

17. ANALYSIS OF HUMAN SKELETAL REMAINS *John A. Williams*

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17. ANALYSIS OF HUMAN SKELETAL REMAINS

John A. Williams¹

Introduction and Bioarchaeology Background

There is very little information on human skeletal remains assigned to the Coalescent tradition in North Dakota (Table 17.1)². Despite a substantial number of burial locales, skeletal remains are few in number. Lehmer (1971) suggests that this is a function of scaffold burial, a characteristic of the historic Mandans and other Siouan peoples of the northern Plains. This lack of data has been worsened by the recent reinterment, without further study, of many Coalescent burials in the state of North Dakota. As Table 17.1 shows, few sites have received any but the most limited analysis. Following the generally held view that the Middle Missouri tradition peoples were pushed northward, the majority of Coalescent sites are located in central North Dakota, far north of earlier Middle Missouri locations. Although Arikaras are known from some sites, the Coalescent of North Dakota is represented primarily by the Mandans and to a much lesser extent the Hidatsas, the latter being a virtual unknown, skeletally speaking. This project therefore fills a definite need in expanding our knowledge of the bioarchaeology of the Mandans and Hidatsas.

The goal of this research is two-fold. The first is to document as fully as possible the various parameters of this skeletal sample, from osteometric features of the skeleton to indicators of relative health and disease. The second is to outline the question of the ethnic identity of the occupants of Scattered Village. This was accomplished using standard craniometric variables and known comparative samples of Mandans and Hidatsas.

While Coalescent Mandans are cited in various studies (see Langdon et al. 1989; Rose et al. 1983, 1984; Williams 1988, 1993), one of the few that is comprehensive is Bass and Birkby's 1982 report on the Huff site (32MO11). In discussing this site assigned to the Terminal variant of the Middle Missouri tradition, they took the opportunity to describe Mandan cranial morphology. Drawing on the then known samples, they measured 35 Mandan crania. They noted that as a group these crania were low vaulted, substantially so when compared to Arikaras and Central Plains peoples. This cranial dimension, first recognized by Strong (1940), has been noted many times since and has been the focus of some speculation regarding Mandan and

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² Coalescent tradition is used in this chapter in the sense of Lehmer 1971, meaning, generally, Plains Village peoples and settlements post-dating circa AD 1500 and falling within the broad cultural pattern that led to people identified historically as the Mandans and Hidatsas. More specifically, the discussion here is about remains Lehmer would have assigned to Postcontact and Disorganized variants of the Coalescent tradition. By the late AD 1700s, the Coalescent tradition in North Dakota would also include the historic Arikaras who, from that time forward, occasionally resided in the Heart and Knife regions. [Ed.]

Table 17.1. Burial locations in North Dakota assigned to the Postcontact and Disorganized variants of the Coalescent tradition.

Site	Variant	Reference ³
Menoken (32BL2) ⁴	Postcontact	
Sperry (32BL4)	Postcontact	
Double Ditch (32BL8)	Postcontact	
Larson (32BL9)	Postcontact	
32EM102	-	Rose et al. 1983
Fort Clark (32ME2)	Disorganized	
Big White Village (32ME4)	Postcontact	
Deapolis (32ME5)	Disorganized	
Amahami (32ME8)	Disorganized	
Lower Hidatsa River (Sakakawea) (32ME11)	-	
Big Hidatsa (32ME12)	Disorganized	
32ME74	-	
Sakakawea ? (32ME493)	Disorganized	
Like a Fishhook (32ML2)	Disorganized	Owsley 1992
32ML35	-	
Barrett (32MO25)	-	
On-A-Slant Village (32MO26)	Postcontact	
Motsiff (32MO29)	Postcontact	
32MO30	-	
Scattered Village (32MO31)	Postcontact	
32MO33	-	
Boley (32MO37)	Postcontact	Williams 1993
32MO81	-	

Arikara origins (Jantz 1973, 1977; Jantz and Willey 1983; Jantz et al. 1981; Owsley et al. 1981). Hidatsa cranial morphology has never been formally described. Key (1983) examined a single Hidatsa cranium and reported that the morphology is not appreciably different from that of the Mandans (i.e., low vaulted and dolicocephalic).

Although Mandan crania have been used in several craniometric comparisons (e.g., Bass et al. 1971; Jantz 1973; Key 1983; Owsley et al. 1981), historical circumstances regarding the discovery and eventual reburial of Mandan and Hidatsa skeletons has directly affected the likelihood of future discoveries and study. This makes the bioarchaeological analysis conducted at Scattered Village all the more significant.

³ References indicate sites where complete skeletal analysis has taken place.

⁴ Menoken (32BL2) is now known to be a Late Woodland settlement dating circa AD 1200. [ed.]

Table 17.2. Burials recovered during the 1998 fieldwork at Scattered Village (32MO31).

Burial Number	Condition	Age	Sex	Time Period	Feature Number	Excavation Block
1	poor	<4 years	n/a	2	-	2
2	poor	25-35 years	female	3	F9	9
3	poor	25-40 years	female	2	F55	3
4	poor	11-18 years	female	2	F8	3
5	good	ca 40 years	female	1	F124	9
6	fair	ca 20 years	female	1	F130	9
7	poor	30-45 years	female	3	F122	7
8	poor	13-16 years	female	4	F119	6
9	good	ca 40 years	female	2	F108	3
10	good	30-40 years	female	2	F108	3
11	fair	20-25 years	female	2	F108	3
12	good	20-25 years	female	1	F120	9
13	poor	30-40 years	male	3	F173	9

Burial Descriptions

Thirteen burials were identified and excavated during the 1998 field season at Scattered Village. These are numbered here in order of discovery (Table 17.2), but their discussion is organized is by time period from latest (TP1, AD 1650-1700) to earliest (TP4, Ad 1550-1600). Analysis of these remains followed protocols outlined in Williams (1993, 1997). Cranial and infracranial metric and non-metric characteristics were recorded (Appendix D). With the exception of Burial 1, all the burials involved nearly complete skeletons. Condition of the remains ranged from poor to good. None was without some damage and fragmentation, however. Soil conditions and the location of the burials under a city street no doubt contributed to the quality of preservation. In general, poor preservation of skeletal remains is not unexpected for this region of the northern Plains (Williams 1996). Despite being mainly primary interments, no skeleton was entirely complete.

Of the thirteen burials two were juvenile, one was subadult, and ten were adult (Table 17.2). Of the skeletons that could be sexed all but one was female (n = 10). Three females (Burials 9, 10, 11) were interred in the same burial pit. Adult age was relatively young (ca. 30 years) and included the reproductive years.

