Late Prehistoric Mortuary Practices: an Analysis of the Bethune, Sisterbutte, Glen Ewen and Moose Bay Burials in Saskatchewan

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ABSTRACT

There are four known Late Prehistoric burials in Saskatchewan which demonstrate at least two distinct patterns of mortuary behavior prevalent on the Northern Plains. The Bethune burial located near Bethune, Saskatchewan, is an Avonlea burial dating 1389 +/- 40 years BP. This site is the only Avonlea burial known to date in Canada, and only one of three burials now known in North America.

The Sisterbutte, Glen Ewen, and Moose Bay burials are all examples of mound burials. The Glen Ewen mound has been dated at 1220 +/- 70 years BP and 1110 +/- 90 years BP, while the Moose Bay mound has been associated with the Kathio and Devils Lake-Sourisford burial complexes. The Sisterbutte mound has not been radiocarbon dated, nor are there any diagnostic cultural remains associated with it. This thesis assembles, and re-evaluates, all the accumulated data on Late Prehistoric burials in Saskatchewan.

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1.0 Introduction

Prehistoric skeletal remains from Saskatchewan, and indeed the northwestern Great Plains, are not abundant. Burials have long held a fascination, with many people eagerly seeking the exotic grave goods interred with the deceased. Few of the sites discovered have been adequately analyzed and interpreted resulting in unanswered questions regarding cultural relationships, health status, and population migration. Often this lack of analysis is directly related to the condition of the recovered remains. Prehistoric burials are commonly secondary interments, with bundle burials often containing only a small portion of the total skeleton in many instances. The placement of graves may also lead to burial destruction. An example is interment in shallow graves on a prominent landscape feature which results in erosion, burial deterioration, and eventual loss.

The Bethune site is a Late Prehistoric burial from south-central Saskatchewan. Originally recovered as a salvage excavation, associated grave goods strongly indicate an Avonlea cultural affiliation. Such an affiliation makes the Bethune site the only Avonlea burial known in Canada, and one of only three on the Great Plains. Situated on a knoll, there is some indication that the Bethune burial may have involved a mound-like feature. Perhaps the Avonlea complex, like the co-existing Besant complex, favored a mound structure for the interment of their dead.

Burial mounds are relatively rare in Saskatchewan and represent a poorly understood temporal span in Saskatchewan

prehistory. Of the three known burial mounds, two are contemporaneous with the Bethune burial. These are the Moose Bay and Glen Ewen mounds. The third burial mound is the Sisterbutte mound which has not been radiocarbon dated. It is quite possible other mound structures once existed in Saskatchewan, but most of these have succumbed to destruction by agricultural practices or were looted over the years.

The Bethune, Sisterbutte, Glen Ewen, and Moose Bay burials are studied here in terms of their construction, mode of interment, and osteological and cultural components. The pathological remains from the Bethune site, and the entire Moose Bay collection have been previously reported in the published literature. The Sisterbutte mound has not been excavated and unfortunately, given the political feelings regarding burials, it is doubtful this mound will be excavated in the near future. The populations of each burial are small: the Glen Ewen mound has two individuals, the Sisterbutte mound has a minimum of four individuals, the Bethune site has seven individuals, and the Moose Bay mound has twelve individuals. Despite their size, it is hoped that the metric and non-metric data which are assembled may prove valuable in future demographic research or multivariate analyses.

The primary objective of this thesis is to analyze the accumulated data and attempt to correlate each site with a specific Late Prehistoric cultural complex. In order to achieve this aim it will be necessary to review the known mortuary behavior on the Northern Plains, as well as the mound building culture complexes of the Late Prehistoric Period.

1.1 Mortuary Behavior on the Northern Plains During the Late Prehistoric

Burials from the Late Prehistoric Period are not abundant (Figure 1), and few of those known have been reported in the published literature. Those that have been reported tend to be lacking in their descriptions and radiocarbon dates, culminating in the inadequate knowledge of burial practices on the Plains during this period.

The Besant complex originated about 2000 years ago, replacing the Pelican Lake complex. In North and South Dakota, particularly along the western border of the Missouri River, a series of burial mounds dating to this period have been found. Neuman (1975) assigns these to the Sonota burial complex. However, it is still unclear whether Sonota and Besant are two distinct complexes. The tool kits recovered from these mounds bear a strong resemblance to Besant, being almost identical. Dyck (1983) notes corresponding fine details in dart point style, endscraper styles, and pottery styles, not to mention identical time frames. As such, Dyck suggests Sonota and Besant are one and the same, and the burial mounds represent the mortuary expression of this complex (Neuman 1975; Dyck 1983:115).

A second mound burial complex known on the Northern Plains is the Devils Lake-Sourisford complex. This complex appeared about A.D. 900 and flourished until the 1400s. Noted for characteristic mortuary vessels and conch shell artifacts, many of the mounds known today have been assigned to this group. The best known example of a Devils Lake-Sourisford mound in

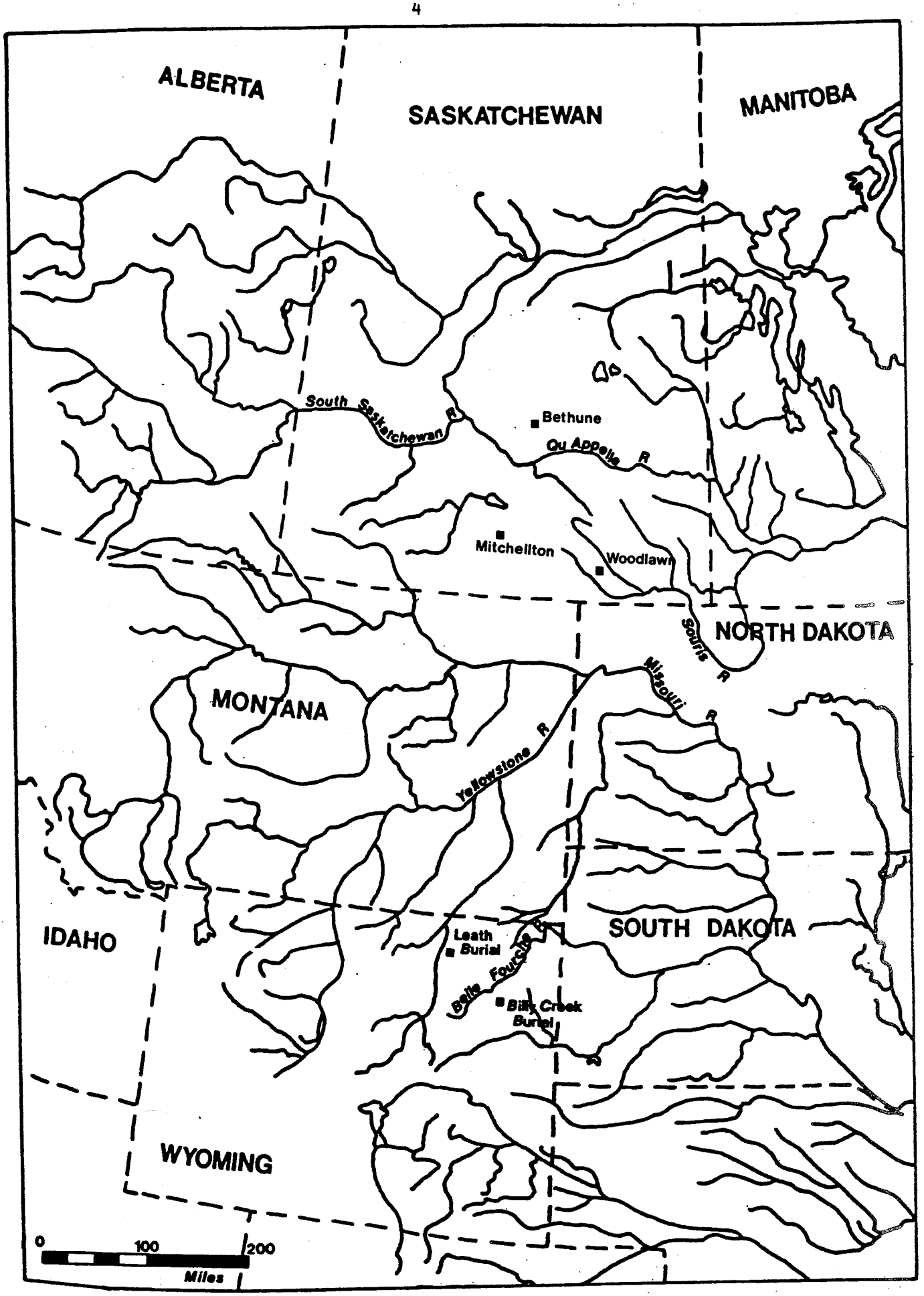


Figure 1

Late Prehistoric Burial Sites on the Great Plains

Saskatchewan is the Moose Bay burial mound. However, the Devils Lake-Sourisford complex is not restricted solely to interring their dead in mounds.

The Woodlawn burial is located near Estevan, Saskatchewan, and has been radiocarbon dated to 865 +/- 70 years B.P. (S-1329) (Walker, 1983). The remains of three individuals were recovered from a circular subsurface burial pit, with at least one of these having been interred as a bundle. Situated on a prominent hill, the burial had been covered with limestone slabs before being completely infilled. The only cultural artifact of note associated with this burial is a complete conch columella pendant. On the basis of this pendant, the geographic location, and the radiocarbon date, Leigh Syms (1979) has included the Woodlawn burial as part of the Devils Lake-Sourisford complex.

Co-existing with the Besant complex, only two burials affiliated with the Avonlea complex were known up to this time. The Billy Creek site is located on the top of a small hill, an eroded sandstone remnant, in northern Wyoming. The fragmentary remains of three individuals were recovered at this site: a young adolescent of undetermined sex, an elderly female, and an adult male. The most predominant grave inclusion was the projectile point, of which 110 complete or fragmentary ones were recovered. Many are highly reminiscent of the Avonlea type style (Galloway 1968:16-19).

The Leath Burial site was also discovered on a small butte in northern Wyoming, between a cap rock and some sandstone blocks which had broken away, somewhat similar to the Billy Creek site. There is no evidence of a subsurface burial pit. Instead, the

interment was covered with earth and rocks, and sandstone slabs were placed against one side. The resulting hole was then covered with earth (Galloway 1962:3). Prior to professional excavation, six to twelve human burials were exhumed from this site. Galloway removed the incomplete and poorly preserved remains of an adult male, associated with quantities of utilitarian and decorative grave goods. Again the projectile points appear identical to the Avonlea point style (Galloway 1962:1-9). Neither of these sites has been radiocarbon dated.

Although burial sites are few in number they do provide the basis for some interesting hypotheses and general conclusions. The Besant complex offers an unique mortuary behavior with the construction of burial mounds and subsurface burial chambers. Avonlea burials tend to be situated on a prominent point of land particularly where protection is offered by a natural rock formation. Such a tendency is also noted in burials dated to the Pelican Lake complex (Walker 1984:146-148).

The mortuary customs of the Plains people reveal much about their philosophy and culture involving the disposal of the deceased. Their customs depict early beliefs regarding the nature of human existence in life following death, as well as the relations of the living to the dead. Primary burials refer to complete, articulated interments. In contrast, secondary interments consist of non-articulated collections of bones. They represent a method of treating the deceased involving several stages. Initially the flesh must be removed. This may be accomplished using tools or by allowing natural decomposition to run its course. The bones are then collected and subsequently

interred as a single burial, or mass grave. A secondary interment may take the form of a bundle burial, or disarticulated scatter burial. Different culture complexes often deal differently with their deceased. However, sometimes within the same culture different mortuary practices may be observed.

Due to the lack of direct knowledge from the Prehistoric period, we increasingly rely on the ethnohistoric record in an attempt to fill this void. Much of this information is derived from the historical observations of missionaries, explorers, and army personnel, which, with care, can be utilized in describing and understanding the prehistoric customs.

For example, on June 24, 1811, John Bradbury recorded an eyewitness account of mortuary customs of the Hidatsa, who are agriculturalists of the Middle Missouri region.

> I passed through a small wood, where I discovered a stage constructed betwist [sic] four trees, standing very near each other, and to which this stage was attached, about ten feet from the ground. On this stage was laid the body of an Indian, wrapt in a buffalo robe. As the stage was very narrow, I could see all that was upon it without much trouble. It was the body of a man and beside it there lay a bow and quiver with arrows, a tomahawk, and a scalping knife. There was a great number of stages erected about a quarter mile from the village (Bradbury 1817 in Ubelaker 1978:3).

Among the Hidatsa, variations were made in the funeral rites depending on the age, sex, and position of the deceased. Women received scaffolding and were later buried, but only the immediate family mourned their passing (Bowers 1965:171). Children were placed on the scaffold of a close relative, while infants were generally buried at the edge of a lodge. When a man of great distinction passed away the normal funeral procedures

were heeded, but everything was performed on a grander scale (Bowers 1965:171). The entire band was involved in his mourning, property destruction and redistribution were more extensive, and the ceremonies were more elaborate and mourning more passionate. Crime victims underwent different rites also. Murder victims were interred face down, while scalped individuals were left unburied. Hidatsa who committed suicide were also left unburied where they had fallen (Bowers 1965:171).

Similarly, the Mandans were a semi-sedentary, semi-agricultural people who inhabited the Middle Missouri River Valley during the historic period. Alden provides some insight into the burial methods of these people.

> ....the Mandans never bury in the ground, but always on a scaffold made of four posts about eight feet high, on which the box is placed, or, if no box is used, the body wrapped in red or blue cloth if able, or, if not, a blanket or cheapest white cloth, the tools and weapons being placed directly under the body, and there they remain forever, no Indian ever daring to touch one of them.....should the body by any means fall to the ground, it is never touched or replaced on the scaffold (E.H. Alden in Yarrow 1976:161).

In 1844, George Catlin witnessed what he referred to as the "golgothas" of the Mandans (Catlin in Yarrow 1976:80).

> There are several of these golgothas, or circles of twenty to thirty feet in diameter, and in the center of each ring or circle is a little mound of three feet high, on which uniformly rest two buffalo skulls (a male and female), and in the center of the little mound is erected `a medicine pole', of about twenty feet high, supporting many curious articles of mystery and superstition, which they suppose have the power of guarding and protecting this sacred arrangement.

Once the scaffolding had rotted away and the bones fallen to the ground, the skeletal remains were gathered and reburied in the vicinity of the scaffolds. The skulls were not interred, but

rather were placed in the golgothas.

> Each one of these skulls is placed upon a bunch of wild sage, which has been pulled and placed under it. The wife knows, by some mark or resemblance, the skull of her husband or her child which lies in this group.....As soon as it is discovered that the sage on which the skull rests is beginning to decay, the woman cuts a fresh bunch and places the skull carefully upon it, removing that which was under it (Catlin in Yarrow 1976:80).

The accounts of Catlin and Alden indicate a dichotomy in the cultural options available to the Mandans in dealing with their dead. Alden indicates scaffolding was the accepted form of burial, with an aversion to any further contact with the corpse being observed. He also notes that the Mandans never buried their dead below the ground. In contrast, Catlin indicates the Mandans did bury their dead in the ground following scaffolding. This reinterment process, as well as the golgothas, also indicates a great deal of subsequent contact with the deceased.

Dakota or Sioux Indians occupying Minnesota, North and South Dakota, and Montana, favored tree or scaffold burials. In order to protect the dead from wild predators, the corpse was placed in the open air rather than being immediately interred (Yarrow 1976:66; Gardner in Yarrow 1976:75; Seymour in Bushnell 1927:19). When trees were available, with limbs sufficiently horizontal to support scaffolding on which to lay the body, then a tree burial ensued. However, the more general method of burial was scaffolding.

Scaffolds were seven to eight feet (2.1-2.4 m) in height, ten feet (3.0 m) long, and four to five feet (1.2 - 1.5 m) wide, supported by four stout corner posts with a flooring of small poles. Burial preparations were left to the women who painted

the face, neck, and hands with vermillion; ornamented the body with clothes and personal trinkets; and then securely wrapped the corpse in a buffalo robe. The deceased was occasionally placed in a coffin and covered with a red or a white cloth before being laid on the scaffold. Buckets and baskets were hung from the scaffold with offerings of food and water for the deceased. If the deceased was a male warrior it was customary for a bison head to be placed on or beneath the scaffold. Some months later, after the soft tissues had decayed, the remains were taken from the scaffold and buried (Yarrow 1976:66-72).

In 1815, Stansbury recounted an example of lodge burials, a common means of burial among the Dakota. Here the bodies were laid upon the ground in lodges, having been wrapped tightly in buffalo skin robes. Personal objects such as saddles, spears, camp kettles, and other ornaments were then piled up around the corpse (Yarrow 1976:63).

Dr. McChesney, of the United States Army, noted that the mode of death directly affected the orientation of the corpse in burial.

> In all burials when the person has died a natural death or had not been murdered, and whether man, woman, or child, the body is placed in the grave with the face up. In cases, however, when a man or woman has been murdered by one of their own tribe, the body was, and is always, placed in the grave with the face down, head to the south, and a piece of fat is placed in the mouth, as these Indians say, to prevent the spirit of the murdered person driving or scaring the game from that section of the country (McChesney in Bushnell 1927:25).

As with the Hidatsa, those Dakota who had been scalped or had committed suicide were left unburied. The Dakota believed their souls had already been destroyed, therefore leaving no

cause for burial or mourning.

Dr. L.S. Turner, of the United States Army, provides some insight into the mourning observances of the Dakotas.

> The mourning customs of the Dakotas, though few of them appear to be of universal observance, cover considerable ground. The hair, never cut under other circumstances, is cropped off even with the neck, and the top of the head and forehead, and sometimes nearly the whole body, are smeared with a species of white earth resembling chalk, moistened with water. The lodge, teepee, and all the family possessions except the few shabby articles of apparel worn by the mourners, are given away and the family left destitute. Thus far the custom is universal or nearly so. The wives, mother, and sisters of a deceased man, on the first, second, or third day after the funeral, frequently throw off the moccasins and leggings and gash their legs with butcher knives, and march through the camp and to the place of burial with bare and bleeding extremeties, while they chant or wail their dismal songs of mourning. The men likewise often gash themselves in many places, and usually seek the solitude of the higher point on the distant prairie, where they remain fasting, smoking, and wailing out their lamentations for two or three days (Turner in Yarrow 1976:71-72).

In 1804, Peter Grant, of the North West Company, wrote a description of an Ojibwan burial.

> ....the body is then decently dressed and wrapped in a new blanket, with new shoes garnished, and painted with vermillion on the feet. It is kept for one night in the lodge, and is the next day buried in the earth. The nearest relations bear it to the grave, in which it is wrapped up in birch bark instead of a coffin, carefully laying his medicine bag under his head. Some bury kettles, guns, axes, and various other articles with the body, but this custom is not general....
>
> They either raise a pile of wood over the grave, or enclose it with a fence; at the head of the grave a small post is erected on which they carve the particular mark of the tribe to whom the deceased belonged.
>
> The bodies of some of their most celebrated chiefs are raised upon high scaffolds, with flags flying and the scalps of their enemies, with other trophies of their prowess, suspended from a high pole, but all those monuments are not intended so much to distinguish their great man from the vulgar as to ensure to their departed souls the same respectability in the next world which they enjoyed in this (Grant in Bushnell 1927:3-4).

Jenness states that both surface and tree burials were "no more than substitutes for interment among the Ojibwa" (Voegelin 1944:344). Another popular method of burial was the stone box grave, where a hole was dug, lined with rocks, and the body deposited within. The entire grave was then covered with a pile of cobble stones brought by the family members (Voegelin 1944:327). During the winter months when the frozen ground made interment impossible, rocks, bark, or logs were piled over the body until interment the following spring. Cremation was rarely practiced among the Ojibwa. Such a method of disposal was limited to the bodies of warriors slain in battle (Voegelin 1944:354).

Throughout the historic period it would appear that scaffolding, with subsequent burial, was the most common means of disposing of the deceased. Exposed to the elements, the corpse quickly decayed and fell to the ground, where it became

scattered. Occasionally family members would return to the scaffold site where the bones would be assembled into a bundle for secondary interment.

There is no evidence of mounds having been constructed in the Northern Plains during the historic period. However, their existence throughout the north central Great Plains suggests they were an accepted form of burial in the prehistoric era.

The characteristic mound was a raised hillock of earth over one or more cylindrical or shallow concave subsurface burial pits. Often a platform of poles was placed over this central burial chamber. Roughly symmetrical, these mounds often varied from six inches (15.2 cm) to eight feet (2.4 m) in height, and often included intrusive burials. Occurring less frequently are mounds where the burials have been laid on the original ground surface. Within the mounds skeletons may be flexed and articulated, or clustered in unarticulated bundles. Both forms may, and often do, occur in a single mound. Rarely does an extended, supine burial occur. While generally circular in shape, burial mounds may also be linear, composite linear, and even occasionally assume an effigy form (Syms 1978:32-36).

The significance of mounds is rather perplexing given the small percentage of the total population buried in such features. There appears to be no evidence of status or rank differentiation, as grave goods are not associated with specific age or sex classes, and there is no indication of high status individuals surrounded by low ranking individuals. Such a situation, however, is manifest in the southern Hopewellian and Mississippian mound burials, where status is indicated by

relative location; primary versus secondary interments; marked differences in grave goods; and the mutilation or semi-dismemberment of accompanying burials (Jennings 1974:220-264).

Syms (1978) notes that the ethnohistorical record of southern Manitoba indicates that the area was occupied by "nomadic, small scale egalitarian Plains tribes of multi-band groups" (Syms 1978:31). He goes on to say that the tribes and composite bands living on the plains are characterized by "essentially egalitarian societies" (Syms 1978:31). If in fact the burial mounds were built by egalitarian societies, the question remains as to why such substantial features were constructed for such a small number of individuals. Perhaps construction of mounds and burial rituals served as an expression of cooperative behaviour between bands. Mound construction may also have had ritual importance. Evidence of small fires on and near the mounds, clustering of offerings, and the presence of exotic materials all support this hypothesis.

Charles and Buikstra (1983) suggest that the appearance of burial mounds in the Middle Mississippi is indicative of increasing competition among neighbouring economic units. They hypothesize that the most feasible way of indicating inherited rights of access to a particular resource locale was for a cultural group to place their ancestors in burial mounds located on ridges along the edge of a bluff (Charles and Buikstra 1983: 130). In this position the mounds would be clearly visible from the valley floor. Charles and Buikstra believe that the preference for such a location for over 5000 years, right up to the beginning of full-scale Mississippian maize agriculture,

lends support to their argument. Thus, bluff top cemeteries of constructed earth works were not arbitrary, stylistic symbols, but rather were functional indicators of hereditary rights to important localized resources (Charles and Buikstra 1983). Regardless of whether the appearance of burial mounds represents a shift from a non-mortuary ritual form to a mortuary form, or whether it simply indicates a change in the preferred burial location, "the fact that bluff-top mounds originated and were then used consistently over a large area for 5000 years indicates the significance of this mode of mortuary activity beyond its corpse disposal function" (Charles and Buikstra, 1983:130). Charles and Buikstra draw upon Chapman's (1981) arguments as further support for their hypothesis. He too has argued for the importance of monumental mortuary structures when resource competition is a critical part of daily survival. Within the technology available to hunters and gatherers, burial mounds constructed on prominent bluff-crests could indeed be viewed as monumental structures and may also have a similar function (Chapman, 1981). Unfortunately, given the destruction of burial mounds throughout history, it is doubtful that we will ever discover the complete meaning surrounding their construction.

Knowledge acquired from the published literature on prehistoric remains and the ethnohistoric data indicates that fairly diverse mortuary behaviour existed on the Plains during the Late Prehistoric Period. It would appear that scaffolding and subsequent interment remained the preferred method of burial throughout this period. Secondary interments, usually as

unarticulated bundles, were placed in mounds or subsurface pits generally in areas offering some form of natural protection. It has been suggested that monumental burial structures, such as mounds, were constructed as a means of claiming a particular resource location. Occasionally flexed and articulated burials have been observed, however, extended, supine burials are extremely rare. A standard characteristic of many prehistoric burials is the inclusion of grave goods. Utilitarian, personal, and decorative objects provide some insight into the culture and status of the deceased.

By studying the known Late Prehistoric burials in Saskatchewan, namely the Bethune, Sisterbutte, Glen Ewen, and Moose Bay burials, it is hoped we will be able to fill a void that exists in the knowledge of mortuary practices on the Northern Plains.

2.0 Methodology of the Osteological Analysis

The osteological materials studied in this thesis were culled from a number of sources. The Bethune and Glen Ewen collections are housed at the University of Saskatchewan and thus, were easily accessible. The Moose Bay Burial Mound materials were obtained on loan from the Saskatchewan Museum of Natural History. The Archaeological Resource Management Section of the Saskatchewan Department of Culture and Recreation provided the osteological materials recovered from the Sisterbutte Burial Mound in 1983. Additional materials were retrieved from the mound surface by the author and Dr. Ernest Walker in the summer of 1986.

Each osteological collection was analyzed and inventoried in order to determine the minimum number of individuals, as well as the age and sex of as many individuals as possible. A total of 53 standard metric variables and 24 non-metric cranial traits were included in the osteological analysis. The individual populations of each site were small; however, the metric and non-metric analyses were done in order to provide a basis for any future multivariate analyses.

2.1 Age Determination

The principal criterion used for aging juvenile skeletal remains was the eruption of the permanent dentition. Teeth are considered the most accurate age indicators because they are controlled by genetic, rather than environmental factors. A

chart compiled for the American Dental Association depicting the formation and eruption of teeth was used extensively (Schour and Massler 1944). Data concerning dental development for American Indians is only available for permanent tooth eruption (Ubelaker 1978:46). Thus, we must rely on studies based on American whites for deciduous tooth eruption (Ubelaker 1978:46). Tooth formation, as opposed to tooth eruption, is the more reliable age indicator, and was determined by radiographs. Tooth eruption refers to the emergence through the gum rather than alveolar emergence. In order to account for the variability in growth, each stage has been given a plus or minus factor (Schour and Massler 1944).

For those individuals where neither a maxilla or mandible was present, an attempt was made to determine approximate age by comparing the length of long bones with those of a child of known age. This technique is not exact given the highly variable growth rates exhibited within populations or racial groups. The comparative data used in this study was correlated by Merchant and Ubelaker (1977) on the protohistoric Arikara of South Dakota. The comparative tables were derived by correlating the chronological age with the maximum diaphyseal length of long bones and the maximum width of the ilium.

Epiphyseal union was the final means used for determining the age of juvenile remains. Postcranial epiphyses do not unite with the diaphyses until puberty, and each long bone unites at varying times. Infracranial epiphyseal union is of most value when used to determine ages between 10-20 years, a period during which dentition and long bone studies have limited merit

(McKern and Stewart 1957; Krogman 1962; Ubelaker 1978:52).

Age determination for adult skeletal remains was based on dental attrition, pubic symphyseal degeneration, and osteoarthritic changes. Attrition of the permanent dentition proceeds continually throughout life, principally dictated by the amount and strength of mastication, as well as by the accidental inclusion of abrasives in food. However, cultural practices also result in some degree of dental attrition (Brothwell 1965:67; Ubelaker 1978:71-72). Brothwell prepared an age classification of dental wear based on pre-medieval British teeth. It is this classification, based on molar teeth, which was used in this study.

1) 17-25 years:

Molar 1 - dentine beginning to be exposed on cusps.

Molar 2 - enamel polishing with little, or no, dentine exposed.

Molar 3 - dentine not exposed. Slight enamel polishing may be present.

2) 25-35 years:

Molar 1 - increased exposure of dentine on cusps. The cusp wear coalesces into a horseshoe shape.

Molar 2 - dentine exposed on cusps. Posterior wear may coalesce.

Molar 3 - enamel polishing more pronounced and dentine slightly exposed on cusps.

3) 35-45 years:

Molar 1 - excessive wear resulting in pulp cavity entirely exposed.

Molar 2 - cusp wear coalesces resulting in a horseshoe-shaped wear pattern or the entire loss of enamel.

Molar 3 - cusps worn off, coalescing of wear pattern may be present.

4) 45+ years:

Any greater degree of wear than in the previous age range. Very unequal wear sometimes occurs in the later stages. Occlusal wear may continue down to the tooth neck as well as the roots (Brothwell 1965: 67).

The onset of tooth wear can be prior to adulthood. Hrdlicka points out that in general the wear on both jaws is uneven, with the maxilla suffering more than the mandible. In addition, wear is not always equal bilaterally, or in all areas of the tooth arcade (Hrdlicka 1952:53).

A more accurate means of aging, utilized whenever an innominate was included in the remains, is degenerative changes of the os pubis (Todd 1920; McKern and Stewart 1957; Gilbert and McKern 1973; Meindl et al. 1985). The McKern and Stewart system for males, and the Gilbert and McKern system for females were implemented. This involved focusing on three aspects of the symphyseal face: the dorsal demifacet, the ventral rampart, and the symphyseal rim. These components were then ranked on a scale of 0-5, with the totals being converted to age estimates.

A second means of aging involving the innominate which was used in conjunction with the pubic symphyseal face, was chronological changes in the auricular surface. While more difficult to interpret, age changes in this region are relatively well defined and sufficiently regular (Lovejoy et al. 1985: 15). Recent studies suggest that auricular surface aging is as accurate as the pubic symphysis aging (Lovejoy et al. 1985). It has other advantages as well. In archaeological populations, the auricular region of the innominate is usually present, while the pubic symphysis often is not. As well, the auricular surface displays interpretable changes that continue well past the age of 50 years. Such is not the case when determining age with the pubic symphysis. In addition to changes on the actual auricular surface, auxiliary indicators such as the apical and retroauricular surfaces may be used to corroborate ages (Lovejoy et al. 1985: 15-28).

In this study, the distinction between adulthood and adolescence was taken to be the fusion of the basioccipital synchondrosis of the cranium, and the complete union of the postcranial epiphyses.

2.2 Sex Determination

Those individuals represented by only a few bones are problematic when it comes to sexing. As a result, given the incomplete nature of the immature remains, no attempt was made to determine their sex. The main criteria used to sex the adult individuals are those characteristics pertaining to the pelvis

(Krogman 1962; Phenice 1969: Bass 1971). The characteristics examined include the pubic bone; the arcuate ligament attachment including the ventral arc, subpubic concavity, and medial aspect of the ischiopubic ramus; the sciatic notch; sacro-iliac joint; and the pre-auricular sulcus.

Where individuals were not represented by an innominate, sex was determined via the skull and long bones. In general, sex differences in the adult long bones are based on size. Male bones are typically longer and more robust than their female counterparts. Similarly, the male skull is generally more robust, rugged, and muscle marked than the female skull. Muscle ridges, particularly in the nuchal region, and the mastoid processes are larger in males. In addition, the male zygomatic process tends to extend past the external auditory meatus in a crest, rather than terminating at the external auditory meatus as in the female. Sexual differences concerning the male face include more prominent supra-orbital ridges, blunt upper orbital margins, and larger palates and teeth. The male mandible exhibits a more squared contour, and the teeth are again larger. The female skull generally appears more gracile, being smaller and smoother. The cranium retains the frontal and parietal bossing, characteristic of childhood, into adulthood.

2.3 Metric Variables

The metric variables of the previously unpublished Bethune and Sisterbutte remains, as well as the re-analyzed Moose Bay and Glen Ewen materials are included in this thesis. Although the population samples of these separate mounds and single burials are not large enough to warrant any multivariate analysis at this time, they may be of some use to others in subsequent studies. In order for these data to be relevant it is necessary that the methodology be outlined for other studies to be consistent.

Cranial measurements were taken on both mature and immature materials using a spreading caliper, a sliding caliper, a cloth tape measure, and a craniometer. Where the skulls were represented by only a few fragments, the few measurements possible were recorded. Instruments used in the recording of mature and immature postcranial measurements were a sliding caliper and a standard osteometric board. All measurements were taken in millimeters.

A total of 53 metric variables and indices were used in this study. These were collated from Montagu (1960), Bass (1971), and Olivier (1969). In addition, a total of 24 non-metric cranial variables were included as part of the osteological analysis. The results of these analyses can be found in appendices 12 through 36 inclusive.

3.0 The Bethune Site

The Bethune site is an Avonlea burial located in the Arm River Valley near Bethune, Saskatchewan. The burial was situated on the top of a knoll, and prior to disturbance by cultivation, may have been a mound interment. Don Pingert and Ron Tillie were responsible for the site survey and excavation on behalf of the Saskatchewan Museum of Natural History in 1972. Their work resulted in the recovery of seven incomplete individuals, and a variety of cultural remains. Included as grave goods were an Avonlea type style projectile point, a biface, an endscraper, a drill, a retouched flake, and an ochre stained bone artifact. Both the osteological and cultural artifacts were subsequently donated to the University of Saskatchewan.

3.1 The Avonlea Culture Complex

The Avonlea people have traditionally been regarded as a Plains complex occupying much of southern Saskatchewan, Alberta, and northern Manitoba, as well as limited distributions in south-western and west-central Manitoba, and Montana and northern Wyoming. However, two major reconnaissance surveys conducted by the Saskatchewan Research Council along the Saskatchewan River and the lower North and South Saskatchewan Rivers have resulted in the documentation of Avonlea in the mixed wood forest of northern Saskatchewan (Klimko 1985). This suggests that a wider

spatial distribution of the Avonlea people into this northern locale might be likely.

