8-1982

Craniometric Relationships among Plains Indians: Culture-Historical and Evolutionary Implications

Patrick J. Key
University of Tennessee, Knoxville

To the Graduate Council:

I am submitting herewith a dissertation written by Patrick J. Key entitled "Craniometric Relationships among Plains Indians: Culture-Historical and Evolutionary Implications." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Anthropology.

Richard L. Jantz, Major Professor

We have read this dissertation and recommend its acceptance:

William M. Bass, Fred H. Smith, John W. Philpot

Accepted for the Council:

Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

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L. Evans Roth

Vice Chancellor
Graduate Studies and Research

CRANIOMETRIC RELATIONSHIPS AMONG PLAINS INDIANS: CULTURE-HISTORICAL AND EVOLUTIONARY IMPLICATIONS

A Dissertation

Presented for the

Doctor of Philosophy

Degree

The University of Tennessee, Knoxville

Patrick J. Key

August 1982

This work is dedicated

to the memory of my father

James G. Key (1924-1982)

and to

The Indians of the Plains

hiye pila maya

ACKNOWLEDGMENTS

Many individuals have helped me on my way during the two years of research represented by the present work and in the years preceding that. I owe them a debt greater than a mere mention of their names could hope to repay.

First and foremost, I would like to thank the members of my doctoral committee, that stalwart crew who didn't bat an eye when I presented them with impossible deadlines. This work is largely an outgrowth of the previous research by my major professor, Dr. Richard Jantz, and it has been profoundly influenced by his ideas and advice. Dr. William M. Bass is in many respects the father of physical anthropology on the Plains. He excavated a substantial portion of the material used here and I was very conscious of following in his footsteps during my many travels. Dr. Fred Smith has been a strong influence on my development as an anthropologist and much of the way I think is grounded in his training. Finally, Dr. John Philpot has shouldered much of my statistical training; in fact, the present work has its roots in a paper I wrote for one of his graduate courses.

I would also like to thank Dr. W. W. Howells, Professor emeritus, Harvard University, who has been a source of advice and encouragement these past several years. In many respects the present work could be considered a practical application of the theoretical foundations he laid down in Cranial Variation in Man in 1973.

I greatly appreciate the efforts of Dr. Paul Lin, who initially measured some of the Arikara used here. My thanks also go out to a host of individuals at various institutions I visited around the country:

Smithsonian Institution: Dr. Doug Ubelaker, Dr. Waldo Wedel, Katherine Holland, Dwight Schmidt and Stephen Hunter; and Peggy Lethbridge, Ellen Paige and Janet Wood in Arlington, Virginia.

University of Nebraska: Dr. Peter Bleed, Dr. Robert Pepprl, Dr. Tom Myers, Dr. C. Bertrand Schultz, Linda Mick and Jeff Buechler.

Nebraska State Historical Society: Dr. Marvin Kivett, John Ludwickson, and Gayle Carlson.

North Dakota State Historical Society: Chris Dill, John Peterson and Signe Snortland; and John and Delnora Tkach in Bismark.

Kansas State Historical Society: Tom Witty and John Reynolds.

Many thanks also to my colleagues at The University of Tennessee for things large and small: Bill Baden, Annette Blackbourne, Donna Blackbourne, Cliff and Dona Boyd, Bruce Bradtmiller, Dr. Anthony Cavender, Dr. Dave Glassman, Jack Hoffman, Dr. Walter Klippel, Dr. Mike Logan, Darcey Morey, Dr. Doug Owsley, Ken Parham, Dr. Gerald Schroedl, and Regina Todd.

Many of the specimens utilized here were originally excavated by Dr. William M. Bass under NSF grants GS-831 and GS-1653, and National Geographic Society Grant 699,912. I thank Dr. Bass for access to these materials.

Portions of this research were carried out on the computer facilities at Key Energy Corporation and most of the tables were

produced there. The drafting was done by Vanneisa Hartmann at Key Oil Properties. The finished version was typed by Claudia Brewster. I acknowledge the use of The University of Tennessee computing center in obtaining some of the results shown here.

Most of this research was carried out while the author was a Hilton A. Smith graduate fellow at The University of Tennessee. It was aided by a Sigma Xi Grant-in-aid-of-Research; however most of the financial support was provided by my parents, James G. and Lorraine M. Key.

Finally, some special notes of thanks:

—to John Ludwickson and Gayle Carlson at the Nebraska State Historical Society for handing a slightly bewildered physical anthropologist a ball of twine and guiding him through some of the more intricate mazes of Plains archaeology.

—to Jeff Beuchler for putting up the stranger on his doorstep with the hospitality of a true Plainsman.

—to Christy Morris, Steve Symes and Terry Zobeck for keeping the faith when *Eeshta wechayzan we* (the Moon of the Sore Eyes) ruled the heavens over the poor guy who had to do the analysis and write his doctoral dissertation in a month.

—to Gail Celmer for many things.

—to Sean Key, programmer extrordinaire, for a stroke of unadulterated brilliance during the red-eye shift.

—to Dr. Mark Guagliardo for being a sounding board, partner in crime and ally these many years.

Last, but certainly not least, my best regards to the makers of Budweiser and Taster's Choice for getting me through all this.

ABSTRACT

This study presents a broad picture of Plains Indian biological relationships on the basis of craniometric data. It employs a sample of 860 individuals distributed temporally from the Paleo-Indian Period into historic times and distributed geographically among the states of North Dakota, South Dakota, Nebraska, Kansas, Iowa and Missouri.

The sample was analyzed within a culture-historical framework utilizing a variety of statistical methodologies: some conventional, some implemented here in the face of small samples and unbalanced designs.

The results show strong evidence of biological continuity on the Plains stretching from the Paleo-Indian Period, through the Plains Archaic Period and into the Plains Woodland. The Middle Missouri-Mandan sequence appears to be strongly rooted in the Plains Woodland, suggesting an *in situ* development for the Middle Missouri Tradition. However, most of the phases of the Initial Middle Missouri Variant show greater affinities to Great Oasis and later Chiwere-Siouan groups than the Middle Missouri Tradition proper. It is possible that the Initial Middle Missouri Variant is not a Mandan-Siouan manifestation.

In contrast to the Middle Missouri Tradition, the Central Plains Tradition is fundamentally distinct from the earlier Plains Woodland complexes. It appears to be an intrusion onto the Plains, perhaps from a Woodland or Mississippian base in the south.

There is also a remarkable temporal trend evident in the Caddoan lineage stretching from the Central Plains Tradition into the Coalescent Arikara and Pawnee sequence. It is characterized by a complex of morphological features generally associated with a lowering of the cranial vault, and appears to coincide with the movement of the Caddoan speakers up the Missouri River. In the absence of a more all-encompassing explanation, the Caddoan trend seems to be the result of gene flow between the Caddoans and the indigenous low-headed Mandan groups. The effect of this gene flow on the Mandan is as yet unknown.

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I. INTRODUCTION

The Plains region of North America has a long and complex history of human occupation stretching back to the first arrival of American Indians into the New World. Throughout this interval the Plains were occupied by an assortment of groups employing a variety of cultural and biological mechanisms to adapt to the Plains environment. At a certain level of abstraction, it is possible to order these groups along lines of cultural similarity, to define relationships between them, and ultimately to infer lines of cultural evolution culminating in the historic tribes of the region.

This "culture-historical reconstruction" has traditionally been accomplished through a detailed examination of artifactual and ethnohistoric data. However, subsequent to the pioneering work of Bass (1964), human skeletal remains have been increasingly examined within the context of Plains culture-history. Jantz (1972, 1973, 1974, 1977) and later Jantz and his co-workers (Jantz, Owsley and Willey 1978; Owsley and Jantz 1978) have been particularly active in this regard. These analyses have demonstrated the utility of applying human skeletal material —craniometric material in particular— to problems of culture history.

The bulk of these investigations have been carried out on skeletal materials excavated by Dr. William Bass from the Missouri River trench in South Dakota during the 1960's, supplemented by less comprehensive samples from Nebraska and North Dakota.

Throughout the course of my involvement with these studies (Key 1979, 1981; Key and Jantz 1981; Jantz, Key and Bass n.d.) it became increasingly obvious that a broad picture of biological relationships on the Plains could not be understood without expanding the data base considerably. Another problem which emerged had to do with the nature of the measurement set employed in most of the analyses.

During the 1960's, the fields of both physical anthropology and archaeology experienced major theoretical reorganizations. A major change in the field of physical anthropology was a shift away from "typological" thinking toward an orientation based on the concept of population variation (Bennett 1969; Johnston 1966; Mayr 1963). This theoretical change was accompanied by a complementary change in analytical methodology: from a basically univariate approach to a multivariate approach aided by the computer.

Although the traditional craniometric data set is ameanable to multivariate analysis, it provides little insight into the nature of the complexes contributing to intergroup variation. This is because the variables are primarily size-related and give little indication of shape, except through cumbersome indices.

In 1973 W. W. Howells defined a craniometric data set specifically designed for multivariate analysis. It provides an excellent representation of the "numerical shape" of a specimen through a wide variety of shape-related angles and a cohesive set of interlocking variables.

Preliminary studies of Plains Indian craniometric material using a subset of Howells' variables demonstrated their considerable utility in studies of population relationships.

With these considerations in mind the present investigation was instigated. First, to systematically examine all the known Plains Indian cranial material. Second, to measure the reasonably complete material using the Howells measurement set as well as certain measurements specifically designed for this analysis. Third, to subject the accumulated data base to a broad scale multivariate analysis to assess Plains Indian craniometric relationships within a culture-historical and evolutionary framework.

Although temporal and geographical subsets of the material have been analyzed previously (Alexander 1971; Bass 1964; Jantz 1972, 1973; Neumann 1952), the Plains area as a whole has never been subjected to a broad scale scrutiny. Even in the present case, it was necessary to drop the Southern Plains and most of the Northwestern Plains from consideration. Because of sheer logistics problems, the present study focuses primarily on cranial material derived from the segment of the Plains drained by the Missouri River system.

Craniometric data are particularly ameanable to analyses of population relationships. The variables are relatively easily and precisely defined and they display a great deal of relevant interpopulational variation (Jantz 1977: 162). Although the genetic basis of cranial shape is not fully understood, craniometric variables have been shown generally to have high heritabilities (Nakata, et al. 1974; Osborne and DeGeorge 1959). There is also a considerable body of empirical evidence to draw on. By way of example, broad scale studies of European (Rösing and Schwidetzky 1977; Schwidetzky 1972; Schwidetzky

and Rösing 1976), Ukranian (Konduktorova 1974) and Pacific Islander (Pietrusewsky 1977) relationships have each produced a cohesive, highly interpretable set of results. In all such studies, the tacit assumption is made that groups with similar cranial morphologies are genetically similar. Such an assumption is fundamental to the present analysis.

II. THE ARCHAEOLOGICAL FRAMEWORK

Spatial Divisions

In archaeological terms, the Plains area can be subdivided into five subareas: the Middle Missouri, the Central Plains, the Northwestern Plains, the Northeastern Periphery and the Southern Plains (Figure 1). These subareas represent fairly distinct environmental units and each appears to be a valid unit in terms of culture history (Lehmer and Caldwell 1966: 512).

Formal definitions of the subareas can be found in Krause (1969: 84-87), Lehmer (1971: 28) and Wedel (1961). I have followed Lehmer's lead (1971: 28) and excluded the arid protions of western Nebraska and Kansas from the Central Plains, making this subarea conform more generally to the limits of the agricultural village tribes in this part of the Plains.

It is possible to further subdivide each subarea into regions; however only the Middle Missouri and Central Plains regions will be considered here.

That region of present-day South Dakota lying between the White and Niobrara Rivers is known as the Ft. Randall region. It is a transitional zone between the Middle Missouri and Central Plains subareas and doesn't fit comfortably into either. It is a very complex region archaeologically with profound influences from the Upper Mississippi Valley as well as the Plains proper (Ludwickson et al. 1981).

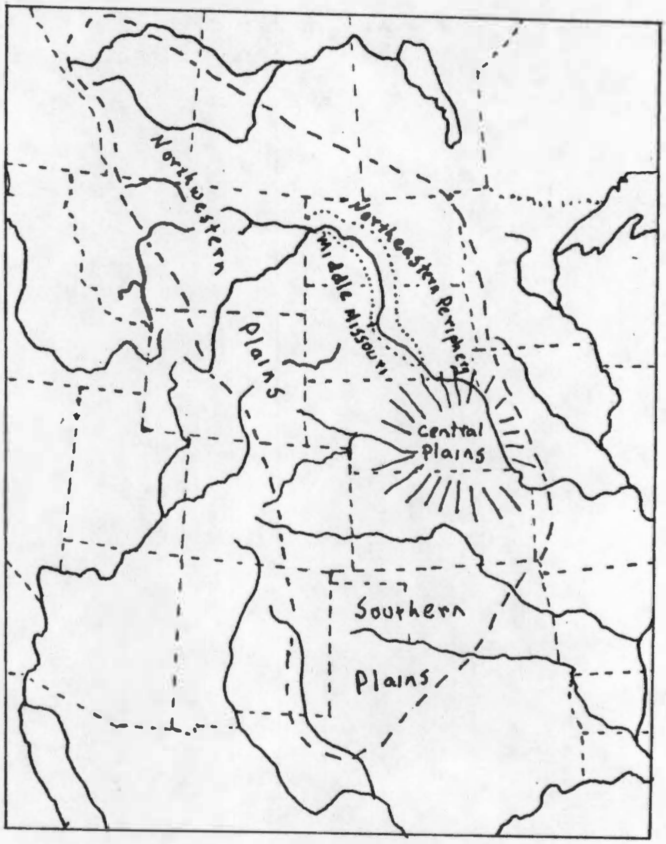

Figure 1. Subareas of the Plains.

Lehmer and Caldwell (1966: 512) have defined six regions in the Middle Missouri subarea. From north to south they are the Garrison, the Knife-Heart, the Cannonball, the Grand-Moreau, the Bad-Cheyenne and the Big Bend (Figure 2). "Each of these regions is distinguished by a unique archaeological sequence, and together they serve as integrative devices in reconstructing the culture history of the Middle Missouri subarea" (Lehmer 1971: 29).

Krause (1969: 84-87) has proposed four regions for the Central Plains: the Eastern Glaciated, the Loess Plains, the Sand Hills and the High Plains (Figure 3). In terms of Lehmer's definition of the Central Plains (1971: 28), the latter two would lie in the Northwestern Plains subarea. Krause's regions conform to physiographic provinces (Fenneman 1938: 309-322). As such they should represent the "most intelligible units for a detailed study of culture ecological relationships" (Krause 1969: 87). Krause also suggests that a region should approximate the territory occupied by a homogeneous large-scale social unit such as a tribe (1969: 85, 87).

Still finer subdivisions such as the _locality_ have been proposed (Willey and Phillips 1962: 18-19), but they will be addressed only as needed. As a whole the spatial subdivisions of the Plains are useful constructs, both in purely descriptive terms and a culture-historical units of integration.

With the exception of the High Plains region of western Nebraska and a few specimens from western North and South Dakota, the Northwestern Plains subarea is outside the scope of this analysis. This is also true of the Southern Plains.

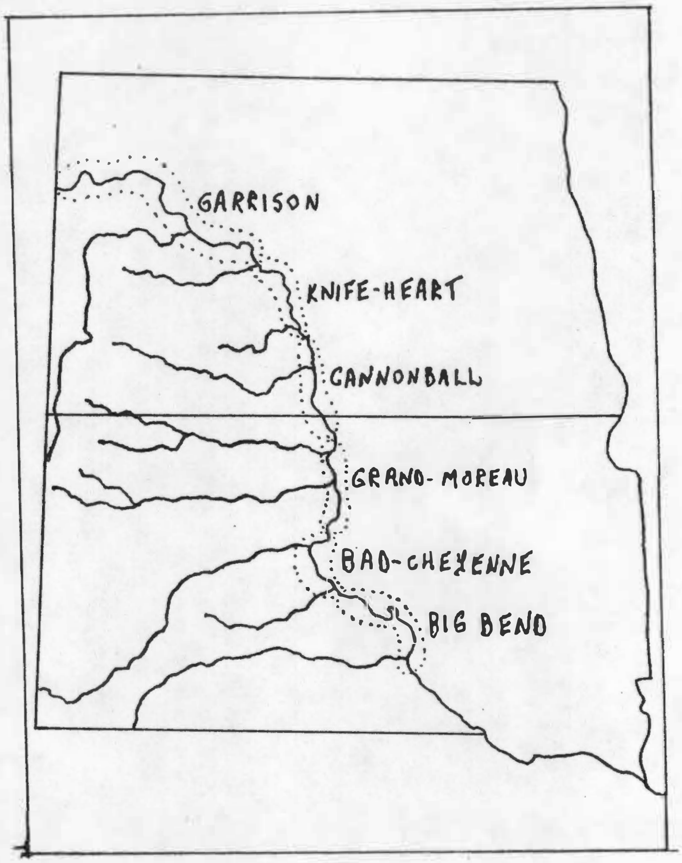

Figure 2. Regions in the Middle Missouri Subarea (after Lehmer 1971: Figure 20).

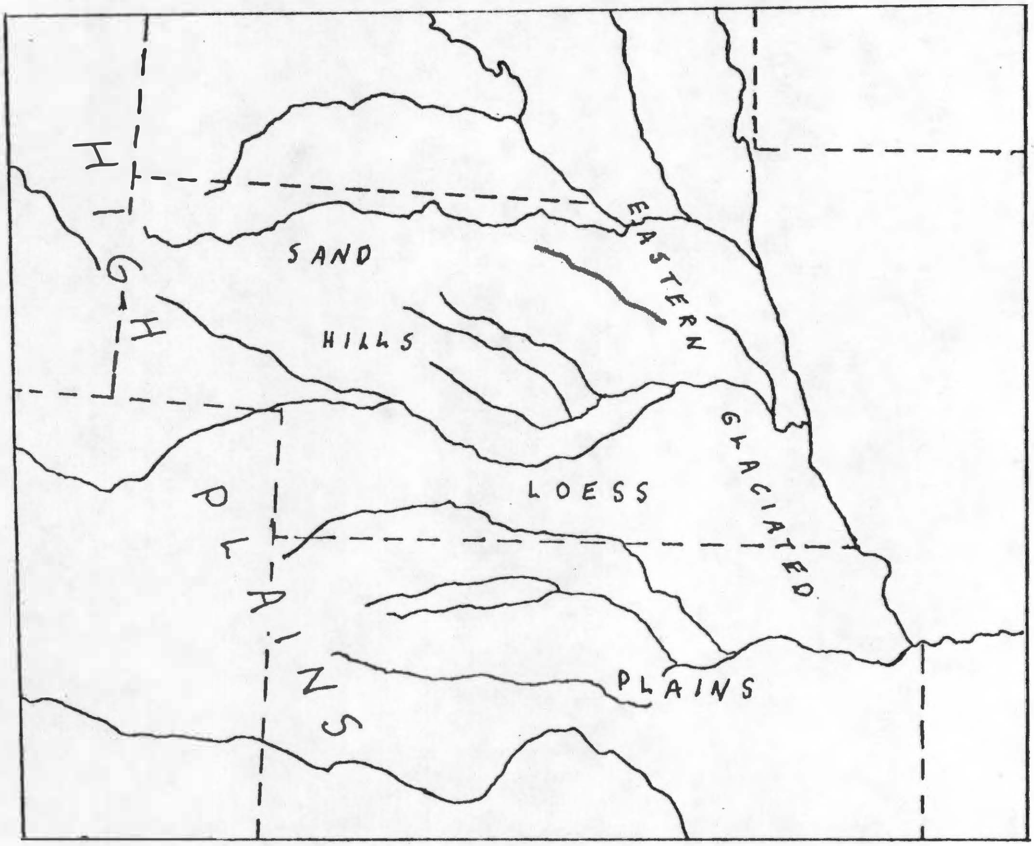

Figure 3. Regions in the Central Plains Subarea (after Krause 1969: Figure 8).

Cultural Categories

The prehistory of the Plains is best viewed in terms of "time horizons" or "periods" when the area as a whole was dominated by a distinct, widespread cultural configuration. Each of these configurations or "culture climaxes" represents a unique adaptation of a particular cultural system to the rigors of the Plains environment. There is a minimum of temporal overlap between these climaxes and they appear to have centered in different subareas of the Plains (Lehmer 1954a: 139).

The earliest of these periods was the Paleo-Indian. It was followed in turn by the Plains Archaic, the Plains Woodland, the Plains Village and the Equestrian Periods.

The Paleo-Indian Period

The Plains were first occupied by bands of big game hunters collectively referred to as Paleo-Indians. The Paleo-Indian hunters represent the first arrival of humans into the New World. The exact time of their arrival is still an unresolved question (Wormington 1971). Most archaeologists would place the arrival at around 20,000 years ago (Griffin 1979; Hopkins 1979), although dates earlier than 70,000 years ago have been suggested (MacNeish 1976: 317). Few would question that the Paleo-Indians came via the Bering Straits and ultimately southward along the Mackenzie River Valley into the midcontinent (Caldwell and Henning 1978: 117). This would imply that they entered into the Plains shortly after their arrival.

By approximately 10,000 B.C. the Paleo-Indians were widespread throughout most of North and South America. Although some regional complexes are beginning to be recognized (Caldwell and Henning 1978: 117-120; Griffin 1979: 51), Paleo-Indian culture as a whole was relatively undifferentiated. It was a lifeway based on the hunting of large game animals and the gathering of a variety of plant foods. Socially, the Paleo-Indians were probably organized into bands with widely ranging patterns of movement and intergroup interaction (Griffin 1979: 51). As such they should exhibit a basic biological similarity over a wide geographical area (Meiklejohn 1972).

Taxonomic subdivisions. That the Plains were inhabited by Paleo-Indians is aptly demonstrated by a wide and varied assortment of sites (Davis 1962; Husted and Caldwell 1965; Smith 1976). There is a tendency for the sites to be concentrated in the Northwestern Plains subarea, although this may be an artifact of depositional environment and sampling. Taxonomic subdivisions have been proposed for the Paleo-Indian Period in general (Haynes 1971) and for the Plains in particular (Irwin 1968), but due to sparse skeletal samples a discussion of them is not warranted here.

The Plains Archaic Period

As the modern faunal forms began to emerge with the retreat of the Wisconsin glaciation, the Paleo-Indian culture climax was gradually replaced by the Plains Archaic. This was a period of regionally

differentiated hunter-gather populations lasting from approximately 6000 B.C. to A.D. 1. The large lanceolate projectile point tradition of the Paleo-Indians gave way to smaller points associated with the atlatl; and the subsistence orientation shifted from large game animals such as the mammoth and mastadon to smaller forms like the bison, elk and deer (Carlson and Steinacher 1978: 1; Griffin 1979: 51-52). The incidence of plant processing implements such as grinding stones and mullers increased substantially. Overall, however, the generally crude level of technology expressed by Plains Archaic artifacts suggests a marginal economy (Lehmer 1971: 31). In fact, at one point it was commonly believed that the Plains were virtually abandoned during much of the Archaic Period when a hot dry climatic episode known as the Altithermal prevailed (from approximately 6000-3000 B.C.) (see Husted and Caldwell 1965: 21). Although this idea is no longer tenable (Reeves 1973), the adverse climatic conditions of the Altithermal must have had a profound impact on the Plains Archaic populations (Ludwickson et al. 1981: 112).

Taxonomic subdivisions. Carlson and Steinacher (1978) have advanced a preliminary culture-historical sequence for the Plains Archaic in Nebraska. They define a number of regional and temporal complexes based largely on projectile point morphology; however their sequence is too preliminary to be utilized here. At a more general level they advance the concept of two traditions within the Plains Archaic: a Western tradition centered on the Northwestern Plains, and an Eastern tradition centered on the Central Plains. Ludwickson, Blakeslee and O'Shea

(1981: 114) suggest that the Western tradition represents a gradual development from the preceding Paleo-Indian adaptive pattern, whereas the Eastern tradition reflects a more radical departure from the Paleo-Indian in economic and social organization and is adapted to a more closed —but diversified— environment. This distinction appears to be a valid one but it is difficult to apply to the present analysis largely because the details of the scheme are still tentative. Also, since some of the Western groups may have moved eastward with the Altithermal, certain Archaic sites in the Central Plains and Middle Missouri may represent a blending of the two traditions (Ludwickson et al. 1981: 114).

The Plains Woodland Period

The beginning of the Woodland Period is traditionally marked by the appearance of pottery in archaeological assemblages. This event occurs much earlier in the Eastern Woodlands than it does on the Plains, a condition which led many people to suggest that the Plains Woodland represents a migration of Woodland peoples from the East (Wilmeth 1972: 153). Plains Woodland sites are usually located along the terraces of major rivers and tributary streams, situations which reproduce in miniature the forest belts of the Eastern United States. There is little doubt that the Woodland lifeway is basically oriented toward the exploitation of forest resources; however Benn (1980) suggests that the Plains Woodland is an in situ development. His work is the first major reorganization of Plains Woodland data in thirty years (Ludwickson et al.

1981: 114). Benn would see the Plains Woodland development in four stages.

The Early Woodland (400-50 B.C.) represents a diffusion of ceramic technology into Archaic peoples already familiar with working and firing clay. His recent work at the MAD sites in central-western Iowa suggests such a Late Archaic-Early Woodland transition (1980: 2-3). The Middle Woodland (50 B.C. - 300-400 A.D.) was a time of increasing population density and concommitant intensification of ideological belief systems and role and status differentiation. The material remains of this intensification are exemplified by the elaborate mound burials characteristic of the Middle Woodland. In spite of the population increase, the Middle Woodland economy remained based on hunting and gathering with no evidence of horticulture north of the Kansas City area. During Early Late Woodland times (300-700 A.D.) small scale horticulture appeared, but the economic mainstay remained hunting and gathering. The bow and arrow were acquired (perhaps from the Northwestern Plains) and pottery became more refined. Late Late Woodland times (700-900 A.D.) were characterized by larger and increasingly sedentary "aggregate" bands and an ever intensifying horticultural base. This time period is marked archaeologically by the widespread appearance of single-line cord impressed pottery. "After arriving on the prairies, regional variants of cord decorated ceramics rapidly appear in patterns that prefigure those of Plains Village cultures" (Benn 1980: 5). The subsequent Plains Village Period is seen by Benn as essentially a "florescence" of the developments occurring throughout the Plains Woodland Period.

Although this developmental sequence was worked out on the Western Prairie-Plains border of Iowa, Benn suggests it is applicable to the Plains as a whole. Woodland manifestations on the Plains seem to center in the Central Plains, Middle Missouri and Northeastern Periphery with most of the Northwestern Plains retaining a basically Archaic lifeway into the Equestrian Period.

Taxonomic subdivisions. To date, no Early Woodland materials are known from the Plains. It appears that the Plains Archaic lifeway persisted there until about 50 B.C. Early Woodland manifestations do occur on the Western Prairie-Plains border in Minnesota (the Fox Lake Phase) and Iowa (the MAD sites). The earliest materials definitely attributable to the Woodland on the Plains appear in the Kansas City area. The Kansas City Hopewell Phase is a Middle Woodland culture, dating from approximately 50 B.C. to A.D. 300 with unquestionable ties to the large Hopewell centers in the Ohio River Valley (O'Brien 1971; Wedel 1943, 1961: 89). In contrast to the other Plains Middle Woodland cultures, the Kansas City Hopewell people practiced horticulture and their sites suggest some degree of sedentarism (Wedel 1961: 88-89).

Other Middle Woodland materials are found further toward the west and north (Figure 4). The Valley Phase is distributed throughout the Eastern Glaciated region of the Central Plains (Hill and Kivett 1940; Kivett 1952). It dates from about 50 B.C. to 3-400 A.D. (O'Brien 1971: 175; Ludwickson et al. 1981: 122). The Keith Phase occurs throughout the High Plains region of the Northwestern Plains, with excursions into the Loess Plains region of the Central Plains (Hill and Kivett 1940;

Figure 4. Distribution of some Early and Middle Woodland Phases.

Fox Lake Phase

Kansas City Hopewell

Valley Phase

Keith Phase

Sonota Complex

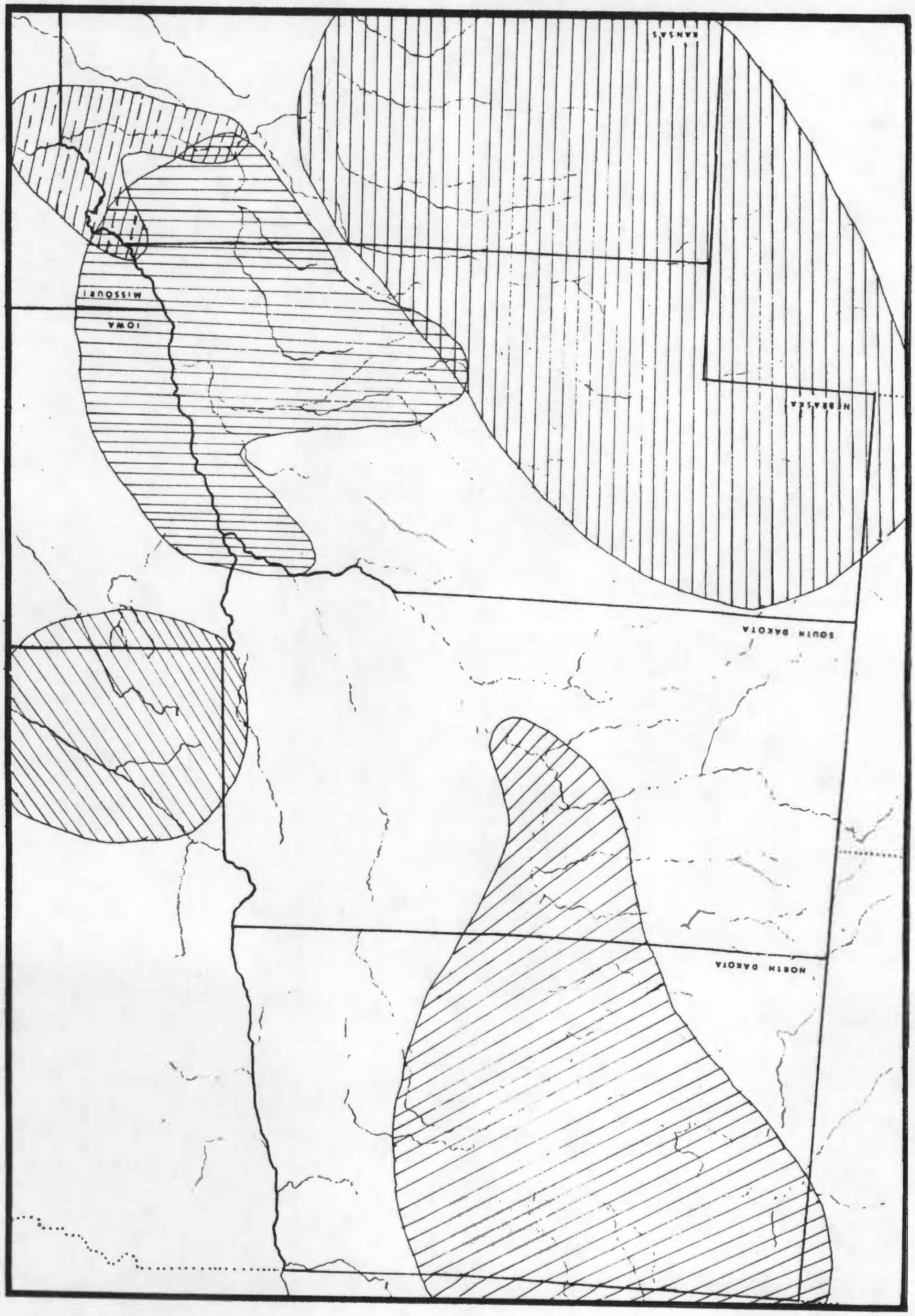

Figure 4

Kivett 1953; Wedel 1961: 90). Its usage here includes the Ash Hollow focus. The Keith Phase dates from approximately 500 to 700 A.D.

At roughly this same time, a widespread Middle woodland mortuary complex known as the Sonota occurs throughout much of the Middle Missouri and Northeastern Periphery (Neuman 1975). It dates from about 1 to 600 A.D. (Neuman 1975: 88). The Sonota complex seems to be distinct from the southern Middle Woodland phases, with its greatest affinities lying to Minnesota and the Illinois River Valley (Neuman 1975: 84-87).

The relationship of Kansas City Hopewell to the (presumably) later Middle Woodland cultures on the Plains is uncertain. It may be an isolated Hopewell outlier or, as Wilmeth suggests (1972: 153) it may represent the cultural and biological base from which the Keith and Valley Phases emerged.

A variety of Late Woodland materials are known from the Plains (Figure 5). The Loseke Creek Phase extends over most of the Eastern Glaciated region of the Central Plains and into the Ft. Randall region between the Central Plains and the Middle Missouri. Its exact dating is unclear, although it is generally considered to be older than the Sterns Creek Phase in southeastern Nebraska. A "best guess" data of 700-800 A.D. is suggested (Lucwickson et al. 1981: 127). The Sterns Creek Phase is not represented by any skeletal material in the present analysis.

On the Northeastern Periphery, the Arvilla Burial Complex appears suddenly about 5-600 A.D. It persists until about 900 A.D. along the Plains-Prairie border of northeastern South Dakota and western Minnesota (South Arvilla) and until about 1100 A.D. in northern Minnesota and

Figure 5. Distribution of some Late Woodland Phases.

Lake Benton Phase

Loseke Creek Phase

Sterns Creek Phase

Truman Complex

Arvilla Complex

Devils Lake-Sourisford Complex

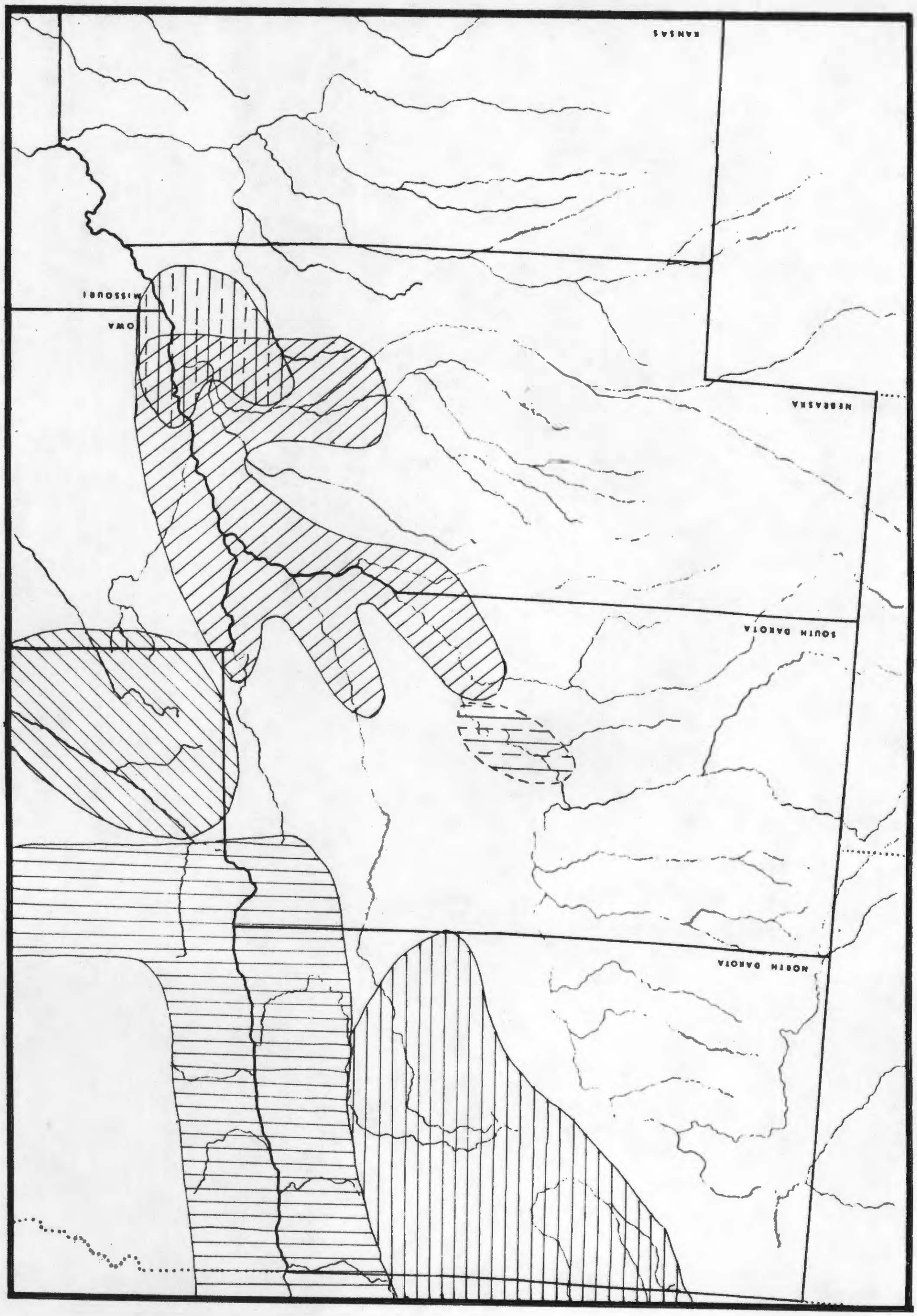

Figure 5

Manitoba (North Arvilla) (Johnson 1973: 65-66; Ossenberg 1974: 18; Wilford 1955).

The details of Late Woodland manifestations in the Middle Missouri have not been worked out with any precision. I have grouped some of the (limited) materials from this subarea into the "Truman Complex" based on the presence of distinctive Truman Plain Rim pottery. A series of radiocarbon determinations dates Truman pottery from roughly 600-800 A.D. (Neuman 1960, 1967: 479).

The Devils Lake-Sourisford Burial Complex is a problematical cultural designation included here with the Late Woodland. As defined by Symes (1979) the Devils Lake-Sourisford Complex extends throughout the Northeastern Periphery from about 900 to 1400 A.D. Its material remains consist of a large series of mounds and earthworks (Howard 1953; Montgomery 1906; Wedel 1961: 215-228) and at least one habitation site (Good et al. 1977). Grave goods include a variety of Mississippian-derived "Southern Cult" objects (Howard 1953; Symes 1979); however, if Symes' assessment is correct, the Devils Lake-Sourisford people maintained a basically Late Woodland lifeway (1979: 283-308). Their relationship to the supposedly contemporary Plains Village and North Arvilla Complex peoples is uncertain.

Great Oasis is another problematical complex included here with the Late Woodland. On economic and ceramic grounds, it is generally viewed as a complex transitional between the Woodland and Plains Village patterns (Johnston 1967: 53-72). The degree to which Great Oasis people practiced agriculture is the subject of some controversy, as is their

relationship to Plains Village manifestations such as the Mill Creek and Over Phases (see Ludwickson et al. 1981: 133-140). Great Oasis is distributed over much of the Western Prairie-Plains border, Northeastern Periphery and up the Middle Missouri as far as the Big Bend region (Henning 1971: 125-133) (Figure 6). It appears to date between 950 and 1120 A.D. (Ludwickson et al. 1981: 218; Tiffany 1981: 62).

The Plains Village Period

Following the Woodland Period a new cultural configuration known as the Plains Village Pattern appeared on the Plains. To what extent the Plains Village Pattern is grounded in the Woodland is uncertain at this time. It may represent a "florescence" of Plains Woodland developments as Benn (1980) suggests or it may be an intrusion of Mississippian developments to the East (or some combination of the two). Whatever its ultimate origins, the Plains Village Pattern is a unique configuration, strongly influenced by the Plains environment (Lehmer 1954b: 139). Willey (1966) has included it as one of the sixteen major cultural patterns in North America.

The Plains Village Period is crosscut by four cultural traditions: a Middle Missouri Tradition centered in the Middle Missouri subarea, a Central Plains Tradition centered on the Central Plains, an Oneota Tradition along the Plains-Prairie border and a Coalescent Tradition representing a fusion of the first two with influences from the third.

The Middle Missouri people were Mandan-Siouan speakers who eventually culminated in the historic Mandan and Hidatsa. Their villages were

Figure 6. Distribution of Great Oasis.

Great Oasis.

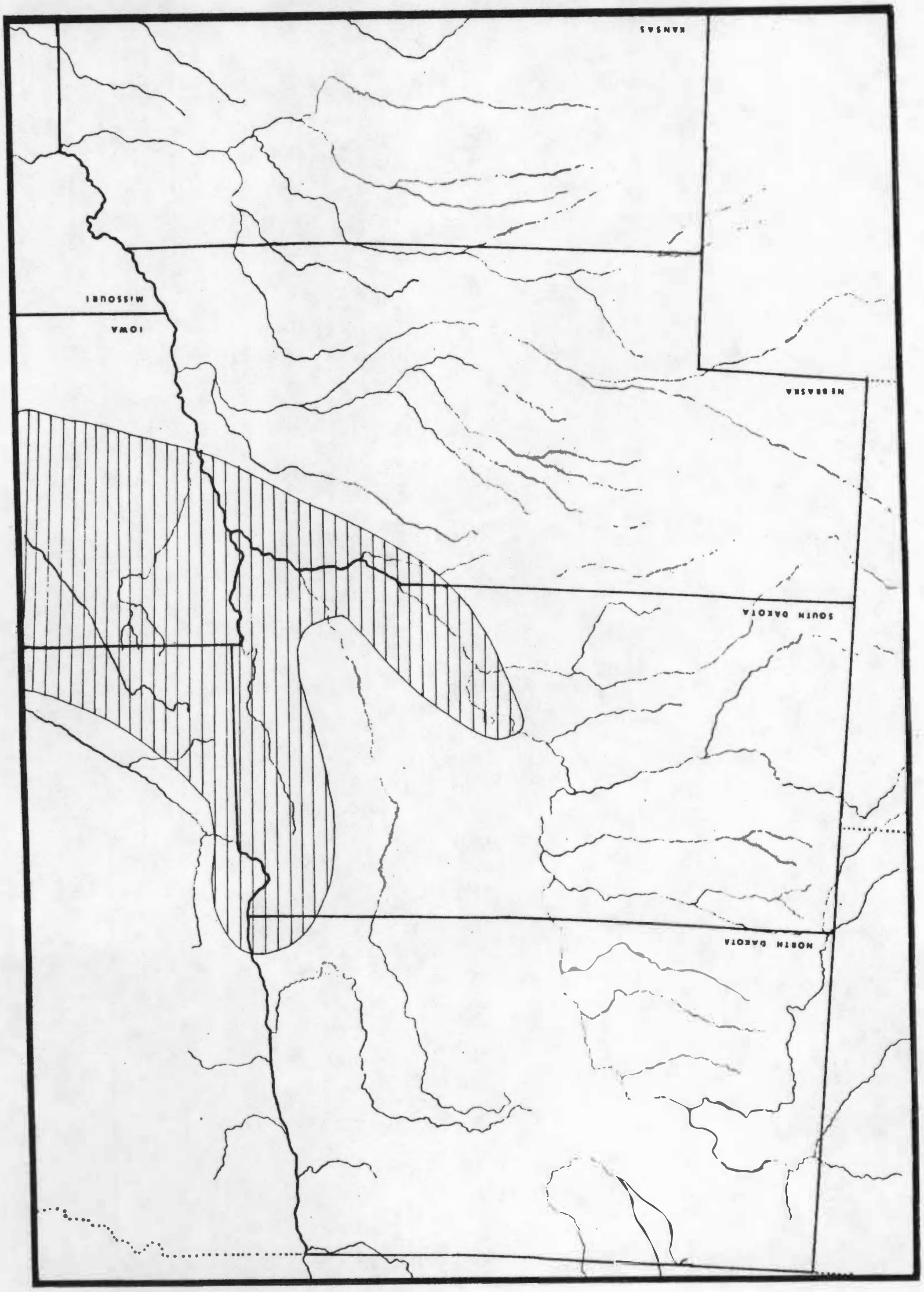

Figure 6

distributed along much of the Missouri River in North and South Dakota. They tended to be large villages, usually surrounded by elaborate fortification systems and possessing distinctive long rectangular houses laid out in neat rows (Lehmer 1971: 66-70).

In contrast to this, the Central Plains settlement pattern consisted of square houses clustered into small hamlets scattered along creek banks and tributary streams throughout the Central Plains (Lehmer 1971: 107-109). The Central Plains people were Caddoan speakers who eventually gave rise to the historic Arikara and Pawnee.

The Oneota Tradition was largely peripheral to the Plains. The Oneota were Chiwere-Siouan speakers for the most part, ancestral to tribes such as the Ioway, Oto and Winnebago. It also appears that the Dhegiha-Siouan Plains Village tribes —the Omaha, Ponca, Kansa and Osage— may ultimately originate from within the Oneota Tradition.

The Coalescent represents a time of complex patterns of movement and interaction between the Central Plains, Middle Missouri and Oneota derived populations (Caldwell 1966; Lehmer 1954a, 1971; Spaulding 1956). The end result was a disappearance of the Central Plains and Middle Missouri Traditions as distinct entities. The initial migrations were probably a result of the droughts induced by the Pacific I climatic episode (Lehmer 1970) aggravated by the arrival of Oneota populations from the east. Much of the cultural "homogenization" which occurred during the Coalescent was probably the result of an extensive intertribal trade network (Blakeslee, in press)

These four traditions represent the major components of the Plains Village pattern, a way of life which dominated the Plains from about

900 A.D. until well into the European contact period. The decimation brought on by that contact so reduced the Plains Villagers, however, that by 1780 A.D. the culture climax shifted westward to the well known equestrian bison hunting tribes of the Northwestern Plains. Remnants of the Plains Village lifeway persisted until the reservation period starting in 1862.

