

A PALEOPATHOLOGICAL AND MORTUARY ANALYSIS OF
THREE PRECONTACT BURIALS FROM SOUTHERN
SASKATCHEWAN

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By

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ABSTRACT

There is relatively little interment information available for the Middle and Late Middle Precontact Periods and even less for the Early Precontact and Early Middle Precontact Periods in Southern Saskatchewan. The Stoney Beach, Fox Valley and Adamiak sites provide some data on paleopathology and mortuary practices and contribute to this data set in order to try to create a more complete picture of health and mortuary practices during Precontact times in southern Saskatchewan.

The Stoney Beach site appears to be the oldest interment found in Saskatchewan and one of the oldest on the Northern Plains. Stoney Beach is classified as an Early Middle Precontact Period inhumation due to a radiocarbon date of 6050 ± 40 B.P. and represents a primary burial orientated southeast-northwest with an adult female between the ages of thirty and thirty five found in a flexed position and an infant between 9.2 and 10.2 lunar months found near the knees. Associated cultural material included bison and canid remains, a shell pendant, and red ochre. The adult female had calculus deposition, attrition/abrasion, and slight periodontal disease. As well, there was minor osteophyte formation on the fourth lumbar vertebra and an abnormal peroneal process of the left calcaneus possibly related to an ankle injury such as a strain, and a possibly transacted fifth metacarpal. The association of the female and infant and the young age of the child may indicate that they both died due to obstetric problems, possibly representing a coffin birth.

The Fox Valley interment is a shallow, secondary bundle burial containing at least four individuals beneath a rock cairn. A radiocarbon date of 2410 ± 40 B.P. is congruent with a Late Middle Precontact burial and the mortuary practices and associated grave goods (a tubular pipe, a flake, red ochre, and whooping crane remains) indicate the Fox Valley burial to be a probable Pelican Lake site. This thesis identifies the past existence and rare inclusion of whooping cranes in archaeological sites and contributes to knowledge of whooping crane use in Precontact cultures. Out of the minimum of four individuals only one could be analyzed in detail and was determined to be an adult male between the ages of thirty and forty. Dental conditions present

included dental attrition, slight periodontal disease, tooth crowding, and an abscess. The other pathological condition present was osteomyelitis of the distal left femur and humerus.

The Adamiak cranium cannot be placed culturally as it had no associated material or a known provenience. However, it is Native American in origin, of antiquity, and displays a unique pathology and therefore is important to this thesis. The Adamiak cranium belongs to a 35 to 45 year old female with poor dentition (enamel hypoplasia, calculus deposition, attrition, and alveolar resorption subsequent to antemortem tooth loss) and displays biparietal thinning which has been observed in many parts of the world but rarely on the Plains. This condition has an unknown etiology but may be related to osteoporosis, vascular constriction, or normal variation. In the future when causation is determined, the information gathered in this thesis may be used to better understand this pathology. These three sites help to expand and contribute to the data for health and mortuary practices from the Middle Precontact Period in Saskatchewan. With the use of comparative sites trends in mortuary practices can be suggested.

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“The history of death is at least as complicated as the history of life.”

(Cannadine 1981:242)

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CHAPTER ONE

INTRODUCTION

1.1 INTRODUCTION

Human burials have long held fascination whether one is interested in seeking graves of legendary historical figures, understanding one's heritage, or attempting to extract information about the health of past populations. This thesis is concerned with the identification of human disease processes affecting precontact populations in southern and central Saskatchewan and making cultural connections based on mortuary practices. Information from three unpublished sites, the Stoney Beach site, the Fox Valley site, and the Adamiak site, will be presented and compared with previously published data to expand knowledge about the Early and Middle Precontact Periods. The archaeological record for this time period is sparse as there are few burial sites that have been excavated and most of those represent single interments. The greater the number of sites studied, the easier it will be to answer questions regarding cultural relationships and health status.

Since the remains under study are of Native American ancestry, the remains from Stoney Beach and Fox Valley have been reinterred and the Adamiak remains will be repatriated in the near future. While archaeologists see the importance of studying human remains for research purposes, educating the public, and contributing to the cultural knowledge of the country, it is important that respect is paid to descendant populations and their concerns and wishes regarding repatriation. For this reason, a firsthand analysis of the skeletal remains from Stoney Beach and Fox Valley was not possible. As a result, information has been obtained from detailed analyses

conducted by Dr. E. Walker, Department of Archaeology and Anthropology, University of Saskatchewan (Walker 2000, 2001).

The Stoney Beach site is located near Pense, in south-central Saskatchewan and is a well-known Late Precontact site. A re-evaluation of the site in 2001 during a pipeline mitigation project revealed a burial containing the remains of two individuals at the bottom of a pit feature. Multiple individuals were also found at the Fox Valley site. A minimum of four individuals appear to be represented at this site near Leader in southwestern Saskatchewan. Having a precise provenience or known location for archaeological remains is of great importance when trying to establish a workable context. Unfortunately, one of the cases presented in this study is lacking specific provenience and background information. Contextual information for the Adamiak cranium is lost and it must be analysed in isolation, thus restricting the scope of its research potential.

1.2 RESEARCH OBJECTIVES

The primary objective of this thesis is to help expand and contribute to the knowledge of health and mortuary practices from the Middle Precontact Period on the Northern Plains. This report will analyze the Stoney Beach site, the Fox Valley site, and the Adamiak burial to get a better understanding of paleopathology and mortuary practices during this time in Saskatchewan. There is also an aim to project a better view of the health status of past populations in the Plains region. Cultural complexes on the Northern Plains are typically separated into different time periods based on similar geographical occupation and material culture such as stylistic attributes of projectile points and specialized tool kits. This thesis will attempt to isolate mortuary practices that are unique or typical of Early Middle Precontact, Oxbow, McKean, and Pelican Lake

cultural complexes in an effort to identify possible trends. In order to achieve these goals, it is necessary to compile data from the three cases highlighted in this thesis as well as from previously documented Middle Precontact Period burials across the Northern Plains. In order to fulfill the goal of expanding and contributing to knowledge of Middle Precontact cultures on the Northern Plains, this thesis uses comparative sites in conjunction with information obtained from the Stoney Beach site, the Fox Valley site, and the Adamiak cranium to propose trends in mortuary practices in the Oxbow, McKean, and Pelican Lake cultural complexes.

1.3 CHAPTER ORGANIZATION

This thesis is comprised of seven chapters. Chapter One describes the subject matter and objectives of the thesis. This chapter also provides an outline for the chapter organization of this thesis.

Chapter Two is an overview of archaeology of the Northern Plains prehistory. The present and past environmental conditions are considered and a cultural chronology of the area is provided.

Methodology is discussed in Chapter Three. This section explains how the objectives of this report are achieved. It also describes how both the osteological and paleopathological analyses of the skeletal remains were conducted. This includes defining paleopathology and looking at different etiologies of disease and causes of skeletal anomalies. Chapter Three finishes with a look at cultural traditions and how mortuary practices are assessed archaeologically. Cultural views of death and funerary rites are broken down and the types of cultural material linked with burials are examined.

The following three chapters provide detailed description of three skeletal assemblages which most likely represent Early or Middle Precontact Period interments. Chapter Four looks at the Stoney Beach site and the two individuals excavated from this primary burial. The Fox Valley site is reviewed in Chapter Five. At least four individuals were discovered from a probable secondary bundle burial. Chapter Six looks at the Adamiak cranium that displays biparietal thinning.

Chapter Seven, serves to present a comparative discussion of Middle Precontact Period interments across the Northern Plains. There is a focus on burial sites from the Oxbow, McKean, and Pelican Lake complexes and where possible, paleopathological conditions and mortuary practices are described to provide data for comparison with Stoney Beach, Fox Valley, and Adamiak sites. The comparative data and the data from the three focus sites are then used to look for trends across Middle Precontact cultural complexes on the Northern Plains. This chapter also provides a final discussion and conclusion for this report summarizing the major points of this thesis and the significance of the information provided as well as suggestions for further areas of study.

CHAPTER TWO

CULTURAL CHRONOLOGY OF THE NORTHERN PLAINS

2.1 GEOGRAPHY

The Great Plains of North America is a grassland area currently occupying about 1,166,000 square kilometres (Plowden 1972). The Northern Plains is comprised of southern Saskatchewan, southern Alberta, southwestern Manitoba, and parts of Montana, Wyoming, North Dakota, and South Dakota. The Nebraska/South Dakota border defines an ecological boundary between the Northern Plains from the Central Plains (Blakeslee 1994). The sites presented in this thesis are from central and southern Saskatchewan. It is important to note that climatic zone boundaries are based both on seasonal temperatures and precipitation as well as vegetation distribution. Due to a precipitation gradient, the ecozones of Saskatchewan tend to have a northwest to southeast orientation across the province (Secoy 2006). All of the sites discussed in this thesis are located in the Prairie ecozone in southern and central Saskatchewan. Classified as a cold steppe climate, southern and central Saskatchewan is a grassland biome region with trees usually only present around lakes and rivers (Chakravarti 1969). It is part of the great Northern American grasslands which are characterized by rolling lacustrine and morainic plains and eroded uplands that are richly deposited with alluvium and loess and are mostly vegetated by grasses, shrubs, and a few flowering plants (Lundquist 1999; Secoy 2006).

2.2 CULTURAL CHRONOLOGY

Cultural complexes on the Northern Plains are separated into different time periods based on similar geographical occupation and material culture such as projectile points, pottery, and specialized tool kits. This thesis will attempt to isolate mortuary practices that are unique or

typical of the Middle Precontact Period (7,500 – 2,000 B.P.) and specifically the Oxbow, McKean and Pelican Lake cultural complexes. Due to the lack of diagnostic tools associated with the Stoney Beach, Fox Valley, and Adamiak burials, cultural associations are difficult. In order to place the burials in a cultural framework, a comparison of mortuary practices with other sites and radiocarbon dates are taken into consideration. Comparative data from Oxbow, McKean, and Pelican Lake burial sites on the Northern Plains, such as the Gray, Greenwater Lake, St. Denis, Graham, Bradwell, and Bracken Cairn sites, are used to reconstruct the mortuary practices of these cultural complexes.

It is important to discuss the cultural chronology on the Northern Plains in order to effectively examine cultural complexes and sites within a cultural framework. Cultural chronologies are based on cultural sequences established from material remains and other cultural aspects such as settlement patterns. Diagnostic artifacts are the most useful tools in creating a chronological sequence. Seriation can be used to create a relative chronological sequence based on typologies or design styles of certain archaeological materials such as pottery. Whether it is a specific projectile point form or pottery vessel decoration, each design style has unique characteristics and distinguishable differences that aid in establishing a cultural sequence. Projectile point form is predominantly the main diagnostic artifact of the Northern Plains for the Precontact Period. It is important that accurate radiocarbon dates are available to create time reliable cultural chronologies by adding the crucial time dimension to these cultural sequences. Throughout this thesis, conventional radiocarbon dates for sites are used unless otherwise stated.

A description of the cultural chronologies proposed over the years will follow a brief clarification of three terms commonly used when describing different periods. The first is a

omplex, which can be defined as “...the total expression of a number of assemblages left by the same group over a sufficiently narrow time period that cultural expressions undergo minor changes,” in which an assemblage is the material remains, features, and evidence of activities of a single occupational group at one site over a brief period of time (Syms 1977:70). Dyck (1983) describes a complex as:

“... a large composite archaeological unit. It consists of interconnected sites features and artifacts, tied together by similarities in function style, technology, and subsistence-settlement system. The parts of a complex are found within a common geographical distribution and within a common segment of time” [Dyck 1983:69].

Secondly, a *tradition* refers to a technological or other cultural pattern of an element or group of elements (frequently diagnostic) in sequential complexes (Dyck 1983). Finally, a *series* is a sequence of complexes or components that are found at slightly different times but occupy the same area and are closely related. It is also defined as, “a crude unit of archaeological analysis used for convenience before sites, features, and artifacts are ready for reclassification into complexes and traditions” (Dyck 1983:69). These descriptions will hopefully help to avoid confusion when these terms are used in this thesis.

There have been numerous chronologies developed over the last few decades that have been used to classify different occupations and time periods. The first chronology for the Northern Plains was created by Mulloy (1958). However, his inclusion of a cultural hiatus or abandonment of the Northern Plains during the Altithermal period (7500-5000 B.P.) was rejected as new information became available from archaeological excavations during the 1960s and 70s that revealed multiple sites from this time period (Walker 1992). Chronologies have also been created by Reeves (1973), Frison (1978), Dyck (1983), Walker (1992), and a variation of Walker

by Cyr (2006) (See Table 2-1). This thesis implements the chronology adapted by Cyr (2006) from Walker (1992). The other chronologies will not be used because the use of “Early I” and “Early II” from Reeves (1973) is awkward, the term “Plains Archaic” used by Frison (1978) is used in Wyoming and surrounding areas, and Dyck (1983) does not separate the “Middle Plains Indian” period resulting in wider time segments of classification which is less useful. The chronology proposed by Walker provides an extra segment of time referred to as “Protohistoric” which accounts for the time interval just prior to and just after initial contact between the first Europeans and Native Americans. A simple modification by Cyr (2006) includes replacing the term “historic” with “contact” and separating a Protocontact period from the Late Precontact Period as an intermediate period where European goods are being traded from other areas but there is no direct contact or occupation by Europeans in the area.

Table 2-1 Cultural Chronology of the Northern Plains

Years B.P.	Mulloy 1958		Reeves 1973		Frison 1978		Dyck 1983	Walker 1992		Cyr 2006	
200	Historic		Historic		Historic		Historic	Historic		Contact	
300	Late Prehistoric		Late Prehistoric		Late Prehistoric		Late Plains Indian	Late Prehistoric		Protocontact	
2000	Late Prehistoric		Late Prehistoric		Late Prehistoric		Late Plains Indian			Late Precontact	
3000	Middle Prehistoric	Late	Middle Prehistoric	Late	Plains Archaic	Late	Middle Plains Indian	Middle Prehistory	Late	Middle Precontact	Late
5000	Early	Early I		Middle		Middle			Middle		
7500	Hiatus			Early II		Early			Early		
10500	Early Prehistoric		Early Prehistoric		Paleoindian		Early Plains Indian	Paleoindian		Early Precontact (Palaeo-Indian)	
12000	Early Prehistoric		Early Prehistoric		Paleoindian		Pleistocene Hunters				

Modified from Walker (1992:120) and Cyr (2006:17)

2.2.1 EARLY PRECONTACT PERIOD (12,000 TO 7,500 B.P.)

The beginning of the Holocene is associated with a new climatic regime. As temperatures

increased, the Laurentian ice sheet retreated from southern and central Saskatchewan producing multiple river systems that shaped the province's topography (Kupsch 1969; Hare 1976). The new environment that was established was able to support new animal and plant distributions quite different from the preceding Pleistocene. Early Precontact cultures began to spread at the end of the Pleistocene and into the beginning of the Holocene due to dramatic changes in the environment following the animal migration and new wildlife distributions. A great variety of now extinct megafauna such as woolly mammoth (*Mammuthus primigenius*), camels, horses, and large bison (*Bison antiquus* and *Bison occidentalis*) roamed the Plains region (Wright 1995, Walker 1999). By approximately 12,000 B.P., southern Saskatchewan was ice free, but it is unclear whether there was occupation directly after the glacial retreat because no artifacts have been found *in situ* from this date (Christiansen 1970). Initial occupation of this region is estimated to be around 11,500 B.P. (Frison 1991). The complexes of the Early Precontact Period are identified from chipped stone tools and are separated based on projectile point morphology.

The oldest artifacts found in Saskatchewan come from the Clovis complex; a culture present on the Northern Plains from about 11,200 to 10,900 B.P. (Frison 1978; Frison et al. 1996; Walker 1999). Clovis populations are known to be megafauna hunters with several mammoth kills described (Walker and Frison 1980; Frison and Todd 1986; Hannus 1990). Clovis complex assemblages are recognized most commonly by the presence of lanceolate fluted spear points (Frison et al. 1996; Walker 1999). Contemporaneous with Clovis is the Goshen complex (13,000 to 10,800 B.P.) which has been found in excavated sites in Montana, Wyoming, and South Dakota. Goshen-Plainview projectile points are similar to Clovis but lack flutes (Frison et al. 1996; Kooyman 2000; Walker 1999). Following the Clovis and Goshen complexes

is the Folsom-Midland complex which dominated the Northern Plains from about 11,000 to 10,500 B.P. Evidence from American excavations indicates that during this time period there was a transition to bison as the prime subsistence base as the megafauna had become extinct and over the next millennia bison procurement continued to escalate (Walker 1999). As a major subsistence base of prehistoric groups, bison had a great effect on the ecosystem and the technological adaptations, movements, and social organization of prehistoric peoples (Acton et al. 1998; Lowie 1985; Wood and Liberty 1980).

Two complexes, Agate Basin (10,500 to 9,500 B.P) and Hell Gap (10,000 to 9,500 B.P.), are represented on the Plains simultaneously and date between about 10,500 and 9,500 years ago (Kooyman 2000; Walker 1999). In Saskatchewan, these complexes have been discovered only by means of surface finds in Saskatchewan. *In situ* evidence is only documented from the United States. The Alberta-Cody complex (9,500 to 8,400 B.P.) is the earliest complex in Saskatchewan to be found *in situ* and has been radiocarbon dated to about 9,000 B.P. (Walker 1999). Also part of the Cody complex are Scottsbluff and Eden technologies and have been found at the Heron Eden site (EeOi-11) located near Prelate (Corbeil 1995), and the Napao (DkNv-2) and Niska (DkNv-3) sites located near Ponteix (Meyer 1985; Meyer and Liboiron 1990).

Following the Cody Complex arises a group of projectile points associated with the terminal Early Precontact Period referred to as the Terminal Paleo-Indian sequence (8,800 to 7,500 B.P.) (Walker 1999). These projectile points include Lusk, Angostura, James Allen, Fredrick, Lovell Constricted, and Pryor Stemmed and are characterized as parallel-sided, obliquely flaked, lanceolate points and the base is unusually concave (Dyck 1983; Walker 1999).

Groups during this time would have been more mobile than earlier populations as they followed bison migration routes (Peck 2011).

2.2.2 MIDDLE PRECONTACT PERIOD (7,500 TO 2,000 B.P.)

All of the cultural complexes and sites discussed in this thesis are from the Middle Precontact Period. The focus of this report is on the Early Middle Precontact, Oxbow, McKean, and Pelican Lake cultural complexes.

2.2.2.1 Early Middle Precontact Period (7,500 to 5,000 B.P.)

In the past, the climate and ecoregion margins of Saskatchewan would have varied from modern times. At the onset of the Middle Precontact period there was a major change in climate on the Plains. This time period is often referred to as the Hypsithermal, Mid-Holocene Climatic optimum, Altithermal, or Holocene Thermal Maximum (Bryson 1987; Bryson et al. 1970; Buchner 1980; Vance 1987; Walker 1987, 1992; Wendland 1978; Wilson 1982). From about 7,400 to 4,700 B.P., there was a significant warming trend that resulted in warmer and drier summers and shorter and more snow filled winters (Bryson 1987; Bryson et al. 1970; Walker 1992). These conditions would have caused the landscape to become dry and arid (Vance et al. 1995). During this time, the Prairie ecoregion boundary would have shifted to the northeast; however, it is difficult to tell if the Plains region area increased because the southern border may also have shifted further north (Acton et al. 1998; Wilson 1982). It was once thought that the Northern Plains were abandoned during this time due to the harsh living conditions; however, this position is now rejected (Reeves 1978; Walker 1992). While the human population may have decreased and there may have been significant population relocations, the area would still have been occupied with groups beginning to congregate near permanent water sources (Walker

1992). The climate change would have resulted in herd migrations and a change in local flora and fauna. Consequently, a shift in hunting technology is observed with a shift from large lanceolate projectile points to small projectile points used with atlatls.

The Plains assemblages from the Early Middle Precontact Period range from about 7,500 to 4,700 B.P. and have been termed both the Mummy Cave Series by Dyck (1983) and Mummy Cave complex by Reeves (1978). The classification Mummy Cave series is more appropriate because it recognizes that multiple assemblages or complexes that are present such as the Bitterroot and Gowen complexes (Dyck 1983; Peck 2011).

2.2.2.2 Middle Middle Precontact Period (5,000 to 3,000 B.P.)

Between 5000 and 3000 B.P. there was another shift in climate; this time it was a shift to a cooler moist climate (Bryson et al. 1970; Ritchie 1983; Wendland 1978). As a result, the position of plant communities shifted and modern vegetation began to adapt to the new environment. Again there would have been a shift in ecoregion boundaries to the southwest. It is important to note that changes in vegetation and boundaries would have adapted to the climate change slowly; therefore the Hypsithermal would have had lingering effects on the environment and therefore on the inhabitants (MacDonald and Ritchie 1986; Ritchie 1983). This climatic shift signifies the beginning of the Middle Middle Precontact Period and is associated with an increase in population. Much more is known about this period in Saskatchewan than those discussed thus far because there have been multiple campsites and burial sites excavated.

The first identified complex of this period is the Oxbow complex. It was first recognized in southeastern Saskatchewan at the Oxbow Dam type site (DhNn-1) and was wide spread throughout Saskatchewan approximately 5,000 to 3,800 B.P. (Nero and McCorquodale 1958).

Dyck (1983) proposes a temporal span of 4,700 to 3,050 years ago and Morlan (1993) suggests a temporal span of 6,300 to 4,400 years ago. However, a reanalysis of the Oxbow dam site suggests that the early dates suggested by Morlan (1993) were erroneous possibly due to a mixed sample or contamination (Green 1998). Currently the accepted range for Oxbow occupation in Saskatchewan is from about 5,000 to 3,800 B.P. (Nero and McCorquodale 1958; Walker 1992). Walker (1992) postulates that the Oxbow complex evolved *in situ* from a Mummy Cave variant.

A variety of Oxbow sites have been excavated including campsites and burials. Often identified by “eared” projectile points (side notched with a thinned, concave base), Oxbow populations relied heavily on bison (*Bison bison*) as they were the most prominent animal on the Plains (McDonald 1981; McHugh 1971; Roe 1970). Sites indicate that small scale hunts were favoured over large scale pound operations. The size of the Oxbow point suggests that it would have been used with an atlatl and been more effective for small scale hunts (Frison 1991; Wright 1995). Other animal remains that have been found within Oxbow sites include elk, moose, hare, fox, canid, deer, martin, and ground squirrel (Buchner 1981; Millar 1978; Webster 2004). In addition, Oxbow occupations provide evidence of long distance trade networks based on exotic materials ranging from copper tube beads originating from the Great Lakes region to shell bead made of *Natica clausa* from the Atlantic coast (Millar 1978, 1981a). Both individual burials and a large cemetery have been identified as Oxbow. The common occurrence of multiple individuals per grave and associated material such as domestic dog remains and red ochre are indicative of ceremonial practices or mortuary rites (Millar 1981a; Savage 1974).

The second grouping of the Middle Middle Precontact Period is the McKean series (4,200 to 3,100 B.P.). There are a couple of theories about the origin of the McKean series, the

first of which is a direct evolution out of Oxbow (Wright 1995). The second theory is direct competition with Oxbow after a migration onto the Plains (Brumley 1975; Syms 1970). Support for an immigration of McKean onto the Plains comes from sites dated 800 years earlier than sites found in Saskatchewan (Frison 1991). A theory for a Great Basin origin seems to be best supported in the literature (Brumley 1975; Jennings 1964; Reeves 1983; Webster 2004). In the past, this assemblage has been thought to be a single complex (Brumley 1975; Reeves 1970) but it has recently been suggested that it should be classified as a series (Webster 2004). The designation of series is reasonable considering that there are three different projectile point styles that could represent three different complexes. Therefore, the classification of McKean series will be used throughout this thesis. The classic McKean point is a lanceolate point with a concave base (Wheeler 1954). The Duncan projectile point has a more stemmed appearance. Finally, the Hanna projectile point is similar to the Duncan but the broad stemmed looking side-notches have been replaced with narrower side-notches (Brumley 1975; Reeves 1970).