In Saskatchewan and Alberta, Avonlea appeared as an in situ development out of the Pelican Lake complex about A.D. 150-250 (Reeves 1983:102). The Avonlea complex appeared approximately 250 years later than the Besant complex. The two complexes existed coterminously on the Northern Plains until their demise about A.D. 700 (Dyck 1983:122-123). In northern Montana, the complex began between A.D. 400-500, while in southern Montana it appeared between A.D. 500-600. Throughout the state, Avonlea terminated by A.D. 900. In the Bell-Fourche-Powder River region, the phase appeared briefly between A.D. 400-500 (Reeves 1983:102).

Avonlea was deemed the earliest of the Late Prehistoric side-notched projectile point complexes from the discoveries at the Avonlea site in Saskatchewan (Kehoe and McCorquodale 1961). To date, a selection of excavated sites containing Avonlea components includes the Old Women's site (Forbis 1962), the Head-Smashed-In site (Reeves 1978), the Gull Lake site (Kehoe 1973), the Estuary site (Adams 1977), the Rousell site (Dyck 1972), the Gravel Pit site (Klimko 1985), the Yellowsky site (Wilson-Meyer and Carlson 1984), and the Pas Reserve (Long and Tamplin 1977:48). A complete list of Saskatchewan sites containing Avonlea components can be found in Table 1. Descriptions of the Avonlea cultural systems are still relatively limited due to the general lack of excavated campsite components. A large campsite was found in Alberta at the Morkin site (Byrne 1973), and several small camps in Saskatchewan at the Garratt site (Morgan 1979) and Sjovold site (Dyck 1979). The Gravel Pit site and Yellowsky site

Table 1

Avonlea Sites in Saskatchewan

Site Name	Date
Amisk	905 +/- 155 BP (AD 890) (S-2537) (Amundson 1986: 201)
Avonlea	1500 +/- 100 BP (AD 450) (S-45) (Kehoe and McCorquodale 1961: 186)
Ayel	undated
Bethune	1389 +/- 40 BP (AD 565) (S-1575) (Walker 1978)
Chomyk Centre	undated
Ens Creek	undated
Estuary Bison Pound	1020 +/- 80 BP (AD 930) (GaK-3809) 1190 +/- 165 BP (AD 760) (S-641) 1070 +/- 70 BP (AD 880) (S-640) (Adams 1977: 38)
FhNg-79	undated
FhNh-111	undated
Garratt	1450 +/- 70 BP (AD 500) (S-406) 1280 +/- 60 BP (AD 670) (S-408) (Morgan 1979: 246)
Gravel Pit	815 +/- 135 BP (AD 1135) (S-2355) (Klimko 1985: 105)
Gull Lake	1740 +/- 60 BP (AD 210) (S-255) 1290 +/- 65 BP (AD 660) (S-254) 1220 +/- 80 BP (AD 730) (S-149) (Kehoe 1973: 43)
Lewis	undated
Long Creek	undated
Mineral Creek	undated
Mollberg	undated
Newo Asiniak	750 +/- 70 BP (AD 965) (S-2529) (Kelly 1986: 139)
Number 56	undated
Orviak	undated
Rousell	1185 +/- 70 BP (AD 765) (S-670) (Wilmeth 1978: 107)
Sjovold	1380 +/- 190 BP (AD 570) (S-1763) 1375 +/- 195 BP (AD 575) (S-1762) (Dyck 1983: 111)
Tom	undated
Wallington Flat	undated
Yellowsky	720 +/- 135 BP (AD 1230) (S-2299) (Klimko 1985: 120)

are two excavated sites from central Saskatchewan, which produced radiocarbon dates of 815 +/- 135 years B.P.: A.D. 1135 (S-2355) (Klimko 1985) and 720 +/- 135 years B.P.:A.D. 1230 (S-2299) (Wilson-Meyer and Carlson 1984) respectively. Compared to those dates obtained from the Plains these northerly sites do tend to be later. The radiocarbon dates for Avonlea sites in Saskatchewan can also be found in Table 1. Figure 2 illustrates the location of many of the Avonlea sites in Saskatchewan, and Figure 3 shows the location of dated Avonlea sites on the Great Plains.

The Avonlea complex is unique for its almost exclusive use of medium to small-sized points characterized by true side-notches situated close to the base. The Avonlea people were so heavily reliant on the bow and arrow for hunting as to suggest that they were the first to use this technology on the Northern Plains (Dyck 1983:122). Avonlea points are triangular, very thin, and have a straight or slightly concave base. Measurements average 21 mm long, 13 mm wide, and 2.5 mm thick (Kehoe and McCorquodale 1961:139; Kehoe 1966:829). Avonlea groups appear to have been more oriented towards utilizing the local raw materials rather than exotic lithic materials. Avonlea tools are crafted from chert, chalcedony, and petrified wood, rather than the Knife River flint the Besant complex favored (Dyck 1983:123).

Avonlea ceramics tend to be conoidal with surface finish encompassing a wide range of variation. The most common finishes are net impressed, fabric impressed, parallel grooved, or a smooth vessel exterior. Decoration, when present, consists of punctates, cord-marked impressions, or bossing on the rim

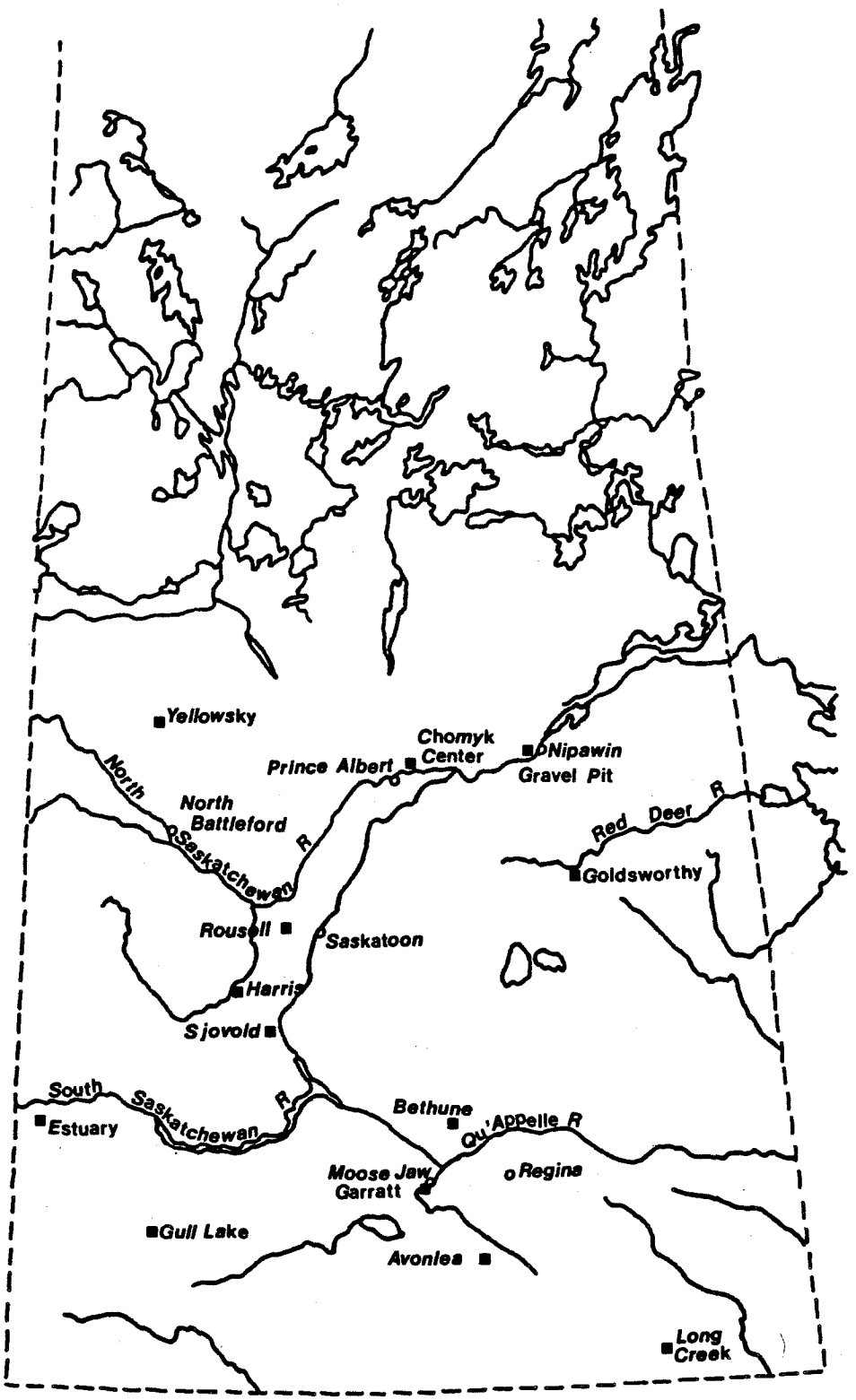
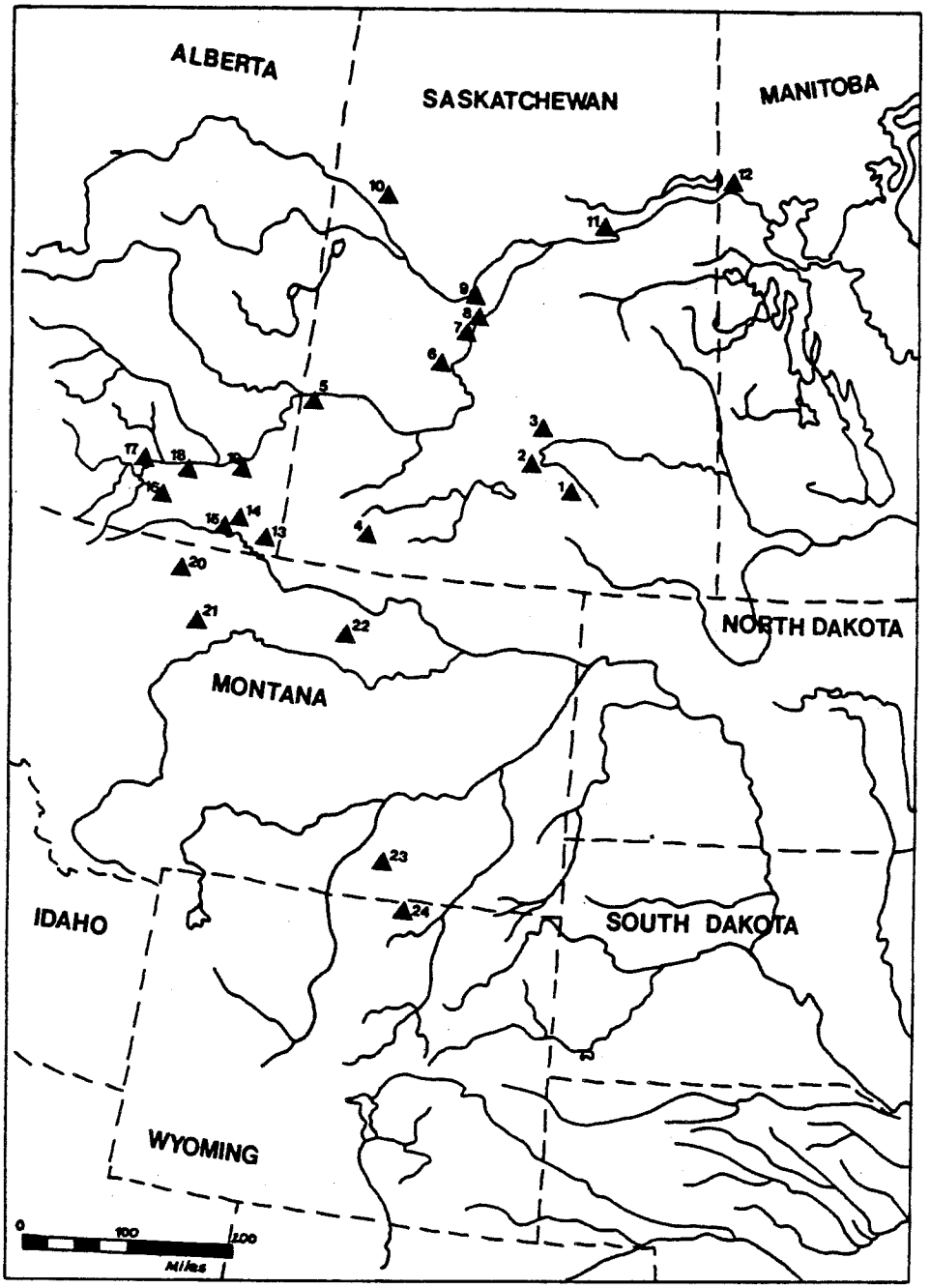


Figure 2

The Location of some Avonlea Sites in Saskatchewan

Figure 3



No. Site Name

1. Avonlea
2. Garratt
3. Bethune
4. Gull Lake
5. Estuary Bison Pound
6. Sjovold
7. Amisk
8. Newo Asiniak
9. Rousell
10. Yellowsky
11. Gravel Pit
12. The Pas Reserve
13. Irvine Kill
14. Morkin
15. DlPk-3
16. DkPi-2
17. Head-Smashed-In
18. Upper Kill
19. EcOs-41
20. Big Badger
21. Crawford
22. Timber Ridge
23. Mangus III
24. PK Ranch

The locations of dated Avonlea sites on the Great Plains.

exterior and lip surface (Klimko 1985:72; Dyck 1983:122).

Avonlea origins are a subject which prompts much speculation and widely diverging theories. Davis (1966) felt that Avonlea was an intrusive complex. Kehoe (1966:839) suggested the complex represented Athapaskan invaders who swooped down from the north to occupy the Plains about A.D. 650. This hypothesis was developed on the basis of a supposed absence of pottery from both the Athapaskan and Avonlea traditions, and a date which was derived from linguistic studies of the Athapaskans. Husted (1969) discounted Kehoe's Athapaskan theory, instead suggesting Avonlea had Siouan origins from the eastern Woodlands. Such a hypothesis is also supported by Morgan (1979). Reeves, with support from Byrne (1973:459) and Adams (1977:139-140), suggests an in situ transformation of the Pelican Lake complex into Avonlea. Today, the Athapaskan theory is generally discounted, while both the eastern Woodland and the in situ maturation hypotheses are potentially viable.

Just as the question of Avonlea origins is a speculative subject, so is the fate of the Avonlea complex. Reeves (1970:32) hypothesizes that the Besant and Avonlea cultures coexisted for a time, and that Avonlea was displaced, while Besant evolved into later prehistoric cultures. Byrne (1973) suggests Avonlea absorbed Besant and then as one they evolved into later traditions on the Northern Plains. Husted (1969:93-96) felt that about A.D. 700-800 Avonlea people travelled to southern Montana where they encountered Shoshoni speaking groups. After passing on the side-notched projectile point technique the Avonlea groups moved eastward into South Dakota where they influenced the oldest

Initial Middle Missouri horizon. Such hypotheses seem highly imaginative. To date we do not know what events led to the disappearance of the Avonlea complex.

Until recently the Avonlea burial pattern was known only from two sites in northeastern Wyoming. These are the Leath Burial and Billy Creek Burial reported by Galloway (1962, 1968). These individuals were interred in a primary flexed or extended pit burial and had considerable amounts of utilitarian and decorative grave goods. To date, the Bethune site is the only other burial which has been attributed to the Avonlea culture.

3.2 The Site Environment

The Bethune burial site (EeNg-6) is located northeast of Bethune, Saskatchewan, in the Arm River Valley, in the SW quarter of section 15, TWP 21, R 23, west of the second meridian (Figure 4). The site coordinates are 50 degrees, 46 minutes, 50 seconds North Latitude, and 105 degrees, 7 minutes, 10 seconds West Longitude. These coordinates place the burial in the heart of the mixed grass prairie ecodistrict. The physiography of the Bethune region ranges from level plain to rolling lacustrine and morainic plain. The site itself is situated on a knoll in an area frequently disturbed by cultivation. The disturbed nature of this region poses some question as to the original condition of the burial, specifically whether the Bethune site was a mound burial. It is conceivable that cultivation removed the dirt overburden leaving the burial exposed and subject to erosion. However, Pingert makes several references to the presence of

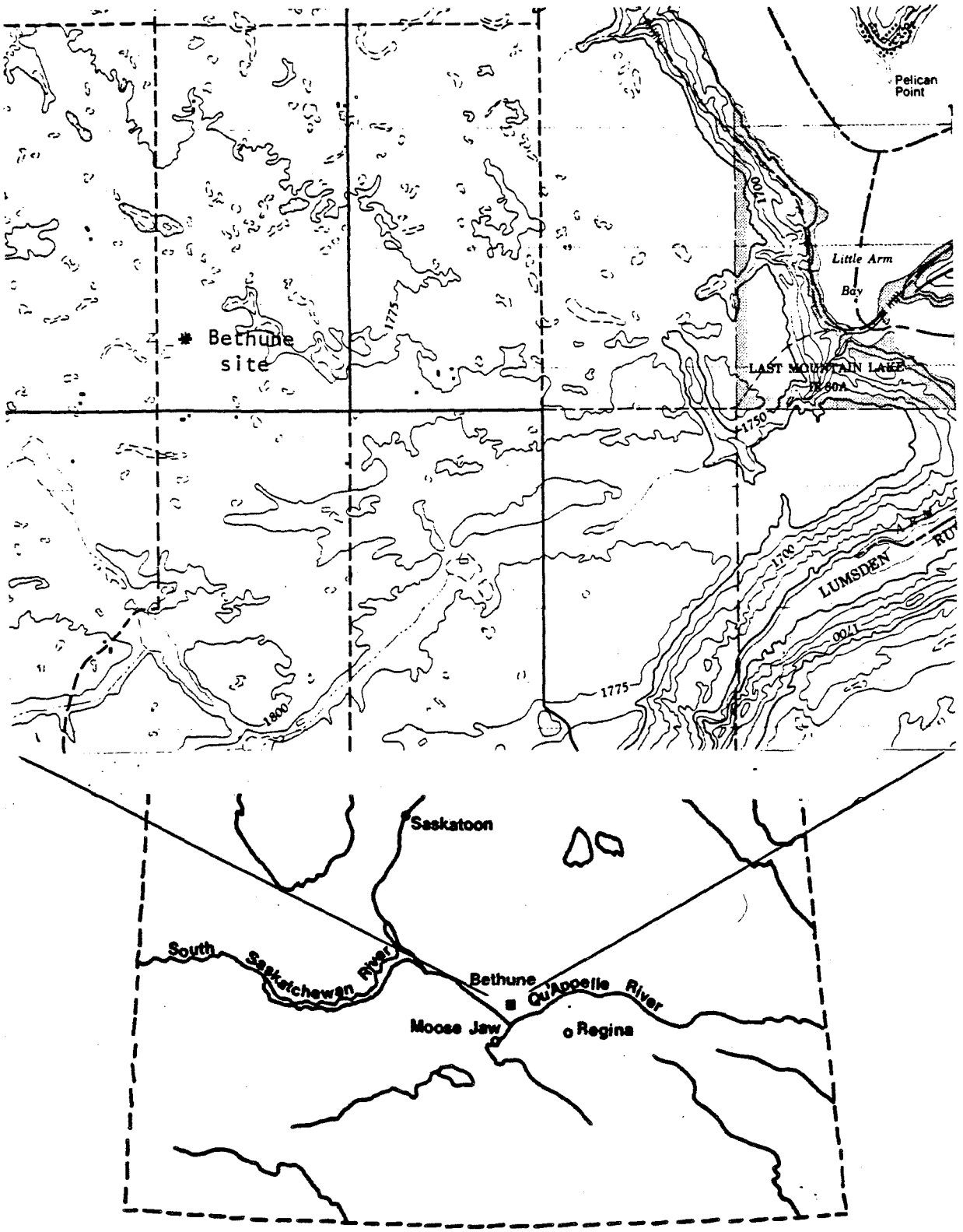


Figure 4 The Location of the Bethune Site. Enlargement of the Last Mountain Lake region produced from Department of Energy, Mines and Resources 72-1/14.

large rocks in the vicinity of the burial. Perhaps this indicates the presence of a stone cairn overlying the original burial.

The climate of this ecodistrict tends to be dry and warm. Annual precipitation is 375 mm of which 240 mm falls between the months of May to September. The mean temperature for January is -16.5 degrees celsius, while for July it is +18.7 degrees celsius (Harris et al. 1983:38).

Soils of the mixed grass prairie are predominantly brown and dark brown chernozemic of medium to fine texture. In the Bethune region specifically, the soil type is a light loam (Mitchell et al. 1977: soil survey map). Drainage in this soil type ranges from rapid and well drained in warm-dry areas, to imperfectly drained in the wet-cool areas. The soils are relatively free of stones and gravel, except for on a few knolls (Harris et al. 1983:38-39; Mitchell et al. 1977:79-100).

Most of the mixed grass prairie has been depleted of its native character due to cultivation, as in the Bethune situation, or intensive grazing. In those areas where the native prairie still exists speargrasses, wheatgrasses, and June grass are the most characteristic species found in the well drained uplands. The most predominant herb is pasture sage. Patches of bush are found throughout the valleys dominated by willows, Saskatoon, chokecherry, snowberry, and wolf willow.

The most abundant large mammal in this ecodistrict is the white-tailed deer, although mule deer and antelope are also quite common. Other fauna include the sharp-tailed grouse and the non-native partridge. Along drainage routes the introduced

ring-necked pheasant may be found. Major fish species common to this region include northern pike, walleye, perch, and whitefish.

3.3 The History of the Excavation

Excavation of the Bethune site (EeNg-6) was initiated on May 10, 1972, by a crew from the Saskatchewan Museum of Natural History consisting of Donald Pingert and Ron Tillie. For several years prior to this the owner, Lawrence Hickey, had been aware of bison bone eroding from the knoll. In an effort to rid the area of these bones and associated stones Mr. Hickey, made a single cut through the knoll with a front end loader. Examination of the fresh cut revealed an exposed human skull and long bone fragments. At this point the Museum was notified of the site's existence (Pingert 1972).

Pingert and Tillie began by examining the disturbed plow zone and retrieving the human and bison bone scattered throughout. Cursory digging led to the discovery of the burial pit outline along the south and west sides of the cut. Upon completion of the first field day, incomplete remains of four individuals had been recovered including a complete skull. As well, an artifact constructed from antelope bone had been discovered in the southwest corner of the pit. No depth measurement was provided.

Inclement weather prevented work from continuing for five days but upon returning to the site on May 15th, it was apparent that the burial had been disturbed during the interim. A hole ten inches (25.4 cms) deep had been excavated in the east end of

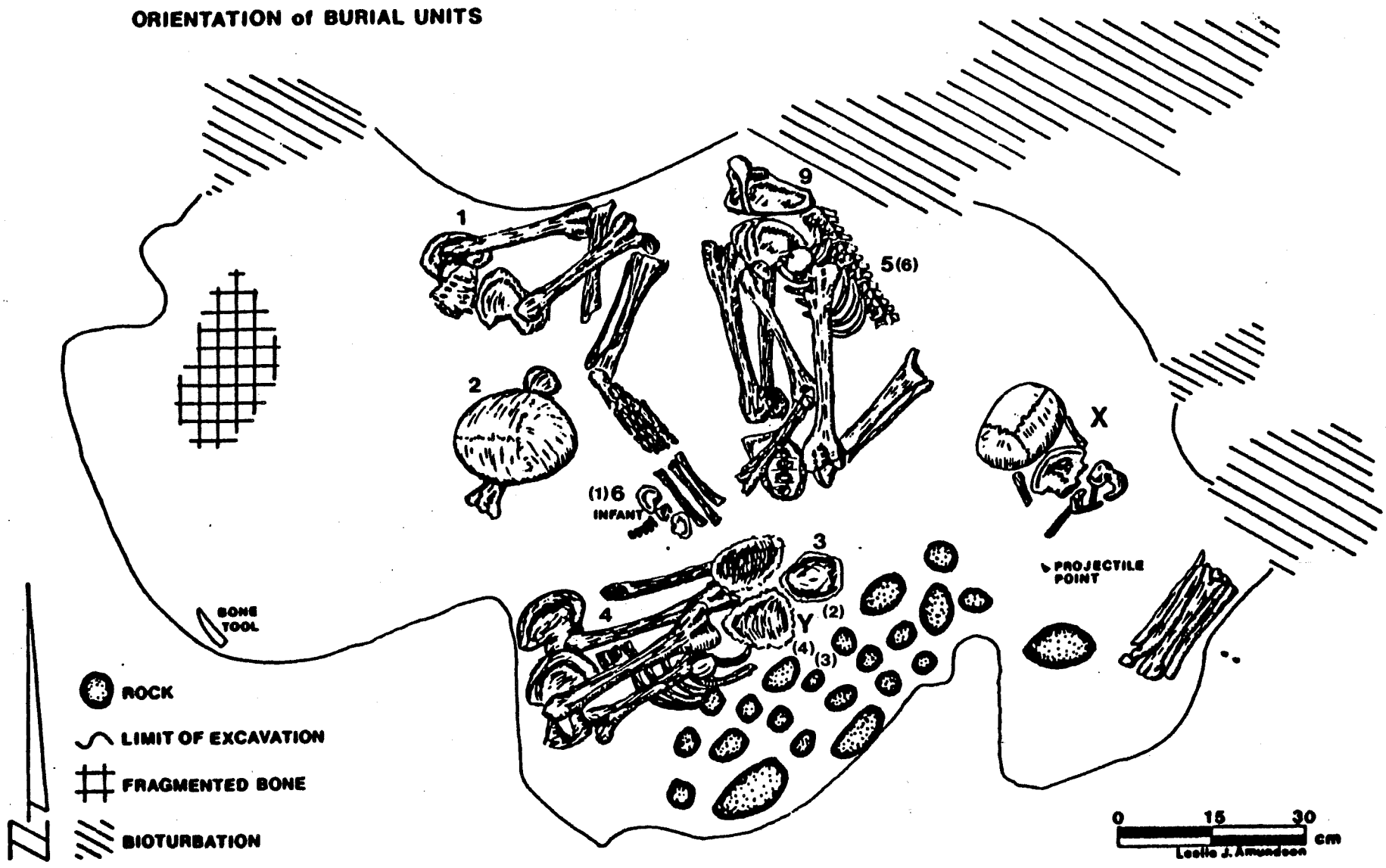
the pit and the contents removed. Pingert and Tillie assumed the appearance of a new pile of long bones in the southeast corner represented these same contents.

The field notes recorded by Pingert contain several discrepancies. He notes that work commenced with an attempt to locate the pit outline and its subsequent mapping. While a rough sketch is included in the notes, no information is provided with regard to burial dimensions. He also notes the presence of numerous pieces of petrified wood and a flat, smooth piece of slate in the disturbed upper soil. However, no mention is made as to whether any of this material was recovered. If it was, it is no longer with the collection. Another omission in the recording of the Bethune site is the lack of any photographic record.

Figure 5 shows the orientation of the burial units at the Bethune site. The numbers in parentheses represent a correlation between the author's numbering system and that of Pingert and Tilley. At a depth of 16 inches (40.6 cms) below the surface Burial Y was discovered in the southern region of the pit. This burial was the most complete, and proved to be the only articulated burial in the pit. In association with Burial Y were the smashed remains of an infant skull. Another broken skull of a probable adolescent was found in the same location as Burial Y, but at a depth of 22 inches (55.8 cms). Burial Y and the southeast corner of the pit were the only regions where large rocks were found covering the bones. There is no indication as to whether these stones had been altered in any manner.

Burial X was situated in the eastern section of the pit at

Figure 5


ORIENTATION of BURIAL UNITS
1
2
9
5(6)
(1)6
INFANT
3
4
Y
(2)
(4)
(3)
X
PROJECTILE POINT
BONE TOOL
ROCK
LIMIT OF EXCAVATION
FRAGMENTED BONE
BIOTURBATION
0
15
30
cm
Leslie J. Amundson

an average depth of 22 inches (55.8 cms). This scattered burial included two skulls, innominates, ribs, and various long bones. It was in association with the south end of this burial that a diagnostic projectile point was discovered at a depth of 23 inches (58.4 cms).

The complete skull removed on the first day of excavation was designated Burial #2. Just west of the pit center, this skull was associated with a humerus and vertebrae at a depth of 17 inches (43.2 cms). To the far west of Burial #2 was an area of fragmented bone among which were the remains of innominates, a skull, phalanges, and ribs. The average depth of these fragments was 17 inches (43.2 cms). Burial #6 is centrally located at a depth of 22 inches (55.8 cms), and is that of an infant. Among the recovered remains were upper and lower long bones, vertebrae, and innominate fragments.

The upper northwest portion of the pit was occupied by a burial designated #1. Found at a depth of 21 inches (53.3 cms) this burial included fully articulated innominates and lower limbs. Other bones found in association included a lower mandible, vertebrae, and several ribs. Opposite Burial #1, in the northeast section of the pit, Burial #5 was complete except for a skull. Apparently interred as a bundle, the burial was discovered at a depth of 16 inches (40.6 cms) and extended to 22 inches (55.8 cms). Pingert's original map shows turtle shell fragments associated with this burial, but, he makes no mention of them in his notes and they are not in the collection today. The bundle of bones located southeast of Burial X in Figure 5 are believed to be those bones excavated during Pingert and Tillies'

absence by an unknown party.

Pingert makes more than a passing mention of the broken and scattered nature of the interred bones. He suggests two possibilities concerning the broken condition of the bones. Firstly, he suggests pot hunters may have begun digging into the grave, scattering bones in the process. They may have terminated this activity when a complete skull was found or they were tired of digging. Secondly, Pingert suggests that Burial Y was the last individual interred, and the Indians themselves scattered the other bones while burying this one (Pingert 1972).

Other factors which may have affected the condition of the bone are bioturbation and burial customs. The map (Figure 5) sketched by Pingert shows considerable bioturbation activity around the northern and eastern borders of the pit. From his diagram it is difficult to ascertain whether this activity spilled over into the pit itself, but the likelihood of this being the case is very high.

In 1978, Ernest Walker submitted a radiocarbon sample of bison bone fragments to the Saskatchewan Research Council for dating analysis. The resulting date for the Bethune site was 1389 +/- 40 years B.P.: A.D. 565 (S-1575) (Walker, personal communication).

3.4 The Bethune Skeletal Remains

Preliminary analysis of the Bethune remains involved laying out the complete collection and sorting it into presumptive individuals. This assemblage was based on bone length, coloration, morphology, and articulation fit. For the most part, bones of the hands and feet were left undesignated, to be analyzed on their own, as were the ribs. This sorting exercise resulted in the distinction of seven individuals, each of whom will be discussed below. The skeletal remains have been numbered from 1-7 inclusive, and in no way relate to the number and letter scheme implemented by Pingert and Tillie during excavation. Where possible the author will try and provide some correlation between the two (Figure 5). However, sketchy field notes and the lumping of burials in storage make this difficult. The descriptions of the pathological remains are based on the original work of Dr. Ernest Walker (1978).

3.4.1 Individual 1

Individual #1 is a juvenile of indeterminate sex. Poorly represented, the skeletal remains include a complete left clavicle, and an incomplete right scapula, right innominate, and left femur. A complete osteological inventory is found in Table 2. Given the incomplete nature of these bones, sex and stature estimates were impossible to determine. The size of the bones suggest the individual was still an infant, leading to an age designation of 1-2 years. These remains appear to correlate with the burial Pingert and Tillie designated #6.

Table 2

Bethune Skeletal Inventory: Individual 1

		Right	Left
Scapula		+*	-
Clavicle		-	+
Humerus		-	-
Radius		-	-
Ulna		-	-
Innominate		+*	-
Femur		-	+*
Patella		-	-
Tibia		-	-
Fibula		-	-
Carpals:	Scaphoid	-	-
	Lunate	-	-
	Triangular	-	-
	Pisiform	-	-
	Trapezium	-	-
	Trapezoid	-	-
	Capitate	-	-
	Hamate	-	-
Metacarpals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-
Phalanges:	Proximal	-	-
	Medial	-	-
	Distal	-	-
Talus		-	-
Calcaneus		-	-
Cuneiforms:	1st	-	-
	2nd	-	-
	3rd	-	-
Cuboid		-	-
Navicular		-	-
Metatarsals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-

+ indicates present, - indicates absent, * indicates incomplete

Table 2

Bethune Skeletal Inventory: Individual 1 (Continued)

		Present	Absent
Skull			+
Mandible			+
Sternum:	Manubrium		+
	Gladiolus		+
	Xiphoid		+
Vertebrae:	Cervical		+
	Thoracic		+
	Lumbar		+
Sacrum			+
Coccyx			+
Ribs			+

3.4.2 Individual 2

A second child labelled Individual #2 is presumed to be that associated with Burial Y by Pingert and Tillie. Once again, sex determination is impossible for this child represented by the incomplete remains of a skull and postcranial elements. Table 3 lists the complete skeletal inventory. There is no evidence of any epiphyseal fusion having yet occurred. On the basis of tooth eruption and roentgenographic tooth formation (Figure 6) the individual was 4.5-5.5 years +/- 9 months of age at death. Such an age is further substantiated by long bone length.

Radiographs of the tibiae and right femur of Individual #2 exhibit transverse lines at the epiphyseal ends (Figure 7). Eight distinct episodes of bilaterally symmetrical arrested growth lines are indicated. There are two factors involved in the development of a transverse line. Initially, there is a period of growth arrest caused by disease or dietary deficiency. This results in the production of a primary stratum, or thin bony plate, immediately below the cartilagenous epiphyseal plate (Steinbock 1976: 46). Secondly, there is the recovery factor which is responsible for the thickening of the primary stratum so it becomes visible as a transverse line (Steinbock 1976). The recovery factor is crucial as transverse lines will not form unless the individual recovers from his affliction, be it illness or inadequate nutrition. The growth arrest lines exibited by Individual #2 may indicate a seasonal starvation pattern during the winter and early spring, followed by a period of good nutrition during the summer and fall.

