranial and pubic morphology.

AGE AT DEATH: Based primarily on pubic symphysis degeneration, which scores as Stage 6 (mean age = 60 years, range = 42 to 87 years). A small corner of the L auricular surface is preserved, most likely scoring as Stage 4 but possibly as Stages 3 or 5 (because of this ambiguity, it was not assigned a rank among the other individuals). Slight vertebral spondylitis, slight osteoarthritis, extensive cranial suture fusion, moderate to extensive dental wear

BODY SIZE: Stature calculated from maximum length of L femur (425 mm), with a +/-2 s.e. range of 152 to 167 cm (5'0" to 5'6"). All bones are very gracile.

PATHOLOGY: Periostitis on anterior shaft of R tibia at the tuberosity, localized, remodeled. Periostitis on distal shaft of L radius, remodeled.

ANTEMORTEM TRAUMA: Possible healed fracture of L distal radius?

DENTITION: AMTL of 6 mandibular teeth. LEH of 3 maxillary teeth. Cervical carious lesions of 15 teeth, with an occlusion lesion of 1 tooth. No abscesses. Calculus is slight on the maxillary teeth and heavy on the mandibular teeth. The maxillary lateral incisors are missing congenitally and the maxillary R 1st premolar is rotated mesially.

TAPHONOMY: Possible green copper stain centered in front of bregma on the frontal bone of the cranium (~4 cm). Such stains in this region of the cranium frequently are caused by pins that held a burial shroud in place.

Rhoads Cemetery Burial Information Form

BURIAL:	E2	**STATUS:**	subadult
EXCAVATED:	November 1996	**LIFE STAGE:**	young child
CONDITION:	Good	**TARGET AGE:**	1 year
COMPLETENESS:	80%	**DENTAL STAGE:**	4
ANCESTRY:	-	**DENTAL RANK:**	7
SEX:	-	**OVERALL AGE RANK:**	11

PRESERVATION: Complete long bones and teeth are present.

AGE AT DEATH: Based primarily on dental development.

PATHOLOGY: Mild, active periostitis on the midshaft of the L tibia.

DENTITION: No LEH's.

Rhoads Cemetery Burial Information Form

BURIAL:	E3	**STATUS:**	subadult
EXCAVATED:	November 1996	**LIFE STAGE:**	young adolesc.
CONDITION:	Excellent	**TARGET AGE:**	12 years
COMPLETENESS:	90%	**DENTAL STAGE:**	16
ANCESTRY:	-	**DENTAL RANK:**	25
SEX:	-	**OVERALL AGE RANK:**	30

PRESERVATION: Complete long bones and teeth are present.

AGE AT DEATH: Based primarily on dental development. This is the oldest subadult individual in the assemblage.

PATHOLOGY: Mild, remodeled cribra orbitalia in both orbits?

DENTITION: LEH of a maxillary 2nd molar. Interproximal carious lesions of the maxillary central incisors. No abscesses or periodontitis. Slight calculus.

Rhoads Cemetery Burial Information Form

BURIAL:	E4	**STATUS:**	subadult
EXCAVATED:	November 1996	**LIFE STAGE:**	young child
CONDITION:	Excellent	**TARGET AGE:**	4 years
COMPLETENESS:	90%	**DENTAL STAGE:**	8
ANCESTRY:	-	**DENTAL RANK:**	19
SEX:	-	**OVERALL AGE RANK:**	24

PRESERVATION: Complete long bones and teeth are present.

AGE AT DEATH: Based primarily on dental development.

PATHOLOGY: Nothing noted.

DENTITION: LEH's (LHPC) of both deciduous mandibular canines. Enamel opacities of 4 maxillary deciduous teeth (including the canines), comprised of areas of yellowed enamel that appears to be thinner than the surrounding enamel. Occlusal carious lesions of 1 mandibular and 2 maxillary teeth, as well as interproximal carious lesions of 4 maxillary teeth (all deciduous). No LEH's of the 2 unerupted permanent teeth present.