2.2.2.3 Late Middle Precontact Period (3,000 to 2,000 B.P.)

With the demise of the Oxbow complex and the McKean series on the Plains around 3000 B.P. the Pelican Lake complex became well established. The Pelican Lake complex occupied western Manitoba, Saskatchewan, and eastern Alberta from about 3,300 to 1,850 B.P. (Dyck 1983). During this time the climate was getting wetter with cooler summers and stormier winters and is known as the Sub-Boreal Climatic episode or ameliorative period (Buchner 1981; Wendland 1978). Based on the idea that formal similarity between cultural groups “is a direct measure of the degree of genetic or affiliational cultural relationship among the units being compared” (Binford 1971:9), Reeves (1983) proposes that the Pelican Lake complex developed

out of the McKean series specifically from Hanna due to similar cultural traditions (Reeves 1969, 1970). However, Pelican Lake also has similarities with the Oxbow complex such as some of the mortuary practices that will be discussed later. Another possibility is that the Pelican Lake complex is unique and separate from the previous cultural complexes.

The Pelican Lake complex is associated with an intensification of bison procurement and there is a shift to communal hunting and joint kill sites. Jumps, pounds and drives generally reflect spring or fall seasonality kill sites (Reeves 1969). The change in hunting is also reflected in material culture, specifically in projectile points. Two varieties of projectile points are present in Pelican Lake occupations. While both points have corner notches there is a great size difference with projectile points ranging from less than two centimetres to more than five centimetres (Dyck 1983). Large points would have been used similarly to those of previous complexes; however, the development of bow and arrow technology led to smaller and light weight points being adopted.

2.2.3 LATE PRECONTACT PERIOD (2,000 TO 300 B.P.)

The Late Precontact Period is made up of the Besant, Sonota, Avonlea, Old Women's, and Mortlach complexes (Cloutier 2004; Dyck 1983; Morlan 1993; Vickers 1986). These sites are more common than those mentioned previously. This may be because there was a greater occupation of the Northern Plains due to an increased population size or that the sites are more recent. Also, because the time depth of these sites is smaller, an attempt can be made to determine cultural origins and influences.

The first complex of the Late Precontact Period is the Besant complex which was present on the Saskatchewan Plains from about 2,500 to 1,400 B.P. (Cloutier 2004). Dyck (1983)

suggests that the Besant complex came into Saskatchewan from a migration originating in the north-central United States. The majority of Besant sites found in Saskatchewan are campsites or kill sites most commonly bison pounds. In addition to tipi ring sites, there is some evidence of different habitation structures utilizing post holes (Wettlaufer 1955). These constructions are post-in-ground structures and are more similar to the eastern early Woodlands complexes than those on the Plains (Dyck 1983). The Besant complex is characterized as having widespread use of the bow and arrow and was the first complex to demonstrate pottery construction (Walker 1999). Projectile points of this time were small side-notched points with a straight to concave base that could easily have been used with bow and arrow technology. Longer side-notched lanceolate projectile points that would have been used with an atlatl were still present during this period (Dyck 1983). Knife River Flint was the material of choice in projectile point construction (Hjermsted 1996). A trade network or seasonal round must have been in place due to the fact that Knife River Flint was quarried in North Dakota and would have traveled an extensive distance to reach Saskatchewan. Local cherts and quartzites were also used to create projectile points (Dyck 1983). A paddle and anvil were used to form concoidal pottery that was grit and sand tempered. The exterior was finished with either a cord marked impression or a plain, smooth surface. Often there is a row of punctures or alternating bosses and punctures found along the lip or rim of the vessel (Dyck 1983; Meyer et al. 1990; Walde and Meyer 2003). On the eastern margin of the Plains is the Sonota complex. This complex is associated with burial mounds and has a material culture very similar to and is thought to be a possible variant of the Besant complex (Frison 1978).

Another complex from the Late Precontact Period is the Avonlea complex. The Avonlea complex occupied the Northern Plains from 1,750 to 1,150 B.P. which overlaps with the Besant occupation (Morlan 1993). This may suggest that the two complexes were contemporaneous, developing alongside each other or being in direct competition (Morlan 1993; Vickers 1986). However, stratigraphy shows that no Avonlea occupations have been found below or with Besant at a single site, which suggests that there was little or no contact between the groups (Cloutier 2004; Walde et al. 1995). Avonlea sites, similar to the Besant complex, are mostly directed at bison procurement and, therefore, traps, pounds and jumps are common. The Avonlea complex is characterized by small, thin triangular side notched points suggesting bow and arrow usage (Burley and Meyer 1982). Local material, such as cherts, chalcedonies, and silicified wood are most commonly used for Avonlea projectile points (Dyck 1983). The concoidal vessel shape is maintained in the Avonlea complex. However, three different finishes are present (Walde and Meyer 2003) including net impressed, spiral channelled, and smooth (Dyck 1980; Hurley 1981; Morgan 1979).

Following the Avonlea complex is the Old Women's complex. This complex includes Prairie Side-Notched points which are dated from 1,150 to 550 B.P. (Dyck 1983). Prairie Side-Notched points are small and generally of poor quality being irregular and lacking symmetry (Kehoe 1966). There is a shift in pottery shape during the Old Women's complex from the earlier concoidal to a more globular shape with distinct shoulders. The vessels are thick and usually have a cord roughened or fabric impressed finish and generally are undecorated (Dyck 1983).

The last complex of the Late Precontact Period is the Mortlach complex which dates from 550 to 100 B.P. (Cyr 2006; Dyck 1983). The characteristic projectile points are Plains Side-Notched which are similar to Prairie Side-Notched points but have better craftsmanship and are typically well formed (Dyck 1983). The Mortlach pottery style includes thin vessels that are check stamped or fabric impressed and elaborately decorated with punctuates or cord wrapped tool impressions on the rim and shoulders (Harty 2005; Walde 2003). Since the Mortlach complex extends to 100 B.P. and first European contact occurred about 300 B.P., there is an overlap into the Protocontact Period. The Protocontact Period is a period at the end of Late Precontact and at the beginning of the Contact when there is interaction between the first European explorers and traders and the native cultures. Protocontact sites begin containing more modern, western material such as metal projectile points and glass seed beads.

In the past, Prairie Side-Notched and Plains Side-Notched have not been assigned to any complexes but rather grouped together as part of a Late Side-Notched series (Dyck 1983). This is due to the fact that they are very similar. They are also both associated with bison jump sites (Reeves 1978, Davis and Zeier 1978, Adams 1976).

CHAPTER THREE

METHODOLOGY

3.1 INTRODUCTION

The goals of this thesis are to help expand and contribute to the knowledge of paleopathology and mortuary style of Middle Precontact cultures on the Northern Plains. This involves documenting disease processes and examining trends in mortuary practices across cultural traditions, specifically Oxbow, McKean, and Pelican Lake. The archaeological record for the Middle to Late Middle Precontact Period is relatively sparse. There are few burial sites that have been excavated on the Northern Plains and most are single interments.

3.2 SKELETAL MATERIAL

A large amount of information can be extracted from skeletal remains. This can include information about the individual, about the individual's life and death, and about the taphonomic processes that have affected the skeletal remains since death. Careful analyzes of skeletal remains can provide information about an individual's sex, ancestry affiliation, and age at death. The presence of pathological lesions can provide information about past activities, diet, disease, and possible cause of death (Schwartz 1995). All this data can be used to examine past life ways in order to better understand earlier populations (Roberts and Manchester 2007).

Before laboratory analysis can take place, information from the burial itself must be obtained. Not all skeletal remains preserve as well as others so taking accurate documentation at the site is of vital importance. To aid in this, prior to disarticulation, photographs were taken of

the Stoney Beach and Fox Valley burials to ensure that information about body positioning and *in situ* location would be maintained.

It is important to identify taphonomic processes that could act on skeletal remains in order to eliminate possible misdiagnoses of pathological conditions. Taphonomic processes are any biological, chemical, or mechanical processes that act on the remains since the death of the individual until it is discovered (Byers 2011). This can include burial, transportation, cryoturbation, bioturbation, weathering, root etching, and soil acidity. Cryoturbation involves a disturbance in the spatial orientation of buried material as a result of freeze and thaw cycles (Waters 1992). Shallow burials within the freeze-thaw zone are more susceptible to cryoturbation and bone can be altered quite dramatically. Bioturbation, like cryoturbation, disrupts the vertical and horizontal integrity of a site (Schiffer 1987). However, bioturbation involves the displacement of material due to animal activity such as burrowing rodents. There can also be the vertical displacement of artifacts as a result of foot traffic over the remains (Gifford-Gonzalez et al. 1985). Another example of a taphonomic process is weathering, including the effects of rain, wind, and sun on bone (Byers 2011). Individuals exposed to the sun will weather at a greater rate than buried individuals and the elements can result in exfoliation, cracking, or warpage of human remains (Byers 2011). Animals such as rodents and scavengers can physically alter bone by leaving gnaw marks. Plant roots, micro-organisms, and insects can also make etches into bone that may be confused with fractures if not correctly identified. Chemical processes that act on remains include mineralization and soil acidity. Acidic soil may increase the speed of the tissue and bone degradation (Gordon and Buikstra 1981; Nawrocki 1995). Finally, cultural practices and the treatment of the dead after death also influence

taphonomic processes (Bushnell 1927). For an example, wrappings, if present, would alter the preservation of the remains and if an individual was placed on a scaffold, degradation would occur at a quicker rate than if it was interred.

Laboratory analysis involved looking at the osteological material from the Stoney Beach site, the Fox Valley site, and the Adamiak remains. Repatriation of the remains from the Stoney Beach and Fox Valley sites in keeping with the Burial Policy of the Saskatchewan Heritage Property Act made it necessary to analyze the associated data through archival work. Using the initial analyses and photographs prepared by Dr. Ernest G. Walker at the University of Saskatchewan, Saskatoon, an osteological inventory and description could be gathered. Site reports also aided in establishing a context such as location and environment for the burials. Direct observation of the Adamiak remains was possible and this resulted in an inventory and analysis of the human cranium.

3.2.1 OSTEOLOGICAL ANALYSIS

An adult human skeleton is typically comprised of 206 bones while subadults have many more depending on the stage of development and bone formation. The completeness and fragmentation for each burial was determined and any abnormalities in the skeletal remains recorded by Dr. Ernest Walker for the Stoney Beach and Fox Valley sites and by the author for the Adamiak cranium. Dentition was also evaluated and the stage of eruption and wear noted. Detailed anthroposcopic and metric analysis of the human remains from the Stoney Beach site, the Fox Valley site, and the Adamiak cranium, were used to determine sex, ancestry affiliation, age at death, and stature where possible. With the use of physical traits, indices, and discriminant functions, identification of individuals can be determined quite accurately (White 2000). Metric

analyses, accurate to 0.1 centimetres, were performed on crania using a sliding dial calliper, a spreading calliper, and a simometer. Postcranial remains were measured using a sliding calliper and an osteometric board. The measurements for the remains from Stoney Beach and Fox Valley were taken by Dr. Walker at the University of Saskatchewan. The Adamiak cranium was measured and analyzed by the author of this thesis using thirteen metric variables and thirty non-metric variables. Radiocarbon dating is the most accurate method for determining time since death.

3.2.1.1 Ancestral Affiliation

Ancestral affiliation refers to ethnicity or cultural affiliation and can generally only be established when looking at adult skeletal remains. The skull provides the most amount of information in determining the ancestry of an individual. This involves looking at anthroposcopic traits and metric methods that differentiate between Caucasoid, Mongoloid, Negroid, and Native American decent (Brues 1977; Byers 2011; Gill and Gilbert 1990; Krogman 1962; Rhine 1990). Given the provenience, context, and antiquity of the burials examined in this thesis all the interments are Native American in origin, therefore all ancestral affiliation observations were for verification purposes.

3.2.1.2 Sex Determination

The sex of an individual can be determined by looking at anthroposcopic traits and using metric methods or discriminant functions. It is more difficult to sex subadults and infants than adults. The accuracy in assessing sex for adults is 90% to 100% when using the whole skeleton. This accuracy drops when there are only certain elements available (Krogman 1962; Stewart 1979). While the term sex implies two possible options, sex determination is commonly graded

on a scale from definite male to probably male to unknown to probably female to definite female. The two most important elements of the human skeleton that can be used to determine sex are the cranium and the pelvis. The pelvis shows the greatest amount of sexual dimorphism due to the fact that the female body is adapted for childbirth (Byers 2011; Krogman 1962; Phenice 1969). The second most reliable part of the skeleton for determining sex is the cranium. Anthroposcopically, most of the areas of the skull that are evaluated are those that exhibit sexual dimorphism and are more robust in the male skull due to increased musculature (Buikstra and Ubelaker 1994; France 1998; Krogman 1962). Other elements of the skeleton can provide information about the sex of human remains, although these are generally concerned with overall robusticity (Bass 1995; Stewart 1979).

3.2.1.3 Age Determination

Age determination can be separated into two processes: skeletal and dental development and skeletal and dental wear and deterioration. Age determination is a little more difficult than sex and ancestry because the outcome consists of a wider range of possibilities. These ranges are narrower before an individual reaches maturity because the fusion of epiphyses and tooth eruption are more regular than the deterioration rates used to age adults.

Subadults are aged based on their stage of development. This includes looking at tooth formation and eruption and epiphyseal fusion. Teeth are the most reliable indicator of age because the formation and eruption schedules tend to be genetic and are influenced little by the environment (Moorees et al. 1963; Schour and Massler's 1941; Stewart 1979). Epiphyses fuse between the ages of ten and twenty five as each union is unique because bone is deposited and

ossification centers fuse according to an approximate timetable (Buikstra and Ubelaker 1994; Byers 2011).

To determine age at death for an adult, signs of wear and deterioration are evaluated. The four main osteoarthritic changes in adults involve the pubic symphysis (Brooks 1955; Brooks and Suchey 1990; Gilbert and McKern 1973; Katz and Suchey 1986; Krogman 1962; McKern and Stewart 1957; Meindl et al. 1985; Todd 1920), the auricular surface of the ilium (Lovejoy et al. 1985), sternal rib ends (Işcan et al. 1984, 1985), and cranial sutures (Mann et al. 1987; Meindl and Lovejoy 1985; Schwartz 1995;). Cranial suture fusion analysis has been found to be a poor age criterion, thus, when used, it has been supplementary in nature.

Similar to subadults, teeth provide information about the age of an adult individual. Attrition or wear of tooth crowns demonstrate aging, but in order for this to be applied, the diet and lifestyle of the individual must be taken into account (Brothwell 1965; Lovejoy et al. 1985; Walker et al. 1991). Where possible, other methods were employed due to the many variables that can affect tooth wear whether this is a consequence of uneven mastication, grit in diet, or cultural practices.

3.2.1.4 Stature Determination

From an archaeological standpoint, it is rare to find whole elements let alone a complete skeleton. Therefore a popular method for determining stature is based on long limb bones because there is a strong correlation between stature and long bone lengths (Trotter and Gleser 1952, 1958; Jantz 1992). Techniques for analyzing long bone fragments have been developed by Steele (1970) and Müller (1926). Their methods are based on the premise that there is a direct correlation between bone segments and total bone lengths. This technique can be used with

humerus, radius, femur, and tibia fragments (Byers 2011). Other stature reconstruction formulas have been developed such as Meadows and Jantz (1992) and Byers et al. (1989b) who use metacarpals, Byers et al. (1989a) who use metatarsals, and Jason and Taylor (1995) who use vertebral column length.

3.2.1.5 Time since Death

Time since death can be established via relative and absolute dating. Applicable relative dating techniques for this thesis include stratigraphy, location of the burial below a known cultural level, and typology of artifacts, direct association of a culturally specific artifact such as a projectile point. Absolute dating is more accurate and provides a numerical age for the specimen being tested. Radiocarbon dating is the form of absolute dating used in this thesis, specifically accelerator mass spectrometry (AMS) radiocarbon dating. AMS dating is similar to conventional radiocarbon dating; however, a smaller sample is needed and carbon isotope atoms are counted directly which allows for greater precision (Gowlett 1987; Taylor et al. 1992). This method of dating uses a mass spectrometer to separate carbon-14 atoms from an ionized carbon atom sample through the use of magnets, lenses, an accelerator, and a filter, in order to measure the remaining ions. This method can distinguish “between carbon-14 and carbon-12 and other isotopes through their mass and energy characteristics, requiring only tiny organic samples” (Fagan and DeCorse 2005). This is a destructive process but much less so than conventional radiocarbon dating where larger samples are needed. Samples of bone from the Stoney Beach site and the Fox Valley site were previously radiocarbon dated by Beta Analytic in Boca Raton, Florida. It should be noted that some of the remains were found in a very sandy matrix which can increase acidity and possibly affect the radiocarbon result.

3.2.2 *PALEOPATHOLOGY*

Analyzing skeletal material and identifying any paleopathological changes is considered a major objective of this thesis. Paleopathology is the study of ancient disease and lesions in human skeletal remains of past populations. Paleopathology also studies how the human body adjusts to changes in the environment and how diseases progress by combining biological and cultural data (Ortner 2003; Roberts and Manchester 2007). Over time, paleopathology has been able to build on the essentially descriptive basis of osteology to identify anomalies or abnormal variations in human remains and link these with possible differential diagnoses. Deviations from the norm could be the result of pathological conditions, occupational stress, or skeletal anomalies. These changes included breaks or discontinuities in bone, abnormal bone growth, and abnormal bone resorption (Ortner 2003; Roberts and Manchester 2007). The presence of any abnormalities can indicate the health condition of an individual and may suggest the health status of the population and the relationship between diseases and society (Roberts and Manchester 2007). Precontact archaeologists can even use data from skeletal biology and pathological conditions to make predictions about migration (Owsley and Jantz 1994).

Description of abnormal features is the first step in paleopathological studies. This includes lesion location and characteristics which may aid in diagnosis. Research into past paleopathological cases and clinical cases helps to better understand the underlying processes observed and are used to try to identify the cause of the pathology as accurately as possible (Byers 2011; Roberts and Manchester 2007). In some cases, x-rays, CT scans, and MRI's are used as a non-invasive technique to better understand the morphology of lesions.

It is important to recognize that usually only skeletal and dental remains can be studied archaeologically, thus only a small portion of diseases can be identified as many diseases only affect soft tissue. In addition, it may be difficult to identify specific diseases due to the fact that some diseases display similar lesions while others have a variety of characteristics that differ on an individual basis (Roberts and Manchester 2007). Stress placed on an individual throughout his or her life can be manifested as stress markers on bone. Stress markers can reflect the nutritional status of an individual or mechanical stresses applied to the skeleton (Larsen 1997; Roberts and Manchester 2007). They can involve enlarged or abnormal muscle attachments and rugosity of bones indicating possible repetitive use or stress. These could be the result of a certain occupation or activity; however, associations are often problematic because many actions can result in similar stress marks on bone. Dietary stress or infections can result in arrested periods of growth of bone or tooth enamel called Harris lines or enamel hypoplasia respectively as the bodies way of directing nutrient to essential bodily functions (Goodman and Capasso 1992; Larsen 1997; Roberts and Manchester 2007).

The majority of the disease processes observed in this thesis are dental problems. Dental pathological conditions are not often seen in isolation. For instance, tooth loss can be a result of alveolar bone resorption which in turn can be caused by gingivitis which is influenced by the presence of calculus deposits (Hillson 1986; Roberts and Manchester 2007). There are also examples of pathological lesions that are degenerative, traumatic, and inflammatory in origin. Degenerative disease occurs with age and reflect wear and tear of the body (Roberts and Manchester 2007). This can include osteoporosis and osteophyte formation. Traumatic pathological lesions include fractures and puncture wounds. Pathological conditions can also be

congenital, developmental, metabolic, or neoplastic in origin; however, none are observed from the Stoney Beach site, Fox Valley site and the Adamiak cranium. However, all the sites display evidence of dental pathological conditions. The observed conditions consist of calculus deposition, attrition, periodontal disease, periodontal abscess with antemortem tooth loss, alveolar resorption, overcrowding, and linear enamel hypoplasia. Diet, dental hygiene and even social status can be reflected in the state of an individual's dentition. Other pathological changes observed include an adult individual from the Stoney Beach site who exhibits minor osteophyte formation, an abnormal calcaneus, and a fractured or severed metacarpal. The Fox Valley remains display osteomyelitis or sclerotic bone growth. There is one paleopathological condition, biparietal thinning, observed in the Adamiak cranium that has an unknown etiology.

Degree of healing must also be considered when looking at pathological lesions. Healed lesions can reflect information about remedial practices and recovery rates or information about possible social or group care. The presence and extent of unhealed lesions can give clues to an individual's cause of death. It is important to note that while paleopathology provides some information about past health conditions, burials do not provide a snapshot of a living population.

The last comprehensive collection of paleopathology in Saskatchewan was "The Paleopathology of Certain Skeletal Remains from Saskatchewan" completed by Dr. E. Walker in 1978. For the most part, all of the paleopathology observed by Walker (1978) is what one might expect to see in a nomadic bison hunting population with activity-induced pathological changes and dental disease occurring most frequently. A discussion of Walker's conclusions and sites

discovered since this initial compilation found in Chapter 7 will help to project a better view of the health status of past populations in Saskatchewan and the Northern Plains.

3.3 MORTUARY PRACTICES

Between 60,000 and 30,000 B.P., during the Middle and Upper Palaeolithic, there was a cultural ‘big bang’: an evolution and expansion of human thought and consciousness (Hayden 1993; Marshack 1991; Mithen 1996). It is during this time that a proposed reflexive relationship developed, in which beliefs and rituals arose through the interplay of imaginative growth and material culture. Childe (1956) states that, “tradition imposes on all members of a society in question a common pattern of behaviour. This must result in the production of standard types, which, if they be artifacts, burial rites or remains of repasts, archaeology can identify” (Childe 1956:9-10). Binford (1964, 1972) agrees that by studying the archaeological record all facets of past populations are reachable. The purpose of studying mortuary practices is to try to infer social organization and complexity and any other aspect of past culture possible (O’Shea 1984). While excavations of burials can reveal a lot of information about human behaviour (Melbye 1973 ; Sprague 1968), it is impossible to determine the exact practices that would have taken place or the cognitive thinking behind these practices. To aid in filling this void, archaeologists must use the material culture found during excavations in conjunction with ethnographic and ethnohistoric data to form interpretations and hypotheses of possible Precontact burial rites. Ethnoarchaeology relies on analogies between past and present cultures by looking at similar features or material culture to make comparisons and relational predictions (Hodder 1982). Data can be used to find parallels between Precontact and contemporary cultures to establish possible reasons or causes for a particular practice such as mortuary practices (Ucko 1969). Caution must

be used in making interpretations; however, because mortuary practices are not directly linked and types of burials and associated grave goods may remain constant while ideas about death vary or vice versa. Using the normative view of culture, similarities and differences in mortuary practices between cultures can be interpreted in terms of diffusion or population movement (Chapman and Randsborg 1981). It should also be noted that information gathered from burials often tells more about life than death (Pearson 1999). In this thesis, the mortuary information from the Stoney Beach site and the Fox Valley site are also compared with that from previously excavated sites to see similarities and differences in order to establish trends through the Middle Precontact Period cultural complexes.

There are two components to mortuary practices, the treatment of the dead or funerary practices and the social context or the collective reaction of the social group to the death. These can be considered subsystems of culture (Pearson 1999). The treatment of the dead can be further broken down into preparation and disposal of the body (Millar 1981b). Preparation of the body includes washing and dressing of the body as well as any associated adornments or body art that are arranged for the display of the body (Millar 1981b). This stage of mortuary practice is difficult to identify in the archaeological record as there are often no soft tissue or clothing remnants. Ethnographic studies provide some theories about body preparation. For example, washing appears to occur within hours after a death and individuals are often dressed in their best clothing (Bushnell 1927). In addition, Native American individuals are frequently painted with vermilion or red ochre (Bushnell 1927). While ornamentation and body preparation can reflect the deceased's social order or personal psychology, it is often left to the living to prepare the body how they see fit.