Time Period 1

Burial No. 5 (Feature 124, Cat. No. 2600)

Burial 5 consists of a nearly complete (95%) adult skeleton. This individual was interred on its back in a partially flexed position and with the head to the northeast (Figure 17.1). The

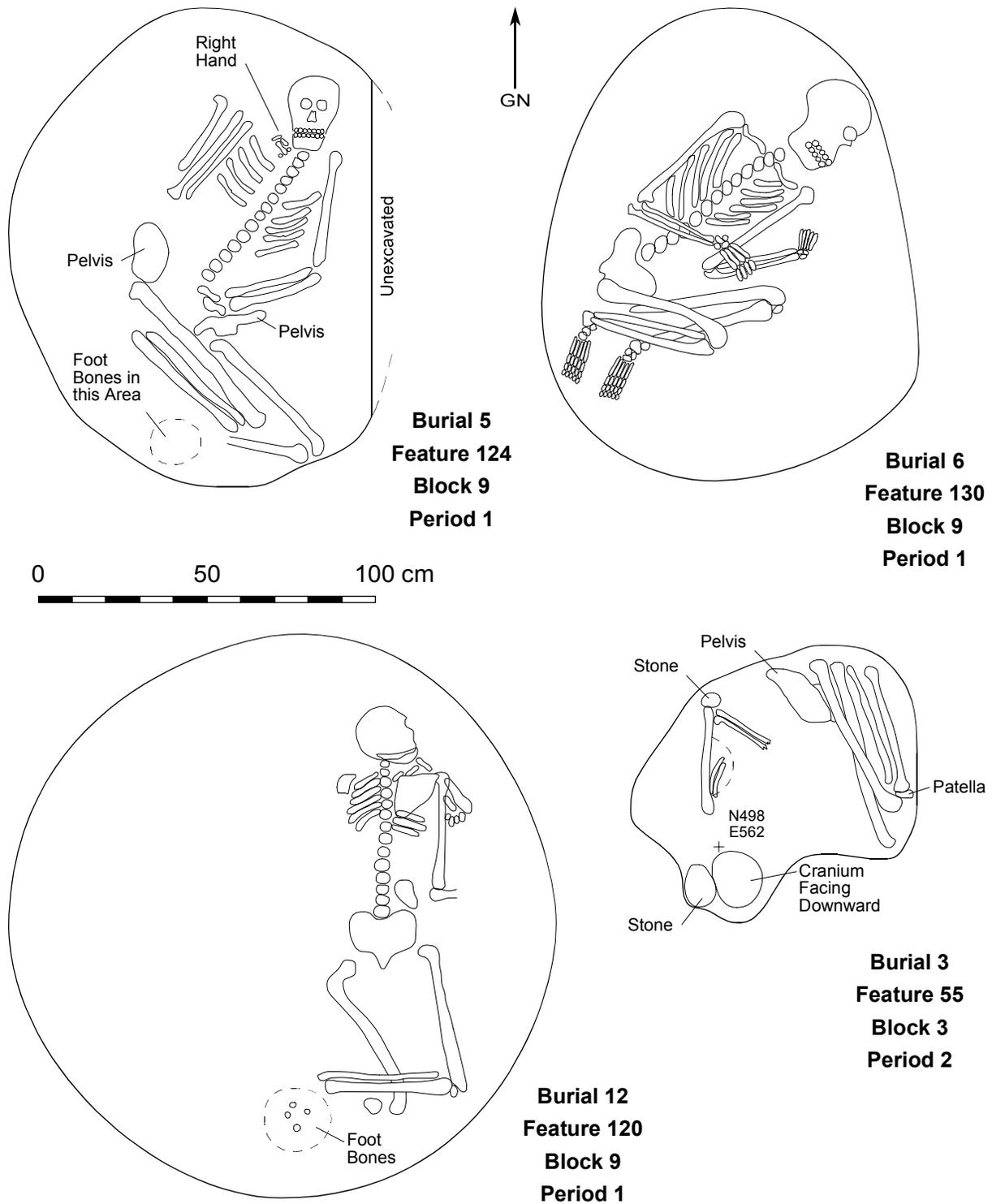


Figure 17.1. Drawings of interment positions for Burials 3, 5, 6, and 12, Scattered Village (32MO31), 1998 excavations.

only missing elements are a few small bones of the hands, feet, and ribs. The remains are in good condition, an indication of which is the presence of an intact hyoid bone. This bone is small, fragile, and uncommonly recovered.

Because of the very good condition of this skeleton, numerous criteria were available for age and sex determination. Both the skull [MS = -1.7] and pelvis [MP = -0.85] identified the sex as female⁵. Dental attrition placed the age of this individual in the range of 35-55 years. Pubic symphysis and sternal rib end morphology were consistent in indicating a central tendency of 40 years of age.

The skull is dolichocranic [CI = 73.7], long, narrow, and relatively low vaulted [AMHI = 67.9]⁶. This cranial morphology is typical of Mandan, Middle Missouri, and some Woodland populations. Using Jantz's discriminant function [ds = 0.649] the dimensions of this cranium clearly falls within the Mandan category⁷. Likewise, the AMHI falls within the Mandan/Middle Missouri category⁸.

There is a puncture defect present on the superior portion of the left ilium about mid-center. The aperture is 21.8 mm in diameter and has dirt-stained edges, indicating that this damage is not a recent event. It is the probable result of prior activity at the site.

Burial No. 6 (Feature 130, Cat. No. 2731)

Burial 6 consists of a nearly complete (95%) adult skeleton. The individual was interred in a fully flexed position partially on the back and left side, with the head to the northeast (Figure 17.1). Missing elements include the sternum and the small bones of the hands and feet. Preservation is fair to good although some bones like the scapulae are fragmentary. What appears to be red ochre staining is present on the endocranial surface of the cranium.

Both the skull [MS = -1.67] and pelvis [MP = -0.36] classify as female. Age estimations, including a partially fused sternal clavicular epiphysis, show a central tendency of 20 years of

⁵ Characteristics used to sex the skeleton (skull and pelvis) are scored on a scale from -2 to +2 and weighted as to their individual significance in sexing. Female traits have negative scores; male traits have positive scores. The scores are multiplied by their weights, summed, and divided by the sum of weights used. The final sexing index (MS = skull, MP = pelvis) falls between -2 (female) and +2 (male).

⁶ The cranial index (CI) is a measure of cranial shape and is the ratio of cranial breadth to length. A cranial index <74.9 is indicative of a long narrow or dolichocranic skull. The auricular mean-height index (AMHI) is a measure of cranial vault height. The auricular height is the distance from the external ear openings to the top of the cranial vault. Indices < 70 are typical of low vaulted crania, while the opposite is true of values >70.

⁷ Jantz (1976) created a discriminant function using various cranial dimensions to segregate Mandan and Arikara crania. The discriminant function is sex-specific. For each sex a sectioning point exists (males = -0.029, females = 0.490). Discriminant scores (ds) that fall above the sectioning point are Mandan.