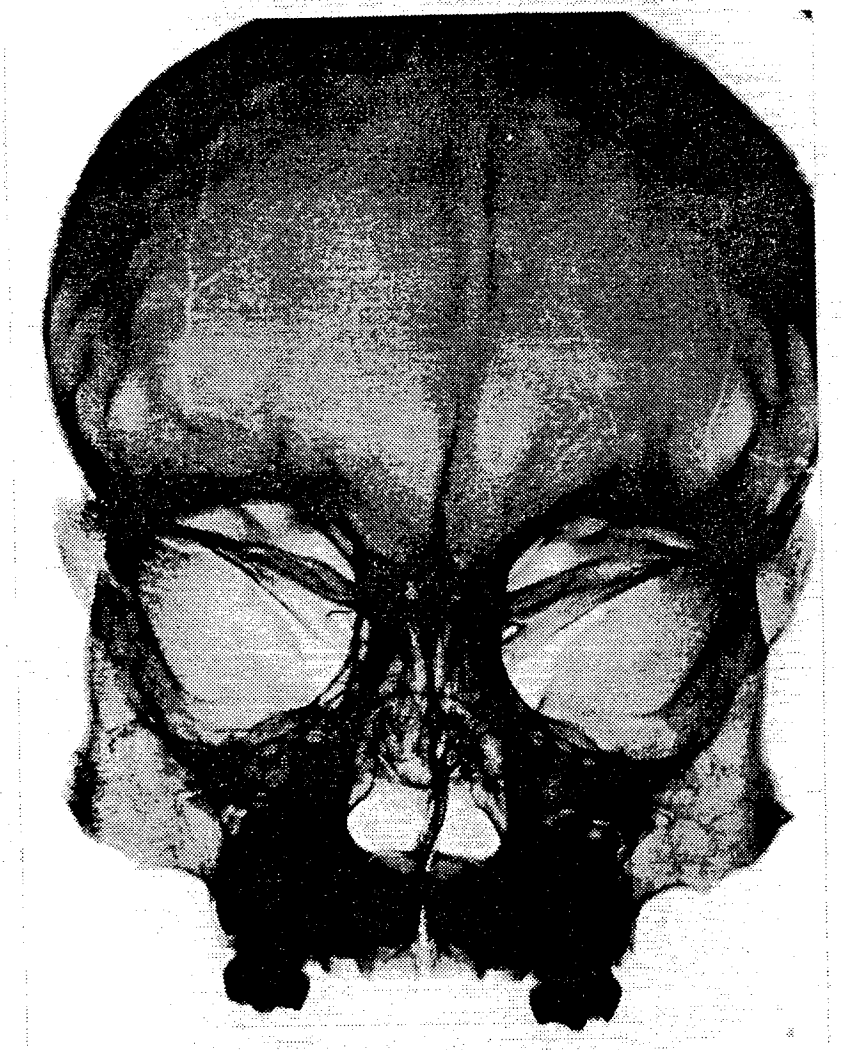


Figure 6

Radiograph of tooth formation, Individual 2

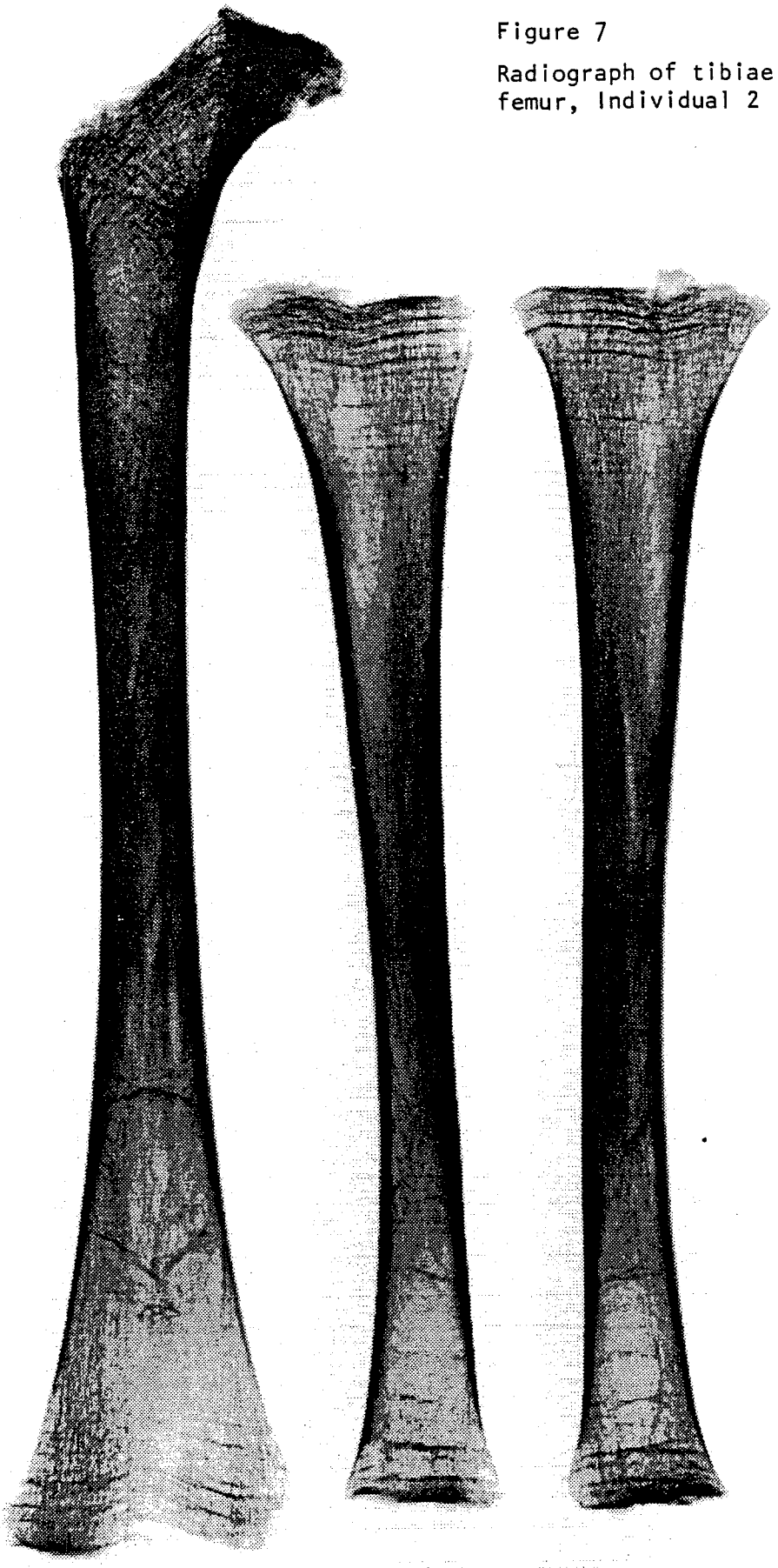


Figure 7

Radiograph of tibiae and right femur, Individual 2

Table 3

Bethune Skeletal Inventory: Individual 2

		Right	Left
Scapula		+*	-
Clavicle		-	+*
Humerus		+	-
Radius		+*	-
Ulna		+*	+
Innominate		+*	+*
Femur		+	+
Patella		-	-
Tibia		+	+*
Fibula		+	-
Carpals:	Scaphoid	-	-
	Lunate	-	-
	Triangular	-	-
	Pisiform	-	-
	Trapezium	-	-
	Trapezoid	-	-
	Capitate	-	-
	Hamate	-	-
Metacarpals:	1st	-	+
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-
Phalanges:	Proximal	-	-
	Medial	-	-
	Distal	-	-
Talus		-	-
Calcaneus		-	-
Cuneiforms:	1st	-	-
	2nd	-	-
	3rd	-	-
Cuboid		-	-
Navicular		-	-
Metatarsals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-

+ indicates present, - indicates absent, * indicates incomplete

Table 3

Bethune Skeletal Inventory: Individual 2 (Continued)

		Present	Absent
Skull		+*	
Mandible			+
Sternum:	Manubrium		+
	Gladiolus		+
	Xiphoid		+
Vertebrae:	Cervical	+*(3)	
	Thoracic	+*(8)	
	Lumbar		+
Sacrum			+
Coccyx		+*	
Ribs			+

3.4.3 Individual 3

The third juvenile represented in the Bethune collection is a subadult deemed #3, who was also found in association with Burial Y. The left side of the skeleton is well represented, and the cranium and mandible are present. The osteological inventory can be found in Table 4. Unfortunately, all the remains are in a poor state of preservation leaving stature and sex undetermined. On the basis of tooth eruption and tooth formation in the maxilla and mandible, the age has been placed at 7-8 years +/- 24 months.

3.4.4 Individual 4

Individual #4 is an adult male. The innominates indicate an age range of 20-24 years, however, occlusal wear suggests this individual was marginally older. Skeletal remains are almost complete indicating this individual is probably Pingert and Tillies' Burial Y (Table 5). Pathological conditions are numerous in these remains.

The cranium of this male exhibits a healed transverse fracture of both nasal bones, as well as a healed depressed fracture bordering the left zygomatic and frontal bones (Figure 8). Walker (1978) notes the right nasal bone retains normal alignment, however, the lower portion of the left nasal bone has slipped to the right. This results in an opening between the two portions of the left nasal. The fracture by the left eye has healed in proper alignment, but is probably related to the incomplete closure of the left sphenozygomatic suture. Both injuries were undoubtedly received simultaneously due to an

Table 4

Bethune Skeletal Inventory: Individual 3

		Right	Left
Scapula		+	+*
Clavicle		+	+*
Humerus		+*	-
Radius		-	-
Ulna		-	-
Innominate		+	+*
Femur		-	+*
Patella		+*	+
Tibia		-	+*
Fibula		-	+*
Carpals:	Scaphoid	-	-
	Lunate	-	-
	Triangular	-	-
	Pisiform	-	-
	Trapezium	-	-
	Trapezoid	-	-
	Capitate	-	-
	Hamate	-	-
Metacarpals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-
Phalanges:	Proximal	-	-
	Medial	-	-
	Distal	-	-
Talus		-	-
Calcaneus		-	-
Cuneiforms:	1st	-	-
	2nd	-	-
	3rd	-	-
Cuboid		-	-
Navicular		-	-
Metatarsals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-

+ indicates present, - indicates absent, * indicates incomplete

Table 4

Bethune Skeletal Inventory: Individual 3 (Continued)

		Present	Absent
Skull		+*	
Mandible		+	
Sternum:	Manubrium		+
	Gladiolus		+
	Xiphoid		+
Vertebrae:	Cervical		+
	Thoracic	+(3)	
	Lumbar	+(5)	
Sacrum		+	
Coccyx			+
Ribs			+

Table 5

Bethune Skeletal Inventory: Individual 4

		Right	Left
Scapula		+	+
Clavicle		+	+
Humerus		+	+
Radius		+	+
Ulna		+	+
Innominate		+	+*
Femur		+	+
Patella		-	-
Tibia		+	+
Fibula		+	+
Carpals:	Scaphoid	-	-
	Lunate	-	-
	Triangular	-	-
	Pisiform	-	-
	Trapezium	-	-
	Trapezoid	-	-
	Capitate	-	-
	Hamate	-	-
Metacarpals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-
Phalanges:	Proximal	-	-
	Medial	-	-
	Distal	-	-
Talus		+	+
Calcaneus		-	-
Cuneiforms:	1st	-	-
	2nd	-	-
	3rd	-	-
Cuboid		-	-
Navicular		-	-
Metetarsals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-

+ indicates present, - indicates absent, * indicates incomplete

Table 5

Bethune Skeletal Inventory: Individual 4 (Continued)

		Present	Absent
Skull		+	
Mandible		+	
Sternum:	Manubrium		+
	Gladiolus		+
	Xiphoid		+
Vertebrae:	Cervical	+(5)	
	Thoracic	+(12)	
	Lumbar	+(5)	
Sacrum		+	
Coccyx			+
Ribs			+

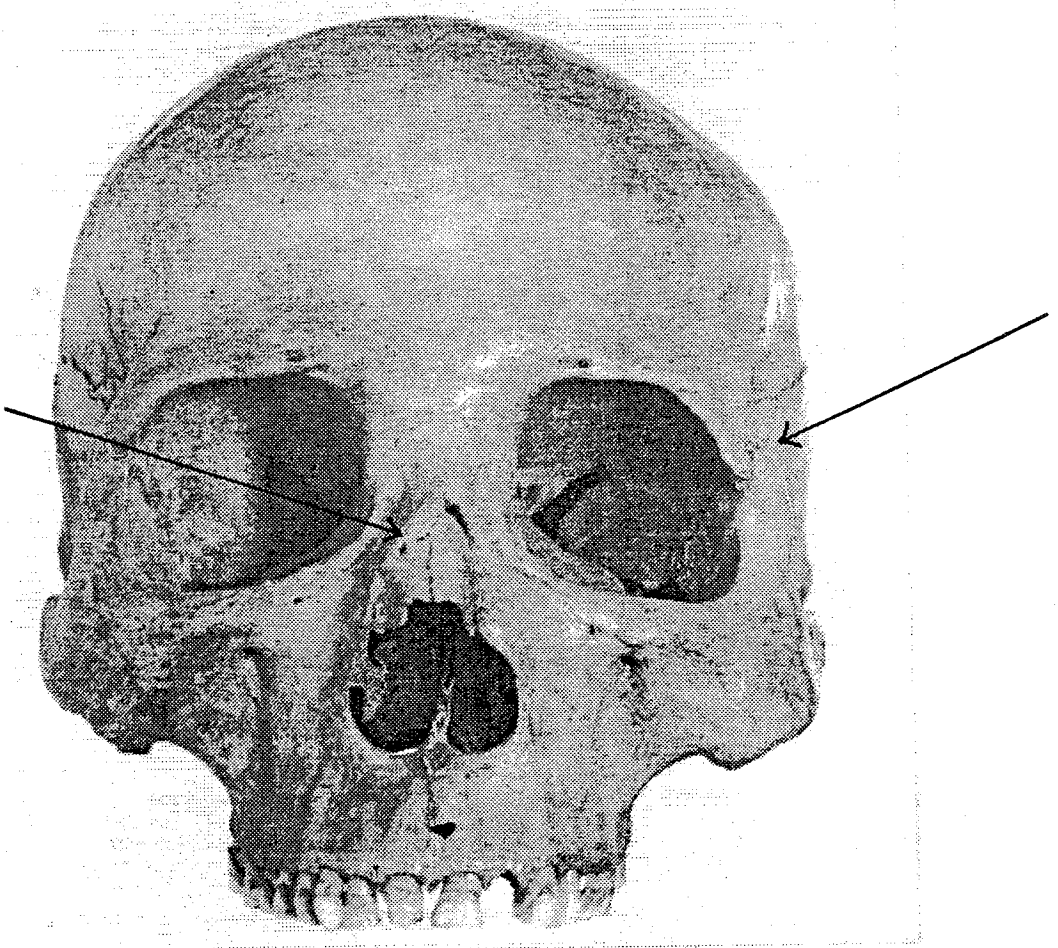


Figure 8

Depressed fractures on cranium of Individual 4

oblique blow directed across the upper left side of the face.

An elongated fissure, 18 mm in length, is present on the lateral condyle of the left femur. Similar lesions have been attributed to the abrupt collision of the patella into the articulating condyle (Walker, 1978:33). The articulating left innominate displays pitting in the superior articular region of the acetabulum. The two conditions may be related to a single source of stress.

The fifth lumbar vertebra of Individual #4 has suffered a compression fracture (Figure 9), resulting in a marked decrease in the overall height of the vertebral centrum. Compression has occurred on both the proximal and distal centrum surfaces leading to almost total loss of the anterior margins. Walker (1978) describes compression fractures as the result of a sudden excessive impaction applied as a vertical force. The resulting appearance of this lumbar vertebra implies such a force was applied when the spine was in a flexed position, leading to a compression of the trabecular portion of the centrum (Walker 1978:32; Merbs 1983:31-33; Ortner and Putschar 1985:55). Merbs (1983) hypothesizes that compression fractures may be an activity-induced pathology. He also notes that compression fracturing is generally preceded by herniation of the intervetebral discs. Evidence of Schmorl's nodes, indicative of damage to the discs, does appear on the inferior surface of the fifth lumbar vertebra and on the superior articulation surface of the sacrum (Merbs 1983:31-33, 171-173).

A developmental abnormality occurs in the dentition of Individual #4. Between the right lateral incisor and canine

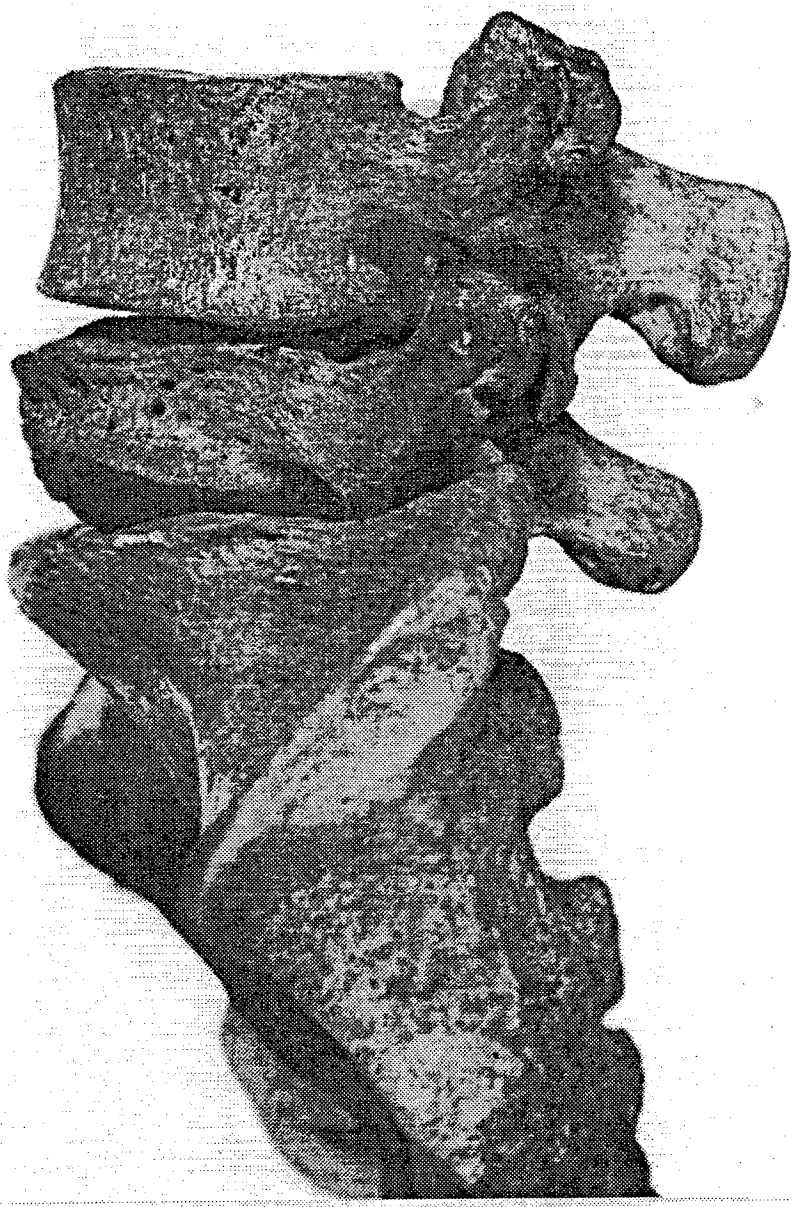


Figure 9

Compressed vertebra of Individual 4

there appears a peg-shaped supernumerary tooth. The overall dentition exhibits some alveolar resorption, while the teeth show marked wear.

3.4.5 Individual 5

Individual #5 is a male who is poorly represented by infracranial remains, as well as an incomplete skull and mandible. A complete osteological inventory appears in Table 6. The majority of the teeth in both the maxilla and mandible have been lost through abscessing. Those that do remain are severely worn indicating an age in excess of 45 years (Brothwell 1965:69). However, these remaining anterior teeth may have been subjected to years of increased usage to compensate for the loss of the molars and premolars. Therefore, this age estimate may also not be valid.

The most apparent pathological condition in this skeleton is the evidence of a severe, but confined, infection on the medial condyle of the left femur. The whole distal articular surface appears porous, except for a smooth region 20 mm by 15 mm at the base of the medial condyle (Figure 10). This region is segregated from the surrounding bone around three quarters of its perimeter. Such a fragment is characteristic of a sequestrum. The lateral condyle houses two smooth-walled cavities on its medial and lateral surfaces. Such concavities, if present on the medial condyle, have been obliterated by post-mortem damage. These cavities may have been a result of abscessing (Walker 1978:34).

Walker (1978) following Jaffe (1972) has provided a

Table 6

Bethune Skeletal Inventory: Individual 5

		Right	Left
Scapula		-	+*
Clavicle		+*	+
Humerus		-	-
Radius		+*	+
Ulna		-	-
Innominate		-	-
Femur		+*	+*
Patella		-	-
Tibia		-	-
Fibula		+	-
Carpals:	Scaphoid	-	-
	Lunate	-	-
	Triangular	-	-
	Pisiform	-	-
	Trapezium	-	-
	Trapezoid	-	-
	Capitate	-	-
	Hamate	-	-
Metacarpals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-
Phalanges:	Proximal	-	-
	Medial	-	-
	Distal	-	-
Talus		-	-
Calcaneus		+	-
Cuneiforms:	1st	-	-
	2nd	-	-
	3rd	-	-
Cuboid		-	-
Navicular		-	-
Metatarsals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-

+ indicates present, - indicates absent, * indicates incomplete

Table 6

Bethune Skeletal Inventory: Individual 5 (Continued)

		Present	Absent
Skull		+*	
Mandible		+*	
Sternum:	Manubrium		+
	Gladiolus		+
	Xiphoid		+
Vertebrae:	Cervical	+(atlas)	
	Thoracic	+(1)	
	Lumbar	+(2)	
Sacrum			+
Coccyx			+
Ribs			+

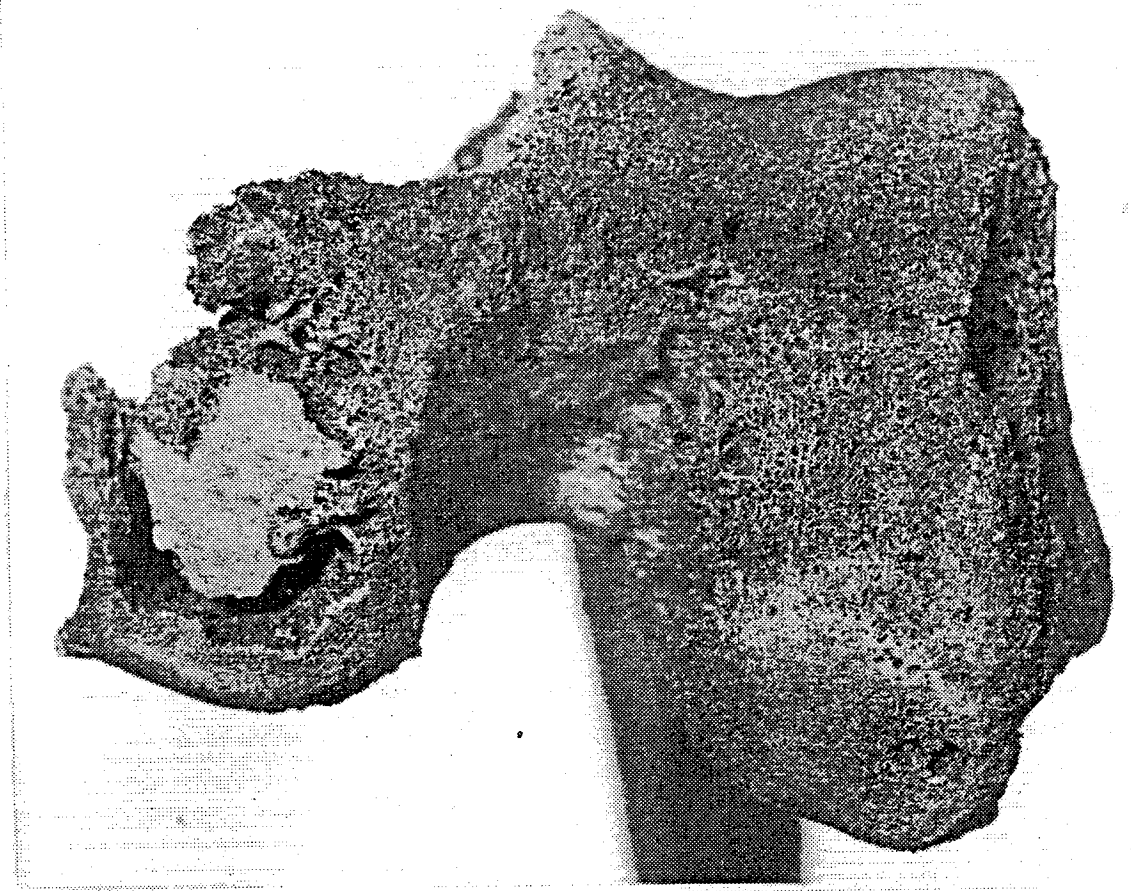


Figure 10 Inflammatory changes in the left femur of Individual 5

description of the pathogenesis of hematogenous pyogenic osteomyelitis.

> Bacteria from other sources of infection enter the bone via a nutrient artery and lodge in the marrow spaces of the metaphysis either adjacent to the epiphyseal plate in a subadult or in the epiphyseal end of the bone in the adult. In these marrow spaces the bacteria produce abscess formation and in time the inflammatory process spreads throughout the cortex along the enlarged Haversian canals. A porosity of the bone cortex results. If the blood supply to a portion of the cortex is interrupted then a cortical sequestrum is formed. As the inflammatory process reaches the outer surface of the cortex subperiosteal abscesses may be formed (Walker 1978:34).

Acute hematogenous osteomyelitis generally affects children, particularly males 3-15 years of age, while adults are more likely to have the chronic form of infection (Steinbock 1976:60-85). The infection favors the long bones of lower extremities, particularly the distal femoral epiphysis, proximal tibial metaphysis, and proximal femoral metaphysis in decreasing order. In most cases the infection is limited to one bone and is localized in a particular area of this bone (Ortner and Putschar 1985:109). Given the morphology of the lesion on Individual #5, and the support of clinical data, it appears highly indicative of an example of chronic hematogenous osteomyelitis (Walker 1978:34).

It may well be possible that the marked periodontal disease noted in this individual may have been related to the generalized bacterimia described above. Peridontal abscessing is caused by the introduction of micro-organisms into the tooth socket via gum disease, or advanced dental caries. In more severe cases, the pressure of the resulting exudate creates a sinus drainage through adjacent tissue. The subsequent destruction of

supporting tissue leads to tooth loss, and eventual healing of the lesion. Once the alveolus undergoes a loss of stimulation disuse atrophy ensues causing further bone destruction. Thus, what begins as the abscessing of a single tooth may at its extreme become pronounced or complete ante-mortem loss of teeth, and subsequent alveolar resorption (Brabant 1967:538-550; Walker 1978:37).

Individual #5 has suffered continual peridontal abscessing and subsequent alveolar resorption, culminating in the total loss of the entire maxillary dentition (Figure 11,12, and 13). All that remains of the alveolar process is sclerotic bone and residual tooth sockets. While alveloar resorption is generally attributed to normal aging or stress resulting from overuse, it can also appear as a symptom of certain metabolic disorders as is probably the case with this individual. In addition, the mandibular molars and some premolars have been lost bilaterally through abscessing.

The remaining teeth of Individual #5 exhibit extreme wear, particularly the right fourth premolar of the mandible which suffered an oblique break antemortem. The subsequent wear on this tooth led to a smoothing of the edges and exposure of the root. The degree of attrition in adults is generally a function of time. However, factors affecting the rate of occurrence include diet, occupation, malocclusion, and psychogenic factors such as teeth grinding. The mandible also exhibits peg-shaped teeth in the medial incisor position bilaterally. However, this is a shape variation rather than a developmental abnormality.