Since preparation of the body is difficult to analyze archaeologically due to lack of preservation of the remains, emphasis is placed on the examination of the disposal of the body. The act of disposing of a corpse is often referred to as an inhumation or interment (Pearson 1999). The act of disposal includes not only the type of burial but also the location, position, orientation, and grave goods included with the burial. These differences may reflect cultural or environmental factors including variation in status, age, circumstances, seasonality, or location of death (Bushnell 1927; Millar 1981b; O'Shea 1984). Status can either be achieved or ascribed and may or may not be reflected in associated burial goods (Pearson 1999). For example, a hunter's social persona may be reflected in associated stone tools in the burial unit. However, burials often tell more about the living than the dead because the living are responsible for preparation of disposal of the body.

There were several different methods for disposing of a body on the Northern Plains during the Precontact period. The Middle Precontact Period is characterized by primary and secondary burials in addition to the rare cremation. The most common form of interment is secondary bundle burials on the Northern Plains (Walker 1984). Burials can contain single or multiple individuals and be isolated or in cemetery burial grounds. In some cultures, individuals are often buried with a companion due to a collective fear of being left alone or with a stranger (Millar 1981b). There are also variations in location from under the floors of habitation structures to atop high hills overlooking bodies of water. A grave may be manmade, an existing pit, or a natural feature and can come in any shape or depth (Pearson 1999). The location and burial style is possibly under the influence of environment or cultural factors. The environment may impose constraints such as the weather or the interment may be based on group

circumstances or related to the place of death. Also, the migratory nature of Precontact groups may have contributed to variation in burial styles (Wade 1981). Regardless of burial style or location, an interment generally implies an act of careful thought and meaning.

Primary burials consist of the dead being buried a short time after death and remaining as relatively complete and articulated skeletons in the archaeological record. In the case of primary burials, positioning and orientation can be determined due to the relatively complete, articulated remains that are left behind (O'Shea 1984). Positioning and orientation refer to the body arrangement and primary burials can be classified further as supine, lying on the back, or prone, lying on the front, and extended or flexed, the latter being with the limbs drawn into the body (O'Shea 1984; Pearson 1999). The orientation of the skeleton is also documented, this includes the direction that the body is facing or orientated (Millar 1981; O'Shea 1984). The body can also be deliberately orientated in a significant direction. For example, the body may be in an east to west orientation so that the body can face either the rising or setting sun. A body directed in the eastward direction may serve to direct the spirit towards the sunrise and rebirth (Pearson 1999).

Secondary burials, on the other hand, are placed in the ground subsequent to being placed elsewhere. The initial location of placement for secondary burials involves aerial structures or scaffolds. These are raised natural or manmade platforms on which a body is placed for a period of time and include most commonly a scaffold or fabricated wooden structure and less commonly a crotch of a tree. The body stays on the scaffold until it becomes skeletonized and then in most cases the remains is gathered into a bundle and buried (Bushnell 1927; Yarrow 1881). Weathering and scavenging would cause elements to be missing from the skeleton before final burial. Some scholars believe that scaffolds were most commonly used on the Plains during

the winters as the ground would be frozen and it would be too difficult to dig a grave. The remains would then be interred when the ground thawed. However, it has been suggested that it would have been just as difficult to construct a scaffold on the Plains during the winter as it would have been to dig a pit because of the cold and scarcity of resources such as wood (Bushnell 1927, Morgan 1959). Another theory for the purpose of a scaffold is to provide a resting place, safe from predators, for the body while supplying the surviving population with enough time for the appropriate funerary rites (Hertz 1960).

Primary and secondary burials may contain grave goods. Grave goods are material objects that are purposely placed with the body during burial. These can include floral or faunal remains and/or inorganic cultural material such as stone tools and red ochre. The objects could have belonged to the individual during his or her life as personal property or they could have belonged to the mourner and been placed as gifts (Pearson 1999). Ethnographic studies have determined that the purpose for grave goods varies. In some cultures, items are simply symbols of remembrance for the deceased's character or deeds during life with functional associations; however, more often they are associated with aspects of separation and transition. For example, the items could be placed in order to equip the dead for the afterlife and frequently consist of tools, food, drink, and in some cases dog remains (Lowie 1909; Pearson 1999). In other cultures, items are given as gifts to prevent the spirit from coming back and haunting the living. The presence of grave goods may have been similar during Precontact times although it is difficult to know for certain. Looking at the assortment of artifacts found with human remain and comparing this information with ethnographic data, archaeologists may provide a more accurate or plausible

hypothesis for theories behind past mortuary rites. In the case of red ochre, its presence, concentration and distribution is documented due to its spiritual connotations.

A major component of mortuary practices is the reaction of the surviving population to the death. This is very difficult to determine archaeologically as only visual remains of a culture are present to establish interpretations. Again, ethnographic data can provide insight into possible cognitive process related to mortuary practices and views on death. After a death has occurred, there is often a mourning period and members of society may be faced with a feeling of separation from the individual or with their own mortality. In some cultures, there is an intermediary period after death followed by a final ceremony (Hertz 1960). Family members may fast or hide themselves under shrouds. There may be complex ceremonies to celebrate the living and form a separation from the dead (Grainger 1998). This allows mourners to share in a common sense of humanity and let them grieve and adjust.

Not unlike other aspects of mortuary practices, the function of funerary rites varies throughout different cultures. By way of ethnography, modern beliefs can provide insight towards the cognitive thinking of past populations. It is important to note that these hypotheses must remain in the hypothetical realm as it is impossible to know definitively what Precontact peoples thought. Mortuary practices may fulfill the responsibilities of the society to the deceased as well as help mourners deal with their own grief. In some cases, mortuary practices serve to benefit the surviving loved ones, uniting members of the social group or they may serve as a statement of a person's value or worth (Grainger 1998). Burial rites may function to aid in restoring equilibrium to a group that has been thrust into a state of mourning and chaos after a death (O'Shea 1984). The act could reunite members of a society as they deal with the separation

from the deceased or as they are faced with their own mortality. Sometimes burials and funerary rites are motivated by fear of the dead and the society seeks to control or pacify the spirit (Fraser 1886). In other cases, burials and associated practices serve to aid the dead in their spirit's transition to a possible afterlife or even act as a celebration of humanness (Grainger 1998; Hertz 1960).

CHAPTER FOUR

STONEY BEACH SITE (EdNh-1)

4.1 INTRODUCTION

The Stoney Beach site (EdNh-1) is a multicomponent archaeological site located in south-central Saskatchewan. Despite disruption from looters, cultivation, and other taphonomic processes, cultural material has been recovered from five cultural periods. This chapter will focus on a burial pit that was discovered in 2001 during a cultural resource management (CRM) re-investigation of the site. An examination of this burial pit will be conducted by analyzing the skeletal remains and related pathological conditions as well as associated material remains and mortuary style.

4.1.1 LOCATION

The Stoney Beach site is situated about 3.25 kilometers south-southeast of the junction of the Moose Jaw River and Qu'Appelle River. Located at 50°32'29"N 105°16'42"E, the site is in the N¹/₂ of N¹/₄ of Section 20 Township 18 Range 24W of the 2nd Meridian. The Stoney Beach site spans private land currently belonging to Moose Jaw Asphalt Ltd. within the rural municipality of Pense, Saskatchewan. UTM coordinates for the site are 13U DF E802 N985. The site comprises over 3200 square meters of surface area, between 20 and 50 centimeters deep, at an elevation of 580 meters (asl).

Stoney Beach is in a grassland vegetation zone and spreads over a sloping prairie terrain, from uplands along the east and south crest of the Moose Jaw River valley, to lowlands along a north coulee. The nearest water source is 250 meters west of the site and is a tributary to the Moose Jaw River which is 1200 meters west of Stoney Beach. In the coulee, the soil is

comprised of a sandy loam with alluvium and orthic humic regosol and the upland plains are comprised of silt, clay, and a sandy loam representative of glaciolacustrine deposits.

4.2 BACKGROUND

The Stoney Beach Site was first recognized in 1930 (Hodges 1968). Looting, vandalism, animal burrowing, cultivation, excavation and road installation have resulted in only about twenty five percent of the site being left intact. The majority of the interior of the site was spoiled by collectors who left only the perimeter intact for archaeological excavations. Stoney Beach consists of multiple occupations some of which represent kill sites and others campsites (Hodges 1968). Surface collections and feature excavations have produced ten projectile points, eighteen bifaces, three end scrapers, a grooved maul, eight cores, lithic flakes, ceramic sherds, and bone. Features identified included four hearths, two fire broken rock concentrations, a historical building foundation, and, most pertinent to this thesis, a burial pit. Cultural affiliations of the material was determined to include Gowen, Oxbow, McKean, Duncan, Hanna, Pelican Lake, Besant, Avonlea, Late Prehistoric (Prairie and Plains), and Historic.

Controlled excavations began in the 1950s and 1960s and were directed by John Hodges (Hodges 1968). Initial excavations revealed the north and west sides of a building foundation, an artifact scatter, cultural horizons in the coulee, and possibly two buried components separated by sterile soil. Charcoal samples for radiocarbon assay were collected in 1964. An organized surface collection occurred in 1971 and was followed by the 1974 University of Regina field school. Prior to 1982, professional and avocational archaeologists had collected over 4500 artifacts including projectile points, knives, scrapers, gravers, an awl, debitage and vessel sherds. Many items were left *in situ* including glass, metal, stoneware, wooden farm tools, a Plains Side-

Notched projectile point base, spall tool, sherds, biface fragments, burned and unburned bone fragments, and debitage comprised of chert, chalcedony, quartzite, and jasper. Collected materials are currently curated at the Royal Saskatchewan Museum, at the University of Regina, and at the Manitoba Museum of Man and Nature.

The planned development of a new natural gas pipeline in 2001 just west of Regina led to a re-investigation of the Stoney Beach site and subsequent mitigation by Golder Associates, Saskatoon. The remains of three individuals were found deeply buried in a pit feature and were retrieved on November 10 and 11, 2001. The remains were sent to Dr. Ernest Walker at the University of Saskatchewan Forensic Identification Laboratory, Saskatoon, for analysis. In December of 2002, an update of this site was submitted to the Saskatchewan Heritage Branch by Golder Associates.



Figure 4-1 Stoney Beach Skeletal Remains in Situ

Photo Courtesy of Dr. E. Walker, U of S

4.3 SKELETAL MATERIAL

An inventory and analysis of the human remains that were found at the bottom of a pit at Stoney Beach were conducted by Dr. Walker (See Figure 4-1). There were three individuals represented in the assemblage: an infant, an adult female, and a second adult (Walker 2001). The second adult was only represented by the crown of a single maxillary molar. The crown appears to have been broken transversely across the cervix or neck of the tooth and probably occurred antemortem, falling into the burial pit accidentally (Walker 2001). The adult female (Individual "A") and infant (Individual "B") were found in direct association, the child located near the knees of the female.

4.3.1 INDIVIDUAL "A"

The recovered remains, of Individual "A," are almost fully complete; however, they are very fragmented. A brief skeletal inventory can be found in Table 4-1. The cranium was reconstructed (Figure 4-2) and the maxilla and mandible provide a full dentition. There is evidence of occlusal wear on the molar teeth with moderate exposure of dentine on the first molars and very little on the third molars (Walker 2001). The dentition also demonstrates some crowding which has caused the left maxillary canine and both mandibular canines to be displaced laterally. There is considerable calculus formation on the right side of the second and third maxillary molars and on the left side second maxillary molar. There is also some evidence of some periodontal disease but no caries (Walker 2001).

The vertebral column, minus the fourth cervical and the caudal vertebrae, was salvaged with the thoracic and sacral elements displaying moderate postmortem damage. There is a slight amount of osteophyte formation around the superior margin of the vertebral body on the fourth

Table 4-1 Skeletal Inventory for Individual "A"

Bone(s)	Side	Complete/ Incomplete	Bone(s)	Side	Complete/ Incomplete
Cranium	N/A	Incomplete	Radius	L	Complete
Mandible	N/A	Incomplete		R	Complete
Axial Skeleton			Hands		
Cervical	N/A	6 of 7	Carpals	-	9 of 16
Thoracic	N/A	12 of 12	Metacarpals	-	10 of 10
Lumbar	N/A	5 of 5	Phalanges	-	15 of 28
Sacrum	N/A	No caudal	Lower Limbs		
Sternum	N/A	Complete	Os coxae	L	Incomplete
Ribs	L	11 of 12		R	Incomplete
	R	12 of 12	Femur	L	Complete
Upper Limbs				R	Complete
Clavicle	L	Complete	Tibiae	L	Complete
	R	Complete		R	Complete
Scapula	L	Complete	Fibulae	L	Complete
	R	Complete		R	Complete
Humerus	L	Complete	Feet		
	R	Complete	Tarsals	-	14 of 14
Ulna	L	Complete	Metatarsals	-	5 of 10
	R	Complete	Phalanges	-	10 of 28



Figure 4-2 Individual "A"'s Cranium

Photo Courtesy of Dr. E. Walker, U of S

lumbar vertebra. In addition to the complete sternum, eleven right ribs, twelve left ribs, and twenty seven small rib fragments were retrieved (Walker 2001).

The recovered upper limb and pectoral girdle elements from Individual “A,” consist of the right and left clavicles, scapulae, humeri, ulnae, and radii. The right scaphoid, trapezium, trapezoid, capitate and all metacarpals, as well as, the left scaphoid, lunate, trapezium, trapezoid, capitate and all metacarpals were recovered. The left fifth metacarpal is pathological with the left distal end missing due to a non-union fracture or removed by incision (Figure 4-9). Seven proximal, four middle, and four distal manual phalanges and two sesamoid bones were also uncovered (Walker 2001).

Lower limb and pelvic girdle elements of Individual “A” consist of left and right femora, tibiae, fibulae, and ossa coxae. The latter were fairly fragmented especially in the pubic region. Also present were the left and right calcanei, tali, partial naviculars, cuboids, and medial, middle, and lateral cuneiforms. The left calcaneus presents an abnormal feature on the peroneal process (Figure 4-5). The right first and fifth metacarpal and the left first, second, and fourth metacarpals were recovered along with eight proximal, one middle, and one distal phalanx (Walker 2001).

4.3.1.1 Osteological Analysis

Despite fragmentation, Individual “A” was identified as a young, Native American female. Anthroposcopic features of the ossa coxae, sacrum, and cranium and the small and gracile nature of the skeletal remains in general support the conclusion that Individual “A” was a female. The cranium, shovel-shaped incisors, and the antiquity of the burial indicate that the remains are of Native American ancestry and by using averaged metric values of the lower limb bones, Individual “A” is estimated to have been about 61.6 centimetres (5 feet 1 inch) tall

(Walker 2001). Data from symphyseal changes, auricular area morphology, and sternal rib ends was compiled to determine age at death to be between thirty and thirty nine years, and most likely between thirty and thirty five (Walker 2001).

Based on radiocarbon dating, the Stoney Beach site appears to be one of the oldest burials on the entire Northern Plains. A sample of bison bone, found above the remains in the excavated burial pit, was sent to Beta Analytic Inc. in Boca Raton, Florida for analysis in March, 2003. Accelerated mass spectrometry was used to establish a radiocarbon date of 5930 ± 55 B.P. (Beta-177965) conventional age of 6050 ± 40 B.P. for the time since death, clearly placing the interment in the Early Middle Precontact Period.

4.3.1.2 Paleopathology

Paleopathological conditions of Individual "A" consist of calculus formation, attrition/abrasion, slight periodontal disease, minor osteophyte formation, and an abnormal calcaneus and fifth metacarpal (Walker 2001). Calculus, attrition/abrasion, periodontal disease, and osteophytosis are very common pathological conditions in prehistoric populations; however, the abnormal fifth metacarpal and calcaneus are more unique and case specific.

The dental pathological changes observed from Stoney Beach are typical of the time period and can be seen in Figures 4-3 and 4-4. Calculus is formed by the calcification of plaque that has built up in an accretionary manner. A mucoid material composed of protein from saliva and of bacterial microorganisms attaches itself to the tooth as plaque. If this plaque is not removed, it can lead to the formation of calculus. Ions in the saliva mineralize crystallites which are deposited on the tooth surface (Aufderheide and Rodríguez-Martín 1998; Hillson 1986; Lieveise 1999; Roberts and Manchester 2007). Calculus can be supragingival and/or subgingival

depending whether there is an accumulation of plaque above or below the gums. The calculus formation for Individual “A” is concentrated on the buccal side of the right first and second maxillary molar and on the left second maxillary molar (Walker 2001). Generally, plaque is deposited near the salivary glands with the lower lingual incisors and upper buccal molars most frequently affected (Roberts and Manchester 2007). Calculus formation favours an alkaline oral environment which translates to a diet high in protein and carbohydrates (Roberts and Manchester 2007).

The anterior maxillary dental arch of Individual “A” displays occlusal wear from attrition and abrasion having dentine exposed on the incisors to first molars and minimal to no wear on the third molars (See Figure 4-3) (Walker 2001). Attrition can be separated into physiologic and pathologic attrition. Physiologic attrition refers to wear due to natural mastication while pathologic attrition refers to wear as a result of atypical use or arrangement of the teeth (Pindborg 1970; Langsjoen 1998). Abrasion includes foreign particle often accelerating wear and causing it to be pathological (Hillson 2000). The rate at which attrition occurs is dependent on tooth density, line up of bite and associated musculature, cultural practices, and the nature of the food being eaten (Queen 1974; Smith 1975; Walker et al. 1991). Tooth density, bite, and associated muscles are genetically attributed to an individual and will only play a slight role. Therefore, diet and food preparation is usually the main variable that contributes to occlusal wear on dentition. Individual “A” exhibits physiologic attrition most likely caused by diet and the crowns of the teeth grinding against each other as it is uniform and not localized (Roberts and Manchester 2007). Abrasives, such as fine sand mixed with meat or fibrous plants, will scour away at the dental enamel revealing the dentine (Millar 1978; Ortner 2003). Maize and cereals



Figure 4-3 Individual "A"'s Maxillary Dental Arch

Photo Courtesy of Dr. E. Walker, U of S

are fibrous plants which may have been a part of the diet. This type of diet usually displays caries as well. No caries are visible in the Stoney Beach remains, but it is possible that the large amount of attrition/abrasion eliminated any evidence (Knutson 1975). However, it is more likely that the Precontact hunters and gatherers at this time had a more carnivorous diet and the sand from the environment mixed with the meat making it grittier (Millar 1978). Over time, the gradual wear of Individual "A" teeth, presumably by abrasive material in the diet, wore down the enamel on the occlusal surfaces exposing the dentin. When this occurs the pulp cavity is in danger of exposure. Subsequently, odontoblasts begin making secondary dentin to protect the



Figure 4-4 Right View of Individual "A" Maxillary Dentition

Photo Courtesy of Dr. E Walker, U of S

pulp cavity (Ortner 2003). If it is exposed to the open environment there is a high chance of infection occurring.

Individual "A" also displays, what appears to be a slight amount of periodontal disease (See Figure 4-4) (Walker 2001). The main method to identify periodontal disease is to determine if there is inflammatory pitting of the alveolar margin. The most common cause of periodontal disease is the build-up of calculus between teeth leading to inflammation of the soft tissue (Hillson 1986; Regezi et al. 2000; Roberts and Manchester 2007). This stage is referred to as gingivitis and cannot be assessed archaeologically. Next, the bone becomes affected and the alveolar margin begins to be reabsorbed and retreat away from the cemento-enamel junction (Ortner 2003; Roberts and Manchester 2007). The bone loss can occur horizontally or irregularly. As the disease progresses the periodontal ligament breaks down and tooth loss can occur (Hillson 1986; Regezi et al. 2000).

It has been suggested that periodontal disease may be over diagnosed in archaeological populations because the increased distance between the bone and the cemento-enamel junction is also a trait of severe attrition (Roberts and Manchester 2007). A high amount of attrition can stimulate further eruption to make more of the tooth available for mastication. On the other hand, attrition can also cause periodontal disease. If tooth wear advances past the point where the crowns of neighbouring teeth form an enamel bridge then there is no longer protection of the interdental sulcus from invading food (Aufderheide and Rodríguez-Martín 1998). The sulcus slowly becomes larger as mastication forces food into the space and the underlying gingival tissues are at greater risk of inflammation from invading bacteria. Therefore, Precontact populations with a grittier diet would have had premature interproximal contact loss and would have been at a greater risk for periodontal disease. Hence, it is reasonable that the posterior chewing teeth were most commonly affected in Precontact populations (Aufderheide and Rodríguez-Martín 1998).

Minor osteophyte formation is found on the superior, anterior margin of the vertebral body of the fourth lumbar vertebra (L4) in Individual "A" (Walker 2001). This type of bony outgrowth can be formed as a compensatory mechanism to stress by the body in an attempt to spread the load at the joint or may be related to the repetition of a particular activity. Osteophyte development is common and can occur simply as part of the aging process or can represent the initial stages of vertebral osteoarthritis. The process by which vertebral osteoarthritis occurs involves the degradation of the intervertebral disc resulting in a closer orientation of the vertebrae (Dieppe and Lim 1998). Everyday mechanics, such as bending or lifting, can lead to intervertebral contact (Roberts and Manchester 2007). If "mechanical interference does occur

there is irritation resulting in excessive bone formation and ultimate ankylosis” (Willis 1923:111). The fibrous capsule in the intervertebral disc can rupture and stimulate the periosteum to initiate bone growth along the edges of the vertebral centrum forming nodules (Aufderheide and Rodríguez-Martín 1998, Ortner 2003). The lipping of vertebral bodies is often referred to as osteophytosis. There is predictable regional distribution for osteophyte formation. This is related to the normal curvature of the spine. The fifth cervical, eighth thoracic, and fourth lumbar are the most common vertebral elements to display evidence of joint disease because these points are most commonly flexed and are subject to a greater degree of stress due to the curvature of the spine, a consequence of bipedalism (Bridges 1994; Dawson and Trinkaus 1997; Duthie and Bentley 1987; Rogers 2000). Since osteophytes are dense and have more compact bone than vertebral bodies they are stronger. Thus, osteophytes can act as a defence mechanism by forming at areas where pressure is the greatest (Nathan 1962).

Based on the study of 419 vertebral columns from the Terry Collection which contains both males and females individuals aged twenty to ninety-nine, Roche (1957) notes that osteophytosis affects females more than males in early life and reverses with age. It was also observed that osteophytosis was more common than osteoarthritis of the articular processes in the vertebral column and may in fact be a causative agent (Roche 1957). Nathan’s (1962) study of four hundred vertebral columns suggested that males were affected to a greater degree. It also revealed that the anterior aspect of the vertebral column displays a higher prevalence of osteophyte formation than the posterior aspect (Nathan 1962). The osteophyte formation on the fourth lumbar vertebra of Individual “A” may be used as evidence to support an early thirties age approximation. This is based on the Schmorl and Junghanns (1971) study where four thousand

spines were autopsied and the relationship between age and osteophytosis were analyzed. This study demonstrated that minimal lesions may begin to occur as early as the third decade. Nathan (1962) observed osteophytes in individuals in their twenties and at least first degree osteophytes in one hundred percent of individuals over forty. Stewart (1953) also notes an increase in hypertrophic arthritis along with spondylolysis between the ages of thirty and forty.