⁸ Jantz and Willey (1983) established parameters for the AMHI of Middle Missouri/Mandan and Coalescent crania. Generally speaking Middle Missouri/Mandan crania have indices <70 while Coalescent crania have indices >70.

age. The skull is intact, dolichocephalic [CI = 73.3], and low vaulted [AMHI = 70.3]. The Jantz discriminant score [ds = 0.653] and AMHI both categorize the cranium as Mandan.

Burial No. 12 (Feature 120, Cat. No. 2560)

Burial 12 consists of nearly complete (98%) adult skeleton. This individual was interred on its left side and stomach with the head to the north (Figure 17.1). This skeleton includes the hyoid and almost complete hands and feet. The infracranial skeleton is in good condition. The skull, however, is moderately damaged. The left parietal and temporal are detached. The fractured edges are clean, pointing to recent damage, probably due to construction activity at the site.

Using the skull [MS = -1.23] and pelvis [MP = -1.31] the skeleton classified as female. Several criteria, including stages of epiphyseal union, were used to arrive at an age of 20-25 years. The skull was too damaged to permit metric analysis.

Time Period 2

Burial No. 1 (Cat. No. 1159)

Burial 1 consists of seven cranial fragments ranging in size from 16.7 mm x 33.3 mm to 58.7 mm x 48.3 mm. These were found dispersed within a small area in midden in Block 2. The fragments are very thin walled and are consistent with a very young juvenile (< four years of age). Fragment morphology corresponds with the frontal and occipital regions of the cranium. The fragments are dirt stained and in otherwise good condition. Normally fragments of this nature are not tallied as burials. They were judged to represent a discrete individual because they comprise approximately 10% of the cranium and fall within an age category not repeated among any of the other burials.

Burial No. 3 (Feature 55, Cat. No. 1800)

Burial 3 consists of very fragmentary portions of an adult cranial and infracranial skeleton, comprising approximately 65% of the skeleton. This individual was interred on their left side in flexed position, with the head to the southeast (Figure 17.1). Although this is a primary interment, the upper appendicular and thoracic skeletons are underrepresented. This appears to be preservation related. Excavation notes indicate very poor preservation of this part of the skeleton.

There is a large (49.1 mm x 23.7 mm) triangular defect (Figure 17.2) on the left side of the calvarium, roughly along the coronal suture extending slightly posteriorly. The edges of the defect are dirt-stained demonstrating that it is not the result of a recent event. The cause of this defect is uncertain. It is not characteristic of blunt trauma and is likely the result of prior



Figure 17.2. Burial 3, triangular defect left side of cranium, Scattered Village (32MO31).

construction activity at the site. The skull, although not intact and deformed, has a rounded, low vaulted, and long appearance. The skeleton of this individual presents a mixture of sex characteristics [MS = 1.40, MP = -1.73]. The remains (including the skull) are very robust. The more reliable pelvic characteristics are clearly female⁹. Age could only be estimated using enamel attrition, yielding an age range of 25-40 years¹⁰.

Burial No. 4 (Feature 8, Cat. No. 1211)

Burial 4 consists of a poorly preserved and very fragmentary juvenile skeleton. This individual was interred on their right side in flexed position, with the head to the southeast (Figure 17.3). A few cranial fragments represent the skull. The infracranial skeleton comprised mainly appendicular fragments. No hand elements were recovered. The thorax consists of seven rib fragments and the vertebral column is represented only by the sacrum. No upper appendicular elements were present for the right side.

⁹ This discrepancy in sexing the skull and pelvis is not uncommon. Cranial sexing traits are easily affected by overall robusticity (i.e., a gracile male skull appears female while a robust female skull may appear male).

¹⁰ Using Brothwell enamel attrition corresponded with an age of 25-35 years. The Lovejoy attrition scale provides an older range of 40-50 years. Personal experience has found that the Lovejoy scale works best at ages below 40 years. For this skeleton the two age ranges were combined using the Lovejoy estimate as the high end of the combined age.