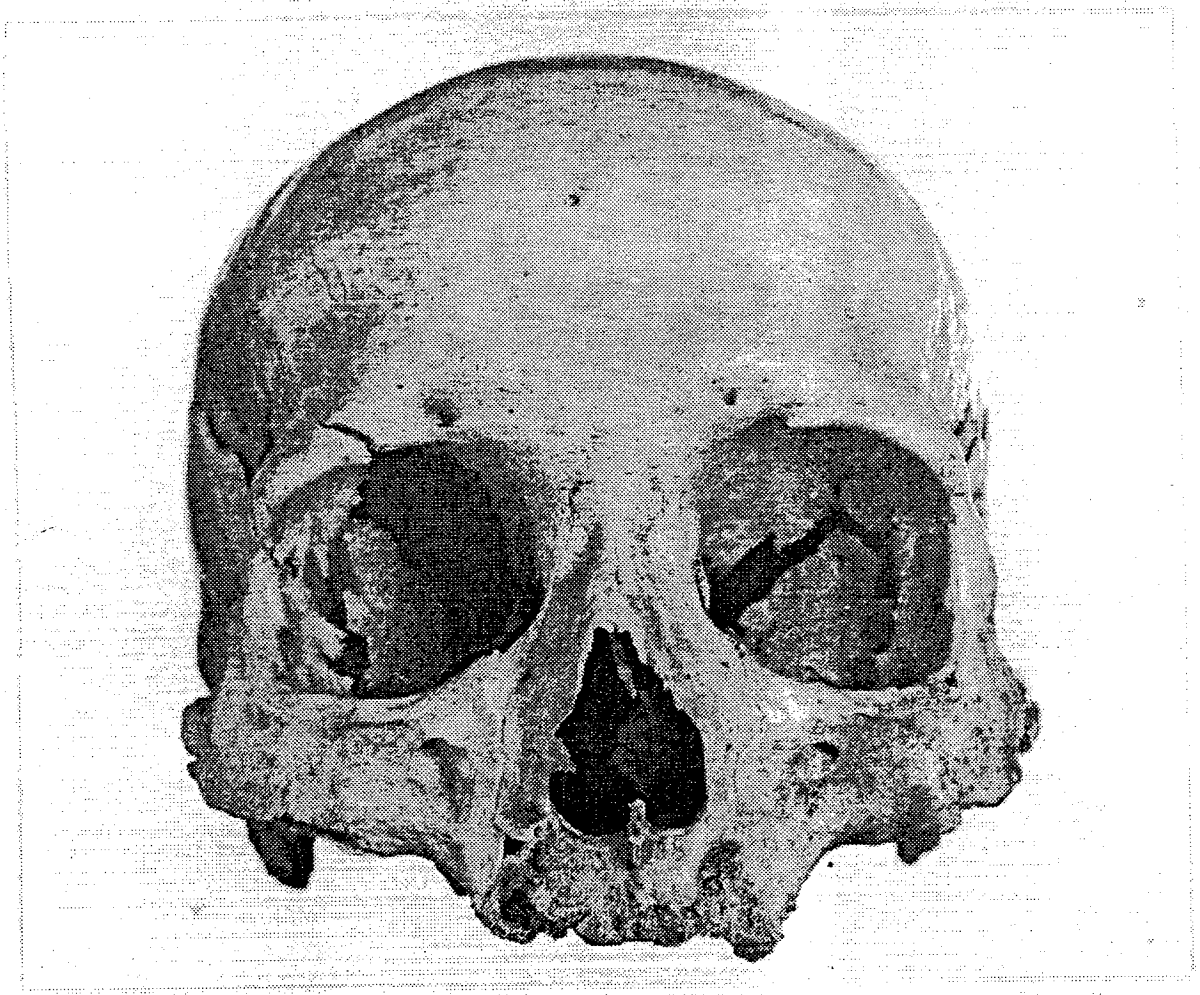


Figure 11

Alveolar resorption of Individual 5, frontal view

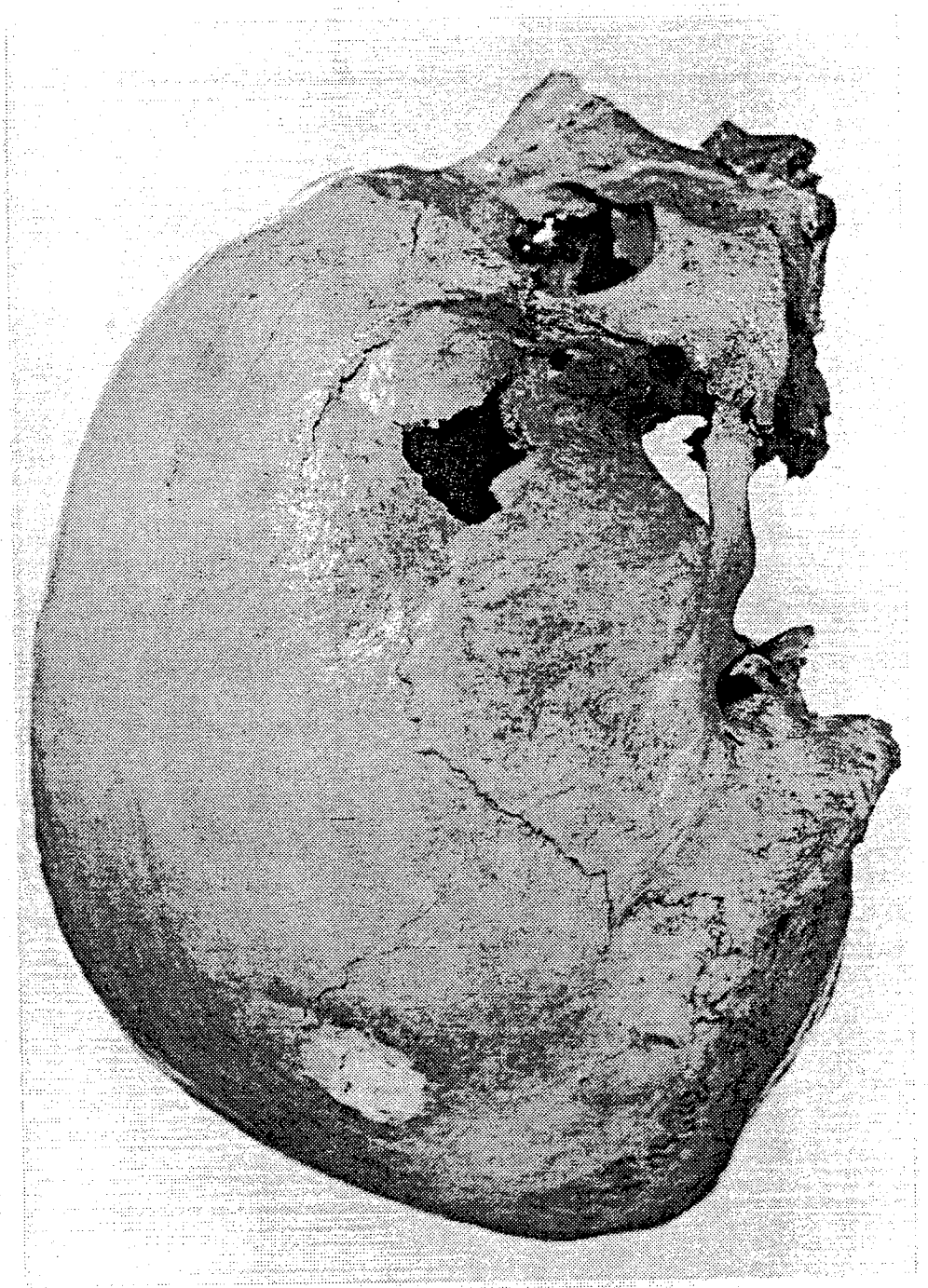


Figure 12

Alveolar resorption of Individual 5, lateral view

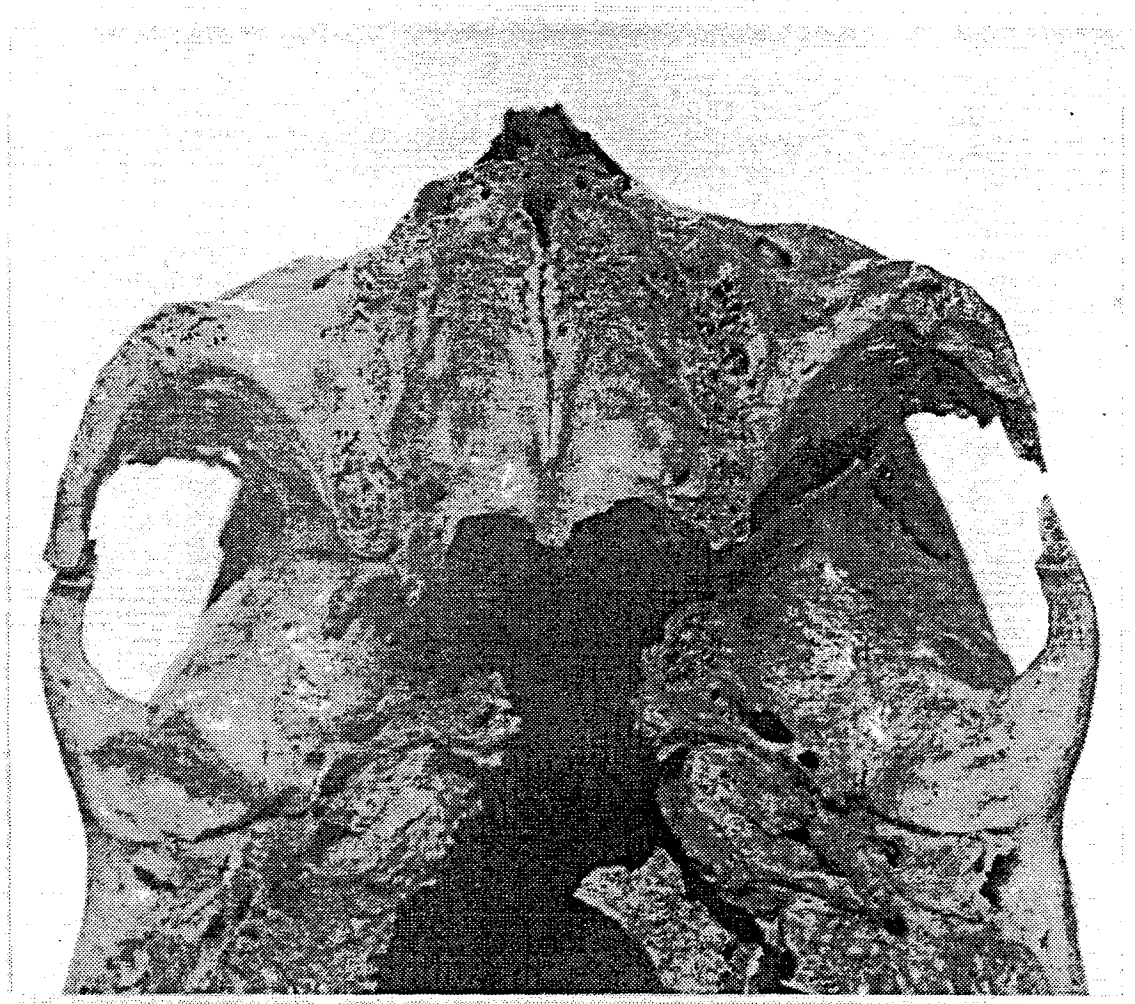


Figure 13

Alveolar resorption of Individual 5, basal view

3.4.6 Individual 6

Individual #6 is well represented by postcranial skeletal remains, however, there are no cranial elements included (Table 7). This lack of a skull indicates these remains may be those designated Burial #5 by Pingert and Tillie. Individual #6 is a female, with an age range of 30-47 years based on the pubic symphysis. The left innominate exhibits pitting in the superior articulating region of the acetabulum, similar to that found in Individual #4.

3.4.7 Individual 7

Individual #7 is also a female. The preserved skeletal remains are predominantly postcranial from the left side. Table 8 contains the complete osteological inventory. The left innominate has suffered some destruction of the os pubis, but nevertheless provides an age range of 23-39 years. The teeth of both the maxilla and mandible are well worn suggesting the upper end of this age range is more accurate.

The left tibia belonging to Individual #7 exhibits areas of hypertrophic bone on the lateral and medial surfaces, directly below the midshaft (Figure 14). Incorporated into the normal cortical bone, such regions undoubtably represent an ossified subperiosteal hemmorhage (Walker 1978:32). Lesions of this type are not uncommon in the weight bearing long bones of the legs. Initiated by trauma or an inadequate consumption of Vitamin C, this results in weakened vascular supplies and subsequent hemmorhage below the periosteum. The elevated periosteum then begins producing reactive bone which attaches to the cortical

Table 7

Bethune Skeletal Inventory: Individual 6

		Right	Left
Scapula		-	-
Clavicle		-	-
Humerus		+*	-
Radius		+	+
Ulna		+	+
Innominate		+*	+
Femur		+	+
Patella		-	-
Tibia		+	+
Fibula		+	+
Carpals:	Scaphoid	-	-
	Lunate	-	-
	Triangular	-	-
	Pisiform	-	-
	Trapezium	-	-
	Trapezoid	-	-
	Capitate	-	-
	Hamate	-	-
Metacarpals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-
Phalanges:	Proximal	-	-
	Medial	-	-
	Distal	-	-
Talus		+	+*
Calcaneus		+*	+
Cuneiforms:	1st	-	-
	2nd	-	-
	3rd	-	-
Cuboid		-	-
Navicular		-	-
Metatarsals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-

+ indicates present, - indicates absent, * indicates incomplete

Table 7

Bethune Skeletal Inventory: Individual 6 (Continued)

		Present	Absent
Skull			+
Mandible			+
Sternum:	Manubrium		+
	Gladiolus		+
	Xiphoid		+
Vertebrae:	Cervical		+
	Thoracic	+(7)	
	Lumbar	+(2)	
Sacrum			+
Coccyx			+
Ribs			+

Table 8

Bethune Skeletal Inventory: Individual 7

		Right	Left
Scapula		+	+*
Clavicle		+*	+*
Humerus		+*	+
Radius		+	+*
Ulna		+	+
Innominate		-	+*
Femur		-	+*
Patella		-	-
Tibia		-	+*
Fibula		-	+*
Carpals:	Scaphoid	-	-
	Lunate	-	-
	Triangular	-	-
	Pisiform	-	-
	Trapezium	-	-
	Trapezoid	-	-
	Capitate	-	-
	Hamate	-	-
Metacarpals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-
Phalnages:	Proximal	-	-
	Medial	-	-
	Distal	-	-
Talus		+	+
Calcaneus		+	+
Cuneiforms:	1st	-	-
	2nd	-	-
	3rd	-	-
Cuboid		-	-
Navicular		-	-
Metatarsals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-

+ indicates present, - indicates absent, * indicates incomplete

Table 8

Bethune Skeletal Inventory: Individual 7 (Continued)

		Present	Absent
Skull		+*	
Mandible		+*	
Sternum:	Manubrium		+
	Gladiolus		+
	Xiphoid		+
Vertebrae:	Cervical	+(7)	
	Thoracic	+(11)	
	Lumbar	+(5)	
Sacrum			+
Coccyx			+
Ribs			+

Figure 14

Hypertrophic bone on left tibia of Individual 7.

bone as the hematoma is resorbed (Ortner and Putschar 1985:270-271).

The most common pathological condition among the Bethune collection is the degeneration of joint surfaces. Degenerative joint disease, or osteoarthritis, is a disorder of diarthrodial joints characterized by the deterioration and abrasion of articular cartilage, followed by the subsequent formation of new sclerotic tissue along joint margins. Osteoarthritis usually affects weight bearing joints, or regions suffering from repeated minor trauma (Steinbock 1976:278-280). The most advanced case is found in Individual #7. The cervical vertebra series, C3-C5, shows extreme erosion and sclerotic bone development around all the articular surfaces (Figure 15). The left postzygapophysis of C4, and the corresponding left prezygapophysis of C5 are eburnated, the result of bone on bone articulation. The lumbar vertebrae series, L1-L5, shows more advanced osteophyte production around the articulation borders (Figure 16) (Walker 1978:33).

Individual #7 also exhibits a unilateral case of spondylolysis in its fifth lumbar vertebra. This specimen shows a complete separation of the neural arch through the left pars interarticularis, resulting in an extremely asymetrical neural arch, caused by a greatly diminished left lamina (Walker 1978:36). As well, the neural arch has suffered distortion and the neural spine skews to the left. A large articulation facet is present on the superior surface of the spinous process of L5, which corresponds to an articular surface on the inferior surface of L4. Such a characteristic indicates a twisting of the neural

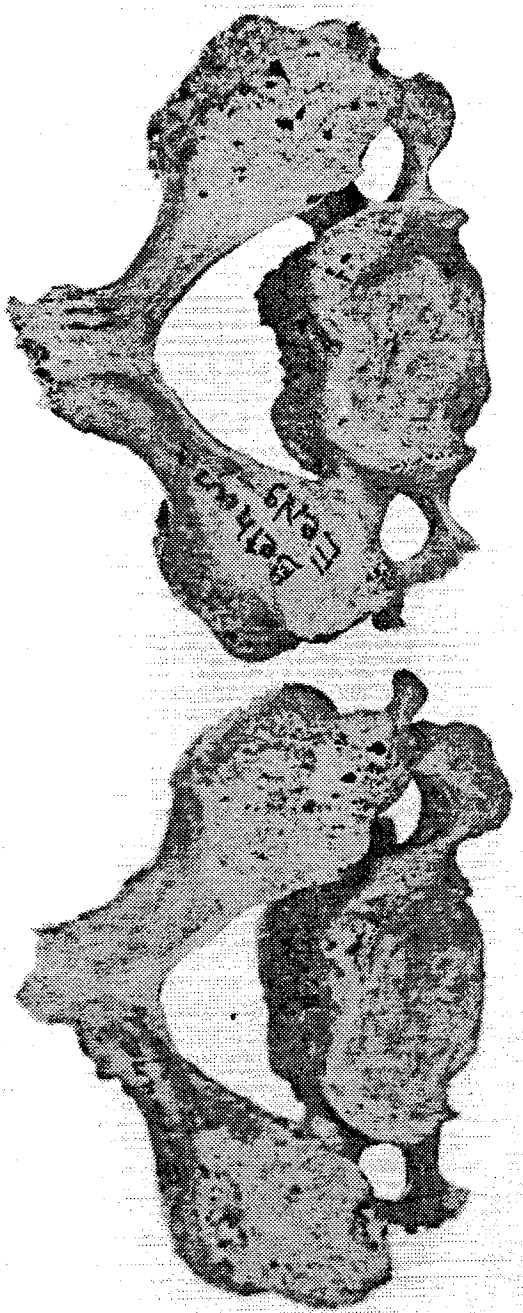


Figure 15

Scleratic cervical vertebrae of Individual 7

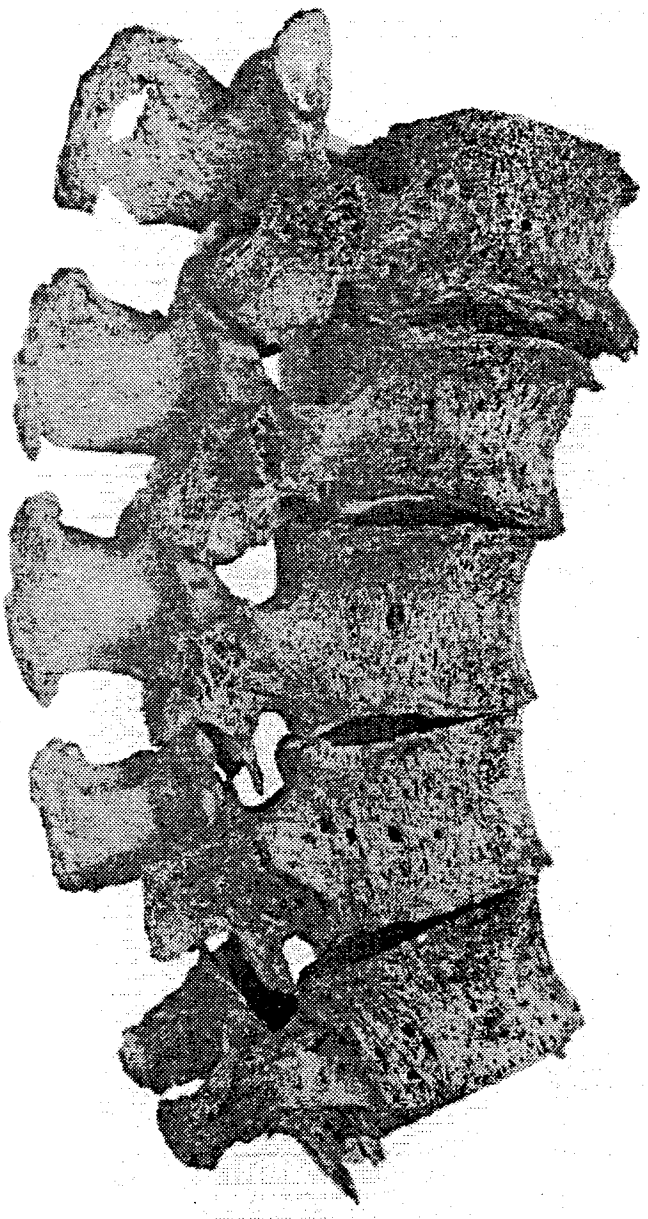


Figure 16

Advanced osteophyte production in lumbar vertebrae of Individual 7

arch resulting in this abnormal vertebral articulation (Walker 1978:36). There is no apparent evidence of centrum collapse suggesting that the causative forces were gradual rather than acute. Merbs (1983) suggests that spondylolysis is triggered by a stress or fatigue fracture which gradually develops from sustained or repeated stress. Thus, he concludes that spondylolysis may be an activity-induced trauma (Merbs 1983:172-176; Ortner and Putschar 1985:357; Steinbock 1976:294-298).

The vertebra sequences T11-L2 of Individual #6 and T12-L2 of Individual #7 show evidence of disc herniation resulting in Schmorl's nodes (Figure 17). Such nodes are the result of disc tissue being displaced into the adjacent vertebral centrum, causing small cavities to develop through erosional pressure (Walker 1978:32). Schmorl's nodes appear as distinct punctate foci on the centrum, or as a general porosity of the entire articular surface (Ortner and Putschar 1985:430-431).

Schmorl's nodes develop as a result of compression forces on the vertebrae which cause damage to the intervertebral discs. The cartilagenous disc capsule tears allowing the nucleus pulposus to escape. Under continuous pressure from this material, the body of the adjacent vertebra both above and below the ruptured disc yields, resulting in cavities in the trabecular bone (Knowles 1983:69). The sequence from Individual #6 includes distinct punctates on the proximal surface of T11 and L2, and on the proximal and distal surfaces of T12 and L1. The sequence from Individual #7 exhibits more diffuse lesions on the distal surface of T12, the proximal surface of L2, and both surfaces of L1. Node formation may result from a single traumatic event, or

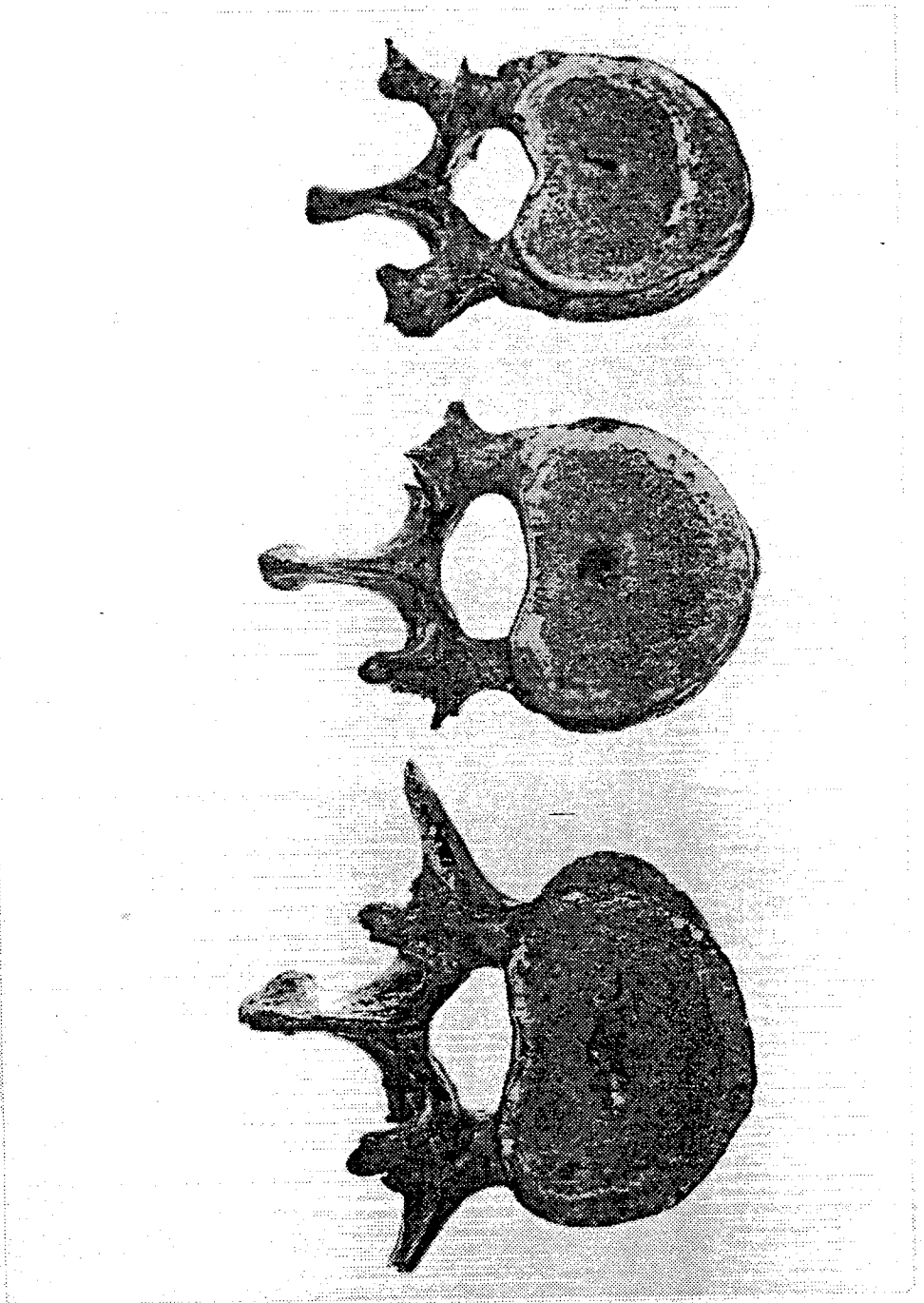


Figure 17

Schmorl's nodes

may be the result of degenerated discs and congenital defects, particularly where vestigial remnants of the notochord left a point of weakness (Knowles 1983:69; Ortner and Putschar 1985:430-431).

3.4.8 Undesignated Materials

Early signs of joint degeneration are found on many of the undesignated skeletal remains. A paired right talus and calcaneus exhibit lipping and erosion around the articular surfaces. Many of the metacarpals, carpals, metatarsals, and phalanges recovered display different stages of osteophyte development bordering articular surfaces.

The Bethune collection includes four ribs which display evidence of having suffered multiple fractures. Each one of the four specimens have fractures through the costochondral junction, while in addition two had fractures on the rib body itself. A primary bony callus unites the broken ends within a week of fracture, before being converted to lamellar bone. Since the primary callus is still evident on these ribs this is indicative of death occuring shortly after the reparative process began (Ortner and Putschar 1985:61-63).

Among the undesignated remains is a thin shaft of bone measuring 84 mm in length and 5 mm in width, which is characterized by irregular bone formations. This may be indicative of a developmental anomaly, in particular, the ossification of the stylohyoid and stylomandibular ligaments, resulting in the elongation of the cranial styloid process (Walker 1978:37).

A single congenital anomaly is found among the Bethune remains involving an undesignated bifid right first rib. This specimen consists of two complete sections of the articular portion of the rib arising from a single aberrant body (Walker 1978:37).

A complete osteological inventory of the undesignated mature materials appears in Table 9, while an inventory of the undesignated immature remains appears in Table 10.

Table 9

Bethune Skeletal Inventory: Undesignated Materials

		Right		Left
Scapula		-		+*(2)
Clavicle		+*(2)		-
Humerus		-		-
Radius		-		-
Ulna		-		-
Innominate		-		-
Femur		-		-
Patella		+		-
Tibia		-		-
Fibula		-		-
Carpals:	Scaphoid	+(2)		+
	Lunate	+		+
	Triangular	+		+(2)
	Pisiform		+(4)	
	Trapezium	+		+(4)
	Trapezoid	+(2)		+
	Capitate	+(4)		+
	Hamate	+(2)		+
Metacarpals:	1st	-		+
	2nd	+		+(2)
	3rd	+		+(3)
	4th	+(4)		+
	5th	-		-
Phalanges:	Proximal - 14 of hand, 24 of foot Medial - 17 of hand, 18 of foot Distal - 13 of foot			
Talus		+		+(2)
Calcaneus		+		+
Cuneiforms:	1st	+(3)		+(3)
	2nd	+		+(3)
	3rd	+(2)		+(2)
Cuboid		+(4)		+(5)
Navicular		+(2)		+(4)
Metatarsals:	1st	+(2)		+(2)
	2nd	+(2)		+(2)
	3rd	+(5)		+(5)
	4th	+(4)		+(5)
	5th	+(3)		+(2)

+ indicates present, - indicates absent, * indicates incomplete

Table 9

Bethune Skeletal Inventory: Undesignated Materials (Continued)

		Present	Absent
Skull		+(fragments)	
Mandible		+(fragment)	
Sternum:	Manubrium	+(2)	
	Gladiolus	+(4)	
	Xiphoid		+
Vertebrae:	Cervical	+(4)	
	Thoracic	+*(2)	
	Lumbar	+(2)	
Sacrum			+
Coccyx			+
Teeth:	Incisor	+(6)	
	Canine	+(2)	
	Premolar	+	
	Molar	+(2)	
	Unknown	+	

Ribs - 46 right ribs (13 complete)
4 right first ribs (1 complete)
1 bifid first rib

- 41 left ribs (11 complete)
2 left first ribs

- 10 undesignated fragments

Table 10

Bethune Skeletal Inventory: Undesignated Immature Materials

		Right		Left
Scapula		-		-
Clavicle		-		-
Humerus			+*	
Radius		-		-
Ulna		-		-
Innominate		-		-
Femur			+(3)	
Patella		-		-
Tibia			+*(2)	
Fibula		-		-
Carpals:	Scaphoid	-		-
	Lunate	-		-
	Triangular	-		-
	Pisiform	-		-
	Trapezium	-		-
	Trapezoid	-		+
	Capitate	-		-
	Hamate	-		-
Metacarpals:	1st	-		-
	2nd	-		-
	3rd	-		-
	4th	-		-
	5th	-		-
Phalanges:	Proximal - 20 of hand, 1 of foot			
	Medial - 13 of hand			
	Distal - 6 of hand, 3 of foot			
Talus		+		-
Calcaneus		+		+*
Cuneiforms:	1st	-		-
	2nd	-		-
	3rd	-		-
Cuboid		-		-
Navicular		-		-
Metatarsals:	1st	-		-
	2nd	-		-
	3rd	-		-
	4th	-		-
	5th	-		-

+ indicates present, - indicates absent, * indicates incomplete

Table 10

Bethune Skeletal Inventory: Undesignated Immature Materials (Continued)

		Present	Absent
Skull			+
Mandible			+
Sternum:	Manubrium	+*(2)	
	Gladiolus		+
	Xiphoid		+
Vertebrae:	Cervical		+
	Thoracic	+*	
	Lumbar		+
Sacrum			+
Coccyx			+

Ribs - 9 right ribs
2 first right ribs (1 complete)

- 8 left ribs (3 complete)

- 12 undesignated fragments

3.5 The Bethune Cultural Remains

The two Wyoming burials attributed to the Avonlea complex yielded an abundance of grave goods. Included with the Leath burial were 24 projectile points, 72 tubular bone beads, 2 drilled Unio shell pendants, and an assortment of bifaces, knives, and flakes. The Billy Creek burial produced a total of 110 projectile points or portions thereof, 23 tubular beads, 6 drilled shell pendants, and numerous bifaces and flakes (Galloway 1962, 1968). Unlike these burials, the Bethune site contained little in the way of grave goods. The complete artifact assemblage includes five different lithic items and one bone artifact (Figure 18 and 19). Unfortunately, with the exception of the projectile point, we do not have any proveniences for these recovered materials. This general paucity of cultural remains may be the result of erosional forces working artifacts to the surface where they were subsequently lost, or the artifacts may have been lost to pot hunters.

3.5.1 Projectile Point

Discovered in association with Burial X (Figure 5), this complete triangular point is characteristic of the classic Avonlea point, with "small, shallow side-notches which are very close to the base" (Dyck 1983:122). The point is symmetrical in shape, has a straight base, and exhibits some basal modification in the form of thinning. The projectile point is fashioned from dark brown transluscent chalcedony (silicified peat), one of the raw materials favored by the complex (Kehoe 1966:289). A list of the basic dimensions recorded for the point are found in Table

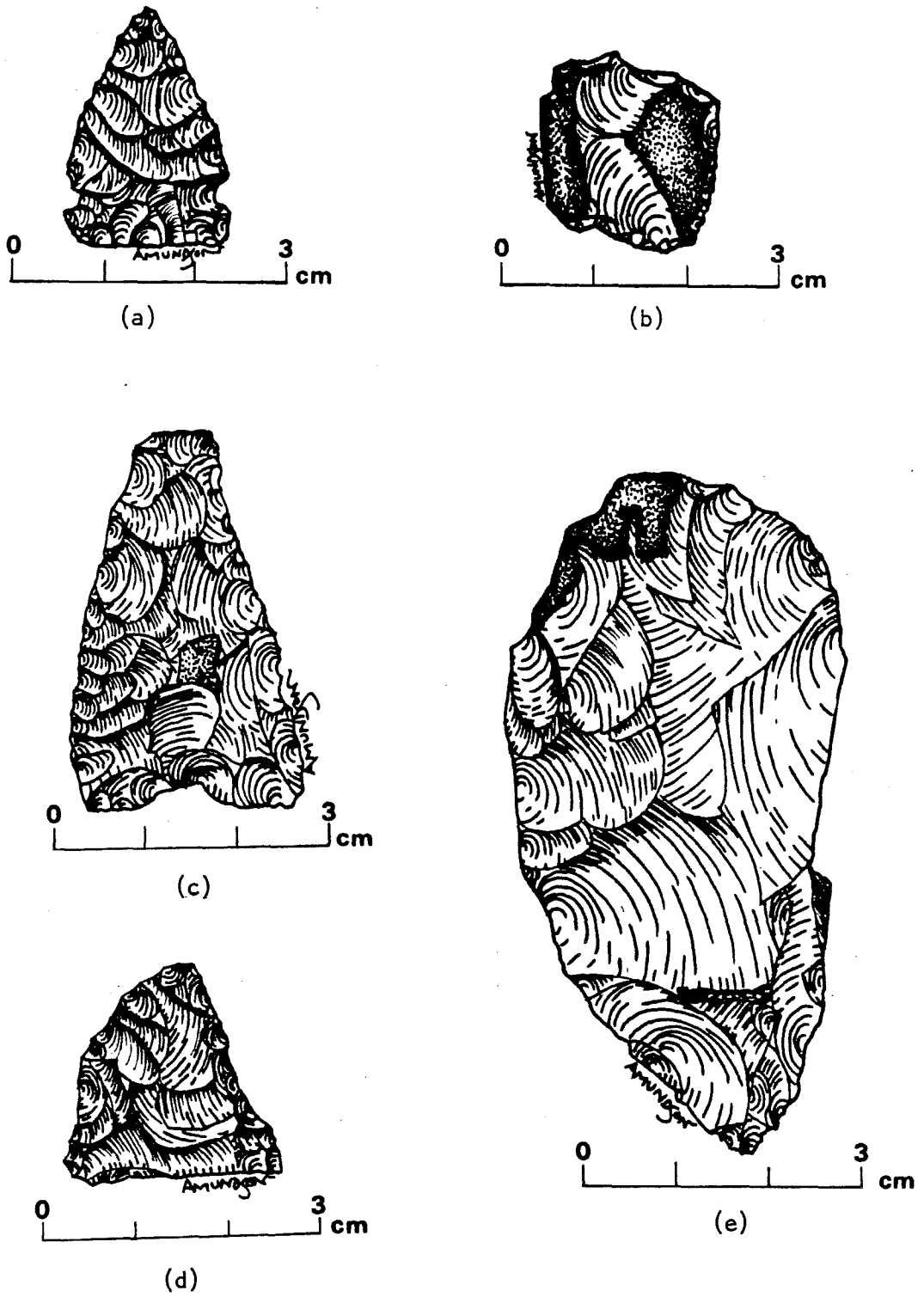


Figure 18 The Lithic Artifacts from the Bethune Site (a) Avonlea Point, (b) Endscraper, (c) Drill, (d) Retouched Flake, and (e) Biface

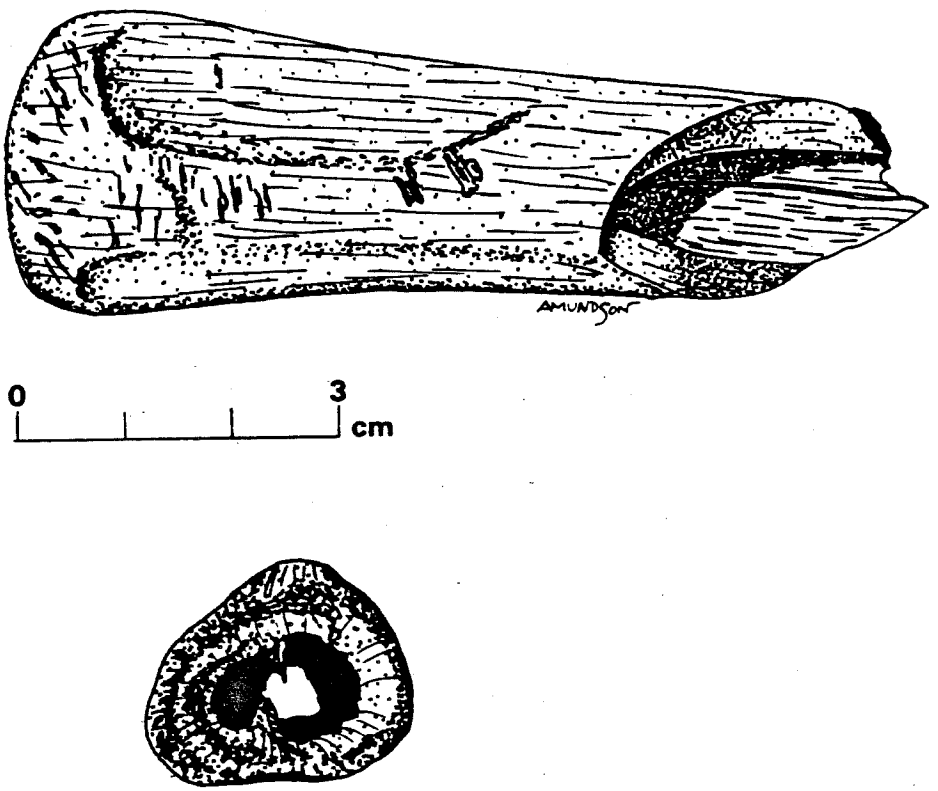


Figure 19

The Bone Artifact from the Bethune Site

11.