Repetitive actions can also lead to the same result. Stress in the lower back can be caused by variable body positions such as a straight-legged hyperflexed posture that are endured over long periods of time such as occupational activities (Stewart 1953). Studies on activity-induced stress were originally conducted on Inuit populations but can also be applied to Plains Native American groups (Sullivan-Spanghel 1989). For example, the repetitive straight-legged bending over of females during the scraping of hides mimics the same posture of Inuit males with their legs extended straight in kayaks. This activity-induced postural theory is supported by Farfan et al. (1976) study of the posterior ligamentous system (PLS). When the supraspinous ligament is stretched it tends to straighten and draw the vertebrae posteriorly and cause posterior shear forces on the spine, especially in the lower levels (Farfan et al. 1976). While the thoracic vertebrae are efficient in absorbing strong torsional forces the lumbar vertebrae are not (Merbs 1981). Thus, the osteophytosis observed in Individual "A" may be a result of weight bearing stress or recurring activity-induced hyperflexion of the back.

Another pathology observed in Individual "A" is an abnormal left calcaneus. The lateral side of the left calcaneus displays a defined peroneal process characterized by a distinct, curved groove with two ridges that pass antero-inferiorly (Figure 4-5) (Walker 2001). The base of the channel is smooth with no signs of exostoses (Walker 2001). The corresponding right calcaneus



Figure 4-5 Individual "A"'s Left and Right Calcanei

Photo Courtesy of Dr. E. Walker, U of S

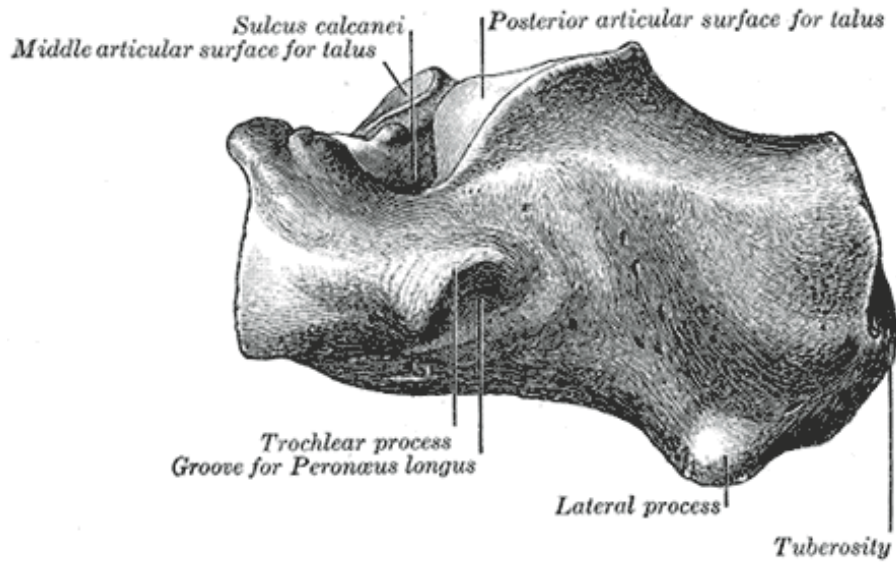


Figure 4-6 Lateral View of Left Calcaneus

Fig. 226 Gray (1918)

displays a standard, tubercular peroneal process like that seen in Figure 4-6. A similar pathology is presented in Plate XX Fig. 45 of Dwight's (1907) Clinical Atlas (See Figure 4-7). The observed ridges are probably the result of an ossification of fibrous tissue that would have separated the tendons of the peroneus longus and peroneus brevis muscles (Dwight 1907). These



Figure 4-7 Lateral View of Right Peroneal Process

Plate XX Fig. 44 Dwight (1907)

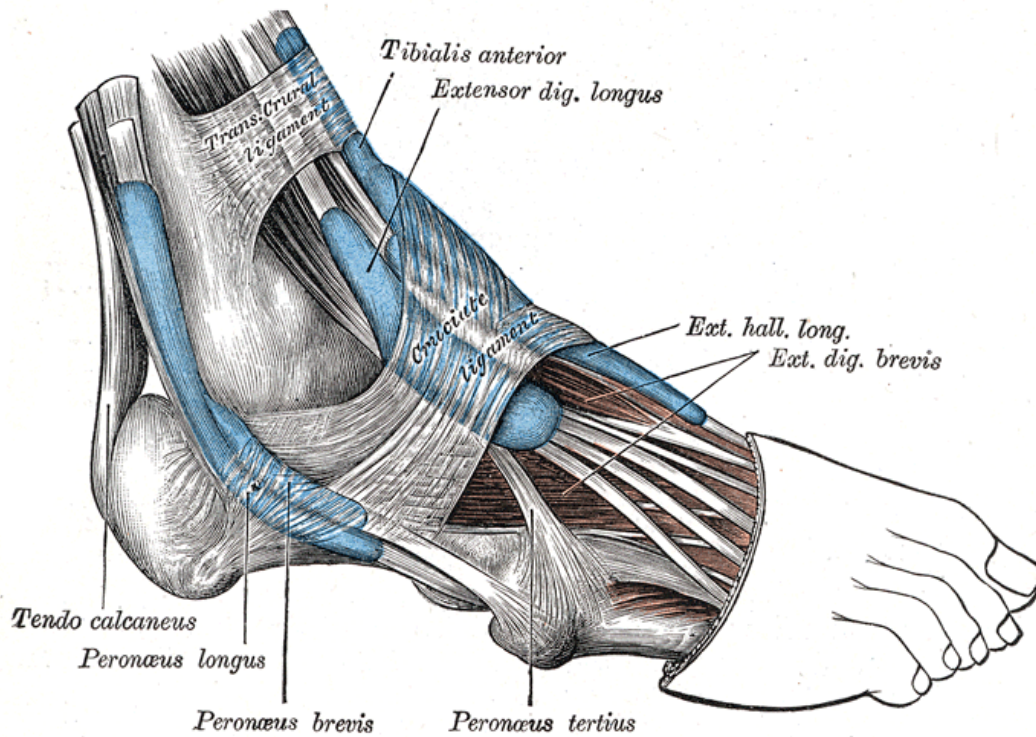


Figure 4-8 Lateral View of Right Ankle Tendons

Fig. 441 Gray (1918)

two muscles originate on the fibula and pass under the peroneal process (Figure 4-8). The peroneus longus tendon inserts on the medial cuneiform and first metatarsal and the peroneus brevis tendon inserts on the fifth metatarsal making these muscles responsible for everting and plantar flexing the foot (Seeley et al. 2003). This type of ossification in Individual “A” could have been due to disease; however, it is more likely the result of physical trauma, such as a sprain, based on the location of the lesion. Ankle sprains are typically the result of the ankle rolling out and the foot turning inwards. This causes ligaments and tendons on the lateral side of the ankle to be stretched or torn depending on the severity or amount of force. It is possible that the peroneus longus or peroneus brevis tendons could be stretched during this process or that they could over compensate during the recovery period. Either circumstance could result in stress being applied to the tendon, stimulating osteoblasts in the surrounding fibrous tissue to form bone.

The final and most interesting pathological condition present in Individual “A” is the absence of the distal end of the left fifth metacarpal. This element shows signs of a healed oblique fracture or cut line and disuse atrophy (decrease in size due to inactivity or diminished function) (Figure 4-9) (Walker 2001). Complete remodelling of the bone into a rounded end provides evidence for an antemortem lesion. In addition, there is an enlarged extensor carpi ulnaris tendon tubercle, which may have developed as a way for the body to function without the distal end of the fifth metacarpal (Walker 2001). This pathology is mechanical in nature and is possibly due to a fracture with non-union and the distal end was not recovered during excavation or possibly the phalangeal elements were lost antemortem. It could also be the result of a severe, clean cut of the distal shaft for purposeful finger removal.



Figure 4-9 Individual "A"'s Right and Left 5th Metacarpals Palmar View

Photo Courtesy of Dr. E. Walker, U of S

There are many theories for why finger dismemberment may have occurred. These are based on ethnographic studies. There is evidence of finger removal from around the world. For example, rock art in New Mexico depicts hands with finger mutilation that resulted in bulbous thickenings, possibly impressions of extreme callous formation (Wellman 1972). There are also examples from France, Spain, New Guinea, and Australia (Wellman 1972). This custom has origins in India or Indonesia where fingers were removed by recently widowed Khoi Khoi wives, who would cut off part of their fingers to pacify the dead and evil spirits and bring supernatural forces to prevent a similar fate from happening to them (Aufderheide and Rodríguez-Martín 1998; Wellman 1972). The purpose of finger removal then began to extend to other threatening situations. Finger mutilation could also be a form of initiation, a marriage rite, punishment, or an offering as a sacrifice for a sick husband or child (Wellmann 1972).

There is also historical evidence for the intentional severance or removal of digits by females in Plains Native American groups. For example, dismemberment of fingers is utilized by the Crow, Thingit, Haida, Assiniboin, and Blackfoot during mourning (Wellmann 1972; Yarrow 1988). The Sioux are also an example of a Native American group that continued to practice finger removal as a burial rite in addition to leg and arm slashing (Hassrick 1964). During worship ceremony, women have been observed severing their little fingers at the first joint. In this culture, it is thought that the removal of an element helps to balance the individual's self control (Hassrick 1964). Ethnographic research has also revealed that the Plains Cree participated in digit removal. However, this was relatively rare and offerings of flesh from the arms and thighs were much more common (Mandelbaum 1979). The sacrifices were then enclosed in a buffalo bladder with sweet grass, charcoal, and tobacco and hung in remote places as offerings to spirit powers. It was hoped that this sacrificial act would result in health and success in war (Mandelbaum 1979).

Archaeologically, there is only one individual that displays possible evidence of digit removal and this is from the Gray site (Millar 1978). Finger removal may have been more common on the Plains than is suggested by the archaeological record but the evidence has been lost. A major contributor to this loss of data is probably due to secondary interments. An individual left to decompose on a scaffold is subject to weathering and predation that would lead to the loss of elements. Preservation may also play a factor. If this is an example of finger removal, then there is a possible cultural continuity between the Middle Middle Precontact Period sites and Native American groups that currently occupy the Northern Plains.

4.3.2 INDIVIDUAL “B”

A nearly complete skeleton of an infant, Individual “B,” was found in direct association with Individual “A.” There was very good preservation despite the fragile nature of these elements (Figure 4-10 and 4-11). The infant was found in the knee region of the adult female and appears to be external to the pelvic cavity (Walker 2001). This could suggest that birth had already occurred or there was post-mortem fetal extrusion or coffin birth similar to a case from the 1930’s in Poland (Panning 1940) or from the 1830’s Le Morne Cemetery in Mauritius (Appleby et al. 2012) which in both an infant was found between the legs of an adult female. Some other examples can be found in Gould and Pyle’s 1896 publication.

4.3.2.1 Osteological Analysis

The nearly complete nature of Individual “B” allowed for long bone measurement to be used for age estimation (right femur 76mm, left humerus 63mm, right tibia 63mm, left ulna 58.5mm, left radius 51mm, and right fibula 60mm) (Walker 2001). The values indicated that the infant was 9.2-10.2 lunar months old with most values clustered around 9.2-9.4 lunar months (Byers 2011). The child was a neonate, meaning it died a few hours or days after birth maybe even after a few weeks. Individual “B” is too young for sex to be determined and there were no abnormalities or pathological conditions observed. The lack of pathology, the young age of the infant, and the direct association with a female adult suggest that the cause of death for both may have been due to obstetric problems (Walker 2001). The neonate could have been a stillborn and buried with the adult female or perhaps it was the result of coffin birth or post-mortem fetal extrusion where gases formed during the emphysematous phase of putrefaction can distend the uterus and expel the dead fetus after the death of the pregnant female (Lasso et al. 2009). If this



Figure 4-10 Individual "B"'s Axial Remains
Photo Courtesy of Dr. E. Walker, U of S



Figure 4-11 Individual "B"'s Axial Remains
Photo Courtesy of Dr. E. Walker, U of S

occurs, the fetal remains should be found complete inferior to the pelvic opening with the fetus orientated opposite to the mother (Lewis 2007).

4.4 CULTURAL MATERIAL

Faunal remain and red ochre were found in direct association with the human remains in the Stoney Beach burial pit; however, none of this consisted of diagnostic cultural material. The only cultural items were a piece of red ochre and a shell pendant.

4.4.1 RED OCHRE (*HEMATITE*)

The single mineral artifact associated with the burial pit at Stoney Beach is a fairly large nodule of red ochre that weighed 13.1 grams (Figure 4-12). There was also red ochre distributed over the remains of Individual “A” with the greatest concentration being on the distal left femur.



Figure 4-12 Red Ochre Nodule

Photo Courtesy of Dr. E. Walker, U of S

A concentration of red ochre was also found on canid remains that were present (Walker 2001). Red ochre, sometimes referred to as hematite or anhydrous iron (III)-oxide (FeH_3O), is a naturally occurring clay that has a reddish pigmentation caused by the presence of iron oxide (Fuller 1988). Archaeologically, red ochre is commonly linked with burial practices (Millar 1978).

4.4.2 FAUNAL REMAINS

Faunal artifacts associated with the burial include unmodified bison, canid remains, and a shell pendant and. The bison bones were found on top of the burial in the pit feature and a sample was used to obtain an AMS radiocarbon date (5648 ± 55 B.P. (BGS-2339)). Bison elements included a right femoral head, left ulna, and three other long bone fragments placed above the human remains. Also in association with the human remains were some canid (*Canis lupus* or *Canis familiaris*) cranial elements; fifteen fragments, one was a right maxilla which retained a canine, two premolar, and three molar teeth (Walker 2001). The left and right



Figure 4-13 Canid Remains

Photo Courtesy of Dr. E. Walker, U of S



Figure 4-14 Shell Pendant
Photo Courtesy of Dr. E. Walker, U of S

temporal, right jugal, and basioccipital were also represented (Figure 4-13). All of the canid remains were stained with red ochre. The shell pendant was small and tubular with dimensions of 23 millimetres by 8.6 millimetres (Figure 4-14) (Walker 2001).

4.5 MORTUARY PRACTICES

The interment at Stoney Beach appears to be a primary burial with the adult female found in a flexed position with a southeast northwest orientation. The adult female and infant were found in direct association with one another, the child being located near the knees of the adult. Burial goods included a shell pendant and red ochre.

4.6 DISCUSSION AND CONCLUSION

The Stoney Beach inhumation in southern Saskatchewan is an example of a primary burial. It contains the skeletal remains of an adult female between the age of 30 and 35 and a neonate. The adult female stood about 62 centimetres high and displayed multiple pathological conditions. Calculus, attrition/abrasion, and slight periodontal disease affected the dentition and skeletal pathological lesions included minor osteophyte formation, an abnormal calcaneus, and

an abnormal fifth metacarpal. The left calcaneus has irregular ossification of the peroneal process possibly due to a past ankle sprain. The left fifth metacarpal displays a possible fracture with non-union or has possibly been transversely severed and could provide evidence for a continuity of finger removal, a cultural act still practiced by some more modern Native American groups (Hassrick 1964; Mandelbaum 1979; Wellmann 1972; Yarrow 1988). No pathological changes were observed in the neonate but the association with the adult female suggests a death due to possible obstetric problems. Few examples of pregnant females are found in the archaeological record (Willis and Oxenham 2011) perhaps this burial represents an example of coffin birth or post-mortem fetal extrusion (Appleby et al. 2012; Lasso et al 2009; Panning 1940). Cultural material found with the Fox Valley burial includes red ochre, a shell pendant, and bison and canid remains. The mortuary style and radiocarbon assay reveal that the Stoney Beach site is an Early Middle Precontact burial and one of the earliest inhumations found on the Northern Plains.

CHAPTER FIVE

FOX VALLEY (EdOj-21)

5.1 INTRODUCTION

The Fox Valley site (EdOj-21) represents an isolated, multiple individual bundle burial that was found beneath a rock cairn in association with limited cultural material. Pathological conditions, mortuary practice, and cultural links are explored in this chapter.

5.1.1 LOCATION

Close to the Saskatchewan Alberta border, the Fox Valley site is located about 11 kilometres (7 miles) west and 4.5 kilometres (2.75 miles) south of Fox Valley, Saskatchewan. Human remains were found on top of a small knoll exposed in a sand excavation pit in the spring of 2000 and retrieved on April 19, 2000 (Walker 2000). The Fox Valley site is located within the mixed grassland ecoregion and the soil is composed of a sandy loam. The human burial was found beneath a rock cairn in a very sandy, ochre stained, matrix (Figure 5-1) (Walker 2000).



Figure 5-1 Fox Valley Burial

Photo Courtesy of Dr. E. Walker, U of S

5.2 BACKGROUND

Mr. Edwin Albrecht, the land owner, reported the burial to the Leader R.C.M.P. Detachment. On March 31, 2000, the site was evaluated by the staff from the Archaeological Resource Management Section, Heritage Branch, Regina. Dr. Ernest Walker from the University of Saskatchewan was subsequently requested to recover and analyse the skeletal remains. This was completed on April 19, 2000 (Walker 2000).

5.3 SKELETAL MATERIAL

The analysis of the skeletal remains from the Fox Valley site was conducted by Dr. Ernest Walker from the University of Saskatchewan (2000) (Dr. Walker's report can be found in Appendix B). The skeletal material found at the Fox Valley site indicates that a minimum of four individuals are represented. This is based on the presence of four right side scapulae each displaying part of an acromial spine and thus indicating separate individuals (Figure 5-2) (Walker 2000). A complete inventory can be found in Table 5-1. Only one individual is represented by a cranium and mandible.

Table 5-1 Skeletal Inventory for Fox Valley

Number	Bone	Side	Complete/ Incomplete	Comments
1	Cranium	N/A	Complete	Includes complete dentition
1	Mandible	N/A	Incomplete	Corpus and two fragments of the left ascending ramus, includes complete dentition
1	Clavicle	L	Incomplete	
1		R	Incomplete	Small
4	Scapula	R	Incomplete	
1	Humerus	R	Incomplete	Lacks proximal and distal ends
1			Incomplete	Shaft fragment
2	Femur	L	Incomplete	Lacks proximal and distal ends, stained with red ochre
1	Rib	L	Incomplete	1 st rib
2		R	Incomplete	Segments
41	Long bone shaft and small comminuted bone fragments			

Based on Walker 2000



Figure 5-2 Four Right Side Scapulae

Photo Courtesy of Dr. E. Walker, U of S

5.3.1 FOX VALLEY INDIVIDUAL OSTEOLOGICAL ANALYSIS

Only one individual out of a minimum of four individuals from the bundle burial at Fox Valley could be assessed in detail due to the fact that only one cranium was present. Based on features of the skull, the individual represented by the cranium and mandible was determined to be a Native American male between thirty and forty years of age (Walker 2000). Morphological features that are indicative of a male identification include large mastoid processes, a receding frontal contour, a lack of parietal bossing, moderate brow ridge development, a square mandibular symphyseal region, and a moderately deep bony palate. The thirty to forty years age approximation as it is difficult to age remains based on only the cranium. The first molars do exhibit almost full exposure of the underlying dentine and fully erupted third molars show some wear. In addition, the speno-occipital synchondrosis is fused, cranial sutures are visible but not fully open, and there are no apparent arthritic changes (Walker 2000). Using unique facial and dental features, such as a depressed nasion, the shape and position of orbits, and shovel-shaped

incisors, the Fox Valley skull represents an individual of Native American ancestry (Walker 2000). This is congruent with the mode of the burial and the presence of Native American manufactured materials and red ochre.

The remains display marked surface cracking and cortical bone exfoliation indicative of heavy weathering. Accelerated mass spectrometry, conducted at Beta Analytic Inc. Boca Raton, Florida, provided a radiocarbon date of 2290 ± 40 B.P. (Beta-177964) conventional age of 2410 ± 40 B.P. which is consistent with a Late Middle Precontact Period interment.

5.3.2 FOX VALLEY INDIVIDUAL PALEOPATHOLOGICAL CONDITIONS

Similar to the Individual “A” at the Stoney Beach burial, the individual from Fox Valley has some dental pathological conditions. Additionally, some long bone shaft fragments found at Fox Valley exhibit osteomyelitis or sclerotic bone growth. It should be noted that these long bone fragments cannot be definitively linked to the individual represented by the cranium and mandible and will be discussed separately although it is very likely that they represent a single individual.

The individual from Fox Valley displays dental attrition, slight periodontal disease, tooth crowding, and an abscess (Figure 5-3). Periodontal disease is evidenced by the resorption that has begun to occur on the alveolar margin and attrition and abrasion that has exposed the dentine dramatically on the incisors, the first molars, and slightly on the third molars (Figure 5-4 and 5-5). There is also a significant displacement and rotation of the maxillary and mandibular dentition in the Fox Valley individual particularly the right maxillary and the anterior mandibular sections (Figures 5-4 and 5-5) (Walker 2000). This rotation and displacement is the consequence of overcrowding which is often the result of the jaw not being large enough to accommodate the



Figure 5-3 Fox Valley Maxillary Dentition
Photo Courtesy of Dr. E. Walker, U of S



Figure 5-4 Mandibular Dental Arch
Photo Courtesy of Dr. E. Walker, U of S



Figure 5-5 Maxillary Dental Arch

Photo Courtesy of Dr. E. Walker, U of S

dental arch. Development of teeth and jaws are based both on genetics and the environment and develop independent of each other (Corruccini 1999). Jaw size is positively correlated with the amount of chewing stress during early development thus the tougher the food the larger the jaws become (Corruccini 1999). In Precontact populations, as generations shift to a soft diet, individuals develop smaller jaws that do not provide enough room for the dentition which has not yet adapted (Corruccini 1999). Also, in the Fox Valley individual the left maxillary canine has been reduced to a single necrotic peg-like tooth with the full root exposed (Figure 5-3) (Walker 2000). A periapical abscess is fully visible near the alveolar margin of this root. This is

an infectious lesion that has progressed into the pulp cavity causing necrosis of the surrounding bone (Langsjoen 1998; Roberts and Manchester 2007).

The other pathological condition found at Fox Valley involves inflammatory disease and sclerotic bone growth. The distal part of a left femoral shaft (Figure 5-6 and 5-7) as well as a segment of a humeral shaft (Figure 5-8) display subperiosteal build-up of sclerotic bone (Walker 2000). This condition probably relates to hematogenous osteomyelitis. The humerus fragment is too small for a more detailed description; however, the femur is complete enough for further analysis. There is no conclusive evidence that these segments belonged to the same individual or to the individual represented by the cranium and mandible, although this seems unlikely. The left side femur displays subperiosteal sclerotic bone with a focal lesion and a sequestrum of smoother cortical bone. In addition, femoral lesion is discoloured due to the deliberate placement of red ochre on the pathological area. This might indicate the persons responsible for the interment



Figure 5-6 Osteomyelitis in Distal Left Femur

Photo Courtesy of Dr. E. Walker, U of S

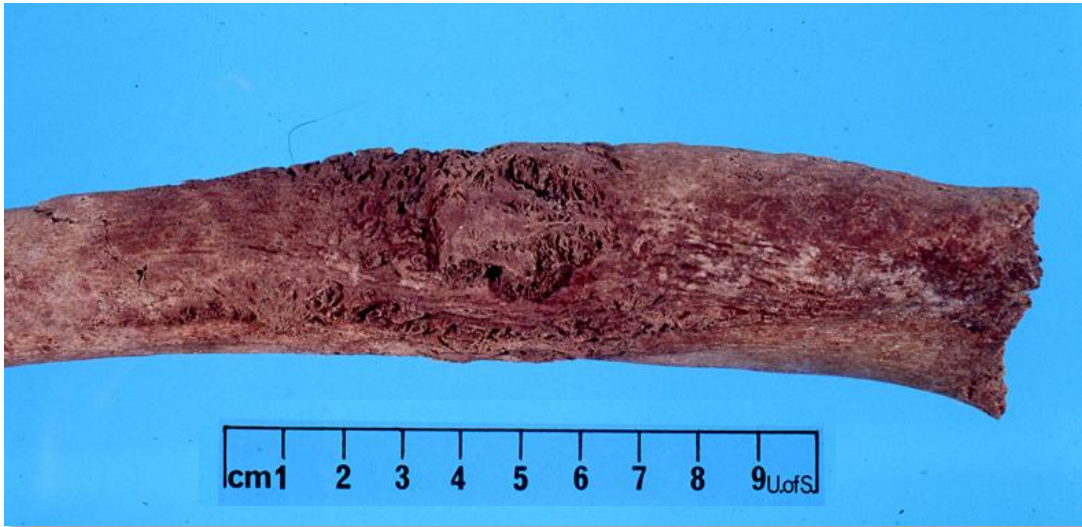


Figure 5-7 Close-up of Osteomyelitis in Distal Left Femur

Photo Courtesy of Dr. E. Walker, U of S



Figure 5-8 Osteomyelitis in Humerus Fragment

Photo Courtesy of Dr. E. Walker, U of S

recognized the significance of this suppurative lesion.