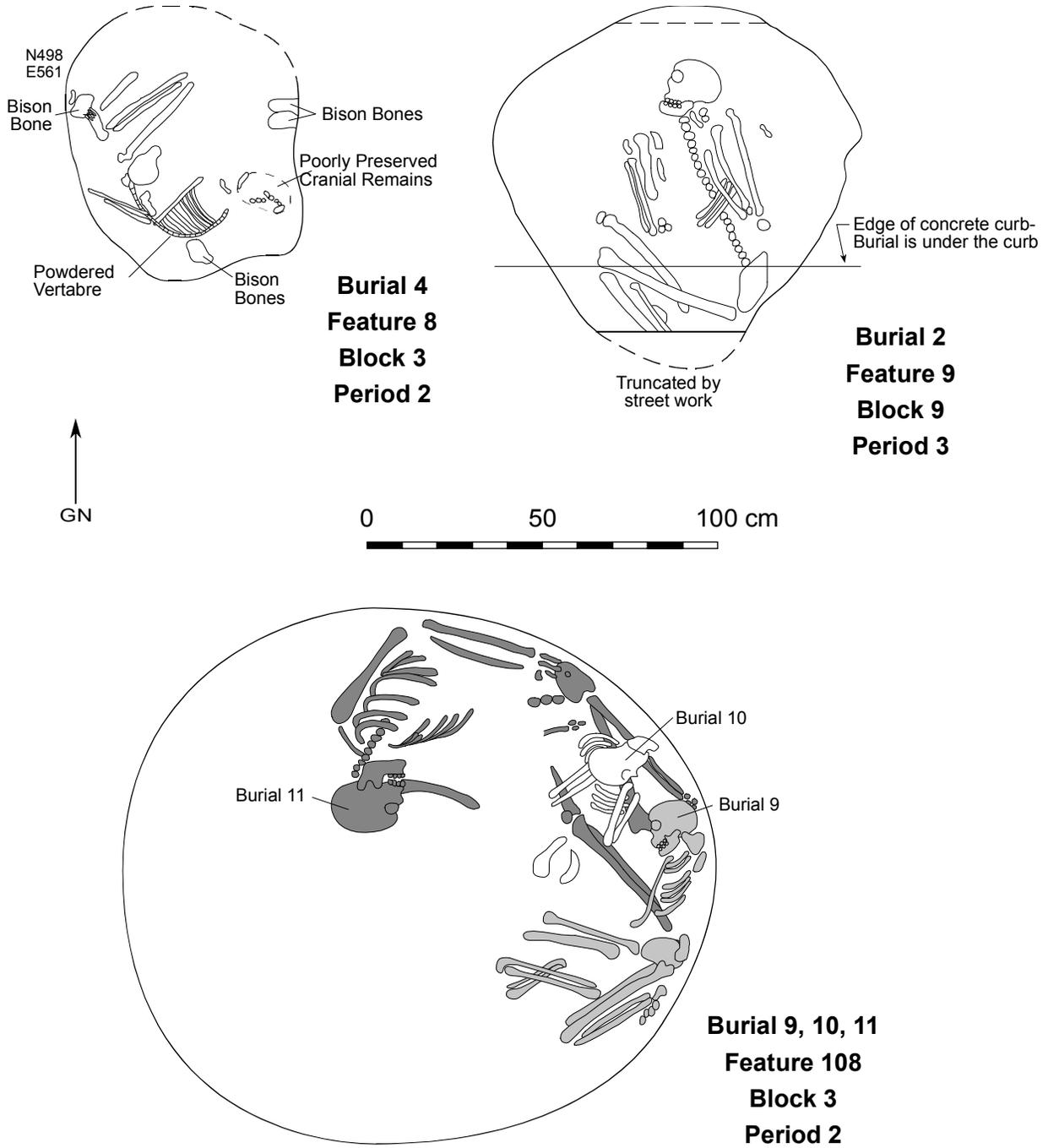


Figure 17.3. Drawings of interment positions for Burials 2, 4, 9, 10, and 11, Scattered Village (32MO31), 1998 excavations.

Age estimations place this juvenile in the range of 11-18 years. Based on the few teeth recovered, development and emergence is consistent with late childhood, ca. 11 years. Epiphyseal union while lacking diagnostic indicators nonetheless places this juvenile at under 18 years (unfused first and second sacral vertebrae). The fragmentary pelvis was female in appearance¹¹.

Burial 9 (Feature 108, Burial #1, Cat. No. 2598)

Burial 9 is one of three individuals interred as a group within Feature 108 in Block 3. The first individual placed in the pit was Burial 11 (Figure 17.3), which was laid with its pelvis against the northeast wall of the pit, on its right side, with the upper torso and head extending toward the center of the pit. Burials 9 and 10 overlie the leg bones of Burial 11 and were therefore placed in the pit after Burial 11. Burial 10 was in a seated position with its back against the northeast, vertical wall of the pit, and with its head slumped forward onto the chest area. Burial 9 was lying on its right side in a partially flexed position, also against the eastern pit wall, overlying the feet of Burial 11.

Burial 9 is represented by a nearly complete (98%) adult skeleton. Preservation is generally good, although the skull and thoracic skeleton display some damage. The endocranial surface of the skull is noteworthy in the presence of what appear to be insect pupae¹². A white crystalline powder was also present in places on the endocranial surface.

Sex was determined to be female for both the skull [MS = -1.38] and pelvis [MP = -1.60]. Aging was slightly problematic in that no clear central tendency existed. Of the various age indicators available the pubic symphysis was chosen, ca 40 years.

The skull, although damaged, can be characterized as weakly dolichocranic [CI = 74.9] and low vaulted [AMHI = 67.4]. The skull was too incomplete, however, to utilize the Jantz discriminant function. The AMHI fell within the Mandan range.

Burial No. 10 (Feature 108, Burial #2, Cat. No. 2598)

Burial 10 consists of fairly complete (95%) adult skeleton. Conspicuously absent is the mandible. At the same time, the thoracic skeleton is complete and a hyoid was recovered. Preservation is generally good, although some of the lower appendages are damaged. On the right femur, a white powder was present at the damaged area.

¹¹ Sexing juveniles is not as reliable as for adults. As adolescence approaches, sexing indicators become more discrete.

¹² These pupae are empty and very small (<3 mm). They are much too small for the flies that normally visit the body during the early stages after death. Without further analysis it is impossible to determine, but their size is consistent with that of a Cheese Skipper (*Piophilina*). These flies are associated with bodies in advanced states of decomposition. This suggests that the body decayed substantially prior to interment.

The completeness of the skeleton permitted a full range of sex and age determinations. Sex was found to be female for the skull [MS = -1.00] and the pelvis [MP = -0.17]. The pelvis in this instance was weakly female. An age range of 30-40 years was established through a combination of several criteria, including pubic symphysis and sternal rib morphologies. Although damaged, the skull was complete enough to characterize as dolichocranic [CI = 73.4] and low vaulted [AMHI = 68.7]. The Jantz discriminant score [ds = 0.638] and AMHI both categorize the cranium as Mandan.

Burial No. 11 (Feature 108, Burial #3, Cat. No. 2598)

Burial 11 comprises approximately 90% of an adult skeleton. Preservation is fair. The cranium is heavily damaged. The bones show substantial deformation, indicative of slow crushing. This is probably due to the weight of the earth above the burial.

The skeleton was sexed as female for the skull [MS = -0.57] and pelvis [MP = -1.61]. The remains were determined to be in the age range of 20-25 years. The skull was too fragmentary to permit any level of metric assessment. No analysis was possible.

Time Period 3

Burial No. 2 (Feature 9, Catalogue Nos. 1160, 1216, 1223)

Burial 2 consists of a damaged skull and portions of the infracranial skeleton, comprising 75% of the skeleton. The skull has been transected along a diagonal line from the left posterior to the right anterior. This is a recent cut due to a shovel, as the burial was discovered during excavation of a narrow curbface trench along the street margin. This individual was interred on its right side, with the head to the north (Figure 17.3). The interior of the skull is dirt free, although there appear to be numerous red ochre stains. Probable red ochre stains are also present along the maxilla on the posterior portion above the third molar and in the left orbit. There are fresh cut marks on the frontal and left zygomatic and scrape marks on the left parietal. Thirteen cranial fragments were also recovered. The largest are from the right parietal and temporal. The fragment edges are dirt stained, however, suggesting that the damage is not as recent as it might appear. There is a white powdery material on the internal surfaces of the parietal fragments. The nearly intact mandible is missing the right condyle. It is broken at the juncture between M2 and M3 on the right side. Damage to the mandible does not appear recent, however, as the fracture edges are heavily dirt stained. The infracranial skeleton is in fair to poor condition. Overall, the infracranial skeleton is gracile yet displays marked muscle attachments (i.e., deltoid tuberosity).

The remains are of an adult female [MS = -0.4], 25-35 years of age. The skull was too damaged to describe its shape metrically. The general appearance is consistent with a Mandan form.

Burial No. 7 (Feature 122, Cat. No. 2559)

Burial 7 consists of approximately 70% of a poorly preserved adult skeleton. A backhoe trench in Block 7 truncated the burial. The individual was interred on its right side in flexed position, with the head to the north (Figure 17.4). The skull is fragmentary and most of the vertebral column is missing. The upper appendicular skeleton was less well preserved than the lower. Among the latter were two complete tarsi.