The Middle Missouri Tradition

Three regional/temporal variants are defined within the Middle Missouri Tradition: an Initial Variant (IMM) dating from 900 to 1400 A.D., an Extended Variant (EMM) dating from 1100 to 1550 A.D. and a Terminal Variant (TMM) dating from 1550 to 1675 A.D.

The Middle Missouri Tradition appears to have its roots in the Prairie-Plains border area of southwestern Minnesota and northwestern Iowa. Its earliest manifestation seems to be an IMM phase known as the Mill Creek (Alex 1980). The relationships of Mill Creek to nearly contemporaneous Late Woodland phases such as Great Oasis and the Cambria phase in southwestern Minnesota have yet to be resolved.

Lehmer has suggested that the movement of IMM peoples onto the Plains coincides with the Neo-Atlantic, a moist climatic episode that was particularly conducive to corn growing (1970: 118, 1971: 105). By 1100 A.D. the IMM peoples were spread throughout the southeastern two-thirds of South Dakota and the Bad-Cheyenne and Big Bend regions along the Missouri (Figure 7).

It once appeared that the EMM variant was a direct outgrowth from the IMM (Lehmer 1954b); however radiocarbon dates now indicate that the

Figure 7. Distribution of the Middle Missouri Tradition.

 Initial Middle Missouri Variant

 Extended Middle Missouri Variant

 Terminal Middle Missouri Variant

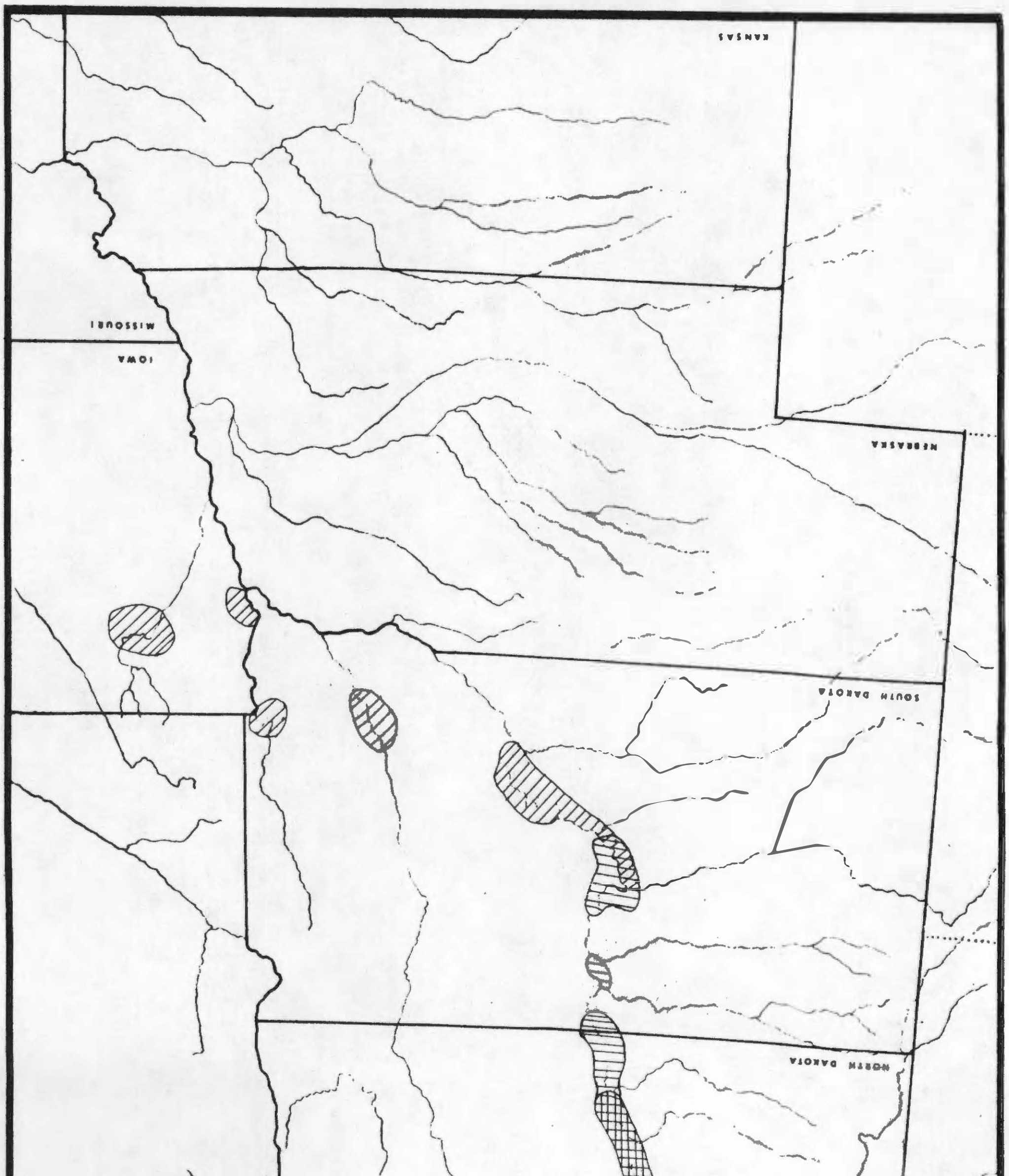

Figure 7

two variants overlapped for a considerable time period (Lehmer 1971: 99-105). The origin of the EMM is uncertain. It may be derived from the IMM but it was initially concentrated along the Missouri in North Dakota. Sometime after 1100 A.D. EMM groups began to filter downriver, eventually coming into contact with the IMM peoples in the Bad-Cheyenne region (Lehmer 1971: 100). Both IMM and EMM villages from this time period exhibit extensive fortification systems, suggesting that interaction between the two groups was not peaceful. In a period between roughly 1250 and 1450 A.D. it appears that the EMM peoples abandoned the Bad-Cheyenne region and moved northward again, perhaps in response to a long term drought (Lehmer 1970: 121). They left behind a remnant IMM population which died out around 1400 A.D., perhaps under pressure from Initial Coalescent (IC) groups moving into the region from the Central Plains.

After 1450 A.D. the EMM peoples moved back downriver, only to be displaced to the north again by the successors of the Initial Coalescent people, a variant known as the Extended Coalescent (EC). This final northward movement is marked by the TMM variant. The TMM persisted until the European contact period beginning in 1675 A.D.

Taxonomic subdivisions. Phases within the Initial Middle Missouri variant include the Mill Creek phase mentioned earlier; an Over Phase spread throughout the Ft. Randall region (Hurt 1951; Over and Meleen 1941); an Anderson Phase in the Bad-Cheyenne region (Lehmer 1954b; Brown 1974); and a Grand Detour Phase in the Big Bend region (Caldwell and Jensen 1969). In addition, Ludwickson et al. (1981: 143) define an

Upper Big Sioux Phase to encompass IMM sites along the Big Sioux which are distinct from Mill Creek. The Extended Middle Missouri variant is subdivided into a Ft. Yates phase representing the North Dakota sites (Hurt 1953: 60-61; Lehmer 1966: 54-60) and a Thomas Riggs Phase encompassing the South Dakota sites (Hurt 1953: 51-61). At some point the Thomas Riggs Phase will probably be subdivided to reflect the abandonment and reoccupation of the Missouri in South Dakota during the 13th and 14th centuries. All of the Terminal Middle Missouri variant materials are included in the Huff Phase (Wood 1967).

The Central Plains Tradition

Whereas the Middle Missouri Tradition seems to stem from the Prairie-Plains border area, the roots of the Central Plains Tradition lie far to the south. The Smoky Hill Phase of north-eastern Kansas is its first expression, dating from 900 to 1300 A.D. Wedel (1959: 564-566) has noted tentative ties between the Smoky Hill Phase and Middle Mississippian materials further south, specifically with Spiro Mound components in the Caddo area of eastern Oklahoma. Both Wood (1969: 102-103) and Roper (1976) have suggested a gradual movement of Central Plains groups northward through time, the latter supported by a trend-surface analysis of Central Plains radiocarbon dates. Wedel (1959: 564-565) has suggested that the Smoky Hill ceramics may represent the ancestral base from which the later Central Plains arose. These phases include a Solomon River Phase in north-central Kansas (Lippincott 1978) (not represented by any skeletal material here), a Nebraska Phase (Blakeslee and Caldwell 1979) and an Upper Republican Phase (Kivett 1949; Wedel 1959).

Still later phases include a Loup River Phase (Ludwickson 1978) and a St. Helena Phase (Blakeslee 1978) (Figure 8).

The Nebraska Phase dates from about 1050 to 1425 A.D. It was distributed throughout the Eastern Glaciated region of the Central Plains (Blakeslee 1978: 134). A major influence on the Nebraska Phase appears to have been Steed-Kisker, a Middle Mississippian complex located in the Kansas City area. Wedel (1943) suggests on the basis of strong ceramic ties that Steed-Kisker might represent a migration out from the large Mississippian center of Cahokia, near St. Louis. It is difficult at this point in time to delineate the full impact of Steed-Kisker on the origin and development of the Nebraska Phase (see O'Brien 1978: 67-80 and Wedel's reply 1978: 158-159); however, it is obvious that the two were intimately related.

A late development out of the Nebraska Phase in northeastern Nebraska is the St. Helena Phase (roughly 1250 to 1400 A.D.). St. Helena exhibits a progression from the Central Plains Tradition to very early Coalescent Tradition. The St. Helena sites differ from the Nebraska Phase "primarily in the extent to which they have been influenced by the Middle Missouri and Oneota Traditions" (Blakeslee 1978: 139). In deference to the crucial role played by St. Helena in the foundation of the Coalescent Tradition, Ludwickson et al. (1981: 165-166) have included it in a "Basal Coalescent Variant." This practice is not followed here largely because this designation is still tentative.

The Upper Republican Phase occupied most of the Loess Plains region of the Central Plains from 1050 to 1350 A.D. Strong (1953) has noted the

Figure 8. Distribution of the Central Plains Tradition.

Smoky Hill Phase

Solomon River Phase

Upper Republican Phase

Nebraska Phase

Loup River Phase

St. Helena Phase

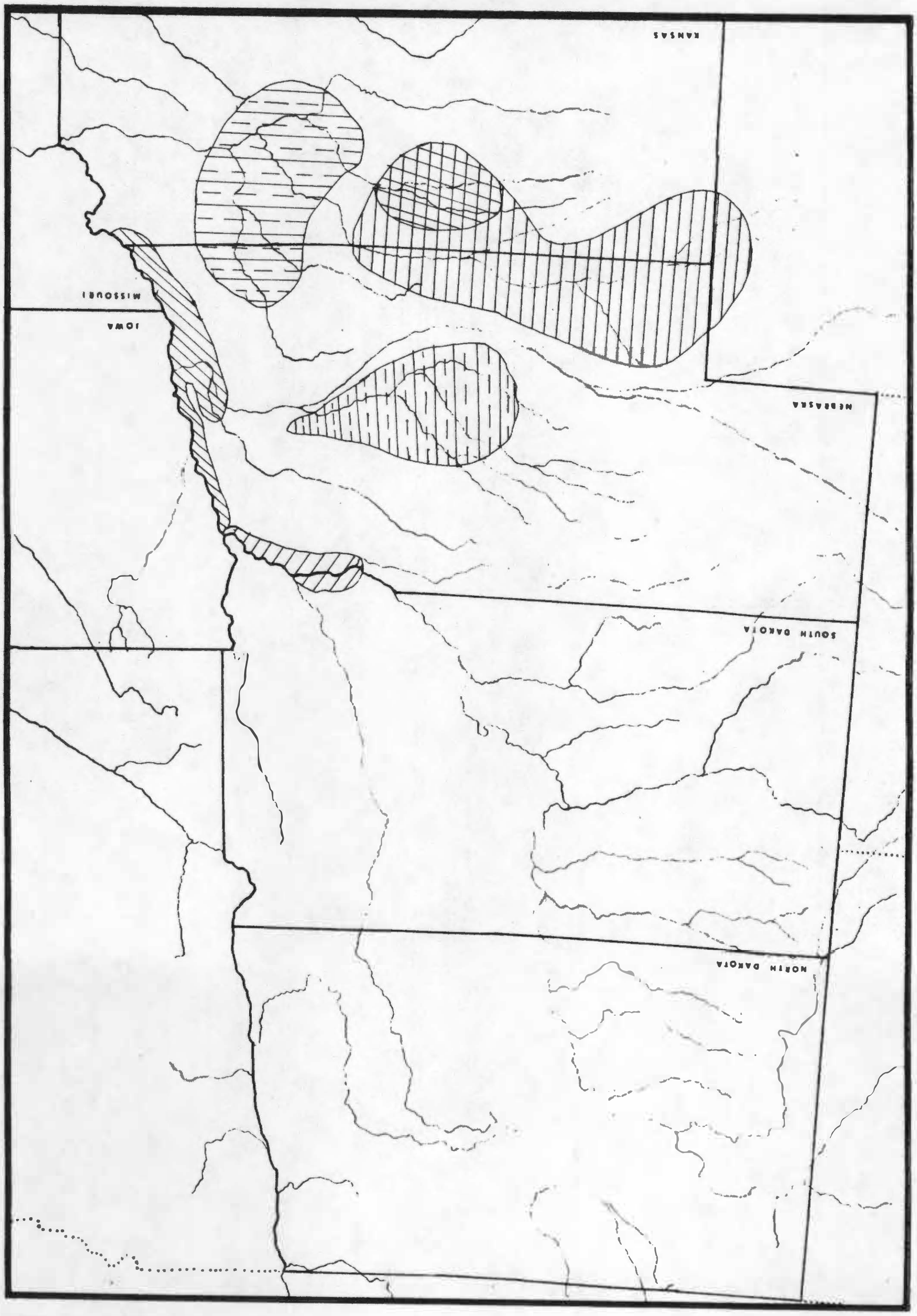

Figure 8

presence of Upper Republican materials on the High Plains, but these appear to represent seasonal hunting camps and not agricultural habitations. It has been convincingly argued by Wedel (1941, 1961: 100-101) and Kivett (1950) that the Upper Republican peoples abandoned much of the Central Plains during the 14th century under the pressure of a long term drought. They cite as evidence the blankets of sterile loess overlying most of the Upper Republican sites, as well as tree-ring studies (Weakly 1950). It has been suggested that the Upper Republican population moved southward into the Oklahoma-Texas Panhandle region of the Southern Plains, although Lintz (1978: 36-55) has presented convincing arguments to the contrary. A more likely "refuge area" for the Upper Republican groups is the Sweetwater locality in the Loup River Basin (Ludwickson 1978).

Ludwickson (1978: 94-108) defines a Loup River Phase to encompass these late Upper Republican groups with a tentative date of 1250 to 1450 A.D. He suggests a developmental sequence from Loup River Phase to the Lower Loup Phase of the Post-Contact Coalescent Variant and ultimately to the Historic Pawnee (1978: 104). This sequence prompts Ludwickson et al. (1981: 165-166) to place the Loup River Phase in their "Basal Coalescent Variant," but once again this practice has not been followed here.

Taxonomic subdivisions. With the possible exception of the St. Helena and Loup River Phases, the Central Plains Tradition phases represent cultural complexes on the same order of magnitude as the "variants" that Lehmer (1971: 32) has proposed for the Middle Missouri

and Coalescent Traditions (see Krause 1969: 82-96). Each may be subdivided into smaller units comparable to the phases of the Middle Missouri and Coalescent Traditions. This has not been carried out here because the small sample sizes for the Central Plains Tradition in general would preclude this fine-grained level of analysis.

The Oneota Tradition

The Oneota Tradition is a cultural entity which extends throughout the Prairie Penninsula region of Iowa, Minnesota and Wisconsin with peripheral excursions into Michigan, Indiana, Missouri, Kansas, Nebraska and South Dakota. In many respects the Oneota Tradition is a "ceramic culture" encompassing a wide and diverse assortment of complexes on the basis of shell-tempered pottery. For the most part the Oneota complexes appear to represent the prehistoric remains of Chiwere-Siouan speaking groups such as the Ioway, Oto and Winnebago (Griffin 1937: 180-181). Some of the western Oneota materials, however, may be associated with Dhegiha-Siouan groups (Harvey 1979: 51). It is these western Oneota materials which are of particular interest here.

The western Oneota materials are distributed along the Prairie-Plains border from South Dakota to Missouri. They date from approximately 1100 or 1200 A.D. into the historic period (Harvey 1979: 220). Some of these materials are undoubtedly Chiwere-Siouan. For example, the Blood Run site in northwestern Iowa has been associated with the Ioway (Harvey 1979: 45-49), although a possible Omaha occupation is also suggested (Harvey 1979: 227). Others are most likely Dhegiha-Siouan.

Dhegiha-Siouan tribes include the Omaha, Ponca, Kansa, Osage and the more distant Quapaw. Oneota-like materials have been associated with the Osage (Harvey 1979: 227) and the Kansa (Wedel 1959: 119-122). Wood (1965: 129) has noted the failure of associating any distinctive pottery type with the Omaha and Ponca. He suggests that the Redbird Phase of the Post-Contact Coalescent variant represents the proto-historic Ponca (1965); although efforts to trace either the Omaha or the Ponca further into the past have failed. Ethnohistoric evidence suggests that they were fairly recent immigrants to the Plains. Their oral history indicates a traditional homeland near the Ohio River (Ludwickson et al. 1981: 56). Harvey (1979: 228) notes that the distinction between Redbird and Oneota pottery is not as great as it first appeared and suggests that the archaeological antecedants of the Omaha and Ponca could be encompassed within the Oneota Tradition (1979: 228-229). Their ultimate derivation is still an open question however.

Taxonomic subdivisions. The western Oneota materials appear to represent complexes peripheral to eastern Oneota developments; thus I have not utilized any of the eastern-derived terminology here. I have included the ethnohistorically documented Kansa materials from the Doniphan and Nestor sites in a "Kansa Phase" and the protohistoric Ioway from Blood Run in an "Ioway Phase." The materials from Vermillion Bluff Village in southeastern South Dakota and from the Leary site in southeastern Nebraska have been put into "phases" based on the site name.

I imply absolutely no formalization of these terms. They are merely working units necessitated by the diverse nature of the western Oneota.

The Coalescent Tradition

The archaeology of the Coalescent Tradition is described with such precision and detail by Lehmer (1971) that only the broad outlines will be presented here. The Coalescent Tradition is crosscut by four temporal variants: an Initial Variant (IC) dating from about 1300 to 1550 A.D.; an Extended Variant (EC) dating from 1550 to 1675 A.D.; a Post-Contact Variant (PCC) dating from 1675 to 1780 A.D.; and a Disorganized Variant (DC) dating from 1780 to 1862 A.D. In addition, Ludwickson et al. (1981) would add the "Basal Coalescent Variant" mentioned earlier, although this usage is not applied here.

The IC represents the first movement of Central Plains populations into the Middle Missouri. It appears to be a direct outgrowth of the St. Helena Phase. The migrations seem to have been a response to the droughts in the Central Plains induced by the Pacific I climatic episode (Lehmer 1970: 121). The IC groups penetrated as far as the Bad-Cheyenne region.

In contrast to the Central Plains settlement pattern of small scattered hamlets, IC villages are large with extensive fortifications, suggesting their northward movement was accompanied by some friction. The IC appear to have prevailed, however. The IMM terminates as a cultural entity shortly after the appearance of the IC in the region and the EMM groups withdraw from the southern reaches of the Missouri.

This allowed the IC peoples to expand throughout the Big Bend and Bad-Cheyenne regions during the succeeding EC. The EC represents a return to the scattered Central Plains settlement pattern, with the exception of the Le Compte Phase sites along the southern edge of the Grand-Moreau region. These are fortified sites, suggesting contact with late EMM groups coming down from the north.

By late in the EC, the Caddoan groups occupied the entire Missouri River trench in South Dakota while the TMM groups occupied the Cannonball and Knife-Heart regions in North Dakota.

The succeeding PCC is marked by major new factors entering into the cultural equation. The first was the diffusion of the horse onto the Plains from Spanish settlements in the southwest. The second was more direct European contact associated with the fur trade.

The net result of the introduciton of the horse was the rise of powerful equestrian tribes on the Plains (Lehmer 1971: 164-165). These tribes began to exert considerable pressure on the Plains Villagers, both through competition for bison and through direct confrontation. Villages once again became extensively fortified in the PCC and there is evidence of massacres of village populations by equestrian groups (Owsley et al. 1977).

During the PCC the Plains Villagers were agents in an elaborate trade network trafficking in European artifacts and furs. This was particularly true of the Arikara. The initial wave of prosperity brought on by this trade gave way to near total cultural collapse as European diseases filtered in causing massive, decimating epidemics.

In the face of this decimation and the pressures from the equestrian tribes, the Plains Villagers declined to a shadow of their former glory. During the DC the remnants of the once powerful tribes banded into conglomerate villages (Bass et al. 1971; Lehmer 1971: 177-179; Smith 1972) or wandered aimlessly about the Plains (Wedel 1955: 78-81). The reservation period beginning in 1862 marks the end of the Plains Village Pattern as a cultural entity.

Taxonomic subdivisions. All of the IC sites are included in the Anoka Phase (Witty 1962); however Grange (1979: 143) has suggested that a distinction be made between the IC sites in Nebraska (Anoka Phase) and the IC sites in South Dakota. The IC is represented in this analysis by only a single skull from the Anoka Phase Lynch site. An excellent IC sample was available from the Crow Creek site in South Dakota (Willey 1982) but unfortunately it was reburied before I could measure it.

Phases of the EC have not been formalized with any precision, however four are usually recognized. The Le Compte Phase encompasses the fortified sites along the southern edge of the Grand-Moreau region (Johnston and Hoffman 1966). The Shannon Phase includes the EC sites from the Big Bend southward (Smith and Johnson 1968) (it is not represented by any skeletal material here). The Akaska Phase includes the late sites in the Grand-Moreau region that were presumably interacting with the TMM (Hurt 1957a). The La Roche Phase includes all the small unfortified sites characteristic of the rapid expansion of EC groups throughout the extent of the Missouri in South Dakota.

The IC and EC sites are thought to be proto-Arikara, although it is possible that the Pawnee may be derived from an IC base or —less likely— from one of the southern EC phases such as the Shannon. The tribal affiliations of most of the PCC phases are known with some certainty.

The Heart River Phase (1675-1780 A.D.) along both banks of the Missouri in North Dakota equates with the Mandan and Hidatsa. Only the Heart River 1 (Mandan) subphase is represented in this analysis.

The PCC phases along the Missouri in South Dakota are generally recognized as Arikara. The Le Beau Phase (1675-1780 A.D.) occurs throughout the Grand-Moreau region and along the left bank of the Missouri in the Bad-Cheyenne region. Due to its wide geographical extent, I have subdivided the Le Beau into three subphases: Le Beau 1 for the sites in the Bad-Cheyenne region, Le Beau 2 for the sites between the Moreau and Cheyenne Rivers and Le Beau 3 for sites between the Moreau and Grand Rivers. The Bad River Phase (Lehmer and Jones 1968) occurs along the right bank of the Missouri in the Bad-Cheyenne region. Two temporal subphases are recognized: Bad River 1 dating from 1675 to 1740 A.D. and Bad River 2 dating from 1740 to 1795 A.D. The Felicia Phase (1675-1700 A.D.) occurs further south in the Big Bend region. There appears to be a developmental sequence in the Big Bend from the EC Shannon Phase, through the Felicia Phase and into the Talking Crow Phase (1700-1750 A.D.). Subsequent to the Talking Crow Phase the Big Bend region was abandoned by the Arikara

The PCC Lower Loup Phase in central Nebraska is generally accepted as proto-historic Pawnee. It is still not known for certain whether the

Lower Loup is derived from the earlier Loup River Phase of the Central Plains Tradition or from some phase of the IC (or even the EC) in South Dakota (see Grange 1979: 143).

The PCC Redbird Phase (1650-1750 A.D.) in northeastern Nebraska is thought to represent proto-historic Ponca (Wood 1965). This affiliation has been supported by craniometric evidence (Jantz 1974).

Although phases are recognized within the DC variant, they have not been applied here. The tribal affiliations of groups during the DC are known with such certainty that they have been utilized instead.

The Equestrian Period

With the diffusion of the horse onto the Plains from Spanish settlements in the southwest, a new and powerful cultural configuration began to emerge. Because the diffusion of the horse was a gradual process, the beginning of the Equestrian Period is placed at different times in different subareas of the Plains. Lehmer (1971: 32) suggests a beginning date of 1720 A.D. for the Northwestern Plains and 1780 A.D. for the Middle Missouri and Central Plains. He suggests a closing date of 1876 A.D. with the treaty ending the Sioux Wars.

The culture climax of the Equestrian Period centered on the Northwestern Plains with the well known mounted bison hunters, although equestrian tribes ranged throughout the Plains area. Wissler (1914) points out that much of the equestrian lifeway is merely a grafting of the horse onto a cultural pattern that had existed on the Northwestern Plains since the Archaic; however only the Blackfoot appear to be long time residents of the subarea (Lehmer 1971: 165).

The Equestrian Period was characterized by a major influx of populations from the east, presumably fleeing a series of intertribal wars around the headwaters of the Mississippi (Lehmer 1971: 165). The most important of these groups in terms of the present analysis were the Dakota Sioux.

The Dakota Sioux are usually subdivided into three groups on the basis of linguistic affiliation: the Eastern or Santee Sioux (Dakota), the Middle or Wiciyela Sioux (Nakota) and the Western or Teton Sioux (Lakota). All three appear to stem from the Red River-Upper Mississippi region of Minnesota. It is unknown how long they occupied this region prior to their emigration out onto the Plains.

Taxonomic subdivisions. The limited equestrian skeletal material utilized in this analysis appears to be Dakota-Siouan —specifically the Eastern (Santee) and Middle (Widiyela) divisions of the Sioux. No attempt is made to classify this material as to tribe. The only distinction that is made is between historic Sioux burials ("Historic Sioux Phase") and Sioux burials intrusive into Woodland mounds ("Intrusive Sioux Phase"). The latter are easily recognizable on the basis of copious European trade artifacts and their shallow depth in the mound.

III. THE DATA BASE

Site Data

Sites yielding craniometric material were organized within the framework discussed in the previous section. These data are presented in Table 1. The geographical locations of the sites are given in Figures 9 through 12. There are a total of 170 sites (or components of sites) in all; however 21 sites were excluded from the present analysis because of unknown or doubtful cultural affiliation.

The geographical coordinates (latitude and longitude) were determined for each site. Usually these data were obtained through site legal locations plotted on USGS 1:250,000 scale topographic maps. Occasionally, when site locations correspond with present-day cities (e.g. Crying Hill and Mandan, North Dakota), the city coordinates were obtained from an atlas (Espenshade and Morrison 1978). In the rare instances where site descriptions were particularly vague, site coordinates were fixed at some nearby distinguishing landmark such as a dam, city or body of water. In all cases the latitude and longitude were calculated to the nearest hundredth of a degree.

Site dates were determined through a variety of methods. The most accurate dates are based on historical sources such as fur trader journals or the Lewis and Clark Expedition. However, most of the dates are archaeologically inferred. These run the gamut from ceramic seriations to "best guess" dates. In those cases where a series of radiocarbon dates were available, the dates were averaged according to the methodology

Table 1. Archaeological and Tribal Affiliations.

TRADITION	VARIANT	PHASE	SITE	NAME	♂	♀	TRIBE / LANGUAGE
Paleo-Indian	—	Paleo-Indian	25CC157	Plattsmouth Oss	1	1	
			25CM2	Wet Gravel Pit	1	1	
			25DO26	Gilder Mound	0	1	
			25FT--	Lime Creek Brl	1	0	
			39BF2	Medicine Crow	1	0	
					4	3	TRIBE: Paleo LANG: Unknown
Plains Archaic	—	Archaic	14SC2	Young Burial	0	2	
			14TO301	Trego Cnty Brl	1	0	
			25HK16	Swanson Lk. Brl	1	0	
			25MP2	Dry Lake	1	1	
			25SF10	Gering	1	1	
			25SY16	Fish Hatchery	0	1	
			32GT101	Grant Cnty Brl	1	0	
					5	5	TRIBE: Archaic LANG: Unknown
Plains Woodland	Middle	KC Hopewell	23PL--	Pearl Mound C	0	1	
			23PL120	Young Mound #1	2	1	
					2	2	TRIBE: KC Hopewel LANG: Unknown
		Keith	14PH4	Woodruff Oss	0	1	
			25HK13	Massacre Canyon	3	1	
			25WT4	Robb Ossuary	0	2	
					3	4	TRIBE: Keith LANG: Unknown
		Sonota Complex	32SI1	Boundary Mound	1	0	
			39DW233	Swift Bird	1	2	
			39DW240	Grover Hand	1	1	
			39DW252	Arpan	2	1	
					5	4	TRIBE: Sonota LANG: Unknown

Table 1. Continued.

TRADITION	VARIANT	PHASE	SITE	NAME	♂	♀	TRIBE / LANGUAGE
Plains Woodland	Middle	Valley	25VY3	Schultz Brl Tst	1	0	
					1	0	TRIBE: Valley LANG: Unknown
	Late	Truman Complex	39BF224	Truman Mound	2	0	
			39BF234	Old Quarry	0	1	
					2	1	TRIBE: Truman LANG: Unknown
		Loseke Creek	25CD21	Burney	1	0	
			25KX207B	Niobrara RR Brg	1	0	
			39GR1	Scalp Creek	1	1	
			39HT2	Hofer Mound	1	1	
					4	2	TRIBE: Loseke Crk LANG: Unknown
		South Arvilla	39RO2	Madsen Mound	1	0	
			39RO3	Buchannon Mnd	2	2	
			39RO4	Hartford Bch Md	2	2	
			39RO10	Daugherty Mnd	2	2	
					7	6	TRIBE: S Arvilla LANG: Unknown
		Great Oasis	25DK2W	Ryan	1	0	
			25NH4	Whitten	0	1	
			39CH7	Oldham	0	1	
			39UN1	Arbor Hill	1	1	
					2	3	TRIBE: Gt. Oasis LANG: Unknown
		Devils L-Souris	32WA--	Forest R. Mnds	4	4	
			32WE401	Heimdal Mound	2	0	
					6	4	TRIBE: Devils L-S LANG: Unknown

Table 1. Continued.

TRADITION	VARIANT	PHASE	SITE	NAME	♂	♀	TRIBE / LANGUAGE
Plains Woodland	--	--	25FN22	Wilsonville Brl	1	0	
		--	32RM--	Ft. Ransom Mnd	1	0	
		--	39BF225	Sitting Crow	1	0	
		--	39DA3	Enemy Swim Mnd	1	0	
		--	39LK2	Madison Pass Md	1	0	
		--	39MK1	Montrose Mound	1	0	
					6	0	TRIBE: Woodland LANG: Unknown
Middle Missouri	Initial Middle Missouri	Anderson	39ST11	Fay Tolton	1	0	
			39ST16A	Breeden A	1	1	
		Grand Detour	39LM2A	Medicine Creek	0	1	
			39LM33	Dinehart	3	0	
			39LM209	Langdeau	0	1	
		Mill Creek	13PM1	Broken Kettle	2	1	
			13PM4	Kimball	1	0	
		Over	39DV2	Mitchell	0	1	
			39HS1	Bloom Village	1	1	
			39HT1/3	Twelve Mile Crk	0	3	
		Upper Big Sioux	39MH1	Brandon	4	3	
					13	12	TRIBE: IMM LANG: Mandan Siouan
	Extended Middle Missouri	Ft. Yates	32EM1	Havens	1	0	
		Thomas Riggs	39HU1	Thomas Riggs	0	1	
			39SL29	C.B. Smith	1	0	
					2	1	TRIBE: EMM LANG: Mandan Siouan
	Terminal Middle Missouri	Huff	32MO11	Huff	0	1	
					0	1	TRIBE: TMM LANG: Mandan Siouan

Table 1. Continued.

TRADITION	VARIANT	PHASE	SITE	NAME	♂	♀	TRIBE / LANGUAGE
Central Plains	--	Upper Republic	25FT13	Medicine Creek	1	0	
			25HN2	Stevenson/Alma	0	1	
			25SF1	Signal Butte 3	0	1	
					1	2	TRIBE: Up. Repub. LANG: Caddoan
		Nebraska	25DO4	Havlicek Farm	0	2	
			25WN3	Kelley	0	1	
			25SY55	Wallace Mound	2	0	
					2	3	TRIBE: Nebraska LANG: Caddoan
		St. Helena	25CD4	Wiseman	2	0	
			25CD7A	Jones/Wynot	1	0	
			25DK9	Murphy/O'Conner	3	4	
			25DK13	Hancock	10	7	
					16	11	TRIBE: St. Helena LANG: Caddoan
		Loup River	25HW2	Lehn	0	1	
			25HW3	Sondergaard	2	1	
			25HW8	Christensen	1	0	
					3	2	TRIBE: Loup River LANG: Caddoan
		Smoky Hill	14SA1	Whiteford	1	0	
					1	0	TRIBE: Smoky Hill LANG: Caddoan
Coalescent	Initial Coalescent	Anoka	25BD1	Lynch	0	1	
					0	1	TRIBE: IC LANG: Caddoan

Table 1. Continued.

TRADITION	VARIANT	PHASE	SITE	NAME	♂	♀	TRIBE / LANGUAGE
Coalescent	Extended Coalescent	Le Compte	39PO7	Hosterman	1	0	
		Akaska	39CO14	Davis/L. Grand	1	0	
			39WW203	Walth Bay	3	0	
		La Roche	39CA4	Rygh	13	12	
			39CO32-3	Nordvold 2&3	19	11	
			39SL2	Fairbanks Vill	2	1	
			39SL4A	Sully A	16	12	
			39SL4D	Sully D	12	12	
			39SL10	Ziltener	0	1	
			39WW1A	Mobridge F1	16	15	
			39WW1C	Mobridge Cem1	10	9	
					93	73	TRIBE: EC LANG: Caddoan
	Post-Contact Coalescent	Talking Crow	39BF3	Talking Crow	0	1	
			39LM26-7	Oacoma	0	2	
		Bad River 2	39ST1	Cheyenne River	7	9	
			39ST215	Leavitt	4	1	
			39ST216	Buffalo Pasture	4	7	
			39ST235	Stony Point	3	4	
		Bad River 1	39ST15	Indian Creek	1	1	
			39ST30	Dodd	1	0	
			39ST203	Black Widow Rdg	4	4	
		Le Beau 1	39HU2	Oahe Village	3	1	
			39SL4B	Sully B	2	0	
			39SL4E	Sully E	11	7	
		Le Beau 2	39DW2	Four Bear	3	9	
			39PO1	Steamboat Creek	1	0	
			39WW7	Swan Creek	19	7	
		Le Beau 3	39CO31	Nordvold 1	3	1	
			39WW2	Larson	60	67	
			39WW1B	Mobridge F2	44	38	
		Felicia	39ST16B	Breeden B	1	1	
					171	160	TRIBE: Arikara LANG: Caddoan

Table 1. Continued.

TRADITION	VARIANT	PHASE	SITE	NAME	♂	♀	TRIBE / LANGUAGE
Coalescent	Post-Contact Coalescent	Lower Loup	25CX1	Gray/Schuyler	0	1	
			25NC1	Burkett	0	1	
			25NC3	Wright	1	0	
			25PT1/31	Larson	2	0	
					3	2	TRIBE: Lower Loup
							LANG: Caddoan
		Redbird	25HT3	Redbird	0	1	
			25KX9	Minarik II	0	2	
					0	3	TRIBE: Redbird
							LANG: Dhegiha Siouan
		Heart River 1	32BL4	Sperry	1	1	
			32BL8	Double Ditch	2	5	
			32BL9	Larson	1	0	
			32MO26	Slant Village	1	3	
			32MO29	Motsiff	0	1	
			32MO37	Boley	0	1	
		Crying Hill	32MO31	Crying Hill	1	4	
					6	15	TRIBE: Mandan
							LANG: Mandan Siouan
	Disorganized Coalescent	Historic Pawnee	25NC20	Genoa	0	1	
		Grand Pawnee	25BU1	Linwood A	7	3	
			25SD31	Woodcliff Brl	1	0	
		Skidi Pawnee	25HW1	Palmer	1	0	
		Republic Pawnee	25WT1	Hill/Pike	6	4	
					15	8	TRIBE: Pawnee
							LANG: Caddoan

Table 1. Continued.

TRADITION	VARIANT	PHASE	SITE	NAME	♂	♀	TRIBE / LANGUAGE
Coalescent	Disorganized Coalescent	Hist. Arikara	32ME2B	Ft. Clark	1	0	
			39CO9	Leavenworth	27	23	
			39CO11B	Ashley Island	2	0	
					30	23	TRIBE: Arikara
							LANG: Caddoan
		Historic Mandan	32ME2A	Ft. Clark	3	1	
		Knife River 1	32ME5	Deapolis	1	1	
					4	2	TRIBE: Mandan
							LANG: Mandan Siouan
		Knife River 2	32ME12	Big Hidatsa	0	1	
					0	1	TRIBE: Hidatsa
							LANG: Mandan Siouan
		Historic Omaha	25CD7B	Jones/Wynot	1	0	
			25DK2	Ryan	4	2	
			25DK10	Large Village	4	4	
					9	6	TRIBE: Omaha
							LANG: Dhegiha Siouan
		Historic Ponca	25KX1	Ponca Fort	6	7	
			25KX5	Hogan	1	0	
			25KX6	Davis	0	1	
			25KX13	Niobrara Landng	1	0	
			25KX207A	Niobrara RR Brg	1	2	
					9	10	TRIBE: Ponca
							LANG: Dhegiha Siouan

Table 1. Continued.

TRADITION	VARIANT	PHASE	SITE	NAME	♂	♀	TRIBE / LANGUAGE
Mississippian	Middle	Steed-Kisker	23PL13	Steed-Kisker	2	0	
			23PL58	Sugar Creek Oss	4	3	
					6	3	TRIBE: Steed-Kisk
							LANG: Unknown
Oneota	--	Vermillion Bluf	39CL1A	Vermillion Bluf	2	0	
		Ioway	13LO2	Blood Run	2	0	
		Leary	25RH1	Leary	1	0	
					5	0	TRIBE: Oneota
							LANG: Chiwere Siouan
		Kansa	14DP2	Doniphan	2	2	
			14LV330	Nestor	1	1	
					3	3	TRIBE: Kansa
							LANG: Dhegiha Siouan
Equestrian	--	Historic Sioux	39BF--	Big Bend Burls	3	0	
			39CL--	Centerville Brl	1	0	
			39CL1B	Kaltasulas	2	0	
		Intrusive Sioux	39BF225I	Sitting Crow	1	1	
			39RO3I	Buchannon Mnd	1	2	
			39RO10I	Daugherty Mnd	0	2	
					8	5	TRIBE: Sioux
							LANG: Lakota Siouan

Table 1. Continued.

TRADITION	VARIANT	PHASE	SITE	NAME	♂	♀	TRIBE / LANGUAGE
Unknown	—	—	13WD—	S Ravine Brl	1	1	
		—	14OS—	Ft. Osage	0	1	
		—	25BO7	Boone/Loretto	1	1	
		—	25CD11	Fort	1	0	
		—	25CU201	South Loup Brl	0	1	
		—	25DX4	Enders	0	3	
		—	25KX12	Niobrara School	1	0	
		—	25PT30		0	1	
		—	25ST12	Stanton Burial	1	1	
		—	25SY55B	Wallace Mound	1	0	
		—	32MO81	Crying Hill Wst	0	1	
		—	32SN31	Jamestown Dam	1	0	
		—	32WI--	Ft. Union Icehs	0	2	
		—	39LM2B	Medicine Creek	2	0	
		—	39LM227	Stricker Mound	2	0	
		—	39PN--	Hangman's Hill	1	0	
		—	39PO207	Second Hand	2	1	
		—	39SL4	Sully	1	1	
		—	39ST23	Gillette	1	0	
		—	39ST53	Rock Cairn Brl	1	0	
		—	39WW—	Bachmeir	0	1	
					17	15	TRIBE: LANG: Unknown
				GRAND TOTAL:	464	396	

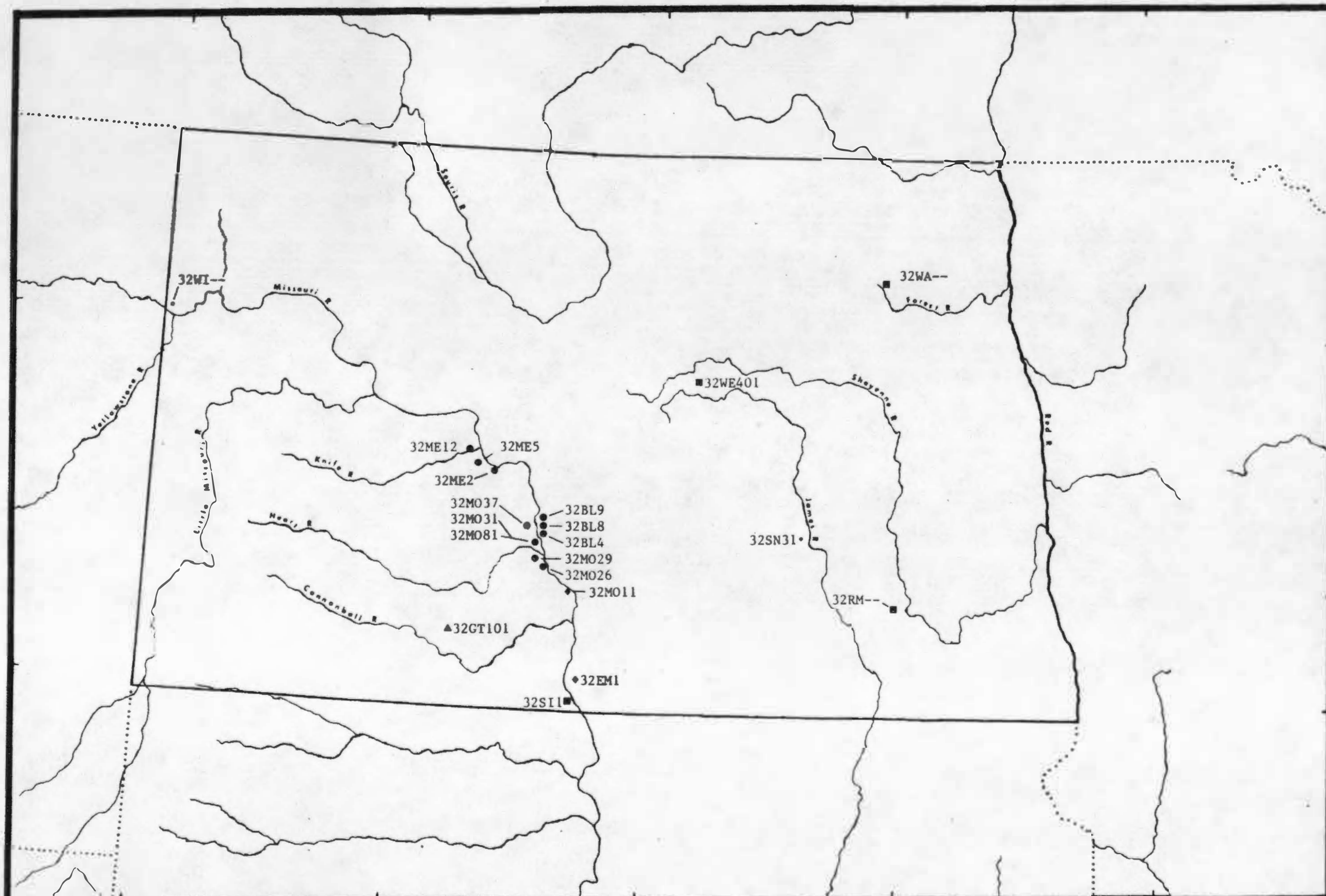

Figure 9. North Dakota Sites Yielding Skeletal Material.