Rhoads Cemetery Burial Information Form

BURIAL:	E5	**STATUS:**	subadult
EXCAVATED:	November 1996	**LIFE STAGE:**	older child
CONDITION:	Excellent	**TARGET AGE:**	6 years
COMPLETENESS:	90%	**DENTAL STAGE:**	10
ANCESTRY:	-	**DENTAL RANK:**	22
SEX:	-	**OVERALL AGE RANK:**	27

PRESERVATION: Complete long bones and teeth are present.

AGE AT DEATH: Based primarily on dental development.

PATHOLOGY: Nothing noted.

DENTITION: No LEH's, abscesses, or periodontitis. Cervical carious lesions of 1 maxillary and 1 mandibular canine.

Rhoads Cemetery Burial Information Form

BURIAL:	E6	**STATUS:**	adult
EXCAVATED:	November 1996	**LIFE STAGE:**	older adult
CONDITION:	Poor	**AGE RANGE:**	50+ years
COMPLETENESS:	70%	**AURICULAR STAGE:**	7
ANCESTRY:	European?	**AURICULAR RANK:**	8
SEX:	female	**TARGET STATURE:**	160 cm (5'3")

PRESERVATION: Cranium is highly fragmented and not reconstructed. Some long bone shafts are complete, with a few attached epiphyses.

ANCESTRY: The nasal sill is sharp, and the zygomaxillary suture is slightly recurved.

SEX: Based on cranial and pelvic morphology (no pubic bones).

AGE AT DEATH: Based primarily on auricular surface degeneration. Slight vertebral spondylitis, slight to moderate osteoarthritis, bone texture indicates middle to advanced age.

BODY SIZE: Stature calculated from maximum length of L ulna (239 mm), with a +/-2 s.e. range of 151 to 168 cm (5'1" to 5'6"). The long bones are slightly robust for a female. Enthesopathies are present along the popliteal line of the R tibia, at the olecranon processes of the ulnae, and at the bicipital grooves of the humeri.

PATHOLOGY: Active periostitis of distal posterior half of R femoral shaft, localized. Remodeled periostitis of middle of R fibular shaft, localized. Irregular bone production of external auditory meatuses, indicating infection?

ANTEMORTEM TRAUMA: Distal end of R fibula is angulated, possible antemortem fracture?

DENTITION: AMTL of 9 teeth. No LEH's. Cervical carious lesions of 7 teeth, with 1 maxillary abscess. Calculus is heavy.

TAPHONOMY: Significant rodent gnawing on the distal portion of the R femoral shaft and the central portion of the R tibial shaft. Burial notes indicate significant rodent disturbance.

NOTES: Includes juvenile pig R premaxilla, butchered.

Rhoads Cemetery Burial Information Form

BURIAL:	E7	**STATUS:**	adult
EXCAVATED:	November 1996	**LIFE STAGE:**	middle adult
CONDITION:	Excellent	**AGE RANGE:**	35 to 49 years
COMPLETENESS:	95%	**AURICULAR STAGE:**	5
ANCESTRY:	European	**AURICULAR RANK:**	7
SEX:	male	**TARGET STATURE:**	177 cm (5'10")

PRESERVATION: Cranium is nearly complete with an attached face, although the L side of the vault is slightly compressed. Long bone shafts are good, with a few attached epiphyses.

ANCESTRY: The nasal bridge is pinched, the upper nose is prominent, and the nasal sill is sharp.

SEX: Based on cranial and pelvic morphology (no pubic bones).

AGE AT DEATH: Based primarily on auricular surface degeneration. Slight to moderate vertebral spondylitis (bordering on severe in the cervical spine), slight to moderate osteoarthritis, moderate to extensive cranial suture fusion, moderate to extensive dental wear.

BODY SIZE: Stature calculated from maximum length of L ulna (270 mm), with a +/-2 s.e. range of 168 to 187 cm (5'6" to 6'1.5"). The long bones are large and robust. Enthesopathy of olecranon process of R ulna.