Sclerotic bone formation or osteomyelitis is an inflammatory process where there is an infection of the subperiosteal tissue and of the bone involving the bone marrow (Ortner 2003).

Most commonly, pyogenic exudate forming bacteria enters the marrow through the blood stream or by means of a penetrating bone injury (Roberts and Manchester 2007). Ninety percent of the time the causative bacterium of osteomyelitis is *Staphylococcus aureus* (Ortner 2003).

While osteomyelitis can occur in any bone or an individual of any age, the most common form of osteomyelitis is hematogenous osteomyelitis. In this form of the pathology, the infection almost always starts in the metaphysis of a bone near an actively growing plate in juveniles. The rich blood supply to these rapidly growing cells increases their susceptibility (Aufderheide and Rodríguez-Martín 1998). Long or tubular bones are most commonly affected and the distal femur is involved at the greatest frequency (Robbins 1975; Wilensky 1934). Eighty percent of the time only one bone is affected and in the other twenty percent of the cases more than one bone is affected (Garré (1893) in Roberts and Manchester 2007). In this strain of osteomyelitis, eighty percent of cases are observed in children ages three to twelve because this is when skeletal growth is most active (Jaffe 1972, Robbins 1975). In the archaeological record, males appear to exhibit osteomyelitis almost three times as often as females. This may be because males were participating in more high risk activities and at a greater risk of injury and thus infection (Aufderheide and Rodríguez-Martín 1998).

Acute hematogenous osteomyelitis involves purulent foci in the metaphysis that lead to the destruction of new spongiosa (Ortner 2003). As exudate spreads through the marrow cavity the pressure starts to build and the vasculature to the bone becomes compressed. The resulting decreased availability of blood and nutrients causes the cortex of the bone to slowly die or undergo necrosis and appear pitted and irregular (Ortner 2003). Bone necrosis stimulates osteoblasts located on the inner most layer of the periosteum, the periosteal involucrum, to

generate bone and thicken the now weakened cortex (Ortner 2003; Roberts and Manchester 2007). This sheath of hypervascular bone causes the affected bone to appear enlarged and become deformed. This new or woven bone is called the involucrum and it is very porous and lacks an organized microstructure (Ortner 2003; Roberts and Manchester 2007). The underlying dead bone is referred to as the sequestrum. The pressure in the bone also can build to such a point that the exudate needs to find a way to drain and release the pressure. An abscess can form a cavity in the interior of the bone and release exudate into the surrounding bony tissues (Aufderheide and Rodríguez-Martín 1998; Roberts and Manchester 2007). The exudate can also travel to the subperiosteal space and out of the body from the bone marrow via Haversian canals (Turek 1982). In order for exudate to drain from an affected bone, a cloaca or hole may form in the involucrum revealing the underlying sequestrum. In the case of the Fox Valley specimen, the shaft of the femur has expanded to about double the width of a normal femoral shaft and as can be seen in Figure 5-6 there is a clear cloaca and sequestrum (Walker 2000). The presence of these features leads to a osteomyelitis diagnosis. For the Fox Valley femur, this non-specific infection could have contributed to the death of the individual and the infection could have been introduced to the bone by bacteria entering the blood stream by means of the aforementioned abscess if from the same individual.

5.4 CULTURAL MATERIAL

Material that was found in association with the human remains of the Fox Valley burial site includes both lithic and avian remains. Part of a pipe, a flake, two red ochre stained pebbles, and some red ochre nodules are the only significant cultural material present. Culturally, the association of the tubular stone pipe and red ochre indicate a Middle Middle Precontact Period

affiliation of 3000 to 2000 B.P. which is congruent with that determined by the skeletal analysis and AMS dating.

5.4.1 LITHICS

Lithic materials present with the buried remains at Fox Valley consist of an incomplete dolomite or limestone tubular pipe, a single agate flake, two ochre stained pebbles, and abundant red ochre nodules (Walker 2000). The tubular pipe fragment can be seen in Figure 4-9. Red ochre was also dispersed in the sandy matrix and was found to be more concentrated of the pathological human elements (Walker 2000).



Figure 5-9 Tubular Pipe
Photo Courtesy of Dr. E. Walker, U of S

5.4.2 FAUNAL REMAINS

Only one faunal individual appears to be associated with the Fox Valley burial. Segments consistent with a whooping crane (*Grus americana*) were present. These are the proximal and distal ends of the left ulna (Figure 5-10). The transverse proximal width of the ulna is 26



Figure 5-10 Whooping Crane Remains

Photo Courtesy of Dr. E. Walker, U of S

millimeters making it larger than that of a Greater Sandhill Crane (Walker 2000). There are also eight smaller avian long bone shaft fragments that are not identifiable, but probably belong to the same individual (Walker 2000). It is not unusual for Precontact burials to have associated bird remains. For example, eagle claws and remains are a common inclusion and remain a significant symbol among modern Native American groups (Baker 1941; Bray 1961; Gilmore 1932; Parmalee 1967; Ubelaker and Wedel 1975). However, this is the first incidence of a whooping crane being found archaeologically in Saskatchewan and one of only a few reported in North America (Baker 1941; Bray 1961; Parmalee 1967; Ubelaker and Wedel 1975).

Adult whooping cranes are white except for red patches on their heads and black-edging on their wings (Dunlap 1991). Standing up to 1.5 meters (5 feet) tall, they can have wing span of 2.3 meters (7.5 feet). They are solitary birds and are generally seen as pairs or alone, with the former being more common (Allen 1952). One reason that might explain the rareness of the find is the scarcity of the species. As of 1952 there were only there are only about two hundred and fifty whooping cranes in the wild, making it the second rarest North American bird (Allen 1952).

Even in Precontact times, there have probably never been more than a few thousand in existence (Dunlap 1991).

The whooping crane has nested in central North America since about 12,000 years ago, when the Pleistocene glaciers retreated. The migration route is relatively well known as there is only one flock remaining. As wetland birds, during the summer months whooping cranes breed and nest in swampy areas in northern Canada. Historically this included a range from the southern North West Territories down through the Great Plains (Lewis 1995). The last observed nesting site in Saskatchewan was in 1922 at Mud Lake (Allen 1952; Dunlap 1991). At present the only wild whooping crane breeding grounds are in the Sass River area of the northern Wood Buffalo National Park (Lewis 1995). Those individuals that have not yet reached maturity or who are not breeding, about half of the group, separate from the pack and flock to western Alberta, while breeding individuals travel further north (Allen 1952).

Between October 1st and 10th, whooping cranes migrate from northern Canada, over the Saskatchewan Plains and across the Dakotas, Nebraska, Kansas, and Oklahoma, finally reaching Texas (Allen 1952). On the way, the cranes stop around sloughs and marches in Saskatchewan where they feed on grains (Lewis 1995). Usually arriving between November 2nd and 8th, the inland tidal marshes and mud flats of the Aransas National Wildlife Reserve in Texas are currently the whooping cranes wintering grounds (Allen 1952). A map of the migratory route can be found in Figure 5-11. The migration trip is 1,800 to 2,000 miles long and new families with youngsters require more time and are often the last to arrive at the wintering grounds (Allen 1952). The discovery of remains at Fox Valley suggests that the migration route during

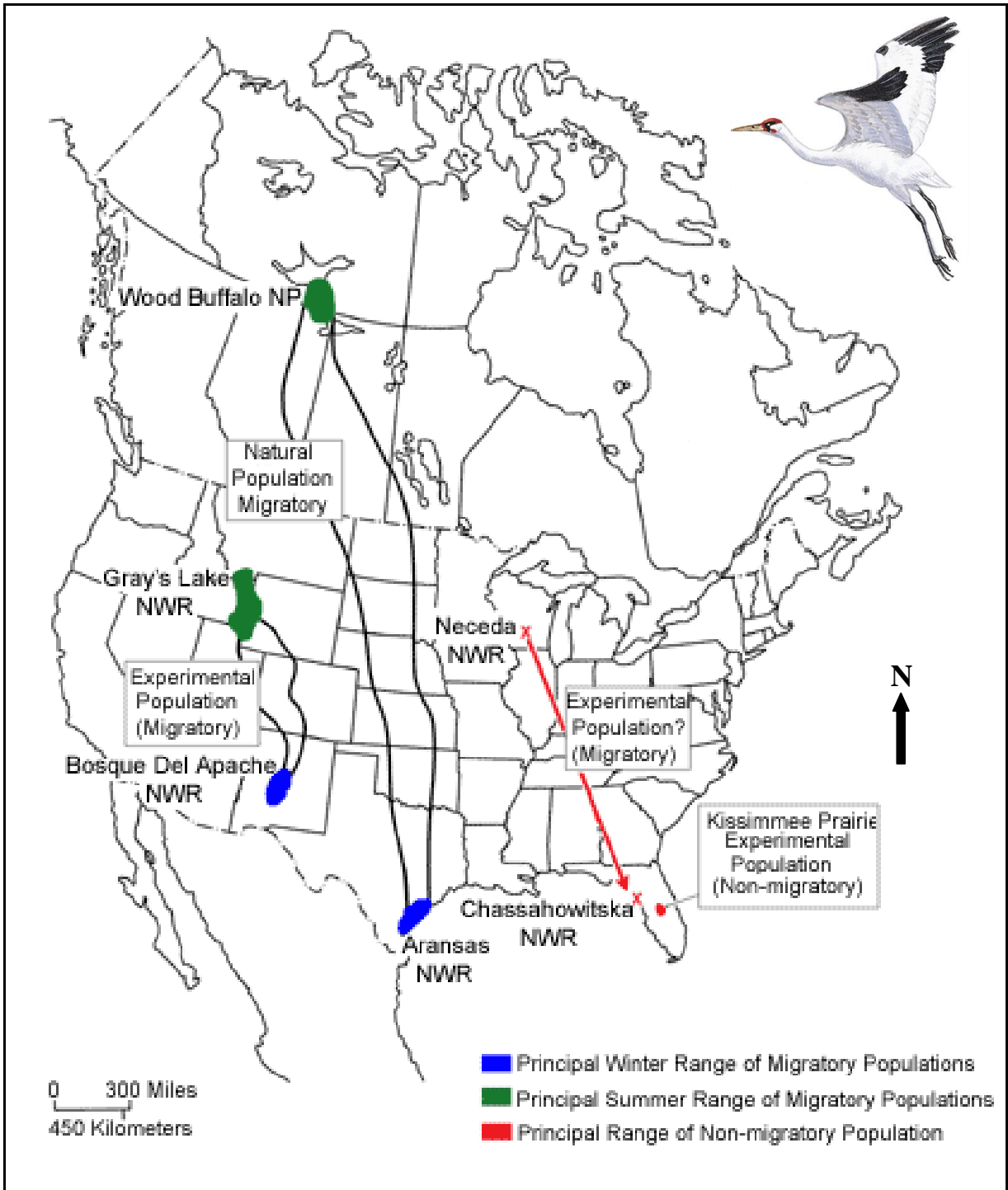


Figure 5-11 Whooping Crane Distribution in North America

Copyright Cornell Lab of Ornithology/data provided by NatureServe

Precontact time may have been similar. In the past, whooping cranes were known to also winter in Louisiana and on the Gulf coast of central Mexico (Dunlap 1991).

Birds were of secondary importance economically and provided food resources as well as spiritual significance in Native American people's lives (Parmalee 1967). "Remains of these animals often provide an index to their early distribution and possible abundance" (Parmalee 1967:155). Late Precontact and Contact period sites tend to have the greatest abundance of bird remains. Prior to this, it is rare to find avian remains. This may be due to preservation issues and the fragility of bird bones or it may be due to differences in subsistence or cultural traditions (Ubelaker and Wedel 1975). Based on archaeological assemblages, it appears that Precontact groups seldom killed or encountered whooping cranes. Drs. Washington Matthews and C.C. Gray, US Army Medical Corps, were the first to find whooping crane remains in association with a burial. A premaxilla/maxilla segment with part of a skull was found at Fort Berthold, Dakota Territory and most likely represents a scaffold burial due to the fact that the remains retained dried tissue and adhering feathers (Ubelaker and Wedel 1975). Remains have also been identified from Georgia, the Flynn Cemetery in Iowa, and Late Woodland to Early Mississippian sites in Illinois (Baker 1941; Bray 1961; Parmalee 1967).

Archaeologically, birds tend to be represented by bones of the skull, wings, or legs. The distribution of remains present in most sites suggests that the assemblage of bird bones represents medicine bundles or fetish, rather than subsistence base (Ubelaker and Wedel 1975). As a medicine bundle item, the bird was skinned and only the beak and part of the skull often remained. Gilmore (1932) broadly describes a bundle as protected collections of sacred objects. In some cases, the skull was almost completely removed and in others the skull, lower legs, and

outer wings were left intact for support and to give form to the skin (Ubelaker and Wedel 1975). “Stuffed bird skins with attached heads and/or bills, feet and/or legs and wings or wing parts, were apparently used in the home as well as in connection with burial rites” (Ubelaker and Wedel 1975:450). For example, these could be of personal importance, household value, spiritual or mystic significance, or simply for good luck (Gilmore 1932; Ubelaker and Wedel 1975). In the case of personal items or individual fetishes, personal charms are predominantly the possession of males (Wissler 1912). The humeri and other long bones of birds could also have been made into whistles and the outer wing (radius, ulna, and carpometacarpal) into fans (Ubelaker and Wedel 1975). Finally, birds would have provided a portion of food resources. This is supported by an interview of a First Nations individual who classified a whooping crane as a first class feed (Dunlap 1991).

The presence of only the proximal and distal ends of a left ulna and eight smaller avian long bone fragments suggest that in the case of Fox Valley the whooping crane remains probably represent part of a medicine bundle. These are the elements that would have remained to give form to the skin and would have preserved better than the smaller, more fragile, wing elements.

5.5 MORTUARY PRACTICES

The burial at Fox Valley is an example of a secondary bundle burial. The intermingled remains of a minimum of four individuals were interred after being exposed to the environment possibly on a scaffold. The inclusion of the bones of a number of individuals in bundle burials is not uncommon (Walker 1984). None of the remains were found articulated and many elements are missing. In addition, a difference in weathering is noticeable among the different elements suggesting that they were exposed to the environment for different lengths of time. Some of the

elements display considerable surface cracking, exfoliation, and bleaching, which are characteristic of heavy weathering, while other elements display only slight weathering. It can thus be concluded that the individuals probably would have died at different times and were subject to a varying amount of weathering before being collected and buried as a whole. Once the remains were collected from their primary resting location they were gathered into a bundle and buried. The pit or grave was then covered with large rocks in the form of a cairn. The presence of a few cultural items, such as a stone pipe and red ochre, indicate that meaning and funerary rites were most likely associated with death and burial during the Precontact period rather than burials being for the simple purpose of corpse disposal.

5.6 DISCUSSION AND CONCLUSIONS

The Fox Valley site in southwestern Saskatchewan contains a secondary bundle burial of the commingled remains of four individuals. Only one cranium was present for identification purposes. This individual is a male of Native American ancestry who died between the ages of thirty and forty years. The dentition within the cranium displays attrition/abrasion, periodontal disease, tooth crowding, and a periapical abscess. The main pathological condition found from the bundle burial remains was sclerotic bone growth, located on femoral and humeral shaft fragments. This infection may or may have not contributed to at least one individual's death.

Cultural material found with the burial included a tubular pipe, a lithic flake, red ochre, and, most interestingly, the remains of a whooping crane. Modern migration routes of the rare whooping crane pass over southern Saskatchewan often stopping to feed in marshes (Lewis 1995). In the past, whooping cranes also sought out nesting grounds in Saskatchewan. The

representative elements associated with the burial indicate that the bird may have been used as some form of a medicine bundle.

While the Fox Valley site does not include any diagnostic artifacts, a radiocarbon date of 2410±40 B.P. suggests a Pelican Lake complex interment. The style of the inhumation, characterized by a shallow, secondary, bundle burial containing multiple individuals and other mortuary practices such as the burial's position under a cairn at a high elevation and the inclusion of grave goods and red ochre is consistent with that of other Pelican Lake sites on the Northern Plains (Baldwin 1980; Brink and Baldwin 1988; Hoppa et al. 2005; King 1961; Maas 1972; Scheiber and Gill 1996; Walker 1983).

The future discovery of additional Pelican Lake burial sites will provide a greater source of data to compare with sites that do not contain diagnostic artifact to ascertain a more definite cultural affiliation. In addition, the analysis of more remains would aid in creating a better depiction of the demographics and health status of past groups.

CHAPTER SIX

ADAMIAK CRANIUM

6.1 INTRODUCTION

A cranium and mandible are all that remain of a Native American female displaying an uncommon pathological change. A human cranium was recovered by a Ms. Esther Adamiak near Outlook, Saskatchewan. Despite the small size of the assemblage, features such as sex, ancestry, and age estimates can be established. Four pathological changes are present, the first three, enamel hypoplasia, alveolar resorption, and dental attrition/abrasion, are typical of Precontact populations; the fourth, biparietal thinning, is much more uncommon.

6.2 LOCATION

The Adamiak cranium was found protruding from an eroding embankment at an unspecified location along the shoreline of Lake Diefenbaker. It is identified as coming from the West ½ of Section 16, Township 30, Range 8, West of the 3rd meridian. This is located in Outlook region of south-central Saskatchewan. Due to the fact that the original location could not be identified, the provenience is unknown. It should be noted that the remains were found in a very sandy matrix such that preservation of skeletal remains in this type of environment can vary and make time since death determinations difficult.

6.3 SKELETAL MATERIAL

The remains recovered by Ms. Adamiak were sent to the University of Saskatchewan for analysis and reburial. A cranium and mandible are the only elements recovered from this single interment. The right frontal half of the cranium is an off white to cream colour suggesting



Figure 6-1 Frontal View of Adamiak Cranium



Figure 6-2 Posterior View of Adamiak Cranium



Figure 6-3 Left View of Adamiak Cranium



Figure 6-4 Right View of Adamiak Cranium



Figure 6-5 Adamiak Mandible

it was bleached by exposure to the open environment for an extended period of time prior to excavation. The other half of the cranium and the mandible have a brownish hue due to discoloration from the surrounding matrix. The bones are very dry, light in weight, and rough in texture. They are fragile and porous especially the cortical bone of the cranial vault. The inferior nasal conchae and right lacrimal bones are absent while the occipital, temporal, and left parietal bones are incomplete. A complete skeletal inventory can be found in Table 6-1. There are symmetrical ovoid depressions in the parietal bones, commonly referred to as biparietal thinning. The left parietal has a postmortem break in the depressed area. Using the FDI World Dental federation notation coding system, the teeth present in the maxilla include 14, 15, 16, and 23 and there are open sockets from postmortem tooth loss for 12, 13, 17, 22, 24, and 25. The remaining sockets are obliterated due to alveolar resorption subsequent to antemortem tooth loss. In addition, there is evidence of enamel hypoplasia and calculus. The teeth in the mandible include

Table 6-1 Skeletal Inventory for Adamiak Cranium

Bone	Side	Complete/ Incomplete	Condition	Comments
Braincase				Tan colour, partially bleached
Frontal	N/A	Complete	Fair	
Parietal	L	Incomplete	Fair	Parietal thinning, ~4.3cm by 5.3cm, post mortem hole 3.3cm by 2.5cm in depression
	R	Complete	Fair	Parietal thinning, ~4.3cm by 5.3cm
Temporal	L	Incomplete	Fair	Missing zygomatic process
	R	Incomplete	Fair	Posterior portion broken
Occipital	N/A	Incomplete	Fair	Irregular left occipital condyle, missing part of basioccipital on the right side
Sphenoid	N/A	Complete	Fair	
Face				
Nasal	L	Complete	Fair	
	R	Complete	Fair	
Maxilla	L	Complete	Fair	23 present, sockets for 22, 24, 25, alveolar resorption, slight enamel hyperplasia, plaque
	R	Complete	Fair	14, 15, 16 present, sockets for 12, 13, 17, alveolar resorption, slight enamel hyperplasia, plaque
Zygomatic	L	Complete	Fair	
	R	Complete	Fair	
Lacrimal	L	Complete	Fair	
	R	N/A	Absent	
Palatine	L	Complete	Fair	
	R	Complete	Fair	
Nasal concha	L	N/A	Absent	
	R	N/A	Absent	
Ethmoid	N/A	Complete	Fair	
Vomer	N/A	Complete	Fair	
Mandible	N/A	Complete	Fair	Large, tan color, flaring goneal angles, short ramus, alveolar resorption, extreme dental wear, can see dentine, alveolar resorption, 34, 35, 36, 41, 42, 43, 44 present, sockets for 31 (loose), 32, 33, 38, 45

34, 35, 36, 41, 42, 43, and 44 and there are open sockets from post mortem tooth loss for 31, 32, 33, 38, and 45. Dental pathological changes include alveolar resorption and extreme dental attrition. The empty sockets have sharp alveolar ridges indicating that some of these teeth were

lost postmortem while the remaining teeth were lost antemortem as evidenced by the alveolar resorption.

6.3.1 OSTEOLOGICAL ANALYSIS

Using anthroposcopic and metric values of the cranium, it can be determined that the Adamiak skull represents a female of Native American ancestry (Table 6-2, 6-3). The surface texture is pitted similar to the remains found at the Fox Valley site and preservation suggests that the cranium is of Precontact origin, supporting the theory that the cranium belonged to an individual of Native American ancestry. Through anthroposcopic traits (Table 6-4) and discriminant function analysis, the unknown individual represented by the Adamiak cranium can be identified as a probable female. Determination of sex of the skull only has an accuracy of 80% to 90%; a more definitive result would be possible if the pelvic girdle was present (Krogman 1962; Stewart 1979). Definitive results are also difficult due to mixed traits; some of the cranial features are intermediate while others are definitely female. In general, the skull is small and gracile in appearance and the mastoid processes are small with shallow digastric fossae. The nuchal area of the occipital is fairly smooth and there is slight parietal bossing. All of

Table 6-2 Cranial Measurements

Measurement	Length
ML (maximum length)	176mm
MB (maximum breadth of the skull above the supramastoid crest)	142mm
BaBr (basion to bregma)	123mm
BaNa (basion to nasion)	96mm
BB (maximum width across the zygomatic arches)	132mm
BaPr (basion to prosthion)	83mm
NaAI (nasion to lowest point on the alveolar border between the central incisors)	62mm
PB (maximum breadth of the palate)	56mm
LM (length of the mastoid processes)	Left 29mm Right 28mm
NB (nasal breadth)	24mm

Table 6-3 Anthroposcopic Characteristics of the Skull in Ancestry Determination

Structure	Description
Nose	
Root	High, narrow
Bridge	High
Spine	Pronounced
Lower Border	Sharp
Width	Narrow
Face	
Profile	Straight
Shape	Fairly wide
Eye Orbits	Rounded, slightly angular
Lower Eye Border	Straight
Vault	
Browridges	Intermediate
Muscle Marks	Smooth
Vault Sutures	Simple
Postbregma	Straight
Jaws and Teeth	
Jaws	Large
Palatal Shape	Parabolic
Upper incisors	None present

Based on Byers (2005), combination from information in Krogman (1962), Brues (1977), and Rhine (1990)

Table 6-4 Anthroposcopic Characteristics of the Skull in Sex Determination

Trait	Description	Sex
Size	Small and smooth	Female
Mastoid	Intermediate/Small, nonprojecting	Female
Browridges	Small	Female
Glabella	Pronounced	Male
Frontal	Intermediate/Slanted	Intermediate/Male
Parietal bossing	Slight	Female
Nuchal area	Rough, no hook	Female
Supraorbital margin	Intermediate	Intermediate
Chin	Blunt/Intermediate	Intermediate
Mental eminence	Large	Male
Nasion	Slightly depressed	Male
Diagastric fossa	Shallow	Female
Zygomatic arch	Intermediate flaring	Intermediate
Occipital crest	Slight	Female
Palate	Wide and shallow	Male

Based on Byers (2005), summarized from Krogman (1962), France (1998), and Buikstra and Ubelaker (1994)

these characteristics are typically female.