3.5.2 Biface

This artifact features flake removal along both the dorsal and ventral sides of the left lateral margin. In general the tool is assymetrically oval in shape, with a straight right lateral edge and a convex left lateral edge which meet in a point at the distal end. The proximal end is convex in shape. This bifacial knife is made from fine grained quartzite, mottled tan in color. The basic dimensions are listed in Table 11.

3.5.3 Endscraper

The endscraper recovered from the Bethune site is slightly rectangular in shape, with the proximal edge serving as the main working surface. The distal working edge is straight to slightly convex, while the proximal surface is concave to convex. The endscraper was fashioned from banded brown and black jasper, and displays remnants of cortex along the right and left lateral margins. Results from the metric analysis are listed in Table 11.

3.5.4 Drill

Drills are included in the larger category of perforators, which includes any tool used to fashion a hole in another material. Utilized for boring holes in bone or softer lithics, the recovered drill is made from grey fine grained quartzite. The interpretation of this artifact cannot be proven because the working end has been broken off. However, all its characteristics are reminiscent of those of drills. Slightly

Table 11

Bethune Cultural Remains

Projectile Point

maximum length	24	mm
maximum width	16	mm
distance maximum width from base	6.5	mm
width of base	15	mm
maximum thickness	2.9	mm
depth of right notch	1.5	mm
depth of left notch	2	mm
length of right notch opening	2.5	mm
length of left notch opening	1.9	mm
maximum stem length	4	mm
maximum stem width	17	mm

Biface

maximum length	62	mm
maximum width	33	mm
distance maximum width from proximal end	24	mm
maximum thickness	12.5	mm

Endscraper

maximum length	18	mm
maximum thickness	7	mm
distance maximum thickness from proximal end	12	mm
angle of distal end	2	
angle of proximal end	7	
angle of right lateral edge	6	
angle of left lateral edge	3	
maximum width	19	mm
distance maximum width from distal edge of furthermost projection	6	mm

Drill

maximum length	40	mm
maximum width	24	mm
maximum thickness	7	mm
depth of notch	2	mm
width of notch	6	mm
maximum right stem width	10	mm
maximum left stem width	8	mm

Table 11

Bethune Cultural Remains (Continued)

Retouched Flake

maximum length	23	mm
maximum width	23	mm
maximum thickness	4.5	mm

Bone Artifact

maximum length	71.5	mm
maximum width (antero-posterior)	19	mm
maximum thickness (medio-lateral)	24	mm

asymetrical, the drill is triangular in shape, exhibits bifacial retouching, and has a notched base for hafting. A list of basic dimensions can be found in Table 11.

3.5.5 Retouched Flake

Retouched flakes encompass any form of flake exhibiting a minimum of modification to a basic edge. As such, one example is found in the Bethune collection. Made from dark brown chalcedony (silicified peat), this flake has been broken to its present triangular shape. The right lateral margin exhibits retouch flaking in its entirety. Given the inability to use this tool form in comparative analysis, a minimum number of basic dimensions have been taken. These dimensions are listed in Table 11.

3.5.6 Bone Artifact

The bone artifact is fashioned from the proximal end of a metacarpal identified as Antilocapra americanus, or pronghorn antelope. Heavily stained with red ochre, this artifact exhibits an oblique break acquired at some point prior to interment. The basal edges of this metacarpal have been ground and polished until they assumed their present round character.

This artifact may represent the base of a bone whistle (Walker, personal communication), however, the absence of any holes makes this hypothesis difficult to prove. A second possibility may be that this artifact is a broken tubular bead. Galloway reports a large number of such beads being recovered from both the Leath and Billy Creek burials (Galloway 1962, 1968). All the beads recovered at Billy Creek exhibit moderate

smoothing at both ends, while only 14% of those recovered from the Leath site "appear to have been superficially ground after cutting" (Galloway 1962:5). There is no mention of the use of ochre at either Wyoming site. Regardless of what the Bethune artifact represents, the presence of red ochre leaves little doubt it had some ornamental or non-utilitarian function. A list of basic dimensions appears in Table 11.

3.6 Summary

On the basis of the recovered Avonlea projectile point and radiocarbon date of 1389 +/- 40 years B.P. we are fairly secure in designating the Bethune site an Avonlea burial. As in the Wyoming Avonlea burials, the Bethune burial contains multiple individuals in what appears to be a single event interment. There is no indication that a second, intrusive burial event occured. However, a subsequent history of cultivation would undoubtedly have obliterated any such evidence.

All the individuals, save two, were reminiscent of secondary burials following scaffolding. The remains of one individual were interred vertically in a bundle burial. Such an orientation is unusual, suggesting some form of disturbance occurred after interment. The other incomplete remains were scattered throughout the site. The remaining two individuals showed varying degress of skeletal articulation suggesting they were primary flexed burials.

The paucity of grave goods recovered from the Bethune site cannot be considered indicative of the norm in regards to Avonlea burials. Undoubtedly erosion or pot hunters are responsible for

the lack of cultural remains. However, our limited collection does include examples of many of those cultural remains found in Wyoming. Given the previous limited knowledge of Avonlea burials, when compared with the Billy Creek and Leath burials, the Bethune site appears to be a characteristic Avonlea burial.

4.0 Burial Mounds of the Late Prehistoric

Contemporaneous with the Avonlea and other more typical Late Prehistoric burial practices are the burial mounds found on the Great Plains. Historically, there is no record of burial mound construction in Saskatchewan, or the northeastern Plains. However, the archaeological record is relatively large, encompassing data from several hundred mounds, most of which are located in southern Manitoba (Syms 1978: 57). Acquisition of mound data has been hindered by the excessive pot hunting which has been prevalent for decades. Loss of cultural artifacts and mound disturbance render the original burial mode and cultural identification of the mound impossible to determine. Compounding these problems is the fact that many mounds were studied prior to the use of radiocarbon dating. Thus, temporal placement was established on the basis of projectile points, ceramic styles, or some other distinguishing feature. This lack of temporal control resulted in mounds being grouped together on the basis of geographic location. It was assumed that all the mounds in a particular vicinity were constructed concurrently by one group. With the advent of radiocarbon dating came the realization that the mounds had considerable antiquity and could be related to a range of cultural complexes (Syms 1978:57).

To date there are three burial mounds which have undergone varying degrees of scientific study in Saskatchewan. These include the Moose Bay mound in the Qu'Appelle Valley; the Glen Ewen mound in southeastern Saskatchewan; and the Sisterbutte mound near Glentworth, Saskatchewan. In addition, two possible

mound structures have been reported in the Souris region, in southeastern Saskatchewan, however, these have not undergone any excavation. The osteological and cultural remains from the Sisterbutte, Glen Ewen, and Moose Bay mounds were examined by the author. Metric and non-metric data was collected, and the skeletal materials were examined for pathological conditions. It was hoped the results of these analyses would augment existing information and allow these mounds to be related to a specific mound building complex or complexes.

4.1 Classification of Burial Mounds

Throughout the past two centuries mounds have held a special fascination for man. Questions such as who were the mound builders, and why were mounds constructed continually arise. These questions, and many more, have resulted in a great deal of archaeological and ethnohistorical data being amassed, and many hypotheses being presented. Yet even today the mounds and their builders remain, to a large degree, an enigma. Prior to discussing the mounds themselves, it is necessary to review the varied history of mound classification.

Burial mounds represent a poorly understood time period in the prehistory of Saskatchewan, and much of the Northern Great Plains. Until the mid-1800s it was hypothesized that the large Hopewellian and Mississipian mounds were the work of a lost race of mound builders. During the 1800s, mound "excavations" were rampant as people sought information on these mound builders.

While some were content to write about their endeavors, most began a frantic search of mound centers seeking to recover the exotic grave goods accompanying the human remains. The written works of these "amateur archaeologists" tend to be general in nature and often solely reliant on the author's memory. There is little concern for context, measurements, or systematic recording or dating. As most of these individuals were associated with historical or scientific societies, much of their ignorance and speculative ideas were accepted as facts by the general public. Not until 1894, when a monumental work by Cyrus Thomas entitled "Report on the Mound Explorations of the Bureau of Ethnology" was published, were the hypotheses involving the mound builders shattered. The sheer volume of archaeological and ethnohistorical data compiled by Thomas showed that indigenous tribes were responsible for the construction of mounds into the historic period (Willey and Sabloff 1974:20).

During the period 1907-1910, Henry Montgomery began digging mounds in Western Canada after spending much time in North Dakota. Responsible for excavating between 25 and 30 mounds, Montgomery's digging technique unfortunately resulted in a series of "doughnut-shaped" features due to his tendency to dig out the centre (Syms 1978: 11). Unfamiliar with the work of Thomas, Montgomery was unaware that the myth of a race of mound-builders had been dispelled. He continued to refer to the mound builders as pre-Siouan and non-Algonquian people, an identification based more on intuition than ethnographic or ethnohistorical data (Syms 1978: 12).

The first classification involving cultures of the northeastern periphery was developed by Lloyd Wilford (1941). This classification amounted to a description of Minnesota's cultural complexes devoid of any chronological sequence. Wilford (1955) elaborated on his original classification, arranging cultures into chronological order.

The earliest attempt to assign various mounds found on the Northern Great Plains to specific archaeological complexes was undertaken by Vickers in the 1940s. He became the only individual to attempt systematically assigning mounds to his chronology of four foci: (1) the Pelican Lake focus, (2) an unnamed focus identified by washer-shaped beads and trapezoidal shell pendants, (3) the Manitoba focus, and (4) the Rock Lake focus which was equated with the Laurel focus of Minnesota (Syms 1978:61). While Vickers' work was an accomplishment in itself, given the staggering amount of data involved, it is necessary to review it critically.

Completed prior to the development of radiocarbon dating, Vickers relies on a very narrow temporal perspective with pottery having been made only since A.D. 1400. His excavation technique consisted of digging arbitrary levels of six inches (15.2 cms) and assigning all materials in each level to a specific focus. This resulted in the lumping of multiple phases into one complex. Although Vickers identified several native groups in southern Manitoba, he assigned archaeological materials to only the Cree and Assiniboine, particularly the latter who held a special interest for him. In retrospect, Vickers' efforts to assign the mounds to individual foci were misguided and the resulting

classification spurious.

In the 1950s, MacNeish developed a stacked chronology which became the definitive research base up until the 1970s. Essentially an elaboration of Vickers' chronology, MacNeish assigned all the Manitoba mounds to one phase (*) attributed to the Assiniboine, disregarding the variability in, or lack of, diagnostic artifacts. The Manitoba phase was dated A.D. 1000-1350. MacNeish briefly referred to the Melita focus as covering southern Manitoba, eastern North Dakota, and southeastern Saskatchewan (MacNeish, 1958:77). For the most part, MacNeish provides no justification for his inclusion of particular mounds in this phase.

Capes (1963) published the work that Nickerson undertook during the 1910s. Unlike his peers, Nickerson had a concern for systematic excavations and recording. From his notes Capes recognized that the Manitoba mounds had similarities with complexes from Wisconsin, Minnesota, and North Dakota. Noting variations within the mounds, Capes concluded that the Manitoba mounds and their traits were introduced from different directions, by "closely related peoples influenced by accumulated traits that reach back to Middle Woodland times" (Capes 1963:119). Unfortunately, Capes' work was solely based on antiquated records and lacked radiocarbon dates for substantiation and trait distinction.

(*) The use of "phase" and "focus" has been included in this discussion because of their historical relevance (Willey and Phillips 1958).

With respect to osteological analyses, several works have been conducted regarding demographics, pathologies, and degree of dissimilarity (Bass 1964; Phenice 1969; Bass et al. 1971; Wilkinson 1971: Ossenburg 1974). Ossenberg's work directly involves the Manitoba mounds. This analysis was hampered by inadequate sample sizes in some populations and the lumping of mixed populations in other samples. Both are severe limitations since each population is measured against every other one. Thus, errors in one population will affect all the inter-relationships. Compounding these limitations is the influence of the MacNeish chronology on her work. As a result, mounds are grouped on the basis of their geographical proximity, and not on their possible cultural affiliation (Syms 1978:75-80).

With the 1970s came a realization that the mounds of the Great Plains had considerable antiquity, and could not possibly all be assigned to a single phase. With mound construction occuring over the last 200 years, the cultural history was obviously more complicated than previous studies had allowed. The ideal circumstance would be for each mound to be analyzed on its own merits, and then related to the range of cultural complexes which have been, and are still being identified.

The mounds of northern Minnesota and Ontario are identified with the Laurel and Blackduck foci (Stoltman 1973: Dawson 1974). Mounds in the central and southern regions of Minnesota have been connected with the Arvilla, Kathio, Oneota, Cambria, and Malmo foci, as well as with an unnamed southern focus (Wilford et al. 1969; Wilford 1970; Johnson 1973; Syms 1978, 1979). The relevant foci to this study are discussed below.

The Mille Lacs aspect is composed of two taxonomic subunits, the Malmo and Kathio foci. The Malmo focus is the earlier of the two, appearing circa 700 B.C. and prevailing until A.D. 500. This focus is identified mainly from sites in the Mille Lacs region of central Minnesota. The characteristic mode of burial is secondary bundle burials placed in a shallow central burial pit with logs arranged over the top. Often there is some charring of the bones, evidence to at least partial cremation (Wilford et al. 1969:50-51). Grave goods associated with particular individuals are rarely discovered in Malmo mounds. Instead, most artifacts are discovered in the mound fill. Among these artifacts are stemmed, notched, and triangular points, as well as characteristic smooth surfaced, grit-tempered, conical based ceramic sherds (Wilford et al. 1969:1-50).

The Kathio focus is limited by our meager knowledge of its temporal and spatial distribution. Believed to form a cultural continuum with the Malmo focus, the Kathio focus appears circa A.D. 900 and has terminated by A.D. 1000. Typical burials of this focus involved bundles being placed on the original ground level with the mound being constructed above them. It is not unusual to discover the presence of a stone cairn within these mounds. Such cairns were also constructed on the original surface and the skeleton then placed near them. Wilford (1941) describes a typical Kathio Burial:

> Mounds are built near lakes and streams and usually contain one or a few bundle burials, though single mounds may contain more. Original burials are on the ground level. An absence of grave goods is characteristic. Primary flexed burials occur occasionally, and some mounds have added features. Low, circular rock cairns on the floor of the mound; the use of small logs or poles, both charred and uncharred, over the burials; the burial in the earth of the mound of carcasses of food animals; cremation in place; and deposition of cremated remains are found (Wilford 1941:237).

The characteristic Kathio projectile point has evolved from predominantly stemmed to predominantly triangular in form. The pottery has also undergone some change, the smooth surface giving way to cord-wrapped and paddle impressed with the vessels having round bodies, sharp shoulders, and prominent necks.

For those mounds deemed transitional, or lacking any distinct characteristics which would place them in a particular focus, the general Mille Lacs aspect was used. Components of the Mille Lacs aspect are located throughout a wide tract extending across central and north-central Minnesota, from the eastern to western boundaries (Wilford 1970:9).

The Laurel focus extends from east-central Saskatchewan through southern Manitoba, northern Minnesota, and into Ontario. The focus is well represented in the eastern forests of northern Saskatchewan, however, its northern most limits are difficult to ascertain due to the paucity of research in this region. Temporally, Laurel first appeared in Minnesota about 100 B.C. and lasted until A.D. 800. Burial mounds associated with the Laurel focus tend to include secondary bundle interments often accompanied by red ochre (Stoltman 1973:1-3; Meyer 1983:160-163).

The Laurel culture is characterized by a hunting and

gathering lifestyle, with extensive exploitation of fish during the warmer summer months (Stoltman 1973: 3). The distinctive artifact assemblage reflects this affinity to aquatic resources. Characteristic features of the Laurel culture include a lithic industry typified by numerous endscrapers, and stemmed and notched projectile points. They also had a bone and antler industry from which were fashioned hafted beaver incisor tools and toggle head harpoons (Stoltman 1973:3). The most distinctive feature are the coiled, conoidal pottery vessels tempered with crushed rock. The vessels had a smooth exterior surface, with an upper rim frequently decorated with dentate or pseudo-scallop shell stamping, linear stamping, or stab and drag stamping (Meyer 1983:160-163; Stoltman 1973:1-3). Eastern locations around the Great Lakes reveal a native copper industry where the metal was cold hammered into simple tools such as awls, barbs, chisels, and beads.

The Sonota complex represents a regional segment of a prehistoric cultural tradition which effectively exploited the plains-riverine environment of north-central North America, appearing about A.D. 1 and persisting until at least A.D. 600 (Neuman 1975: 1). The western range of the Sonota complex included the southern regions of Alberta and Saskatchewan, Montana in its entirety, and the western portion of the Dakotas (Neuman 1975: 91). The Sonota complex is also characterized by a subsistence pattern oriented around the buffalo. The major means of killing the animals was by stampeding them over a river bank, or by coralling them in a natural break where they were killed using atlatls (Neuman 1975: 89). Bison offerings were

often placed in burial mounds, manifesting its importance to this culture. The burial mounds were oval in shape with subsurface, centrally located burial pits. Interments were predominantly secondary bundle burials, with some evidence of primary flexed burials. The presence of ochre is also predominant (Neuman 1975: 75-96).

The artifact assemblage of the Sonota culture reveals an affinity for Knife River flint side-notched projectile points, knives, endscrapers, and sidescrapers. Basketry and matting have also been recovered, with cordage manifest in their ceramics (Neuman 1975:89). Exotic grave goods include shell, bear canine teeth, and bird effigy pendants; copper and clay beads; and catlinite, columella, and conch artifacts (Neuman 1975:79-95). A characteristic feature predominant in all known Sonota mounds is the presence of quantities of pigments, including such sources as hematite, greensand, magnetite, and yellow ochre (Neuman 1975: 90-95).

Artifacts manifesting a ceramic industry for the Sonota culture are not particularly abundant. The total artifact inventory includes a selection of vessel sherds, a clay pipe bowl, and several clay beads. From these materials we can hypothesize that the Sonota complex had one general class of pottery which involved a grit-sand temper, and use of the paddle and anvil method of construction. Neuman notes that to date there has been no recovered evidence for coiled pottery being part of the Sonota cutural tradition (Neuman 1975:93). The characteristic shape is conoidal, with a cord marked or plain surface finish. The decorations are equally austere, being

limited to punctates or dentate stamps.

The Sonota burial complex reflects derivations transmitted westward by Hopewellian societies from sites in the east and southeast portions of the north-central Plains (Neuman 1975: 96). While the Sonota complex did not necessarily originate on the Plains, its similarity to the Besant complex suggests it most certainly underwent its cultural development on the Northern Great Plains, and is closely linked to the Besant occupations in Montana, Saskatchewan, and Alberta (Neuman 1975: 93-94; Syms 1978: 63-68).

The Arvilla complex inhabited an area stretching from east-central Minnesota to the Red River Valley, and north across the Pembina plain to Winnipeg (Johnson 1973:65). The burial complex reveals a recurring pattern of linear and circular mounds covering deep subsoil pits which contain primary flexed, primary disarticulated, and secondary bundle burials. There is a high incidence of red and yellow ochre in Arvilla burials. To date the deep pits have never revealed any stone facings or coverings, as are found in Mille Lacs burials. There appears to be no single diagnostic trait for the Arvilla omplex. Rather, it is the particular combination of utilitarian and ornamental goods found in recurring patterns which identifies this cultural complex. The interred utilitarian objects include stemmed and corner-notched projectile points, chipped stone sidescrapers, pipes, deer antler hafts, bone awls and pins, and antler tip flaking tools. Ornamental grave goods are dominated by shell beads, pendants, and gorgets; eagle talons; bear claws and incisors; bird beaks; wolf or dog canines; bone and turtle

carapace pendants; and pottery vessels. These mortuary vessels appear to be non-utilitarian given the lack of any interior staining or charring indicative of use prior to interment (Johnson 1973:58-62; Syms 1982:151).

Johnson suggests the Arvilla complex appeared circa A.D. 500-600 and began a northward spread. He believes the demise in southern regions occurred about A.D. 900, with the northern existence terminating several hundred years later (Johnson 1973:65-66). Syms, however, suggests the upper end of this range has to be extended due to Arvilla items which reflect trading networks with Mississippian developments dated A.D. 800-1350. He also notes the recovery of one Duck Bay punctate vessel from an Arvilla site which has been established as Blackduck circa A.D. 1200-1400 (Syms 1979:300).

The Blackduck focus is a Late Woodland cultural manifestation which extended westward from Lake Superior across northwestern Ontario, northern Minnesota, northwestern Wisconsin, southern Manitoba, and northern Saskatchewan. The temporal span of this culture is tentatively set at A.D. 800-1400. Blackduck includes several regional complexes which Syms attributed to a single horizon style (Syms 1977:97). This horizon is characterized by globular pottery vessels sporting constricted necks and flaring rims. The necks, rims, and lips of Blackduck ceramics are elaborately decorated with punctates and cord wrapped tool impressions. Among the characteristic grave goods are small triangular notched and un-notched projectile points, endscrapers, sidescrapers, awls, tubular pipes, unilateral harpoon and socketed bone projectile points, bone spatulates,

fleshers, copper beads and awls, and beaver incisor gouges (Syms 1977:104; Evans 1961:271-275). Blackduck burials are often discovered as intrusive interments in Laurel mounds. Occasionally small Laurel mounds were lengthened and heightened in order to accomodate additional Blackduck remains (Wilford 1955:136). The burials are primary interments with the individuals being placed in a flexed sitting or kneeling position.

Finally, the Devils Lake-Sourisford burial complex is centered in an arc extending across the northeastern Plains from the Aspen Parkland to the Missouri Coteau including southeastern North Dakota, southern Manitoba, and southeastern Saskatchewan (Syms 1978: 69). The complex spread into the northeastern Plains about A.D. 900-1000 and persisted until the 1400s, with a few items existing into the historic period. Characteristic of the Devils Lake-Sourisford culture are small vessels with incised effigy motifs; conch shell mask-gorgets, with some displaying a weeping eye motif; columella beads; incised tablets; catlinite and steatite tubular pipes; "wristlets" and "anklets" of incised bone; notched trapezoidal shell pendants; washer-shaped shell beads; and copper bands and beads. The predominant art motifs include bilateral symmetry; deep incisions along key lines so that the object is completely penetrated; and diamond shaped eyes, tiny legs, and square bodies on animal representations (Howard 1953:130-138; Syms 1979:283-304). A notable pattern involving the Devils Lake-Sourisford complex is that the majority of the large, accumulative mounds known to date have been attributed to this culture. The complex is also responsible for

simple and composite linear mounds (Syms 1978: 82-83), as well as individual burials interred in subsurface pits.

4.2 Mound Distribution on the Northern Great Plains and the Relationship with the Devils Lake-Sourisford Burial Complex

As previously stated, the vast majority of work done on mounds in Manitoba and Saskatchewan during the past century was by "amateur archaeologists" or "pot hunters". The results were few records, many discrepancies, and numerous unanswered questions. Today, much of the research involving burial mounds on the Northern Plains has been conducted by Leigh Syms. In the early 1970s, Syms was contracted to prepare an overview of the known mounds in southern Manitoba. This work resulted in an assessment of previous research; a summation of the current status of mounds as a result of cultivation, looting, and excavations; an accumulation of the available data as a result of these previous endeavors; and the presentation of recommendations for future research and public development. Syms concluded that previous osteological and artifactual analyses of these collections are now inaccurate due to sample size, and the grouping of mounds on the basis of geographical proximity. Given the paucity of burial mounds in Saskatchewan, the Manitoban material is relied on for a research base.

There are several limitations now facing researchers as a result of a century of work by non-archaeological personnel. A number of mounds lack any diagnostic artifacts and cannot be assigned to any archaeological context. This is due to all the "souvenirs" being distributed to the members of the excavating party. Stewart recalls the 1931 McKay Mound excavations which typified the attitude of the day:

> My father was the soul of generosity, and decreed that each participant would keep some part of the "proceeds". Even the unique arrowhead...was pressed upon a Winnipeg visitor who was there almost by chance when it was found (Stewart in Syms 1978:14).

Due to the crude techniques, haste, and general lack of concern for context, all the burials recovered in a particular mound must now be lumped together and treated as a single cultural tradition. However, results from more recent excavations (Wilford 1941, 1945; Evans 1961; Hanna 1976) reveal that often two cultural groups can be represented, and that intrusive burials are not uncommon. Particularly with regard to research done between 1890-1920, the brief, cryptic comments are useless as they provide inadequate data on specific locations of artifacts in the burial context.

For years exotic mortuary artifacts have been recovered from an area of the northeastern Great Plains. Among these items were miniature ceramic vessels incised with thunderbirds, broken arrows, and lizard or salamander effigy motifs; incised catlinite tablets; whelk shell gorgets; columella shell beads or pendants; and tubular pipes. Specifically, these artifacts are usually associated with burial mounds in the Devils Lake region of North Dakota and the Sourisford region of southwestern Manitoba and southeastern Saskatchewan (Syms 1979:283-308). Syms described the distribution of the cultural entity and subsequently defined the Devils Lake-Sourisford burial complex, which he advocated had strong similarities with groups from the Mississippian area. The burial activities through which Syms defined the complex comprise part of a much broader set of activities making up the adaptation

to the Plains as a whole. This factor is what allows us to relate the distribution of this complex to variables of climate and resource fluctuation (Syms 1979: 283-308), thereby gaining a more complete understanding of their culture.

Site concentration is greatest in the Devils Lake region of North Dakota and the Sourisford locality of southwestern Manitoba. Recent surveys of southern Manitoba have culminated in the identification of some 200 mounds, two thirds of which are concentrated in the Sourisford locality (Syms 1979:294). The majority of these mounds, if not all, are probably related to the Devils Lake-Sourisford burial complex. Unfortunately, many of these mounds were disturbed by pot hunters and their contents looted, thereby rendering it impossible to precisely determine which mounds belong to the complex in question (Syms 1979:294).

Site distribution is critical when predicting the lifestyle of these indigenous mound builders. Mound prevalence on the northeastern Plains, with only limited examples in the Aspen Parkland, suggests a nomadic bison hunting lifestyle. Assuming these people relied primarily on bison, then the mound distribution could be related to the seasonal movement of the buffalo (Syms 1979: 295). Syms (1979) proposes that the bison pursued a fairly regular seasonal route which involved summer grazing on the Plains grasslands, and winter feeding in the sheltered valleys, uplands, and Aspen Parkland. Such a seasonal migration of these herds would cause tremendous fluctuations in the resource potential of the various ecological zones. However, historical evidence indicates that the bison were present in all the ecozones throughout the entire years (Hanson 1984: 99). This

suggests that any seasonal range use patterns which may have existed were more localized and flexible than those predicted by Syms.

The seasonal limitations for the construction of burial mounds must also be considered. Given the extremes of winter, it is highly conceivable that the majority of mounds were constructed between late spring and early fall, when the ground would not be frozen. For the region in question, this would constitute a time frame from late April or early May, until late September. The greatest concentration of Devils Lake-Sourisford mounds occurs in those regions which may have been areas of autumn and spring migration (Figure 20). It is interesting to note that while the nomadic Devils Lake-Sourisford people continued to rely on the fluctuating bison herds for subsistence, they began building mortuary structures more typical of sedentary horticulturists (Syms 1979:294-296; Hanson 1984: 93-111; Walker 1974:1-6; Moodie and Ray 1976:45-52).

The Devils Lake-Sourisford burial complex is considered to have been strongly influenced by the Middle Missouri tradition, which was enjoying its optimum expansion on the Plains between A.D. 900- 1250 (Syms 1979:298). Many of the recovered cultural remains reflect Mississippian characteristics including the style of pottery, the depiction of salamanders, and the incised catlinite tablets. The Devils Lake-Sourisford complex appeared on the Plains circa A.D. 900-1000, and persisted well into the 15th century.

Given the temporal span of this complex and the inclusion in its cultural tradition of materials exhibiting Mississippian

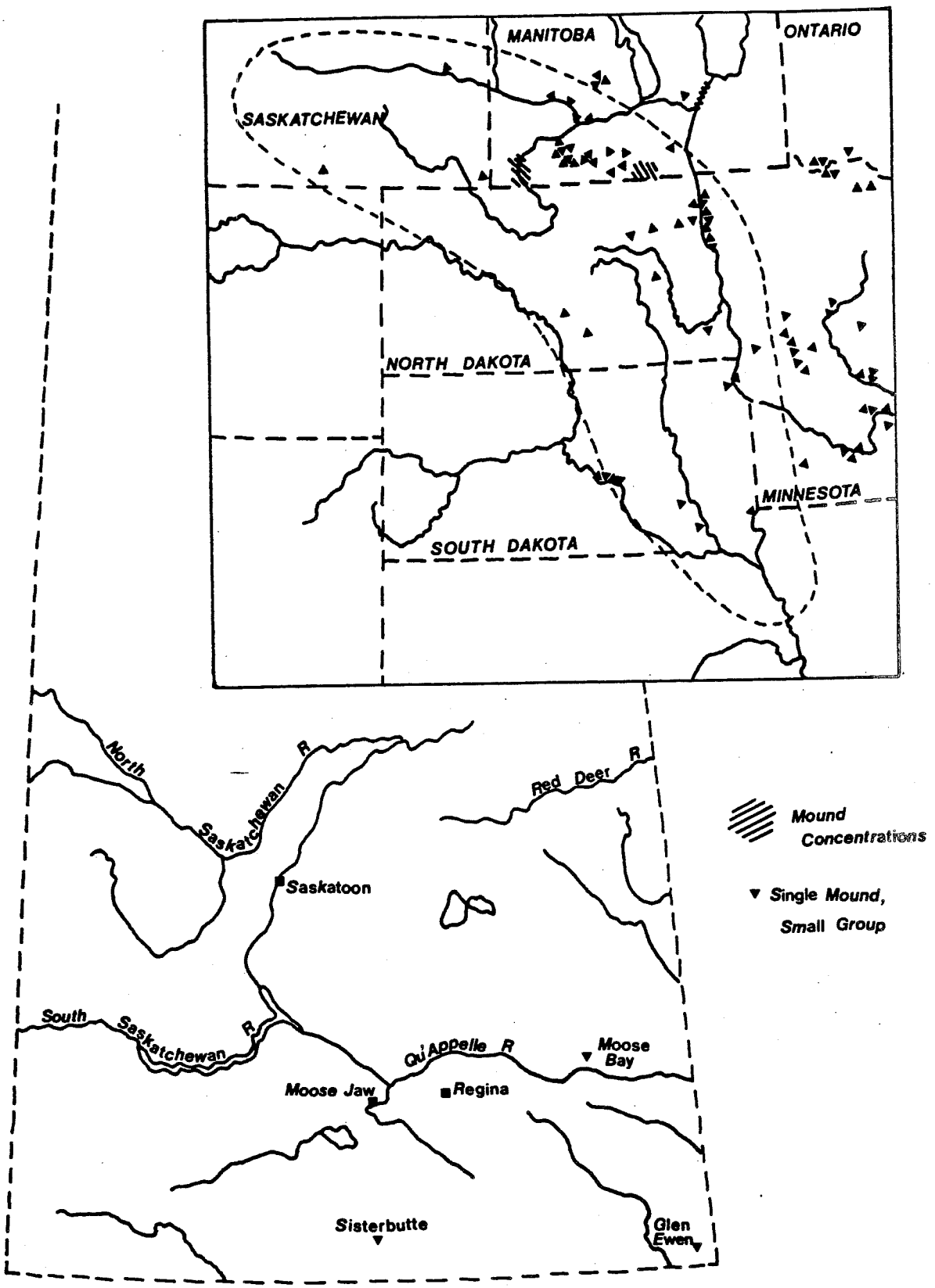


Figure 20

The Distribution of Burial Mounds in Saskatchewan and in the North-Central Great Plains

traits, the Devils Lake-Sourisford complex is now identified as being of ancestral Siouan stock (Syms 1979:303-304). Knowing that this complex is very Late Prehistoric, it is now possible for us to assign it to some ethnic or linguistic group, or at least delimit our options. Siouan groups which could be represented include the Hidatsa-Crow, Mandan, an eastern Santee Dakota group or Assiniboine, or a western Teton Dakota group (Syms 1979:303).

If the Devils Lake-Sourisford burial complex did persist into the proto-historic period, then some of the possibilities are eliminated, leaving only those groups of Assiniboine, Teton, or Crow. By the early historic period the Mandan and Hidatsa groups were firmly entrenched in a more sedentary lifestyle. However, due to the fragmentary, and often biased, archaeological evidence for the northeastern Plains during the temporal span A.D. 900-1200, more work must be done before a more specific identification can be established (Syms 1979: 304).