PATHOLOGY: Large area (~2 cm) of lumpy reactive bone on inferior surface of R femoral neck.

ANTEMORTEM TRAUMA: Nothing noted.

DENTITION: AMTL of 4 teeth. The mandibular L canine has a hypoplastic lesion that is similar to lesions on the deciduous canines in the assemblage. Cervical carious lesions of 14 teeth and 2 maxillary teeth have occlusal lesions. One maxillary abscess. Calculus is slight. Periodontitis at 12 of 22 scorable alveoli.

NOTES: Fusion (congenital?) of 3rd and 4th cervical vertebrae.

Rhoads Cemetery Burial Information Form

BURIAL:	E8	**STATUS:**	subadult
EXCAVATED:	December 1996	**LIFE STAGE:**	young child
CONDITION:	Excellent	**TARGET AGE:**	1.5 years
COMPLETENESS:	80%	**DENTAL STAGE:**	5
ANCESTRY:	-	**DENTAL RANK:**	10
SEX:	-	**OVERALL AGE RANK:**	14

PRESERVATION: The remains were received in a very waterlogged state. Complete long bones and teeth are present.

AGE AT DEATH: Based primarily on dental development.

PATHOLOGY: Nothing noted.

DENTITION: The deciduous maxillary R canine displays a circular pit hypoplastic lesion. No other LEH's, caries, abscesses, periodontitis, or calculus.

Rhoads Cemetery Burial Information Form

BURIAL:	F1	**STATUS:**	subadult
EXCAVATED:	November 1996	**LIFE STAGE:**	young child
CONDITION:	Excellent	**TARGET AGE:**	1.5 years
COMPLETENESS:	75%	**DENTAL STAGE:**	5
ANCESTRY:	-	**DENTAL RANK:**	13
SEX:	-	**OVERALL AGE RANK:**	17

PRESERVATION: Complete long bones and teeth are present.

AGE AT DEATH: Based primarily on dental development.

PATHOLOGY: Small, plaque-like reactive bone (periostitis?) in both orbits near the supraorbital foramina.

DENTITION: No LEH's, caries, abscesses, periodontitis, or calculus.

Rhoads Cemetery Burial Information Form

BURIAL:	F2	**STATUS:**	subadult
EXCAVATED:	November 1996	**LIFE STAGE:**	older child
CONDITION:	Excellent	**TARGET AGE:**	7 years
COMPLETENESS:	90%	**DENTAL STAGE:**	11
ANCESTRY:	-	**DENTAL RANK:**	23
SEX:	-	**OVERALL AGE RANK:**	28

PRESERVATION: Complete long bones and teeth are present.

AGE AT DEATH: Based primarily on dental development.

PATHOLOGY: Moderate porosity and diploic expansion in both orbits (cribra orbitalia).

DENTITION: No LEH's or abscesses. Cervical carious lesions of 2 deciduous maxillary molars and an occlusal carious lesion of 1 deciduous maxillary molar. No carious lesions of the permanent teeth. Slight calculus.

Rhoads Cemetery Burial Information Form

BURIAL:	F3	**STATUS:**	subadult
EXCAVATED:	November 1996	**LIFE STAGE:**	young child
CONDITION:	Good	**TARGET AGE:**	2 years
COMPLETENESS:	80%	**DENTAL STAGE:**	6
ANCESTRY:	-	**DENTAL RANK:**	15
SEX:	-	**OVERALL AGE RANK:**	18

PRESERVATION: Complete long bones and teeth are present.