The pelvis is clearly female [MP = -1.75] while the skull was equivocal [MS = 0.00]. This discrepancy is attributed to the fragmentary nature of the skull. The normally fragile facial skeleton is the only intact portion of the skull. Poor preservation limited aging to enamel attrition (30-45 years).

Burial No. 13 (Feature 173, Cat. No. 2892)

Burial 13 consists of a fairly complete (90%) adult skeleton. Preservation is poor with significant damage present on all areas of the skeleton. This damage is probably due to heavy equipment used to grade the area where the burial was discovered. This individual was interred in a flexed position on its left side, partially facing downward, with the head to the northeast (Figure 17.4).

The skeleton was complete enough to use the skull [MS = 2.00] and the pelvis [MP = 1.46] to determine that the sex of the remains was male. Age was estimated at 30-40 years. The skull was too incomplete to permit any form of analysis.

Time Period 4

Burial No. 8 (Feature 119, Cat. No. 2635)

Burial 8 consists of a nearly complete (95%) but poorly preserved subadult skeleton. This individual was interred on its back, in flexed position with knees to the east and with the head to the north/northeast (Figure 17.4). Only the hands are not fully represented. The skull and upper appendages are in fair to poor condition. Damaged areas of the skull are marked by the presence of a white crystalline powder. The poor condition of the remains is attributed to burial/soil conditions.

Sexing using the skull [MS = -1.85] and pelvis [MP = -1.31] was possible, both sets of criteria identifying a female. Despite heavy damage to the skeleton precise/accurate aging was possible. Using several criteria, including dental emergence and epiphyseal union, an age range of 13-16 years was arrived at.

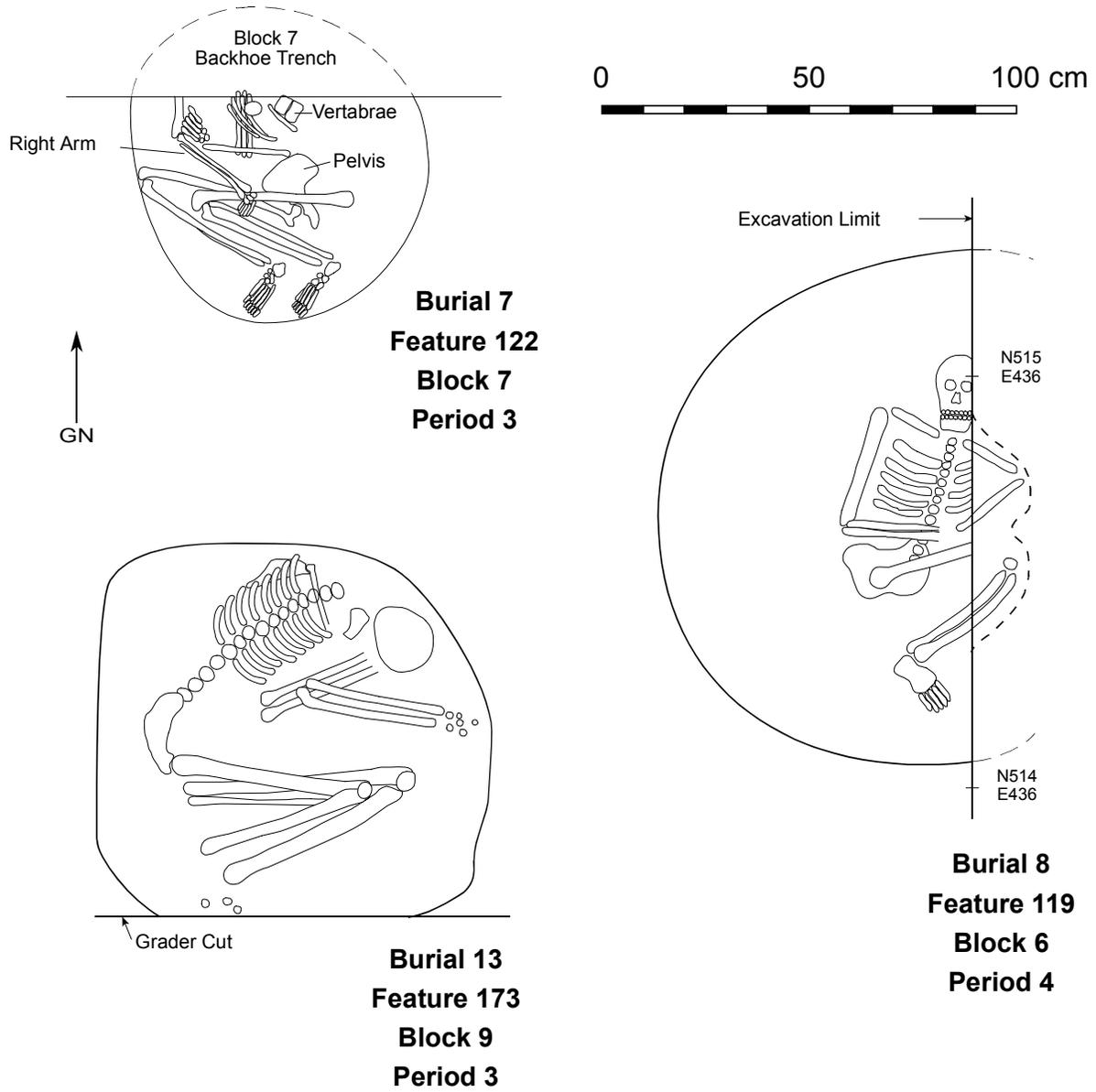


Figure 17.4. Drawings of interment positions for Burials 7, 8, and 13, Scattered Village (32MO31), 1998 excavations.

Although subadult, the cranium has reached its adult shape (Figure 17.6). The skull is dolichocephalic [CI = 73.9] and low vaulted [AMHI = 64.5]. The Jantz discriminant score [ds = 0.876] and AMHI both categorize the cranium as Mandan.

Dentition

As did the skeletons, teeth varied in quality. Eleven burials included partial or complete dentitions. Four dentitions were intact and sufficiently unworn to permit metric assessment. Where possible, other characteristics including caries and periodontal resorption were recorded.

Caries

Caries represent bacterial erosion of the crown and underlying dentin. Caries incidence is directly linked to the level of dietary processed carbohydrates. For this reason Northern Plains maize horticulturalists have higher caries rates than earlier prehorticultural foragers (Williams 1994, 1997).

Six individuals had one or more carious lesions. The number of lesions ranged from one (n=2) to eight (n=2). With the exception of one canine, lesions were confined to the premolars and molars. Caries were distributed on the crown surface (pit/fissure) and interproximally. In four cases, lesions encompassed the whole crown surface, two of which extended into the pulp cavity (Figure 17.5).



Figure 17.5. Carious lesions Burial 10, Scattered Village (32MO31).