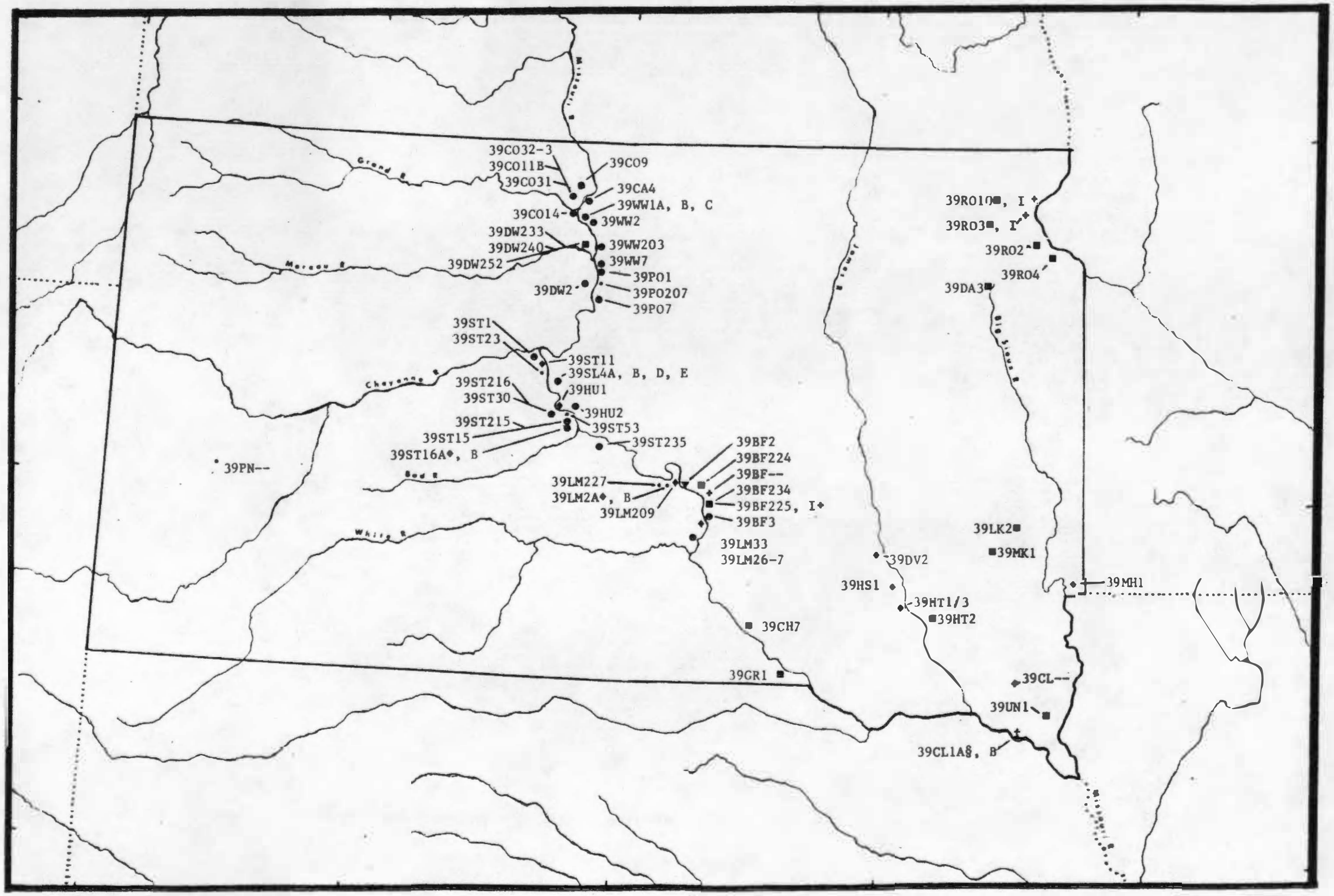

Figure 10. South Dakota Sites Yielding Skeletal Material.

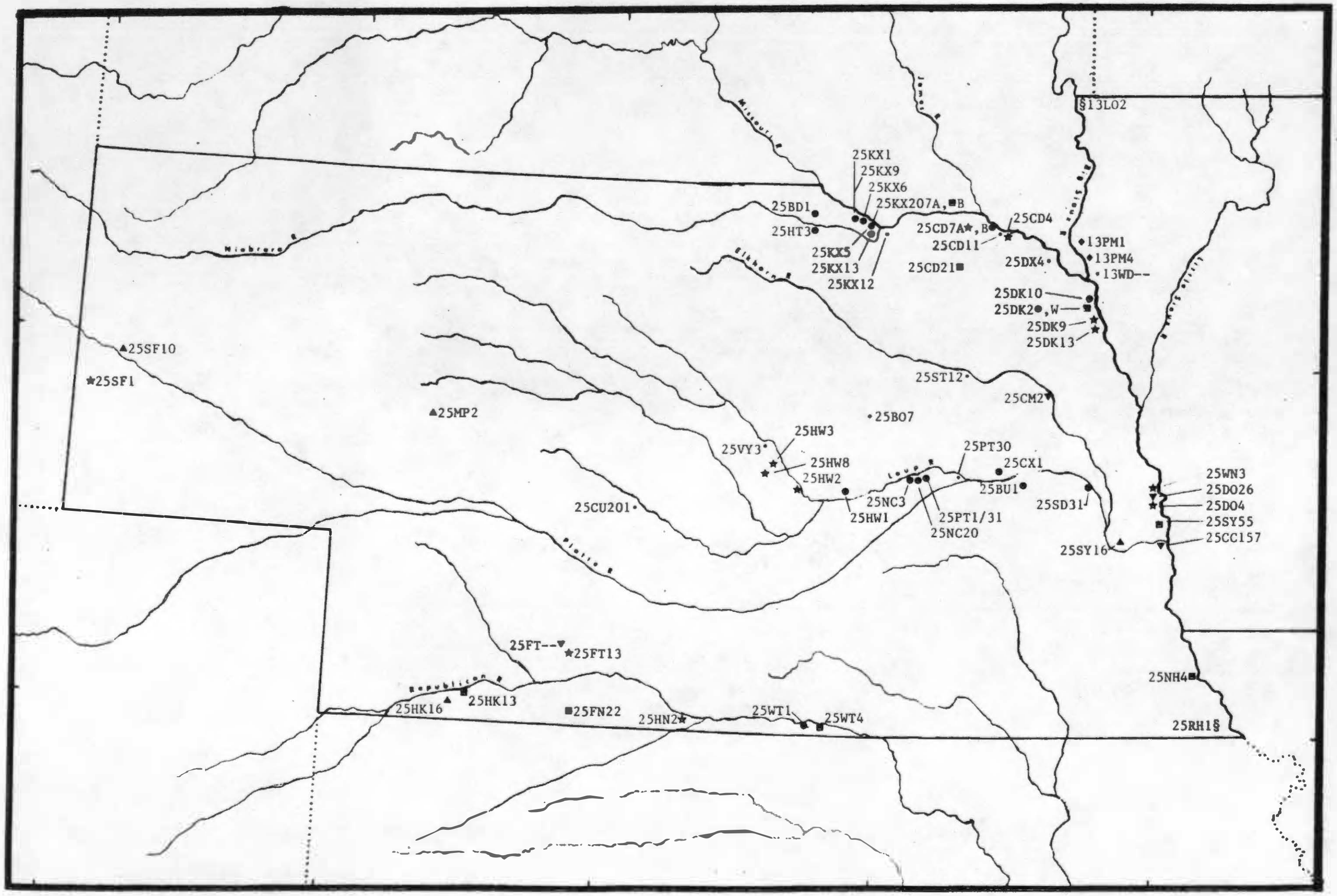

Figure 11. Nebraska and Iowa Sites Yielding Skeletal Material.

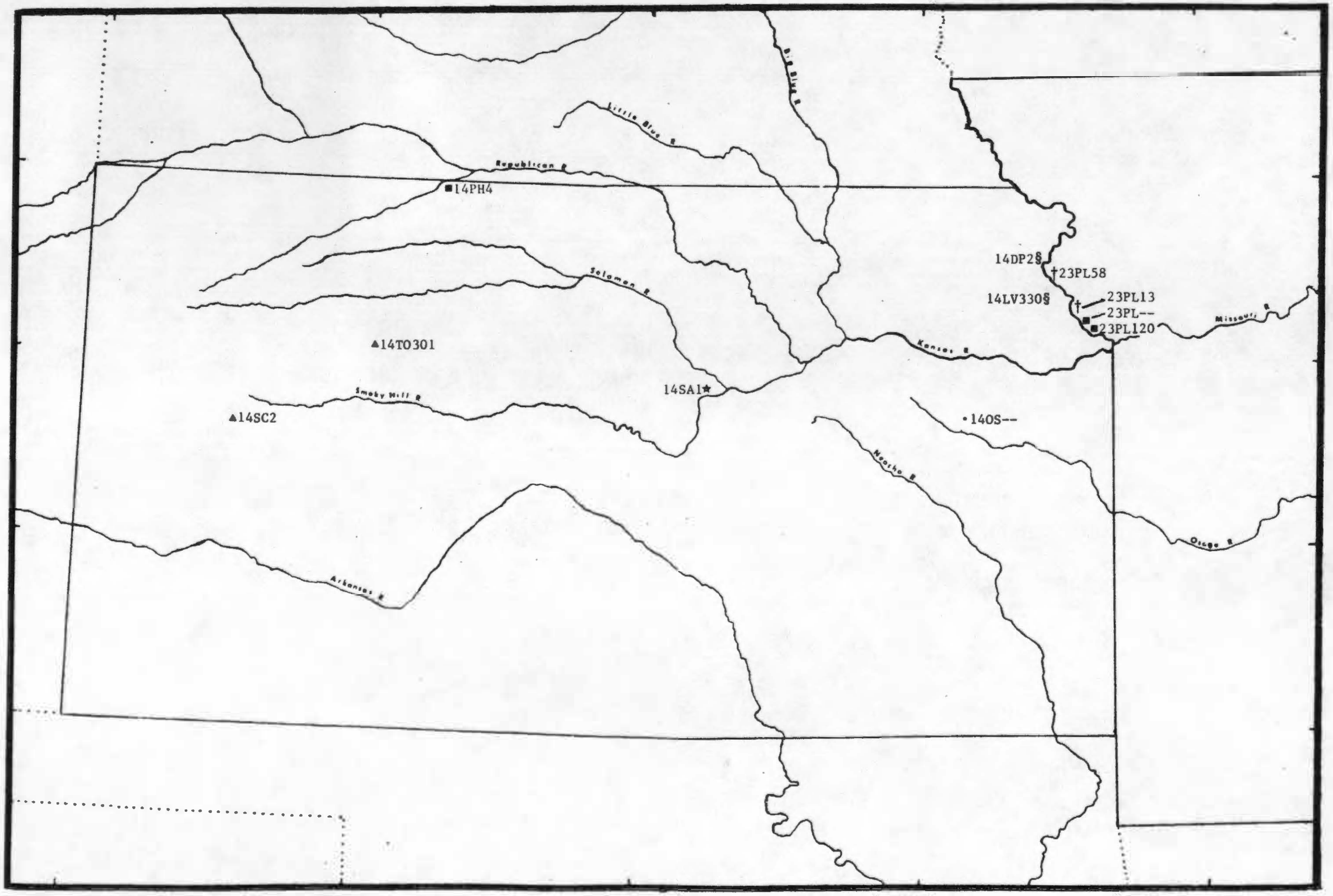

Figure 12. Kansas and Missouri Sites Yielding Skeletal Material.

of Long and Rippeteau (1974). All radiocarbon dates were corrected using the Damon et al. (1974) dendrochronologic calibration scale except the very early or very recent dates outside the range of the scale. Occasionally dendrochronometric dates were used (Weakly 1971) and some of the very early material was dated by associated fauna. In all cases a date range was obtained for each site and a median site date calculated from it. In the case of radiocarbon dates, the date range indicates a ± 1 sigma range.

The Smithsonian site designation, site name, cultural and language affiliation, male and female sample size, date range, dating method and geographical coordinates are given for each site in Table A-2, Appendix A. Those sites with no tribal affiliation listed were excluded from the analysis. Literature references and notes as to provenance and cultural affiliation are given for each site in Table A-3, Appendix A. Notes on coding schemes and abbreviations are given in Table A-1, Appendix A.

Craniometric Data

Craniometric data were collected on a series of 865 specimens, however 32 were excluded from the present analysis because of unknown or questionable cultural affiliation and 5 because of too many missing data. These are all adult specimens, as evidenced by the closure of the basilar suture and/or the eruption of the third molars. Site and specimen numbers for the entire sample are listed in Table C-2, Appendix C. Wherever possible, the specimen numbers are those utilized in published reports. Barring this, the specimen numbers represent

(in order of preference): the original field numbers, Missouri Basin Project numbers (where applicable) or museum accession numbers. In those cases where no specimen numbers were available, numbers were assigned (in the form P/K-1, P/K-2, etc.) and penciled on the specimen.

Most of the craniometric data were entered and verified on an IBM System 34 computer at Key Energy Corporation, Williston, North Dakota, using an RPG II program named INDIAN. (Unless otherwise stated, all programs utilized here were written by myself.) The data were transferred onto the DEC System 10 computer at The University of Tennessee through the kindness of Jim Ulseth. Approximately 15% of the sample was checked by hand against the original data sheets and the entire sample was screened by hand to detect obvious typing errors.

Variables

Sixty-five measurements were collected on each specimen, from which another 15 angles were calculated, yielding a total of 80 measurements per individual. These variables are listed in Table 2 and in Table B-1, Appendix B. The majority of these variables were defined by W. W. Howells (1973: 159-190) where excellent descriptions can be found. Certain variables were devised by myself to more fully measure particular morphological complexes such as the flatness of the cranial base and the transverse curvature of the frontal. Those variables not defined by Howells are described in Table B-2, Appendix B.

A convenient feature of the Howells system is the use of a three character code name for each variable. These code names greatly facilitate the labeling of computer generated material and are used

Table 2. Code Names for Variables in Order of Use.

#	CODE NAME	VARIABLE NAME	#	CODE NAME	VARIABLE NAME
1	GOL	Glabello-Occipital Length	41	FRC	Nasion-Bregma Chord
2	NOL	Nasio-Occipital Length	42	FRS	Nasion-Bregma Subtense
3	BNL	Basion-Nasion Length	43	FRF	Nasion-Subtense Fraction
4	BBH	Basion-Bregma Height	44	PAC	Bregma-Lambda Chord
5	XCB	Maximum Cranial Breadth	45	PAS	Bregma-Lambda Subtense
6	XFB	Maximum Frontal Breadth	46	PAF	Bregma-Subtense Fraction
7	WFB*	Minimum Frontal Breadth	47	OCC	Lambda-Opisthion Chord
8	ZYB	Bizygomatic Breadth	48	OCS	Lambda-Opisthion Subtense
9	AUB	Biauricular Breadth	49	OCF	Lambda-Subtense Fraction
10	WCB	Minimum Cranial Breadth	50	FOL	Foramen Magnum Length
11	ASB	Biasterionic Breadth	51	FOB*	Foramen Magnum Breadth
12	BPL	Basion-Prosthion Length	52	NAR	Nasion Radius
13	NPH	Nasion-Prosthion Height	53	SSR	Subspinale Radius
14	NLH	Nasal Height	54	PRR	Prosthion Radius
15	JUB	Bijugal Breadth	55	DKR	Dacryon Radius
16	NLB	Nasal Breadth	56	ZOR	Zygoorbitale Radius
17	MAB	External Alveolar Breadth	57	FMR	Frontomalare Radius
18	MAL*	External Alveolar Length	58	EKR	Ectoconchion Radius
19	MDH	Mastoid Height	59	ZMR	Zygomaxillare Radius
20	MDB	Mastoid Breadth	60	AVR	M1 Alveolus Radius
21	OBH	Orbit Height Left	61	BRR*	Bregma Radius
22	OBB	Orbit Breadth Left	62	VRR	Vertex Radius
23	DKB	Interorbital Breadth	63	LAR*	Lambda Radius
24	NDS	Naso-Dacryal Subtense	64	OPR*	Opisthion Radius
25	WNB	Simotic Chord	65	BAR*	Basion Radius
26	SIS	Simotic Subtense	66	NAA	Nasion Angle, ba-pr
27	ZMB	Bimaxillary Breadth	67	PRA	Prosthion Angle, na-ba
28	SSS	Zygomaxillary Subtense	68	BAA	Basion Angle, na-pr
29	FMB	Bifrontal Breadth	69	NBA	Nasion Angle, ba-br
30	NAS	Nasio-Frontal Subtense	70	BBA	Basion Angle, na-pr
31	EKB	Biorbital Breadth	71	SSA	Zygomaxillare Angle
32	DKS	Dacryon Subtense	72	NFA	Nasio-Frontal Angle
33	IML	Malar Length Inferior	73	DKA	Dacryal Angle
34	XML	Malar Length Maximum	74	NDA	Naso-Dacryal Angle
35	MLS	Malar Subtense	75	SIA	Simotic Angle
36	WMH	Cheek Height Minimum	76	FRA	Frontal Angle
37	SOS	Supraorbital Projection	77	PAA	Parietal Angle
38	GLS	Glabella Projection	78	OCA	Occipital Angle
39	STB	Bistephanic Breadth	79	STA*	Bistephanic Angle
40	STS*	Stephanic Subtense	80	CBA*	Cranial Base Angle

*Variables not defined by Howells (1973), see Appendix B for definitions.

extensively throughout this analysis. They are listed in Table 2. It is worth noting that the use of these code names is quite specific and implies that the variables were measured precisely as Howells has defined them.

All measurements were taken to the nearest millimeter with the exception of simotic chord and simotic subtense which were taken to the nearest tenth of a millimeter. All angles were calculated to the nearest degree by ANGLE, a Fortran-10 program.

Sexing

Sex estimations were based on standard osteological criteria (Bass 1971; Krogman 1962; Phenice 1969b). When time allowed, the initial cranial sex estimations were validated on the basis of post-crania. The majority of the specimens utilized here have been sexed by previous workers and whenever possible I have checked my sex determinations against theirs.

At the U.S. National Museum, Dwight Schmidt and Steve Hunter are in the process of conducting an inventory of all the skeletal collections. I checked my sex estimates against their inventory (after the fact) and found the two disagreed in only 16 out of 239 cases. These disagreements were examined by Dwight Schmidt and myself and final assessments made.

The extensive collections at The University of Tennessee have been sexed by numerous workers. In most cases sex assignments are written on the box and I seldom disagreed with them. Disagreements were examined carefully (usually with the aid of Dr. P. Willey) and final determinations made.

My greatest difficulties with sexing were at Nebraska where I was moving rapidly and arbitrarily (alphabetical by county) through an assortment of populations. Since groups can differ radically in robusticity (a Pawnee female is much more robust than an Archaic male) it was difficult to "assess" the level of sexual dimorphism exhibited by any particular group. Luckily, Dr. Bass and Dr. Jantz had sexed most of the specimens previously and my assessments rarely disagreed with theirs. Unfortunately, it was not possible to go back and examine the disagreements and my original assessments are used here. This is also true of the North Dakota and Kansas materials.

It should be noted that the sex of a specimen is not assured simply because two (or twenty) workers agree what to call it. Krogman (1962: 112-113) points out that about 10-20% of a sample will be sexed incorrectly by visual methods. However, in the course of measuring close to 900 crania, one does acquire some experience and I would hope that my rate of correct sexing is higher than this.

Interobserver Error

Approximately 78% of the some 56,000 data points collected for this analysis were collected by myself. About half of the Arikara sample was previously measured by Dr. Paul Lin (1973). Portions of the Nebraska sample were measured by Dr. Richard Jantz and Dr. W. W. Howells measured the Sully material. They utilized either subsets of the Howells measurement set (in the case of Jantz and Lin) or a subset of the present measurement set (in the case of Howells). These data were very generously provided by them.

In the face of time limitations, I was unable to conduct an interobserver error study. My approach was a very pragmatic one. I measured five specimens, matching my observations with Howells' data sheets. Conspicuous errors caused me to modify my measurement technique for three variables (minimum cranial breadth, mastoid breadth and malar subtense). I then measured five skulls independent of Howells' data sheets and matched observations afterward. The two sets agreed very closely. When it came time to fill out the Jantz and Lin data sets I measured five specimens each in the presence of their data sheets. Any variable with a consistent error of greater than two millimeters was remeasured throughout the entire data set. Measurements were also checked at random.

In this manner the total sample can be broken down into the number of individuals originally measured by each of the four workers and the proportion of the variables measured by myself. These data are presented in greater detail in Table C-1, Appendix C.

Howells	69	9/65
Jantz	70	30/65
Key	520	65/65
Lin	206	33/65

Utermohle and Zegura (1982: 303-310), using a subset of the Howells measurement set, have demonstrated that significant inter- and intra-observer effects may exist. In view of the large proportion of the data measured by myself, it would appear intraobserver effects would be the main topic of concern. No doubt both inter- and intraobserver effects

exist here although their magnitude is unknown. They are assumed to be random and no provision is made to account for them.

Missing Data Estimation

A certain amount of missing data due to breakage is a fact of life in skeletal collections. Although Plains Indian skeletal material tends on the whole to be beautifully preserved, it is no exception to the rule. In large well-sampled groups, damaged specimens can be discarded with a certain savoir-faire; however poorly-sampled groups require a balance between throwing away a great deal of crucial information and including badly damaged specimens. Thus I have let circumstances dictate the amount of missing data I would accept for any one specimen. Other than that I have utilized the criteria and systematics proposed by Howells (1973: 33-35).

Multivariate statistical procedures demand that all individuals in a sample have complete data vectors. Thus missing data must be estimated. The simplest method would be to substitute group means for missing points; however this distorts the numerical shape of specimens falling away from the mean (Howells 1973: 33-34). A better method has been devised by C. A. B. Smith (reported in Holt 1968: 46-48). It modifies the group mean according to an individual's data vector within the context of the within-groups variance-covariance structure of the entire sample. This methodology is particularly useful when individual group sample sizes are not large enough to employ multiple regression methods. It was accomplished here through the ESTIMATE procedure, a

series of four Fortran-10 programs, one of which is a matrix inversion subroutine presented in Davies (1971).

Cranial Deformation

A problem confounding attempts to infer biological relationships among many American Indian groups is the presence of artificial cranial deformation. A comprehensive review of deformation practices and terminology can be found in Droessler (1981: 89-116). The net result is a distortion in the shape of the skull. In the case of Plains Indians the deformation is almost invariably in the lambdaoccipital region, presumably resulting from cradle-boarding practices. The extent of deformation varies widely. Marked deformation is characteristic of some groups such as the Dhegiha-Siouan speakers, the Nebraska Phase of the Central Plains Tradition and the Middle Mississippian Steed-Kisker complex. Some of the Arikara samples (Extended Coalescent in particular) exhibit slight to moderate deformation. However, the vast majority of groups exhibit no deformation at all.

Various methods have been proposed to deal with deformation, from correcting the shape of the skull via regression methods (Shapiro 1928: 1-38) to excluding any deformed skull from the sample (Howells 1973: 34). The former has been criticized by Buikstra (1976: 47) on a variety of grounds and the latter would necessitate discarding entire tribal groups from the analysis.

No attempt is made to account for deformation effects here except to note their presence. At some point it might be worthwhile to exclude from the analysis those components presumably affected by deformation

(such as Occipital Curvature and Parietal Size and Profile). However, I doubt if the structure of intergroup relationships would change dramatically.

Descriptive Statistics

Means and standard deviations for the entire sample (excluding the unknowns) are given in Tables B-3 through B-12, Appendix B. They are broken down by PHASE, by SEX, and were calculated via the MEANS procedure in SAS (SAS Institute, Inc. 1979).

IV. ANALYTICAL METHODS

With the large and fairly representative data base available here, a host of methodological, biological and archaeological problems could be addressed. Finer-grained analyses have been and will be conducted on certain segments of the material, but the goal here is to present a broad picture. This is accomplished through a variety of multivariate statistical techniques, some of which are conventional techniques, others which have been implemented here in the face of small samples and unbalanced designs.

Principal Components Analysis with Rotation

Howells has pointed out that "population differences in cranial shape are based upon traits which have a common ground of individual genetic variation within all populations" (1973: 146). Stated in another way, intergroup differences appear to be simply greater manifestations of the same sort of variation that occurs within any particular group.

Patterns of intra-group (within-group) cranial variation are defined here through the use of principal components. This is not to say that the principal components reflect underlying genetic traits. At best, they are mathematical approximations of them, although even this is far from certain. In any case, the components define independent structural dimensions of the skull along which populations differences can be assessed. They are extracted from a pooled within-groups

correlation matrix and presumably reflect aspects of cranial shape universal to all human populations. Such a contention has been supported through the work of Brown (1967), Key (1979) and Key and Jantz (1981).

Because principal components are usually extracted from a total correlation matrix rather than the pooled within-groups matrix used here, it was necessary to go through a series of computational steps generally unavailable in program packages.

1. Calculation of a pooled within-groups correlation matrix. This was accomplished via RMATRIX, a Fortran-10 program which is an extensively modified version of a multiple group discriminant function program given in Davies (1971). The program calculates the Sum of Squares and Cross-Products (SS&CP) matrix for each group, pools them over all groups, and then converts the pooled SS&CP matrix into a correlation matrix. Pooling SS&CP matrices rather than individual group variance-covariance matrices weighs the contribution of each group according to sample size, an approach followed here because of radically unbalanced samples sizes.

In terms of the present analysis the groups are the "Tribes" listed in Table 1, page 44, (with the exception of the PCC variant where the groups are the "Phases"). The sexes were kept separate to minimize size effects. The resulting matrix has 767 degrees of freedom.

2. Extraction of principal components. The latent roots and vectors were extracted from the pooled within-groups correlation matrix using the PA1 option of the SPSS FACTOR procedure (Nie et al. 1975).

Those components with eigenvalues greater than 1.0 were rotated to the Varimax solution. The remainder were discarded.

3. Calculation of principal component scores. Scores were calculated along the components for each individual in the sample. This was accomplished via SCORE, a Fortran-10 program. The program converts an individual's raw data vector to z-scores, centered on the grand means and standardized by the within-groups standard deviations (the square root of the diagonal of the within-groups variance-covariance matrix). The scores are postmultiplied by the factor score coefficient matrix (F) output by the SPSS FACTOR procedure. The resulting principal component scores have means of zero and standard deviations of 1.0.

Principal components have the advantage of reducing a large battery of measurements (such as the 80 variables used here) into a smaller number of uncorrelated components, each of which is readily interpretable in morphological terms. They may be further analyzed by any means desired and they are the foundation upon which the rest of this analysis is based.

Pooling the Sexes

Although the level of sexual dimorphism displayed by a group is an important aspect of intergroup variation, the sexes were pooled in the present analysis to increase sample sizes. The methodology employed is a simple one. Grand means were calculated for each sex for each component and subtracted from male and female specimens accordingly. The calculations were performed by SEXCENTER, a Fortran-10 program. A

multivariate analysis of variance (MANOVA) was utilized to test for any residual sex or sex-interaction effects. The sexes were then pooled and all subsequent analyses based on the pooled sample.

Intergroup Relationships

Levels of Analysis / Interpretive Frameworks

A concept crucial to much of this analysis is that of "group space." The majority of techniques employed here take place in group space. Stated in nonmathematical terms, this means that the pattern of intergroup relationships is dependent upon the groups entered in the analysis. Adding or deleting groups alters relationships (see Key and Jantz 1981: 247-248). In this light two important considerations must be addressed: first, the manner in which groups are defined (levels of analysis); second, the manner in which they are brought together for comparative purposes (interpretive frameworks).

As indicated in Table 1, page 44, the data are organized within a hierarchial framework, with levels stretching from Tradition down to Variant, Phase, Site and Individual. Within the Plains Village Period, Language Affiliation crosscuts the hierarchial structure.

This hierarchy defines the levels at which specimens may be grouped for analysis. Most of the analyses conducted here take place at the Phase level, although the group space is defined by individual specimens in the analysis of the very early material (Paleo-Indian and Archaic) and higher levels such as the Tradition and Variant are used for nesting effects (Table 3).

:able 3. Interpretive Frameworks and Levels of Analysis.

[NTERPRETIVE FRAMEWORK	MANOVA	PRINCIPAL COORDINATES	# GROUPS	N	INTERPL GROUPS
1. Paleo-Indian/Archaic	--	Individual	17	17	0
2. Woodland	Variant Phase(Variant)		2, 8	57	
	Phase	Phase	8	57	2
3. Paleo-Indian/Archaic/Woodland	Phase	Phase	10	74	2
4. Woodland/Mandan-Siouans	Tradtn Phase(Tradtn)	Phase	2, 16	109	6
5. Woodland/Central Plains	Tradtn Phase(Tradtn)	Phase	2, 12	97	3
6. Mandan-Siouans	Phase	Phase	8	52	4
7. Dhegiha-Siouans/Oneota	--	Phase	4	43	3
8. Caddoans/Steed-Kisker	--	Phase	16	624	4
9. Full Sample	--	Phase	40	793	13

Willey and Phillips (1962: 22) have defined the phase as "an archaeological unit possessing traits sufficiently characteristic to distinguish it from all other units similarly conceived . . . " and "spatially limited to the order of magnitude of a locality or region and chronologically limited to a relatively brief interval of time."

The Phase was chosen as the primary working level here because it is a midrange taxonomic unit, large enough to group together individual sites, yet not so large that subtle patterns of temporal and geographical variation might be obscured. Whether the Phase has any biological reality is open to argument.

Several interpretive frameworks were employed (Table 3) although many more possibilities exist. For the most part they were chosen to address specific culture-historic questions including: (1) Paleo-Indian and Archaic relationships; (2) the interrelationships of the various Woodland groups; (3) the transition from Paleo-Indian and Archaic groups into the Woodland; and the transition from the Woodland into (4) the Middle Missouri-Mandan sequence and (5) into the Central Plains Tradition.

For the Plains Villagers, group interrelationships were viewed within an interpretive framework based on language affiliations. These include those within the (6) Mandan-Siouans, (7) the Dheigiha-Siouans and (8) the Caddoans.

Finally, an interpretive framework with a group sapce defined by the entire sample (at the Phase level) was utilized (9) to present a broad picture of Plains Indian relationships.

Each of these frameworks presents a different perspective on the patterns of intergroup relationships. Thus the manner in which the patterns are perceived may change from framework to framework. For instance, a certain arrangement of Woodland groups might occur along the major axes of variation in a space defined solely by Woodland groups. However, in a space defined by Woodland and Central Plains groups, the intra-Woodland arrangement might alter. This is because the major axes of variation would presumably be between the Woodland and the Central Plains, not between the various Woodland groups. To reiterate, the actual group interrelationships never change, however the perception of them may change depending upon the groups entered into the space.

Weighted versus Unweighted Space

Another important consideration when working in group space is the relative contribution of each group to the definition of the space. This is the concept of "weighted versus unweighted space" (Albrecht 1980: 820). The various canonical variate techniques (such as discriminant functions, or the roots of the E-inverse*H matrix in the MANOVA procedure) weigh the contribution of each group on the basis of sample size. In unweighted space (such as the principal coordinates used here), all groups contribute equally regardless of sample size. Taken in the extreme, this means that a point based on a sample of one is given the same weight as a point based on a sample of 100. At first glance this might appear to be a very bad procedure. However, with unbalanced sample sizes, it prevents the well-sampled groups from

completely overwhelming the space and defining all the major axes of variation to the exclusion of the poorly-sampled groups.

The danger of working in unweighted space is that poorly-sampled groups may define major axes of variation merely because of sampling variance. In an effort to compensate for this, groups with very small samples have been interpolated into the space rather than being allowed to define it. This methodology is outlined below.

It is worth reiterating once again that, regardless of the manner in which the space is defined, the structure of intergroup relationships does not change, merely the perception of them.

MANOVA

When sample sizes and design balance warranted, multivariate analyses of variance (MANOVAs) were carried out within the nine interpretive frameworks presented in Table 3. These analyses indicate first, whether there is overall group heterogeneity present and second, which principal components the heterogeneity occurs along.

MANOVAs were calculated when there were approximately 50 degrees of freedom available to estimate error and when the design was not obviously radically unbalanced. All tests of significance in the univariate ANOVAs were based on the Type IV Sums of Squares, the most conservative tests with unbalanced designs. Even so, they should be viewed with caution.

Discussions of MANOVA in mathematical terms can be found in Cooley and Lohnes (1971), Morrison (1976) and Tatsuoka (1971).

Generalized Distance and Principal Coordinates

Goodman (1972, 1974) has demonstrated that a generalized distance (D^2) calculated from principal component scores will approximate a Mahalanobis D^2 to the extent that the rotated components contain the total within-groups variation. Such an approach has been used here.

Within each of the interpretive frameworks, generalized distances were calculated between all pairs of groups as the sum of squared differences between their mean principal component vectors. This yields a symmetrical matrix of D^2 values with zeros down the main diagonal (since the distance of a group from itself equals zero). The matrix is of order n, where n equals the number of groups.

In order to identify the major axes of intergroup variation, the principal coordinates of the matrix were extracted following the methodology of Gower (1972: 11-12):

1. A matrix E was defined with elements $-1/2d^2_{jk}$ where $j = 1, \ldots n$; $k = 1, \ldots n$.
2. With $e_{.k}$, $e_{j.}$, and $e_{..}$ as the row, column and grand means of E, a matrix F was calculated with elements f_{jk} such that

$$f_{jk} = e_{jk} - e_{j.} - e_{.k} + e_{..} \; .$$

3. The latent roots (Λ) and vectors (X) of F were extracted.
4. The columns of X were scaled such that the sum of squared elements of column $\underline{i}$ is equal to the $\underline{i}$th latent root (λ_i) where $\underline{i} = 1, \ldots n-1$.

X is an asymmetrical matrix with as many columns (coordinate axes) as there are significant roots of F and rows corresponding to the groups. Usually the first few coordinates account for most of the significant intergroup variation and only the first two were plotted for the analyses presented here.

A convenient feature of this methodology is that the *i*th diagonal element (f_{ii}) of the F matrix represents the squared distance of the *i*th group from the origin. (The origin is the zero point of all axes in the space.) Therefore extremely aberrant groups can be readily identified.

Groups with extremely small sample sizes were interpolated into the space according to the following methodology (Gower 1972: 12):

1. For any new (n+1)th point, a vector of distances between it and the original n groups was calculated with elements $d^2_{i,n+1}$ where i = 1, . . . n.
2. This vector of distances was subtracted from the diagonal of the F matrix, yielding vector $\underline{d}$ such that

$$d_i = f_{ii} - d^2_{i,n+1} .$$

3. The vector $\underline{x}$, representing the coordinates for plotting the (n+1)th group, was calculated as

$$\underline{x}' = 1/2\Lambda^{-1}X'\underline{d} .$$

This allows groups with extremely small samples to be examined within an unweighted space, yet without having them contribute to that space.

Both the generalized distance and principal coordinate calculations were accomplished via COORDINATE, a program written using the SAS MATRIX procedure (SAS Institute, Inc. 1979).

In order to determine which principal components contribute to intergroup distances, correlation coefficients were calculated between group scores on each principal coordinate and the group's mean principal component vector. These correlations can be viewed as the cosines of the angles between the two sets of axes in multidimensional space. If a component contributes a substantial amount of information to a major axis of intergroup variation (principal coordinate) the two axes should line up in multidimensional space with a correlation coefficient of close to 1.0. If a component contributes little or no information to a coordinate, it should be nearly orthogonal to it with a correlation of close to 0.0.

The correlations were calculated via the CORR procedure in SAS (SAS Institute, Inc. 1979).

Canonical Correlations

Canonical correlation analysis was used to examine group relationships within a space defined by time and geography rather than by the groups themselves. The canonical correlations serve first to indicate if significant temporal and geographical patterns are present and second to assess group relationships along these patterns.

In computational terms, canonical correlation analysis is a general linear models procedure which defines structural interrelationships between two variable sets. One is usually thought of as the "predictor"

set and the other as the "criterion" set. In the present case, the predictor set would be the principal component scores and the criterion set the median site dates and geographical coordinates. Axes of covariation are then defined between the two variable sets. For instance, if certain craniometric components varied according to a systematic temporal pattern, they should emerge on an axis in conjunction with the site dates. If certain components varied in a systematic geographical pattern, they should emerge on an axis with the geographical coordinates of the sites (with the constraint that this axis has to be orthogonal to the first). Scores can then be calculated along these axes and groups examined in a temporal and/or geographical context.

Since the calculations are based on individual specimens, there is no group structure inherent to the canonical correlation analysis. The only archaeological influence is the extent to which the site dates are archaeologically derived. However, the group structure can be reassembled after the fact by calculating Phase means along the canonical variables and plotting these means. Therefore group relationships can be examined within a context of spatial and temporal variation defined by the morphology of individual specimens.

Two canonical correlation analyses were calculated here: one based on the Caddoan speakers, the other on the Mandan-Siouan and the Woodland. The calculations were performed by the CANCORR procedure in SAS (SAS Institute, Inc. 1979). Mathematical discussions of canonical correlation can be found in Levine (1977: 11-36), Morrison (1976: 259-263) and Tatsuoka (1971: 183-191).

V. RESULTS AND DISCUSSION

Principal Components Analysis

Twenty-one components with eigenvalues greater than 1.0 were extracted from the within-groups correlation matrix. They account for 80.1% of the total variation. The varimax-rotated principal components matrix is given in Table D-1, Appendix D.

The post-rotational variable communalities (computed as the sum of squared row elements) are very high, indicating that most of the variables contribute information to the component structure. The lowest communalities are for supraorbital subtense (SOS), parietal subtense-fraction (PAF) and nasal breadth (NLB) with values of 0.46, 0.48, and 0.50 respectively. These variables either possess information extraneous to the common structure of the variable set or they have high degrees of measurement error. I would suspect the latter.

The lowest salient loading in the matrix is 0.31 for SOS on component 11. All loadings equal to or higher than this are reported in the discussions below.

The component structure as a whole is virtually identical to the factor structure obtained by Howells (1973) using a world-wide sample and image factor analysis. Therefore I have given the components the same "names" that he employed. There are a few exceptions to this. Three components extracted here are not found in the Howells set because the variables defining them are unique to the present analysis. One of the minor components defined here does not exist in the Howells

set even though the variables are included there. Also, in one case I changed the name of a component to more precisely define the morphological complex it is measuring.

I. Facial Forwardness. This is an important component, accounting for 10% of the total variation. It measures the forward extension of the face relative to the temporal region. The highest loadings are on the radii from the external auditory meatus to the orbit margins. The loadings diminish slightly moving down the face. Smaller loadings for cranial length (GOL and NOL) and length of the cranial base (BPL and BNL) are probably secondary loadings, indicating the contribution of facial extension to the total length of the skull. Salient loadings (with leading zeroes and decimals removed) are:

GOL	44	DKR	84	EKR	91
BNL	67	ZOR	86	ZMR	80
NAR	82	NOL	43	AVR	53
SSR	71	BPL	46	NBA	-32
PRR	60	FMR	86		

II. Vault Breadth. This is the second largest component, accounting for 6% of the variation. The highest loadings are on biauricular breadth (AUB), maximum cranial breadth (XCB) and bizygomatic breadth (ZYB) and the loadings diminish with breadths in the frontal and occipital regions. Smaller loadings for the facial breadths indicate the correlation of these breadths with vault breadth in general. Salient loadings are:

AUB	83	WCB	51	EKB	41
XCB	76	ASB	49	FMB	41
ZYB	76	WFB	42	ZMB	34

XFB	64	MAB	42
JUB	60	STB	47

III. Vault Height. This is a fairly important component, accounting for 5% of the variation. It is equivalent to Howells' Factor 18, Occipital Size (1973: 141). The two exhibit similar patterns of loadings but the component defined here includes loadings for variables unique to the present analysis. These additional variables present a clear picture of vault height, whereas Howells only noted the contribution of occipital size to vault height. The highest loadings are on the radii from the external auditory meatus to vertex (VRR) and bregma (BRR). The other loadings conform to a picture of vault height above the auditory meatus. Basion-bregma height (BBH) contributes to this component as well as to Component 6, Cranial Base Flatness. Since it transects the two complexes, this is to be expected. The salient loadings include:

BBH	62	OCC	67	VRR	84
ASB	32	OCF	45	LAR	71
FRC	43	BRR	78	NBA	37

IV. Orbit Horizontal Profile. This component expresses the backward angulation of the lateral margins of the eye orbits relative to the midline of the face. The high negative loadings on nasio-frontal angle (NFA) and dacryal angle (DKA) conform to this picture: these angles grow more acute as the face gets more "beaked." High scores on this component would indicate a flat orbit region, a characteristic common to American Indians and Mongoloids in general. Significant loadings include:

NAS	82	NAR	36	NFA	-82
DKS	85	DKR	35	DKA	-85

V. Prognathism. This is a moderately important component, accounting for 5% of the variation. It presents a clear picture of alveolar prognathism. The signs of the angles on this component are reversed from Howells' Prognathism factor (12), but the interpretation remains unchanged. The relationship of the angles to the component can be seen in Figure 13. As the alveolus grows more prognathic, the nasion angle (NAA) grows more obtuse and the prosthion angle (PRA) more acute. Therefore high scores on this component would indicate greater degrees of prognathism. Salient loadings are:

BPL	75	SSR	42	NAA	83
MAB	32	PRR	65	PRA	-78
MAL	72				

VI. Cranial Base Flatness. This is a component unique to the present analysis. George K. Neumann (1942, 1952) pointed out that the flatness of the cranial base seems to be an important aspect of variation in American Indians. I formulated some variables to measure this flatness and they have emerged in an identifiable component, suggesting that the cranial base is a distinct morphological complex. The highest loadings are on the cranial base angle (CBA) and the radius from basion to the external auditory meatus (BAR). The loadings indicate that individuals with high scores should have more prominent (less flat) cranial bases. Salient loadings are:

BNL	35	BAR	92	PRA	32
BBH	64	NBA	63	CBA	-91
OSR	38	BBA	-64		

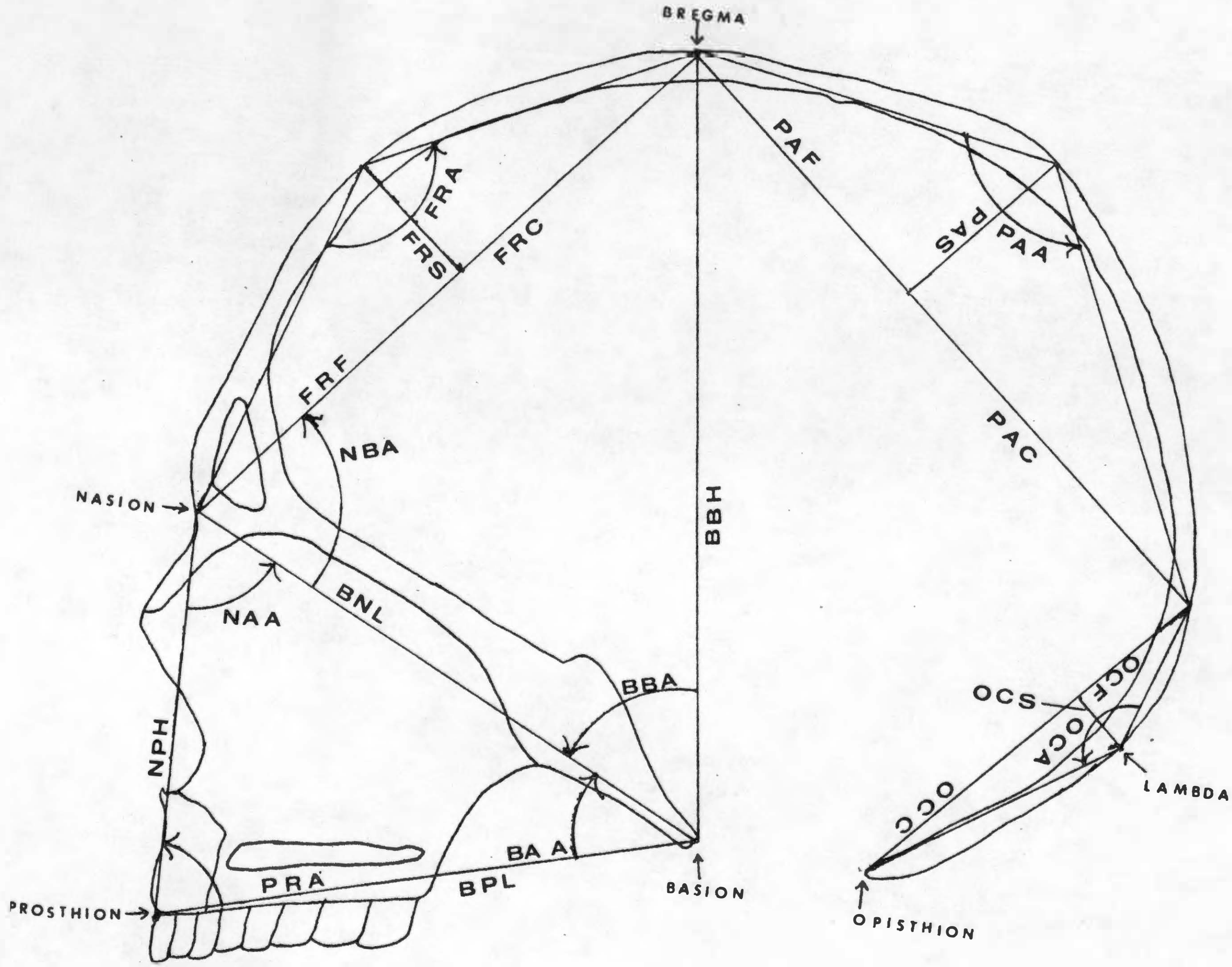

Figure 13. Angles of the Sagittal Profile.

VII. Occipital Curvature. The loadings on this component present a clear picture of the curvature of the occipital bone in the sagittal plane (Figure 13). The highest loadings are on occipital subtense (OCS) and occipital angle (OCA). The moderate loadings of glabello-occipital and nasio-occipital length (GOL and NOL) reflect the contribution of occipital curvature to cranial length in general. Higher scores on this component indicate more curved occipitals. Salient loadings include:

GOL	67	OCS	90	OCA	-88
NOL	66	LAR	38	PAA	31
OCC	33				

VIII. Parietal Size and Profile. This component measures both the length of the parietal and its angulation in the sagittal plane (Figure 13). The loadings suggest that longer parietals are more curved. It is interesting that none of the cranial length variables load on this component, since the parietal represents a substantial segment of cranial length. The presence of the negative occipital loadings on this component is also puzzling, but their contribution is a small one.