Since only the cranium is present, the age of the Adamiak individual is more difficult to determine. Based on the fusion of cranial sutures using scores for vault and lateral-anterior Suture closure (Table 6-5), this individual was between twenty nine and forty five years of age at time of death based (Ubelaker and Buikstra 1994). For obliteration of the palatal sutures the incisive suture was complete, the anterior part of the median palatine partially complete, the posterior part of the median suture almost complete, and the transverse palatine suture partially complete. However, cranial suture aging is not very accurate and provides a large age range. Dental changes, such as the amount of occlusal wear on the teeth can also be used to estimate the age of an individual. Based on the amount of attrition/abrasion and the amount of dentine showing, the age of the Adamiak individual would be quite old using modern standards. However, since the cranium is Precontact, the diet would have been grittier resulting in a faster wear rate. Therefore, based on cranial sutures and dental attrition, the Adamiak individual could have been in the late thirties to mid-forties at time of death although the window is probably larger as these methods can be unreliable.

Table 6-5 Ectocranium Suture Closure for Age Determination

Suture	Degree of Closure	Suture	Degree of Closure
Midlambdoid	Partially closed	Midcoronal	Significantly closed
Lambda	Partially closed	Pterion	Open
Obelion	Partially closed	Sphenofrontal	Open
Anterior-sagittal	Open	Interior sphenofrontal	Open
Bregma	Partially closed	Superior sphenofrontal	Open

6.3.2 PALEOPATHOLOGICAL CONDITIONS

There are five pathological conditions present in the Adamiak cranium. The first is enamel hypoplasia, a deficiency in the matrix composition of enamel (Goodman 1991). Calculus, a build up mucoid material and bacterial colonization on the exterior of the tooth that has mineralized and attrition and abrasion or occlusal wear of the teeth are also dental conditions present in the specimen. The fourth dental pathological condition, alveolar resorption after antemortem tooth loss refers to a remodeling of the bone forming the tooth sockets (See Figure 6-6, 6-7, 6-8, 6-9 for close up of dentition) Finally, the fifth and most apparent pathological condition present is the symmetrical thinning of the parietal bones, also known as biparietal thinning. These five conditions can give some insight to the health and life of the individual.

Enamel hypoplasia, a developmental problem, is a non-specific indicator of stress due to illness or malnutrition during childhood (Goodman and Rose 1991; Roberts and Manchester 2007). The magnitude of the stress has to be significant enough in order to cause the body's energy to be directed away from enamel formation by ameloblasts to more essential bodily processes. Enamel hypoplasia is characterized by linear horizontal bands or grooves or sometimes pitting of reduced enamel thickness found on the crown of the tooth. The causative stress occurs during the time of dental crown formation (Regezi et al. 2000). There is evidence of some enamel hypoplasia on the upper left canine of the Adamiak cranium (Figure 6-9). Langsjoen (1998) suggests that amelogenesis for maxillary incisors and mandibular canines occurs in the first year after birth and using this assumption, the individual was ill or malnourished at this early age or just after. However, Hillson (1997) advises that tooth formation rates are not consistent cross-culturally and therefore not necessarily the same in the past as in



Figure 6-6 Adamiak Maxillary Dentition



Figure 6-7 Adamiak Mandibular Dentition



Figure 6-8 Right View of Adamiak Maxillary Dentition



Figure 6-9 Frontal View of Adamiak Maxillary Dentition

the present as most studies assume. There are a variety of stresses that could lead to a disruption of ameloblastic physiology. These include infectious diseases, hereditary anomalies, trauma, cultural activities, and nutritional stress (Goodman and Rose 1991; Langsjoen 1998). Social determinants that could affect dental enamel are socio-economic status and weaning. Weaning stress can not only cause enamel hypoplasia but can also alter the age at which this can occur (Corruccini et al. 1985; Goodman and Rose 1990). Nutritional status is thought to be the most common and more probable source of stress. Studies have been done on children in developing countries to test the effect of nutrition. Some children were given normal, unsupplemented food and some children were given supplemented food and their defects were recorded (Dobney and Goodman 1991; May et al. 1993). The results support the theory that malnutrition is a major component to enamel hypoplasia. The Adamiak cranium shows some evidence of enamel hypoplasia. This provides evidence that the individual probably underwent stress at a young age due to malnutrition or infectious disease.

The Adamiak cranium has calculus encrusted on the dentition. The calcified plaque is a result of a lack of dental care and generally a diet high in protein. The dentition also presents excessive physiologic wear or attrition similar to that observed at Stoney Beach. The Adamiak individual is older and therefore the dentine is exposed on all teeth including the third molars, unlike the younger Stoney Beach adult.

Antemortem tooth loss is followed by complete or nearly complete alveolar resorption with is a degenerative disease. The occurrence before death allows for a healing period where the edges of the tooth socket become rounded and the socket eventually becomes obliterated. In the case of the dentition in the Adamiak skull, the teeth may have been lost due to abscess formation,

periodontal disease, caries, or trauma. However, the bone has been remodeled to the point where this is undeterminable.

Biparietal thinning is a less common pathological condition. It has many different synonyms in the literature such as *depressio biparietalis circumscripta*, *malum senile biparietale*, and *osteoporosis calvarii symmetrica*. The first person to observe this was E. Sandifort in 1783, when he described and sketched his observations of the condition (Bruyn and Bots 1978). Since then biparietal thinning has been seen in low frequencies of 0.25% to 2.37% across the world (Lim and Sohn 2001). Often the only way to observe this condition is from “archaeological discoveries, skull-caps from autopsies, and cranial roentgenograms of the living” (Bruyn and Bots 1978:125).

Parietal thinning presents with a visual depression of the parietals that can be seen unilaterally or bilaterally. The edges of the depression tend to be shelved and a band of exposed diploë surrounds the central area of the bare inner table (Durward 1929). Remarkably, the right side is usually involved more than the left. When the depression is unilateral it tends to be on the right parietal and in bilateral cases the right side is often the first to be affected (Camp and Nash 1944; Epstein 1953). Located superior to the temporal ridge on the cranium, the condition is usually found “about equidistant from both the coronal and lambdoid sutures” (Durward 1929), anterior to the parietal foramina (Phillips 2007). It is interesting to note that in females this is usually the thickest part of the cranium (Lippert and Käfer [1974] in Phillips 2007). There are two types of thinning that have been described in the literature; flat and grooved. Flat is characterized by an oval of decreased thickness and is the most common, comprising about 80% of cases. The grooved form is very rare and is considered a separate lesion termed biparietal

osteodystrophy (Greig 1926; Camp and Nash 1944; Wilms et al. 1983). The Adamiak cranium presents flat, bilateral, parietal thinning with the elliptical depressions measuring a maximum of 4.3 centimetres by 5.3 centimetres (See Figure 6-10). This thinning of the parietal bones is almost always limited to the diploë and outer table with the inner table rarely being affected. The diploë is described as disappearing and the outer table thinning as it approaches the inner table and later fusing (Ribes [1816] in Wilms et al. 1983). This theory is contradicted by some scholars who believe “that it is the external table which disappears first, followed by loss of the external diploic tissue” (Bruyn and Bots 1978). From this perspective, the external table is first to be lost and the Haversian system of the diploë widens and comes into contact with the subperiosteal space (Maier [1854] in Bruyn and Bots 1978). The diploë then becomes a replacement external table as rebuilding and remodeling occur with new lamellar bone. Once the



Figure 6-10 Biparietal Thinning in Adamiak Cranium

outer table and diploë are lost, the inner table undergoes increased stratification (Virchow 1853; Sauvage [1869] in Bruyn and Bots 1978). Typically, parietal thinning can be observed with x-rays and symmetrical photon defects in the parietal bones can be seen on bone scintigraphy (Sohn et al. 2007).

Some researchers believe biparietal thinning to be a progressive process (Bruyn and Bots 1978; Cederlund et al. 1982; Epstein 1953; Steinback and Obata 1957), whereas others believe it to be a static condition (Camp and Nash 1944; Greig 1926; Rowlings 1961; Wilson 194;). The progressive nature of biparietal thinning is supported by the fact that it usually affects older individuals and the degree of thinning has been shown in some cases to gradually increase over time. Most literature states that females are most often affected (Cederlund et al. 1982; Epstein 1953; Lim and Sohn 2001), while a few scholars, such as Wilms et al. (1983) and Camp and Nash (1944), suggest that males are most often affected. Others, such as Dutta (1969) and Steinback and Obata (1957), state that biparietal thinning is not dependant on age or sex.

Since there is so much debate in the literature about the structure of the condition and who is affected, it is no wonder that there is also great debate about its importance and etiology. The multitude of postulations only adds to the biparietal thinning enigma. The numerous hypotheses regarding the cause include a slowly progressing lesion, senility, muscle movement, osteoporosis, constant pressure, hormonal defects, heredity, congenital dysplasia, and vascular constriction. Senility was first proposed as a cause for biparietal thinning by Gall ([1823] in Bruyn and Bots 1978) and since then there have been many causative ideas related to old age. One theory related to senility is the wearing down of the parietal bones by the galea aponeurotica, which is fibrous tissue that covers the upper part of the cranium (Chiari 1912;

Burckhardt [1970] in Bruyn and Bots 1978). This tissue seems to loosen with age resulting in more movement and rubbing. However, this would not provide enough force to cause such deep depressions especially because the periosteum separates the galea aponeurotica from the external table of the calvarium (Bruyn and Bots 1978). Other scholars propose that the depressions are caused by muscle movement and exertion or by a constant pressure. However, the masticator muscle attaches below the site of thinning on the parietals and the condition's incidence is not higher in populations who tend to carry heavy loads on their heads. Another hypothesis related to old age is cranial osteoporosis. This process reduces the bone mineral density and alters the bone structure of the cranium as a consequence of a decreased osteoclast count (Cederlund et al. 1982; Shiobhon et al. 2010). Aufderheide and Rodríguez-Martín (1998) associate biparietal thinning with osteoporosis because of the high prevalence in elderly females particularly or those who have gone through menopause (Epstein 1953). This theory provides explanation for the seemingly high percentage of elderly women affected. The Adamiak cranium would support this premise based on the sex (female) and age (35 to 45 years) determinations for the individual. In one case of biparietal thinning in an elderly female, bone mineral density of the lumbar spine was measured and found to be non-osteoporotic (Tsutsumi et al. 2008). Cederlund et al. (1982) acknowledge that this may be a cause; however, they also suggest hormonal disorders, congenital dysplasia, or slowly progressing lesions as possible causes. They provide the most evidence for, and promote, the slowly progressing lesion theory. Some scholars state that hormonal disorders such endocrinopathy or gonadal hormonal insufficiency can lead to decreased osteoblastic activity which can present itself as biparietal thinning (Epstein 1953; Steinback and Obata 1957). This idea is supported by the fact that after the reduction of gonadal activity a majority of cases have developed (Bruyn and Bots 1978). Others believe there may be

a familial relationship although cases are usually sporadic (Rowlings 1961; Sheperd 1893). Ancestral relationship is supported by a recent analysis of over a thousand ancient Egyptian crania, the data of which indicated there is a genetic component to some degree (Phillips 2007). Doerr's ((1972) in Bruyn and Bots 1978) vascular hypothesis is that there is a constriction or blockage of the distal external carotid branches which supply the external table and diploë of the vault with blood. This blockage leads to necrobiosis or cell death and an atrophy of the bone affected. Finally, others believe the etiology of biparietal thinning is not important and stress that it should not be confused with other diseases of the skull deemed more important (Steinbach and Obata 1957).

6.4 CONCLUSION

Despite a lack of locational information for the Adamiak cranium, some data can still be drawn and some hypotheses can be made. The skull probably represents a thirty five to forty five year old female of Native American ancestry. Dental conditions suggest a gritty diet and childhood physiological stress such as malnourishment or infection. The thinning of both parietal bones is unique and could represent any number of conditions such as osteoporosis or vascular constriction, or it could be a skeletal anomaly with no known etiology. More research on biparietal thinning is required to reach a more conclusive diagnosis. The individual is only represented by a skull so there is no way to propose cause of death, a full body examination would be necessary. Due to a lack of provenience information, the context for this individual has been lost. The weathered condition and preservation of the cranium indicated antiquity but there is no certainty to the period it comes from. Obtaining a radiocarbon date would put it in a more

accurate chronological framework for better interpretation. Until that time, the Adamiak cranium can only be analyzed in isolation.

CHAPTER SEVEN

DISCUSSION AND CONCLUSIONS

7.1 INTRODUCTION

This chapter discusses and summarizes newly presented and existing data on mortuary practices and paleopathology from Middle Precontact Period burial sites on the Northern Plains and provides concluding comments. A primary goal was to look for trends in mortuary practices across cultural complexes and to determine if mortuary practices can be stylistic and unique to individual complexes. A secondary goal was to study and document disease processes to establish a better depiction of health and disease processes during the Middle Precontact Period (7,500 to 2,000 B.P.). To gain a better understanding, the information gathered from the Stoney Beach, Fox Valley, and Adamiak sites is compared with data from an assemblage of comparative sites.

7.2 COMPARATIVE SITES FROM THE NORTHERN PLAINS

There are eighteen Middle Precontact Period sites from the Northern Plains that will be used for comparative purposes in this thesis. These burials range from the Early Middle Precontact Period to the Late Middle Precontact Period. Some of the comparative sites can be confidently placed within a cultural complex; however, there are no diagnostic artifacts associated with a few of the burials and thus only a probable classification can be attempted. A complete list of sites discussed in this thesis can be found in Table 7-1.

Table 7-1 Precontact Burial Sites

Site	Location	Conventional Radiocarbon Date	Cultural Affiliation	Minimum Number of Interred Individuals	Type	References
Whitemouth Falls	Manitoba	6070±110 B.P. (GaK-6493) 6350±110 B.P. (GaK-6494)	Early Middle Precontact	1	1°, flexed	Buchner 1980; Buchner and Pujó 1977
Stoney Beach (EdNh-1)	Saskatchewan	6050±40 B.P. (Beta-177965)	Early Middle Precontact	2	1°, flexed	Milsom 2012; Walker 2001
Dunlap-McMurry (48NA67)	Wyoming	5250±150 B.P. (RL-543) 5350±160 B.P. (RL-651)	Early Middle Precontact	1	1°, flexed	Zeimans et al. 1979
Camp Rayner (EgNr-2)	Saskatchewan		Possible Early Middle Precontact	1	1°, flexed	Jones and McCann 1990
Gray (EcNx-1a)	Saskatchewan	5720±320 B.P. (SFU-297) 5420±160 B.P. (SFU-296) 5250±160 B.P. (SFU-294) 5200±390 B.P. (S-647) 5055±165 B.P. (S-619) 4850±160 B.P. (SFU-295) 4600±170 B.P. (RIDDLL-513) 4600±130 B.P. (RIDDLL-514) 4510±140 B.P. (RIDDLL-512) 4440±250 B.P. (GX-3373) 4420±190 B.P. (RIDDLL-515) 3855±100 B.P. (S-646) 3850±180 B.P. (S-707) 3650±295 B.P. (S-693) 3585±195 B.P. (S-706) 3515±105 B.P. (S-1450) 3015±85 B.P. (S-1449)	Oxbow	304	Varied	Foster 1972; Gibson 1981; Millar 1978, 1981b; Morlan 1993; Wilmeth 1978
St. Brieux (FdNf-2)	Saskatchewan	4895±75 B.P. (S-520)	Oxbow	1	1°, extended	Morlan 1993; Wilmeth 1978
Greenwater Lake (FcMv-1)	Saskatchewan	4390±105 B.P. (S-1447)	Oxbow	1	1°, extended	Walker 1981
Kisbey (DjMq-3)	Saskatchewan	3145±85 B.P. (S-2251)	Probable Oxbow	5	2°	Morlan 1993; Walker 1982, 1984
St. Denis	Saskatchewan	N/A	Probable Oxbow	1	1°, extended	Millar 1978; Walker 1984; Wilmeth 1978
McKean (48CK7)	Wyoming	3287±600 B.P.	McKean	1	Single cranium	Frison 1991; Mulloy 1954
Dead Indian Creek (48PA551)	Wyoming	4430±250 B.P. (W-2599) 4180±250 B.P. (W-2597) 3800±110 B.P. (RL-321)	McKean	1	2°	Frison 1978, 1991; Smith 1970; Walker 1984
Crown (FhNa-86)	Saskatchewan	3425±105 B.P. (S-2291)	McKean	1	1°, extended	Walker 1983, 1986
Graham (FaNq-30)	Saskatchewan	3350±55 B.P. (S-1574)	McKean	1	Cremation	Morlan 1984; Rutherford et al. 1981; Walker 1984
Eriksdale (EhL1-1)	Manitoba	3700±60 B.P. (Beta-172905) 3470±40 B.P. (Beta-172904) 3460±100 B.P. (S-651)	Pelican Lake	2	1°, flexed	Hoppa et al. 2005; Maas 1972
Highwood (EePk-272)	Alberta	2825±85 B.P. (S-1962)	Pelican Lake	2	2°	Baldwin 1980; Brink and Baldwin 1988
Whitewater (24PH86)	Montana	2610±130 B.P. (RL-1017)	Pelican Lake	2	2°	Lahren 1979; Scheiber and Gill 1996
Bracken Cairn (DhOb-3)	Saskatchewan	2570±90 B.P. (S-912)	Pelican Lake	5	2°	King 1961; Pendree 1980; Walker 1983
Bradwell (EkNm-1)	Saskatchewan	2800±75 B.P. (S-441)	Probable Pelican Lake	1	1°, flexed	Edmunds et al. 1938; Kipsch et al. 1970
Fox Valley (EdOj-21)	Saskatchewan	2410±40 B.P. (Beta-177964)	Probable Pelican Lake	4	2°	Milsom 2012; Walker 2001
Sand Creek Burial	Wyoming	N/A	Probable Pelican Lake	1	1°, flexed	Scoggin 1978
Adamiak	Saskatchewan		Unknown	1	Unknown	Milsom 2012

Modified from Walker (1984)

7.2.1 EARLY MIDDLE PRECONTACT

Early Middle Precontact Period sites on the Plains that have been found to have human remains are the Whitemouth Falls site and the Dunlap-McMurry site. A possible Early Middle Precontact site is Camp Rayner in south-central Saskatchewan. The Whitemouth Falls and Dunlap-McMurry sites are of use for comparative purposes with Stoney Beach due to a similar time depth. The first site, Whitemouth Falls, is located in southeastern Manitoba. The remains of an adult female have been radiocarbon dated 6070 ± 110 B.P. (GaK-6493) and 6350 ± 110 B.P.

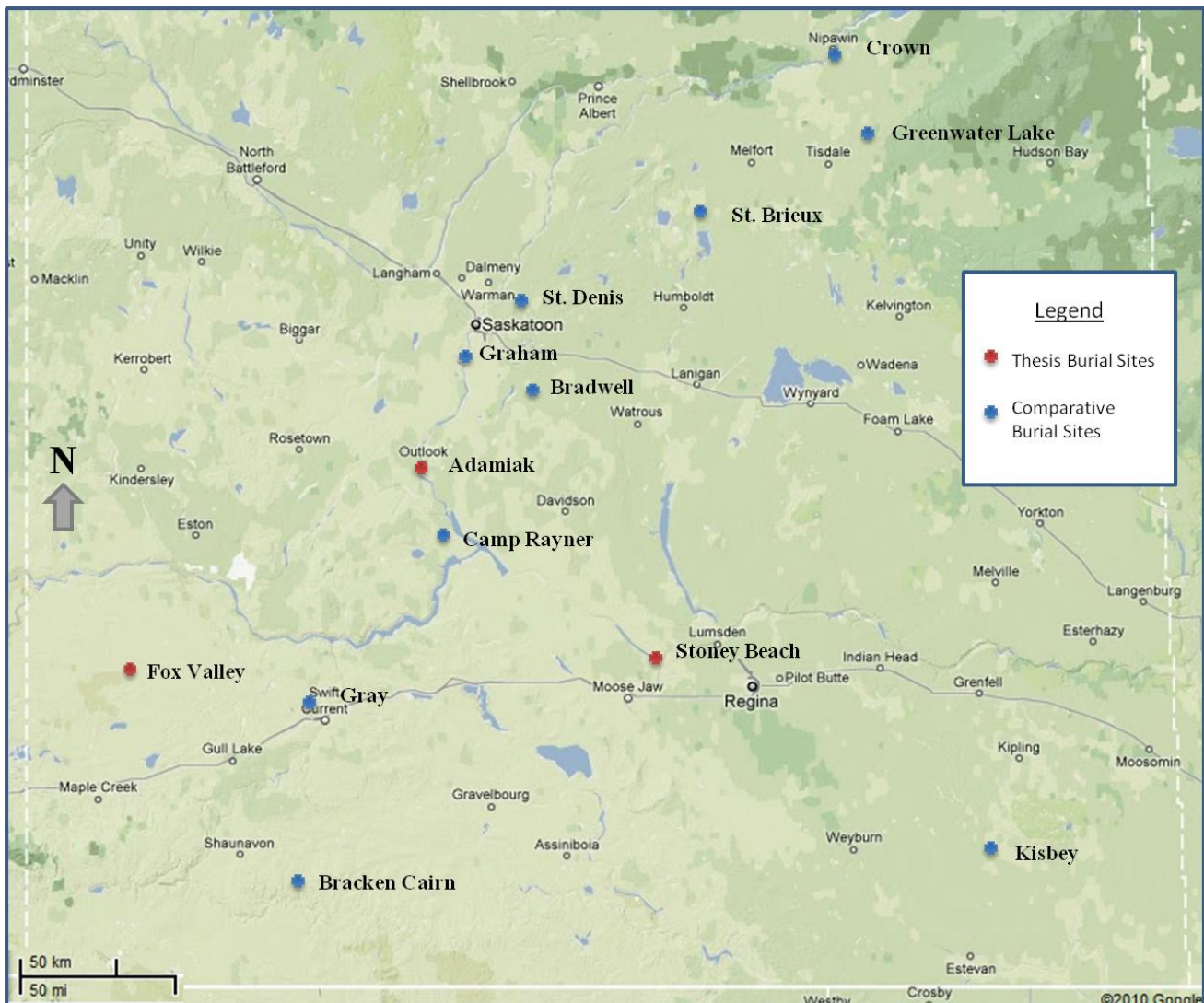


Figure 7-1 Map of Precontact Burials in Central and South Saskatchewan
Modified from Google Earth 2010

(GaK-6494). As a primary burial, the body was placed in a flexed position and covered with red ochre (Buchner 1980). Red ochre was also found within an associated clam shell. At the time of interment there was a bison cranium placed on top of the individual's lower limbs (Buchner and Pujo 1977).