Periodontal Resorption and Abscess

Periodontal disease, like caries, is related in part to diet. Highly processed carbohydrates can be trapped beneath the gum surface. Bacterial utilization of these trapped foodstuffs can cause the formation of hard calculus deposits. Together these inflame the gum tissue, leading to recession of the alveolar bone. In severe cases the roots can weaken and result in premature tooth loss.

Calculus deposits ranged from none present to excessive. The latter being characterized as greater than 3 mm in thickness. Periodontal resorption varied directly with the level of calculus deposits. Where resorption was slight (<3 mm), calculus deposits were minor. The opposite was true of excessive resorption. In one instance resorption measured 9.8 mm.

As resorption progresses bacterial infection of the alveolar bone can occur, forming an abscess around the tooth roots. This too can contribute to antemortem tooth loss. Thirteen abscesses (n=4) were recorded. Two individuals had one abscess apiece. The remaining two individuals had four and seven abscesses respectively. The two individuals with the large number of abscesses also had moderate to excessive resorption and antemortem tooth loss.

Antemortem and Postmortem Tooth Loss

Antemortem tooth loss is characterized by the presence of abscess and/or remodeling of the alveolar bone obliterating the tooth sockets. Nineteen teeth met the criteria for antemortem loss. Ten of the antemortem losses were recorded in one individual.

Postmortem tooth loss is a major hindrance to prehistoric dental analysis. Postmortem tooth loss is characterized by intact tooth sockets without abscess or excessive periodontal resorption. Postmortem loss was generally minor. Eight of ten dentitions had less than three missing teeth. Two, however, had substantial tooth loss, 26 and 16 teeth respectively. Prior personal experience places this at a very low loss level (Williams 1997). Conclusions regarding dental health must be tempered by the impact of these missing teeth.

Osteopathology

Evidence of osteopathological conditions were few. This may be a function of lifestyle or perhaps of the generally young age (average 32 years) of the individuals. No evidences of chronic disease (i.e., tuberculosis or treponematosis) were present. Causes of death are unapparent (i.e., no aggression trauma) but rapid in onset as no bony changes are recorded in any of the skeletons.

Osteoarthritis

Osteoarthritis is one of the most common paleopathological conditions for the prehistoric Northern Plains (Williams 1994, 1997). Its etiology is not fully understood but is viewed in general as a function of aging and joint trauma. It is expressed as a progressive deterioration of

the joint surface that begins as minor pitting of the articular surface. This is followed by the progressive formation of a marginal lip. In severe cases, bone to bone contact and polishing (eburnation) of the joint surface take place. Vertebral osteophytosis is a form of arthritic inflammation that takes place between adjacent vertebra. It occurs when the intervertebral disk deteriorates. Lipping, known as osteophytes, forms around the margin of the body. In severe cases this can lead to bony fusion.

Right Carpus (Burial 2). There is moderate lipping of the distal head and severe lipping and erosion (probable eburnation) of the proximal end of the right #2 metacarpal. The right lunate displays moderate erosion and lipping. The articular surface (#2 metacarpal) of the right navicular shows mild erosion. The lesser multangular has calcified tissue extending posteriorly to encompass the right lunate (Figure 17.6). The extension measures approximately 21.6 mm in cord length and just less than 10 mm in breadth. There is some eburnation where it articulates with the proximal end of the right #3 metacarpal (styloid process).

Left radius (Burial 3). The head displays mild osteoarthritic lipping.

Left and right popliteal joints (Burial 3). There is bilateral moderate to severe lipping of both popliteal joints. The left tibia is the most affected, displaying substantial lipping, erosion, and eburnation.

Left sacrum/os coxa (Burial 5). The left sacrum and os coxa are in the early stages of bony fusion. While strictly speaking not arthritic, joint fusion can occur in severe cases of osteoarthritis.

Right clavicle (Burial 5). The scapular articular surface displays moderate to severe erosive pitting.

L3-L5 and sacrum (Burial 5). The lower three lumbar vertebrae and the sacral promontory display severe vertebral osteophytosis. The most severe lipping and body erosion is on L5 and the sacral promontory.

Left femur (burial 5)

The distal articular surfaces (condyles) display mild to moderate lipping.

Enthesophytes

These bony growths emanate from sites of ligamentous attachment. These commonly form in response to acute or chronic stress of the affected muscle or tissue. These can occur on any bone.



Figure 17.6. Calcification of left lesser multangular, Burial 2, Scattered Village (32MO31).

Left and right calcanei (Burial 5). There are mild bilateral heel spurs on the inferior surface of the calcaneal tubercle. Chronic injury to the plantar aponeurosis results in calcification of its attachment site, forming a heel spur.

Right calcaneus (Burial 10). There is a slight heel spur present. This specific incidence may be related to the presence of a bifurcated calcaneal tubercle, the attachment site for the aponeurosis.

Anomalies

Anomalous characteristics are viewed as non-pathological features of the skeleton. Although within the range of normal variation, they are uncommon enough to be recorded.

Multiparity (Burial 5). The preauricular sulci of both os coxae are marked by broad, deep pits. These are indicative of multiparity (3+ births).

Persistent Metopic Suture (Burial 6). The metopic suture joins the left and right halves of the frontal bone. This suture normally closes within the first two years of life. Occasionally, as with this individual, the suture remains patent into adulthood.

Septal Aperture (Burial 7). This foramen is a rare asymptomatic developmental defect that appears as a small opening in the inferior portion of the sternal body.

Spina Bifida Occulta (Burial 11). The left and right halves of the vertebral arch normally fuse by the 3rd year of life. When the arch does not fuse on the sacrum is it referred to as spina bifida occulta. In this instance, all five sacral vertebrae are open on the posterior side.

Coronal Ossicle (Burial 13). Ossicles are small bones that form in cranial sutures. They are often present on the lambdoidal suture but are rare on the coronal suture. There are bilateral ossicles present (Figure 17.7). On the left side it is located 34.6 mm from bregma, and measures 12.6 mm by 15.6 mm. On the right side, it is located in nearly the same location, 34.4 mm from bregma. It is slightly smaller, measuring 17.4 mm by 13.8 mm.



Figure 17.7. Coronal ossicles, Burial 13, Scattered Village (32MO31).

Biological Distance

Although Mandan skeletal samples have been included in a number of biological distance studies, in nearly every instance they have been employed as comparative samples rather than as the focus (Bass and Birkby 1962; Jantz 1976; Jantz et al 1981; Owsley and Symes 1981; Owsley et al. 1981). For this reason, almost all of the reported Mandan osteometric represent data pooled

from several sites. The interaction between individual sites has not been considered. The exception is Key's (1983) analysis of craniometric relationships on the northern Plains. Key included in his research 27 male and female crania recovered from eight Mandan sites (Table 17.3). Key reports a time frame for these sites from the early AD 1600s¹³ through the 1840s. Among these are four female crania previously recovered from Scattered Village.