PAC	78	PAS	91	PAF	57
OCC	-42	OCF	-47	PAA	-72

IX. Facial Height. This is a very clean component, presenting a clear and uncomplicated picture of facial height (Figure 13). Higher scores on this component would indicate higher faces. Salient loadings are:

NPH	85	NLH	73	OBH	51
NAA	-35	BAA	86		

X. Frontal Profile Flatness. The loadings on this component primarily measure the flatness of the frontal in the sagittal plane (Figure 13). There is also some suggestion of the sagittal length of the frontal given by the basion angle (BBA). The signs of the loadings are reversed from those on Howells Frontal Profile Flatness factor (15). Higher scores on this component would indicate frontals more arched in the sagittal plane. There are only four salient loadings:

FRC	64	FRS	89	BBA	61
FRA	-78				

XI. Bistephanic Flatness. This is another component defined primarily by variables unique to the present analysis. They were designed to measure the transverse arching of the frontal in the region above the forehead. Precise descriptions of these measurements can be found in Table B-2, Appendix B. Higher scores on this component reflect frontals more arched in the transverse plane. Significant loadings include:

WFB	41	SOS	31	STB	65
STS	93	STA	-87		

XII. Upper Facial Breadth. This component expresses breadth of the upper face, the orbital region in particular. It is distinct from the Vault Breadth component defined earlier and none of the lower facial breadths such as ZMB or MAB contribute to it. It appears to be a generally size-related component. There are five salient loadings:

JUB	36	OBH	37	OBB	74
FMB	63	EKB	67		

XIII. Foramen Magnum Size. This is a component unique to the present analysis, accounting for 3% of the total variation. Foramen

magnum length (FOL), which has the highest loading, loads moderately on Howells' Sagittal Cranial Length factor (2). This is the only one of Howells' factors which does not have an equivalent here. The other variables contributing to the Foramen Magnum Size component do not appear in the Howells set. I suspect that this component is trying to measure some aspect of cranial base morphology that is not adequately defined in the present measurement set. A near salient loading of 0.30 for biasterionic breadth (ASB) might be indicative of this. There are only three salient loadings, all high:

FOL 79 FOB 61 OSR 76

XIV. Interorbital Prominence. This is a fairly minor component, accounting for 3% of the variation. It is very specific, clearly measuring the prominence of the bridge of the nose. A higher score reflects a more prominent nasal bridge. Only three variables contribute to the component:

DKB -33 NDS 83 NDA -91

XV. Interorbital Breadth. Distinct from the last component, yet centered in the same area, this component measures the breadth of the interorbital region. It includes a high loading for the minimum breadth across the nasal bones (WNB) and a secondary loading for nasal breadth (NLB). NLB has a low communality and this is its only salient contribution to the component structure:

NLB 49 DKB 71 WNB 74

XVI. Malar Size. Another small, specific component, this one expresses size of the malar only, distinct from any of the facial

breadths. It accounts for 3% of the variation with three significant loadings:

IML 78 XML 79 MLS 66

XVII. Subnasal Flatness. Distinct from the Prognathism and Facial Forwardness components, this component measures the transverse flatness of the alveolar border below the nose. It is also distinct from the Orbit Horizontal Profile component which measures the flatness of the orbital region. The signs on this component are reversed from the Howells equivalent (11). Higher scores indicate a more protruding subnasal region. There are three salient loadings:

SSS 88 SSR 36 SSA -87

XVIII. Frontal Bone Length. This component is roughly equivalent to Howells' Frontal Bone Length factor (14) although it lacks the extremely high loading (0.84) for basion angle (BBA). A true frontal bone length component should include this variable (see Figure 13). In the present analysis BBA loads on the Frontal Profile Flatness component. The high loading of glabella projection (GLS) suggests that this component may have something to do with glabellar prominence as well as frontal length. It is the only component extracted here which defies a clear morphological interpretation. There are three loadings:

GLS 74 FRC 38 FRF 70

XIX. Nasalia Prominence. This is a clear, simple component, accounting for 2% of the variation. Although it is in the same region as the Interorbital Prominence and Interorbital Breadth components, it is distinct from them. This suggests that there is a great deal of

highly specific information in the interorbital region. The present component expresses the prominence of the nasal bones, independent of the breadth of the nasal bones (WNB). High scores reflect more prominence. There are only two loadings:

SIS	84	SIA	-82

XX. Midfacial Size. Although Howells (1973: 133) suggested his factor was "a somewhat nebulous one of expansion of the lower face," the same complex is identified here with a virtually identical pattern of loadings. It appears to be related to maxillary development, although a very small loading for minimum cranial breadth (WCB) is also present:

MAB	42	ZMB	58	WMH	60
WCB	31				

XXI. Mastoid Size. As with the last four or five components, this is a very small one, accounting for 2% of the variation. Yet it is easily interpretable. The two loadings measure the height (MDH) and breadth (MDB) of the mastoid process. Although these variables are present in Howells' measurement set, they do not define a specific factor there and have low communalities. This is not surprising since they define a very minor, almost residual, component here.

MDH	72	MDB	72

In summary, there is a remarkable concordance between the component structure defined here and the factor structure defined by Howells (1973). The only significant differences are (1) the presence of three additional components here (defined primarily through variables unique to this analysis); (2) the absence of a Sagittal Cranial Length factor here

(this is a low key factor in Howells' analysis, accounting for only 2.79% of the variation. A different low key component, Mastoid Size, emerges here); (3) Howells' Frontal Bone Length factor is not defined as clearly.

This is an impressive concordance considering it occurs despite:

1. Different methodologies. Whereas Howells used an image factor solution, the present analysis employs a principal components solution. The latter is much simpler mathematically, does not require the inversion of the correlation matrix, and is based on fewer interpretive assumptions (see Harman 1976). Given the high multiple correlations of the variables in the Howells' set, it is possible that an image covariance solution might approximate a principal components solution. In both Howells' analysis and the present analysis, varimax rotation was used.

2. A world-wide sample versus a regional sample. It would appear that a "universal" set of factors/components emerge when Howells' variable set is used, regardless of the sample. In fact, Howells' results are based on a sample of males only, whereas both sexes defined the matrix here. Previous analyses of American Indian material using a subset of Howells' variables produced components very similar to those defined here (Key 1979; Key and Jantz 1981).

3. Slightly different measurement sets. Another point worth addressing is the additional variables in the present measurement set. Some of these variables were expressly defined to measure morphological complexes particularly relevant to American Indian material. Others were included because they were measurements for which a large body of

comparative data existed. The specially designed variables emerged on specific components measuring the complex for which they were defined. The other variables merged into already existing components. This suggests first, that the existing components are robust and appear despite alterations of the data set, and second that there are probably a large number of independent morphological complexes in the cranium. However, merely taking a large battery of measurements on the skull will not identify these additional complexes. They must be addressed through precisely defined measurements.

4. Balanced versus unbalanced samples. Howells' within-groups correlation matrix was based on 17 populations with roughly 50 individuals in each sample. The within-groups matrix utilized here was calculated from 43 groups with sample sizes ranging from 2 to 107. That the correlations remained stable in spite of this grave imbalance is amazing. It would appear that the algorithm used by the RMATRIX program compensates for sample imbalance and/or there are enough degrees of freedom in the matrix to stabilize the correlations.

Pooling the Sexes

After centering the principal component scores on the grand sex means via the methodology discussed earlier, a MANOVA was performed to test for a residual sex and/or sex interaction effect. This analysis was based on the Disorganized Coalescent (DC) tribes listed in Table 1, page 43. The results of the MANOVA are given in Table 4.

Table 4. MANOVA Test for Residual Sex Effect.

EFFECT	WILKE'S λ	F	D.F.	PR > F
Sex	0.7798	1.16	21, 86	0.3100
Tribe	0.1858	2.16	84, 342	0.0001
Sex*Tribe	0.4195	1.00	84, 342	0.4817

Usually, the Sex effect far outweighs any sort of Tribal (group) effect, necessitating separate analyses for males and females (see Key and Jantz 1981: Table 3). Such is not the case here: The Sex and Sex Interaction effects are not significant, yet the Tribal effect remains significant after the sex-centering procedure. This procedure has apparently removed most of the size-related variation that tends to differentiate the sexes, presumably leaving the shape-related variation intact. Therefore the sex-centered scores have been pooled and the Sex and Sex Interaction effects dropped from all subsequent analyses. In addition to simplifying the models for the MANOVAs, pooling the sexes increases sample sizes for poorly sampled groups, hopefully giving better estimates of their statistical population parameters. The Sex-Centered scores are listed by Phase in Tables E-1 and E-2, Appendix E.

Intergroup Relationships

Paleo-Indian/Archaic

Any inferences concerning Paleo-Indian and Archaic relationships must be considered very tentative since the analysis is based on a small

sample of individual specimens (PI = 7; AR = 10). A MANOVA was not calculated. The correlations of the principal component and principal coordinate axes are given in Table 5 and the second and third principal coordinates are plotted in Figure 14. The first coordinate was not plotted because it only served to differentiate the two specimens from Scott County, Kansas (14SC2) from the rest of the sample. It accounted for 20.20% of the between-groups variation, however group relationships on the second and third coordinates are more revealing.

PCII accounts for 14.93% of the between-groups variation and PCIII for 13.68%. Therefore Figure 14 represents approximately 30% of the between-groups dispersion. PCII differentiates the Paleo-Indian specimens from the Archaic, mainly on the basis of the Vault Height component (Table 5). The Parietal Size and Profile and Midfacial Size components also contribute some information to this axis. Paleo-Indians appear to have higher vaults, longer and more curved parietals and slightly larger midfacial regions. The parietal length is at least a partial reflection of cranial length and these results are consistent with the general picture of Paleo-Indians as possessing long, narrow and very high cranial vaults. The Cranial Breadth component does not contribute here because Archaic individuals also tend to be very narrow.

The Swanson Lake burial (25HK16) is the only individual seriously misplaced on PCII. It is interesting that the Gilder Mound specimen (25DO26) (aka Long's Hill or Nebraska Loess' Man) once the subject of considerable controversy (Barbour 1907; Hrdlička 1907; Gilder 1907), falls out with the other purported Paleo-Indians.

Table 5. Paleo-Indian/Archaic: Correlations of Principal Component and Principal Coordinate Axes.

PRINCIPAL COMPONENT	PCII	PCIII
1. Facial Forwardness	0.41	0.50
2. Vault Breadth	0.24	-0.13
3. Vault Height	-0.74	0.48
4. Orbit Horizontl Prfl	0.27	0.57
5. Prognathism	0.09	0.68
6. Cranial Base Flatns	-0.09	0.53
7. Occipital Curvature	-0.07	-0.47
8. Parietal Size & Prfl	0.54	0.38
9. Facial Height	-0.34	-0.44
10. Frontal Prfl Flatns	0.47	0.04
11. Bistephanic Flatns	-0.25	0.47
12. Upper Facial Breadth	0.27	-0.29
13. Foramen Magnum Size	0.36	0.05
14. Interorb Prominence	0.32	0.25
15. Interorb Breadth	0.40	0.10
16. Malar Size	0.18	0.14
17. Subnasal Flatns	0.07	0.10
18. Frontal Bone Lngth	0.40	-0.20
19. Nasalia Prominence	-0.10	0.22
20. Midfacial Size	-0.54	-0.08
21. Mastoid Size	0.42	-0.30
Latent Root	54.42	49.86
Percentage of Trace	14.93%	13.68%

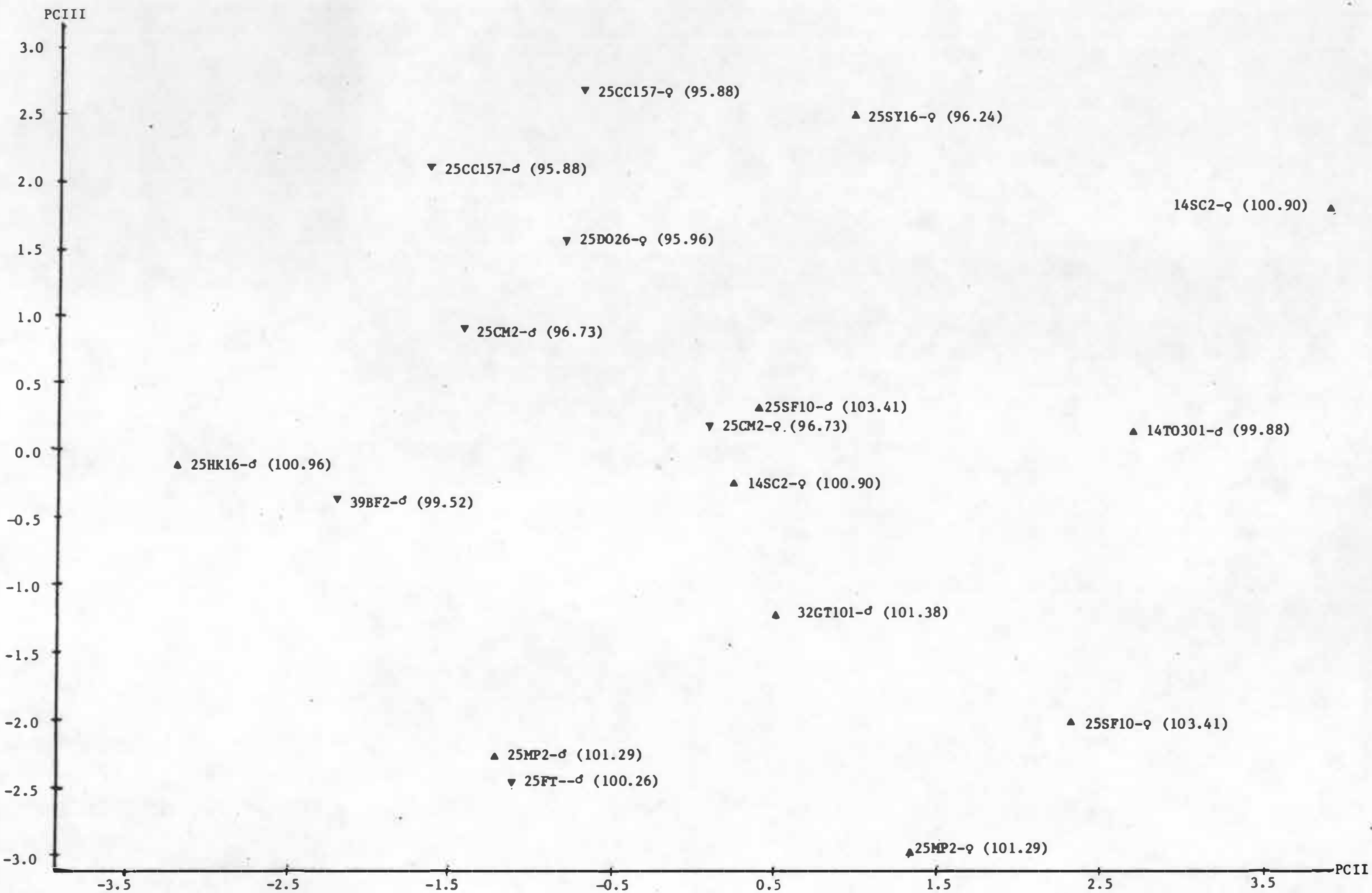

Figure 14. Paleo-Indian/Archaic: Plot of Second and Third Principal Coordinates.

With the exception of a specimen from Scott County, Kansas (14SC2) and one from the Gering Site in western Nebraska (25SF10), PCIII defines an East-West gradient that crosscuts the Paleo-Indian/Archaic distinction. The degrees west longitude has been noted for each specimen in Figure 14.

The gradient is drawn by a number of components (Table 5), primarily related to the general flatness and extension of the face. The specimens to the west appear to have slightly flatter and less extended faces. I hesitate to make sweeping generalizations on the basis of so few specimens, but the fact that the gradient crosscuts Paleo-Indian and Archaic lines suggests it is a deep-seated phenomenon. It is also possible, of course, that it is merely a statistical artifact. If the east-west gradient is a real phenomenon, inferences concerning the mechanism behind it would represent too large a step into the realm of speculation.

On a more general level, the Paleo-Indians exhibit a remarkable homogeneity considering they are widely distributed in space and presumably in time as well. Meiklejohn (1972, 1976, 1978) has suggested that groups organized at the band level with an economy based on the hunting of migratory animals should exhibit a high degree of regional homogeneity. Although his model was proposed for the European Mesolithic Period, it seems applicable here. Stated simply, the model suggests that in regions of low population density, small migratory bands would have to develop extensive mating networks in order to achieve the minimum effective breeding size necessary for survival. The net result

of the extensive breeding networks would be a relatively homogeneous biological population spread over a wide area since endogamous "pockets" would not develop. The more scattered nature of the Archaic specimens might be interpreted as a reflection of the increasing regional differentiation which occurs during the Archaic as the food supply becomes more localized.

Of course, all of this is based on a very small number of specimens (in several cases with uncertain archaeological provenance) and the entire set of results may represent nothing more than sampling variance.

Woodland

A MANOVA was calculated to test for systematic differences between the Middle and Late variants of the Woodland Period. For this analysis the phases were nested within their respective variants. The results of this analysis are presented in Table 6.

The Variant effect is not significant, indicating that there is no significant biological difference between the Middle and Late Woodland variants, given the present samples. The distinction between the two would appear to be an archaeological distinction with no biological concommitants. The various Woodland phases do exhibit significant heterogeneity, however. Therefore the Variant effect was dropped and the MANOVA was recalculated with only the Phase effect in the model. The overall tests are presented in Table 6 and the univariate tests of each component in Table 7.

The overall test indicates a highly significant Phase effect and the univariate ANOVAs indicate that most of the Phase heterogeneity

Table 6. Overall MANOVA tests.

INTERPRETIVE FRAMEWORK	EFFECT	WILKE'S	F	D.F.	PR > F
Woodland	Variant	0.4947	1.41	21, 29	0.1928
	Phase(Variant)	0.0157	1.46	126, 175	0.0104
	Phase	0.0080	1.47	147, 204	0.0054
Paleo-Indian/Archaic/Woodland	Phase	0.0061	1.72	189, 384	0.0001
Woodland/Mandan-Siouans	Tradition	0.7489	1.17	21, 73	0.3064
	Phase(Tradition)	0.0067	1.63	294, 894	0.0001
Woodland/Central Plains	Tradition	0.2820	7.88	21, 65	0.0001
	Phase(Tradition)	0.0219	1.53	210, 612	0.0001
Mandan-Siouans	Phase	0.0016	1.88	147, 171	0.0001

Table 7. Woodland: One-Way ANOVAs for PHASE Effect and Principal Component/Coordinate Correlations.

PRINCIPAL COMPONENT	MODEL SS	ERROR SS	F	PCI	PCII
1. Facial Forwardness	6.46	50.99	0.89	-0.01	-0.03
2. Vault Breadth	7.19	57.77	0.87	-0.34	-0.34
3. Vault Height	23.77	57.92	2.87**	0.93	-0.20
4. Orbit Horizontl Prfl	7.33	61.64	0.83	-0.63	-0.02
5. Prognathism	16.76	43.08	2.72**	-0.24	-0.10
6. Cranial Base Flatns	19.66	39.38	3.49***	0.78	-0.03
7. Occipital Curvature	14.68	53.91	1.91	-0.69	0.40
8. Parietal Size & Prfl	7.62	44.30	1.20	0.71	0.46
9. Facial Height	15.15	50.27	2.11*	-0.41	-0.71
10. Frontal Prfl Flatns	11.75	45.98	1.79	-0.07	0.12
11. Bistephanic Flatns	10.05	78.73	0.89	0.43	0.54
12. Upper Facial Breadth	2.71	48.65	0.39	-0.11	0.32
13. Foramen Magnum Size	8.56	45.28	1.32	-0.64	0.50
14. Interorb Prominence	24.37	50.79	3.36***	-0.25	-0.49
15. Interorb Breadth	9.24	52.05	1.24	0.79	-0.17
16. Malar Size	7.74	41.85	1.30	0.02	-0.73
17. Subnasal Flatns	9.95	68.12	1.02	-0.37	0.53
18. Frontal Bone Lngth	22.78	65.68	2.43*	0.04	-0.76
19. Nasalia Prominence	14.19	39.74	2.50*	-0.73	-0.24
20. Midfacial Size	9.27	47.90	1.35	-0.87	-0.09
21. Mastoid Size	10.79	49.71	1.52	-0.29	0.14

Degrees of freedom for MODEL, ERROR and TOTAL are 7, 49 and 56.

*P < 0.05; **P < 0.01; ***P < 0.005; ****P < 0.0001.

occurs along the Cranial Base Flatness and Interorbital Prominence components. Smaller degrees of dispersion occur along the Vault Height and Prognathism components, and minor differences can be found on the Facial Height, Frontal Bone Length and Nasalia Prominence components.

The principal coordinates representation of intergroup differences is given in Figure 15. PCI accounts for 33.36% of the variation and PCII accounts for 17.90% (with latent roots of 15.30 and 8.21, respectively). Therefore the relationships presented in Figure 15 represent approximately 40% of the total group dispersion.

It is obvious that PCI distinguishes the Kansas City Hopewell material from all of the remaining Woodland groups. The primary components contributing to this discimination are Vault Height, Cranial Base Flatness and Midfacial Size although a number of other components make significant contributions. In view of this obvious distinction (accounting for 33.36% of the total between-groups variance) it is highly unlikely that the Kansas City Hopewell Phase is the biological ancestor of the remaining Plains Woodland groups. This distinction will become even more obvious when the Paleo-Indian and Archaic samples are entered into the picture in a subsequent analysis.

It is possible that Kansas City Hopewell is related to some other Plains Woodland groups which are not represented here. For instance, when I examined some of the Schultz focus material from east-central Kansas, I noted how it distinctly resembled Kansas City Hopewell material. (This was before I had any notion as to the cultural affiliation of the material. It was merely in a set of boxes labeled with site numbers only.)

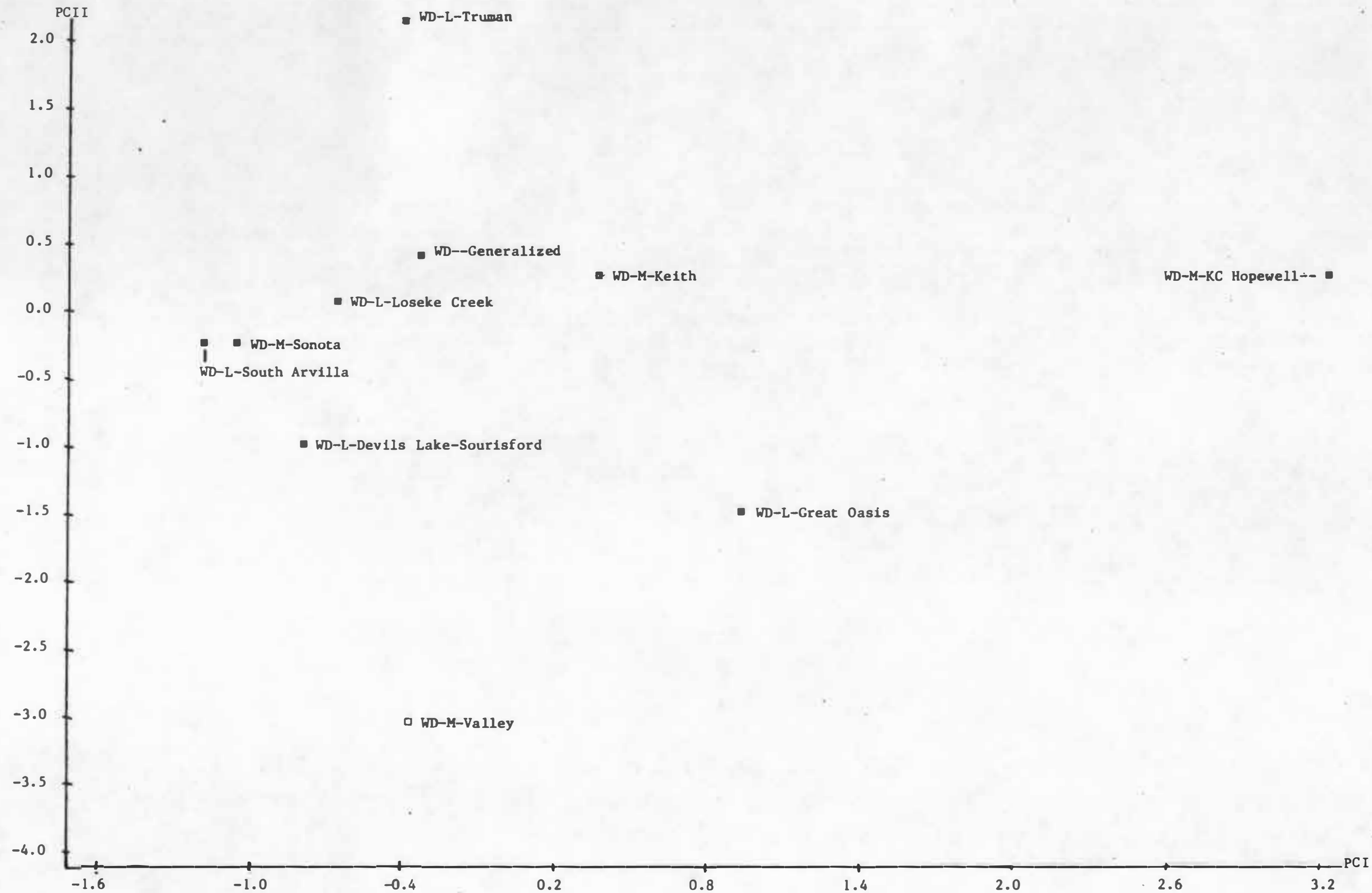

Figure 15. Woodland: Plot of First Two Principal Coordinates.

This material was unfortunately too fragmentary to measure, however Phenice (1969a) has suggested it closely resembles Kansas City Hopewell. In view of the present results, however, I would suggest that the Schultz focus merely represents a westward excursion of Kansas City Hopewell populations along the Kansas and Big Blue Rivers, and not the beginning of their "colonization" of the Plains.

It is entirely possible that the Kansas City Hopewell Phase contributed culturally to Plains Woodland developments, but a significant biological contribution is doubtful.

The second coordinate utilizes a diverse set of components to draw a distinction between the Truman material and the remaining Woodland groups, for reasons unknown. Throughout all of the subsequent analyses the Truman material tends to hang at the edge of the Woodland distribution and does not clearly affiliate itself with any other group. I constructed this group on the basis of a distinctive pottery type and it may not have any biological reality. It is also a very small sample of only three specimens.

When the single Valley Phase specimen is interpolated into the space, it lies on the opposite extreme of PCII. However, in subsequent analyses the Valley specimen clearly aligns itself with the remaining Woodland groups.

I have also consistently interpolated a group I term "Generalized Woodland" into any space defined by Woodland groups to see how it would behave. This is a motley assortment of specimens, widely distributed geographically, termed "Woodland" because they were derived from a mound

or were associated with nondiagnostic Woodland pottery. I had hoped the Generalized Woodland group would hang near the center of any Woodland distribution since it probably contains specimens from all the other Woodland groups. This is what it appears to do, both here and in subsequent analyses.

The northern Woodland groups (Sonota, South Arvilla and Devils Lake-Sourisford) tend to cluster fairly well and to be displaced slightly away from the Central Plains Woodland groups (Valley, Keith and Loseke Creek). This is a minor distinction, however.

The Great Oasis material is consistently displaced away from the other Woodland groups, although never as markedly as Kansas City Hopewell. This is not surprising since Great Oasis is an enigmatic complex, possibly derived from the east, whose affiliations with the Woodland and/or the Plains Village groups is uncertain.

In summary, the Woodland groups present a fairly clear picture of relationships. There appears to be no obvious biological distinction between Middle and Late Woodland groups, however the northern groups tend to be displaced slightly from the Central Plains groups. Kansas City Hopewell clearly represents a separate population which I suspect would resemble the Ohio Hopewell populations rather closely. The Great Oasis and Truman materials are somewhat displaced from the other Woodland groups. In the case of the former, this is a logical displacement. The latter is displaced for reasons unknown.

Paleo-Indian/Archaic/Woodland

In order to test aspects of biological continuity from the Paleo-Indian to the Woodland Period, Paleo-Indian and Archaic specimens were grouped into a "Paleo-Indian Phase" and an "Archaic Phase" and introduced into a Woodland context. A MANOVA was then calculated to test the Phase effect. The overall significance test is given in Table 6, page 96, and the univariate ANOVAs in Table 8.

The overall test indicates that the level of heterogeneity increases noticeably over that of a pure Woodland context; however the ANOVAs suggest that the additional samples do not introduce a new axis of variation, they merely increase the level of heterogeneity along the patterns already established. This is also true for the first principal coordinate, but the second coordinate is defined according to peculiarities introduced by the Archaic sample.

The two coordinates represent roughly 50% of the between-groups variation (Figure 16). PCI accounts for 28.16% of the variation with a latent root of 16.27, the second for 19.22% of the variation with a root of 11.11. PCI once again discriminates between Kansas City Hopewell and all of the Plains groups, including the Paleo-Indian and Archaic samples. Once again, the primary contributer is the Vault Height component, although a number of other components contribute to the discrimination (Table 8). (It is worth noting that the negative correlation between Vault Height and PCI does not indicate that Kansas City Hopewell specimens have low vaults, quite the contrary. It indicates that the Kansas City Hopewell sample has a high negative score on PCI. The signs of the axes are arbitrary and serve only to discriminate the groups.)

Table 8. Paleo-Indian/Archaic/Woodland: One-Way ANOVAs for PHASE Effect and Principal Component/Coordinate Correlations.

PRINCIPAL COMPONENT	MODEL SS	ERROR SS	F	PCI	PCII
1. Facial Forwardness	8.22	65.10	0.90	-0.09	-0.26
2. Vault Breadth	14.51	80.26	1.29	0.39	-0.33
3. Vault Height	36.35	77.98	3.31***	-0.87	-0.30
4. Orbit Horizontl Prfl	8.67	79.62	0.77	0.64	0.02
5. Prognathism	25.45	59.97	3.02***	-0.01	0.81
6. Cranial Base Flatns	23.81	55.59	3.05***	-0.60	-0.57
7. Occipital Curvature	16.36	73.94	1.57	0.56	0.49
8. Parietal Size & Prfl	8.94	70.76	0.90	-0.68	0.22
9. Facial Height	20.82	56.13	2.64**	0.46	-0.18
10. Frontal Prfl Flatns	13.89	63.27	1.56	0.15	0.22
11. Bistephanic Flatns	22.47	98.27	1.63	-0.55	0.66
12. Upper Facial Breadth	11.87	60.51	1.39	0.14	0.46
13. Foramen Magnum Size	12.27	56.65	1.54	0.62	-0.18
14. Interorb Prominence	32.67	73.68	3.15***	0.42	-0.66
15. Interorb Breadth	17.26	70.33	1.74	-0.68	0.43
16. Malar Size	14.25	48.38	2.09*	0.14	-0.38
17. Subnasal Flatns	11.39	83.97	0.96	0.37	0.29
18. Frontal Bone Lngth	28.32	79.40	2.54**	-0.06	0.14
19. Nasalia Prominence	15.88	47.62	2.37*	0.77	-0.34
20. Midfacial Size	13.04	61.07	1.52	0.49	0.27
21. Mastoid Size	12.97	58.37	1.58	0.16	0.36

Degrees of freedom for MODEL, ERROR and TOTAL are 9, 64 and 73.

*P < 0.05; **P < 0.01; ***P < 0.005; ****P < 0.0001.

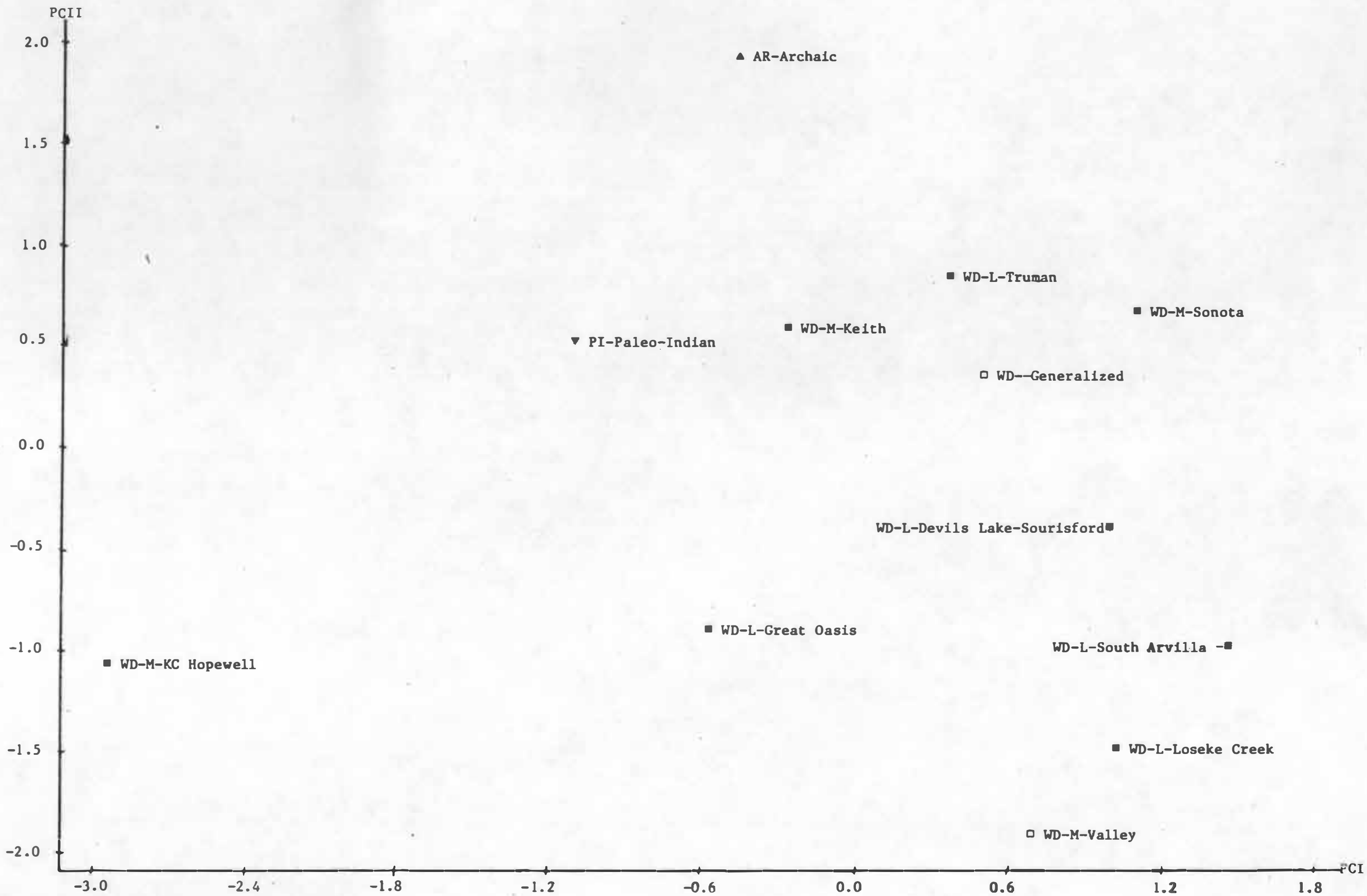

Figure 16. Paleo-Indian/Archaic/Woodland: Plot of First Two Principal Coordinates.

The Paleo-Indian sample is slightly displaced away from the Woodland on this axis, a reflection of their high cranial vaults. They are still clearly aligned with the Plains groups however.

The second coordinate draws the Archaic sample away from the rest of the groups. This axis is mostly closely aligned with the Prognathism component, although the Bistephanic Flatness and Interorbital Breadth components also contribute substantially. The scores indicate that Archaic specimens are generally more prognathic, with a frontal more arched in the transverse plane and a less prominent nasal bridge.

In many respects this axis is very similar to PCI in the Paleo-Indian/Archaic analysis. This axis, although not reported, served to differentiate the two specimens from Scott County, Kansas, from the rest of the sample. These specimens appear to have a profound influence on the Archaic sample as a whole (as small as it is). Yet they cannot be excluded from the sample merely to clean up the results. Their Archaic affiliation is somewhat secure in that one of the specimens was associated with an Archaic point. Therefore they must be assumed to be within the Archaic range of variation. (An historical note: in Wedel's (1959) initial discussion of these specimens, he noted that they were probably Early Woodland or older. This was written at a time when the Plains were generally thought to have been abandoned during the Archaic. He later (1961: 86) suggested that they were probably Archaic. The point associated with the burial is clearly Archaic.)

In any case, the pattern of relationships suggest that both the Paleo-Indian and Archaic samples align themselves with the later Plains

groups in a space that includes a Hopewellian group. Thus it would seem more logical to derive the Plains Woodland groups from a Plains Archaic base and ultimately from a Plains Paleo-Indian base rather than to suggest a migration of Hopewellian groups from the east.

I must stress, however, that this conclusion is based on small samples and that the Archaic sample does not fit as clearly into the picture as might be desired.

Woodland/Mandan-Siouans

A MANOVA was calculated to test relationships between the Woodland Tradition and the Middle Missouri-Mandan sequence. For this analysis the Coalescent Mandan phases were included in the Middle Missouri Tradition. The Woodland and Middle Missouri phases were then nested in their respective traditions. The overall tests are presented in Table 6, page 96, and the univariate ANOVAs in Table 9.

The Tradition effect is not significant, suggesting that there is not a marked biological distinction between Woodland and Mandan groups as a whole. The highly significant Phase (Tradition) effect indicates that high levels of heterogeneity exist between the various phases in the analysis, but not between the Woodland and Mandan Traditions as a whole. These relationships are amplified in the principal coordinate plots.

The relationships indicated in Figure 17 account for about 40% of the total between-groups variation. PCI accounts for 25.60% with a latent root of 25.40 and PCII for 14.76% with a root of 14.65. PCI is defined primarily by the two components of general cranial height, Vault Height and Cranial Base Flatness. It serves to separate most of the

Table 9. Woodland/Mandan-Siouans: Nested ANOVAs and Principal Component/Coordinate Correlations.

			TRADITION		PHASE(TRADTN)		CORRELATIONS	
PRINCIPAL COMPONENT	MODEL SS	ERROR SS	IV SS	F	IV SS	F	PCI	PCII
1. Facial Forwardness	10.76	99.37	0.88	0.82	9.86	0.66	-0.28	-0.03
2. Vault Breadth	19.62	106.96	0.01	0.08	18.69	1.16	0.08	-0.23
3. Vault Height	33.77*	105.62	0.07	0.06	33.75	2.12**	0.75	0.43
4. Orbit Horizontl Prfl	18.92	92.80	0.04	0.04	18.15	1.30	-0.49	-0.04
5. Prognathism	27.62**	79.37	0.53	0.62	26.69	2.23**	-0.16	-0.22
6. Cranial Base Flatns	37.03***	87.87	0.16	0.17	35.21	2.66***	0.82	0.13
7. Occipital Curvature	29.25**	81.86	1.88	2.14	27.50	2.23**	-0.66	-0.34
8. Parietal Size & Prfl	15.50	82.09	0.29	0.33	15.48	1.25	0.08	-0.23
9. Facial Height	24.50	91.55	3.81	3.87	22.28	1.62	-0.11	-0.07
10. Frontal Prfl Flatns	15.33	104.86	0.16	0.14	14.86	0.94	0.02	-0.29
11. Bistephanic Flatns	29.10	119.56	0.75	0.59	23.86	1.33	0.22	0.11
12. Upper Facial Breadth	9.82	77.05	0.30	0.37	9.79	0.84	0.02	-0.23
13. Foramen Magnum Size	40.89***	95.74	11.21	10.89	32.79	2.28**	-0.78	0.16
14. Interorb Prominence	45.95***	101.65	0.00	0.00	45.93	3.00***	-0.43	0.48
15. Interorb Breadth	22.88	98.95	0.49	0.46	21.40	1.44	0.46	-0.17
16. Malar Size	27.05*	84.51	0.37	0.41	24.63	1.94*	-0.19	-0.08
17. Subnasal Flatns	27.50	130.41	0.08	0.06	27.50	1.40	-0.19	-0.08
18. Frontal Bone Lngth	38.58**	111.16	3.06	2.56	36.34	2.17**	-0.14	0.66
19. Nasalia Prominence	23.37	88.95	0.01	0.01	23.16	1.73	-0.44	-0.53
20. Midfacial Size	40.58***	99.84	0.92	0.86	38.22	2.54	-0.83	0.18
21. Mastoid Size	31.57*	102.47	0.13	0.12	31.53	2.04*	0.08	-0.80

Degrees of freedom for MODEL, ERROR, TOTAL, TRADITION and PHASE(TRADTN) are 15, 93, 108, 1 and 14.

*P < 0.05; **P < 0.01; ***P < 0.005; ****P < 0.0001.

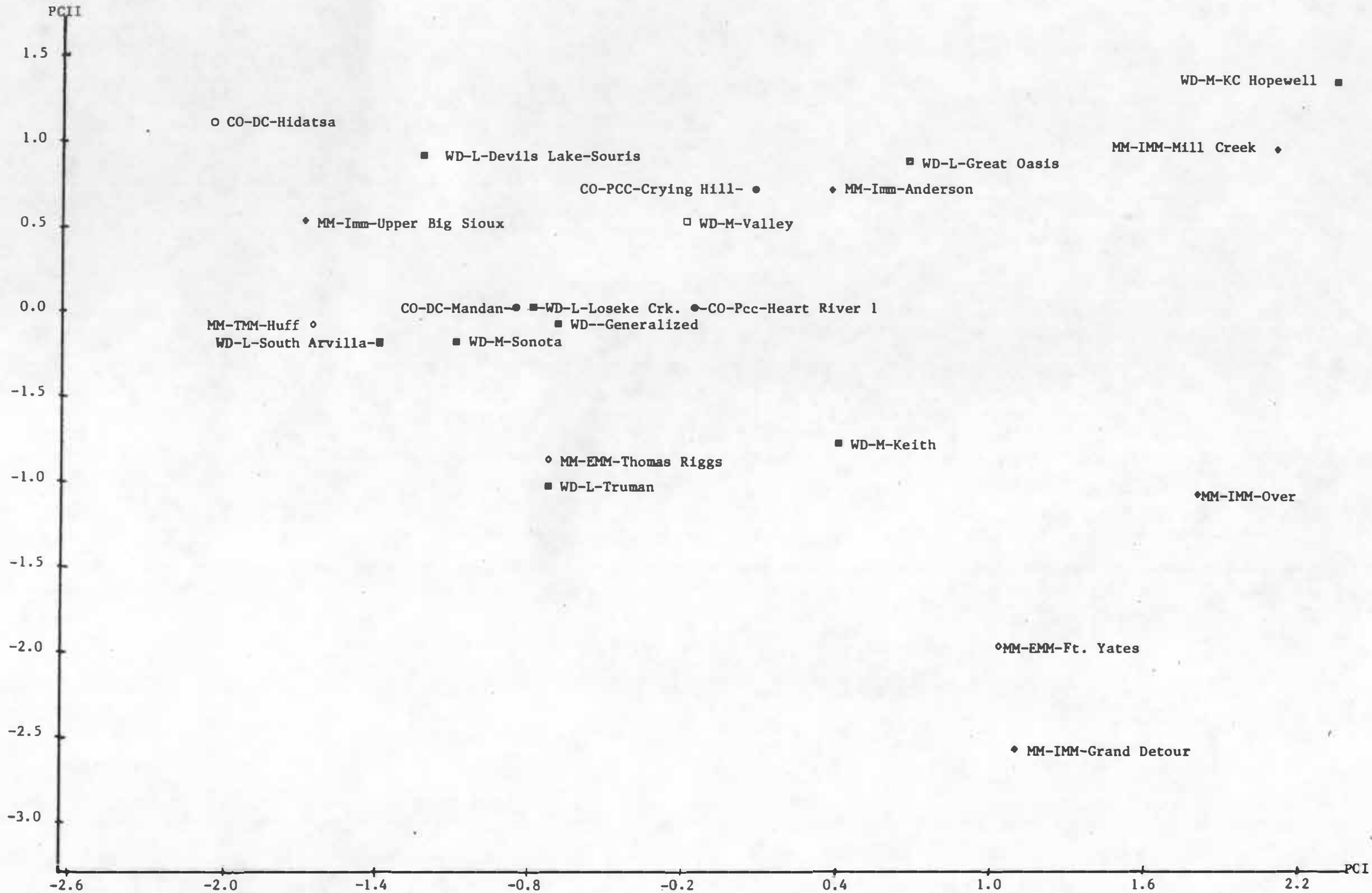

Figure 17. Woodland/Mandan-Siouans: Plot of First Two Principal Coordinates.

Initial Middle Missouri groups (IMM) from a cluster of later Mandan groups and Woodland groups. Kansas City Hopewell is also displaced along the axis, as would be expected.

PCII is a minor axis, defined by a diverse set of components, that serves mainly to draw slight distinctions between some of the IMM phases.

The overall relationships displayed in Figure 17 are both very interesting and very puzzling. In the absence of the Woodland relationships (such as will be presented in a subsequent analysis), the results could be viewed as a temporal progression from the Initial Middle Missouri into the later Mandan sequence. This progression would be marked generally by a reduction in cranial height, both of the vault and of the base. The only group that would not fit comfortably into this scheme would be the IMM Big Sioux Phase.

In view of the present results, however, this progression would represent a gradual convergence of Mandan morphology onto a pattern that already existed with the Woodland groups in the area prior to the Middle Missouri-Mandan sequence.

A more logical senario, to my mind, would be to derive an Extended Middle Missouri-Mandan sequence from a generalized Woodland base with the IMM as a distinct entity. The sequence from EMM into later Mandan is well established (see Lehmer 1966); however the origin of the EMM has always been an enigma. At one point it was thought to be derived from the IMM, but later radiocarbon dates show the two entities overlap temporally for several hundred years (IMM: 900-1400 A.D.; EMM: 1100-1550 A.D.). When the EMM first appears archaeologically, it is already

centered along the Missouri in North Dakota and is pushing downriver into IMM territory. This is presented in greater detail in the archaeology section of this report.