4.3 The Sisterbutte Burial Mound

The Sisterbutte burial mound is located in southern Saskatchewan along the Wood Mountain upland. The mound had undergone two episodes of limited excavation prior to 1986. The osteological materials recovered at these times were stored by the Archaeological Resource Management Section. Additional remains were recovered during a surface survey of the site in August, 1986. Based on cranial material, a minimum of four individuals were interred in this mound. Metric and non-metric analyses were conducted, however, given the poor preservation of the materials, the results are incomplete. There were no cultural materials recovered from the Sisterbutte mound.

4.3.1 The Physical Environment

The Sisterbutte burial mound is located in the southeast quarter of section 5, township 4, range 5, west of the third meridian. This is approximately 14 kms southwest of the village of Fir Mountain on the tablelands along the northern edge of the Wood Mountain upland (Figure 21). The site coordinates are 49 degrees, 16 minutes, 10 seconds North Latitude, and 106 degrees, 38 minutes, 16 seconds West Longitude. The nearest water source is an unnamed tributary of the Sisterbutte Creek which runs 300 m to the northwest of the site. Located in the grassland ecoregion, the Sisterbutte Burial Mound falls within the ecodistrict of shortgrass prairie running along the 49th parallel.

The Wood Mountain uplands have undergone severe erosion in

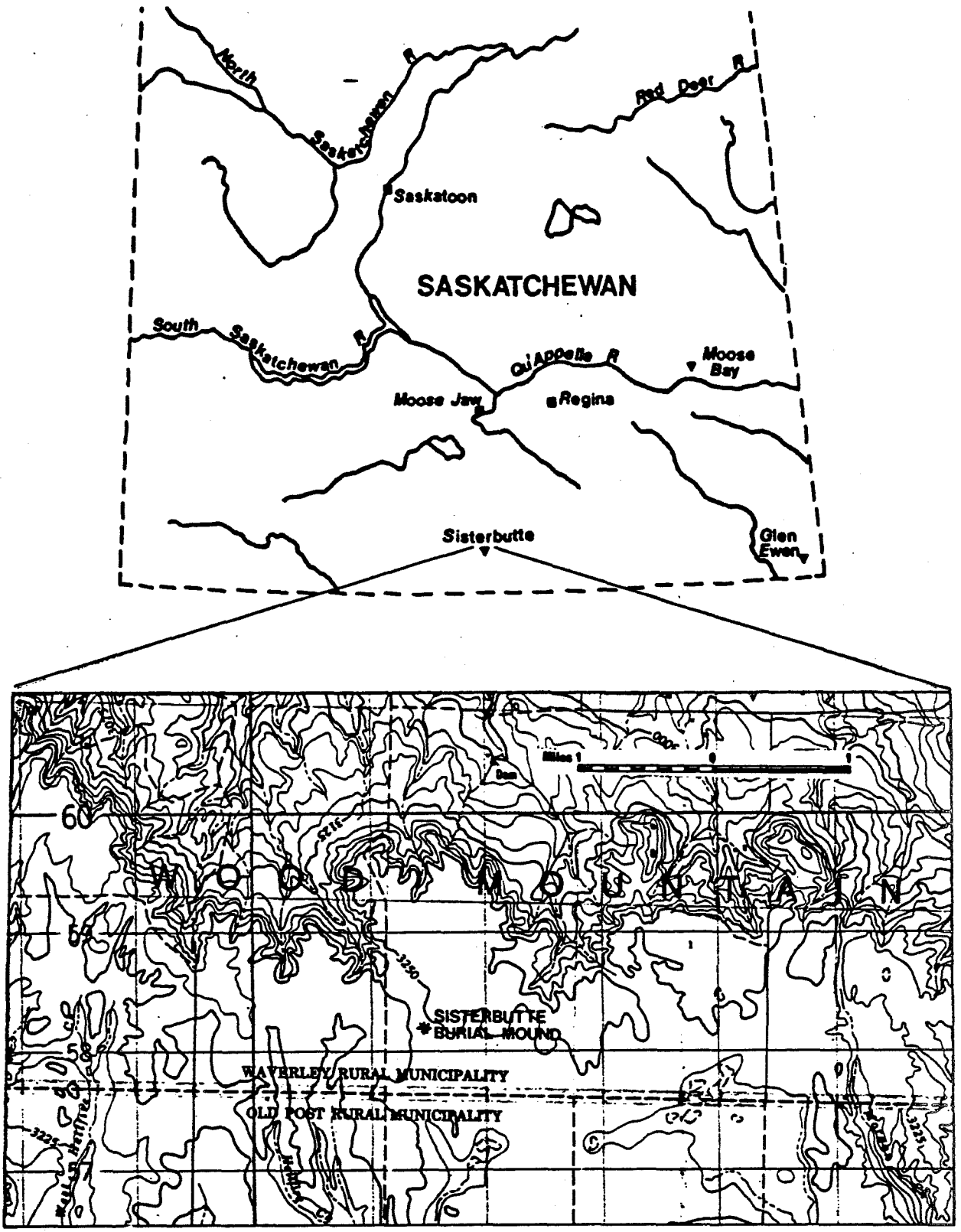


Figure 21

The location of the Sisterbutte Burial Mound in relation to Wood Mountain and Saskatchewan. Wood Mountain enlargement produced from Department of Energy, Mines and Resources 72 G/7.

the past resulting in a physiography dissected by deep rugged valleys and tributary coulees. Today, the plateau is represented by gently undulating to strongly rolling uplands separated by these deep valleys and coulees. Soils of this region are predominantly brown chernozems ranging in texture from medium to fine. Surface drainage of these chernozemic soils is good to excessive, the latter being attributable to the steep slopes bordering the valleys. Internal drainage varies directly with the soil texture. Medium to heavier textured soils are adequately drained, while the fine soils tend to be excessively drained (Mitchell et al. 1977:76-80).

4.3.2 The History of the Excavation

The Sisterbutte burial mound is a circular, flat-topped earth mound approximately ten m in diameter and 40-50 cm in height. Discovered by Harold Scutt on land owned by Lila Mitchell, the mound has been disturbed twice in previous years. Initial disturbance occured in 1943, when Mr. Scutt removed some bones which he subsequently reinterred. This endeavor resulted in a one meter depression in the center of the mound. In 1983, Carlos Germann of the Archaeological Resource Management Section (ARMS) revisited the site. From a 40 cm deep shovel test pit at the bottom of the initial depression, Germann collected numerous cranial fragments representing three individuals. Total damage to the Sisterbutte mound from these two periods of disturbance has been estimated at 20%. The existing depression measures approximately 3 m by 2.5 m in diameter and 1 m deep, extending to

a depth of 1.4 m in the center.

On August 5, 1986, the author, Dr. Ernest Walker, Brian Spurling (ARMS), and Carlos Germann (ARMS) revisited the Sisterbutte burial mound. It was immediately apparent that the mound had suffered extensive damage due to bioturbation. Using the previous disturbance as a point of entry, badger holes traversed the mound in an east to west direction, with a third run extending to the south. All three avenues exited beyond the mound perimeter. This bioturbation had left a great deal of human skeletal material exposed, scattered throughout the depression and up onto the mound surface. These osteological materials were collected in order to avoid further destruction. To date, the Sisterbutte mound has never been completely excavated.

4.4 The Sisterbutte Skeletal Remains

The skeletal remains of a minimum four individuals were recovered during the Sisterbutte mound's history of disturbance. Most of this material was cranial. One complete and five fragmentary skulls were recovered, as well as two broken maxillae, one complete mandible, and several assorted fragments. Postcranial elements consisted of humerus and rib fragments.

4.4.1 Individual 1

Recovered in 1983, skull #1 is complete and in good condition (Table 12). Teeth present include I2,C,P4,M1,M2 on the left side and I1,I2,C,M1,M2 on the right side. Eruption of the

Table 12

Sisterbutte Skeletal Inventory: Individual 1

		Right	Left
Scapula		-	-
Clavicle		-	-
Humerus		-	-
Radius		-	-
Ulna		-	-
Innominate		-	-
Femur		-	-
Patella		-	-
Tibia		-	-
Fibula		-	-
Carpals:	Scaphoid	-	-
	Lunate	-	-
	Triangular	-	-
	Pisiform	-	-
	Trapezium	-	-
	Trapezoid	-	-
	Capitate	-	-
	Hamate	-	-
Metacarpals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-
Phalanges:	Proximal	-	-
	Medial	-	-
	Distal	-	-
Talus		-	-
Calcaneus		-	-
Cuneiforms:	1st	-	-
	2nd	-	-
	3rd	-	-
Cuboid		-	-
Navicular		-	-
Metatarsals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-

+ indicates present, - indicates absent, * indicates incomplete

Table 12

Sisterbutte Skeletal Inventory: Individual 1 (Continued)

		Present	Absent
Skull		+	
Mandible			+
Sternum:	Manubrium		+
	Gladiolus		+
	Xiphoid		+
Vertebrae:	Cervical		+
	Thoracic		+
	Lumbar		+
Sacrum			+
Coccyx			+
Ribs			+

third molar on the right side did occur, however, this tooth has suffered post-mortem loss. Evidence of one third molar would indicate the individual was about 18-20 years of age. Further substantiation of a young individual is the excellent condition of the teeth in general. No caries are present, and occlusal wear appears on the incisors only.

4.4.2 Individual 2

A second skull reconstructed in 1983 by Carlos Germann is designated #2 (Table 13). Included are portions of the frontal, left and right parietals, and left zygomatic arch, along with the complete occipital and left and right petrous temporals. Given the robust nature and large mastoid processes possessed by this cranium, it has been designated a male. The age at death cannot be determined accurately due to the lack of teeth. The sagittal and coronal sutures are almost fused, however, this is not a reliable aging characteristic on its own. As such, the skull will only be termed adult.

4.4.3 Individual 3

Skull #3 includes the superior orbital ridge and forehead region of the frontal bone, and the facial architecture of the individual (Table 14). This skull may belong with one of the other reconstructed calvaria, however, without more fragments it is difficult to determine which one. Teeth present in the maxilla include the right and left first molar only. These teeth are worn enough to suggest an age of 25-35 years.

4.4.4 Individual 4

Skull #4 is represented by a calvarium reconstructed from the frontal, an incomplete left parietal, and the superior

Table 13

Sisterbutte Skeletal Inventory: Individual 2

		Right	Left
Scapula		-	-
Clavicle		-	-
Humerus		-	-
Radius		-	-
Ulna		-	-
Innominate		-	-
Femur		-	-
Patella		-	-
Tibia		-	-
Fibula		-	-
Carpals:	Scaphoid	-	-
	Lunate	-	-
	Triangular	-	-
	Pisiform	-	-
	Trapezium	-	-
	Trapezoid	-	-
	Capitate	-	-
	Hamate	-	-
Metacarpals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-
Phalanges:	Proximal	-	-
	Medial	-	-
	Distal	-	-
Talus		-	-
Calcaneus		-	-
Cuneiforms:	1st	-	-
	2nd	-	-
	3rd	-	-
Cuboid		-	-
Navicular		-	-
Metatarsals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-

+ indicates present, - indicates absent, * indicates incomplete

Table 13

Sisterbutte Skeletal Inventory: Individual 2 (Continued)

		Present	Absent
Skull		+*	
Mandible			+
Sternum:	Manubrium		+
	Gladiolus		+
	Xiphoid		+
Vertebrae:	Cervical		+
	Thoracic		+
	Lumbar		+
Sacrum			+
Coccyx			+
Ribs			+

Table 14

Sisterbutte Skeletal Inventory: Individual 3

		Right	Left
Scapula		-	-
Clavicle		-	-
Humerus		-	-
Radius		-	-
Ulna		-	-
Innominate		-	-
Femur		-	-
Patella		-	-
Tibia		-	-
Fibula		-	-
Carpals:	Scaphoid	-	-
	Lunate	-	-
	Triangular	-	-
	Pisiform	-	-
	Trapezium	-	-
	Trapezoid	-	-
	Capitate	-	-
	Hamate	-	-
Metacarpals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-
Phalanges:	Proximal	-	-
	Medial	-	-
	Distal	-	-
Talus		-	-
Calcaneus		-	-
Cuneiforms:	1st	-	-
	2nd	-	-
	3rd	-	-
Cuboid		-	-
Navicular		-	-
Metatarsals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-

+ indicates present, - indicates absent, * indicates incomplete

Table 14

Sisterbutte Skeletal Inventory: Individual 3 (Continued)

		Present	Absent
Skull		+*	
Mandible			+
Sternum:	Manubrium		+
	Gladiolus		+
	Xiphoid		+
Vertebrae:	Cervical		+
	Thoracic		+
	Lumbar		+
Sacrum			+
Coccyx			+
Ribs			+

orbital ridge (Table 15).

4.4.5 Undesignated Materials

The remains of two undesignated calvaria were reconstructed from fragments collected in 1986. The first comprises a complete occipital, right parietal, and right petrous temporal bones, as well as the incomplete left parietal. An intact basisphenoid is also present.

The second calvarium includes an incomplete occipital bone, the right and left parietals, and the right petrous temporal. The calvarium exhibits buttressing of the parietals and small mastoid processes characteristic of the female skull. Age cannot be determined as the only possible diagnostic is a fused sagittal suture.

The Sisterbutte mandible displays an extremely poor dentition. The teeth present include I2,C,P3,P4,M1 bilaterally. Complete abscessing of the second and third molar has also occurred bilaterally. The whole dentition exhibits extreme wear indicating an age in excess of 45 years.

Quite possibly the corresponding maxilla to this mandible is one of the maxillae recovered separately. The maxilla in question is represented only by the left side, from which the palate is broken. Teeth present include I1,C,P3,P4,M1,M3. All of the crowns of have been worn to such an extent that only the roots remain. Such extreme occlusal wear undoubtedly indicates some utilization of the teeth as tools, but it seems likely that the individual was in excess of 45 years of age.

A second maxilla was also poorly preserved, but did include

Table 15

Sisterbutte Skeletal Inventory: Individual 4

		Right	Left
Scapula		-	-
Clavicle		-	-
Humerus		-	-
Radius		-	-
Ulna		-	-
Innominate		-	-
Femur		-	-
Patella		-	-
Tibia		-	-
Fibula		-	-
Carpals:	Scaphoid	-	-
	Lunate	-	-
	Triangular	-	-
	Pisiform	-	-
	Trapezium	-	-
	Trapezoid	-	-
	Capitate	-	-
	Hamate	-	-
Metacarpals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-
Phalanges:	Proximal	-	-
	Medial	-	-
	Distal	-	-
Talus		-	-
Calcaneus		-	-
Cuneiforms:	1st	-	-
	2nd	-	-
	3rd	-	-
Cuboid		-	-
Navicular		-	-
Metatarsals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-

+ indicates present, - indicates absent, * indicates incomplete

Table 15

Sisterbutte Skeletal Inventory: Individual 4 (Continued)

		Present	Absent
Skull		+*	
Mandible			+
Sternum:	Manubrium		+
	Gladiolus		+
	Xiphoid		+
Vertebrae:	Cervical		+
	Thoracic		+
	Lumbar		+
Sacrum			+
Coccyx			+
Ribs			+

the palate. Teeth present include M1,M2,M3 on the left, and M1 on the right. Occlusal wear is limited on all the teeth indicating an age of 25-35 years.

A complete osteological inventory of the undesignated materials recovered from the Sisterbutte mound appears in Table 16.

4.5 Summary

Unable to excavate the Sisterbutte burial mound for political reasons, it is impossible to accurately identify the cultural complex with which it is associated. The presence of four individuals indicates the mound was a multiple burial, however, we cannot ascertain whether it was a single or multiple event interment. In light of the prevalence of Devils Lake-Sourisford mounds in neighbouring Manitoba and North Dakota, it may be possible to hypothesize a similar association for the Sisterbutte mound. However, without a radiocarbon date and/or a diagnostic cultural artifact such a hypothesis cannot be verified. Therefore, it is impossible to accurately correlate the Sisterbutte burial mound with a specific culture complex.

Table 16

Sisterbutte Skeletal Remains: Undesignated Remains

		Right	Left
Scapula		-	-
Clavicle		-	-
Humerus		+*	-
Radius		-	-
Ulna		-	-
Innominate		-	-
Femur		-	-
Patella		-	-
Tibia		-	-
Fibula		-	-
Carpals:	Scaphoid	-	-
	Lunate	-	-
	Triangular	-	-
	Pisiform	-	-
	Trapezium	-	-
	Trapezoid	-	-
	Capitate	-	-
	Hamate	-	-
Metacarpals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-
Phalanges:	Proximal	-	-
	Medial	-	-
	Distal	-	-
Talus		-	-
Calcaneus		-	-
Cuneiforms:	1st	-	-
	2nd	-	-
	3rd	-	-
Cuboid		-	-
Navicular		-	-
Metatarsals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-

+ indicates present, - indicates absent, * indicates incomplete

Table 16

Sisterbutte Skeletal Inventory: Undesignated Remains (Continued)

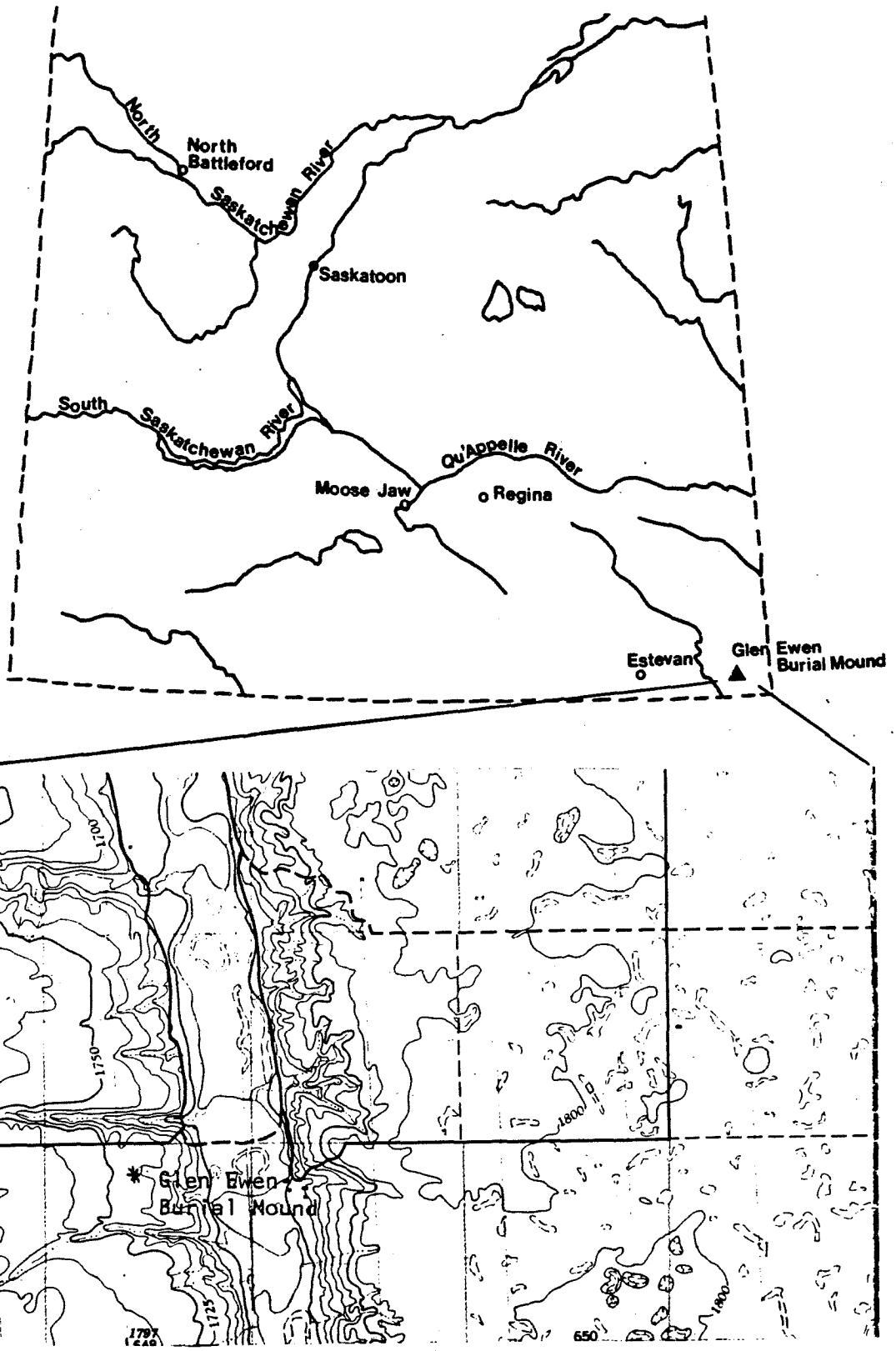
		Present	Absent
Skull		+*(2)	
Skull - maxilla		+*(2)	
Mandible		+	
Sternum:	Manubrium		+
	Gladiolus		+
	Xiphoid		+
Vertebrae:	Cervical		+
	Thoracic		+
	Lumbar		+
Sacrum			+
Coccyx			+
Ribs		+*	
Undesignated bone		+*	

4.6 The Glen Ewen Burial Mound

The Glen Ewen burial mound is situated in the extreme southern corner of Saskatchewan, near the Sourisford region of Manitoba and North Dakota (Figure 22). Specifically, the mound is found in the northeast quarter of the northwest quarter, section 4, township 1, range 34, west of the first meridian. First disturbed in 1915, this mound has been plundered repeatedly by pot hunters. By 1964, when the Museum of Natural History conducted a controlled excavation, the mound had been so thoroughly plundered that only a few bone fragments remained. The Glen Ewen collection, as it is designated today, is comprised of a few fragments collected by the museum as well as some remains recovered by private collectors. Much of the material belonging to this mound is still tucked away in personal collections, or has been misplaced over the years. Two radiocarbon samples have been submitted for the Glen Ewen mound. The dates returned on these are 1220 +/- 70 years B.P. (A.D. 730) (S-258) and 1110 +/- 90 B.P. (A.D. 840) (S-259), both within the Late Prehistoric Period (Dyck 1983:111).

The existing Glen Ewen collection is currently stored at the University of Saskatchewan. The osteological remains include two skulls and corresponding mandibles, as well as the almost complete postcranial skeleton of one individual. There are no known cultural remains associated with this mound.

Figure 22



The Location of the Glen Ewen Burial Mound. Souris River Valley enlargement produced from Department of Energy, Mines and Resources 62 F/4.

4.7 The Glen Ewen Skeletal Remains

4.7.1 Individual 1

Individual #1 is a female, 17-25 years in age, represented by a complete skull and mandible. All the teeth are present except the right I1,I2 and the left canine of the maxilla, and the right canine and left lateral incisor of the mandible. The entire dentition is in excellent condition with very little occlusal wear or alveolar resorption.

The postcranial remains comprise the nearly complete body of a female between 16-25 years of age. It is possible that these remains belong to Individual #1, and will be discussed as such, even though the missing atlas vertebra denies us confirmation through articulation. A complete skeletal inventory appears in Table 17.

The right radius of Individual #1 appears to have suffered a fracture (Figure 23). At the insertion point of the pronator quadratus the radius exhibits a slight angulation resulting in the distal portion of the bone being deflected posteriorly. The dorsal bone surface of the distal half is extremely hypertrophied suggesting an ossified subperiosteal hematoma related to this fracture (Walker 1978:32).

The dorsal surface of the right ribs exhibit periosteal bone formation, a pathological condition which does not similarly affect those ribs of the left side. Such depositions are most likely the result of pulmonary hypertrophic osteoarthropathy (Figure 24). However, it has been reported that periostitis of the ribs is associated with tuberculosis (Walker 1978:35; Ortner and Putschar 1985:245).

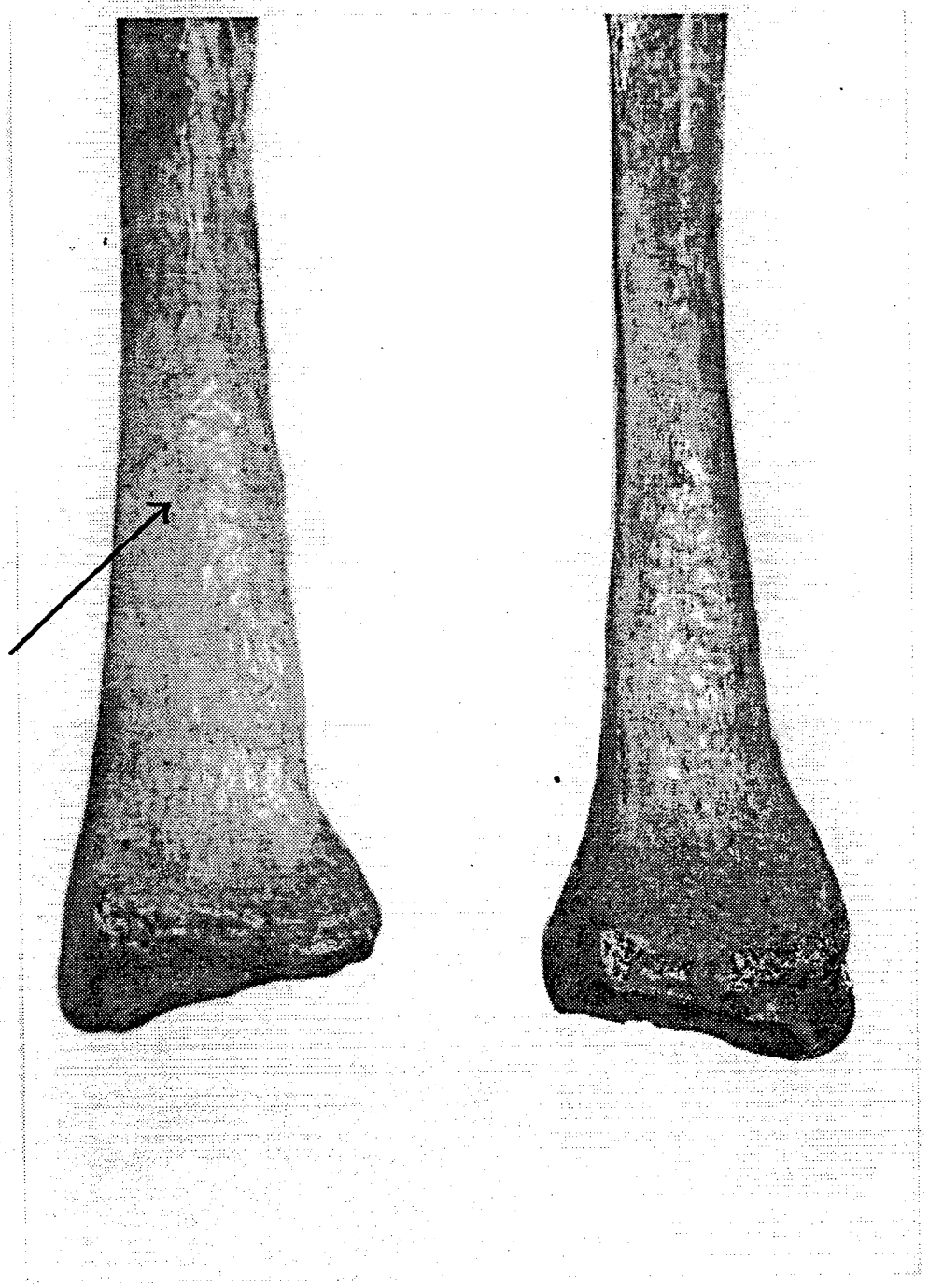


Figure 23

Radii of Individual 1 displaying probable fracture

Table 17

Glen Ewen Skeletal Inventory: Individual1

		Right	Left
Scapula		-	+
Clavicle		+	+*
Humerus		-	+
Radius		+	+
Ulna		+	+*
Innominate		+	+
Femur		+	+
Patella		+	+
Tibia		+	+
Fibula		+*	+*
Carpals:	Scaphoid	+	+
	Lunate	+	+
	Triangular	+	+
	Pisiform	+	+
	Trapezium	-	+
	Trapezoid	+	-
	Capitate	-	+
	Hamate	+	+
Metacarpals:	1st	-	-
	2nd	-	+
	3rd	+	+
	4th	+	+
	5th	+	-
Phalanges:	Proximal - 10 of hand Medial - 5 of hand Distal - 5 of hand, 1 of foot		
Talus		-	+
Calcaneus		-	+
Cuneiforms:	1st	+	-
	2nd	+	-
	3rd	+	-
Cuboid		-	-
Navicular		-	-
Metatarsals:	1st	-	-
	2nd	-	-
	3rd	+	+
	4th	-	-
	5th	-	-

+ indicates present, - indicates absent, * indicates incomplete

Table 17

Glen Ewen Skeletal Inventory: Individual 1 (Continued)

		Present	Absent
Skull		+	
Mandible		+	
Sternum:	Manubrium	+	
	Gladiolus	+	
	Xiphoid		+
Vertebrae:	Cervical	+*(5)	
	Thoracic	+*(12)	
	Lumbar	+*(5)	
Sacrum		+	
Coccyx		+	

Ribs - 12 right ribs
12 left ribs (incomplete)

4.7.2 Individual 2

Individual #2 is represented by a skull and mandible, both of which have suffered some post-mortem breakage (Table 18). The skull displays an elongated nasal spine, styloid process, and intact medial pterygoid plates. With the exception of the left I2,C,P4, all the maxillary teeth are present. Occlusal wear is prominent with the exception of the third molar bilaterally. The mandible is missing the left I1,C, and exhibits heavy occlusal wear only on the first molar bilaterally. The nature of the teeth and cranial characteristics indicate Individual #2 is a female, 25-35 years of age.

Pathological conditions are restricted to the dentition in Individual #2. The fourth premolar of the maxillary dentition has been lost ante-mortem through the process of abscessing. While a solitary incident at this point, such abscessing could indicate the beginning of pronounced peridontal disease. The second abnormality present is a developmental problem involving the mandibular dentition. The right half of the dentition displays the loss of a tooth space between the lateral incisor and third premolar, thereby forcing the canine into an anterior position outside the tooth row. The left half of the dentition is normal.

4.8 Summary

The destruction of the Glen Ewen mound, and the loss of any cultural artifacts previously recovered, makes a cultural association for this mound impossible. Like the Sisterbutte

Table 18

Glen Ewen Skeletal Inventory: Individual 2

		Right	Left
Scapula		-	-
Clavicle		-	-
Humerus		-	-
Radius		-	-
Ulna		-	-
Innominate		-	-
Femur		-	-
Patella		-	-
Tibia		-	-
Fibula		-	-
Carpals:	Scaphoid	-	-
	Lunate	-	-
	Triangular	-	-
	Pisiform	-	-
	Trapezium	-	-
	Trapezoid	-	-
	Capitate	-	-
	Hamate	-	-
Metacarpals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-
Phalanges:	Proximal	-	-
	Medial	-	-
	Distal	-	-
Talus		-	-
Calcaneus		-	-
Cuneiforms:	1st	-	-
	2nd	-	-
	3rd	-	-
Cuboid		-	-
Navicular		-	-
Metatarsals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-

+ indicates present, - indicates absent, * indicates incomplete

Table 18

Glen Ewen Skeletal Inventory: Individual 2 (Continued)

		Present	Absent
Skull		+*	
Mandible		+*	
Sternum:	Manubrium		+
	Gladiolus		+
	Xiphoid		+
Vertebrae:	Cervical		+
	Thoracic		+
	Lumbar		+
Sacrum			+
Coccyx			+
Ribs			+

mound, it is known that the Glen Ewen mound was a multiple burial. However, it is not known how many burial events were involved, or how the individuals were oriented in their grave. The radiocarbon dates for the mound place it within the Late Prehistoric, but tell us little about any specific cultural affiliation.

4.9 The Moose Bay Burial Mound

The Moose Bay burial mound (EdMq-3) was originally excavated in 1968 by the Saskatchewan Museum of Natural History. The mound is located on the north edge of the Qu'Appelle Valley overlooking Crooked Lake in the northeast quarter, section 7, township 19, range 5, west of the second meridian (Figure 24). The M.A. thesis written at the University of Manitoba by Margaret Hanna (1976) provides a detailed discussion of the mound's archaeology, including an analysis of the associated artifacts and osteological remains.

For the present study the complete Moose Bay collection was borrowed from the Saskatchewan Museum of Natural History. Of this, only the osteological component was analyzed, as Hanna provided a comprehensive analysis of the cultural component. Although Hanna indicates a metric analysis was conducted, these results are not included in her monograph. Thus, a new metric and non-metric analysis was undertaken. However, due to the poor preservation of the bones these results are not complete.