Table 17.3. List of sites with craniometric data studied by Key (1983), and craniometric variables used for biological distance analysis in the present study.

<u>Comparative Samples from Key (1983)</u>			Craniometric Variables
Site	Sample N	Group	
Sperry (32BL4)		MAN1	minimum frontal breadth
Double Ditch (32BL8)		MAN1	biorbital breadth
Fort Clark (32ME2) ¹⁴		MAN2	nasal breadth
Deapolis (32ME5)		MAN2	nasal height
Big Hidatsa (32ME12)	1F	Hidatsa	upper facial height
On A Slant Village (32MO26)		MAN1	bizygomatic breadth
Motsiff (32MO29)		MAN1	cranial length
Scattered Village (32MO31)	4F	KSV	cranial breadth
Boley (32MO37)		MAN1	basion-bregma height
			basion-nasion length
			basion-prosthion length

Four female crania (Burials 5, 6, 8, and 10) were intact enough to permit metric assessment. The single male skull was too damaged to permit sufficient osteometric collection. Eleven craniometrics (Table 17.3) were chosen based on their presence on these four crania and previously reported use. Comparative female Mandan craniometrics were derived from Key (1983). For the purposes of this analysis these were separated into three categories: 32MO31 [Key's Scattered Village, or KSV], Mandan 1 [early, MAN1], and Mandan 2 [late, MAN2]. The KSV sample represents four female crania previously from Scattered Village, MAN1 is a pooling of data from five sites (32BL4, 32BL8, 32MO26, 32MO29, 32MO37), and MAN2 is a pooling of two historic Mandan sites (32ME2 and 32ME5) (Table 17.3). The KSV sample is

¹³ Current assessment of relevant chronology using data available since Key's study places the beginning date in the early AD 1500s.

¹⁴ The native village at Fort Clark includes Mandan occupation, from ca. Ad 1822 to 1837, and Arikara occupation from AD 1838 to 1861. Depending on provenience, the individual studied by Key could be either Mandan or Arikara. [Ed.]

considered contemporary with the Scattered Village burials in this study. The MAN1 sample is broadly contemporaneous with the full temporal range of all burials in our sample (AD 1550-1700), while the historic MAN2 falls outside and later than the temporal framework of the present study sample from Scattered Village. Key (1983) also collected craniometric data from a single female Hidatsa from Big Hidatsa (32ME12). This individual could fall within the time range for our Scattered Village sample or could be later.

To minimize size effects the craniometric data were standardized prior to analysis. The Average Taxonomic Distance was used as a distance algorithm. This is a simple Euclidian distance formula that functions well with small samples such as those in this study. Single Linkage clustering was used to graphically present these distances (Sneath and Sokal 1973). Two distance clusterings were constructed. The first included only the comparative samples from KSV and 32ME12. The second added the pooled MAN1 and MAN 2 samples. The resulting phenograms are presented in Figure 17.8.

The results of the first single linkage distance clustering are presented in Figure 17.8 (top). Distances ranged from 0.79 to 1.41¹⁵. The KSV sample from Scattered Village and Burial 10 have the closest distance. Burial 5 and Burial 6 join with KSV at slightly greater distances. Burial 10 clusters with the lone Hidatsa cranium at a very similar level. Burial 8 is the most distant and the last to cluster.

In the second clustering (Figure 17.8, bottom), the addition of the two pooled Mandan samples changes some of the distances and their connections. Distances formed a tighter overall clustering ranging from .88 to 1.29. Burial 10 again clusters closely with the KSV pooled sample and with the Hidatsa and Burial 8 samples. Perhaps not unexpectedly, the KSV sample forms a tight cluster with MAN1. Like the first clustering, Burial 5 continues to cluster with KSV at a very similar distance. In this iteration Burial 6 clusters with Burial 10, as does MAN2.

Discussion

Thirteen burials were identified. The majority were female, spanning the subadult through late middle adult years. Although this represents a large number of individuals, variable preservation reduced the database. Preservation ranged from good to poor. This is due in part to shallow burial depth crushing. This is evidenced by deformational damage (slow loading) to several crania. Soil conditions also may play a role as skeletal preservation in this region of the upper Missouri is less than perfect (Williams 1996, 1997).

¹⁵ The magnitude of distances is arbitrary (i.e., .79 vs. 7.9). The order of magnitude is chosen for ease of application.