There is some question whether the IMM upper Big Sioux Phase materials used here are really IMM. They were excavated by W. H. Over from the Brandon area. They are labeled "Brandon Village" but there is a possibility that some (or all?) of them are from the nearby Split Rock Creek Mounds. If they are IMM, their position in Figure 17 might be called in as support for Hurt's (1953) contention that the "northern complex" of Mandan materials (these include the EMM, TMM Mandan sequence) are ultimately derived from the Big Sioux area of southwestern Minnesota. If they are in fact Woodland, their position would fall generally within the Woodland distribution.

In any case, Figure 17 indicates that the IMM Phases from the Ft. Randall region (and Grand Detour) are generally distinct from a Mandan-Woodland group. The IMM Anderson Phase comes closest to the Mandan-Woodland cluster. The single skull from the EMM Ft. Yates Phase which was interpolated into the space falls away from the where it might be expected to lie.

The pattern of Mandan relationships will be taken up again in subsequent analyses.

Woodland/Central Plains

Another important question of biological continuity is that between the Woodland and Central Plains Traditions. This was tested via a MANOVA with a Tradition effect and a Phase (Tradition) effect in the model.

The overall tests are given in Table 6, page 96, and the univariate ANOVAs in Table 10.

In contrast to the Woodland/Mandan relationships, the overall tests here indicate a highly significant difference between the Woodland and Central Plains Traditions as a whole. Once again, there is also significant heterogeneity between the Phases within both traditions.

These results suggest that while at least some of the Mandan groups appear to be strongly rooted in the Woodland Tradition, the Central Plains Tradition as a whole is distinct from the Woodland. These results are amplified in the principal coordinate plots (Figure 18).

Figure 18 is a roughly 60% picture of inter-group relationships. PCI accounts for 39.82% of the variation with a latent root of 37.57, PCII for 17.52% with a latent root of 16.53. There is an unequivocal distinction between the Central Plains and Woodland Traditions defined by PCI. The primary components contributing to this axis are Occipital Curvature and Foramen Magnum Size with additional information provided by the Interorbital Prominence component. In classical craniometry, the distinctions drawn by this axis might be approximated by the cranial index. The Central Plains groups are brachycephalic (round-headed) with skulls nearly as broad as they are long. Their occipitals are gently curved in both the sagittal (measured here) and transverse planes. The Woodland groups, on the other hand, are dolichocephalic (long-headed) with very narrow, very long skulls. Their occipitals are almost cone-shaped —that is, they are nearly parabolic in both the

Table 10. Woodland/Central Plains: Nested ANOVAs and Principal Component/Coordinate Correlations.

				TRADITION		PHASE(TRADTN)		CORRELATIONS	
PRINCIPAL COMPONENT		MODEL SS	ERROR SS	IV SS	F	IV SS	F	PCI	PCII
1.	Facial Forwardness	24.14*	90.68	2.00	1.87	11.55	1.08	-0.48	0.46
2.	Vault Breadth	14.24	109.02	2.72	2.12	12.65	0.99	0.40	-0.53
3.	Vault Height	42.74***	107.74	7.07	5.58*	24.15	1.91*	0.67	0.44
4.	Orbit Horizontl Prfl	9.80	93.06	0.12	0.11	8.86	0.81	-0.42	0.04
5.	Prognathism	31.51	84.15	7.24	7.31**	21.33	2.15*	0.56	-0.68
6.	Cranial Base Flatns	23.12	96.42	3.79	3.35	20.18	1.78	-0.10	0.46
7.	Occipital Curvature	150.98****	105.33	79.98	64.54****	19.25	1.55	-0.96	0.04
8.	Parietal Size & Prfl	14.88	102.45	0.01	0.01	14.29	1.19	0.06	0.80
9.	Facial Height	38.09***	99.49	13.28	11.35***	31.38	2.68**	-0.54	-0.60
10.	Frontal Prfl Flatns	12.47	82.53	0.20	0.21	12.44	1.28	-0.07	-0.28
11.	Bistephanic Flatns	26.71*	108.24	5.10	4.01*	12.13	0.95	0.65	-0.12
12.	Upper Facial Breadth	25.92***	71.32	16.68	19.87****	7.64	0.91	0.64	0.33
13.	Foramen Magnum Size	28.35***	68.99	11.73	14.45***	9.77	1.20	-0.86	0.11
14.	Interorb Prominence	46.53****	69.27	0.12	0.14	34.71	4.26****	-0.26	0.38
15.	Interorb Breadth	24.00**	82.49	4.73	4.88*	11.04	1.14	0.84	-0.20
16.	Malar Size	20.38*	79.36	8.85	9.48***	14.21	1.52	-0.53	-0.41
17.	Subnasal Flatns	14.81	93.20	1.34	1.22	12.02	1.10	0.28	-0.50
18.	Frontal Bone Lngth	23.50	126.60	0.07	0.05	23.17	1.56	-0.06	-0.07
19.	Nasalia Prominence	20.21*	72.83	0.64	0.74	15.64	1.83	-0.41	-0.31
20.	Midfacial Size	17.42	82.71	1.36	1.40	16.64	1.71	0.20	-0.80
21.	Mastoid Size	15.41	68.55	0.92	1.14	13.28	1.65	0.23	-0.30

Degrees of freedom for MODEL, ERROR, TOTAL, TRADITION and PHASE(TRADTN) are 11, 85, 96, 1 and 10.

*P < 0.05; **P < 0.01; ***P < 0.005; ****P < 0.0001.

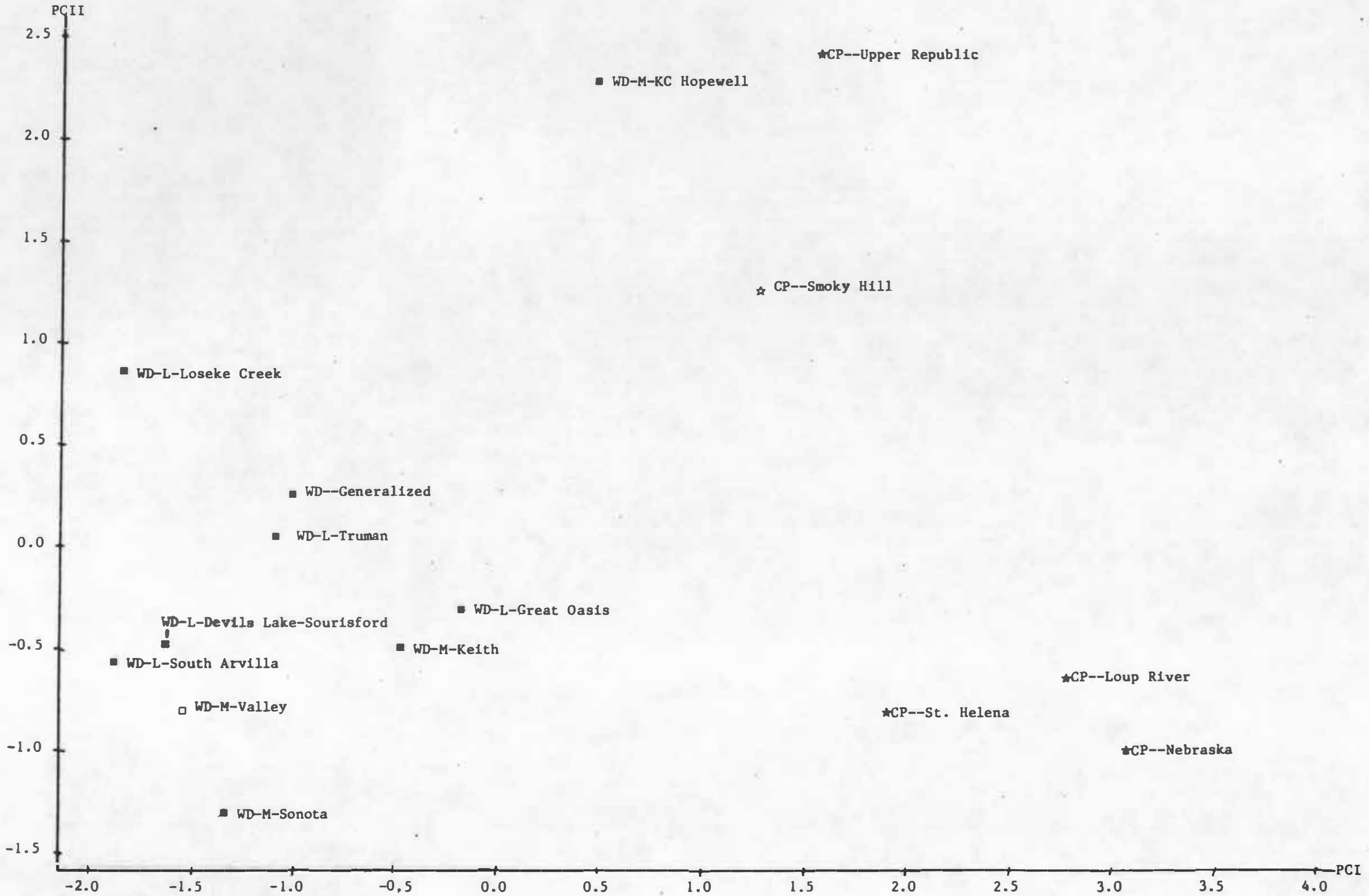

Figure 18. Woodland/Central Plains: Plot of First Two Principal Coordinates.

sagittal and transverse planes. This appears to be what this axis is primarily measuring. Most of the length of a Woodland skull occurs via the occipital, both through its sharp angulation and through its posterior position relative to the auricular region. This would explain the contribution of the Foramen Magnum Size component since its largest loadings are for opisthion radius (OSR) and basion-opisthion length (FOL).

The distinctions drawn by PCI are probably accentuated somewhat by the presence of occipital deformation in the Nebraska Phase sample, but deformation is absolutely not the cause of the distinction. It is a deep-seated biological distinction that is obvious upon an examination of the specimens.

PCII defines relationships within the Central Plains Tradition which will be addressed in a subsequent analysis.

Taken as a whole, the results of this analysis suggest that the Central Plains Tradition is not rooted in any of the Plains Woodland groups represented here. The position of Kansas City Hopewell near some of the Central Plains groups on the second axis appears to be an artifact of their high-headedness. PCIII, not reported here, which accounts for 12% of the variation, clearly differentiates the Kansas City Hopewell Phase from the Central Plains groups. (The score for Kansas City Hopewell on PCIII is -2.05. The closest Central Plains group is the St. Helena Phase with a score of -0.58.)

In this light, Hughes (1968) contention that the Central Plains Tradition can be traced back to the Woodland must be called into question and the results of two previous studies must be addressed.

Jantz (1977) and Jantz et al. (1978) noted that a sample of supposedly Valley Phase Woodland specimens from the Enders site (25DX4) resembled a set of Central Plains reference samples fairly closely. On this basis, they cautiously suggested a biological continuity from the Woodland into the Central Plains Tradition. When I measured these specimens, however, I noted that they were distinctly strange-looking for a Woodland sample and that they were markedly deformed. At my request, John Ludwickson of the Nebraska State Historical Society examined the field notes for the site. His results are reported here (from a letter dated 1 February 1982):

> Enders Site. This site is a hard one to call. A small Middle Woodland vessel ("Valley Cord Roughened") was found in the site, ipso facto a "Woodland site." However, a limestone bead attributable to the Central Plains Tradition was also found. No other diagnostic materials were found. Burial pattern could be either Woodland or Central Plains Tradition; neither are well-enough studied to say. The possibility exists that the site is multi component.

It would appear that these specimens fell close to the Central Plains Tradition in the Jantz studies because they quite possibly are Central Plains Tradition skulls and not Woodland. These skulls were excluded from the present analysis because of questionable affiliation. The single Valley Phase skull included here (from the Schultz site, 25VY3) falls well away from the Central Plains Tradition, although its exact cultural affiliation is also not assured. It was found in a badly scattered grave near the Schultz site (Hill and Kivett 1940: 182).

The other study pertinent to the present set of results is Phenice's (1969a) analysis of the Schultz focus material from Kansas. I have noted earlier how distinctly this material resembles Kansas City Hopewell and

Phenice (1969a: 68-69) notes this as well. After a meticulous analysis of this very fragmentary material has concluded that the Central Plains Tradition "appears to be the possible result of an intermixture between the Kansas City-Schultz physical type and Sonota complex physical type" (1969a: 76).

His conclusions are based primarily on two measures of cranial height: the basion mean height index and the porion mean height index. There is no denying that the Schultz-Kansas City Hopewell sample is high-headed, as are the Central Plains groups. Their overall constellation of features, however, makes them quite distinct from the Central Plains groups. These distinctions are drawn out on smaller principal coordinates that are not reported here.

Taken as a whole, the results suggest that the Central Plains Tradition is probably an intrusive element onto the Plains, derived from Woodland (or Mississippian) populations further to the south. However, in the absence of any of these southern groups in this analysis, I would suggest that of any Woodland group, the Central Plains Tradition most closely resembles the Kansas City Hopewell material. It may possibly be derived from Kansas City Hopewell but this is doubtful.

Mandan-Siouans

Most of the Mandan group relationships have been discussed in a previous analysis and only a few issues require additional comment. The one-way MANOVA for the Phase effect is given in Table 6, page 96, and the univariate ANOVAs in Table 11. Figure 19 presents the group relationships

Table 11. Mandan-Siouans: One-Way ANOVAs for PHASE Effect and Principal Component/Coordinate Correlations.

PRINCIPAL COMPONENT	MODEL SS	ERROR SS	F	PCI	PCII
1. Facial Forwardness	3.40	48.38	0.44	-0.07	-0.56
2. Vault Breadth	11.50	49.19	1.47	0.67	-0.10
3. Vault Height	9.98	47.70	1.32	0.47	0.74
4. Orbit Horizontl Prfl	10.81	31.15	2.18*	-0.23	-0.58
5. Prognathism	9.92	36.29	1.72	-0.17	-0.33
6. Cranial Base Flatns	15.55	48.50	2.02	0.75	0.41
7. Occipital Curvature	12.82	27.95	2.88**	-0.24	-0.77
8. Parietal Size & Prfl	7.86	37.79	1.31	-0.07	-0.85
9. Facial Height	7.13	41.28	1.09	-0.21	0.00
10. Frontal Prfl Flatns	3.11	58.88	0.33	-0.14	-0.26
11. Bistephanic Flatns	13.81	40.83	2.13	-0.27	0.08
12. Upper Facial Breadth	7.08	28.41	1.57	0.24	0.06
13. Foramen Magnum Size	24.23	50.46	3.02**	-0.84	-0.17
14. Interorb Prominence	21.56	50.86	2.67*	-0.65	-0.15
15. Interorb Breadth	12.15	46.90	1.63	0.20	-0.49
16. Malar Size	16.88	42.66	2.49*	-0.87	0.26
17. Subnasal Flatns	17.55	62.28	1.77	-0.15	0.37
18. Frontal Bone Lngth	13.56	45.48	1.87	-0.45	0.47
19. Nasalia Prominence	8.98	40.20	1.15	0.27	-0.71
20. Midfacial Size	28.96	51.93	3.50***	-0.84	-0.13
21. Mastoid Size	20.74	52.76	2.47*	0.63	-0.62

Degrees of freedom for MODEL, ERROR and TOTAL are 7, 44 and 51.

*P < 0.05; **P < 0.01; ***P < 0.005; ****P < 0.0001.

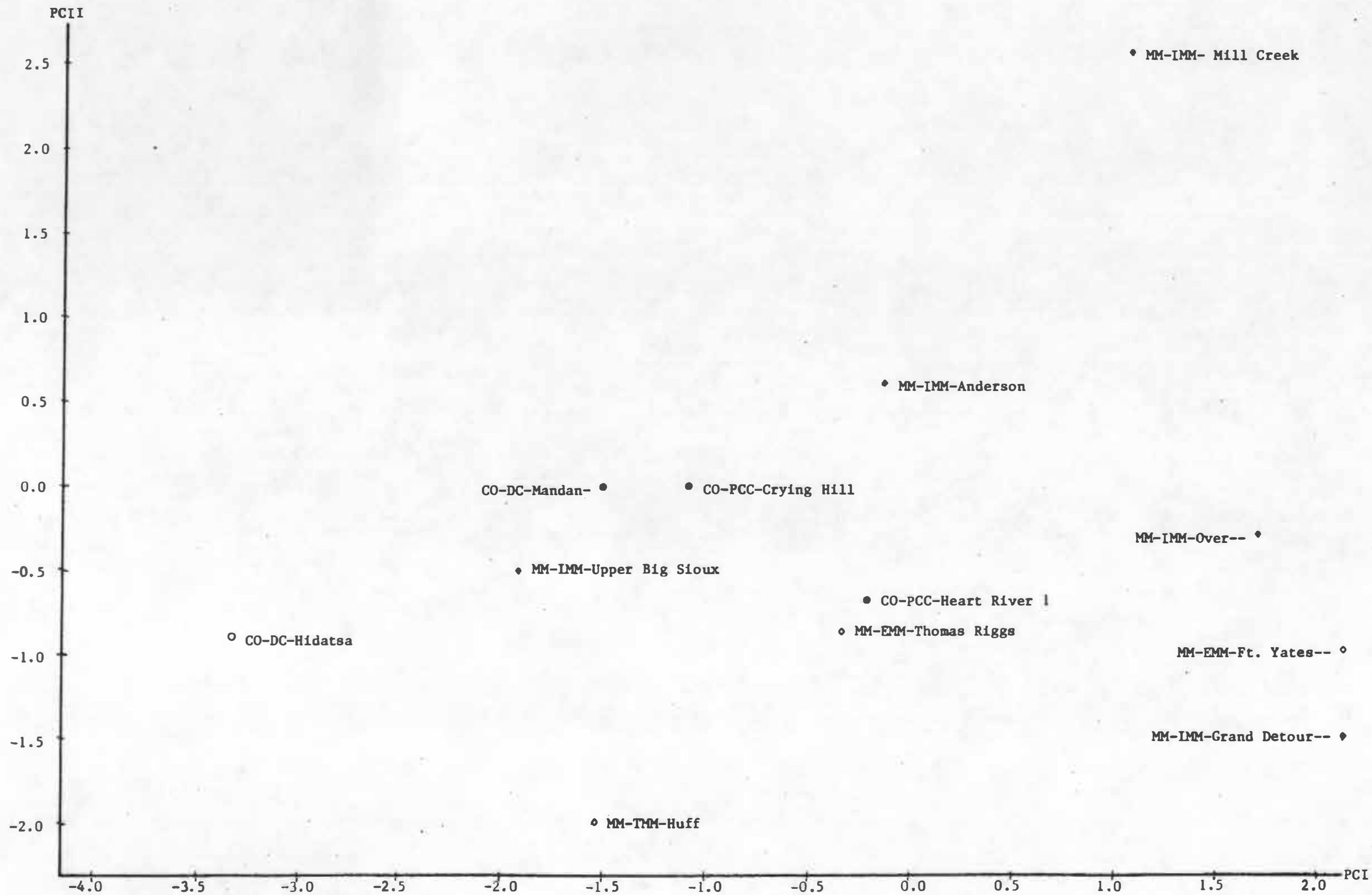

Figure 19. Mandan-Siouans: Plot of First Two Principal Coordinates.

on the first two principal coordinates. They account for 32.52% and 20.19% of the variation, respectively.

The overall pattern of relationships is the same as that presented in Figure 17, page 108, with the Woodland groups in the picture. The IMM groups tend to be displaced away from the later Mandan samples. This is particularly true of the Mill Creek Phase on PCII. The IMM group that falls closest to the later Mandan samples is the Anderson Phase. This is an IMM group that was concentrated along the Missouri in the Bad-Cheyenne region. The Bad-Cheyenne region was the primary contact zone between the IMM and EMM variants (see Lehmer 1971: 95-105). If the IMM and EMM variants do in fact represent separate biological populations, the position of the Anderson Phase might be construed to represent some degree of admixture between them. This, of course, is pure conjecture.

The other point worth making is the position of the single Hidatsa skull interpolated into the space. The origin of the Hidatsa has always been an enigma. They appear to be related to the Crow and are somewhat distinct linguistically from the Mandan (see Bowers 1948). They are generally thought to be encompassed within the Middle Missouri Tradition however they have never been identified archaeologically (see Ludwickson et al. 1981: 38). If a single skull can be taken as any indication, the Hidatsa appear to be somewhat distinct from the Mandan, but not radically so.

Dhegiha-Siouans/Oneota

The analysis of Dhegiha-Siouan and Oneota relationships is marred by the small number of groups entered into the space. The analysis is based on the four Dhegiha-Siouan groups with the Oneota samples interpolated into the space because of their small sample sizes. It was not possible to calculate a MANOVA. The principal component/coordinate correlations are given in Table 12.

The first two coordinates account for over 80% of the variation (Figure 20). It is difficult to determine which components are contributing to the discrimination. According to Table 12, five components have correlations of over 0.9 with the first coordinate. It is difficult to see how five supposedly orthogonal components could all align themselves so closely with a single axis. I suspect that the correlations are not being accurately estimated because of the small number of groups in the space.

The most obvious feature of Figure 20 is the distinction between the Redbird sample and the Kansa. Redbird also fails to align itself as closely with the Omaha and Ponca as might be expected (see Jantz 1974). This is the result of one of the skulls included in the Redbird sample of three. In an analysis of individual sites, not reported here, two of the Redbird sites fell very close to a cluster of Omaha and Ponca sites; however the specimen from the Redbird site itself fell well away from all the Dhegiha-Siouans. The affiliation of this specimen with the Redbird Phase would appear unquestionable. The burial is from Feature 631, a bell-shaped pit in the floor of House 2 at the Redbird

Table 12. Dhegiha-Siouans/Oneota: Correlations of Principal Component and Principal Coordinate Axes.

PRINCIPAL COMPONENT	PCI	PCII
1. Facial Forwardness	0.66	0.69
2. Vault Breadth	-0.70	0.72
3. Vault Height	-0.65	0.71
4. Orbit Horizontl Prfl	0.82	0.57
5. Prognathism	-0.44	-0.36
6. Cranial Base Flatns	0.92	0.39
7. Occipital Curvature	0.94	0.31
8. Parietal Size & Prfl	-0.19	0.97
9. Facial Height	0.47	-0.59
10. Frontal Prfl Flatns	-0.01	-0.98
11. Bistephanic Flatns	-0.64	-0.58
12. Upper Facial Breadth	0.97	0.09
13. Foramen Magnum Size	-0.02	0.15
14. Interorb Prominence	-0.07	0.61
15. Interorb Breadth	0.43	-0.47
16. Malar Size	0.76	0.58
17. Subnasal Flatns	-0.82	-0.56
18. Frontal Bone Lngth	0.65	-0.45
19. Nasalia Prominence	0.97	0.16
20. Midfacial Size	-0.57	0.23
21. Mastoid Size	-0.98	0.04
Latent Root	6.85	3.82
Percentage of Trace	52.63%	29.42%

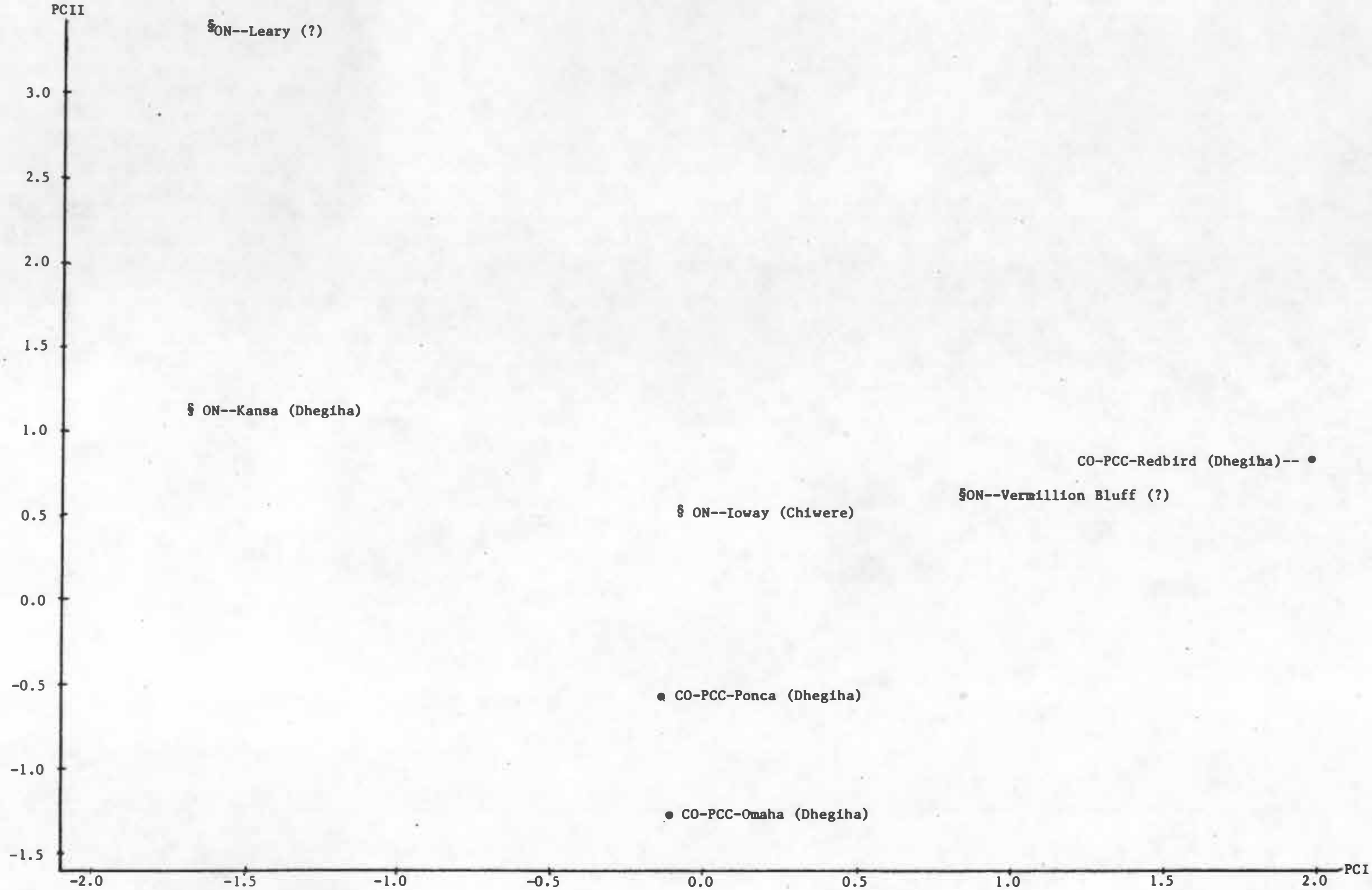

Figure 20. Dhegiha-Siouans/Oneota: Plot of First Two Principal Coordinates.

site (25HT3) (Wood 1965). Therefore I have no choice but to assume the specimen is within the range of variation of the Redbird Phase. Its presence in the very small Redbird sample distorts the position of this group in the full sample analysis presented shortly. Incidentally, this specimen was not included in Jantz's (1974) analysis of the Redbird material and I was unable to locate one of the specimens he utilized in that study.

In view of the problems with the present analysis, it would be more fruitful to examine Dhegiha-Siouan and Oneota relationships within the context of the full sample analysis. One point deserves further comment however. The position of the specimen from the Leary Site (25RH1) in the full sample analysis and its extreme position here suggest it is not an Oneota specimen. The Nebraska State Historical Society site files note the presence of some Nebraska Phase burials among the Oneota burials at the Leary Site. The specimen falls within the Central Plains cluster in the full sample analysis, suggesting it is probably one of the Nebraska Phase burials.

Caddoans/Steed-Kisker

Although there are generally large samples available for the Caddoan-speakers, the radical imbalance of sample sizes between the various phases precludes the calculation of a MANOVA. However, the plot of the first two principal coordinates given in Figure 21 present a clear picture of relationships. The correlations between the principal coordinates and the components are given in Table 13.

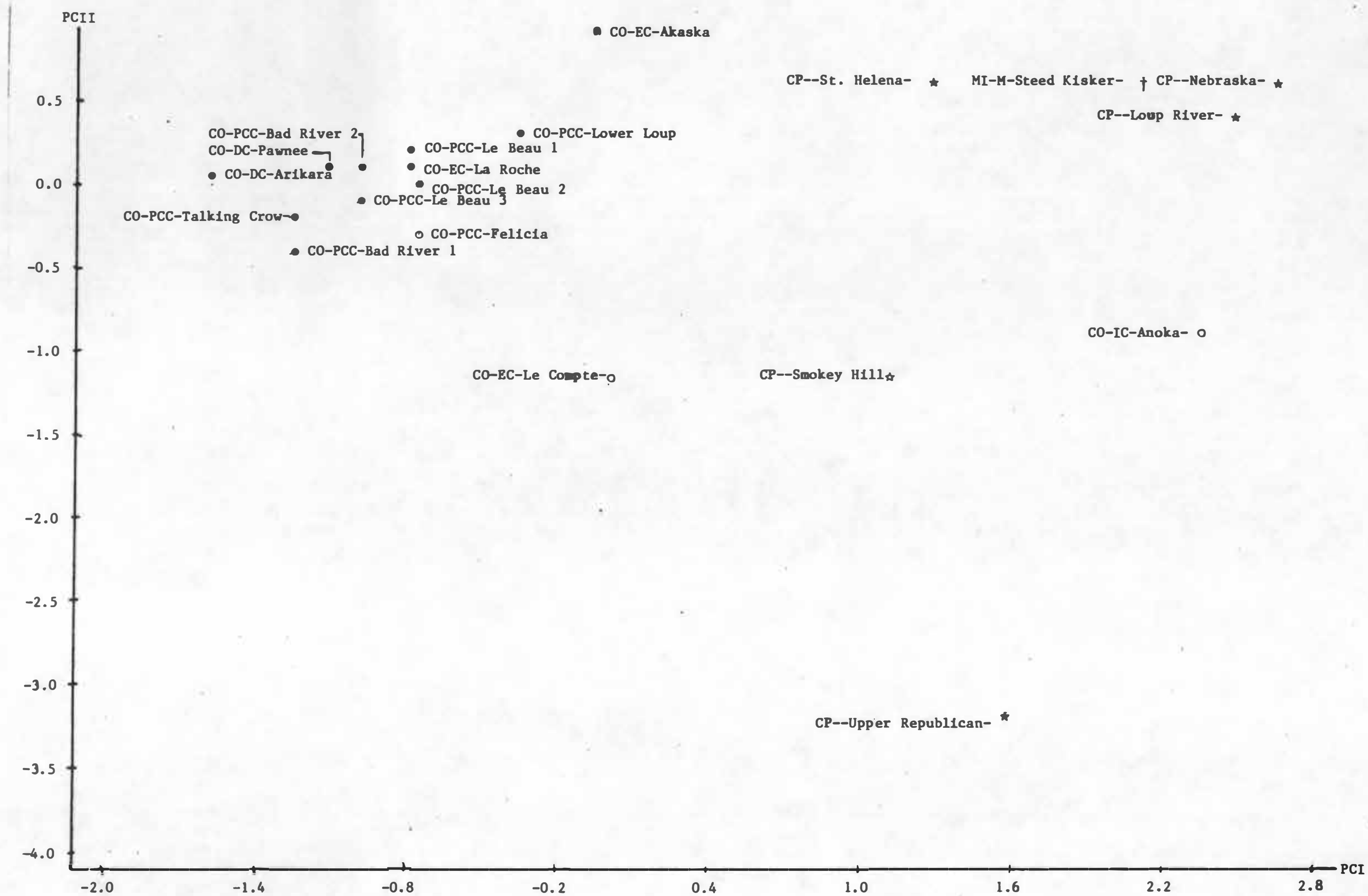

Figure 21. Caddoans/Steed-Kisker: Plot of First Two Principal Coordinates.

Table 13. Caddoans/Steed-Kisker: Correlations of Principal Component and Principal Coordinate Axes.

PRINCIPAL COMPONENT	PCI	PCII
1. Facial Forwardness	0.16	-0.34
2. Vault Breadth	0.36	0.57
3. Vault Height	0.87	-0.10
4. Orbit Horizontl Prfl	-0.29	-0.42
5. Prognathism	0.66	0.60
6. Cranial Base Flatns	0.00	-0.18
7. Occipital Curvature	-0.92	-0.15
8. Parietal Size & Prfl	-0.02	-0.88
9. Facial Height	-0.81	0.42
10. Frontal Prfl Flatns	-0.42	0.10
11. Bistephanic Flatns	0.70	0.24
12. Upper Facial Breadth	0.50	-0.69
13. Foramen Magnum Size	-0.58	-0.31
14. Interorb Prominence	-0.29	-0.73
15. Interorb Breadth	0.72	0.20
16. Malar Size	-0.69	0.43
17. Subnasal Flatns	0.26	0.38
18. Frontal Bone Lngth	0.52	-0.07
19. Nasalia Prominence	-0.46	0.12
20. Midfacial Size	0.19	0.42
21. Mastoid Size	0.32	0.29
Latent Root	32.59	12.44
Percentage of Trace	42.23%	16.12%

PCI accounts for 42.23% of the variation with a latent root of 32.59. PCII accounts for 16.12% of the variation with a root of 12.44. PCI is clearly a temporal axis with a pattern of relationships stretching from the Central Plains Tradition through the Coalescent Tradition to the historic Arikara and Pawnee of the Disorganized Coalescent variant. From Table 13 it is evident that the temporal progression is accomplished through an increase in Occipital Curvature, an increase in Facial Height and a decrease in Vault Height.

PCII serves to differentiate the Upper Republican samples (as well as the Smoky Hill specimen when it is interpolated into the space) from the rest of the Central Plains phases. This is accomplished primarily through an increase along the Parietal Size and Profile component and suggests that the southern groups are longer-headed than the northern groups. Since the Upper Republican Phase is represented by only three specimens, it is difficult to say if this is a real phenomenon.

The implications of the temporal trend among the Caddoans will be discussed in the context of the canonical correlation analysis; however it is worth noting the position of some of the groups in the space defined here.

The Steed-Kisker sample fits comfortably into a Central Plains Tradition cluster. This is contrary to O'Brien's (1978: 77) assertion that the two should be distinctly different. The Steed-Kisker sample employed here contains individuals from both the Sugar Creek Ossuary (23PL58) and the Steed-Kisker site itself (23PL13). In deference to O'Brien's (1978: 76) claim that the mixing of Nebraska Phase and

Steed-Kisker ceramics at Sugar Creek represents two components and not an evolutionary relationship, at some point it might be worthwhile to separate the two sites and see if the same results obtain. I feel that they would since the two subsamples look very similar visually.

In a broader context, the apparent gap between the Central Plains and Coalescent Traditions is more an artifact of missing samples than a clear-cut biological distinction. Conspicuously absent from this analysis are Initial Coalescent samples and southern Extended Coalescent materials such as the Shannon Phase.

A large and well-dated sample of IC materials was available from the Crow Creek site in southern South Dakota, but unfortunately these materials were reburied before I could measure them. The loss of these specimens is a severe blow to this analysis and to an understanding of developments along the Missouri trench in general. It is a crucial data point in that it is temporally and spatially intermediate between the Central Plains and Coalescent Traditions. The only information we have on this sample stems from the careful work of Dr. P. Willey (1982) prior to its reburial.

In an analysis of the Crow Creek material in a context of several Arikara sites and two St. Helena sites, Willey (1982) found that the St. Helena samples occupied a position intermediate between the Crow Creek sample and the later Arikara. A similar situation occurs here with the single IC skull from the Lynch site. If this is a true situation, it suggests that the St. Helena samples employed here are derived in the direction of the Arikara and could not be ancestral to the IC Crow Creek

group. It would be more logical to say that the IC Crow Creek group is ancestral to the St. Helena samples. This is probably not the case, however, I suspect that the St. Helena specimens used here and in the Willey analysis are probably very late in the St. Helena sequence. Since St. Helena and the Initial Coalescent overlap temporally, Willey's results (and those hinted at here by a single specimen) are probably the result of interaction between the two groups.

In the absence of IC and southern EC samples, it is difficult to say anything concrete regarding the origin of the Pawnee. The position of the (proto-Pawnee) Lower Loup Phase could be viewed either as a development in line with the South Dakota Coalescent or as a group intermediate between the Loup River Phase and the Pawnee. The Lower Loup Phase is displaced slightly away from the South Dakota Coalescent groups on PCII in tandem with the northern Central Plains groups, favoring the second idea somewhat. However, one of the South Dakota Coalescent groups is displaced even further on this axis.

Overall, the Caddoans present a very coherent set of relationships. These relationships will be viewed from a temporal and spatial perspective in the canonical correlation analysis.

Full Sample

The results of the full sample analysis serve primarily to reinforce conclusions offered earlier. The pattern of intergroup relationships does not alter dramatically within this expanded framework, suggesting that the Plains area as a whole can be characterized by certain broad-scale relationships.

The picture of Plains Indian relationships presented in Figure 22 accounts for about 40% of the between-groups variation. There are undoubtedly more subtle patterns present than those presented here. These patterns would presumably be revealed in plots of later principal coordinates. However the purpose here is to present a broad picture of relationships.

PCI (accounting for 24.01% of the variation with a root of 61.85) is defined primarily through the Vault Height and Occipital Curvature components (Table 14). Groups with negative scores on this axis have lower vaults and more curved occipitals.

PCII is defined primarily through Vault Breadth and Cranial Base Flatness. It accounts for 15.83% of the variance with a latent root of 40.79. Groups with negative scores on this axis have wider vaults and flatter cranial bases.

I have identified what I perceive as clusters on Figure 22. I must state, however, that while the position the points occupy is objective, the boundaries I have drawn are not. Alternative perceptions of group relationships are welcome.

The Paleo-Indian and Archaic samples seem to fit comfortably within a Plains Indian context. They occupy a position slightly above the center of the space and are not markedly displaced from the Woodland. In view of this, it would be easier to derive the Plains Woodland from the Archaic and ultimately from the Paleo-Indian rather than to suggest a migration of groups from the east. The single eastern Woodland group, Kansas City Hopewell, occupies a very remote position in the space.

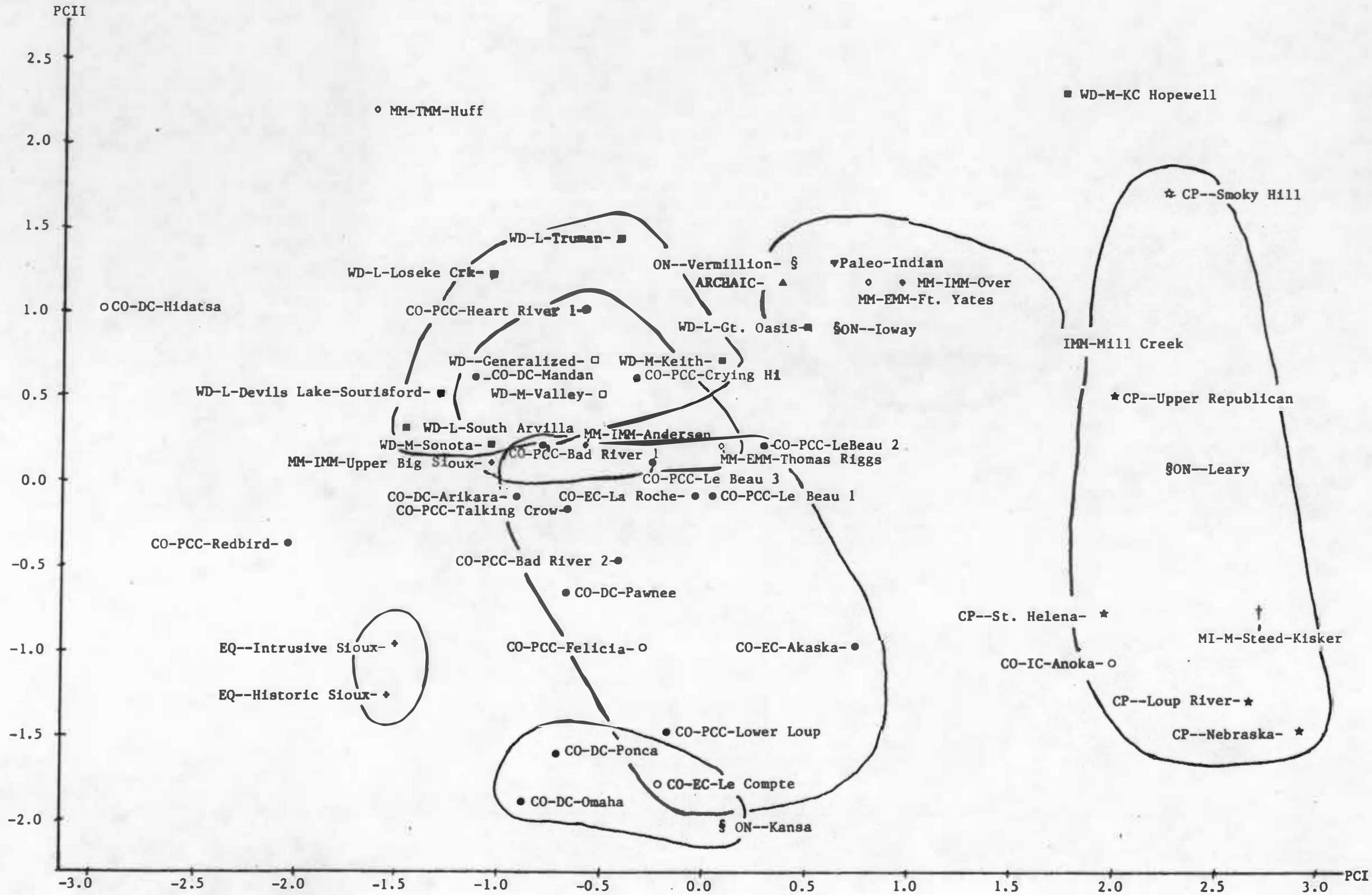

Figure 22. Full Sample: Plot of First Two Principal Coordinates.

Table 14. Full Sample: Correlations of Principal Component and Principal Coordinate Axes.

PRINCIPAL COMPONENT	PCI	PCII
1. Facial Forwardness	0.05	0.66
2. Vault Breadth	0.09	-0.73
3. Vault Height	0.73	0.26
4. Orbit Horizontl Prfl	-0.53	-0.31
5. Prognathism	0.30	-0.25
6. Cranial Base Flatns	0.35	0.78
7. Occipital Curvature	-0.74	0.54
8. Parietal Size & Prfl	0.09	0.34
9. Facial Height	-0.60	-0.17
10. Frontal Prfl Flatns	-0.15	0.13
11. Bistephanic Flatns	0.41	0.09
12. Upper Facial Breadth	0.35	-0.08
13. Foramen Magnum Size	-0.60	0.19
14. Interorb Prominence	-0.38	-0.14
15. Interorb Breadth	0.60	0.06
16. Malar Size	-0.53	-0.10
17. Subnasal Flatns	0.28	-0.09
18. Frontal Bone Lngth	0.19	0.19
19. Nasalia Prominence	-0.40	-0.14
20. Midfacial Size	-0.25	-0.45
21. Mastoid Size	0.46	0.06
Latent Root	61.85	40.79
Percentage of Trace	24.01%	15.83%

The Woodland groups as a whole define a fairly cohesive cluster. The northern Woodland groups (Sonota, South Arvilla and Devils Lake-Sourisford) define a tight cluster and are somewhat distinct from the Central Plains groups (Keith, Valley and Loseke Creek). There is no obvious Middle-Late Woodland dicotomy. The Generalized Woodland sample occupies a position near the center of the Woodland distribution, as expected. The Truman sample is on the periphery of the Woodland distribution, yet it is not clearly aligned with any non-Woodland group. Great Oasis could be perceived as lying on the extreme edge of the Woodland distribution or as belonging to the IMM cluster. In many respects this intermediate position reflects the position of Great Oasis archaeologically.

I have separated the Middle Missouri-Mandan sequence into two clusters, although these clusters could conceivably be joined into a single large distribution. The Coalescent Mandan materials overlap the Woodland distribution considerably. Also included into this cluster is an EMM sample interpolated into the space as well as two IMM Phases: the Anderson and the Upper Big Sioux. It is possible the later group is a Woodland sample. This is one of the reasons it was separated into a separate phase. The remaining IMM phases are fairly distinct from the later Mandan. I have grouped them into a cluster which also contains Great Oasis, a Chiwere-Siouan Ioway sample from Blood Run and another Oneota sample from Vermillion Bluff Village. The Paleo-Indian and Archaic samples also fall within this cluster but I doubt if this is significant. The single EMM Ft. Yates Phase specimen interpolated into

the space also falls within this cluster. Ideally, it should fall with the later Mandan. Were it not for the near-total overlap of the later Mandan and Woodland clusters, the Middle Missouri-Mandan sequence could be viewed as a temporal progression stretching from the IMM into the historic Mandan. In this framework only the IMM Big Sioux and Anderson Phases would be misplaced. However this would imply that the Mandan morphology converged onto a morphological pattern that already existed with the Woodland groups in the area prior to the Middle Missouri Tradition. It is possible that a group intruding onto the Plains might experience strong environmental determinants to shape their cranial morphology into a pattern "correct" for the Plains. However, it would seem more logical to derive the Mandan from the generalized Woodland base that already existed in the region and to suggest that the IMM-Great Oasis-Chiwere Oneota cluster is a distinct group. I have no idea if this is supported archaeologically. The only points I can call in to support this contention are: (1) when the EMM first appears archaeologically it is already firmly established along the Missouri in North Dakota and is pushing downriver towards the IMM occupations in the Bad-Cheyenne region of South Dakota; (2) the IMM and EMM coexist for several hundred years and could logically be viewed as separate groups; (3) while there is a clear progression from EMM to TMM to the later Mandan in North Dakota (see Lehmer 1966) the IMM appears to terminate as a cultural entity approximately 1400 A.D. (Lehmer 1971: 97-105).