The Dunlap-McMurry site is located in central Wyoming west of Casper. The burial at this site was also primary in nature with the remains of a nearly complete adult male between 50 and 65 years of age found in a flexed position in a shallow pit. This burial has been radiocarbon dated to 5250 ± 150 B.P. (RL-543) and 5350 ± 160 B.P. (RL-651) (Ziemans et al. 1979). Over sixty rock lined hearths were found in the vicinity of the interment. Artifacts associated with the Dunlap-McMurry site include three projectile point fragments, mano and metate fragments, and various scraping tools as well as a few faunal remains (Ziemans et al. 1979). Based on the presence of multiple hearths and the type of grave goods present, the site is thought to have been a vegetable gathering and production camp (Ziemans et al. 1979; Walker 1984).

The Stoney Beach burial was dated to 6050 ± 40 B.P. This date was established based on bison bones found in association with the burial. A date based on the human skeletal remains would be ideal to definitively date the burial as one of the oldest on the Northern Plains. Like the Whitemouth Falls site, the Stoney Beach burial is a primary interment of a flexed adult female with the inclusion of red ochre and a shell pendant. In the case of Stoney Beach the body was placed in a southeast northwest orientation and there was an infant found in direct association with the adult remains.

Camp Rayner (EgNr-2) contains a possible Early Middle Precontact burial. It is a multilevel Precontact site near Lake Diefenbaker, Saskatchewan, and lies in the valley of the

original South Saskatchewan River close to a small natural aspen grove forest (Jones and McCann 1990). The site was excavated by the Saskatchewan Archaeological Society as a field school from 1987 to 1995. For eight days each summer this site aided in educating members about archaeological excavation procedures and about Saskatchewan's past as well as rescuing the archaeological material from further damage and erosion. Excavations of units 9 and 10 in 1987 revealed a pit feature containing human remains (Jones and McCann 1990). The burial was about 130cm DBD; there were no associated artifacts with the burial, nor was anything found above it. The earliest cultural level of the site was found at a depth of 95cm to 115cm and contains material from the terminal Early Precontact Period possibly placing the inhumation during this period or during the slightly later Early Middle Precontact Period. The exposed burial pit revealed only the lower extremities with the rest of the skeleton being in an adjacent unit which remains unexcavated. The individual was found in a flexed sitting position and was identified as male (Jones and McCann 1990).

By looking at the Stoney Beach, Whitemouth Falls (Buchner 1980), Dunlap-McMurry (Ziemans et al. 1979), and Camp Rayner (Jones and McCann 1990) sites, trends in mortuary practices during the Early Middle Precontact Period can be observed. All of these sites are examples of primary burials and the skeletal remains in each case were placed in a flexed position. A second common factor amongst Stoney Beach, Whitemouth Falls, and Dunlap McMurry was the inclusion of red ochre, a material known to have spiritual significance. Both the Whitemouth Falls site and Stoney Beach burial also had a shell pendant as part of the grave goods. Although the sample site is extremely small, the location of Early Middle Precontact burials tend to be in habituated areas, including pit features in processing areas or campsites,

rather than as isolated occurrences. Burials of the Early Middle Period appear to have had structure and specific traditions associated with them and were not merely random methods of body disposal. It can be predicted that future burial sites discovered from this geographical and chronological classification will also display similar practices. Unlike the Whitemouth Falls, Dunlap-McMurry, and Camp Rayner inhumations, the Stoney Beach burial probably contained two individuals and may provide a link or a glimpse at the cultural continuity with the Oxbow complex where it is not uncommon to find immature individuals associated with an adult (Millar 1978).

Given that the Stoney Beach inhumation should be classified as an Early Middle Precontact Period burial, the site is very important archaeologically as it is one of the few Early Middle Period burials on the Plains and the only interment of this period that has been found in Saskatchewan. Thus, this site provides data towards understanding a relatively elusive culture.

7.2.2 MIDDLE MIDDLE PRECONTACT

Nine out of the eighteen sites used for comparison come from the Middle Middle Precontact Period. Included are Oxbow, probable Oxbow, and McKean complex sites depending on the presence or absence of diagnostic artifacts.

7.2.2.1 Oxbow Burial Sites

Slightly later burial sites found on the Northern Plains are those with definite Oxbow affiliations. These include the Gray (5250±160 B.P. to 3515±105 B.P.), St. Brieux (4895±75 B.P.), and Greenwater Lake sites (4390±105 B.P.).

The Gray site is unique on the Northern Plains as it is a large multiburial cemetery site. Located in southwestern Saskatchewan about 8 kilometres northwest of Swift Current, the Gray site (EcNx-1a) is positioned on a sandy hillside above a glacial drainage channel at an elevation of 747 meters (asl) and can be found at the coordinates 50°21'N 107°54'W (Foster 1972; Wilmeth 1978). Radiocarbon dates from the site range from 5250±160 B.P. (SFU-294) to 2915±85 B.P. (S-1449) (Millar 1981b). The large time range suggests that the Oxbow complex persisted for an extended period of time over a large area (Gibson 1981). An alternate theory is that different cultural groups could have made use of the site (Millar 1978, 1981b). Possible support for this theory comes from the fact that there appears to be two clusters of radiocarbon dates that are separated by about six hundred years. Out of seventeen radiocarbon dates that have been obtained for this site, only four are directly associated with Oxbow points (Morlan 1993). McKean points found on the surface of the Gray site may indicate that these later radiocarbon dates may be associated with a McKean usage of the site. However, the majority of these younger dates may be erroneous due to samples containing insoluble collagen extractions (Morlan 1993). Therefore, due to inconclusive evidence for multiple complex occupations, the Gray burial is assumed to contain only a single cultural complex, the Oxbow complex (Millar 1981b; Morlan 1993).

The Gray site was first excavated in 1963 by Thomas Kehoe. Twenty-one individuals were initially unearthed followed by thirty five more in 1969 and many more in the next couple of years (Foster 1972). In total, excavations have exposed 99 burial units containing 304 individuals with only about 60% of the site having been excavated. Both males and females of all ages were present. Of these burials, thirteen were found beneath rock cairns (Millar 1978,

1981b). Single cobbles throughout the site may have been used to identify the location of burials. However, some burials intrude on others suggesting that the cobbles became displaced or hidden from view (Millar 1978). The Gray site contains almost every type of burial present on the Northern Plains. This includes single and multiple individual burials found in primary flexed or extended positions as well as in secondary bundle burials. There was even one possible cremation. The majority of the inhumations are primary extended burials (Millar 1981b). It is evident that there was preference for young children to be buried with another individual, commonly an adult female (Millar 1978). No universal direction of orientation for the primary burials is present, although there are slightly more cases in which the head is pointed to the southeast or east-southeast than any other directions (Millar 1978). Secondary bundle burials are the second most common type on interment (Millar 1981b).

In terms of bioarchaeology, there are a few trends recognized from the Gray burial site. One is that the presence of periodontal disease increases with age and is more prevalent in women (Millar 1978). This may be because of diet deficiencies or because females were using their teeth as tools more regularly. A high number of enamel hypoplasia cases in females and a higher dental attrition rate in males also supports a decreased nutritional level of the female population compared to their male counterparts (Millar 1978). Due to the high number of burials, the Gray site can be used to reach conclusions about the population. Based on the ages of the interred individuals and on the amount of dental wear present, 36 to 55 years of age would have been old in the population (Millar 1978). It is important to note that a burial ground is not an accurate demographic representation or a snap shot of what the living population would have been like (Millar 1978). The individuals all died for some reason, whether it was childhood

illnesses or old age. In addition, not all the dead would have been buried at the Gray site (Millar 1978). Therefore, the site probably includes individuals who died while inhabiting a nearby area or while the group was beginning to return to the area. Other individuals were probably buried at other undiscovered cemetery sites or as single inhumations (Millar 1978).

Grave goods were infrequently associated with the Gray burials. A total of 109 artifacts and 183 faunal specimens such as bison and canid remains were present. Associated lithic artifacts included 16 projectile points, 5 bifaces, 9 end scrapers, 3 specialized scrapers, 23 retouched and utilized flakes, flake debitage, 11 pebble tools, 3 grooved mauls, 2 smooth stones, and red ochre (Millar 1978). Bone artifacts such as tools, beads, and 28 pendants and there were 4 copper artifacts including 3 fragments and 1 sheet (Millar 1978, 1981b). The Gray burials also contained 6 shell artifacts such as beads, gorgets, and ornaments (Millar 1978). A clam shell pendant is similar to shell gorgets that have been discovered at a number of large burial sites from the eastern woodlands and at later sites on the Western Plains (Hewes 1949; Mulloy 1942, Webb 1946;). Seven sets of eagle talons were discovered and Millar (1978) suggests that they culturally link several of the graves. One was associated with a primary child burial and others were associated with male and child secondary burials (Millar 1978). These may have been combined as part of medicine bundles or have been part of personal fetishes (Eyman and Forbis 1976; Millar 1978).

A second Oxbow burial on the Saskatchewan Plains was found at the St. Brieux site (FdNf-2), north of Lenore Lake on a sandy kame on a lacustrine plain (Morlan 1993; Wilmeth 1978). Unlike the Gray burial site, there is only a single isolated burial at St. Brieux. Isolated inhumations appear to be the norm for Oxbow burials and cemeteries like the Gray site are

unique. An adult male was found face-down, about 1.83 meters below the surface at St. Brieux, in a primary, extended position. The only documented cultural material in association was red ochre. A femur was used to obtain a radiocarbon date of 4895 ± 75 years B.P. (S-520) in 1965 (Morlan 1993; Walker 1984; Wilmeth 1978).

The Greenwater Lake burial (FcMv-1) was discovered in July of 1973, eroding from a partially disturbed steep backslope of a municipal road cut located in Greenwater Lake Provincial Park at $59^{\circ}29'45''\text{N } 103^{\circ}32'10''\text{W}$ (Walker 1981). The remains were recovered by the R.C.M.P. and sent to Dr. E. Walker of the Department of Archaeology and Anthropology at the University of Saskatchewan for analysis. The recovered skeletal material represented a single adult male individual in his early twenties who was interred in a primary, extended position (Walker 1981). The remains are slightly incomplete and fragmented as a result of warpage *in situ* due to exposure from the backslope and disorganized recovery. This would also explain the absence of the small bones of the hands and feet (Walker 1981). A slightly asymmetric, side-notched Oxbow projectile point comprised of Swan River chert was found within the thoracic region of the skeleton which is congruent with a radiocarbon date of 4390 ± 105 B.P. (S-1447) that was established based on a rib sample from the remains (Morlan 1993; Walker 1981). Associated cultural material included flakes, a core, and red ochre which was found in nodular form as well as staining some of the skeletal remains (Walker 1981).

7.2.2.2 Probable Oxbow Burial Sites

The Kisbey and St. Denis sites are also thought to be of Oxbow affiliation; however, no diagnostic artifacts were found in direct association with the human remains. A single burial pit was excavated at the Kisbey site (DjMq-3), about six kilometres west-southwest of Kisbey,

Saskatchewan (Morlan 1993; Walker 1984). Despite massive disturbance from cultivation, three bundle burials containing five individuals were found *in situ*, including a young adult male, an adolescent female, a second adolescent individual, and two children (Walker 1982). The bundle burials were found in a single pit stacked one on top of the other. Associated grave goods included faunal remains, a graver, and red ochre. The discovery of Oxbow points in a nearby field and a radiocarbon date of 3145 ± 85 years B.P. (S-2251) indicate that the Kisbey site was probably an Oxbow complex site (Morlan 1993; Walker 1982).

St. Denis is another probable Oxbow site. It is positioned on a south sloping sand hill east-northeast of Saskatoon, Saskatchewan (Millar 1978). Although there are no diagnostic artifacts, the presence of red ochre and an isolated, primary, extended burial of an adult female are similar to other confirmed Oxbow interments (Walker 1984; Wilmeth 1978).

The Oxbow complex (5,000 to 3,500 B.P.) appears to have evolved out of the Mummy Cave complex, an Early Middle Period complex on the Northern Plains. Therefore, it is logical that Oxbow burials maintain some commonalities with Early Middle Period burial sites. A major similarity is the presence of red ochre. While only five Oxbow/possible Oxbow burial sites have been identified, the majority are isolated burials: St. Brieux (4895 ± 75 B.P.) (Wilmeth 1978; Morlan 1993), Greenwater Lake (4390 ± 105 B.P.) (Hartney and Walker 1974; Walker 1981), Kisbey site (3145 ± 85 B.P.) (Walker 1982), and St Denis site (Millar 1978; Wilmeth 1978; Walker 1984). The Gray site is the only example of a unique cemetery type site. While primary flexed burials have been observed in Oxbow sites there is also more diversity. The wide range of interment styles includes both primary and flexed primary burials, secondary bundle burials, and

there may be an example of a cremation. Within these styles the number of individuals also varies and can include individual interments as well as multiple individuals per burial.

The Gray site (5250±160 B.P. to 3515±105 B.P) (Millar 1978, 1981b) provides the majority of the information known about Oxbow burials. This cemetery site was utilized for an extended period of time and contains 99 inhumations with a minimum of 304 individuals. The most common form of interment at the site is primary extended burials with secondary bundle burials a close second. There are thirteen examples of the presence of a cairns and there is one example of a possible cremation. Three of the isolated burials, the St. Brieux, Greenwater Lake, and St. Denis site, are primary extended burials and the fourth burial, the Kisbey site, is a secondary bundle burial. Thus, these isolated burials have interment styles similar to the Gray site. The only associated material found with the St. Brieux and St. Denis sites was red ochre; however, the other two sites contained some grave goods. The Greenwater Lake site contained flakes, a core, and an Oxbow projectile point that was found in the thoracic region of one of the individuals suggesting some interpersonal violence. The Kisbey site contained some faunal remains and a graver. The Gray site contained a variety of grave goods including bison and canid remains reflective of the heavy reliance on bison as a food source and possible domestication of dogs. The presence of eagle talons, tools, beads, native copper, and a shell pendant are suggestive of long distance trade. While individual, primary extended burials with red ochre appear to be the most common form of interment during the Oxbow complex, there is definitely a great variety.

7.2.2.3 McKean Burial Sites

There appears to be a dramatic change in mortuary practices between Oxbow and McKean (4,200 to 3,100 B.P.) burial sites. The four McKean burial sites that have been identified on the Northern Plains include the McKean, Dead Indian Creek, Crown, and Graham sites. Although this is a small sample size, the four sites have a great deal in common.

The McKean site (48CK7) is a multi-component site on the south side of the Belle Fourche River in Crook County, northeastern Wyoming. It was excavated in 1951 and 1952 by the National Park Service and the University of Wyoming (Mulloy 1954). The site revealed the occupation of two culturally distinct groups with McKean, Duncan, and Hanna occupation levels (Mulloy 1954; Frison 1991). A radiocarbon date for the upper level was 3287 ± 600 B.P. A fragmented cranium was located in the lower occupation level in a cache pit (Mulloy 1954). The pit was about 46cm (1.5 feet) wide and a little over 61cm (2 feet) deep. The cranium was missing the facial bones and was found face down with the top of the head roughly facing a north-northeastern direction (Mulloy 1954). Due to the fact that the skull appears to have been fragmented prior to burial it may have been a trophy of some sort (Frison 1991; Mulloy 1954). Despite fragmentation, the skull appears to have belonged to a female about thirty years of age (Stewart 1954). To the east of the human remains were two fragmented bison innominates. The stratum of the lower occupation level was charcoal stained and there were a number of hearths in the surrounding area as well as end scrapers, spokeshaves, knives, cores, bifaces, and 115 whole or broken projectile points all being McKean Lanceolate points or slight variations (Mulloy 1954). None of these were in the cache pit with the cranial remains.

The Dead Indian Creek site (48PA551) is located in the Sunlight basin in Park County, northwestern Wyoming (Smith 1970). It is a winter occupation campsite which has been radiocarbon dated to 4,430±250 B.P. (W-2599), 4,180±250 B.P. (W-2597), and 3800±110 B.P. (RL-321) (Frison 1978, 1991). The Dead Indian Creek burial was excavated on August 10, 1969. The inhumation consisted of a single chipped and worn molar and an incomplete immature individual (HR002) buried in a shallow pit (Gill 1984; Haspel and Wedel 1983). The child was determined to be between eight and nine years of age based on a partially developed second molar, the developmental stage of five ossification centers, and the length of the long bone (Gill 1984). Associated with the burial are McKean projectile points, flakes, and faunal remains (Gill 1984). There is evidence of the extensive use of mule deer at the Dead Indian Creek site as well as lesser amounts of mountain sheep. Based on the intentional placement of large male mule deer skull caps in and around a cairn, there appears to be some sort of ceremonialism connected with deer procurement (Frison 1991; Gill 1984; Walker 1984).

The Crown and Graham sites are the only two McKean burials found within Saskatchewan (Walker 1984). Found during a cultural resource management project before the Nipawin Reservoir project, the Crown site (FhNa-86) is a multi-component site from which seventeen radiocarbon dates have been obtained. It is located in north-central Saskatchewan at the southern edge of the boreal forest and is the location of a shallow burial pit that was found beneath the floor of a Hanna occupational level dating to 3425±105 B.P. (S-2291) (Walker 1983). This primary burial was found on a terrace above a tributary to the Saskatchewan River and contained the remains of a young child found in an extended position (Walker 1983, 1986).

The Graham site is about 3.5 kilometres south of Saskatoon in southcentral Saskatchewan and the excavated burial has been dated to 3350 ± 55 B.P. (S-1574). A discovered hearth feature with the remains of a young adult is unique as it displays intentional cremation as a form of mortuary practice which is rare on the Plains during this time period. Based on a similar degree of burning on natural and fractured bone ends, the probable male individual appears to have been dismembered prior to incineration. The burn pattern and direction of cracking of the bone may imply that the bones were cremated secondarily to being dried (Walker 1984). The presence of non-human remains in conjunction with the fracturing and secondary interment qualities imply that the remains appear to be part of a bundle burial (Walker 1984). Consistent with a McKean burial, the hearth at the Graham site contained a Duncan projectile point and a hafted biface in association with the human remains (Walker 1984). Other artifacts found near the hearth include 10 bifacial cores or preforms, a large core fragment, 21 pieces of debitage, a split rib awl, a cut deer antler burr, and an antler segment possibly having served as a hammer (Walker 1984).

The McKean (Frison 1991; Mulloy 1954), Dead Indian Creek ($4,430\pm250$ B.P., $4,180\pm250$ B.P.) (Frison 1978, 1991; Smith 1970; Walker 1984), Crown (3425 ± 105 B.P.) (Walker 1983, 1986), and Graham (3350 ± 55 B.P.) (Walker 1984) sites are all habitation type sites with human remains found in shallow pits beneath the living or occupational floor. Also, there was no red ochre associated with any of the inhumations. These burial characteristics are a contrast to the burials discussed thus far.

There are also some variations among the sites. For example, the McKean site was a single cranium and the Dead Indian Creek site contains mule deer skull caps which may indicate a more elaborate burial ceremony connected with deer procurement. The Crown site consisted of

a primary extended burial, while the Graham site is associated with a hearth and the remains appear to have been cremated subsequent to being dismembered, a rare practice on the Plains. The Graham interment also included non-human remains and grave goods such as a Duncan projectile point.

The radiocarbon dates for the two sites in Saskatchewan (Crown and Graham) indicate that they were occupied later than the Dead Indian Creek site in Wyoming. When this is coupled with the fact that the mortuary practices observed at the Oxbow and McKean burial sites are noticeably different, there is support for the theory that the McKean culture originated in the Great Basin and migrated to the Northern Plains that is based on habitation and kill sites (Brumley 1975; Jennings 1964; Reeves 1983; Syms 1970). With the slight overlap in radiocarbon occupation dates, McKean and Oxbow could have been contemporaneous and in direct competition rather than the opposing theory that the McKean culture evolved from Oxbow (Wright 1995). If the McKean culture migrated onto the Northern Plains, this would explain the difference in mortuary practices

7.2.3 LATE MIDDLE PRECONTACT PERIOD

There are five burials from the Pelican Lake complex (3,000 to 2,000 B.P.) of the Late Middle Precontact Period following the Middle Middle Precontact Period that are used for comparative purposes in this thesis. They are separated into two categories: Pelican Lake burials including the Eriksdale [Hoppa et al. 2005; Maas 1972], Bracken Cairn [King 1961; Pendree 1980; Walker 1983], Highwood River [Baldwin 1980; Brink and Baldwin 1988], and Whitewater sites [Lahren 1979; Scheiber and Gill 1996] and probable Pelican Lake burials including the Bradwell [Edmunds et al. 1938; Kupsch et al. 1970] and Sand Creek sites [Scoggin

1978]. Probable Pelican Lake burials are those with no diagnostic artifacts but are very likely associated with the Pelican Lake complex.

7.2.3.1 Pelican Lake Burial Sites

The Eriksdale site (EfL1-1) was accidentally discovered in June of 1971 by gravel quarry workers in the Interlake region between Lake Winnipeg and Lake Manitoba north of Winnipeg, Manitoba (Hoppa et al. 2005; Maas 1972). This area is called the Manitoba Lowlands or the First Prairie Level (Buchner et al. 1983). Local RCMP and personnel from the Department of Highways recovered the human remains and associated artifacts which were then taken to the Anthropology laboratory at the University of Manitoba for a preliminary review by Jonathan Maas (Hoppa et al. 2005). Two individuals were discovered in close proximity to each other; however, radiocarbon dates differing by close to two centuries indicate that they probably did not exist contemporaneously. This coincidence seems unlikely and it is possible that there is an error with the radiocarbon dates.

About fifty percent of Individual 1 was recovered, including the skull, some long bones, and other dense bone. Some of the more delicate bones found were highly fragmented (Hoppa et al. 2005). The remains were disturbed and removed without archaeological protocol, so position and orientation of the body is unclear. Green staining on the bones of the arms and upper thorax from a copper object indicate that Individual 1 was most likely buried in a flexed position with the arms crossed over the chest (Hoppa et al. 2005). Osteological analysis of the Eriksdale remains indicate that Individual 1 was a male between 30 and 35 years of age with transition analysis predicting a most probable age of 36. Long bone measurements suggest a living height of 168.5 centimeters (Hoppa et al. 2005). DNA extraction of both individuals took place and the

results confirmed Individual 1 to be male. Radiocarbon dates of 3460 ± 100 B.P. (S-651) and 3470 ± 40 (Beta-172904) for Individual 1 and 3700 ± 60 B.P. (Beta 172905) for Individual 2 place both burials during the Pelican Lake complex (Hoppa et al. 2005). Embedded in the posterior section of the inter-trochanteric area of Individual 1's left proximal femur is a broken projectile point. The barbed Knife River Flint point may have broken on impact or at an attempt at removal but the tip is found embedded at a 30 degree angle and the base at a 55 degree angle. This would not have been the cause of death as there is a considerable amount of healing and no signs of infection. In fact, there is no indication that there would have been long term biomechanical problems (Hoppa et al. 2005).

Grave goods associated with Individual 1's burial at the Eriksdale site include 55 unmodified mammalian bone fragments (4 of which were identified as *Bison bison*), 10 unique decorated bird bone tubes with root etching (6 of which were identified as humeri and ulna from Trumpeter Swan (*Cynus buccinators*)), and 1 Grey Wolf (*Canis lupus*) canine. There were also 392 small shell beads, 38 medium shell beads, 1 cylindrical shell bead, Swan River Chert flakes commonly found west of Lake Manitoba, chert and chert-limestone composite flakes, and 2 chert-limestone cores (Hoppa et al. 2005). The Knife River Flint projectile point found embedded in Individual 1 is the earliest dated Pelican Lake point in Manitoba. Both red ochre (hematite) and rusty orange colored ochre (limonite) were also associated with the burial. The Knife River Flint projectile point and shell beads reflect the continent-wide trade networks that were in place at this time

Only about 26 percent of Individual 2 was recovered from the Eriksdale site and the bones were in fairly poor condition. Osteological analysis suggests the individual to be a male

about 165 centimeters tall, in his mid-forties at time of death (Hoppa et al. 2005). DNA results indicate the individual to be female but the results may be erroneous due to degradation and lack of preservation of the Y chromosome in the DNA (Hoppa et al. 2005). No artifacts were found in association with Individual 2's burial. While the two burials are separated by more than two centuries they were found very close to each other, perhaps suggesting that the area was commonly lived in and travelled to. Based on mtDNA the individuals are not maternally related (Hoppa et al. 2005).