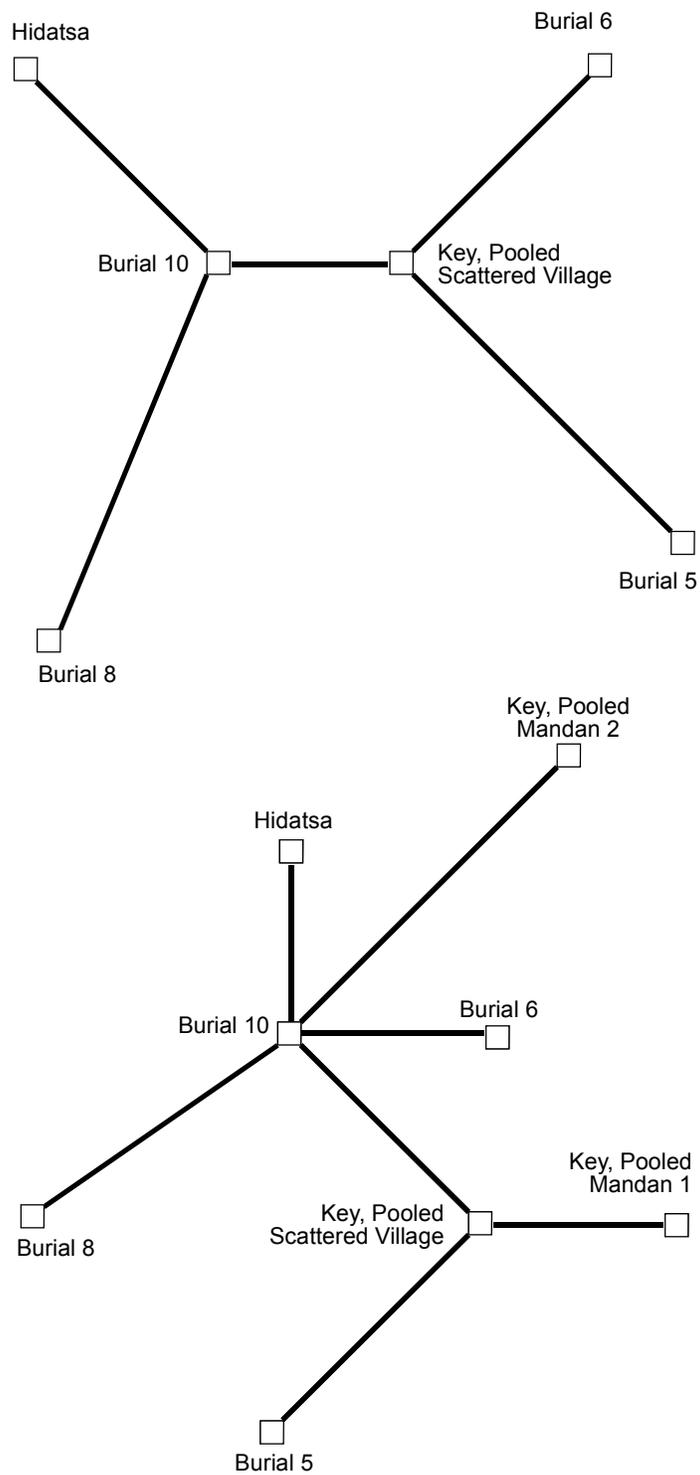


Figure 17.8. Top: Phenogram 1 (KSV, Hidatsa, and four individuals from Scattered Village). Bottom: Phenogram 2 (all samples). The dark lines represent distances; orientation is arbitrary.

Compared with contemporary populations farther south along the Missouri River, the general health pattern is very good. Conditions observed such as arthritis are expected and are not life threatening. No signs of infection or chronic metabolic disease were evident, in direct contrast to Arikara and other Plains Village cemetery samples (Owsley and Bruweldheide 1994; Williams; 1988). With an average age of 32 years, this may be a function of the young age of this series of remains. Causes of death are unknown but clearly acute in nature. Due to the predominance of females present and their ages within the reproductive years, death in childbirth cannot be excluded. No evidence of aggression trauma was observed. While this sample is too small to create a life table, the adult demographic profile is consistent with a pooled life table derived from North and South Dakota Village remains (Williams 1997). These demographic data show a fairly even distribution of adults from the early 20s through the 60s. Dental health was typical or expected of a maize horticultural people. High caries and abscess incidence fit this dietary profile. The latter are the only health-related features typical of a Village association. Otherwise, the skeletal sample resembles earlier Woodland populations in the absence of chronic disease (Williams 1994). One serious question remains. Where are the males and the younger juveniles?

All the crania, both fragmentary and intact, exhibited the general Mandan (Hidatsa?) morphology of low vault height and relative dolichocrany. Where it was possible to use, the Jantz discriminant function placed the crania in the Mandan category.

As for biological distance, three of the four burials (Nos. 5, 6, and 10) formed a close association with Key's Scattered Village pooled sample (KSV) in the first clustering. In the second clustering, Burial 6 formed a closer connection with Burial 10 than with KSV. Burial 8 and to a lesser extent Burial 10 did maintain an identity separate from Burials 5 and 6. In both clusterings, the Hidatsa sample associated with Burial 10, and Burial 8 remained the most distant of the four burials. As could be expected, the addition of Key's pooled samples of other Mandan sites provided different results. The MAN1 (early) sample formed a very tight cluster with the pooled KSV sample and with Burial 5. The late, MAN2 sample linked with Burial 10 just slightly less than with Burial 8. These results, however, did not assist in settling questions regarding Mandan and Hidatsa occupation of Scattered Village.

Key's results (1983) are not directly comparable with those presented here. Key, for example, pooled male and female data as well as pooled the Scattered Village crania with other contemporary Mandan sites. Still, they do show a similar overall pattern. This includes a distant association of the Hidatsa with the Mandan samples, and the distinctness of the MAN1 and MAN2 sets.

These results appear to suggest that cranial morphology (Mandan or Hidatsa?) is consistent over a period of time as evidenced by the close clustering of KSV, MAN1, and Burials 5 and 6. At the same time, the distances were not as close as might be expected for a single temporal frame. The placement of Burial 6 with Burial 10 in the second clustering also runs counter to this generalization. Burial 10, from TP2, formed a more distant connection to the TP1 crania. This could point to temporal changes in cranial morphology or to changes in the

occupation of Scattered Village. The latter is hinted at by the clustering of Burial 10 with the Hidatsa sample. This grouping does not necessarily mean that Burial 10 is Hidatsa, but does indicate that Burial 10 is closest in shape to the Hidatsa sample. At the same time, Burial 8, from the oldest temporal unit, also clusters closest with Burial 10. These results can be interpreted in one of several not mutually exclusive ways.

1. First, there is the very likely possibility of multiple occupations of Scattered Village. The distance clusterings imply that this first involved the Hidatsas and then Mandans. This doesn't explain, however, the association of MAN2 with Burial 10.
2. Another possibility for the confusing results is the likelihood for gene flow between the Mandans and Hidatsas. This would tend to homogenize cranial morphology and lead to less distinction in the various samples.
3. Finally, the very small samples including only a single Hidatsa cranium, the absence of males, and the compression of temporal differences in the samples used here must be considered serious tempering factors. Results may be serendipitous and bear no resemblance to actual circumstances at Scattered Village.

Until more is known about Hidatsa physical anthropology and the dynamics of the Coalescent, drawing definitive conclusions concerning the occupants of Scattered Village is difficult at best.

Figure 17.1. Drawings of interment positions for Burials 3, 5, 6, and 12, Scattered Village (32MO31), 1998 excavations.	17.4
Figure 17.2. Burial 3, triangular defect left side of cranium, Scattered Village (32MO31).....	17.7
Figure 17.3. Drawings of interment positions for Burials 2, 4, 9, 10, and 11, Scattered Village (32MO31), 1998 excavations.	17.8
Age estimations place this juvenile in the range of 11-18 years. Based on the few teeth recovered, development and emergence is consistent with late childhood, ca. 11 years. Epiphyseal union while lacking diagnostic indicators nonetheless places this juvenile at under 18 years (unfused first and second sacral vertebrae). The fragmentary pelvis was female in appearance.....	17.9
Figure 17.4. Drawings of interment positions for Burials 7, 8, and 13, Scattered Village (32MO31), 1998 excavations.	17.12
Although subadult, the cranium has reached its adult shape (Figure 17.6). The skull is doliocranic [CI = 73.9] and low vaulted [AMHI = 64.5]. The Jantz discriminant score [ds = 0.876] and AMHI both categorize the cranium as Mandan.	17.13
Figure 17.5. Carious lesions Burial 10, Scattered Village (32MO31).....	17.13
Figure 17.6. Calcification of left lesser multangular, Burial 2, Scattered Village (32MO31). 17.16	
Figure 17.7. Coronal ossicles, Burial 13, Scattered Village (32MO31).....	17.17
Figure 17.8. Top: Phenogram 1 (KSV, Hidatsa, and four individuals from Scattered Village). Bottom: Phenogram 2 (all samples). The dark lines represent distances; orientation is arbitrary.....	17.20