Although they were interpolated into the space, the western Oneota groups occupy a position fundamentally distinct from the Dhegiha-Siouans

(the Omaha, Ponca and Kansa). The close proximity of the Oneota sample from Vermillion Bluff Village to the Chiwere-Siouan Ioway sample from Blood Run suggests a similar language affiliation for this group. Although the Dhegiha-Siouan and Chiwere-Siouan groups could both be encompassed within the "ceramic culture" of the Oneota Tradition, there is little doubt that they are distinct biologically. The position of the specimen from the Leary site suggests that it is probably a Nebraska Phase burial and not Oneota (this was discussed earlier).

The Redbird sample occupies a position far removed from its supposed affiliation with the Ponca (Jantz 1974; Wood 1965). This is primarly due to the influence of a single specimen from the Redbird site itself. Its archaeological affiliation would appear secure and I have checked its data vector for errors, so it must be assumed to be within the range of variation of the Redbird Phase. Redbird as a whole does not clearly affiliate itself with any other group in the space.

The two Equestrian Sioux groups, not entered into any of the previous analyses, cluster nicely. The two samples represent historic Sioux burials and Sioux burials intrusive into Woodland mounds, respectively. They are distinct from any of the other clusters, yet fall closest to the Dhegiha-Siouans. This is a logical situation, linguistically.

The single Hidatsa specimen interpolated into the space occupies a very remote position. This is also true of a single Terminal Middle Missouri skull from the Huff site (32MO11). It is possible the Huff specimen is an Hidatsa, although this is sheer speculation. In the analysis of the Mandan-Siouans, the Hidatsa specimen was not as displaced

as it is here. In any case, it would be unwise to place too much emphasis on the relationships shown by a single specimen.

The Central Plains Tradition occupies a position fundamentally distinct from any of the Plains Woodland groups, suggesting it is an intrusive element onto the Plains and not an in situ development. The south to north distribution of Central Plains groups along the second axis could be viewed as a gradual dispersion of Central Plains groups northward from an ancestral base somewhere far to the south, perhaps in the Caddo area of eastern Oklahoma. A gradual northward dispersion of Central Plains groups (from whatever source) has been suggested both archaeologically (Wood 1969) and on the basis of radiocarbon dates (Roper 1976). In the absence of any of the Southern Plains Woodland groups, however, the Central Plains Tradition most closely resembles the Kansas City Hopewell complex. The northern Central Plains groups are also very similar to the Middle Mississippian Steed-Kisker complex.

The close proximity of the IMM Mill Creek Phase to the Upper Republican could be suggestive of a biological relationship between Mill Creek and the Central Plains Tradition (as hinted by Owsley et al. 1981). However, in view of the wide geographical distinction between Mill Creek and Upper Republican, I would see it as fortuitous.

In the absence of any representative Initial Coalescent samples, it is difficult to say anything substantial regarding the origin of the Coalescent Tradition or the derivation of the Pawnee. There is little doubt, however, that the Coalescent Arikara morphology converges on that of the Mandan with time. This is particularly true of the northern

Post-Contact Coalescent phases. This convergence is most likely the result of gene flow (as suggested by Jantz 1972, 1973) and is probably accentuated by the presence of actual Mandan individuals in the later Arikara samples (Blakeslee, n.d.).

Canonical Correlations

Caddoans

The canonical correlations between the spatial and temporal parameters and the principal component scores are given in Table 15 for the Caddoans. The relationships of the Phases along the first canonical variable are presented in Figure 23.

All three canonical variables are highly significant. I had hoped that the canonical analysis would extract separate axes for date, latitude and longitude, allowing group relationships to be examined along each of these parameters independent of the others. For instance, it would be fruitful to examine temporal relationships among groups independent of geography and geographical relationships among groups independent of time. However, it appears that time and geography are highly correlated among the Caddoan speakers (at least with the samples used here). This is probably a result of their slow movement northward and along the westward sloping Missouri through time.

In view of this intimate relationship between time and geography I will only deal with group relationships along the first canonical variable. Date has the strongest correlation with the axis, although both latitude and longitude contribute substantially.

Table 15. Caddoans: Canonical Correlation Analysis.

PRINCIPAL COMPONENT	1	2	3
1. Facial Forwardness	-0.01	0.57	-0.10
2. Vault Breadth	-0.06	-0.25	-0.09
3. Vault Height	-0.46	0.07	0.23
4. Orbit Horizontl Prfl	0.06	-0.20	0.11
5. Prognathism	-0.09	-0.05	0.42
6. Cranial Base Flatns	0.12	0.41	0.42
7. Occipital Curvature	0.67	-0.01	-0.10
8. Parietal Size & Prfl	0.05	0.47	-0.16
9. Facial Height	0.49	-0.24	0.33
10. Frontal Prfl Flatns	0.24	0.05	0.56
11. Bistephanic Flatns	-0.24	-0.03	0.06
12. Upper Facial Breadth	-0.11	-0.04	-0.13
13. Foramen Magnum Size	0.11	-0.06	-0.26
14. Interorb Prominence	0.31	0.12	-0.13
15. Interorb Breadth	-0.26	-0.20	0.05
16. Malar Size	0.15	0.07	-0.18
17. Subnasal Flatns	-0.05	-0.10	-0.03
18. Frontal Bone Lngth	-0.10	0.07	0.11
19. Nasalia Prominence	0.17	0.25	0.04
20. Midfacial Size	-0.04	-0.11	0.04
21. Mastoid Size	-0.15	0.26	0.09
Date	0.95	-0.26	-0.16
Latitude	0.67	0.53	0.51
Longitude	0.71	0.69	-0.10
Canonical Correlation	0.60	0.28	0.26
F	6.28	2.40	2.28
Probability	0.0001	0.0001	0.0016
Degrees of Freedom	63, 1780	40, 1194	19, 598

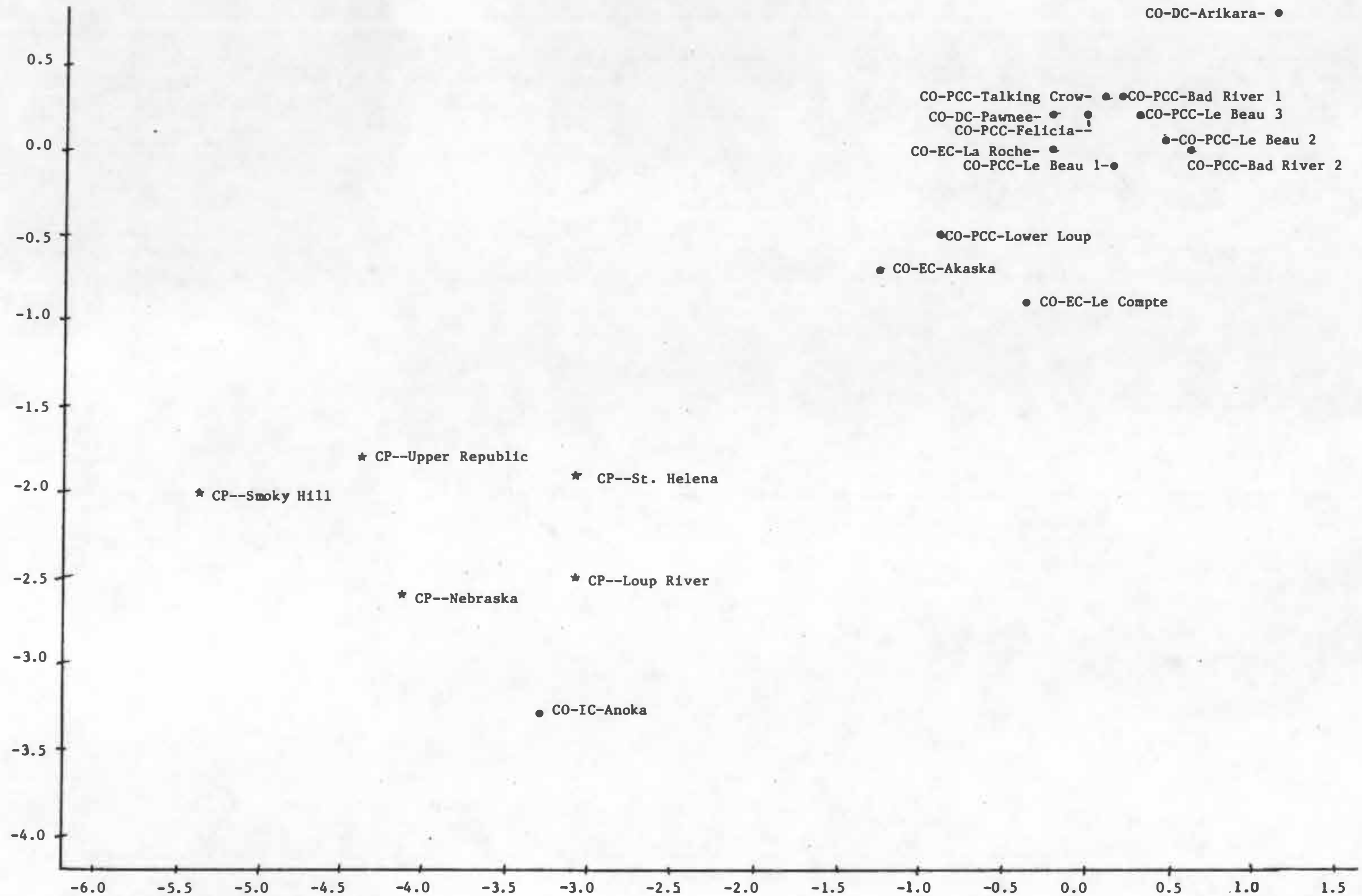

Figure 23. Caddoans: Plot of First Canonical Variable.

From the r-square it is evident that 36% of the temporo-spatial variation can be accounted for by the craniometrics. This is an astoundingly systematic change in cranial morphology. From Table 15, it appears that most of the temporo-spatial change occurs along the Occipital Curvature, Facial Height and Vault Height components. The later and more northwestward groups have more angled occipitals, lower vaults and higher faces. This is precisely the picture presented by the first principal coordinate in the Caddoan analysis. The temporo-spatial trends appear to be very strong, very systematic and to define themselves despite fluctuating sample sizes.

The group relationships along the first canonical variable are plotted in Figure 23. Groups can be viewed as being "locked on" to the horizontal axis because their temporal and spatial parameters are fixed. They are free to vary along the vertical axis in response to their particular cranial morphology. If a group conforms to the general pattern of the temporo-spatial variation established by the Caddoans as a whole, it should lie along a line stretching from the lower left to the upper right-hand corner of the plot. If the morphology of a group departs from the Caddoan temporo-spatial pattern, it will be displaced away from the line.

The Smoky Hill and Upper Republican Phases of the Central Plains Tradition fall away from the axis, as does the Loup River Phase to a lesser extent. The single IC Anoka Phase skull is radically displaced. This may or may not be significant. A statement concerning the IC cannot be made without the Crow Creek sample. Most of the later groups fall

very close to the line. The only noteable exception is a single EC Le Compte Phase skull.

The results suggest a very strong temporo-spatial change in craniometrics beginning with the Nebraska Phase (and possibly the Loup River Phase), stretching through the St. Helena Phase and presumably the Initial Coalescent into the later Coalescent Phases. In short, a remarkably systematic alteration of cranial architecture accompanied the movement of the Caddoans up the Missouri River.

As noted previously, the temporo-spatial trend is defined by an increased angulation of the occipital, a decrease in vault height and an increase in facial height. An additional effect, noted by Key and Jantz (1981) is an arching of the frontal in the sagittal plane. This is reflected here by a moderate correlation for Frontal Profile Flatness. It is possible to see these relationships as a deformation effect. Deforming a skull flattens the occipital and tends to increase the height of the vault. However, it is very difficult to see a practice as variable and uncontrolled as occipital deformation producing a temporal trend as strong and systematic as that displayed by the Caddoans. It would call for a slow progressive decrease in the amount of deformation over the approximately 800 years represented by the trend.

It would be more logical to view the temporo-spatial trend as a complex of craniometric changes generally associated with a lowering of the cranial vault. The increased curvature displayed by the occipital and frontal could be viewed as a general "bulging" of the skull as the vault gets lower.

In the absence of a more all-encompassing explanation, it would seem most likely that the temporo-spatial trend which characterizes the Caddoan lineage is a result of the complex patterns of intertribal contact and associated gene flow which occurred with the initiation of the Coalescent Tradition (Blakeslee 1978, n.d.). In particular, Jantz's (1972, 1973) suggestion of gene flow with the low-headed Mandan could be called into play. This idea will be taken up shortly.

Mandan-Siouans/Woodland

In contrast to the strong trend exhibited by the Caddoans, there appear to be no marked temporo-spatial trends between the Woodland and the Mandan-Siouans. The multivariate test of the first canonical variable (Table 16) tests if that root along with all subsequent roots is significant. It is, but at a much lower level than the Caddoans. The test of the second root indicates the remaining two roots are not significant. Therefore most of the variation is accounted for by the first root. However, it has very low correlations with the temporal and spatial parameters. All of this suggests that the Woodland and the Mandan are relatively undifferentiated. This supports my contention that the Mandan are derived from a generalized Woodland base.

As a final matter, several points need addressing regarding the contribution of the Mandan to the temporo-spatial trend exhibited by the Caddoans. The Mandan are a low-vaulted, high-faced group. It would be easy to see the progressive increase in facial height and lowering of the vault in the Caddoans as a result of gene flow with the Mandan. However, it is highly unlikely the gene flow was one-way. The Caddoans

Table 16. Woodland/Mandan-Siouans: Canonical Correlation Analysis.

PRINCIPAL COMPONENT	1	2	3
1. Facial Forwardness	-0.19	-0.12	0.08
2. Vault Breadth	-0.27	-0.33	-0.20
3. Vault Height	0.30	-0.08	0.22
4. Orbit Horizontl Prfl	-0.32	0.24	0.38
5. Prognathism	-0.11	0.24	0.04
6. Cranial Base Flatns	0.36	0.10	-0.12
7. Occipital Curvature	-0.48	0.05	-0.04
8. Parietal Size & Prfl	0.26	-0.07	-0.12
9. Facial Height	-0.97	0.45	0.21
10. Frontal Prfl Flatns	0.27	0.23	0.28
11. Bistephanic Flatns	0.06	0.45	-0.16
12. Upper Facial Breadth	-0.00	-0.20	0.03
13. Foramen Magnum Size	-0.20	-0.18	0.13
14. Interorb Prominence	-0.47	0.28	0.14
15. Interorb Breadth	0.19	0.10	-0.01
16. Malar Size	-0.23	-0.03	0.15
17. Subnasal Flatns	-0.18	0.07	-0.24
18. Frontal Bone Lngth	-0.08	-0.17	0.73
19. Nasalia Prominence	-0.12	0.12	-0.13
20. Midfacial Size	-0.35	0.03	0.04
21. Mastoid Size	0.15	-0.03	-0.42
Date	0.05	0.96	0.27
Latitude	0.19	0.27	-0.94
Longitude	0.31	0.19	-0.93
Canonical Correlation	0.63	0.52	0.32
F	1.71	1.18	0.63
Probability	0.0017	0.2332	0.8760
Degrees of Freedom	63, 290	40, 196	19, 99

must have had some biological effect on the Mandan. This effect is probably masked by the small and inadequate samples of Mandan available.

The second point concerns the patterns of intergroup relationships revealed on the first two principal coordinates in the full sample analysis (Figure 22, page 130). Rather than separating the IMM and later Mandan clusters into distinct groups as I have suggested, they might be combined into a temporal lineage. This lineage and the Caddoan lineage could be viewed as gradually converging with time, presumably as the result of two-way gene flow. That the final morphology brought on by this convergence happens to resemble the Woodland pattern in virtually every feature could be regarded as fortuitous. Thus the relationships of the late Mandan and Arikara could be viewed as the final homogeneous product of a long history of gene flow between two groups intrusive onto the Plains.

The problem I see with this scenario is that while the historic Arikara and Mandan tend to be low-headed and high-faced, both the IMM groups and the Central Plains ancestors of the Coalescent Arikara are high-headed and low-faced (see the principal component means in Table E-1, Appendix E). It is difficult to see gene flow between two high-headed and low-faced groups producing a low-headed and high-faced product.

I would prefer to see the Mandan as a distinct group, derived from the Woodland, who have biological influences on the Caddoan lineage (and perhaps on the IMM Anderson Phase as well). There is a slight problem with this in that the Mandan have higher faces that the Woodland

and would have had to evolve this feature by some mechanism. However, they are so similar to the Woodland in virtually every feature (see Table 9, page 107) that I do not see this as a serious problem.

VI. CONCLUSIONS

This study was instigated to present a broad picture of Plains Indian biological relationships on the basis of craniometric data. The results have been generally successful in spite of inadequate representation for some groups and the conspicuous absence of a representative Initial Coalescent sample.

The principal components structure obtained here on a regional sample is virtually identical to the factor structure obtained by Howells (1973) using a world-wide sample. This occurs despite different methodologies, and a radical imbalance in sample sizes in the present case, yet once again supports the notion that craniometric structure is "universal" in human populations.

Intergroup relationships were examined utilizing several methodologies, some traditional, some implemented here in the face of small sample sizes and unbalanced designs. The patterns of intergroup relationships do not change markedly between small working frameworks addressing specific culture-historical questions and a broad framework containing all the groups. This suggests that the Plains area as a whole can be characterized by certain broad-scale relationships.

The small Paleo-Indian and Archaic samples are somewhat distinct from each other, yet not radically so. There also appears to be an East-West cline which crosscuts the Paleo-Indian and Archaic Periods. If this cline is biologically real (and not some sort of statistical artifact), it occurs for reasons unknown.

Both the Paleo-Indian and Archaic samples clearly align themselves with the later Plains Woodland samples when an eastern Woodland sample, Kansas City Hopewell, is introduced into the space. Kansas City Hopewell is distinct from all the Plains Woodland groups. This suggests it is more logical to derive the Plains Woodland from the Plains Archaic and ultimately from the Plains Paleo-Indian groups, rather than to infer a migration of Woodland groups from the east.

There also appears to be strong biological continuity between the Woodland and the later Mandan. In fact, the two traditions cannot be differentiated statistically. However, the Initial Middle Missouri samples from the Ft. Randall and Big Bend regions appear to be distinct from the later Mandan. These groups align themselves with Great Oasis and later Chiwere-Siouan Oneota groups such as the proto-historic Ioway from Blood Run. Although the Initial Middle Missouri-Mandan relationships could be viewed as a temporal trend, it would require this lineage converging onto a morphological pattern that already existed with the Woodland groups in the region prior to the Initial Middle Missouri. It seems more logical to derive the Extended Middle Missouri-Mandan sequence out of the Woodland in the area and view most of the Initial Middle Missouri as an intrusion, perhaps from an Oneota-like base in the east.

In contrast to the Woodland-Mandan continuity, the Central Plains Tradition is fundamentally distinct from the Plains Woodland groups. This, in conjunction with a north-south cline within the Tradition, strongly suggests that the Central Plains Tradition is an intrusive element onto the Plains from an ancestral base somewhere to the south.

In the absence of any southern groups in the present analysis, the Central Plains Tradition falls closest to Kansas City Hopewell. It is possibly derived from Kansas City Hopewell, but this is doubtful. The Steed-Kisker complex appears to be simply another Central Plains group.

There is a strong temporal trend evident, beginning with the Nebraska and St. Helena Phases of the Central Plains Tradition and stretching throughout the Coalescent Arikara sequence. The trend is reflected in a set of morphological complexes generally associated with an increase in facial height and a lowering of the cranial vault. In the absence of a more all-encompassing hypothesis, Jantz's (1972, 1973) hypothesis of gene flow with the high-faced, low-headed Mandan would appear the most tenable explanation for the trend. However, since the gene flow was undoubtedly two-way, it must have had some effect on the Mandan which the present samples do not illuminate.

It is possible to view the Initial Middle Missouri-Mandan relationships mentioned earlier as a trend within the Mandan-Siouans brought on by gene flow with the Caddoans. However, this would require gene flow between the high-headed, low-faced Caddoans and the high-headed low-faced Initial Middle Missouri groups producing the low-headed, high-faced Mandan who happen to resemble the Woodland pattern in almost every feature.

In the absence of a representative Initial Coalescent sample, it is difficult to say anything concrete regarding the origin of the Pawnee. They appear to conform generally to the temporal trend shown by the Arikara, but it is impossible to say whether they are ultimately derived

from the early Coalescent Tradition or from the Loup River Phase in the Central Plains Tradition.

The Dhegiha-Siouan groups cluster together with the exception of the Redbird sample. This is primarily due to the influence of a single specimen from the Redbird site itself, which for reasons discussed earlier must be assumed to be within the range of variation exhibited by the Redbird Phase. The Dhegiha-Siouans are fundamentally distinct from the Chiwere-Siouan Oneota groups, although this does not necessarily preclude encompassing them with the "ceramic culture" of the Oneota Tradition.

The Equestrian sample (Dakota-Siouan) clusters tightly and occupies a position somewhat distinct from the other groups in the space. This is not surprising since they were relatively late arrivals on the Plains. They fall closest to the Dhegiha-Siouan cluster, a position which could be supported linguistically.

The single Hidatsa specimen occupies a fairly remote position, yet falls closest to the Mandan. It would be unwise to say anything more regarding Hidatsa origins on the basis of a single specimen.

As a final point: the conclusions advanced here represent my interpretations of biological relationships among groups within my perception of the archaeological framework. If any of these conclusions fly in the face of someone's archaeological convictions, I would hope they will be viewed as grounds for a closer examination of both the biological and archaeological data, and not as a direct confrontation.

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APPENDICES

APPENDIX A

SITE DATA

Table A-1. Coding Schemes and Abbreviations.

VARIABLE	SYMBOL	CODE	NAME
Tradition	▼	PI	Paleo-Indian
	▲	AR	Plains Archaic
	■	WD	Plains Woodland
	◆	MM	Middle Missouri
	★	CP	Central Plains
	●	CO	Coalescent
	§	MI	Mississippian
	†	ON	Oneota
	+	EQ	Equestrian
	•	--	Unknown
Variant		E	Early
		M	Middle
		L	Late
		IMM	Initial Middle Missouri
		EMM	Extended Middle Missouri
		TMM	Terminal Middle Missouri
		IC	Initial Coalescent
		EC	Extended Coalescent
		PCC	Post-Contact Coalescent
		DC	Disorganized Coalescent
Language		M	Mandan Siouan
		C	Caddoan
		D	Dhegiha Siouan
		W	Chiwere Siouan
		L	Lakota Siouan
		-	Unknown
State		13	Iowa
		14	Kansas
		23	Missouri
		25	Nebraska
		32	North Dakota
		39	South Dakota

Table A-2. Site Data.

	SITE	NAME	TRIBE	♂	♀	DATE RANGE		METHOD	DATE	GEO COORDIN		LANG	TRAD	VARNT	PHASE
1	13LO2	Blood Run	Oneota	2	0	1700	1750	ARCH	1725.0	43.46	96.58	W	ON		Ioway
2	13PM1	Broken Kettle	IMM	2	1	1029	1097	C14*	1063.0	42.64	96.50	M	MM	IMM	Mill Creek
3	13PM4	Kimball	IMM	1	0	1135	1219	C14*	1177.0	42.60	96.49	M	MM	IMM	Mill Creek
4	13WD--	S Ravine Brl		1	1					42.50	96.42				
5	14DP2	Doniphan	Kansa	2	2	1724	1724	HIST	1724.0	39.64	95.09	D	ON		Kansa
6	14LV330	Nestor	Kansa	1	1	1744	1764	ARCH	1754.0	39.40	94.96	D	ON		Kansa
7	14OS--	Ft. Osage		0	1					38.47	95.88				
8	14PH4	Woodruff Oss	Keith	0	1	365	903	C14*	634.0	39.99	99.50		WD	M	Keith
9	14SA1	Whiteford	Smoky Hill	1	0	900	1300	ARCH	1100.0	38.83	97.62	C	CP		Smoky Hill
10	14SC2	Young Burial	Archaic	0	2					38.67	100.90		AR		Archaic
11	14TO301	Trego Cnty Brl	Archaic	1	0					39.02	99.88		AR		Archaic
12	23PL--	Pearl Mound C	KC Hopewel	0	1	100	400	ARCH	250.0	39.24	95.80		WD	M	KC Hopewell
13	23PL120	Young Mound #1	KC Hopewel	2	1	100	400	ARCH	250.0	39.20	95.77		WD	M	KC Hopewell
14	23PL13	Steed-Kisker	Steed-Kisk	2	0					39.29	94.83		MI	M	Steed-Kisker
15	23PL58	Sugar Creek Oss	Steed-Kisk	4	3					39.53	95.02		MI	M	Steed-Kisker
16	25BD1	Lynch	IC	0	1	1128	1410	C14*	1269.0	42.84	98.49	C	CO	IC	Anoka
17	25BO7	Boone/Loretto		1	1					41.76	98.08				
18	25BU1	Linwood A	Pawnee	7	3	1777	1809	HIST	1793.0	41.40	96.93	C	CO	DC	Grand Pawnee
19	25CC157	Plattsmouth Oss	Paleo	1	1					41.02	95.88		PI		Paleo-Indian
20	25CD11	Fort		1	0					42.76	97.15				
21	25CD21	Burney	Loseke Crk	1	0	700	900	ARCH	800.0	42.58	97.35		WD	L	Loseke Creek
22	25CD4	Wiseman	St. Helena	2	0	1250	1450	ARCH	1350.0	42.76	97.10	C	CP		St. Helena
23	25CD7A	Jones/Wynot	St. Helena	1	0	1250	1450	ARCH	1350.0	42.77	97.16	C	CP		St. Helena
24	25CD7B	Jones/Wynot	Omaha	1	0	1804	1836	HIST	1820.0	42.77	97.16	D	CO	DC	Historic Omaha
25	25CM2	Wet Gravel Pit	Paleo	1	1	-8550	-10550	GEOL	-9550.0	41.87	96.73		PI		Paleo-Indian
26	25CU201	South Loup Brl		0	1					41.18	99.70				
27	25CX1	Gray/Schuyler	Lower Loup	0	1	1650	1675	ARCH	1575.0	41.49	97.07	C	CO	PCC	Lower Loup
28	25DK10	Large Village	Omaha	4	4	1800	1820	HIST	1810.0	42.34	96.49	D	CO	DC	Historic Omaha
29	25DK13	Hancock	St. Helena	10	7	1250	1450	ARCH	1350.0	42.30	96.44	C	CP		St. Helena
30	25DK2	Ryan	Omaha	4	2	1804	1836	HIST	1820.0	42.31	96.46	D	CO	DC	Historic Omaha
31	25DK2W	Ryan	Gt. Oasis	1	0	800	900	ARCH	850.0	42.31	96.46		WD	L	Great Oasis
32	25DK9	Murphy/O'Conner	St. Helena	3	4	1250	1450	ARCH	1350.0	42.30	96.44	C	CP		St. Helena
33	25DO26	Gilder Mound	Paleo	0	1					41.38	95.96		PI		Paleo-Indian
34	25DO4	Havlicek Farm	Nebraska	0	2	1050	1450	ARCH	1225.0	41.39	95.94	C	CP		Nebraska
35	25DX4	Enders		0	3					42.64	96.75				
36	25FN22	Wilsonville Brl	Woodland	1	0					40.11	100.16		WD		
37	25FT--	Lime Creek Brl	Paleo	1	0	-9074	-9974	C14*	-9524.0	40.40	100.26		PI		Paleo-Indian
38	25FT13	Medicine Creek	Up. Repub.	1	0	956	1090	C14*	1023.0	40.39	100.21	C	CP		Upper Republic
39	25HK13	Massacre Canyon	Keith	3	1	500	700	ARCH	600.0	40.20	100.96		WD	M	Keith
40	25HK16	Swanson Lk. Brl	Archaic	1	0					40.16	101.12		AR		Archaic
41	25HN2	Stevenson/Alma	Up. Repub.	0	1	1050	1350	ARCH	1200.0	40.07	99.35	C	CP		Upper Republic

Table A-2. Continued.

	SITE	NAME	TRIBE	♂	♀	DATE RANGE		METHOD	DATE	GEO COORDIN		LANG	TRAD	VARNT	PHASE
42	25HT3	Redbird	Redbird	0	1	1650	1750	ARCH	1700.0	42.77	98.44	D	CO	PCC	Redbird
43	25HW1	Palmer	Pawnee	1	0	1804	1836	HIST	1820.0	41.29	98.30	C	CO	DC	Skidi Pawnee
44	25HW2	Lehn	Loup River	0	1	1250	1450	ARCH	1350.0	41.29	98.63	C	CP		Loup River
45	25HW3	Sondergaard	Loup River	2	1	1250	1450	ARCH	1350.0	41.39	98.70	C	CP		Loup River
46	25HW8	Christensen	Loup River	1	0	1250	1450	ARCH	1350.0	41.38	98.73	C	CP		Loup River
47	25KX1	Ponca Fort	Ponca	6	7	1770	1800	HIST	1785.0	42.81	98.16	D	CO	DC	Historic Ponca
48	25KX12	Niobrara School		1	0					42.76	98.03				
49	25KX13	Niobrara Landng	Ponca	1	0	1800	1850	ARCH	1825.0	42.75	98.07	D	CO	DC	Historic Ponca
50	25KX207B	Niobrara RR Brg	Loseke Crk	1	0	700	900	ARCH	800.0	42.77	98.05		WD	L	Loseke Creek
51	25KX207A	Niobrara RR Brg	Ponca	1	2	1800	1850	ARCH	1825.0	42.77	98.05	D	CO	DC	Historic Ponca
52	25KX5	Hogan	Ponca	1	0	1800	1850	ARCH	1825.0	42.76	98.06	D	CO	DC	Historic Ponca
53	25KX6	Davis	Ponca	0	1	1800	1850	ARCH	1825.0	42.79	98.12	D	CO	DC	Historic Ponca
54	25KX9	Minarik II	Redbird	0	2	1650	1750	ARCH	1700.0	42.81	98.15	D	CO	PCC	Redbird
55	25MP2	Dry Lake	Archaic	1	1	-2000	-500	ARCH	-1250.0	41.66	101.29		AR		Archaic
56	25NC1	Burkett	Lower Loup	0	1	1530	1730	C14	1630.0	41.30	98.00	C	CO	PCC	Lower Loup
57	25NC20	Genoa	Pawnee	0	1	1857	1873	HIST	1865.0	41.43	97.73	C	CO	DC	Historic Pawnee
58	25NC3	Wright	Lower Loup	1	0	1580	1780	C14	1680.0	41.43	97.76	C	CO	PCC	Lower Loup
59	25NH4	Whitten	Gt. Oasis	0	1	800	900	ARCH	850.0	40.38	95.69		WD	L	Great Oasis
60	25PT1/31	Larson	Lower Loup	2	0	1700	1725	ARCH	1712.5	41.48	97.68	C	CO	PCC	Lower Loup
61	25PT30			0	1					41.44	97.54				
62	25RH1	Leary	Oneota	1	0					40.01	95.38		ON		Leary
63	25SD31	Woodcliff Brl	Pawnee	1	0	1850	1859	ARCH	1854.5	41.39	96.47	C	CO	DC	Grand Pawnee
64	25SF1	Signal Butte 3	Up. Repub.	0	1	1050	1350	ARCH	1200.0	41.87	103.67	C	CP		Upper Republic
65	25SF10	Gering	Archaic	1	1	-501	500	ARCH	-0.5	41.49	103.41		AR		Archaic
66	25ST12	Stanton Burial		1	1					41.99	97.35				
67	25SY16	Fish Hatchery	Archaic	0	1					41.02	96.24		AR		Archaic
68	25SY55	Wallace Mound	Nebraska	2	0	1050	1400	ARCH	1225.0	41.15	95.90	C	CP		Nebraska
69	25SY55B	Wallace Mound		1	0					41.15	95.90				
70	25VY3	Schultz Brl Tst	Valley	1	0	-50	350	ARCH	150.0	41.51	98.82		WD	M	Valley
71	25WN3	Kelley	Nebraska	0	1	1050	1400	ARCH	1225.0	41.41	95.98	C	CP		Nebraska
72	25WT1	Hill/Pike	Pawnee	6	4	1775	1815	HIST	1795.0	40.06	98.39	C	CO	DC	Republic Pawnee
73	25WT4	Robb Ossuary	Keith	0	2	395	863	C14*	629.0	40.05	98.36		WD	M	Keith
74	32BL4	Sperry	Mandan	1	1	1675	1764	ARCH	1719.5	46.78	100.87	M	CO	PCC	Heart River 1
75	32BL8	Double Ditch	Mandan	2	5	1675	1797	ARCH	1736.0	46.93	100.92	M	CO	PCC	Heart River 1
76	32BL9	Larson	Mandan	1	0	1600	1675	ARCH	1637.5	46.97	100.90	M	CO	PCC	Heart River 1
77	32EM1	Havens	EMM	1	0	1140	1294	C14*	1217.0	46.03	100.55	M	MM	EMM	Ft. Yates
78	32GT101	Grant Cnty Brl	Archaic	1	0					46.43	101.38		AR		Archaic
79	32ME12	Big Hidatsa	Hidatsa	0	1	1780	1845	ARCH	1812.5	47.37	101.38	M	CO	DC	Knife River 2
80	32ME2A	Ft. Clark	Mandan	3	1	1822	1845	HIST	1833.5	47.25	101.27	M	CO	DC	Historic Mandan
81	32ME2B	Ft. Clark	Arikara	1	0	1837	1862	HIST	1849.5	47.25	101.27	C	CO	DC	Hist. Arikara
82	32ME5	Deapolis	Mandan	1	1	1780	1845	ARCH	1812.5	47.28	101.33	M	CO	DC	Knife River 1

Table A-2. Continued.

	SITE	NAME	TRIBE	♂	♀	DATE RANGE		METHOD	DATE	GEO COORDIN		LANG	TRAD	VARNT	PHASE
83	32MO11	Huff	TMM	0	1	1570	1650	C14*	1610.0	46.62	100.63	M	MM	TMM	Huff
84	32MO26	Slant Village	Mandan	1	3	1675	1764	ARCH	1719.5	46.78	100.85	M	CO	PCC	Heart River 1
85	32MO29	Motsiff	Mandan	0	1	1600	1797	ARCH	1698.5	46.82	100.88	M	CO	PCC	Heart River 1
86	32MO31	Crying Hill	Mandan	1	4	1400	1764	ARCH	1582.0	46.83	100.90	M	CO	PCC	Crying Hill
87	32MO37	Boley	Mandan	0	1	1675	1764	ARCH	1719.5	46.90	100.92	M	CO	PCC	Heart River 1
88	32MO81	Crying Hill Wst		0	1					46.83	100.90				
89	32RM--	Ft. Ransom Mnd	Woodland	1	0					46.53	97.92		WD		
90	32SI1	Boundary Mound	Sonota	1	0	460	760	C14	610.0	45.94	100.53		WD	M	Sonota Complex
91	32SN31	Jamestown Dam		1	0					46.90	98.70				
92	32WA--	Forest R. Mnds	Devils L-S	4	4	900	1400	ARCH	1150.0				WD	L	Devils L-Souris
93	32WE401	Heimdal Mound	Devils L-S	2	0	900	1400	ARCH	1150.0				WD	L	Devils L-Souris
94	32WI--	Ft. Union Icehs		0	2	1867	1900	HIST	1883.5	48.00	104.00				
95	39BF--	Big Bend Burls	Sioux	3	0					44.06	99.43	L	EQ		Historic Sioux
96	39BF2	Medicine Crow	Paleo	1	0	-5050	-2050	ARCH	-3550.0	44.09	99.52		PI		Paleo-Indian
97	39BF224	Truman Mound	Truman	2	0	660	840	C14	750.0	44.06	99.47		WD	L	Truman Complex
98	39BF225	Sitting Crow	Woodland	1	0					44.03	99.38		WD		
99	39BF225I	Sitting Crow	Sioux	1	1					44.03	99.38	L	EQ		Intrusive Sioux
100	39BF234	Old Quarry	Truman	0	1	600	800	C14	700.0	44.05	99.38		WD	L	Truman Complex
101	39BF3	Talking Crow	Arikara	0	1	1725	1750	ARCH	1737.5	44.04	99.37	C	CO	PCC	Talking Crow
102	39CA4	Rygh	EC	13	12	1600	1650	ARCH	1625.0	45.64	100.38	C	CO	EC	La Roche
103	39CH7	Oldham	Gt. Oasis	0	1	800	900	ARCH	850.0	43.31	99.04		WD	L	Great Oasis
104	39CL--	Centerville Brl	Sioux	1	0	1800	1850	ARCH	1825.0	43.04	96.97	L	EQ		Historic Sioux
105	39CL1A	Vermillion Bluf	Oneota	2	0					42.77	96.93	W	ON		Vermillion Bluf
106	39CL1B	Kaltasulas	Sioux	2	0	1859	1900	HIST	1879.5	42.77	96.93	L	EQ		Historic Sioux
107	39CO11B	Ashley Island	Arikara	2	0	1803	1811	HIST	1807.0	45.62	100.43	C	CO	DC	Hist. Arikara
108	39CO14	Davis/L. Grand	EC	1	0	1221	1487	C14*	1354.0	45.58	100.47	C	CO	EC	Akaska
109	39CO31	Nordvold 1	Arikara	3	1	1675	1780	ARCH	1727.5	45.61	100.44	C	CO	PCC	Le Beau 3
110	39CO32-3	Nordvold 2&3	EC	19	11	1550	1675	ARCH	1612.5	45.61	100.44	C	CO	EC	La Roche
111	39CO9	Leavenworth	Arikara	27	23	1802	1832	HIST	1817.0	45.67	100.36	C	CO	DC	Hist. Arikara
112	39DA3	Enemy Swim Mnd	Woodland	1	0					45.43	97.29		WD		
113	39DV2	Mitchell	IMM	0	1	1033	1105	C14*	1069.0	43.74	98.04	M	MM	IMM	Over
114	39DW2	Four Bear	Arikara	3	9	1758	1774	TREE	1766.0	45.19	100.30	C	CO	PCC	Le Beau 2
115	39DW233	Swift Bird	Sonota	1	2	250	450	C14	350.0	45.45	100.35		WD	M	Sonota Complex
116	39DW240	Grover Hand	Sonota	1	1	230	390	C14	310.0	45.44	100.34		WD	M	Sonota Complex
117	39DW252	Arpan	Sonota	2	1	10	190	C14	100.0	45.43	100.32		WD	M	Sonota Complex
118	39GR1	Scalp Creek	Loseke Crk	1	1	650	900	ARCH	775.0	43.11	98.77		WD	L	Loseke Creek
119	39HS1	Bloom Village	IMM	1	1	900	1400	ARCH	1150.0	43.56	97.84	M	MM	IMM	Over
120	39HT1/3	Twelve Mile Crk	IMM	0	3	1041	1135	C14*	1088.0	43.46	97.86	M	MM	IMM	Over
121	39HT2	Hofer Mound	Loseke Crk	1	1	650	900	ARCH	775.0	43.42	99.58		WD	L	Loseke Creek
122	39HU1	Thomas Riggs	EMM	0	1	1378	1524	C14*	1451.0	44.49	100.56	M	MM	EMM	Thomas Riggs
123	39HU2	Oahe Village	Arikara	3	1	1675	1780	ARCH	1727.5	44.47	100.56	C	CO	PCC	Le Beau 1

Table A-2. Continued.

	SITE	NAME	TRIBE	♂	♀	DATE RANGE		METHOD	DATE	GEO COORDIN		LANG	TRAD	VARNT	PHASE
124	39LK2	Madison Pass Md	Woodland	1	0					43.94	97.00		WD		
125	39LM2A	Medicine Creek	IMM	0	1	900	1400	ARCH	115.0	44.05	99.68	M	MM	IMM	Grand Detour
126	39LM2B	Medicine Creek		2	0					44.05	99.68				
127	39LM209	Langdeau	IMM	0	1	1036	1132	C14*	1084.0	44.14	99.60	M	MM	IMM	Grand Detour
128	39LM227	Stricker Mound		2	0					44.11	99.71				
129	39LM26-7	Oacoma	Arikara	0	2	1700	1750	ARCH	1725.0	43.80	99.38	C	CO	PCC	Talking Crow
130	39LM33	Dinehart	IMM	3	0	900	1400	ARCH	1150.0	43.84	99.34	M	MM	IMM	Grand Detour
131	39MH1	Brandon	IMM	4	3	900	1400	ARCH	1150.0	43.57	96.61	M	MM	IMM	Upper Big Sioux
132	39MK1	Montrose Mound	Woodland	1	0					43.79	97.13		WD		
133	39PN—	Hangman's Hill		1	0					44.08	103.23				
134	39PO1	Steamboat Creek	Arikara	1	0	1675	1780	ARCH	1727.5	45.20	100.27	C	CO	PCC	Le Beau 2
135	39PO207	Second Hand		2	1					45.19	100.27				
136	39PO7	Hosterman	EC	1	0	1550	1675	ARCH	1612.5	45.08	100.31	C	CO	EC	Le Compte
137	39RO10	Daugherty Mnd	S Arvilla	2	2	500	900	ARCH	700.0	45.61	96.86		WD	L	South Arvilla
138	39RO10I	Daugherty Mnd	Sioux	0	2					45.61	96.86	L	EQ		Intrusive Sioux
139	39RO2	Madsen Mound	S Arvilla	1	0	500	900	ARCH	700.0	45.46	96.74		WD	L	South Arvilla
140	39RO3	Buchannon Mnd	S Arvilla	2	2	500	900	ARCH	700.0	45.56	96.86		WD	L	South Arvilla
141	39RO3I	Buchannon Mnd	Sioux	1	2					45.56	96.86	L	EQ		Intrusive Sioux
142	39RO4	Hartford Bch Md	S Arvilla	2	2	500	900	ARCH	700.0	45.40	96.67		WD	L	South Arvilla
143	39SL10	Ziltener	EC	0	1	1550	1675	ARCH	1612.5	44.61	100.58	C	CO	EC	La Roche
144	39SL2	Fairbanks Vill	EC	2	1	1550	1675	ARCH	1612.5	44.77	100.51	C	CO	EC	La Roche
145	39SL29	C.B. Smith	EMM	1	0	1100	1550	ARCH	1325.0	44.60	100.58	M	MM	EMM	Thomas Riggs
146	39SL4	Sully		1	1					44.59	100.58				
147	39SL4A	Sully A	EC	16	12	1650	1675	TREE	1662.5	44.59	100.58	C	CO	EC	La Roche
148	39SL4B	Sully B	Arikara	2	0	1679	1733	TREE	1706.0	44.59	100.58	C	CO	PCC	Le Beau 1
149	39SL4D	Sully D	EC	12	12	1650	1675	TREE	1662.5	44.59	100.58	C	CO	EC	La Roche
150	39SL4E	Sully E	Arikara	11	7	1675	1700	TREE	1687.5	44.59	100.58	C	CO	PCC	Le Beau 1
151	39ST1	Cheyenne River	Arikara	7	9	1740	1795	ARCH	1767.5	44.76	100.72	C	CO	PCC	Bad River 2
152	39ST11	Fay Tolton	IMM	1	0	1019	1111	C14*	1065.0	44.74	100.68	M	MM	IMM	Anderson
153	39ST15	Indian Creek	Arikara	1	1	1675	1740	ARCH	1707.5	44.42	100.38	C	CO	PCC	Bad River 1
154	39ST16A	Breeden A	IMM	1	1	982	1078	C14*	1030.0	44.41	100.38	M	MM	IMM	Anderson
155	39ST16B	Breeden B	Arikara	1	1	1675	1700	ARCH	1687.5	44.41	100.38	C	CO	PCC	Felicia
156	39ST203	Black Widow Rdg	Arikara	4	4	1675	1740	ARCH	1707.5	44.60	100.60	C	CO	PCC	Bad River 1
157	39ST215	Leavitt	Arikara	4	1	1740	1792	ARCH	1766.0	44.44	100.39	C	CO	PCC	Bad River 2
158	39ST216	Buffalo Pasture	Arikara	4	7	1740	1795	ARCH	1767.5	44.45	100.43	C	CO	PCC	Bad River 2
159	39ST23	Gillette		1	0					44.74	100.68				
160	39ST235	Stony Point	Arikara	3	4	1740	1795	ARCH	1767.5	44.31	100.09	C	CO	PCC	Bad River 2
161	39ST30	Dodd	Arikara	1	0	1675	1740	ARCH	1707.5	44.44	100.42	C	CO	PCC	Bad River 1
162	39ST53	Rock Cairn Brl		1	0					44.44	100.41				
163	39UN1	Arbor Hill	Gt. Oasis	1	1	800	900	ARCH	850.0	42.86	96.76		WD	L	Great Oasis
164	39WW—	Bachmeir		0	1										

Table A-2. Continued.