4.9.1 The History of the Excavation and Analysis

The Moose Bay mound is a round, conical shaped composite structure consisting of an inner framework of poles radiating from a center post, and an outer covering of dirt. A radiocarbon date of 910 +/- 70 years B.P. (A.D. 1040) (S-543) was derived from a sample of this inner framework (Hanna, 1976:22). Eleven of the 12 individuals interred in the mound were discovered

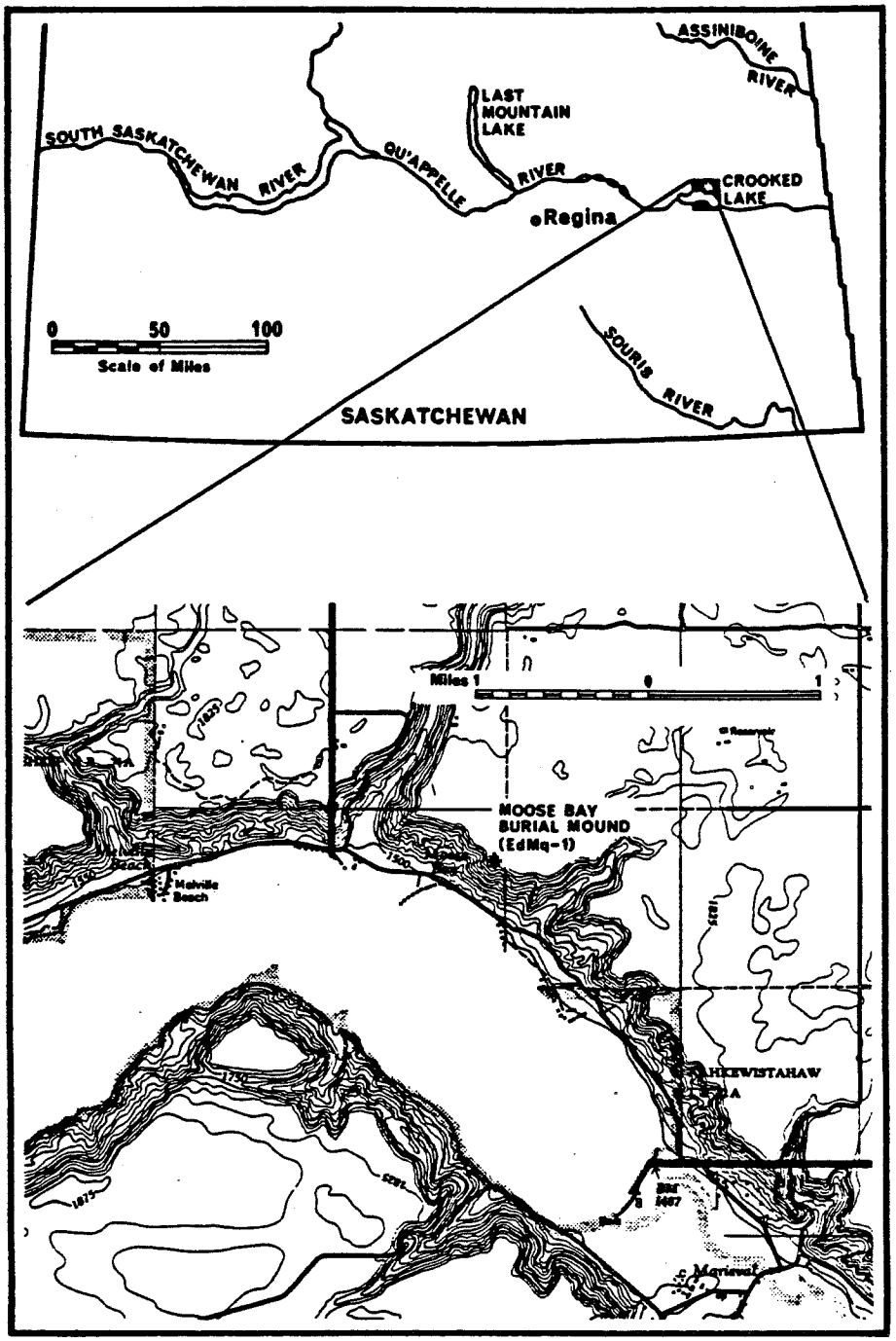


Figure 24

The location of the Moose Bay Burial Mound in relation to Crooked Lake and southern Saskatchewan. (Produced from Hanna, 1975: 14).

within the pole framework and were in the form of secondary bundle burials and secondary scattered remains found in the fill. The twelfth individual was recovered as an intrusive secondary bundle burial. With the exception of the scattered remains all the individuals were interred with associated grave goods. Among the more exotic artifacts are tubular pipes, birch bark containers, and mortuary vessels. Hanna provides a careful analysis of the artifacts recovered from the mound, particularly with regard to the highly detailed descriptions of the recovered ceramics.

Using the classifications devised by Howard (1953), Wilford et al. (1955), and MacNeish (1958), Hanna identifies the relevant units of study to be the Malmo focus, the Laurel focus, the Arvilla focus, the Blackduck (Manitoba) focus, the Kathio focus, and the Devils Lake-Melita focus (Hanna 1976:9). Lack of a consistent chronological and cultural framework made the task of assigning the Moose Bay mound to one complex rather difficult. Based on comparisons of mound construction, burial mode, and artifact attributes, the individuals interred within the burial were attributed to the Kathio focus. The single intrusive bundle burial has been attributed to the Devils Lake-Melita focus (Hanna 1976:64). Since the publication of this work a re-assessment of mounds in southern Manitoba and adjacent areas has resulted in the redefinition of a number of the complexes (Syms 1977, 1978, 1979; Johnson 1973). On the basis of these works the intrusive burial has been redefined by Syms as being from the Devils Lake-Sourisford complex (Syms 1979:290).

The section of Hanna's The Moose Bay Burial Mound (EdMq-3) drawing the most criticism is that concerning the osteological analysis. However, Hanna is not totally at fault as two factors contribute to the failure of this section. Firstly, the poor preservation and incomplete nature of burial units undoubtedly caused problems. Secondly, not specialized in physical anthropology, Hanna relied on secondary data for the osteological component. As a result, this particular section is Hanna's weakest, especially with regard to those specimens deemed pathological. These factors have prompted this re-study of the remains. Skeletal inventories of the Moose Bay remains can be found in Appendix 1 through 11 inclusive.

4.9.2 The Moose Bay Skeletal Remains

Many of the specimens considered pathological in the Moose Bay report were, after further analysis by Walker (1983), reclassed as pseudopathologies. Among these is a pitted and porous mastoid process from Individual #1 of Burial #1 deemed the probable consequence of the inflammatory condition mastoiditis (Walker 1983:14). However, no inflammatory changes are apparent on the specimen suggesting instead that natural erosion resulted in postmortem detruction of the cortical bone. Such action would cause the osteological changes noted. An identical osteological condition is extremely prevalent among the Bethune remains. Birkett (1983) acknowledges difficulties in the diagnosis of mastoid abscess cavities because postmortem erosion of mastoid

air cells often simulates a discharging mastoid abscess (Birkett 1983:101). However, he also notes that there is little evidence of mastoid disease in ancient populations in North America.

A second example is the manubrium sternum and associated ribs of Individual #2 from Burial #2A. These are described as exhibiting bilateral osteomyelitis on the manubrium causing ossification of the costal cartilage. The individual in question is considered to be an elderly male, and Hanna does note the presence of "minor arthritic lipping" on the femora, sacroiliac articulations, and lumbar spine (Hanna 1976:46). Further analysis of the afflicted specimens suggests the ossification of the costal cartilages is attributable to degenerative joint disease, and are a function of old age (Figure 25) (Walker 1983:114). There appears to be no evidence suggesting any inflammatory process. Another example of osteomyelitis being misdiagnosed is that of Individual #3 of Burial #2B, with a sample including the fourth thoracic vertebra and four rib fragments. Once again upon further analysis all of these remains were determined to exhibit degenerative joint disease rather than any inflammatory processes.

A final example to be noted refers to the description of a right temporal fragment from Individual #7 of Burial #4. Hanna notes that "the right auditory meatus was diseased, the canal being obstructed by an extensive bony growth" (Hanna 1976:49). The individual under scrutiny is a child considered to be no more than 6 years of age. Rather than showing any evidence of exostosis the auditory meatus exhibits a tympanic dehiscence, resulting in the exposure of the posterior wall of the auditory

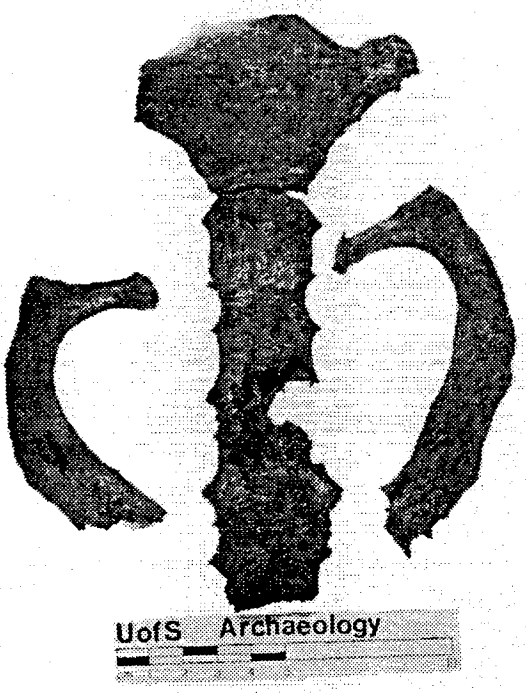


Figure 25

The manubrium sternum and associated ribs of Individual 2 displaying degenerative joint disease

canal. Such a feature is quite plausible given the age of the individual (Walker 1983:114).

Skeletal age was estimated from dental eruption and wear, epiphyseal union, and suture closure. Caution must be exercised when utilizing these age indicators, as individual variation is common in all save for epiphyseal union. The author admits that given the poorly represented and often badly preserved individuals, accurate age and sex determination was often difficult or impossible (Hanna 1976:45). Thus, the age determination for Individual #2 of Burial #2A stands out. The author suggests an age in excess of eighty years for this individual based on "complete closure of all cranial sutures" (Hanna 1976:46). As well, "the general texture of the bone, dental attrition, and pubic symphysis degeneration" (Hanna 1976:46) all supported such an advanced age.

During the 1950s, suture closure was effectively abandoned as a means for determining age at death due to its unreliability. "So erratic is the onset and progress [of suture closure] that an adequate series will provide just about any pattern at any age level. Thus, as a guide for age determination, such a trend is of little use" (McKern and Stewart 1957:37). Recent work by Meindl and Lovejoy (1985) suggests that age estimates should never be based on a single skeletal indicator, but while not without risks, suture closure may "achieve an important and functional role in age determination" (Meindl and Lovejoy 1985:66).

Further analysis of the cranium in question shows the

dentition is in remarkably good condition, with the exception of the bilateral abscessing of the third molar. The teeth exhibit only moderate wear, with the second molar bilaterally being almost wear free. The author notes "minor arthritic lipping" (Hanna 1976:46) on some of the lower limbs and vertebral column, not the severe lipping one would expect to find at this proposed advanced age. Given the lifestyle of the Plains Indians and the relatively early age of death in general, new evidence would suggest this individual was 35-45 years of age at death.

4.10 Summary

The Moose Bay burial mound contained a total of twelve individuals, of which one had been a second event, intrusive burial. All the individuals were interred as bundle burials, and all had been found in association with grave goods. On the basis of mound construction, burial mode, and artifact attributes, the eleven initial burials have been assigned to the Kathio focus. The twelfth, intrusive burial, has been placed into the Devils Lake-Sourisford complex.

5.0 Conclusions

The published literature on prehistoric burials, when combined with the ethnohistoric data on burials, reveals that diverse mortuary practices were present on the Northern Plains during the Late Prehistoric Period. The preferred method of disposing of the dead was through scaffolding with subsequent interment. Typically, such interments were unarticulated bundles, rarely containing the complete skeleton. These bundle burials were placed in mounds or subsurface pits, accompanied by a variety of grave goods.

The Leath and Billy Creek burials in Wyoming are situated on prominent points of land where they are protected by natural rock formations. Such locations may be characteristic of Avonlea burials. The Bethune site is found on a knoll, and Pingert reported a great quantity of petrified wood as well as a piece of slate on top of the site. Perhaps the latter represents an effort to imitate the protection offered by natural rock caps. Such a hypothesis can be answered only through the discovery and analysis of other Avonlea burials.

On the basis of the Avonlea projectile point and a radiocarbon date of 1389 +/- 40 years B.P.:A.D. 565, we can firmly establish the Bethune site as the only known Avonlea burial in Canada. The burial included seven individuals, all of whom appeared to have been interred simultaneously, but in various modes. Examples of a bundle burial, scatter burial, and primary flexed burials were noted. Grave goods from the Bethune burial follow the pattern noted by the Wyoming burials. Although

they are lacking in quantity they do have a similar diversity including a drill, biface, endscraper, Avonlea point, retouched flake, and a possible bone whistle or tubular bead.

A major question revolving around the Bethune site is does it represent an example of an Avonlea mound structure? Co-existing with the Avonlea people during the Late Prehistoric were the Besant complex who are known to have constructed mound burials. Perhaps the Avonlea complex copied this mortuary style. Galloway states there was no evidence of a mound structure at either the Leath or Billy Creek burial sites. Given the cultivation of the Bethune site at the time of excavation this question cannot be answered.

The presence of large rocks at the Bethune site may indicate a rock cairn once overlay the burial pit. Such a burial form was common among the Pelican Lake people, who preceded the Avonlea and Besant complexes. Several examples of these cairn burials have been excavated on the Northern Plains including the Highwood site, the Bracken Cairn site, and the Whitewater burial site (Walker 1984). Characteristic features of these burials are a location on a prominent point of land, subsurface burial pits, a secondary mode of interment, the presence of red ochre and a variety of grave goods, and a large stone cairn constructed over the entire burial. The Avonlea burials in Wyoming are protected by natural rock formations. Perhaps in the absence of natural protection at the Bethune site, the Avonlea people constructed a rock cairn to serve a similar function.

There are currently three known burial mounds in Saskatchewan which have been the subject of varying degrees of

scientific examination. The Sisterbutte burial mound is located in the Wood Mountain region of southern Saskatchewan. Never the subject of a full scale excavation, there are no cultural remains available for analysis, and there is no radiocarbon date. Located in southeastern Saskatchewan is the Glen Ewen burial mound. Subjected to numerous episodes of pot hunting, the mound was virtually destroyed prior to scientific excavation. Once again there is a lack of cultural remains, however, radiocarbon dates of 1220 +/- 70 years B.P.:A.D. 730 and 1110 +/- 90 years B.P.:A.D. 840 have been obtained. Finally, the Moose Bay burial mound in the Qu'Appelle Valley has undergone an extensive excavation. This mound did contain cultural artifacts, which along with the characteristics of mound construction and burial mode, suggests an association with the Kathio focus. A single intrusive burial associated with a complete, turtle incised, pottery vessel has prompted Leigh Syms to designate it affiliated with the Devils Lake-Sourisford burial complex.

The lack of diagnostic artifacts from the Sisterbutte and Glen Ewen mounds renders it impossible to accurately identify the cultural complex, or complexes, with which these mounds are associated. However, one must consider the existence of two Saskatchewan burials attributed to the Devils Lake-Sourisford complex, namely the Moose Bay mound and the Woodlawn burial. Noting the prevalence of Devils Lake-Sourisford mounds in Manitoba and North Dakota it is tempting to suggest that the Glen Ewen and Sisterbutte mounds are also affiliated with this complex. Unfortunately, without some form of diagnostic cultural remains and a reliable radiocarbon date for confirmation, the

affiliation of these mounds will remain speculative.

The presence of mound burials and the possibility of the Bethune site being a cairn burial indicates at least two distinct mortuary patterns existed in southeastern Saskatchewan during the Late Prehistoric Period. This suggests an indigenous Plains population continuing in the tradition of the Pelican Lake complex by constructing subsurface burial pits with overlying rock cairns. In addition, there appears to have also been an intrusive group influenced by the Early and Middle Woodland complexes of the eastern United States who built mound structures in which to inter their dead (Dyck 1983; Walker 1984).

It is becoming increasingly clear that the study of burials results in more questions than answers. Therefore, it is important to obtain any information which may be of use to subsequent researchers. This thesis marks the first time all the known data on Saskatchewan mound burials has been pulled together and re-evaluated in order to provide a solid informational background. Recent work in the Souris River basin has revealed at least two possible mound structures (Finnigan, personal communication). It is hoped that further mound research conducted in the Souris region will benefit from this information, as well as serve to elaborate upon this thesis.

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Appendix 1

Moose Bay Skeletal Inventory: Individual 1

		Right	Left
Scapula		+	+
Clavicle		-	-
Humerus		+*	-
Radius		+*	+*
Ulna		+*	+*
Innominate		+*	+*
Femur		+*	+*
Patella		+	+
Tibia		+*	+*
Fibula		+*	+*
Carpals:	Scaphoid	-	-
	Lunate	-	-
	Triangular	-	-
	Pisiform	-	-
	Trapezium	-	-
	Trapezoid	-	-
	Capitate	-	-
	Hamate	-	-
Metacarpals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-
	Undesignated - 1 distal epiphysis		
Phalanges:	Proximal - 1 of foot		
	Medial		
	Distal - 2 of foot		
Talus		+	+
Calcaneus		+	+
Cuneiforms:	1st	+*	+*
	2nd	+*	+*
	3rd	+*	+*
Cuboid		+*	+*
Navicular		+	-
Metatarsals:	1st	-	-
	2nd	-	+*
	3rd	-	+*
	4th	-	+*
	5th	-	-
	Undesignated - 5 distal epiphyses		

+ indicates present, - indicates absent, * indicates incomplete

Appendix 1

Moose Bay Skeletal Remains: Individual 1 (Continued)

		Present	Absent
Skull		+*	
Mandible		+*	
Sternum:	Manubrium	+*	
	Gladiolus		+
	Xiphoid		+
Vertebrae:	Cervical	+(5,atlas,axis)	
	Thoracic	+*(14)	
	Lumbar	+(6)	
Sacrum		+*	
Coccyx			+

Ribs - 40 undesignated fragments

Appendix 2

Moose Bay Skeletal Inventory: Individual 2

		Right	Left
Scapula		+	-
Clavicle		+	+*
Humerus		+	+
Radius		+	+
Ulna		+	+*
Innominate		+	+
Femur		+*	+
Patella		-	+
Tibia		+	+
Fibula		+	+
Carpals:	Scaphoid	-	+
	Lunate	-	-
	Triangular	-	-
	Pisiform	-	-
	Trapezium	-	-
	Trapezoid	-	-
	Capitate	-	-
	Hamate	-	-
Metacarpals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-
Phalanges:	Proximal	-	-
	Medial	-	-
	Distal	-	-
Talus		-	-
Calcaneus		-	-
Cuneiforms:	1st	-	+
	2nd	-	-
	3rd	-	-
Cuboid		-	-
Navicular		-	-
Metatarsals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-

+ indicates present, - indicates absent, * indicates incomplete

Appendix 2

Moose Bay Skeletal Inventory: Individual (Continued)

		Present	Absent
Skull		+	
Mandible		+*	
Sternum:	Manubrium	+	
	Gladiolus	+	
	Xiphoid		+
Vertebrae:	Cervical	+(2,atlas)	
	Thoracic	+(12)	
	Lumbar	+(5)	
Sacrum		+	
Coccyx			+

Ribs - right first rib
6 complete right ribs
6 incomplete right ribs

- left first rib
9 incomplete left ribs

- 23 undesignated incomplete ribs

Appendix 3

Moose Bay Skeletal Inventory: Individual 3

		Right	Left
Scapula		-	+
Clavicle		+	-
Humerus		+	+
Radius		+	+
Ulna		+	-
Innominate		-	+*
Femur		+*	+*
Patella		-	-
Tibia		+*	+*
Fibula		+*	+*
Carpals:	Scaphoid	-	-
	Lunate	-	-
	Triangular	-	-
	Pisiform	-	-
	Trapezium	-	-
	Trapezoid	-	-
	Capitate	-	-
	Hamate	-	-
Metacarpals:	1st	-	+
	2nd	+	+
	3rd	+	+
	4th	-	+
	5th	-	-
Phalanges:	Proximal - 3 of hand		
	Medial	-	-
	Distal	-	-
Talus		-	-
Calcaneus		-	-
Cuneiforms:	1st	-	-
	2nd	-	-
	3rd	-	-
Cuboid		-	-
Navicular		-	-
Metatarsals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-

+ indicates present, - indicates absent, * indicates incomplete

Appendix 3

Moose Bay Skeletal Inventory: Individual 3 (Continued)

		Present	Absent
Skull		+*	
Mandible		+*	
Sternum:	Manubrium		+
	Gladiolus		+
	Xiphoid		+
Vertebrae:	Cervical	+(3)	
	Thoracic	+*(12)	
	Lumbar		+
Sacrum			+
Coccyx			+

Ribs - 53 fragments

Appendix 4

Moose Bay Skeletal Inventory: Individual 4

		Right	Left
Scapula		-	-
Clavicle		-	-
Humerus		+*	+*
Radius		+*	-
Ulna		-	-
Innominate		-	-
Femur		+*	+*
Patella		-	-
Tibia		+*	-
Fibula		+*	-
Undesignated - 5 long bone fragments			
Carpals:	Scaphoid	-	-
	Lunate	-	-
	Triangular	-	-
	Pisiform	-	-
	Trapezium	-	-
	Trapezoid	-	-
	Capitate	-	-
	Hamate	-	-
Metacarpals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-
Phalanges:	Proximal	-	-
	Medial	-	-
	Distal	-	-
Talus		-	-
Calcaneus		-	-
Cuneiforms:	1st	-	-
	2nd	-	-
	3rd	-	-
Cuboid		-	-
Navicular		-	-
Metatarsals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-

+ indicates present, - indicates absent, * indicates incomplete

Appendix 4

Moose Bay Skeletal Inventory: Individual 4 (Continued)

		Present	Absent
Skull		+*	
Mandible			+
Sternum:	Manubrium		+
	Gladiolus		+
	Xiphoid		+
Vertebrae:	Cervical		+
	Thoracic		+
	Lumbar		+
Sacrum			+
Coccyx			+
Ribs			+

Appendix 5

Moose Bay Skeletal Inventory: Individual 5

		Right		Left
Scapula			+*	
Clavicle		-		-
Humerus		-		+
Radius			+*	
Ulna			+*	
Innominate			+*	
Femur		-		-
Patella		-		-
Tibia			+*	
Fibula		-		-
Carpals:	Scaphoid	-		-
	Lunate	-		-
	Triangular	-		-
	Pisiform	-		-
	Trapezium	-		-
	Trapezoid	-		-
	Capitate	-		-
	Hamate	-		-
Metacarpals:	1st	-		-
	2nd	-		-
	3rd	+		-
	4th	-		-
	5th	-		-
Phalanges:	Proximal	-		-
	Medial	-		-
	Distal	-		-
Talus		-		-
Calcaneus		+*		-
Cuneiforms:	1st	-		-
	2nd	-		-
	3rd	-		-
Cuboid		-		-
Navicular		+*		-
Metatarsals:	1st	-		-
	2nd	-		-
	3rd	-		-
	4th	-		-
	5th	-		-

+ indicates present, - indicates absent, * indicates incomplete

Appendix 5

Moose Bay Skeletal Inventory: Individual 5 (Continued)

		Present	Absent
Skull - maxilla		+	
Mandible		+*	
Sternum:	Manubrium		+
	Gladiolus		+
	Xiphoid		+
Vertebrae:	Cervical		+
	Thoracic	+(3)	
	Lumbar	+(3)	
	Undesignated - 9 fragments		
Sacrum			+
Coccyx			+
Ribs			+

Appendix 6

Moose Bay Skeletal Inventory: Individual 6

		Right	Left
Scapula		-	-
Clavicle		-	-
Humerus		-	+*
Radius		-	-
Ulna		-	+*
Innominate		-	-
Femur		-	-
Patella		-	-
Tibia		-	-
Fibula		-	-
Undesignated - 8 long bone fragments			
Carpals:	Scaphoid	-	-
	Lunate	-	-
	Triangular	-	-
	Pisiform	-	-
	Trapezium	-	-
	Trapezoid	-	-
	Capitate	-	-
	Hamate	-	-
Metacarpals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-
Phalanges:	Proximal	-	-
	Medial	-	-
	Distal	-	-
Talus		-	-
Calcaneus		-	-
Cuneiforms:	1st	-	-
	2nd	-	-
	3rd	-	-
Cuboid		-	-
Navicular		-	-
Metatarsals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-

+ indicates present, - indicates absent, * indicates incomplete

Appendix 6

Moose Bay Skeletal Inventory: Individual 6 (Continued)

		Present	Absent
Skull		+*	
Mandible			+
Sternum:	Manubrium		+
	Gladiolus		+
	Xiphoid		+
Vertebrae:	Cervical		+
	Thoracic		+
	Lumbar		+
Sacrum			+
Coccyx			+

Ribs - 27 fragments

Appendix 7

Moose Bay Skeletal Inventory: Individual 7

		Right	Left
Scapula		-	-
Clavicle		-	-
Humerus		-	-
Radius		-	-
Ulna		+*	-
Innominate		-	-
Femur		-	-
Patella		-	-
Tibia		-	-
Fibula		-	-
Carpals:	Scaphoid	-	-
	Lunate	-	-
	Triangular	-	-
	Pisiform	-	-
	Trapezium	-	-
	Trapezoid	-	-
	Capitate	-	-
	Hamate	-	-
Metacarpals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-
Phalanges:	Proximal	-	-
	Medial	-	-
	Distal	-	-
Talus		-	-
Calcaneus		-	-
Cuneiforms:	1st	-	-
	2nd	-	-
	3rd	-	-
Cuboid		-	-
Navicular		-	-
Metatarsals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-

+ indicates present, - indicates absent, * indicates incomplete

Appendix 7

Moose Bay Skeletal Inventory: Individual 7 (Continued)

		Present	Absent
Skull		+*	
Mandible		+*	
Sternum:	Manubrium		+
	Gladiolus		+
	Xiphoid		+
Vertebrae:	Cervical		+
	Thoracic		+
	Lumbar		+
Sacrum			+
Coccyx			+
Ribs			+

Appendix 8

Moose Bay Skeletal Inventory: Individual 8

		Right	Left
Scapula		-	-
Clavicle		-	-
Humerus		-	-
Radius		-	-
Ulna		-	-
Innominate		-	-
Femur		-	-
Patella		-	-
Tibia		-	-
Fibula		-	-
Carpals:	Scaphoid	-	-
	Lunate	-	-
	Triangular	-	-
	Pisiform	-	-
	Trapezium	-	-
	Trapezoid	-	-
	Capitate	-	-
	Hamate	-	-
Metacarpals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-
Phalanges:	Proximal	-	-
	Medial	-	-
	Distal	-	-
Talus		-	-
Calcaneus		-	-
Cuneiforms:	1st	-	-
	2nd	-	-
	3rd	-	-
Cuboid		-	-
Navicular		-	-
Metatarsals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-

+ indicates present, - indicates absent, * indicates incomplete

Appendix 8

Moose Bay Skeletal Inventory: Individual 8 (Continued)

		Present	Absent
Skull		+*	
Mandible			+
Sternum:	Manubrium		+
	Gladiolus		+
	Xiphoid		+
Vertebrae:	Cervical		+
	Thoracic		+
	Lumbar		+
Sacrum			+
Coccyx			+
Ribs			+

Appendix 9

Moose Bay Skeletal Inventory: Individual 9

		Right	Left
Scapula		-	-
Clavicle		-	-
Humerus		-	-
Radius		-	-
Ulna		-	-
Innominate		-	-
Femur		-	-
Patella		-	-
Tibia		-	-
Fibula		-	-
Carpals:	Scaphoid	-	-
	Lunate	-	-
	Triangular	-	-
	Pisiform	-	-
	Trapezium	-	-
	Trapezoid	-	-
	Capitate	-	-
	Hamate	-	-
Metacarpals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-
Phalanges:	Proximal	-	-
	Medial	-	-
	Distal	-	-
Talus		-	-
Calcaneus		-	-
Cuneiforms:	1st	-	-
	2nd	-	-
	3rd	-	-
Cuboid		-	-
Navicular		-	-
Metatarsals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-

+ indicates present, - indicates absent, * indicates incomplete

Appendix 9

Moose Bay Skeletal Inventory: Individual 9 (Continued)

		Present	Absent
Skull		+*	
Mandible			+
Sternum:	Manubrium		+
	Gladiolus		+
	Xiphoid		+
Vertebrae:	Cervical		+
	Thoracic		+
	Lumbar		+
Sacrum			+
Coccyx			+
Ribs			+

Appendix 10

Moose Bay Skeletal Inventory: Individual 10

		Right	Left
Scapula		-	-
Clavicle		-	-
Humerus		-	-
Radius		-	-
Ulna		-	-
Innominate		-	-
Femur		-	-
Patella		+*	
Tibia		-	-
Fibula		-	-
Carpals:	Scaphoid	-	-
	Lunate	-	-
	Triangular	-	-
	Pisiform	-	-
	Trapezium	-	-
	Trapezoid	-	-
	Capitate	-	-
	Hamate	-	-
Metacarpals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-
Phalanges:	Proximal	-	-
	Medial	-	-
	Distal	-	-
Talus		-	-
Calcaneus		-	-
Cuneiforms:	1st	-	-
	2nd	-	-
	3rd	-	-
Cuboid		-	-
Navicular		-	-
Metatarsals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-

+ indicates present, - indicates absent, * indicates incomplete

Appendix 10

Moose Bay Skeletal Inventory: Individual 10 (Continued)

		Present	Absent
Skull		+*	
Mandible			+
Sternum:	Manubrium		+
	Gladiolus		+
	Xiphoid		+
Vertebrae:	Cervical		+
	Thoracic	+*(8)	
	Lumbar		+
	Undesignated - 7 fragments		
Sacrum			+
Coccyx			+

Ribs - 13 fragments

Appendix 11

Moose Bay Skeletal Inventory: Individuals 11 and 12

		Right	Left
Scapula		+*	+*
Clavicle		-	-
Humerus		-	-
Radius		-	-
Ulna		-	-
Innominate		-	+
Femur		-	-
Patella		-	-
Tibia		+*	+*
Fibula		+*	+*
Undesignated - 4 long bone fragments			
Carpals:	Scaphoid	-	-
	Lunate	-	-
	Triangular	-	-
	Pisiform	-	-
	Trapezium	-	-
	Trapezoid	-	-
	Capitate	-	-
	Hamate	-	-
Metacarpals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-
Phalanges:	Proximal	-	-
	Medial	-	-
	Distal	-	-
Talus		-	-
Calcaneus		-	-
Cuneiforms:	1st	-	-
	2nd	-	-
	3rd	-	-
Cuboid		-	-
Navicular		-	-
Metatarsals:	1st	-	-
	2nd	-	-
	3rd	-	-
	4th	-	-
	5th	-	-

+ indicates present, - indicates absent, * indicates incomplete

Appendix 11

Moose Bay Skeletal Inventory: Individuals 11 and 12 (Continued)

		Present	Absent
Skull			+
Mandible			+
Sternum:	Manubrium		+
	Gladiolus		+
	Xiphoid		+
Vertebrae:	Cervical		+
	Thoracic	+	
	Lumbar		+
Sacrum		+*	
Coccyx			+
Ribs			+

Appendix 12

Bethune Non-Metric Discrete Traits: Individual 2

	Right	Center	Left
Lambdic Ossicle		-	
Lambdoidal Wormian Bones	-		-
Parietal Foramen	-		-
Epiteric Bone	-		-
Parietal Notch Bone	-		-
Tympanic Dehiscence	-		-
Accessory Hypoglossal Canal	-		-
Posterior Condylar Canal	-		-
Accessory Lesser Palatine Foramen	-		-
Supraorbital Foramen	+		+
Infraorbital Suture	+		+
Os Inca		-	
Palatine Torus		-	
Metopic Suture		-	
Bregmatic Bone		-	
Asterionic Bones	-		-
Pterygoid Bridge	-		-
Clinoid Bridge	-		-
Coronal Ossicle	-		-
Precondylar Tubercle		-	
Trochlear Spur	-		+
Auditory Exostosis	-		-
Paracondylar Process	-		-
Accessory Optic Canal	-		-

+ indicates trait presence, - indicates trait absence

Appendix 13

Bethune Non-Metric Discrete Traits: Individual 3

	Right	Center	Left
Lambdic Ossicle		-	
Lambdoidal Wormian Bones	-		-
Parietal Foramen	-		-
Epiteric Bone	-		-
Parietal Notch Bone	-		-
Tympanic Dehiscence	-		-
Accessory Hypoglossal Canal	-		-
Posterior Condylar Canal	+		-
Accessory Lesser Palatine Foramen	-		-
Supraorbital Foramen	+		+
Infraorbital Suture	-		-
Os Inca		-	
Palatine Torus		-	
Metopic Suture		-	
Bregmatic Bone		-	
Asterionic Bones	-		-
Pterygoid Bridge	-		-
Clinoid Bridge	-		-
Coronal Ossicle	-		-
Precondylar Tubercle		-	
Trochlear Spur	-		-
Auditory Exostosis	-		-
Paracondylar Process	-		-
Accessory Optic Canal	-		-

+ indicates trait presence, - indicates trait absence

Appendix 14

Bethune Non-Metric Discrete Traits: Individual 4

	Right	Center	Left
Lambdic Ossicle		-	
Lambdoidal Wormian Bones	-		-
Parietal Foramen	-		-
Epiteric Bone	-		-
Parietal Notch Bone	-		-
Tympanic Dehiscence	-		-
Accessory Hypoglossal Canal	+		-
Posterior Condylar Canal	+		+
Accessory Lesser Palatine Foramen	+		+
Supraorbital Foramen	+		+
Infraorbital Suture	-		+
Os Inca		-	
Palatine Torus		-	
Metopic Suture		-	
Bregmatic Bone		-	
Asterionic Bones	-		-
Pterygoid Bridge	-		-
Clinoid Bridge	-		-
Coronal Ossicle	-		-
Precondylar Tubercle		-	
Trochlear Spur	-		-
Auditory Exostosis	-		-
Paracondylar Process	-		+
Accessory Optic Canal	-		-