The Bracken Cairn burial (DhOb-3) is the one site in Saskatchewan that has positively been identified as Pelican Lake based on a radiocarbon date of 2565 ± 85 B.P. (S-912) and the presence of a Pelican Lake projectile point (Pendree 1980; Walker 1983). Located in the far southwest of Saskatchewan, this burial site was positioned on the top of a prominent knoll overlooking the Frenchman River (Pendree 1980; Walker 1983). Bracken Cairn was discovered in 1936 but not excavated until 1948. The collectors who excavated the site retained two crania and the cultural material they found and reburied the rest of the skeletal remains. A primary analysis was conducted in 1957 by R. W. Nero from the Saskatchewan Museum of Natural History and a secondary one was conducted in 1961 by D. R. King of the Glenbow Foundation (Walker 1983). After recovering the reburied skeletal remains Dr. E. Walker from the University of Saskatchewan was able to conduct a re-analysis of the entire collection in 1981.

The remains were secondarily interred and were found as two bundle burials placed at opposite ends of a shallow pit about 1.22 metres in length, 0.91 metres in width, and 0.76 metres in depth, only about 0.9 to 1.2 meters below the surface (King 1961). Both bundle burials contained crania that faced west. The burial was covered about three metres in diameter with

boulders, leading to the site name Bracken Cairn (King 1961; Walker 1983). Initial analyses by King (1961) indicated the presence of three individuals; however, the re-evaluation by Walker (1983) revealed that the Bracken Cairn burial contained five individuals. Three of the individuals were determined to be adults and two were subadults (Pendree 1980; Walker 1983). The examination of an immature right mandibular fragment and numerous cranial and postcranial elements indicate there was an infant around the age of one and a neonate or near term fetus (Walker 1983). Compared to the immature remains, the adult remains were more complete. The reburial of the post cranial remains resulted in a greater degree of post mortem damage. One adult is only represented by a single left femur. The other adult material represents one male between 36 and 46 years of age and one female between 44 and 54 years of age (Walker 1983). These ages are older than King (1961) had originally suggested, thereby challenging his theory that Bracken Cairn represented a single family unit as a woman of this age would be unlikely to have such young children. The burial is more likely the result of the collection of individuals that died around the same time or two bundles that were interred at the same time (Walker 1983). The main pathological conditions observed from the Bracken Cairn site was a unique resorptive lesion of the sternal end of a right clavicle and the posterior of the right side of the manubrium of one of the adults (Walker 1983). There is a dramatic reduction in bone thickness and the right sternoclavicular joint surface was eliminated indicating a mass of about 7 cm in diameter applying pressure for an extended period of time behind the joint to such a degree that the bone structure became compromised. An explanation for this would be a spirochetal infection of the ascending aorta leading to an aneurysm due to cardiovascular syphilis (Walker 1983). This is supported by resorptive lesions on the left side of the vertebral centra of the second and third thoracic vertebra that can reasonably be assumed to be from the same individual (Walker 1983).

Other pathological conditions observed include bilateral spondylolysis of a fifth lumbar vertebra and bilateral impaction of the third molars in the female mandible.

In addition to a Pelican Lake point composed of fine-grained gray quartzite, other grave goods found in direct association included an incomplete drill (made of mottled chert), three end scrapers (two made of mottled chert and one brown chalcedony), seven bifaces (made of reddish fine-grained quartzite, coarse-grained gray quartzite, or fused shale), six large unifacially-retouched flakes (made of fine-grained gray quartzite or fused shale), fourteen non-retouched flake debitage, one ground stone or pestle made from a stalagmite/stalagtite, and one fragment of rolled copper (King 1961; Walker 1983). Red ochre was present in nodular form in the burial as well as staining the skeletal remains, laying on the top of the burial, and adhering to the surface of some of the bifaces. A small amount of limonite was also found (Walker 1983). Mammal and avian remains were also found in association with the Bracken Cairn bundle burials, with a minimum of nine swift fox (*Vulpes velox*) mandibles and maxillae (King 1961; Walker 1983). Other artifacts present consisted of two large freshwater clam shell gorgets, cut and polished bone spatulate tools, antler tine flakers or awls, polished bear (*Ursus sp.*) and beaver incisors (*Castor canadensis*), three deer antler burr containers, and decorative items made of bone or shell such as beads and pseudo-elk teeth pendants made from cut and polished bone (Walker 1983).

The third Pelican Lake site is the Highwood River site (EePk-272) in southern Alberta. The burial is located on the highest terrace overlooking the Highwood River; however, the exact provenience is not recorded (Baldwin 1980; Brink and Baldwin 1988). Orientated roughly east to west, the Highwood burial is relatively shallow and within the active zone, perhaps indicating a

past belief that a shallow, subsurface burial would have allowed the spirit to escape easier (Baldwin 1980). Only about fifteen percent of the burial was found *in situ* as a consequence of ploughing, wind erosion, and artifact collecting. Dated to 2825±85 B.P. (S-1962) the Highwood burial contains two partial individuals mixed together in a single pit. One individual was identified as a ten year old child and the other was determined to be an infant about nine to twelve months in age (Baldwin 1980; Brink and Baldwin 1988). The presence of mixed, partially complete remains and evidence of animal gnawing indicates the remains may have been placed on a platform and represent a secondary burial. There are only a few bones from the infant included in the burial which could mean that some of the infant's remains were left on a scaffold after a previous gathering and burial and were collected upon the gathering of the older child's remains for a subsequent inhumation (Brink and Baldwin 1988). Grave goods associated with the human remains include a Knife River Flint Pelican Lake projectile point, a retouched flake, a core, a native copper fragment, a few non-human bone tools, 1 shell bead, 5 bivalve shell disk beads (probably mussel), a fragment of a shell gorget, 2 *Dentalium* sp. shells, 40 elk teeth pendants (*Cervus elaphus*), 66 drilled bison incisors and canines (*Bison bison*), and 11 perforated bear claws (*Ursus sp.*) (Baldwin 1980; Brink and Baldwin 1988). The presence of utilitarian type stone tools may indicate a tool kit typically associated with hunting and may suggest that the 10 year old child was a male since this tended to be a male-dominated activity (Brink and Baldwin 1988). The artifacts also indicate that there was an extensive trade route in place as the gastropod species originates on the west coast which is about 800 kilometres away. In addition, Knife River Flint originates about 1000 kilometres to the southwest and native copper originates about 2000 kilometres to the southeast (Brink and Baldwin 1988). Similar to the Bracken Cairn burial, the

Highwood burial is filled with ochre stained sand which usually has a ceremonial or spiritual implication (Baldwin 1980; Brink and Baldwin 1988).

Located in northcentral Montana, the Whitewater burial (24PH86) is the final definite Pelican Lake site that will be used for comparative purposes with the Fox Valley site (Lahren 1979). Initially this site was dated to about 2610±130 B.P. (RL-1017); however, this date was not corrected for isotopic fractionation and a new corrected date of 2620±200 B.P. was calculated (Scheiber and Gill 1996). Two female individuals were found together in a bundle burial. Similar to the Bracken Cairn, the Whitewater burial is a secondary interment with red ochre which was covered by a rock cairn. (Lahren 1979; Scheiber and Gill 1996). A portion of a canid pelvis was also associated with the skeletal remains (Lahren 1979).

7.2.3.2 Probable Pelican Lake Burial Sites

During a gravel pit quarry in 1936, a burial site was exposed on the north slope of Allan Hills located in southcentral Saskatchewan (Kupsch et al. 1970; Wilmeth 1978). Designated as the Bradwell site (EkNm-1), the provenience is Section 36, Township 32, Range 2, west of the 3rd meridian. The remains were found in a four to five feet (122-152cm) deep burial pit dated to 2800±75 B.P. (S-441) (Wilmeth 1978). The interment is of a single adult male individual who was found in a primary, flexed prone position (Edmunds et al. 1938; Kupsch et al. 1970). The remains are somewhat abnormal with the bones being generally heavy indicating a considerable amount of mineralization. In addition, the long bones are bowed, the femora are different lengths, and the skull is asymmetrical (Walker 1984). Material culture found in association with the human remains include a possible eagle talons necklace with five claws, a bison rib fragment, a large worked biface, and a biface fragment. It should be noted that the artifacts were found in a

pile of gravel that had been previously removed and moved to a road three miles (4.8km) to the north (Edmunds et al. 1938; Kupsch et al. 1970; Walker 1984). Although there are no diagnostic artifacts, the fact that the Bradwell site was a subsurface pit and that there was associated red ochre suggests a probable Pelican Lake connection (Walker 1984).

The Sand Creek burial is located on the north slope of a deflation basin in the Pathfinder Dam area of south central Wyoming (Scoggin 1978). In 1973 the partially exposed remains of an adult male were found by Rodger Duthie and Wm. E. Scoggin. Excavation was necessary to prevent further damage to the remains which were in a subsurface pit about 40 centimetres deep in a primary flexed position with a north orientation and facing to the east (Gill 1978; Scoggin 1978). Remains recovered included the complete skull and mandible, both femora, and the left and right ossa coxae. Identified as being about seventy years old, this individual stood about 156 centimetres (5 feet 1.5 inches) tall (Scoggin 1978). Pathological lesions include malocclusion, with the mandible jutting forward and atrophy of the maxillary alveolae from tooth loss some five to ten years prior to death. He also had a severely fractured right ilium that had had time to heal (thus occurring before death) (Gill 1978; Scoggin 1978). The vertical fracture of the iliac crest healed in a displaced position resulting in a perforation from bone resorption posterior to the fracture and bone spurs along the crest from mechanical stress (Scoggin 1978). Mobility would have been painful suggesting some type of care/assistance from family or community members. Associated cultural material included a large mano overlying the pelvic area (made of pale pink quartzite), 18 bone pendant beads, 16 bone tubular beads, and a number of fragmented beads that could not be recovered (Scoggin 1978). The beads were strung on to strings around the lower abdominal area of the skeletonised remains and were found separated by type with

pendant beads on one string and tube beads on the other (Scoggin 1978). A series of tools and beads were found grouped together about 10 centimetres in front of the rib cage, possibly comprising a bead-makers tool kit. The kit consisted of 2 bone awls, 3 shell pieces, a cut and polished antler burr, a mixture of beads, 5 large pendants, 3 smaller pendants, 5 incomplete, tubular, *Canis sp.* bones used as bead material, 12 flakes (made of brown agate, brown chert, or purple-grey chert), and a corner-notched projectile point (made of brown agate) that appears to belong to the Late Middle Precontact Period (Scoggin 1978).

Dated to 2410±40 B.P., the Fox Valley burial may represent a Pelican Lake interment. It is very similar to the Bracken Cairn burial in southwestern Saskatchewan (2570±90 B.P.) (Pendree 1980; Walker 1983) and the Whitewater burial in north central Montana (2620±200 B.P.) (Scheiber and Gill 1996). Like the Bracken Cairn and Whitewater burials, the Fox Valley interment is an example of a shallow, secondary bundle burial containing multiple individuals. These sites are also all found in elevated locations and consist of burials covered by cairns or piles of boulders. In addition, all sites contain associated grave goods and red ochre. The tubular pipe segment found at the Fox Valley site would be considered typical of a Pelican Lake site. While the Fox Valley site does not contain any diagnostic artifacts, the Bracken Cairn and Whitewater burials contained Pelican Lake points. The similarities of mortuary practice and time depth between the three sites suggest that the Fox Valley interment is also representative of Pelican Lake. In addition, the Bracken Cairn contained associated avian remains similar to Fox Valley (King 1961). The Highwood burial in southern Alberta has also been recognized as a definite Pelican Lake burial (Brink and Baldwin 1988). It is similar to the Bracken Cairn and Whitewater burials as it a subsurface bundle burial; however, there is no evidence of a stone

cairn. This may be because the area has been subject to cultivation, erosion, and looting to such a degree that a once present pile of boulders has disappeared. Two other sites that are possible Pelican Lake sites are the Bradwell and Sand Creek inhumations (Edmunds et al. 1938; Kupsch et al. 1970; Scoggin 1978). These sites are primary burials rather than secondary but they have retained some Pelican Lake characteristics similar to the Fox Valley burial, such as being shallow burials with the use of red ochre. The Bradwell site is the only other possible Pelican Lake site to contain avian remains, in this case eagle talons (Edmunds et al. 1938; Kupsch et al. 1970).

All of the Late Middle Precontact interments appear to be isolated away from campsites and most were found high on knolls or terraces overlooking bodies of water. The Bracken Cairn, Highwood River, Whitewater, and Fox Valley sites consisted of multiple individuals in secondary bundle burials with red ochre. While the Highwood River site is too disturbed to tell, the other sites were marked by stone cairns suggesting this was a common mortuary practice for the complex. The Eriksdale site is an exception as one of the burials appears to be a primary burial with Individual 1 placed in a flexed position. All of the sites contain associated grave goods such as native copper, decorative items made of shell or bone, stone tools, bone or antler tools, and mammal and avian remains. The high number of bison remains and decorative items such as drilled canines and incisors may reflect the intensification of bison procurement that occurs at this time. In addition, the high number of smaller fauna such as fox may be a result of the introduction of the bow and arrow as a hunting tool. In contrast to the other four sites, the Bradwell and Sand Creek inhumations are primary burials with the individuals placed in flexed positions. While these two sites are shallow burials with red ochre, they are missing a number of

features that appear to be representative of a Pelican Lake burial. Based on the small sample size, a typical Pelican Lake burial would be located in a shallow pit, covered by a rock cairn, at a high elevation overlooking a body of water. Multiple individuals would be secondarily interred in bundle burials and commonly would be found with red ochre and associated grave goods such as projectile points, faunal remains, native copper, and beads indicative of a well established trade network (Brink and Baldwin 1988).

Based on projectile point morphology it is suggested that the Pelican Lake complex evolved from McKean, specifically Hanna (Reeves 1971, 1983). However, the observable mortuary practices at Pelican Lake sites suggest otherwise. Similar to most Oxbow sites, Pelican Lake interments are found as isolated burials away from campsites with associated red ochre suggesting a cultural continuity. Also, examples of cairns are seen during the Oxbow complex at the Gray site. Perhaps these contrasting ideas can be explained by a mixing of practices between Oxbow and McKean prior to Pelican Lake in a convergent evolution. The discovery of more burial sites during this time period may shed light on this mystery by providing intermediate or transitional data on these practices.

7.3 PALEOPATHOLOGY

The majority of pathological conditions seen in the individuals analyzed in this thesis are related to dentition; these include dental crowding, calculus, periodontal disease, alveolar resorption, attrition/abrasion, and enamel hypoplasia. These conditions can reflect a great deal about the diet, food preparation, or nutrition of a population. Dental crowding observed from Fox Valley could reflect the shift from a tough diet to a softer one with the adaptation of the jaw occurring at a faster rate than the dentition (Corruccini 1999). The build up of calculus is greater

in populations with a high protein diet such as that seen in Precontact bison hunter populations. Calculus can then lead to periodontal disease and alveolar resorption. Attrition and abrasion are also related to a population's diet. For example, sand incorporated into meat during processing would create a grittier substance that would wear down the teeth. Enamel hypoplasia indicates an individual's body was stressed as a child to the point of arrested periods of growth due to sickness or malnourishment. Studies of dentition from the Gray site revealed periodontal disease increased with age and was more common in females, attrition was more common in males, and enamel hypoplasia was more common in females (Millar 1978). These results support a hypothesis that male members of the population had more access to meat and better nutrition than female members who may have dietary deficiencies (Millar 1978). While the Gray site is only representative of a small portion of a population from the Oxbow complex, the diet and cultural behaviour of other Middle Precontact populations probably would have been very similar. Dental pathological changes from the individuals analyzed in this thesis are congruent with the results of the Gray burial. For example, the Stoney Beach female displays a substantial amount of periodontal disease and the Fox Valley male displays a high degree of attrition.

Other pathological conditions observed in this thesis include osteophyte formation, an abnormal calcaneus, osteomyelitis, biparietal thinning, and a fracture with non-union or a possibly transacted fifth metacarpal. The osteophyte formation on a fourth lumbar vertebral body may be the result of normal wear and tear of the body and be compensatory growth to alleviate stress placed on the spine. It could also be the result of the repetitive actions of a specific activity such as hide scraping. The abnormal calcaneus from Stoney Beach may also be activity induced with strain being place of the peroneus longus and brevis tendons. Or more likely it was the

result of a sprain due to the unilateral nature of the condition. Osteomyelitis is an inflammatory response to an infection that has travelled into the bone marrow and is a possible cause of death for one of the individuals in the Fox Valley bundle burial (Ortner 2003). The example of biparietal thinning is uncommon on the Plains and its unknown etiology and unknown provenience make it difficult to make suggestions about the health condition of the individual and thus the population. Finally, possible cultural modification of the left fifth metacarpal from the Stoney Beach burial indicates there may have been some form of ritual or tradition related to finger removal. Another example of this is seen from the Gray site suggesting this was more than an accidental occurrence and that it may be of specific cultural significance such as a form of sacrifice or sign of mourning for a lost loved one. However, this may simply be an example of a fracture with non-union.

7.4 CONCLUSIONS

There is relatively little interment information available for the Middle and Late Middle Precontact Periods and even less for the Early Precontact and Early Middle Precontact Periods; however, there are some burials that can be compiled to establish a broad enough sample from which to extrapolate trends. This thesis has contributed more sites to this data set in order to try to create a more complete picture of health and mortuary practices in southern and central Saskatchewan. The Stoney Beach and Fox Valley sites provide some data on paleopathology and mortuary practices during the Middle Precontact Period.

As discussed in this thesis, the Stoney Beach site appears to be the oldest interment found in Saskatchewan and one of the oldest on the Northern Plains. Stoney Beach is classified as an Early Middle Precontact Period inhumation due to a radiocarbon date of 6050±40 B.P. and

represents a primary burial orientated southeast northwest with an adult female between the ages of thirty and thirty five found in a flexed position and an infant between 9.2 and 10.2 lunar months found near the knees. Associated cultural material included a shell pendant and red ochre. The adult female had calculus deposition, attrition, and slight periodontal disease. As well, there was minor osteophyte formation on the fourth lumbar vertebra and an abnormal peroneal process of the left calcaneus possibly related to an ankle injury such as a strain, and a transacted fifth metacarpal. The association of the female and infant and the young age of the child may indicate that they both died due to obstetric problems.

The Fox Valley interment is a shallow, secondary bundle burial containing at least four individuals beneath a rock cairn. A radiocarbon date of 2410 ± 40 B.P. is congruent with a Late Middle Precontact burial and the mortuary practices and associated grave goods (a tubular pipe, a flake, red ochre, and whooping crane remains) indicate the Fox Valley burial to be a probable Pelican Lake site. This thesis identifies the past existence and rare inclusion of whooping cranes in archaeological sites and contributes to knowledge of whooping crane use in Precontact cultures. Out of the minimum of four individuals only one could be analyzed in detail and was determined to be an adult male between the ages of thirty and forty. Dental conditions present included dental attrition, slight periodontal disease, tooth crowding, and an abscess. The other pathological condition present was osteomyelitis of the distal left femur and humerus.

The Adamiak cranium could not be placed culturally as it had no associated material or a known provenience. However, it is Native American in origin, of antiquity, and displays a unique pathology and therefore is important to this thesis. The Adamiak cranium belongs to a 35 to 45 year old female with poor dentition (enamel hypoplasia, calculus deposition, attrition, and

alveolar resorption subsequent to antemortem tooth loss) and displays biparietal thinning which has been observed in many parts of the world but rarely on the plains. This condition has an unknown etiology but may be related to osteoporosis, vascular constriction, or normal variation. In the future when causation is determined, the information gathered in this thesis may be used to better understand this pathology.

These three sites help to expand and contribute to the data for health and mortuary practices from the Middle Precontact Period in Saskatchewan, which was the main objective of this thesis. Another goal was to project a better view of the health status of past populations on the Plains. Some general comments can be made on this note despite the small sample size. The first is that dental pathological changes are the most common and may have contributed a great deal to the health of past populations because, as the teeth wore and abscesses occurred, there was a greater chance of bacteria entering the body and leading to infection and possibly leading to other conditions such as osteomyelitis. Pathological conditions such as osteophyte formation and an abnormal calcaneus could be typical of nomadic bison hunting populations where there was a greater amount of stress placed on the body through daily life activities or hazards of the time period. The possibly transacted fifth metacarpal from Stoney Beach suggests that there may be a cultural continuity from this early occupation to more modern Native American groups that practice finger removal.

Another objective of this thesis was to identify trends in mortuary practices for the Middle Period cultural complexes including the Early Middle Period and the Oxbow, McKean, and Pelican Lake cultural complexes. Although there is variation, the Early Middle Period burials are most commonly characterized by isolated primary burials with individuals placed in a flexed

position and located in habituated areas often with the inclusion of red ochre and sometimes shell pendants. The Oxbow complex appears to have emerged from an Early Middle Period complex and retains the use of red ochre for burial use. Also the majority are isolated interments with the exception of the Gray site. However, there is a greater diversity of mortuary practices including primary burials, secondary bundle burials, as well as a cremation and the number of individuals varies as does orientation and position. Grave goods are common and the use of cairns is used in some cases. McKean burials change dramatically from those of the Oxbow complex. Located in shallow pits beneath occupational floor the majority of McKean interments are be primary or secondary in nature with one example of a cremation and there is no known use of red ochre in these sites. Finally Pelican Lake sites have some similarities with Oxbow burials sites. The biggest of these is the use of cairns and the inclusion of red ochre. Pelican Lake burials tend to be secondary bundle burials containing multiple individuals and are often found at elevated locations looking over bodies of water. Grave goods are common and can include native copper, decorative items, stone tools, pipes, and/or animal remains reflective of the vast trade network in place at the time.

The small number of burial sites of the Middle Precontact Period limits the extrapolations and accuracy of hypothesis that can be drawn from the data. Future discoveries can aid in supplying data to support, modify, or challenge the ideas presented thus far. If future research in this area was more detailed and systematic, parallels and comparisons of sites would be more conclusive and accurate which in turn would aid in more precise hypothesis about paleopathological conditions and mortuary practices.

The majority of burials discovered in Saskatchewan have been found accidentally or through cultural resource management (CRM) work. Even the material evaluated in this thesis was discovered in this manner. The human remains unearthed at the Stoney Beach burial were found during an investigation in preparation for a natural gas pipe line. The Fox Valley site was reported by] the land owner after being exposed in a sand excavation pit and the Adamiak cranium was found and collected by a civilian from an unidentified eroding cut bank along Lake Diefenbaker. Despite the unintentional finding of these types of sites, burials remain a crucial source of archaeological data on the plains. They provide information about cultural traditions, trade material, tool technologies, faunal and floral material as well as about the health of a population. In fact, burials are the only types of sites to provide information about disease, healing, and mortuary behaviors of Middle Precontact populations.

In order to get the most out of accidentally discovered interments it is important to gather as much information as possible from the site itself as well as from the human remains before they are reinterred. Proper excavation techniques, notes on orientation and position of the remains and associated materials, photographs, and provenience must be conducted on site. To be comprehensive and provide data available for future usage, laboratory work should include osteological analyses, analyses of material culture, and radiocarbon dates.

Since the sample size of burial sites from the Middle Precontact Period is so small, every opportunity to acquire data must be taken before reburial of the remains. This includes accidental as well as intentional excavations such as academic or research based field work. If this information is gathered more thoroughly and aggressively, the database for this time period can become more complete and can contribute to a more comprehensive understanding of the times.

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