	SITE	NAME	TRIBE	♂	♀	DATE RANGE		METHOD	DATE	GEO COORDIN		LANG	TRAD	VARNT	PHASE
165	39WW1A	Mobridge F1	EC	16	15	1600	1650	ARCH	1625.0	45.56	100.45	C	CO	EC	La Roche
166	39WW1B	Mobridge F2	Arikara	44	38	1675	1700	ARCH	1687.5	45.56	100.45	C	CO	PCC	Le Beau 3
167	39WW1C	Mobridge Cem1	EC	10	9	1600	1650	ARCH	1625.0	45.56	100.45	C	CO	EC	La Roche
168	39WW2	Larson	Arikara	60	67	1679	1733	ARCH	1706.0	45.52	100.41	C	CO	PCC	Le Beau 3
169	39WW203	Walth Bay	EC	3	0	1381	1649	C14*	1515.0	45.41	100.26	C	CO	EC	Akaska
170	39WW7	Swan Creek	Arikara	19	7	1675	1725	ARCH	1700.0	45.31	100.29	C	CO	PCC	Le Beau 2

Table A-3. Site References and Notes.

	SITE	REFERENCES	NOTES
1	13LO2	Glenn 1974; Harvey 1979	
2	13PM1	Fugle 1962; Tiffany 1981	
3	13PM4	Fugle 1962; Tiffany 1981	
4	13WD--	UT site files	Possibly non-Indian
5	14DP2	Stewart 1959; Wedel 1959	
6	14LV330	UT site files	
7	14OS--	UT site files	Cultural affilation uncertain, may be Osage
8	14PH4	Kivett 1953; Wedel and Kivett 1956	
9	14SA1	Wedel 1959	
10	14SC2	Stewart 1959; Wedel 1959, 1961:86	
11	14TO301	Finnegan and Witty 1977	
12	23PL--	Stewart 1943; Wedel 1943	
13	23PL120	Johnson 1976; Stewart 1943; Wedel 1943	
14	23PL13	Stewart 1943; Wedel 1943; O'Brien 1978	
15	23PL58	Nickels 1969	
16	25BD1	Freed 1954; Wedel 1961; Witty 1962	Oneota component also present
17	25BO7	Bass 1964; Ludwickson p.c.	Site is probably not Central Plains Tradition as stated in Bass (1964)
18	25BU1	Carlson and Jensen 1973; Grange 1968	Burials most probably from Linwood A, not B (CO-DC-Grand Band 1850-76)
19	25CC157	Poynter 1915	
20	25CD11	Ludwickson p.c.; Wood 1978	Material proably not from site, may be from 25CD7 or another in area
21	25CD21	NSHS site files	Possibly Sterns Creek rather than Loseke Creek
22	25CD4	Cooper and Bell 1936	
23	25CD7A	Price 1956:153; NSHS site files	
24	25CD7B	Price 1956:153; NSHS site files	Historic Omaha possibly associated with "Bad Village"
25	25CM2	Frankforter 1950; Schultz p.c., 1981	Ass. fauna correlates w/ base of Fill A in the Cent.Pl. terrace seq.
26	25CU201	NSHS site files	Affiliation unknown, looks Woodland, pottery present
27	25CX1	Grange 1968	Date based on ceramic seriation
28	25DK10	Champe 1949; Gradwohl 1969:27; Price 1956	This is the cemetary ass. w/ 25DK5 (Large Village aka Ton Wan Tonga)
29	25DK13	Bass 1964; Price 1956	Possibility of intrusive Omaha
30	25DK2	Champe 1949; Price 1956	Historic Omaha component, combines 25DK2A and 25DK2B
31	25DK2W	Champe 1949; Price 1956	Great Oasis burial
32	25DK9	Frantz 1963	
33	25DO26	Barbour 1907; Hrdlicka 1907; Gilder 1907	This is one of the original "Nebraska Loess Man" specimens
34	25DO4	Cooper 1939	Material is Nebraska Phase, Woodland burials also present at site
35	25DX4	Ludwickson p.c.	Possibly WD-M-Valley or Central Plains
36	25FN22	NSHS site files	Exposed by road construction, exact affiliation uncertain
37	25FT--	UNSM site files	Association with Lime Creek (25FT41) occupation extremely tenative
38	25FT13	Kivett 1949; Wedel 1953:17	
39	25HK13	Kivett 1952; Neuman 1967:477-478	C14 date is generally thought too early but Neuman (1967) disagrees
40	25HK16	NSHS site files	Deeply buried specimen; no pottery present
41	25HN2	Kivett 1953; Strong 1935	

Table A-3. Continued.

	SITE	REFERENCES	NOTES
42	25HT3	Wood 1965	
43	25HW1	Grange 1968	
44	25HW2	Ludwickson 1978	
45	25HW3	Bass 1964; NSHS site files	
46	25HW8	Bass 1964; NSHS site files	
47	25KX1	Jantz 1974; Wood 1965	Possibility of Arikara burials present; see Jantz (1974)
48	25KX12	NSHS site files	Material looks Woodland
49	25KX13	Jantz 1974	
50	25KX207A	Howard and Gant 1966:24-27	Historic Ponca component
51	25KX207B	Howard and Gant 1966:24-27	Woodland burial, exact phase uncertain
52	25KX5	Jantz 1974;	
53	25KX6	Jantz 1974; Price 1956	Woodland mounds w/ intrusive Ponca burials containing trade artifacts
54	25KX9	Jantz 1974; Wood 1965	
55	25MP2	Carlson and Steinacher 1978; Kivett 1952	
56	25NC1	Grange 1968	
57	25NC20	Carlson and Jensen 1973; Grange 1968	25NC20 aka 25NC6, all four Pawnee bands present at site
58	25NC3	Grange 1968; Wedel 1979:289	Burial from House 5, interpreted as a massacre site
59	25NH4	NSHS site files	Many Anculosa beads and Great Oasis pottery with burials
60	25PT1/31	NSHS site files	25PT1 is the Larson site, 25PT31 is the associated cemetary
61	25PT30	NSHS site files	
62	25RH1	Frantz 1966; Hill and Wedel 1936	Oneota, Historic Ioway and Nebraksa Phase present at site
63	25SD31	NSHS site files	
64	25SF1	Strong 1935; Wedel p.c.	Burial from Level III at site; small possibility of being Dismal River
65	25SF10	Carlson and Steinacher 1978; Kivett 1952	
66	25ST12	NSHS site files	This is not the Stanton site
67	25SY16	NSHS site files	Possibly Early Woodland rather than Archaic
68	25SY55	Strong 1935:208	
69	25SY55B	UNSM site files	Probably intrusive into mound, looks Omaha
70	25VY3	Hill and Kivett 1940:182	Probably ass w/ Schultz (25Vy1:WD-M-Valley), although may beUp. Republ
71	25WN3	Bass 1964; Cooper 1939; Gradwohl 1969:27	Affiliation not secure, may be Woodland
72	25WT1	Bass 1964; Grange 1968	
73	25WT4	Kivett 1953:129; NSHS site files	Slight possibility material is Upper Republican or Pawnee
74	32BL4	Will and Hecker 1944	
75	32BL8	Will and Hecker 1944	Some of the burials do not look Mandan
76	32BL9	Will and Hecker 1944	
77	32EM1	Thiessen 1977	
78	32GT101	NDSHS site files	Atlatl weight, two mica flakes with burial, no pottery present
79	32ME12	Lehmer 1971:206; NDSHS site files	Material may be Heart River 2 (Hidatsa 1675-1780) not Knife River 2
80	32ME2A	Lehmer 1971:175	Historic Mandan component
81	32ME2B	Lehmer 1971:175	Historic Arikara component
82	32ME5	Lehmer 1971:205	

Table A-3. Continued.

	SITE	REFERENCES	NOTES
83	32MO11	Bass and Birkby 1962; Wood (1967)	Burial from cache pit in long rectangular house
84	32MO26	Strong 1940; Will and Hecker 1944	
85	32MO29	Will and Hecker 1944	
86	32MO31	Will and Hecker 1944	Long sequence present, exact affiliation of the material is uncertain
87	32MO37	Will and Hecker 1944	
88	32MO81	NDSHS site files	Salvaged from West side of Crying Hill, material probably Mandan
89	32RM--	NDSHS site files	Excavated by amateurs from mound, Woodland designation uncertain
90	32SI1	Neuman 1975; Wood 1960	
91	32SN31	NDSHS site files	Exposed by power shovel for dam fill, remnant excavated by RBS
92	32WA--	Montgomery 1906; Syms 1979	"Southern Cult" materials associated w/ burials
93	32WE401	Howard 1953; Syms 1979	"Southern Cult" materials associated w/ burials
94	32WI--	UT site files	Burials found beneath collapsed ice house floor, affiliation uncertain
95	39BF--	Gant 1962	Sioux graves, probably of late historic origin
96	39BF2	Bass 1976; Protsch 1978	Below Duncan Horizon, possibly ass. w/ Plainview Point
97	39BF224	Neuman 1960,1967	
98	39BF225	Neuman 1964	
99	39BF225I	Neuman 1964	Intrusive burials, presumed to be Sioux
100	39BF234	Neuman 1967,p.c.	
101	39BF3	Smith 1977	Talking Crow component, Woodland and IC components also present
102	39CA4	Jantz 1972,1973	Some burials are probably Post-Contact Coalescent
103	39CH7	Johnston 1967	Probably Great Oasis, although Coalescent components also present
104	39CL--	Kelly 1967	Sioux burial, found with numerous European trade artifacts
105	39CL1A	Sigstad and Sigstad 1973:29	"Vermillion Bluff Village"; probably Onoeta
106	39CL1B	Sigstad and Sigstad 1973:30	Historic Sioux burial, date based on pipe inscription
107	39CO11B	Sigstad and Sigstad 1973	Material adjacent to Ashley Island, may not be from Ashley Is. Village
108	39CO14	Ahler 1975	Phase designation uncertain
109	39CO31	Wedel 1955	
110	39CO32-3	Wedel 1955	Cemetary between Nordvold 2 & 3
111	39CO9	Bass, Evans and Jantz 1971; Wedel 1955	
112	39DA3	Sigstad and Sigstad 1973:70	
113	39DV2	Meleen 1938; Thiessen 1977:79	
114	39DW2	Hurt et al 1962; Weakly 1971:24	
115	39DW233	Hoffman 1963; Neuman 1963,1975	
116	39DW240	Neuman 1975	
117	39DW252	Bass and Phenice 1975; Neuman 1975	
118	39GR1	Hurt 1952	Material possibly EC, not Woodland
119	39HS1	Sigstad and Sigstad 1973	
120	39HT1/3	Sigstad and Sigstad 1973; Thiessen 1977:82	Material may be from mounds and may not be IMM
121	39HT2	Kant 1979; Zimmerman 1981	
122	39HU1	Hurt 1953; Meleen 1949; Thiessen 1977:81	Burial from house floor
123	39HU2		

Table A-3. Continued.

	SITE	REFERENCES	NOTES
124	39LK2	Sigstad and Sigstad 1973	Ten columell beads and clam shell found with burials
125	39LM2A		IMM component
126	39LM2B		??IMM,IC,EC
127	39LM209	Bass & Ubelaker 1969; Caldwell & Jensen 1969	
128	39LM227	Bass and Jantz 1965	May be associated with 39LM1 which has IMM and EC components
129	39LM26-7	Ludwickson p.c.; Sigstad and Sigstad 1973	May be Lower Loup Phase; 39LM26-7 aka 39LM9-10
130	39LM33	Sigstad and Sigstad 1973	Burials may be from mounds, not village, may be Woodland not IMM
131	39MH1	Over & Meleen 1941; Sigstad & Sigstad 1973	May be from mounds not village, may be Woodland not IMM
132	39MK1	Sigstad and Sigstad 1973	
133	39PN--	Over Museum site files	May be non-Indian
134	39PO1	Hurt 1957b	
135	39PO207		
136	39PO7	Lehmer 1971; Miller 1964	
137	39RO10	Sigstad and Sigstad 1973	
138	39RO10I	Sigstad and Sigstad 1973	Intrusive burials, presumed to be Sioux
139	39RO2	Sigstad and Sigstad 1973	
140	39RO3	Sigstad and Sigstad 1973	
141	39RO3I	Sigstad and Sigstad 1973	Intrusive burials, presumed to be Sioux
142	39RO4	Sigstad and Sigstad 1973	Elbow clay pipe with burial, bison scapula hoe in mound fill
143	39SL10	Lehmer 1971:117	
144	39SL2	Lehmer 1971:117; Sigstad and Sigstad 1973	Phase designation uncertain
145	39SL29	SI Accession Memorandum #229,862	Material from EMM component, EC component also present
146	39SL4	Jantz 1972; UT site files	From Sully site, but exact feature is uncertain
147	39SL4A	Jantz 1972	Sully Feature A
148	39SL4B	Jantz 1972; Weakly 1971:43	Sully Feature B
149	39SL4D	Jantz 1972; Weakly 1971:43	Sully Feature D
150	39SL4E	Jantz 1972; Weakly 1971:43	Sully Feature E
151	39ST1	Jantz 1972; Thiessen 1977	IMM, EMM, EC, and PCC components present, material probably PCC
152	39ST11	Thiessen 1977; Wood 1976	
153	39ST15	Lehmer 1954; Lehmer and Jones 1968	
154	39ST16A	Brown 1974; Thiessen 1977	IMM component
155	39ST16B	Brown 1974	EC component
156	39ST203	Lehmer and Jones 1968	EMM and PCC components present, material probably from PCC
157	39ST215	Lehmer and Jones 1968	Probably cemetary for Phillips Ranch (39ST14)
158	39ST216	Bass 1968; Lehmer and Jones 1968	
159	39ST23	Bass 1966; Brown 1966	IMM and PCC components present
160	39ST235	Sigstad and Sigstad 1973	
161	39ST30	Lehmer 1954b; Lehmer and Jones 1968	IMM and PCC components present, material probably PCC
162	39ST53	Lehmer 1954b	741 discoidal shell beads in association, looks Woodland
163	39UN1	Ludwickson et al 1981:203	Probably Great Oasis and/or Mill Creek
164	39WW--	UT site files	Excavated by amateurs, probably from mound, may be Woodland

Table A-3. Continued.

	SITE	REFERENCES	NOTES
165	39WW1A	Jantz 1972	Mobridge Feature 1
166	39WW1B	Jantz 1972	Mobrdige Feature 2
167	39WW1C	Wedel 1955	This is Stirling's "Cemetary 1"
168	39WW2	Jantz 1972, 1973	
169	39WW203	Ahler 1975	Phase designation uncertain
170	39WW7	Hurt 1957a	Burials represent both PCC-Le Beau and EC-Akaska components

APPENDIX B

DESCRIPTIVE STATISTICS

Table B-1. Variables and Code Names.

#	CODE NAME	VARIABLE NAME	#	CODE NAME	VARIABLE NAME
1	GOL	Glabello-Occipital Length	41	FRC	Nasion-Bregma Chord
2	NOL	Nasio-Occipital Length	42	FRS	Nasion-Bregma Subtense
3	BNL	Basion-Nasion Length	43	FRF	Nasion-Subtense Fraction
4	BBH	Basion-Bregma Height	44	PAC	Bregma-Lambda Chord
5	XCB	Maximum Cranial Breadth	45	PAS	Bregma-Lambda Subtense
6	XFB	Maximum Frontal Breadth	46	PAF	Bregma-Subtense Fraction
7	WFB	Minimum Frontal Breadth	47	OCC	Lambda-Opisthion Chord
8	ZYB	Bizygomatic Breadth	48	OCS	Lambda-Opisthion Subtense
9	AUB	Biauricular Breadth	49	OCF	Lambda-Subtense Fraction
10	WCB	Minimum Cranial Breadth	50	FOL	Foramen Magnum Length
11	ASB	Biasterionic Breadth	51	FOB	Foramen Magnum Breadth
12	BPL	Basion-Prosthion Length	52	NAR	Nasion Radius
13	NPH	Nasion-Prosthion Height	53	SSR	Subspinale Radius
14	NLH	Nasal Height	54	PRR	Prosthion Radius
15	JUB	Bijugal Breadth	55	DKR	Dacryon Radius
16	NLB	Nasal Breadth	56	ZOR	Zygoorbitale Radius
17	MAB	External Alveolar Breadth	57	FMR	Frontomalare Radius
18	MAL	External Alveolar Length	58	EKR	Ectoconchion Radius
19	MDH	Mastoid Height	59	ZMR	Zygomaxillare Radius
20	MDB	Mastoid Breadth	60	AVR	M1 Alveolus Radius
21	OBH	Orbit Height Left	61	BRR	Bregma Radius
22	OBB	Orbit Breadth Left	62	VRR	Vertex Radius
23	DKB	Interorbital Breadth	63	LAR	Lambda Radius
24	NDS	Naso-Dacryal Subtense	64	OPR	Opisthion Radius
25	WNB	Simotic Chord	65	BAR	Basion Radius
26	SIS	Simotic Subtense	66	NAA	Nasion Angle, ba-pr
27	ZMB	Bimaxillary Breadth	67	PRA	Prosthion Angle, na-ba
28	SSS	Zygomaxillary Subtense	68	BAA	Basion Angle, na-pr
29	FMB	Bifrontal Breadth	69	NBA	Nasion Angle, ba-br
30	NAS	Nasio-Frontal Subtense	70	BBA	Basion Angle, na-pr
31	EKB	Biorbital Breadth	71	SSA	Zygomaxillare Angle
32	DKS	Dacryon Subtense	72	NFA	Nasio-Frontal Angle
33	IML	Malar Length Inferior	73	DKA	Dacryal Angle
34	XML	Malar Length Maximum	74	NDA	Naso-Dacryal Angle
35	MLS	Malar Subtense	75	SIA	Simotic Angle
36	WMH	Cheek Height Minimum	76	FRA	Frontal Angle
37	SOS	Supraorbital Projection	77	PAA	Parietal Angle
38	GLS	Glabella Projection	78	OCA	Occipital Angle
39	STB	Bistephanic Breadth	79	STA	Bistephanic Angle
40	STS	Stephanic Subtense	80	CBA	Cranial Base Angle

Table B-2. Variables Not Defined by Howells.

N	CODE NAME	VARIABLE	DESCRIPTION
7	WFB	Minimum Frontal Breadth	The minimum breadth across the frontal, perpendicular to the median sagittal plane. Apply the caliper to the points of maximum incurvature of the temporal line. Taken with the skull on its base, with the face toward the observer.
18	MAL	External Alveolar Length	The distance along the midplane from prosthion to alveolon Alveolon is defined as the intersection of the midplane and a line connecting the posterior alveolar borders. Taken with the skull base up and a small stick resting behind the 3rd molars to define alveolon.
40	STS	Stephanic Subtense	The subtense from the suface of the frontal in the sagittal plane to the bistephanic breadth (as defined by Howells). Taken with the skull on its base with the face toward the observer. Take bistephanic breadth with a coordinate caliper and drop the subtense along the midline so that it is perpendicular to the bone surface. Make no reference to the coronal plane.
61	BRR	Bregma Radius	The perpendicular to the transmeatal axis from bregma. See Howells radius definitions for more information.
63	LAR	Lambda Radius	The perpendicular to the trasmeatal axis from lambda.
64	OSR	Opisthion Radius	The perpendicular to the transmeatal axis from opistion.
65	BAR	Basion Radius	The perpendicular to the transmeatal axis from basion.
79	STA	Bistephanic Angle	The angle formed on the midline of the frontal, whose sides reach from this point to stephanion, left and right. Calculated from STB and STS.
80	CBA	Cranial Base Angle	The angle at basion formed by the radius from basion to the transmeatal axis where the transmeatal axis is set equal to the biauricular breadth (AUB). Calculated from BAR and AUB

Table B-3. Means by Phase, by Sex, Section 1.

TR	VAR	PHASE	SEX	N	GOL	NOL	BNL	BBH	XCB	XFB	WFB	ZYB	AUB	WCB	ASB	BPL	NPH	NLH	JUB	NLB
PI		Paleo-Indian	1	4	191.5	188.3	104.5	137.5	139.8	116.0	91.8	138.8	128.5	72.8	111.8	101.0	70.8	52.5	121.0	26.0
PI		Paleo-Indian	2	3	172.7	170.0	99.3	136.3	137.3	108.0	90.0	129.7	120.0	69.7	103.0	100.7	66.0	47.0	114.7	24.0
AR		Archaic	1	5	186.0	182.8	101.0	131.0	138.8	113.2	94.0	135.8	126.6	73.8	107.6	102.0	68.4	50.4	120.2	26.4
AR		Archaic	2	5	181.8	179.8	102.4	127.6	133.2	112.2	90.8	129.0	118.2	69.2	103.6	101.2	65.8	48.6	119.6	24.4
WD	M	KC Hopewell	1	2	188.5	184.0	106.0	145.0	138.5	115.0	93.5	137.5	127.0	73.0	109.0	99.5	62.5	49.0	121.0	26.5
WD	M	KC Hopewell	2	2	173.5	171.5	103.5	141.0	135.5	110.0	84.0	139.0	123.5	70.0	109.0	98.0	64.5	50.5	113.0	25.0
WD	M	Keith	1	3	185.3	181.7	99.3	131.0	138.0	117.3	93.0	136.0	127.3	76.7	109.7	99.0	70.3	51.7	119.3	26.0
WD	M	Keith	2	4	169.8	168.3	98.5	128.8	136.3	113.3	88.3	129.5	119.5	72.8	101.3	93.5	67.8	50.8	113.8	24.5
WD	M	Sonota	1	5	185.2	182.2	103.6	127.4	140.4	115.6	92.2	142.8	132.8	73.0	110.6	102.6	71.6	55.0	123.2	26.8
WD	M	Sonota	2	4	180.5	178.3	98.0	129.5	141.8	111.5	89.8	136.5	129.5	74.8	110.3	98.3	68.0	52.8	119.8	26.0
WD	M	Valley	1	1	184.0	178.0	107.0	136.0	144.0	112.0	91.0	142.0	134.0	76.0	116.0	102.0	75.0	55.0	120.0	23.0
WD	L	Truman	1	2	183.5	183.0	106.0	134.5	138.5	119.0	95.5	138.5	129.0	73.5	110.5	99.0	70.5	51.0	120.0	25.5
WD	L	Truman	2	1	175.0	175.0	95.0	126.0	126.0	101.0	87.0	122.0	116.0	68.0	107.0	97.0	62.0	46.0	113.0	27.0
WD	L	Loseke Creek	1	4	186.8	183.8	108.5	136.5	139.5	112.8	89.8	140.3	130.0	72.3	108.5	96.5	65.8	52.8	121.8	25.0
WD	L	Loseke Creek	2	2	171.5	171.5	99.0	121.0	135.0	110.0	86.5	129.5	123.0	71.0	103.0	95.0	69.5	50.0	111.5	23.0
WD	L	South Arvilla	1	7	187.6	184.6	105.3	131.7	144.4	117.9	91.3	143.6	134.9	76.0	109.6	98.0	72.9	56.3	124.0	25.7
WD	L	South Arvilla	2	6	176.5	175.7	98.7	128.5	136.8	112.2	86.3	129.5	124.5	70.8	105.7	95.7	68.5	52.3	113.3	25.0
WD	L	Great Oasis	1	2	186.5	183.0	112.0	146.5	140.0	117.0	93.5	141.0	129.5	76.5	112.5	103.0	75.0	57.0	123.5	25.5
WD	L	Great Oasis	2	3	168.3	167.3	99.7	131.7	131.0	111.0	87.7	129.7	120.3	70.7	104.0	95.0	69.7	50.0	116.3	25.3
WD	L	Devils L-Souris	1	6	187.7	185.5	105.5	132.7	141.8	113.2	92.7	140.5	131.3	73.5	112.5	100.2	72.5	56.3	124.0	25.7
WD	L	Devils L-Souris	2	4	179.0	176.8	102.8	131.0	138.0	112.8	90.5	133.3	124.8	69.8	107.5	98.3	68.5	53.8	117.5	24.8
MM	IMM	Anderson	1	1	168.0	165.0	100.0	135.0	136.0	114.0	85.0	134.0	124.0	71.0	106.0	91.0	69.0	52.0	117.0	25.0
MM	IMM	Anderson	2	2	174.0	172.0	99.5	127.0	139.5	118.0	93.0	134.5	125.5	73.5	106.5	94.0	65.0	49.5	119.5	23.5
MM	IMM	Grand Detour	1	3	182.7	179.7	103.3	131.3	145.0	118.3	94.3	144.0	132.0	76.0	108.0	100.7	70.7	52.7	127.3	25.3
MM	IMM	Grand Detour	2	2	181.5	180.0	98.5	132.0	133.5	112.0	93.5	130.0	122.5	74.5	109.5	94.0	73.0	51.0	119.0	26.0
MM	IMM	Mill Creek	1	3	179.7	176.0	105.7	144.3	142.7	115.7	90.3	136.0	127.0	73.3	115.0	98.7	71.7	54.3	121.7	28.0
MM	IMM	Mill Creek	2	1	158.0	155.0	98.0	125.0	132.0	107.0	87.0	125.0	118.0	71.0	101.0	97.0	69.0	51.0	110.0	23.0
MM	IMM	Over	1	1	180.0	177.0	107.0	138.0	139.0	111.0	88.0	136.0	126.0	74.0	104.0	98.0	78.0	55.0	124.0	26.0
MM	IMM	Over	2	5	171.4	170.6	101.6	132.6	134.8	110.8	91.2	129.8	122.2	70.2	105.0	95.2	66.6	50.8	113.8	25.8
MM	IMM	Upper Big Sioux	1	4	180.3	179.5	104.3	131.3	138.8	114.8	89.5	138.3	128.3	75.8	114.0	98.3	69.3	53.5	122.8	26.5
MM	IMM	Upper Big Sioux	2	3	180.7	179.7	100.0	127.7	137.0	113.7	88.7	131.7	123.7	71.3	106.7	94.7	69.3	53.0	112.7	25.0
MM	EMM	Ft. Yates	1	1	175.0	172.0	99.0	142.0	143.0	110.0	91.0	138.0	129.0	76.0	108.0	88.0	62.0	50.0	119.0	23.0
MM	EMM	Thomas Riggs	1	1	178.0	171.0	104.0	133.0	146.0	121.0	93.0	143.0	133.0	78.0	106.0	103.0	73.0	56.0	127.0	28.0
MM	EMM	Thomas Riggs	2	1	190.0	189.0	99.0	134.0	136.0	111.0	93.0	135.0	125.0	75.0	106.0	98.0	66.0	49.0	117.0	24.0
MM	TMM	Huff	2	1	196.0	194.0	106.0	131.0	133.0	114.0	92.0	132.0	112.0	66.0	105.0	106.0	75.0	57.0	120.0	27.0
CP		Smoky Hill	1	1	174.0	173.0	103.0	138.0	135.0	107.0	87.0	123.0	111.0	67.0	103.0	97.0	62.0	47.0	111.0	24.0
CP		Upper Republic	1	1	173.0	172.0	109.0	140.0	137.0	111.0	88.0	143.0	130.0	74.0	103.0	100.0	58.0	49.0	121.0	26.0
CP		Upper Republic	2	2	176.5	174.5	100.0	128.5	138.0	117.5	93.5	127.0	118.0	71.5	101.5	97.0	62.5	47.0	113.0	26.5
CP		Loup River	1	3	174.7	172.3	104.7	139.0	147.7	123.0	99.0	141.7	133.7	78.0	110.3	107.7	67.0	52.0	123.3	28.0
CP		Loup River	2	2	165.0	163.5	97.0	130.0	141.5	118.5	94.5	131.0	126.0	76.5	103.5	94.0	64.5	49.0	117.5	27.5
CP		Nebraska	1	2	168.5	167.5	103.0	136.5	141.0	118.5	93.0	133.0	126.5	74.0	103.5	101.5	67.5	51.5	126.0	27.5

Table B-3. Continued.

TR	VAR	PHASE	SEX	N	GOL	NOL	BNL	BBH	XCB	XFB	WFB	ZYB	AUB	WCB	ASB	BPL	NPH	NLH	JUB	NLB
CP		Nebraska	2	3	165.3	164.3	101.3	132.0	141.0	117.3	93.0	136.0	124.7	77.3	101.3	102.7	69.3	50.0	120.0	27.3
CP		St. Helena	1	16	174.4	172.5	102.8	136.2	144.0	120.3	96.4	140.2	129.7	76.1	108.2	100.1	71.6	53.0	122.9	26.4
CP		St. Helena	2	11	164.6	163.3	97.2	130.0	136.6	111.8	88.8	129.5	121.3	72.1	103.8	97.4	66.5	48.8	116.9	25.1
CO	IC	Anoka	2	1	172.0	172.0	102.0	125.0	136.0	115.0	90.0	127.0	119.0	72.0	107.0	106.0	65.0	50.0	117.0	29.0
CO	EC	Le Compte	1	1	175.0	175.0	102.0	132.0	137.0	116.0	91.0	142.0	129.0	77.0	105.0	95.0	73.0	56.0	126.0	24.0
CO	EC	Akaska	1	4	174.5	173.8	102.0	131.0	145.3	119.5	94.0	146.0	134.5	75.5	111.5	99.3	70.0	54.0	126.3	23.3
CO	EC	La Roche	1	88	179.5	177.1	103.6	134.0	142.4	117.9	93.6	142.0	131.8	74.8	108.5	99.0	71.8	54.7	123.1	26.2
CO	EC	La Roche	2	73	172.5	171.2	98.3	127.8	136.4	112.9	90.4	130.7	123.9	71.6	104.4	96.4	68.7	50.9	114.8	25.4
CO	PCC	Redbird	2	3	177.7	177.0	101.3	124.7	145.3	117.0	93.3	133.7	126.7	74.3	109.0	95.0	71.0	52.7	116.3	25.3
CO	PCC	Felicia	1	1	175.0	173.0	102.0	130.0	142.0	118.0	103.0	138.0	130.0	78.0	109.0	95.0	74.0	55.0	122.0	26.0
CO	PCC	Felicia	2	1	173.0	171.0	100.0	126.0	137.0	113.0	89.0	128.0	121.0	71.0	102.0	95.0	73.0	52.0	113.0	27.0
CO	PCC	Bad River 1	1	6	186.2	184.0	105.2	135.8	143.3	117.3	93.8	144.5	133.5	76.8	109.0	99.7	71.8	54.8	125.5	26.3
CO	PCC	Bad River 1	2	5	176.8	176.0	98.2	128.6	137.8	112.4	92.2	130.4	124.8	74.2	108.8	96.8	69.8	50.2	114.6	25.6
CO	PCC	Bad River 2	1	18	176.7	175.3	102.5	133.3	142.3	116.9	93.5	140.2	130.3	75.0	108.5	97.4	71.6	54.8	123.1	26.6
CO	PCC	Bad River 2	2	21	169.8	168.7	96.8	126.3	137.1	113.7	91.0	129.0	122.4	71.8	104.2	93.9	68.6	50.9	113.9	24.4
CO	PCC	Le Beau 1	1	16	180.2	177.8	102.9	132.5	141.4	116.3	89.9	140.4	130.6	74.9	108.0	99.6	72.4	54.8	122.3	26.3
CO	PCC	Le Beau 1	2	8	166.4	165.5	98.9	127.5	133.3	110.1	87.3	129.8	121.8	71.4	101.8	95.6	67.6	50.5	114.6	25.5
CO	PCC	Le Beau 2	1	23	179.3	177.7	102.4	133.3	140.4	117.5	93.6	139.5	128.9	73.4	106.6	98.6	71.6	54.3	123.9	24.7
CO	PCC	Le Beau 2	2	16	171.6	170.1	97.1	127.3	136.9	112.6	89.3	129.8	123.6	71.3	104.6	93.8	67.8	50.6	114.8	24.4
CO	PCC	Le Beau 3	1	107	180.5	178.2	103.3	133.8	140.2	116.4	93.3	139.8	129.3	75.0	106.4	99.4	73.0	54.7	121.4	25.7
CO	PCC	Le Beau 3	2	106	172.4	171.1	98.0	128.4	135.8	112.2	90.4	129.5	122.7	71.5	102.6	96.2	69.1	50.8	113.7	25.2
CO	PCC	Talking Crow	2	3	173.3	171.3	98.7	126.3	140.3	114.3	90.7	130.3	125.0	68.0	108.0	96.7	67.7	50.3	114.3	24.7
CO	PCC	Lower Loup	1	3	175.0	172.7	100.3	127.7	148.7	119.3	94.0	142.0	135.0	77.7	108.3	98.3	70.0	52.3	121.7	25.7
CO	PCC	Lower Loup	2	2	169.0	168.5	98.0	128.5	139.0	116.0	94.0	133.5	126.0	72.5	108.0	95.0	69.0	49.0	115.0	24.5
CO	PCC	Heart River 1	1	5	189.0	186.4	105.8	135.6	139.6	113.6	91.8	137.4	126.2	72.2	109.6	99.6	74.2	54.4	116.4	23.8
CO	PCC	Heart River 1	2	11	178.2	176.6	101.8	131.0	136.1	113.3	91.1	132.3	125.2	71.8	105.6	97.7	68.8	50.8	114.8	23.2
CO	PCC	Crying Hill	1	1	170.0	167.0	100.0	130.0	123.0	103.0	83.0	125.0	115.0	67.0	99.0	100.0	64.0	48.0	113.0	27.0
CO	PCC	Crying Hill	2	4	178.8	177.5	99.3	130.3	135.8	109.8	92.8	129.8	122.8	71.5	104.0	97.3	71.8	51.8	114.0	25.8
CO	DC	Pawnee	1	15	177.7	175.5	102.1	130.5	142.9	116.3	95.0	141.5	131.5	74.7	110.7	98.9	72.5	54.6	123.1	26.0
CO	DC	Pawnee	2	8	168.6	167.3	95.6	121.9	137.6	112.1	90.6	130.1	123.9	73.1	105.3	92.4	67.3	50.4	113.4	24.0
CO	DC	Arikara	1	30	182.1	180.0	102.2	132.7	141.8	116.5	94.8	140.9	130.4	75.9	108.4	98.8	73.5	55.9	122.8	26.4
CO	DC	Arikara	2	23	173.2	172.0	97.7	125.8	136.2	111.8	90.7	131.0	123.8	73.2	105.2	94.7	69.0	52.4	116.7	25.1
CO	DC	Mandan	1	4	185.8	183.5	104.0	134.5	138.5	116.0	92.8	138.5	127.3	74.3	106.0	102.0	75.5	56.3	122.0	26.0
CO	DC	Mandan	2	2	168.5	167.0	95.0	126.0	131.0	106.5	85.0	127.0	120.0	71.0	100.0	95.5	71.0	50.5	112.0	23.0
CO	DC	Hidatsa	2	1	184.0	182.0	96.0	125.0	137.0	112.0	88.0	128.0	120.0	70.0	102.0	96.0	70.0	51.0	112.0	26.0
CO	DC	Omaha	1	9	173.4	171.6	98.3	127.3	148.9	118.9	94.9	140.2	132.1	76.4	110.8	96.8	74.1	56.0	121.0	26.6
CO	DC	Omaha	2	6	165.0	163.8	96.7	124.2	147.2	116.7	92.5	132.7	127.7	73.2	108.7	93.7	72.0	53.3	113.5	25.0
CO	DC	Ponca	1	9	171.9	169.4	100.1	125.1	147.2	117.8	93.2	141.7	133.3	74.4	111.8	95.2	69.4	53.9	121.4	25.7
CO	DC	Ponca	2	10	168.9	167.4	98.3	125.2	143.0	117.2	90.9	132.3	127.9	72.2	110.0	93.7	68.3	51.2	114.5	24.6
MI	M	Steed-Kisker	1	6	177.8	175.2	105.8	136.7	151.7	124.8	96.0	144.2	134.5	78.2	105.7	103.8	70.7	52.2	124.8	27.3
MI	M	Steed-Kisker	2	3	170.7	169.3	102.3	132.7	143.7	114.3	89.0	134.7	125.3	72.7	106.0	99.3	66.0	50.0	117.3	26.7

Table B-3. Continued.

TR VAR	PHASE	SEX	N	GOL	NOL	BNL	BBH	XCB	XFB	WFB	ZYB	AUB	WCB	ASB	BPL	NPH	NLH	JUB	NLB
ON	Vermillion Bluf	1	2	178.5	175.0	108.5	141.5	139.5	114.0	94.0	145.0	130.5	72.5	108.5	94.5	65.0	53.0	124.0	26.0
ON	Ioway	1	2	182.0	180.5	112.0	139.0	138.5	116.5	94.0	133.5	126.5	72.5	106.0	106.5	70.5	54.0	118.5	25.5
ON	Leary	1	1	181.0	180.0	103.0	147.0	150.0	122.0	94.0	140.0	133.0	76.0	117.0	90.0	64.0	52.0	124.0	28.0
ON	Kansa	1	3	175.0	172.7	102.0	133.3	155.0	120.3	90.7	143.3	137.0	78.0	113.0	98.0	73.0	52.3	126.0	26.0
ON	Kansa	2	3	168.0	166.7	96.3	129.7	147.3	118.3	90.3	136.3	129.7	72.3	112.7	93.3	68.7	49.7	118.7	26.7
EQ	Historic Sioux	1	6	180.8	178.5	101.7	130.5	144.2	115.2	94.5	140.0	132.3	76.2	114.7	101.5	74.5	55.5	122.7	25.0
EQ	Intrusive Sioux	1	2	179.5	177.0	101.0	129.5	144.0	124.5	96.5	138.0	130.0	70.0	112.5	96.5	71.0	54.0	116.5	24.5
EQ	Intrusive Sioux	2	5	169.4	168.8	95.4	123.0	138.0	109.8	87.4	128.0	122.2	71.6	107.8	94.0	67.4	49.2	114.6	23.8
	Grand Means		860	176.5	174.7	101.0	131.0	139.8	115.1	92.0	136.0	127.3	73.5	106.6	97.8	70.3	52.8	119.0	25.5

Table B-4. Means by Phase, by Sex, Section 2.

TR	VAR	PHASE	SEX	N	MAB	MAL	MDH	MDB	OBH	OBB	DKB	NDS	WNB	SIS	ZMB	SSS	FMB	NAS	EKB	DKS
PI		Paleo-Indian	1	4	65.3	55.3	26.8	14.0	33.5	40.5	22.8	10.3	8.9	3.6	103.0	24.3	98.5	17.3	100.0	12.0
PI		Paleo-Indian	2	3	61.3	54.0	23.0	11.7	32.0	37.0	22.7	9.3	8.5	3.5	96.7	23.3	94.3	15.3	95.3	9.7
AR		Archaic	1	5	65.4	50.4	26.8	14.0	34.4	39.6	22.2	10.2	9.2	4.1	99.8	24.6	99.0	18.0	100.0	10.6
AR		Archaic	2	5	60.6	53.8	23.4	12.8	33.6	39.6	23.8	9.8	10.7	3.0	98.8	23.8	99.2	17.2	99.4	10.8
WD	M	KC Hopewell	1	2	63.5	50.0	22.5	11.0	35.0	40.0	24.0	10.0	10.8	3.5	100.0	22.5	101.0	16.0	100.5	11.0
WD	M	KC Hopewell	2	2	60.0	49.5	21.5	11.5	34.5	39.0	22.0	10.5	8.7	2.9	93.0	23.5	95.0	16.0	96.0	10.0
WD	M	Keith	1	3	64.7	55.7	26.7	13.7	34.7	38.3	22.3	8.7	9.3	3.3	99.3	21.3	96.3	14.3	96.7	10.3
WD	M	Keith	2	4	59.5	51.5	23.8	11.8	35.8	38.8	21.5	9.8	9.3	2.9	94.5	23.3	94.8	16.8	95.5	11.5
WD	M	Sonota	1	5	66.8	54.8	25.6	11.2	35.0	40.6	22.6	9.2	8.5	4.3	105.0	26.0	100.8	19.2	101.0	12.2
WD	M	Sonota	2	4	64.0	51.5	22.8	11.3	35.3	40.0	22.0	10.0	9.5	3.6	98.8	24.8	97.8	17.8	99.0	11.3
WD	M	Valley	1	1	70.0	55.0	27.0	16.0	35.0	40.0	22.0	13.0	8.6	5.1	101.0	24.0	99.0	17.0	99.0	9.0
WD	L	Truman	1	2	63.0	53.0	29.0	12.5	35.0	40.5	22.0	11.0	9.1	4.8	101.5	27.0	97.5	17.0	98.0	13.5
WD	L	Truman	2	1	62.0	50.0	20.0	8.0	33.0	38.0	22.0	8.0	8.9	2.1	97.0	27.0	91.0	17.0	97.0	12.0
WD	L	Loseke Creek	1	4	65.8	48.3	25.3	12.3	34.8	40.5	20.5	10.5	7.7	4.3	102.5	22.8	97.8	17.8	98.8	11.5
WD	L	Loseke Creek	2	2	57.5	49.0	24.0	11.0	36.0	38.5	21.0	12.0	8.4	4.5	93.5	25.0	96.0	14.5	95.5	10.0
WD	L	South Arvilla	1	7	64.6	53.4	30.0	12.0	35.6	41.0	20.6	12.1	8.0	4.9	103.4	25.6	99.3	18.6	98.3	11.3
WD	L	South Arvilla	2	6	61.5	51.7	24.2	10.3	33.3	37.7	20.8	10.7	9.3	4.4	93.3	24.8	92.7	16.8	93.7	10.3
WD	L	Great Oasis	1	2	67.5	55.0	28.0	14.0	35.0	41.5	23.5	11.5	9.7	4.0	102.0	26.5	102.0	17.0	101.0	11.5
WD	L	Great Oasis	2	3	65.3	54.7	22.0	9.7	32.7	39.3	20.0	10.7	9.9	4.3	94.3	23.7	95.0	17.0	95.3	10.7
WD	L	Devils L-Souris	1	6	67.0	54.0	27.5	11.3	35.5	41.2	23.3	11.5	8.0	3.9	103.3	25.0	100.8	20.5	100.8	13.3
WD	L	Devils L-Souris	2	4	60.0	53.0	23.8	10.0	34.5	39.3	21.8	11.5	7.7	4.0	96.0	24.3	96.0	17.3	97.5	10.5
MM	IMM	Anderson	1	1	60.0	48.0	23.0	11.0	35.0	40.0	20.0	12.0	7.2	3.8	88.0	22.0	97.0	18.0	96.0	12.0
MM	IMM	Anderson	2	2	64.0	51.5	23.0	9.0	35.0	39.5	20.5	9.5	10.0	3.3	93.5	19.5	96.5	16.0	97.5	9.5
MM	IMM	Grand Detour	1	3	67.3	55.7	28.3	15.3	35.7	42.7	22.3	12.0	8.6	4.7	98.0	23.7	99.0	19.3	98.0	12.0
MM	IMM	Grand Detour	2	2	64.0	52.0	25.5	14.5	34.5	39.5	25.0	8.5	11.0	3.5	98.5	23.0	96.0	16.5	96.5	12.5
MM	IMM	Mill Creek	1	3	67.0	50.3	27.0	10.7	35.0	40.3	22.0	10.0	8.2	3.6	100.3	26.7	99.7	16.3	100.0	10.7
MM	IMM	Mill Creek	2	1	57.0	52.0	23.0	9.0	35.0	40.0	18.0	8.0	6.7	2.8	93.0	27.0	93.0	15.0	96.0	12.0
MM	IMM	Over	1	1	71.0	53.0	21.0	10.0	38.0	40.0	23.0	11.0	9.1	5.0	106.0	19.0	97.0	14.0	100.0	17.0
MM	IMM	Over	2	5	62.0	50.4	25.6	11.0	34.2	39.0	22.2	9.4	9.9	3.4	91.0	23.4	93.4	18.0	93.8	12.0
MM	IMM	Upper Big Sioux	1	4	64.0	53.3	28.3	12.8	32.5	41.0	22.8	11.8	9.2	4.3	101.0	24.0	101.3	19.0	101.5	10.5
MM	IMM	Upper Big Sioux	2	3	60.0	51.7	21.3	9.7	35.7	39.3	21.0	11.0	6.5	3.1	100.7	27.3	95.7	18.0	95.3	12.0
MM	EMM	Ft. Yates	1	1	69.0	51.0	36.0	15.0	30.0	40.0	19.0	11.0	6.8	4.9	98.0	26.0	92.0	17.0	92.0	11.0
MM	EMM	Thomas Riggs	1	1	69.0	53.0	30.0	13.0	35.0	42.0	20.0	11.0	10.0	5.1	102.0	26.0	100.0	18.0	102.0	11.0
MM	EMM	Thomas Riggs	2	1	67.0	57.0	27.0	9.0	36.0	38.0	22.0	11.0	8.6	5.1	100.0	25.0	97.0	15.0	97.0	9.0
MM	TMM	Huff	2	1	67.0	58.0	22.0	13.0	37.0	41.0	21.0	12.0	8.6	3.9	104.0	27.0	100.0	23.0	98.0	14.0
CP		Smoky Hill	1	1	65.0	53.0	25.0	14.0	32.0	38.0	23.0	10.0	8.7	3.6	93.0	25.0	98.0	19.0	95.0	10.0
CP		Upper Republic	1	1	60.0	48.0	25.0	14.0	37.0	43.0	21.0	13.0	7.3	4.9	103.0	27.0	103.0	15.0	103.0	11.0
CP		Upper Republic	2	2	59.0	49.5	25.0	10.0	35.0	40.5	20.5	9.5	9.7	3.5	95.0	21.5	98.5	20.0	98.5	12.5
CP		Loup River	1	3	67.3	58.0	24.3	13.7	33.0	41.3	24.0	11.3	9.8	4.0	105.0	25.3	101.7	18.0	102.3	11.0
CP		Loup River	2	2	65.5	51.0	23.5	10.0	34.0	37.5	23.0	10.0	10.3	4.5	100.0	24.0	96.5	16.0	96.5	10.0
CP		Nebraska	1	2	68.5	56.5	26.5	14.0	32.5	40.5	22.5	10.0	10.4	3.7	100.5	26.5	100.0	17.5	101.5	11.5

Table B-4. Continued.