AGE AT DEATH: While the dental development of this individual is very similar to that of Burials D13, F3, C6, and B7, the lengths of the long bones and development of the temporal bone are much closer to that expressed by Burials E8, F5, D3, and F1, which are ranked as dental Stage 5. Burial F3 shows a greater mismatch between its dental and postcranial development than any other subadult individual in the assemblage. This mismatch can be interpreted in one of two ways: (1) dental development is normal and postcranial development is relatively delayed for an individual in Stage 6, or (2) dental development is precocious for an individual with postcranial development more typical of an individual in Stage 5. No pathological conditions that would be indicative of childhood diseases were noted. The mismatch may simply be a reflection of the normal range of variation in timing of growth between different body systems, although it is possible that the child suffered from a chronic condition that delayed postcranial growth but failed to manifest itself with identifiable lesions. Dental development would probably be more resistant to such a condition than postcranial development. We have chosen to give a target age for Burial F3 in line with its scored dental stage, but have ranked it as the earliest one in that stage, which places it ahead of (younger than) Burial D13, which is actually slightly less advanced in dental development than Burial F3 but which displays 'normal' postcranial development.

PATHOLOGY: Nothing noted.

DENTITION: No LEH's, carious lesions, abscesses, or periodontitis. Slight calculus.

Rhoads Cemetery Burial Information Form

BURIAL:	F4	**STATUS:**	subadult
EXCAVATED:	November 1996	**LIFE STAGE:**	infant
CONDITION:	Poor	**TARGET AGE:**	0 months
COMPLETENESS:	15%	**DENTAL STAGE:**	-
ANCESTRY:	-	**DENTAL RANK:**	-
SEX:	-	**OVERALL AGE RANK:**	2

PRESERVATION: No dental remains or petrous bones are present.

AGE AT DEATH: The radius is very close to but slightly smaller than that from Burial A1, which is the youngest of the burials with teeth (scored as dental Stage 1). The target age for Burial F4 has thus been extrapolated as if the individual was in dental Stage 1.

PATHOLOGY: Nothing noted.

Rhoads Cemetery Burial Information Form

BURIAL:	F5	**STATUS:**	subadult
EXCAVATED:	November 1996	**LIFE STAGE:**	young child
CONDITION:	Good	**TARGET AGE:**	1.5 years
COMPLETENESS:	90%	**DENTAL STAGE:**	5
ANCESTRY:	-	**DENTAL RANK:**	11
SEX:	-	**OVERALL AGE RANK:**	15

PRESERVATION: Complete long bones and teeth are present.

AGE AT DEATH: Based primarily on dental development.

PATHOLOGY: Mild, active periostitis on midshafts of L and R tibiae, and shafts appear slightly swollen. Pinpoint lesions in both orbits but no diploic expansion, may be remodeled cribra orbitalia?

DENTITION: LEH of the deciduous mandibular R canine. No carious lesions, abscesses, periodontitis, or calculus.

Rhoads Cemetery Burial Information Form

BURIAL: G **STATUS:** mixed
EXCAVATED: April 24 1997

NOTES: These remains were recovered from the surface of a backdirt pile immediately east of and adjacent to Burials A1 & A3, although their original provenience is unknown and they could have come from anywhere in the cemetery. Approximately 40 fragments of bone are present, comprised primarily of adult ribs and vertebrae. The largest fragment (a rib) measures 47 mm in length. Mild to moderate sunbleaching is present on a number of fragments, indicating that they had been on the surface for a period of months. Some of the fragments are at least partially diagnostic. However, none could be reassociated with any certainty to the known interments.

96.40.G.1 complete hyoid body, missing cornua are unfused, adult
96.40.G.2 complete 1st proximal phalanx of the hand, slightly eroded & bleached, adult
96.40.G.3 infant or young child cranial vault fragment
96.40.G.4 fragment of subadult long bone with epiphyseal surface preserved
96.40.G.5 tooth crown, unerupted (?), R maxillary lateral incisor

Rhoads Cemetery Burial Information Form

BURIAL: H **STATUS:** subadult
EXCAVATED: August 4 1998

NOTES: This bone fragment, a 2.5 cm long portion of infant cranial vault bone, was recovered on the surface of a backdirt pile immediately south of and adjacent to Burial B1, although its original provenience is unknown and it could have come from anywhere in the cemetery. Mild to moderate sunbleaching is present, indicating that it had been on the surface for a period of months