+ indicates trait presence, - indicates trait absence

Appendix 15

Bethune Non-Metric Discrete Traits: Individual 5

	Right	Center	Left
Lambdic Ossicle		-	
Lambdoidal Wormian Bones	-		-
Parietal Foramen	-		-
Epiteric Bone	-		-
Parietal Notch Bone	-		-
Tympanic Dehiscence	-		-
Accessory Hypoglossal Canal	-		-
Posterior Condylar Canal	-		-
Accessory Lesser Palatine Foramen	-		-
Supraorbital Foramen	+		+
Infraorbital Suture	-		-
Os Inca		-	
Palatine Torus		-	
Metopic Suture		-	
Bregmatic Bone		-	
Asterionic Bones	-		-
Pterygoid Bridge	-		-
Clinoid Bridge	-		-
Coronal Ossicle	-		-
Precondylar Tubercle		-	
Trochlear Spur	-		-
Auditory Exostosis	-		-
Paracondylar Process	-		-
Accessory Optic Canal	-		-

+ indicates trait presence, - indicates trait absence

Appendix 16

Bethune Non-Metric Discrete Traits: Individual 7

	Right	Center	Left
Lambdic Ossicle		-	
Lambdoidal Wormian Bones	-		-
Parietal Foramen	-		-
Epiteric Bone	-		-
Parietal Notch Bone	-		-
Tympanic Dehiscence	-		-
Accessory Hypoglossal Canal	-		-
Posterior Condylar Canal	-		-
Accessory Lesser Palatine Foramen	-		-
Supraorbital Foramen	+		+
Infraorbital Suture	+		+
Os Inca		-	
Palatine Torus		-	
Metopic Suture		-	
Bregmatic Bone		-	
Asterionic Bones	-		-
Pterygoid Bridge	-		-
Clinoid Bridge	-		-
Coronal Ossicle	-		-
Precondylar Tubercle		-	
Trochlear Spur	-		-
Auditory Exostosis	-		-
Paracondylar Process	-		-
Accessory Optic Canal	-		-

+ indicates trait presence, - indicates trait absence

Appendix 17

Sisterbutte Non-Metric Discrete Traits: Individual 1

	Right	Center	Left
Lambdic Ossicle		-	
Lambdoidal Wormian Bones	-		+
Parietal Foramen	-		-
Epiteric Bone	-		-
Parietal Notch Bone	-		-
Tympanic Dehiscence	-		-
Accessory Hypoglossal Canal	-		-
Posterior Condylar Canal	+		+
Accessory Lesser Palatine Foramen	+		+
Supraorbital Foramen	+		+
Infraorbital Suture	-		-
Os Inca		-	
Palatine Torus		-	
Metopic Suture		-	
Bregmatic Bone		-	
Asterionic Bone	-		-
Pterygoid Bridge	-		-
Clinoid Bridge	-		-
Coronal Ossicle	-		-
Precondylar Tubercle		-	
Trochlear Spur	-		-
Auditory Exostosis	-		-
Paracondylar Process	-		-
Accessory Optic Canal	-		-

+ indicates trait presence, - indicates trait absence

Appendix 18

Sisterbutte Non-Metric Discrete Traits: Individual 2

	Right	Center	Left
Lambdic Ossicle		-	
Lambdoidal Wormian Bones	-		-
Parietal Foramen	-		-
Epiteric Bone	-		-
Parietal Notch Bone	-		-
Tympanic Dehiscence	-		-
Accessory Hypoglossal Canal	-		+
Posterior Condylar Canal	-		-
Accessory Lesser Palatine Foramen	-		-
Supraorbital Foramen	+		+
Infraorbital Suture	-		-
Os Inca		-	
Palatine Torus		-	
Metopic Suture		-	
Bregmatic Bone		-	
Asterionic Bone	-		-
Pterygoid Bridge	-		-
Clinoid Bridge	-		-
Coronal Ossicle	-		-
Precondylar Tubercle		-	
Trochlear Spur	-		-
Auditory Exostosis	-		-
Paracondylar Process	-		-
Accessory Optic Canal	-		-

+ indicates trait presence, - indicates trait absence

Appendix 19

Sisterbutte Non-Metric Discrete Traits: Individual 3

	Right	Center	Left
Lambdic Ossicle		-	
Lambdoidal Wormian Bone	-		-
Parietal Foramen	-		-
Epiteric Bone	-		-
Parietal Notch Bone	-		-
Tympanic Dehiscence	-		-
Accessory Hypoglossal Canal	-		-
Posterior Condylar Canal	-		-
Accessory Lesser Palatine Foramen	-		-
Supraorbital Foramen	+		+
Infraorbital Suture	-		-
Os Inca		-	
Palatine Torus		+	
Metopic Suture		-	
Bregmatic Bone		-	
Asterionic Bone	-		-
Pterygoid Bridge	-		-
Clinoid Bridge	-		-
Coronal Ossicle	-		-
Precondylar Tubercle		-	
Trochlear Spur	-		-
Auditory Exostosis	-		-
Paracondylar Process	-		-
Accessory Optic Canal	-		-

+ indicates trait presence, - indicates trait absence

Appendix 20

Sisterbutte Non-Metric Discrete Traits: Individual 4

	Right	Center	Left
Lambdic Ossicle		-	
Lambdoidal Wormian Bones	-		-
Parietal Foramen	-		-
Epiteric Bone	-		-
Parietal Notch Bone	-		-
Tympanic Dehiscence	-		-
Accessory Hypoglossal Canal	-		-
Posterior Condylar Canal	-		-
Accessory Lesser Palatine Foramen	-		-
Supraorbital Foramen	-		+
Infraorbital Suture	-		-
Os Inca		-	
Palatine Torus		-	
Metopic Suture		-	
Bregmatic Bone		-	
Asterionic Bone	-		-
Pterygoid Bridge	-		-
Clinoid Bridge	-		-
Coronal Ossicle	-		-
Precondylar Tubercle		-	
Trochlear Spur	-		-
Auditory Exostosis	-		-
Paracondylar Process	-		-
Accessory Optic Canal	-		-

+ indicates trait presence, - indicates trait absence

Appendix 21

Moose Bay Non-Metric Discrete Traits: Individual 1

	Right	Center	Left
Lambdic Ossicle		+	
Lambdoidal Wormian Bones	+		+
Parietal Foramen	-		-
Epiteric Bone	-		-
Parietal Notch Bone	-		-
Tympanic Dehiscence	-		-
Accessory Hypoglossal Canal	-		-
Posterior Condylar Canal	-		-
Accessory Lesser Palatine Foramen	-		-
Supraorbital Foramen	+		+
Infraorbital Suture	-		-
Os Inca		-	
Palatine Torus		-	
Metopic Suture		-	
Bregmatic Bone		-	
Asterionic Bones	-		-
Pterygoid Bridge	-		-
Clinoid Bridge	-		-
Coronal Ossicle	-		-
Precondylar Tubercle		-	
Trochlear Spur	-		-
Auditory Exostosis	-		-
Paracondylar Process	-		-
Accessory Optic Canal	-		-

+ indicates trait presence, - indicates traits absence

Appendix 22

Moose Bay Non-Metric Discrete Traits: Individual 2

	Right	Center	Left
Lambdic Ossicle		+	
Lambdoidal Wormian Bones	+		+
Parietal Foramen	-		-
Epiteric Bone	-		-
Parietal Notch Bone	-		-
Tympanic Dehiscence	-		-
Accessory Hypoglossal Canal	-		-
Posterior Condylar Canal	-		-
Accessory Lesser Palatine Foramen	+		+
Supraorbital Foramen	+		+
Infraorbital Suture	-		-
Os Inca		-	
Palatine Torus		+	
Metopic Suture		-	
Bregmatic Bone		-	
Asterionic Bones	-		-
Pterygoid Bridge	-		-
Clinoid Bridge	-		-
Coronal Ossicle	-		-
Precondylar Tubercle		-	
Trochlear Spur	-		-
Auditory Exostosis	-		-
Paracondylar Process	-		-
Accessory Optic Canal	-		-

+ indicates trait presence, - indicates trait absence

Appendix 23

Moose Bay Non-Metric Discrete Triats: Individual 3

	Right	Center	Left
Lambdic Ossicle		-	
Lambdoidal Wormian Bones	+		-
Parietal Foramen	-		-
Epiteric Bone	-		-
Parietal Notch Bone	-		-
Tympanic Dehiscence	-		-
Accessory Hypoglossal Canal	-		-
Posterior Condylar Canal	-		-
Accessory Lesser Palatine Foramen	-		-
Supraorbital Foramen	-		-
Infraorbital Suture	-		-
Os Inca		-	
Palatine Torus		-	
Metopic Suture		-	
Bregmatic Bone		-	
Asterionic Bones	-		-
Pterygoid Bridge	-		-
Clinoid Bridge	-		-
Coronal Ossicle	-		-
Precondylar Tubercle		-	
Trochlear Spur	-		-
Auditory Exostosis	-		-
Paracondylar Process	-		-
Accessory Optic Canal	-		-

+ indicates trait presence, - indicates trait absence

Appendix 24

Moose Bay Non-Metric Discrete Traits: Individual 4

	Right	Center	Left
Lambdic Ossicle		-	
Lambdoidal Wormian Bones	+		-
Parietal Foramen	-		-
Epiteric Bone	-		-
Parietal Notch Bone	-		-
Tympanic Dehiscence	-		-
Accessory Hypoglossal Canal	-		-
Posterior Condylar Canal	-		-
Accessory Lesser Palatine Foramen	-		-
Supraorbital Foramen	-		-
Infraorbital Suture	-		-
Os Inca		-	
Palatine Torus		-	
Metopic Suture		-	
Bregmatic Bone		-	
Asterionic Bones	-		-
Pterygoid Bridge	-		-
Clinoid Bridge	-		-
Coronal Ossicle	-		-
Precondylar Tubercle		-	
Trochlear Spur	-		-
Auditory Exostosis	-		-
Paracondylar Process	-		-
Accessory Optic Canal	-		-

+ indicates trait presence, - indicates trait absence

Appendix 25

Moose Bay Non-Metric Discrete Traits: Individual 5

	Right	Center	Left
Lambdic Ossicle		-	
Lambdoidal Wormian Bones	+		-
Parietal Foramen	-		-
Epiteric Bone	-		-
Parietal Notch Bone	-		-
Tympanic Dehiscence	-		-
Accessory Hypoglossal Canal	-		-
Posterior Condylar Canal	-		-
Accessory Lesser Palatine Foramen	-		-
Supraorbital Foramen	-		-
Infraorbital Suture	-		-
Os Inca		-	
Palatine Torus		-	
Metopic Suture		-	
Bregmatic Bone		-	
Asterionic Bones	-		-
Pterygoid Bridge	-		-
Clinoid Bridge	-		-
Coronal Ossicle	-		-
Precondylar Tubercle		-	
Trochlear Spur	-		-
Auditory Exostosis	-		-
Paracondylar Process	-		-
Accessory Optic Canal	-		-

+ indicates trait presence, - indicates trait absence

Appendix 26

Moose Bay Non-Metric Discrete Traits: Individual 6

	Right	Center	Left
Lambdic Ossicle		-	
Lambdoidal Wormian Bones	+		-
Parietal Foramen	-		-
Epiteric Bone	-		-
Parietal Notch Bone	-		-
Tympanic Dehiscence	-		-
Accessory Hypoglossal Canal	-		-
Posterior Condylar Canal	-		-
Accessory Lesser Palatine Foramen	-		-
Supraorbital Foramen	-		-
Infraorbital Suture	-		-
Os Inca		-	
Palatine Torus		-	
Metopic Suture		-	
Bregmatic Bone		-	
Asterionic Bones	-		-
Pterygoid Bridge	-		-
Clinoid Bridge	-		-
Coronal Ossicle	-		-
Precondylar Tubercle		-	
Trochlear Spur	-		-
Auditory Exostosis	-		-
Paracondylar Process	-		-
Accessory Optic Canal	-		-

+ indicates trait presence, - indicates trait absence

Appendix 27

Moose Bay Non-Metric Discrete Traits: Individual 7

	Right	Center	Left
Lambdic Ossicle		-	
Lambdoidal Wormian Bones	-		-
Parietal Foramen	-		-
Epiteric Bone	-		-
Parietal Notch Bone	-		-
Tympanic Dehiscence	+		-
Accessory Hypoglossal Canal	-		-
Posterior Condylar Canal	-		-
Accessory Lesser Palatine Foramen	-		-
Supraorbital Foramen	-		-
Infraorbital Suture	-		-
Os Inca		-	
Palatine Torus		-	
Metopic Suture		+	
Bregmatic Bone		-	
Asterionic Bones	-		-
Pterygoid Bridge	-		-
Clinoid Bridge	-		-
Coronal Ossicle	-		-
Precondylar Tubercle		-	
Trochlear Spur	-		-
Auditory Exostosis	-		-
Paracondylar Process	-		-
Accessory Optic Canal	-		-

+ indicates trait presence, - indicates trait absence

Appendix 28

Moose Bay Non-Metric Discrete Traits: Individual 8

	Right	Center	Left
Lambdic Ossicle		-	
Lambdoidal Wormian Bones	-		-
Parietal Foramen	-		-
Epiteric Bone	-		-
Parietal Notch Bone	-		-
Tympanic Dehiscence	-		-
Accessory Hypoglossal Canal	-		-
Posterior Condylar Canal	-		-
Accessory Lesser Palatine Foramen	-		-
Supraorbital Foramen	-		-
Infraorbital Suture	-		-
Os Inca		-	
Palatine Torus		-	
Metopic Suture		-	
Bregmatic Bone		-	
Asterionic Bones	-		-
Pterygoid Bridge	-		-
Clinoid Bridge	-		-
Coronal Ossicle	-		-
Precondylar Tubercle		-	
Trochlear Spur	-		-
Auditory Exostosis	-		-
Paracondylar Process	-		-
Accessory Optic Canal	-		-

+ indicates trait presence, - indicates trait absence

Appendix 29

Moose Bay Non-Metric Discrete Traits: Individual 9

	Right	Center	Left
Lambdic Ossicle		-	
Lambdoidal Wormian Bones	-		-
Parietal Foramen	-		-
Epiteric Bone	-		-
Parietal Notch Bone	-		-
Tympanic Dehiscence	-		-
Accessory Hypoglossal Canal	-		-
Posterior Condylar Canal	-		-
Accessory Lesser Palatine Foramen	-		-
Supraorbital Foramen	-		-
Infraorbital Suture	-		-
Os Inca		-	
Palatine Torus		-	
Metopic Suture		+	
Bregmatic Bone		-	
Asterionic Bones	-		-
Pterygoid Bridge	-		-
Clinoid Bridge	-		-
Coronal Suture	-		-
Precondylar Tubercle		-	
Trochlear Spur	-		-
Auditory Exostosis	-		-
Paracondylar Process	-		-
Accessory Optic Canal	-		-

+ indicates trait presence, - indicates trait absence

Appendix 30

Moose Bay Non-Metric Discrete Traits: Individual 10

	Right	Center	Left
Lambdic Ossicle		-	
Lambdoidal Wormian Bones	-		-
Parietal Foramen	-		-
Epiteric Bone	-		-
Parietal Notch Bone	-		-
Tympanic Dehiscence	-		-
Accessory Hypoglossal Canal	-		-
Posterior Condylar Canal	-		-
Accessory Lesser Palatine Foramen	-		-
Supraorbital Foramen	-		-
Infraorbital Suture	-		-
Os Inca		-	
Palatine Torus		-	
Metopic Suture		-	
Bregmatic Bone		-	
Asterionic Bones	-		-
Pterygoid Bridge	-		-
Clinoid Bridge	-		-
Coronal Ossicle	-		-
Precondylar Tubercle		-	
Trochlear Spur	-		-
Auditory Exostosis	-		-
Paracondylar Process	-		-
Accessory Optic Canal	-		-

+ indicates trait presence, - indicates trait absence

Appendix 31

Glen Ewen Non-Metric Discrete Traits: Individual 1

	Right	Center	Left
Lambdic Ossicle		-	
Lambdoidal Wormian Bones	-		+
Parietal Foramen	-		-
Epiteric Bone	-		-
Parietal Notch Bone	-		-
Tympanic Dehiscence	-		-
Accessory Hypoglossal Canal	-		-
Posterior Condylar Canal	-		-
Accessory Lesser Palatine Foramen	+		+
Supraorbital Foramen	+		+
Infraorbital Suture	+		-
Os Inca		-	
Palatine Torus		+	
Metopic Suture		+	
Bregmatic Bone		-	
Asterionic Bone	-		-
Pterygoid Bridge	-		-
Clinoid Bridge	-		-
Coronal Ossicle	-		-
Precondylar Tubercle		-	
Trochlear Spur	-		-
Auditory Exostosis	-		-
Paracondylar Process	-		-
Accessory Optic Canal	-		-

+ indicates trait presence, - indicates trait absence

Appendix 32

Glen Ewen Non-Metric Discrete Traits: Individual 2

	Right	Center	Left
Lambdic Ossicle		-	
Lambdoidal Wormian Bones	-		-
Parietal Foramen	-		-
Epiteric Bone	-		-
Parietal Notch Bone	-		-
Tympanic Dehiscence	-		-
Accessory Hypoglossal Canal	-		-
Posterior Condylar Canal	+		+
Accessory Lesser Palatine Foramen	+		+
Supraorbital Foramen	+		+
Infraorbital Suture	+		+
Os Inca		-	
Palatine Torus		+	
Metopic Suture		-	
Bregmatic Bone		-	
Asterionic Bones	-		-
Pterygoid Bridge	+		-
Clinoid Bridge	-		-
Coronal Ossicle	-		-
Precondylar Tubercle		-	
Trochlear Spur	-		-
Auditory Exostosis	-		-
Paracondylar Process	-		-
Accessory Optic Canal	-		-

+ indicates trait presence, - indicates trait absence

Appendix 33

Metric Variables for the Moose Bay Burial Mound

	Ind. 1	Ind. 2	Ind. 3	Ind. 4	Ind. 5
Cranial Measurements					
1. Length		200			
2. Breadth		140			
3. Basion-bregma height		133			
4. Minimum frontal breadth		90			
5. Bizygomatic breadth		146			
6. Auricular height					
7. Total facial height					
8. Upper facial height		75			
9. Basion-prosthion line		100			
10. Nasal height-left		57			
-right		59			
11. Nasal breadth		27			
12. Orbital breadth-left		40			
-right		39			
13. Orbital height-left		37			
-right		38			
14. Interorbital breadth		32			
15. Biorbital breadth		101			
16. Maxillo-alveolar height		13			
17. Maxillo-alveolar breadth		62			
18. Mean diameter of foramen magnum		40			
19. Maximum circumference		358			
20. Transverse arc		290			
Mandible Measurements					
1. Bicondylar width			122*		
2. Symphyseal height	21*	28	30*		26
3. Bigonial diameter	96*		105		51*
4. Ascending ramus height			58*		35
5. Ascending ramus breadth	36*		36		
6. Mandibular angle	117		118		115
7. Mandibular body length	95		101		88
8. Mandibular body thickness	19	14	10		14

All measurements taken in millimeters

* estimated measurement

() measurement of duplicated element

Appendix 33 (Continued)

Metric Variables for the Moose Bay Burial Mound

	Ind. 1	Ind. 2	Ind. 3	Ind. 4	Ind. 5
Clavicle Measurements					
1. Length-left		155*			
-right		162	159		
Scapula Measurements					
1. Morphological breadth-left			166*(150*)		
-right		176			
2. Morphological length-left			105*(99)		
-right		109(98*)			
3. Infraspinous fossa breadth-left			125*(115*)		
-right		131(116*)			
4. Supraspinous fossa breadth-left			50*(53*)		
-right		62			
5. Scapular index-left			63.3*(66*)		
-right		61.9			
6. Infrascapular index-left			119*(116.2*)		
-right		120.2(118.4*)			
7. Suprascapular index-left			47.6*(53.5*)		
-right		56.9			
Humerus Measurments					
1. Length-left		342	323		
-right		344	322	229*	
2. Maximum diameter of head-left		47	45		
-right		48	46		
3. Antero-posterior midshaft diameter-left		20	20		
-right	19	24	18		
4. Medio-lateral midshaft diameter-left		23	22		
-right	19	24	23		
5. Medio-lateral distal diameter-left		47	44		
-right	38	45	48		
Ulna Measurements					
1. Length-left		267*	272		
-right		277			
2. Maximum diameter of head-left	23	29	27		
-right	23	30			
3. Antero-posterior midshaft diameter-left	15	13	16		
-right	15	13			
4. Medio-lateral midshaft diameter-left	14	16	13		
-right	13	16			
5. Medio-lateral distal diameter-left		13	15		
-right		14			

Appendix 33 (Continued)

Metric Variables for the Moose Bay Burial Mound

	Ind. 1	Ind. 2	Ind. 3	Ind. 4	Ind.5
Radius Measurements					
1. length-left		255	251		
-right	206*	258	255		
2. Maximum diameter of head-left	19	26	23		
-right	18	25	23		
3. Antero-posterior midshaft diameter-left	11	13	11		
-right	12	13	12		
4. Medio-lateral midshaft diameter-left	15	17	16		
-right	16	15	14		
5. Medio-lateral distal diameter-left		27	24		
-right	21*	25	26		
6. Radio-humeral index-left		74.6*	77.7		
-right		75	79.2		
Innominate Measurements					
1. Height-left		233			
-right		227*			
2. Breadth-left		167*			
-right		183			
Femur Measurements					
1. Length-left		275			
-right		472		338*	
2. Bicondylar length-left		470			
-right		467			
3. Maximum diameter of head-left		53			
-right		54			
4. Subtrochanteric antero-posterior diameter-left		32	30		
-right	31	34	32	20	
5. Subtrochanteric medio-lateral diameter-left		41	37		
-right	30	41	36	26	
6. Platymeric index-left		78.1	81.1		
-right	103.3	82.9	88.9	76.9	
7. Antero-posterior midshaft diameter-left	28	32	29	20	
-right	27	32	29	22	
8. Medio-lateral midshaft diameter-left	25	32	25	18	
-right	25	29	25	18	

Appendix 33 (Continued)

Metric Variables for the Moose Bay Burial Mound

	Ind. 1	Ind. 2	Ind. 3	Ind. 4	Ind. 5
Tibia Measurements					
1. Length-left		400			
-right		420			
2. Antero-posterior midshaft diameter-left	27	30	35*		
-right	25	31	36		
3. Medio-lateral midshaft diameter-left	24	28	22*		
-right	23	30	21		
4. Antero-posterior nutrient foramen diameter-left	29	35			
-right	29	36	41		
5. Medio-lateral nutrient foramen diameter-left	26	30			
-right	27	32	23		
Fibula Measurements					
1. Length-left		390*			
-right		395			

Appendix 34

Metric Variables for the Glen Ewen Burial Mound

	Ind. 1	Ind. 2
Cranial Measurements		
1. Length	176	173
2. Breadth	136	135
3. Basion-bregma height	129	133
4. Minimum frontal breadth	113	93
5. Bizygomatic breadth	131	124*
6. Auricular height	111	109
7. Total facial height	109	115
8. Upper facial height	65	73
9. Basion-prosthion line	97	95
10. Nasal height-left	48	52
-right		53
11. Nasal breadth	24	26
12. Orbital breadth-left	39	37
-right	36	36
13. Orbital height-left	29	34
-right	30	34
14. Interorbital breadth	28	24
15. Biorbital breadth	100	96
16. Maxillo-alveolar height	51.5	54
17. Maxillo-alveolar breadth	64	61
18. Mean diameter of foramen magnum	36	33
19. Maximum circumference	498	503
20. Transverse arc	214	213*
Mandible Measurements		
1. Bicondylar width	120	
2. Symphyseal height	31	29
3. Bigonial diameter	92	91*
4. Ascending ramus height	64	65
5. Ascending ramus breadth	36	35
6. Mandibular angle	114	115
7. Mandibular body length	95	94
8. Mandibular body thickness	16	15

All measurements are taken in millimeters

* estimated measurement

Appendix 34 (Continued)

Metric Variables for the Glen Ewen Burial Mound

	Ind. 1	Ind. 2
Clavicle Measurements		
1. Length-left	137*	
-right	136	
Scapula Measurements		
1. Morphological breadth-left	142	
-right		
2. Morphological length-left	95.5	
-right		
3. Infraspinous fossa breadth-left	119	
-right		
4. Supraspinous fossa breadth-left	52	
-right		
5. Scapular index-left	67.2	
-right		
6. Infrascapular index-left	124.6	
-right		
7. Suprascapular index-left	54.4	
-right		
Humerus Measurements		
1. Length-left	276	
-right		
2. Maximum diameter of head-left	37.5	
-right		
3. Antero-posterior midshaft diameter-left	19	
-right		
4. Medio-lateral midshaft diameter-left	22	
-right		
5. Medio-lateral distal diameter-left	38	
-right		
Ulna Measurements		
1. Length-left	237	
-right	232	
2. Maximum diameter of head-left	25	
-right	24	
3. Antero-posterior midshaft diameter-left	11	
-right	12	
4. Medio-lateral midshaft diameter-left	15	
-right	13	
5. Medio-lateral distal diameter-left	13*	
-right	13	

Appendix 34 (Continued)

Metric Variables for the Glen Ewen Burial Mound

	Ind. 1	Ind. 2
Radius Measurements		
1. Length-left	211	
-right	218	
2. Maximum diameter of head-left	20	
-right	20	
3. Antero-posterior midshaft diameter-left	11	
-right	12	
4. Medio-lateral midshaft diameter-left	14	
-right	15	
5. Medio-lateral distal diameter-left	25	
-right	27	
6. Radio-humeral index-left	76.4	
-right		
Innominate Measurements		
1. Height-left	190	
-right	188	
2. Breadth-left	138*	
-right	132*	
Femur Measurements		
1. Length-left	397	
-right	400	
2. Bicondylar length-left	394	
-right	398	
3. Maximum diameter of head-left	41	
-right	43	
4. Subtrochanteric antero-posterior diameter-left	24	
-right	25	
5. Subtrochanteric medio-lateral diameter-left	31.5	
-right	32	
6. Platymeric index-left	108.3	
-right	113	
7. Antero-posterior midshaft diameter-left	26	
-right	26	
8. Medio-lateral midshaft diameter-left	24	
-right	23	

Appendix 34 (Continued)

Metric Variables of the Glen Ewen Burial Mound

	Ind. 1	Ind. 2
Tibia Measurements		
1. Length-left	313	
right	313	
2. Antero-posterior midshaft diameter-left	25	
-right	23	
3. Medio-lateral midshaft diameter-left	19	
-right	20	
4. Antero-posterior nutrient foramen diameter-left	26	
-right	25	
5. Medio-lateral nutrient foramen diameter-left	21	
-right	22	
Fibula Measurements		
1. Length-left	308	
-right	310	

Appendix 35

Metric Variables for the Sisterbutte Burial Mound

	Ind. 1	Ind. 2	Ind. 3
Cranial Measurements			
1. Length	170	178*	
2. Breadth	130	137*	
3. Basion-bregma height	126	135*	
4. Minimum frontal breadth	95	107*	90
5. Bizygomatic breadth	122		124*
6. Auricular height			
7. Total facial height	110		
8. Upper facial height	59		62
9. Basion-prosthion line	92		
10. Nasal height-left	44		49
-right	45		48
11. Nasal breadth	21		20
12. Orbital breadth-left	34		36
-right	36		36
13. Orbital height-left	29		34
-right	30		35
14. Interorbital breadth	10		10
15. Biorbital breadth	22		24
16. Maxillo-alveolar height	51		
17. Maxillo-alveolar breadth	60		60
18. Mean diameter of foramen magnum	31	33	
19. Maximum circumference	554		
20. Transverse arc	212	223*	

All measurements taken in millimeters

* estimated measurement

Appendix 36

Metric Variables for the Bethune Burial Site

	Ind. 2	Ind. 3	Ind. 4	Ind. 5	Ind. 7
Cranial Measurements					
1. Length		165	181	185	
2. Breadth		126*	133	126	
3. Basion-bregma height	104*		131	120*	
4. Minimum frontal breadth	82	86	98	94	91
5. Bizygomatic breadth	95		139	137	119
6. Auricular height			115	107	
7. Total facial height			122	116*	
8. Upper facial height	50		76	66*	71
9. Basion-prosthion height	70*		104		
10. Nasal height-left	36		53	51	34
-right	36		53	51	34
11. Upper nasal breadth	20		28	22	28
12. Orbital breadth-left	31	32	41	38	38
-right	31	32	43	43	37
13. Orbital height-left	28		35	38	35
-right	28		34	37*	34
14. Interorbital breadth	19	19*	25	24	23
15. Biorbital breadth	77	82*	104	102	96
16. Maxillo-alveolar height	42		58	47	
17. Maxillo-alveolar breadth	52		66	53*	60
18. Mean diameter of foramen magnum		31*	34.5		31
19. Maximum circumference			524	522	511*
20. Transverse arc			225	218*	
Mandible Measurements					
1. Bicondylar width		104*	128		
2. Symphyseal height		21	36	30	
3. Bigonial diameter		87	110	120*	
4. Ascending ramus height		37	61	63*	
5. Ascending ramus breadth		28	39	33	
6. Mandibular angle		111	104	119	
7. Mandibular body length		91	108	104	
8. Mandibular body thickness		13	13	13*	

All measurements taken in millimeters

* estimated measurement

Appendix 36 (Continued)

Metric Variables for the Bethune Burial Site

	Ind. 1	Ind. 2	Ind. 3	Ind. 4	Ind. 5	Ind. 6	Ind. 7
Clavicle Measurements							
1. Length-left				152	165		
-right		92		156	168*		
Scapula Measurements							
1. Morphological breadth-left			135	172			
-right			138	172			152
2. Morphological length-left			97	102			98
-right	49		96	103	92		99
3. Infraspinous fossa breadth-left			103	142			
-right			104	142			124
4. Supraspinous fossa breadth-left			42	43*			41*
-right	23		49	52	44		44*
5. Scapular index-left			71.9	59.3			
-right			69.6	59.9			65.1*
6. Infrascapular index-left			106.2	139.2			
-right			108.3	137.9			125.3
7. Suprascapular index-left			43.3	42.2*			41.8*
-right	46.9		45.8	50.5	47.8		44.4*
Humerus Measurements							
1. Length-left				340			313
-right		172	304	345			316*
2. Maximum diameter of head-left			39	45			43
-right			41	46			42*
3. Antero-posterior midshaft diameter-left				22			16
-right		11	17	21			18
4. Medio-lateral midshaft diameter-left				21			21
-right		12	20	24			24
5. Medio-lateral distal diameter-left				38			41
-right		25	35	38			40*
Ulna Measurements							
1. Length-left		140				274	279
-right						275	276
2. Maximum diameter of head-left						28	26
-right						27	26
3. Antero-posterior midshaft diameter-left		8				16	13
-right						17	12
4. Medio-lateral midshaft diameter-left		9				12	12
-right						12	12
5. Medio-lateral distal diameter-left		9				14	11
-right		9				15	10

Appendix 36 (Continued)

Metric Variables for the Bethune Burial Site

	Ind. 1	Ind. 2	Ind. 3	Ind. 4	Ind. 5	Ind. 6	Ind. 7
Radius Measurements							
1. Length-left				242	263	250	
-right		128*		245		254	253
2. Maximum diameter of the head-left				21	23	22	23
-right				21	24	23	23
3. Antero-posterior midshaft diameter-left				12	12	13	12
-right	7			12	11	12	12
4. Medio-lateral midshaft diameter-left				16	13	13	15
-right	8			15	14	13	16
5. Medio-lateral distal diameter-left				20	22	24	23*
-right	10			22		24	23
6. Radio-humeral index-left				71.2			
-right	74.4*			71			80.1*
Innominate Measurements							
1. Height-left				224		212	195*
-right				224		212*	
2. Breadth-left		65*		224		207	156
-right	67*	65*		219		205	
Femur Measurements							
1. Length-left		230	390*	461	456*	442	452*
-right		232		463	448*	440	
2. Bicondylar length-left				457	440	439	446
-right				458	436	435	
3. Maximum diameter of head-left			42	49	44	46	45
-right				50		45	
4. Subtrochanteric antero-posterior diameter-left		19	26	28	29	30	32
-right		17		29	28	30	
5. Subtrochanteric medio-lateral diameter-left		22	30	36	26	34	36
-right		23		37	25	31	
6. Platymeric index-left		86.4	86.7	77.8	111.5	88.2	88.9
-right		73.9		78.4	112	96.8	
7. Antero-posterior midshaft diameter-left		15	25	29	29	27	28
-right		15		29	28	28	
8. Medio-lateral midshaft diameter-left		15	22	27	26	26	25
-right		15		27	25	28	

Appendix 36 (Continued)

Metric Variables for the Bethune Burial Site

	Ind. 1	Ind. 2	Ind. 3	Ind. 4	Ind.5	Ind. 6	Ind. 7
Tibia Measurements							
1. Length-left		185		383		374	372
-right		186		381		375	
2. Antero-posterior midshaft diameter-left		15	32	29		24	31
-right		15		29		25	
3. Medio-lateral midshaft diameter-left		12	20	28		25	21
-right		12		28		25	
4. Antero-posterior nutrient foramen diameter-left		15	27	32		30	38
-right		16		33		28	
5. Medio-lateral nutrient foramen diameter-left		15	20	30		27	23
-right		15		31		26	
Fibula Measurements							
1. Length-left			315	378		370	368
-right		183		380	341	370	