TR	VAR	PHASE	SEX	N	MAB	MAL	MDH	MDB	OBH	OBB	DKB	NDS	WNB	SIS	ZMB	SSS	FMB	NAS	EKB	DKS
CP		Nebraska	2	3	65.3	54.0	25.3	12.3	34.0	40.3	22.3	10.7	9.2	3.8	104.0	26.0	99.0	16.7	100.0	11.0
CP		St. Helena	1	16	66.6	54.3	25.9	13.6	35.1	41.1	23.5	9.9	10.1	3.9	102.8	25.6	101.8	18.0	101.9	11.9
CP		St. Helena	2	11	63.7	51.5	23.7	11.5	34.3	39.3	21.5	8.5	9.2	2.9	97.9	24.5	95.4	15.5	96.7	10.5
CO	IC	Anoka	2	1	59.0	49.0	22.0	12.0	35.0	40.0	24.0	9.0	10.1	2.9	98.0	23.0	97.0	18.0	97.0	14.0
CO	EC	Le Compte	1	1	64.0	50.0	24.0	9.0	37.0	41.0	20.0	11.0	8.0	4.1	109.0	28.0	100.0	21.0	97.0	12.0
CO	EC	Akaska	1	4	66.3	53.8	31.0	15.5	35.8	42.0	21.8	10.3	9.3	4.0	100.5	22.8	100.3	17.5	100.3	11.3
CO	EC	La Roche	1	88	66.2	53.6	27.8	12.6	35.4	40.8	21.9	11.1	9.0	4.5	102.6	25.5	100.5	18.1	100.2	11.5
CO	EC	La Roche	2	73	62.5	52.1	24.7	11.0	35.1	39.2	21.0	9.8	8.8	3.5	96.9	24.0	96.0	16.7	96.6	11.3
CO	PCC	Redbird	2	3	64.0	52.3	21.7	9.7	36.3	40.3	21.7	10.3	8.9	3.9	96.3	21.0	98.0	20.0	98.0	12.7
CO	PCC	Felicia	1	1	66.0	52.0	25.0	11.0	38.0	42.0	22.0	11.0	11.5	4.3	106.0	28.0	101.0	20.0	102.0	14.0
CO	PCC	Felicia	2	1	62.0	53.0	24.0	12.0	34.0	40.0	22.0	12.0	9.4	4.3	100.0	26.0	96.0	17.0	97.0	12.0
CO	PCC	Bad River 1	1	6	66.0	54.0	28.7	11.0	34.8	42.7	22.5	11.2	9.0	4.5	103.2	24.5	101.0	18.7	103.2	11.8
CO	PCC	Bad River 1	2	5	64.4	53.4	24.8	10.6	34.4	39.6	21.6	10.0	10.1	3.6	95.8	25.0	97.0	17.4	97.4	10.6
CO	PCC	Bad River 2	1	18	65.4	52.9	26.1	11.6	35.8	40.6	22.3	10.6	10.1	4.4	103.4	24.9	99.8	18.6	100.0	12.4
CO	PCC	Bad River 2	2	21	62.0	50.6	23.4	9.4	34.5	39.0	21.1	9.9	9.0	3.7	94.6	23.6	94.7	17.0	95.3	11.5
CO	PCC	Le Beau 1	1	16	67.2	55.1	29.0	14.4	34.9	40.1	20.8	10.4	7.7	4.3	102.5	25.7	98.4	16.8	98.5	10.0
CO	PCC	Le Beau 1	2	8	62.6	51.9	24.0	11.4	33.3	40.4	19.6	10.0	8.4	3.9	91.8	22.9	94.5	16.8	95.4	10.0
CO	PCC	Le Beau 2	1	23	63.9	53.1	28.8	13.2	35.7	40.9	21.9	11.1	9.0	4.4	99.6	25.7	98.7	18.3	98.0	11.8
CO	PCC	Le Beau 2	2	16	61.6	50.3	24.5	10.6	34.6	39.3	21.1	10.3	8.6	3.5	94.8	23.6	93.3	16.4	94.1	11.6
CO	PCC	Le Beau 3	1	107	65.7	54.0	28.0	11.6	35.5	40.3	21.6	10.7	8.9	4.3	102.3	26.0	99.7	18.3	99.6	12.1
CO	PCC	Le Beau 3	2	106	62.6	52.0	25.0	9.6	34.9	38.9	20.7	10.0	8.9	3.7	96.6	24.5	95.4	16.7	95.9	11.1
CO	PCC	Talking Crow	2	3	62.0	42.0	24.7	9.7	34.3	39.7	21.3	10.0	9.0	4.4	91.0	24.3	95.3	18.7	96.3	12.7
CO	PCC	Lower Loup	1	3	66.3	53.7	25.3	12.0	33.7	39.7	22.0	12.3	8.9	4.1	101.0	25.3	99.0	18.7	98.7	11.3
CO	PCC	Lower Loup	2	2	61.5	53.0	21.0	11.0	35.0	39.5	22.5	9.5	9.3	4.0	96.0	25.5	99.5	16.5	99.5	11.5
CO	PCC	Heart River 1	1	5	63.8	54.6	28.6	13.4	34.6	40.0	22.6	11.4	9.2	3.9	98.8	24.2	98.2	20.2	98.4	13.4
CO	PCC	Heart River 1	2	11	62.5	52.3	23.5	10.6	34.5	38.6	21.3	11.6	9.5	3.9	94.1	23.5	96.0	18.2	95.7	11.3
CO	PCC	Crying Hill	1	1	58.0	51.0	20.0	12.0	32.0	37.0	24.0	9.0	10.8	2.2	96.0	23.0	97.0	17.0	97.0	9.0
CO	PCC	Crying Hill	2	4	63.0	53.5	23.3	9.5	34.3	38.5	22.5	11.8	10.3	3.6	94.8	23.8	97.0	19.3	97.0	11.5
CO	DC	Pawnee	1	15	65.3	54.3	27.5	12.5	35.3	41.3	22.3	11.1	9.3	4.0	102.3	25.4	101.3	18.2	101.2	12.1
CO	DC	Pawnee	2	8	61.4	50.1	21.3	10.0	35.6	39.5	20.6	9.9	8.1	3.1	95.6	22.6	95.0	17.6	96.1	12.1
CO	DC	Arikara	1	30	67.5	54.8	29.2	12.0	36.2	41.1	21.3	11.0	9.1	4.5	103.7	26.2	100.0	18.5	100.1	11.5
CO	DC	Arikara	2	23	64.1	51.2	23.0	9.2	36.0	39.6	20.7	9.9	8.9	3.6	97.6	23.6	95.7	17.4	96.1	11.1
CO	DC	Mandan	1	4	65.3	56.3	27.0	11.0	36.0	40.8	21.8	10.8	7.9	4.0	100.3	28.8	100.8	19.5	99.8	12.0
CO	DC	Mandan	2	2	62.0	53.0	18.5	11.0	33.0	36.5	22.0	8.5	9.2	3.4	95.0	23.0	92.0	15.5	93.0	8.0
CO	DC	Hidatsa	2	1	58.0	51.0	23.0	7.0	34.0	37.0	20.0	9.0	10.7	2.9	98.0	23.0	90.0	18.0	92.0	11.0
CO	DC	Omaha	1	9	65.2	52.8	24.2	11.7	35.7	41.1	21.7	10.2	9.3	4.0	104.1	25.4	100.4	18.3	100.0	13.0
CO	DC	Omaha	2	6	63.3	52.2	21.7	11.2	35.7	39.7	20.8	9.0	8.9	3.7	97.0	23.7	96.7	16.8	96.5	13.2
CO	DC	Ponca	1	9	63.9	52.7	24.0	11.8	34.3	40.7	22.1	11.7	9.1	4.2	99.0	23.0	98.7	18.9	98.8	11.4
CO	DC	Ponca	2	10	61.4	50.3	22.9	10.9	35.1	39.6	20.7	10.5	8.9	3.5	95.8	24.2	94.7	18.0	94.9	12.4
MI	M	Steed-Kisker	1	6	67.2	56.0	27.3	14.8	34.7	41.2	25.2	11.0	10.9	4.5	106.0	26.7	104.3	17.7	104.3	12.7
MI	M	Steed-Kisker	2	3	67.0	56.7	26.0	13.7	35.3	39.3	23.7	11.0	10.6	4.7	99.0	25.7	100.0	16.7	99.0	11.0

Table B-4. Continued.

TR VAR	PHASE	SEX	N	MAB	MAL	MDH	MDB	OBH	OBB	DKB	NDS	WNB	SIS	ZMB	SSS	FMB	NAS	EKB	DKS
ON	Vermillion Bluf	1	2	62.5	49.0	26.0	12.0	35.5	39.5	21.5	12.0	8.5	5.5	99.0	22.0	100.5	17.5	99.0	9.5
ON	Ioway	1	2	61.5	54.5	23.5	11.5	35.5	41.0	21.5	12.0	9.3	4.9	95.5	28.0	99.5	22.0	99.0	14.5
ON	Leary	1	1	65.0	49.0	25.0	11.0	35.0	42.0	25.0	13.0	10.5	4.3	102.0	25.0	103.0	19.0	105.0	13.0
ON	Kansa	1	3	65.0	54.0	25.3	12.3	34.7	40.0	22.7	11.0	7.8	3.4	102.3	23.3	99.7	17.7	101.0	11.3
ON	Kansa	2	3	63.7	50.3	24.3	12.0	35.3	40.0	21.0	11.3	10.2	4.0	97.3	23.0	93.3	19.0	96.3	13.0
EQ	Historic Sioux	1	6	69.2	55.0	26.2	11.8	35.8	42.8	22.2	11.5	9.1	4.7	102.5	24.2	101.7	19.7	101.3	13.2
EQ	Intrusive Sioux	1	2	67.0	54.5	23.5	11.0	34.5	42.0	22.0	11.0	6.9	3.8	97.0	22.5	101.0	20.0	101.5	12.0
EQ	Intrusive Sioux	2	5	62.8	52.8	21.2	8.8	33.8	38.6	21.2	10.6	8.8	4.2	96.8	22.4	95.0	17.0	95.6	11.8
	Grand Means		860	64.3	52.9	25.8	11.4	35.1	40.0	21.6	10.5	9.0	4.0	99.5	24.8	98.0	17.7	98.2	11.6

Table B-5. Means by Phase, by Sex, Section 3.

TR	VAR	PHASE	SEX	N	IML	XML	MLS	WMH	SDS	GLS	STB	STS	FRC	FRS	FRF	PAC	PAS	PAF	OCC	OCS
PI		Paleo-Indian	1	4	32.0	52.8	10.5	26.8	6.8	4.3	110.3	30.0	111.3	22.3	51.5	111.8	21.0	59.3	104.5	34.5
PI		Paleo-Indian	2	3	34.3	50.3	10.0	25.7	5.0	2.3	105.7	30.7	107.7	22.7	46.0	109.0	23.0	57.7	94.3	26.7
AR		Archaic	1	5	34.0	50.8	10.0	24.2	7.2	3.6	107.2	30.6	111.4	22.2	53.2	109.2	21.2	59.6	100.0	34.0
AR		Archaic	2	5	33.4	51.0	10.0	23.6	5.8	3.0	107.0	31.8	108.2	23.4	50.2	110.8	24.6	58.2	94.0	29.2
WD	M	KC Hopewell	1	2	37.5	56.0	12.5	22.0	8.5	4.0	104.0	28.0	109.5	24.0	50.5	118.5	27.5	64.0	99.5	32.0
WD	M	KC Hopewell	2	2	38.0	52.0	8.0	22.0	4.5	1.0	103.0	32.5	108.5	24.0	48.5	108.5	23.0	59.0	101.0	25.0
WD	M	Keith	1	3	36.7	53.7	10.7	23.3	6.0	2.7	108.3	29.3	112.0	26.0	50.7	111.3	25.0	58.3	97.0	34.0
WD	M	Keith	2	4	32.5	48.5	9.8	21.0	5.0	1.8	106.8	29.3	107.8	24.5	47.5	101.8	22.8	52.8	90.0	25.3
WD	M	Sonota	1	5	38.4	58.0	10.8	26.2	7.0	4.4	106.0	25.8	108.4	22.2	53.6	105.2	21.0	56.6	98.6	34.0
WD	M	Sonota	2	4	36.8	54.3	10.3	24.8	4.3	2.8	103.0	28.3	107.5	23.0	47.5	105.3	22.0	53.5	95.0	29.3
WD	M	Valley	1	1	38.0	58.0	10.0	27.0	7.0	8.0	100.0	21.0	111.0	21.0	50.0	103.0	23.0	55.0	98.0	29.0
WD	L	Truman	1	2	34.5	54.0	8.0	23.5	6.5	2.0	113.5	32.5	107.5	21.5	53.5	109.0	23.0	61.5	95.5	30.0
WD	L	Truman	2	1	33.0	48.0	11.0	20.0	3.0	1.0	99.0	30.0	107.0	24.0	47.0	109.0	24.0	56.0	94.0	34.0
WD	L	Loseke Creek	1	4	36.0	55.8	9.5	24.3	6.3	3.3	100.0	23.5	109.5	22.5	53.5	106.8	21.8	56.0	99.3	31.5
WD	L	Loseke Creek	2	2	34.0	49.0	7.5	21.0	4.0	1.5	100.5	26.5	103.0	21.5	47.0	101.0	21.0	51.5	90.0	27.5
WD	L	South Arvilla	1	7	37.0	56.3	10.0	26.0	5.9	3.3	104.9	25.6	109.7	22.0	50.7	111.7	22.7	60.7	100.1	32.4
WD	L	South Arvilla	2	6	35.5	53.0	9.8	23.0	4.2	1.7	104.3	27.0	105.5	21.0	44.2	104.3	20.7	55.2	95.7	28.7
WD	L	Great Oasis	1	2	37.5	53.5	10.0	25.0	7.5	5.0	109.5	29.0	116.5	23.0	60.0	109.0	24.0	58.5	99.5	27.5
WD	L	Great Oasis	2	3	37.0	51.0	11.0	23.0	5.7	2.0	101.7	27.3	105.7	22.0	47.3	102.3	23.0	53.7	94.3	27.0
WD	L	Devils L-Souris	1	6	39.8	55.3	10.3	25.7	6.5	4.0	102.0	25.5	115.8	22.5	56.0	107.8	19.5	53.7	95.5	32.0
WD	L	Devils L-Souris	2	4	35.5	52.8	9.8	22.3	5.8	1.8	109.0	29.8	107.5	22.5	48.5	107.3	23.5	57.8	95.3	29.0
MM	IMM	Anderson	1	1	35.0	52.0	9.0	19.0	6.0	3.0	103.0	26.0	103.0	20.0	57.0	102.0	22.0	59.0	92.0	27.0
MM	IMM	Anderson	2	2	37.0	53.5	10.5	20.5	5.0	1.5	111.0	29.0	106.0	23.5	45.5	101.5	22.5	52.0	92.5	29.0
MM	IMM	Grand Detour	1	3	30.7	46.7	11.0	19.7	6.3	4.3	110.0	27.0	106.3	22.7	49.7	104.0	22.7	52.0	92.7	30.0
MM	IMM	Grand Detour	2	2	32.0	49.5	11.5	23.0	2.5	1.0	109.5	30.0	104.0	25.5	40.0	109.0	23.5	48.5	96.5	32.0
MM	IMM	Mill Creek	1	3	37.3	53.7	11.0	24.0	5.7	3.3	109.0	28.0	111.3	24.0	56.0	107.7	22.3	48.7	103.3	30.0
MM	IMM	Mill Creek	2	1	32.0	48.0	8.0	18.0	4.0	2.0	107.0	31.0	100.0	23.0	48.0	93.0	19.0	40.0	90.0	27.0
MM	IMM	Over	1	1	35.0	51.0	12.0	25.0	7.0	4.0	105.0	28.0	107.0	23.0	46.0	107.0	31.0	55.0	89.0	26.0
MM	IMM	Over	2	5	33.4	48.8	10.0	18.8	2.8	1.2	105.4	29.4	102.8	23.2	44.2	101.4	23.0	53.6	89.2	26.6
MM	IMM	Upper Big Sioux	1	4	38.8	58.0	10.5	26.5	5.5	2.8	104.5	24.5	108.8	18.8	54.3	111.5	24.8	57.5	90.5	26.0
MM	IMM	Upper Big Sioux	2	3	31.0	51.0	10.0	25.7	4.7	1.7	105.7	26.7	110.0	23.7	46.7	108.3	20.7	56.0	99.0	30.3
MM	EMM	Ft. Yates	1	1	30.0	51.0	10.0	23.0	5.0	3.0	110.0	36.0	109.0	25.0	46.0	107.0	27.0	51.0	94.0	32.0
MM	EMM	Thomas Riggs	1	1	37.0	59.0	13.0	27.0	5.0	4.0	115.0	26.0	109.0	17.0	52.0	108.0	23.0	64.0	85.0	26.0
MM	EMM	Thomas Riggs	2	1	27.0	48.0	10.0	21.0	3.0	1.0	111.0	34.0	107.0	24.0	46.0	114.0	22.0	56.0	99.0	33.0
MM	TMM	Huff	2	1	32.0	51.0	9.0	25.0	7.0	3.0	107.0	28.0	109.0	23.0	56.0	115.0	23.0	64.0	99.0	38.0
CP		Smoky Hill	1	1	32.0	48.0	10.0	24.0	7.0	2.0	101.0	25.0	110.0	24.0	44.0	107.0	23.0	59.0	100.0	26.0
CP		Upper Republic	1	1	37.0	56.0	9.0	24.0	5.0	3.0	104.0	22.0	104.0	16.0	50.0	111.0	30.0	57.0	94.0	20.0
CP		Upper Republic	2	2	31.0	45.0	8.5	19.5	5.5	2.0	111.0	33.0	109.5	25.5	50.5	110.0	26.5	57.0	91.5	25.5
CP		Loup River	1	3	37.7	54.3	11.0	23.3	6.3	4.0	118.7	33.0	114.7	23.7	54.7	111.3	23.0	56.7	96.3	24.3
CP		Loup River	2	2	31.0	47.0	9.0	22.0	4.5	1.0	114.5	31.5	106.5	23.5	49.0	102.0	22.0	58.0	93.5	21.5
CP		Nebraska	1	2	32.5	50.5	10.5	24.5	4.5	2.0	113.5	31.0	111.0	22.5	55.0	104.5	23.5	57.0	93.5	22.0

Table B-5. Continued.

TR	VAR	PHASE	SEX	N	IML	XML	MLS	WMH	SOS	GLS	STB	STS	FRC	FRS	FRF	PAC	PAS	PAF	OCC	OCS
CP		Nebraska	2	3	32.0	51.7	9.3	23.3	4.3	2.0	113.3	31.7	108.3	22.0	54.7	96.3	23.3	52.0	94.0	23.0
CP		St. Helena	1	16	36.4	53.4	10.9	24.0	6.4	2.8	115.7	31.5	112.4	23.6	53.1	104.8	23.5	56.9	99.0	25.5
CP		St. Helena	2	11	32.5	50.1	10.2	22.0	4.3	2.1	108.0	30.0	106.2	22.8	50.2	102.0	23.0	55.5	92.8	23.5
CO	IC	Anoka	2	1	34.0	49.0	11.0	22.0	3.0	2.0	110.0	32.0	105.0	19.0	47.0	102.0	21.0	61.0	96.0	25.0
CO	EC	Le Compte	1	1	33.0	54.0	8.0	26.0	6.0	3.0	106.0	26.0	108.0	17.0	53.0	108.0	24.0	53.0	97.0	20.0
CO	EC	Akaska	1	4	39.3	58.5	11.3	22.5	5.0	3.5	111.8	27.8	109.0	21.8	55.3	103.3	23.3	56.0	92.8	25.3
CO	EC	La Roche	1	88	37.4	54.9	10.6	24.3	6.8	3.6	109.4	27.7	110.0	22.1	51.3	108.1	23.9	55.3	94.8	27.9
CO	EC	La Roche	2	73	34.2	51.1	10.2	22.5	4.9	2.0	106.8	29.0	106.7	23.1	47.0	104.4	22.7	53.1	92.3	27.5
CO	PCC	Redbird	2	3	35.7	51.3	9.7	23.0	5.0	1.3	107.3	26.7	106.3	22.3	48.7	105.7	21.0	56.0	88.7	31.0
CO	PCC	Felicia	1	1	32.0	51.0	9.0	22.0	6.0	2.0	108.0	26.0	110.0	22.0	47.0	106.0	23.0	52.0	90.0	26.0
CO	PCC	Felicia	2	1	31.0	47.0	9.0	24.0	4.0	2.0	104.0	26.0	109.0	26.0	51.0	101.0	18.0	58.0	87.0	26.0
CO	PCC	Bad River 1	1	6	39.3	56.7	10.8	25.0	6.0	3.5	106.7	25.3	112.0	22.3	53.3	110.8	22.3	57.8	96.3	30.8
CO	PCC	Bad River 1	2	5	34.8	51.6	10.8	24.0	3.8	1.8	107.0	28.6	109.0	22.8	49.0	106.8	21.8	55.8	92.4	30.6
CO	PCC	Bad River 2	1	18	37.0	54.4	10.6	23.9	5.7	2.7	107.4	26.6	109.8	21.1	53.1	105.2	22.7	56.8	94.1	28.1
CO	PCC	Bad River 2	2	21	34.2	49.9	10.2	22.1	4.0	1.5	107.4	28.6	104.8	22.9	47.5	103.8	21.8	54.7	89.8	28.0
CO	PCC	Le Beau 1	1	16	36.7	55.3	11.6	25.8	6.0	3.7	107.6	26.4	109.9	21.9	51.1	108.4	23.8	55.3	93.4	26.8
CO	PCC	Le Beau 1	2	8	36.5	50.0	10.6	21.3	4.3	2.3	104.6	28.3	104.3	22.3	47.1	102.9	24.4	55.4	89.1	23.0
CO	PCC	Le Beau 2	1	23	35.8	53.9	10.9	22.0	6.1	3.5	109.0	27.9	110.5	23.3	49.9	105.0	23.0	52.7	94.7	27.4
CO	PCC	Le Beau 2	2	16	32.9	48.4	10.4	20.9	3.9	1.9	107.8	29.0	104.9	23.2	45.9	103.4	22.6	51.6	90.1	27.5
CO	PCC	Le Beau 3	1	107	36.4	53.9	10.1	24.3	6.6	3.2	108.4	27.9	110.8	22.8	50.9	108.7	23.6	54.9	93.8	28.3
CO	PCC	Le Beau 3	2	106	33.9	50.7	10.1	22.3	4.7	1.8	107.6	29.5	107.3	23.6	47.3	104.8	22.8	53.6	92.3	27.2
CO	PCC	Talking Crow	2	3	35.0	49.7	10.7	23.0	5.7	2.0	108.7	27.3	106.3	23.0	47.7	107.3	22.0	52.3	89.0	27.0
CO	PCC	Lower Loup	1	3	38.0	53.7	9.0	24.7	6.3	3.0	110.7	27.7	107.7	21.3	50.3	108.0	23.3	56.0	89.3	26.3
CO	PCC	Lower Loup	2	2	32.5	51.5	9.5	22.0	5.5	2.0	111.5	30.5	108.0	22.5	48.5	104.5	20.5	53.5	88.5	24.0
CO	PCC	Heart River 1	1	5	34.2	51.4	9.4	24.2	6.8	3.4	109.0	31.2	115.0	23.8	52.6	108.6	21.8	51.0	98.6	34.4
CO	PCC	Heart River 1	2	11	33.7	50.8	9.1	21.4	5.2	2.0	110.5	32.7	107.6	23.6	47.2	103.5	22.7	53.4	93.2	28.6
CO	PCC	Crying Hill	1	1	36.0	53.0	11.0	20.0	5.0	4.0	92.0	24.0	102.0	21.0	42.0	104.0	20.0	49.0	88.0	25.0
CO	PCC	Crying Hill	2	4	36.0	51.5	9.3	22.5	5.8	1.5	109.5	34.3	110.5	25.0	48.0	107.8	21.5	54.5	93.8	30.3
CO	DC	Pawnee	1	15	37.0	53.0	10.2	24.3	7.3	3.5	108.3	26.9	108.1	21.3	50.8	104.7	22.7	53.3	94.9	28.9
CO	DC	Pawnee	2	8	33.1	49.0	9.3	22.1	4.5	1.9	107.5	27.8	105.0	22.6	44.9	99.8	21.1	51.4	89.8	27.0
CO	DC	Arikara	1	30	35.7	53.9	10.2	24.0	6.2	3.0	109.4	27.4	111.0	23.2	50.0	107.6	22.8	53.3	96.1	31.1
CO	DC	Arikara	2	23	34.3	51.1	10.1	23.0	4.5	2.0	105.1	26.3	106.5	24.0	46.3	102.4	21.7	52.3	92.0	29.0
CO	DC	Mandan	1	4	37.0	56.0	10.8	24.8	7.0	2.5	111.0	32.3	112.5	24.0	49.5	110.3	22.5	59.3	97.5	30.8
CO	DC	Mandan	2	2	35.0	52.0	11.5	24.0	4.5	1.5	98.5	24.0	103.5	22.5	43.0	100.5	19.0	58.5	92.5	29.5
CO	DC	Hidatsa	2	1	38.0	58.0	12.0	22.0	5.0	1.0	108.0	32.0	111.0	27.0	48.0	110.0	24.0	61.0	94.0	35.0
CO	DC	Omaha	1	9	34.2	52.2	9.2	24.4	6.0	3.0	111.6	27.0	109.8	23.3	51.6	101.0	21.1	55.8	92.9	28.8
CO	DC	Omaha	2	6	33.5	51.3	10.0	28.7	5.0	2.2	111.7	27.8	104.3	22.8	46.2	95.8	19.3	52.2	92.0	27.3
CO	DC	Ponca	1	9	35.8	53.7	9.9	22.6	7.1	3.6	109.6	26.1	107.9	22.3	49.7	102.3	22.2	56.1	89.6	25.1
CO	DC	Ponca	2	10	31.7	49.8	9.0	22.5	4.8	1.9	109.0	27.3	106.8	23.1	50.7	100.1	20.9	53.6	90.4	25.9
MI	M	Steed-Kisker	1	6	35.5	53.5	9.3	25.3	7.2	4.8	116.7	29.8	114.0	22.8	57.3	104.8	23.7	57.8	99.0	26.2
MI	M	Steed-Kisker	2	3	33.0	52.0	11.3	22.0	5.3	2.3	108.7	26.0	104.7	20.0	50.0	105.0	24.0	57.3	98.3	26.3

Table B-5. Continued.

TR VAR	PHASE	SEX	N	IML	XML	MLS	WMH	SOS	GLS	STB	STS	FRC	FRS	FRF	PAC	PAS	PAF	OCC	OCS
ON	Vermillion Bluf	1	2	36.0	52.5	9.5	25.0	6.0	4.0	110.5	30.0	112.0	23.0	55.0	102.5	24.5	59.5	96.0	28.5
ON	Ioway	1	2	37.5	52.5	9.0	23.5	7.0	2.5	114.5	32.0	112.5	22.5	49.0	108.5	22.5	57.0	96.5	27.5
ON	Leary	1	1	34.0	49.0	8.0	23.0	6.0	2.0	120.0	37.0	120.0	22.0	49.0	121.0	32.0	63.0	99.0	28.0
ON	Kansa	1	3	37.3	55.0	8.0	25.7	4.3	2.3	113.3	26.3	112.3	23.0	48.0	103.3	21.3	56.0	94.3	27.0
ON	Kansa	2	3	35.7	50.3	9.0	23.7	3.3	1.0	114.7	32.7	107.0	22.7	48.7	109.3	24.7	59.0	91.7	24.0
EQ	Historic Sioux	1	6	39.0	57.2	10.5	26.8	5.5	2.5	109.0	28.7	112.3	22.5	54.2	110.2	22.7	60.3	90.8	29.0
EQ	Intrusive Sioux	1	2	40.0	58.0	12.5	23.0	6.0	3.0	115.5	30.0	113.5	25.0	50.0	106.0	24.0	56.0	95.5	29.0
EQ	Intrusive Sioux	2	5	33.0	51.8	9.8	23.0	3.8	1.2	104.6	27.0	104.2	21.0	45.0	99.2	18.4	52.2	92.2	31.0
	Grand Means		860	35.4	52.6	10.2	23.4	5.6	2.6	108.3	28.4	108.8	22.8	49.6	105.9	22.8	54.7	93.8	28.0

Table B-6. Means by Phase, by Sex, Section 4.

TR	VAR	PHASE	SEX	N	OCF	FOL	FOB	NAR	SSR	PRR	DKR	ZOR	FMR	EKR	ZMR	AVR	BRR	VRR	LAR	OSR
PI		Paleo-Indian	1	4	58.3	36.3	33.8	99.5	99.8	107.8	87.3	85.3	82.0	76.0	76.3	85.5	121.8	123.8	110.3	43.5
PI		Paleo-Indian	2	3	48.3	36.0	28.3	92.3	95.3	103.0	81.7	81.0	78.3	73.0	73.7	82.0	123.7	125.3	103.0	40.0
AR		Archaic	1	5	46.2	34.6	30.2	96.2	98.8	106.0	84.0	82.2	79.4	73.4	75.0	84.0	118.8	120.8	106.0	39.0
AR		Archaic	2	5	42.0	34.2	25.8	94.6	95.2	102.6	82.8	80.6	78.2	72.4	72.2	79.8	113.8	117.4	101.8	40.8
WD	M	KC Hopewell	1	2	50.5	33.0	29.5	97.5	95.0	99.5	84.5	81.0	82.0	73.5	73.0	83.0	127.0	130.5	107.0	41.5
WD	M	KC Hopewell	2	2	52.5	36.5	30.0	94.5	94.5	99.5	83.5	81.0	80.0	72.5	72.5	79.0	124.0	125.0	105.0	43.0
WD	M	Keith	1	3	51.7	37.0	30.0	93.0	95.0	103.7	83.0	80.7	80.0	74.7	75.7	80.7	116.7	120.7	108.7	42.3
WD	M	Keith	2	4	43.0	35.0	28.8	91.8	90.5	97.3	80.0	76.5	76.3	69.0	68.3	78.5	115.0	117.5	98.5	39.5
WD	M	Sonota	1	5	48.2	34.4	29.8	98.2	101.8	106.2	87.6	85.4	82.2	76.6	77.2	86.0	115.6	116.8	102.2	39.4
WD	M	Sonota	2	4	45.5	35.0	29.5	94.5	95.5	100.8	83.0	80.3	78.5	72.0	72.0	79.5	113.5	116.0	103.3	44.8
WD	M	Valley	1	1	51.0	36.0	34.0	101.0	100.0	106.0	87.0	83.0	84.0	77.0	75.0	88.0	122.0	124.0	107.0	40.0
WD	L	Truman	1	2	53.0	41.0	30.5	98.0	100.0	103.5	87.0	83.0	82.0	74.5	74.5	84.0	116.5	118.5	102.5	47.0
WD	L	Truman	2	1	42.0	34.0	30.0	88.0	95.0	101.0	79.0	76.0	74.0	68.0	68.0	75.0	111.0	115.0	100.0	41.0
WD	L	Loseke Creek	1	4	53.3	38.5	32.3	99.3	96.3	98.3	87.5	84.3	81.8	75.5	74.0	79.5	117.5	120.3	106.3	47.3
WD	L	Loseke Creek	2	2	41.0	35.5	29.5	93.0	94.5	98.5	80.0	79.5	75.5	73.0	70.5	79.0	109.5	112.5	97.0	41.5
WD	L	South Arvilla	1	7	46.7	36.6	31.3	99.4	99.3	102.7	86.7	84.3	81.3	75.9	75.6	82.9	117.1	119.1	104.4	42.6
WD	L	South Arvilla	2	6	45.0	36.2	29.2	92.8	95.5	100.0	81.3	79.8	76.5	71.2	71.2	79.2	114.2	116.3	103.3	40.3
WD	L	Great Oasis	1	2	48.5	38.5	30.5	101.0	101.0	104.5	86.5	82.0	84.5	75.0	74.5	84.5	127.5	128.0	107.0	46.0
WD	L	Great Oasis	2	3	52.0	35.3	29.0	90.0	92.7	99.3	78.7	75.7	73.7	68.7	70.0	79.0	113.7	116.7	96.7	42.0
WD	L	Devils L-Souris	1	6	45.0	36.7	30.5	99.5	99.7	103.7	86.0	82.8	79.5	73.7	74.8	84.3	119.3	121.5	104.8	41.5
WD	L	Devils L-Souris	2	4	47.8	37.5	30.5	95.8	98.3	102.3	83.3	83.5	79.5	73.3	75.0	82.3	117.0	119.0	101.8	41.5
MM	IMM	Anderson	1	1	48.0	35.0	29.0	96.0	94.0	99.0	83.0	80.0	78.0	72.0	73.0	83.0	120.0	120.0	95.0	35.0
MM	IMM	Anderson	2	2	45.0	38.0	30.0	91.5	91.0	96.5	80.0	77.5	77.0	70.5	72.5	78.0	113.5	117.0	101.0	43.5
MM	IMM	Grand Detour	1	3	42.3	36.7	28.7	99.3	98.3	105.0	85.3	81.7	80.7	75.3	75.7	83.0	119.3	120.7	103.3	41.7
MM	IMM	Grand Detour	2	2	41.5	30.5	24.0	92.5	91.5	99.5	82.5	79.0	76.5	72.5	71.0	78.0	117.5	122.0	108.5	38.0
MM	IMM	Mill Creek	1	3	53.0	36.3	30.0	96.0	98.0	102.0	83.7	80.3	81.7	73.7	71.7	81.3	125.7	128.7	105.7	44.3
MM	IMM	Mill Creek	2	1	54.0	31.0	28.0	91.0	89.0	98.0	80.0	76.0	77.0	69.0	65.0	74.0	116.0	116.0	89.0	37.0
MM	IMM	Over	1	1	38.0	38.0	31.0	97.0	94.0	101.0	85.0	81.0	84.0	76.0	74.0	87.0	120.0	124.0	99.0	46.0
MM	IMM	Over	2	5	42.4	32.4	24.2	92.8	93.6	98.2	82.4	79.0	76.2	70.0	71.6	78.4	116.0	118.2	99.6	42.0
MM	IMM	Upper Big Sioux	1	4	42.3	39.0	30.0	97.3	97.8	102.5	84.0	81.8	77.8	73.5	74.0	82.0	115.3	118.3	101.8	43.8
MM	IMM	Upper Big Sioux	2	3	41.3	37.0	28.7	96.7	97.7	103.0	86.7	84.7	80.0	75.7	73.3	80.0	115.3	116.3	102.7	39.0
MM	EMM	Ft. Yates	1	1	44.0	34.0	28.0	89.0	93.0	94.0	78.0	74.0	72.0	67.0	67.0	73.0	120.0	122.0	99.0	45.0
MM	EMM	Thomas Riggs	1	1	54.0	40.0	31.0	99.0	100.0	106.0	85.0	83.0	80.0	75.0	75.0	90.0	121.0	123.0	95.0	43.0
MM	EMM	Thomas Riggs	2	1	44.0	36.0	26.0	94.0	97.0	104.0	83.0	81.0	80.0	74.0	72.0	82.0	118.0	122.0	111.0	42.0
MM	TMM	Huff	2	1	39.0	38.0	24.0	103.0	104.0	114.0	91.0	88.0	79.0	74.0	74.0	91.0	121.0	123.0	107.0	36.0
CP		Smoky Hill	1	1	56.0	36.0	28.0	94.0	95.0	101.0	81.0	80.0	77.0	70.0	70.0	78.0	120.0	124.0	107.0	40.0
CP		Upper Republic	1	1	49.0	39.0	30.0	99.0	103.0	105.0	85.0	85.0	83.0	76.0	76.0	79.0	118.0	124.0	100.0	46.0
CP		Upper Republic	2	2	45.5	35.5	27.0	93.5	92.5	97.5	81.0	77.5	73.5	68.5	71.0	75.5	117.5	122.5	103.0	39.5
CP		Loup River	1	3	58.3	33.3	28.7	98.7	100.3	107.0	86.7	83.7	81.0	75.7	76.7	84.0	127.3	128.0	102.3	39.7
CP		Loup River	2	2	40.5	36.5	29.5	91.0	93.0	99.5	80.5	78.0	75.5	71.5	70.5	80.0	115.0	116.5	98.0	40.0
CP		Nebraska	1	2	52.0	35.0	30.5	94.0	95.5	102.0	83.5	78.5	78.0	70.0	70.5	81.5	122.5	124.5	103.5	42.0

Table B-6. Continued.

TR	VAR	PHASE	SEX	N	OCF	FOL	FOB	NAR	SSR	PRR	DKR	ZOR	FMR	EKR	ZMR	AVR	BRR	VRR	LAR	OSR
CP		Nebraska	2	3	51.0	35.7	29.7	94.0	96.7	105.0	83.3	79.0	77.0	71.0	70.7	79.0	118.3	121.0	96.3	41.0
CP		St. Helena	1	16	55.9	36.6	29.5	96.4	96.8	102.5	84.2	80.3	78.3	72.1	71.9	80.3	123.3	125.6	105.4	41.0
CP		St. Helena	2	11	50.3	34.6	28.3	90.3	91.3	98.9	78.9	76.9	74.9	68.9	68.8	78.8	117.0	119.1	99.4	39.9
CO	IC	Anoka	2	1	52.0	36.0	32.0	99.0	98.0	105.0	88.0	85.0	82.0	77.0	78.0	88.0	120.0	121.0	102.0	36.0
CO	EC	Le Compte	1	1	45.0	38.0	29.0	97.0	99.0	101.0	85.0	80.0	77.0	72.0	74.0	80.0	119.0	121.0	100.0	47.0
CO	EC	Akaska	1	4	52.3	36.8	29.0	98.3	99.8	104.0	85.5	84.3	81.3	75.8	77.3	84.8	118.8	121.0	100.0	40.5
CO	EC	La Roche	1	88	46.5	37.4	31.0	97.5	98.6	103.4	85.0	81.3	80.2	73.9	73.9	83.3	118.8	121.4	101.9	41.5
CO	EC	La Roche	2	73	44.6	34.8	28.6	92.5	93.9	99.7	81.6	78.7	76.5	70.7	70.8	79.1	114.3	117.0	99.9	39.0
CO	PCC	Redbird	2	3	45.7	34.0	26.7	94.7	91.3	97.0	82.3	79.3	76.0	71.3	72.0	78.0	112.7	113.7	100.7	39.7
CO	PCC	Felicia	1	1	48.0	40.0	33.0	94.0	97.0	100.0	82.0	78.0	75.0	68.0	69.0	81.0	114.0	118.0	98.0	46.0
CO	PCC	Felicia	2	1	46.0	35.0	26.0	95.0	93.0	100.0	81.0	77.0	77.0	69.0	67.0	80.0	115.0	115.0	97.0	37.0
CO	PCC	Bad River 1	1	6	46.7	39.8	31.2	100.3	101.0	105.0	88.8	84.2	81.5	76.0	77.3	82.0	120.3	123.3	104.8	41.3
CO	PCC	Bad River 1	2	5	45.4	38.0	29.6	90.8	93.4	99.2	80.0	77.8	74.6	69.8	69.4	77.8	116.0	118.8	105.2	42.4
CO	PCC	Bad River 2	1	18	48.2	37.7	30.5	96.7	97.4	102.6	84.4	80.9	78.4	73.4	73.9	83.7	118.9	121.2	102.3	40.6
CO	PCC	Bad River 2	2	21	44.0	35.4	28.5	91.6	92.6	98.4	80.4	77.7	75.0	69.5	69.9	77.5	113.0	115.3	98.0	38.5
CO	PCC	Le Beau 1	1	16	44.3	38.4	30.8	97.4	99.4	104.3	85.0	82.1	80.6	75.1	74.7	83.7	117.8	120.9	101.5	42.2
CO	PCC	Le Beau 1	2	8	45.1	34.8	28.9	91.3	92.0	97.8	80.4	76.9	74.5	69.8	70.1	76.6	113.1	115.1	96.3	40.5
CO	PCC	Le Beau 2	1	23	46.7	35.0	27.6	97.4	98.1	103.4	85.3	81.7	80.0	73.6	73.5	82.2	118.6	121.2	102.9	40.2
CO	PCC	Le Beau 2	2	16	41.6	32.9	26.6	90.8	92.6	97.8	79.9	77.2	75.2	69.3	69.9	77.7	112.4	115.4	99.0	39.0
CO	PCC	Le Beau 3	1	107	46.3	37.0	30.7	96.8	98.6	103.5	84.9	81.3	79.0	73.3	73.4	82.9	118.1	120.8	102.1	41.4
CO	PCC	Le Beau 3	2	106	44.1	34.4	28.6	91.5	93.5	99.5	80.6	78.2	75.5	69.9	70.0	78.5	113.5	116.5	100.0	38.9
CO	PCC	Talking Crow	2	3	41.3	33.7	27.7	94.3	95.7	101.7	83.7	80.3	76.3	71.7	73.3	80.3	113.7	115.3	97.0	37.7
CO	PCC	Lower Loup	1	3	48.0	37.0	31.0	98.0	98.0	103.3	84.7	81.3	78.0	73.0	73.7	82.3	117.7	118.3	97.0	39.3
CO	PCC	Lower Loup	2	2	40.5	37.5	28.5	91.5	92.0	97.5	81.0	78.5	77.0	70.5	70.0	75.0	118.0	119.0	98.5	40.5
CO	PCC	Heart River 1	1	5	47.4	35.6	28.8	97.8	97.2	103.0	84.2	80.6	78.4	72.2	72.6	82.6	119.6	122.4	106.8	43.0
CO	PCC	Heart River 1	2	11	44.5	35.5	28.2	94.8	94.8	100.1	82.2	80.2	77.5	71.6	72.0	78.9	115.9	118.9	101.9	42.5
CO	PCC	Crying Hill	1	1	40.0	32.0	24.0	92.0	94.0	104.0	80.0	80.0	75.0	70.0	71.0	78.0	113.0	113.0	97.0	37.0
CO	PCC	Crying Hill	2	4	44.5	33.3	29.3	94.5	94.3	100.5	80.8	79.5	75.8	70.3	71.0	80.8	116.0	118.0	101.8	37.3
CO	DC	Pawnee	1	15	48.8	37.3	31.1	95.6	97.7	102.8	83.5	80.2	77.4	71.9	73.1	83.7	117.0	119.9	101.9	41.8
CO	DC	Pawnee	2	8	44.3	35.9	29.5	91.0	91.0	96.0	80.3	76.4	74.3	69.1	69.0	76.5	111.3	113.8	97.3	39.1
CO	DC	Arikara	1	30	48.0	36.5	30.6	97.3	98.7	104.4	84.5	81.1	79.1	73.5	72.6	82.9	117.5	120.5	103.7	40.3
CO	DC	Arikara	2	23	44.6	35.9	28.9	92.0	92.8	99.0	80.8	77.7	75.4	70.3	69.9	79.7	112.3	114.6	98.6	40.2
CO	DC	Mandan	1	4	44.0	39.5	31.3	99.3	103.3	109.3	87.3	85.3	81.0	76.3	76.0	86.5	119.8	121.5	104.8	42.3
CO	DC	Mandan	2	2	45.0	33.5	27.0	88.0	92.5	100.0	77.5	77.0	73.5	69.5	70.0	79.0	111.0	112.5	102.5	39.0
CO	DC	Hidatsa	2	1	48.0	37.0	28.0	93.0	95.0	101.0	82.0	82.0	75.0	71.0	74.0	79.0	115.0	118.0	105.0	39.0
CO	DC	Omaha	1	9	48.0	36.4	30.4	95.9	96.7	101.4	84.4	80.3	78.0	72.1	72.6	82.0	116.6	117.2	98.7	38.3
CO	DC	Omaha	2	6	46.3	34.7	28.2	90.7	90.7	95.8	80.3	77.2	74.3	68.7	69.5	76.8	112.7	113.7	98.2	38.8
CO	DC	Ponca	1	9	45.0	35.8	30.1	95.7	94.1	98.1	82.7	79.1	76.9	71.4	71.9	78.1	114.0	115.1	97.0	39.1
CO	DC	Ponca	2	10	44.5	35.1	29.6	92.1	91.2	95.9	80.6	76.5	74.5	68.8	67.9	76.9	113.5	114.4	96.9	40.1
MI	M	Steed-Kisker	1	6	54.5	32.3	30.5	97.5	98.0	104.3	84.8	80.8	81.3	73.7	72.3	83.0	124.2	127.7	106.8	38.3
MI	M	Steed-Kisker	2	3	46.0	33.7	30.3	94.0	94.7	102.3	82.0	78.3	79.0	71.3	70.0	79.0	117.0	120.7	101.7	39.3

Table B-6. Continued.

TR VAR	PHASE	SEX	N	OCF	FOL	FOB	NAR	SSR	PRR	DKR	ZOR	FMR	EKR	ZMR	AVR	BRR	VRR	LAR	OSR
ON	Vermillion Bluf	1	2	48.5	37.0	33.0	96.0	93.0	95.0	81.5	79.5	79.5	73.0	70.5	78.0	121.0	124.0	102.0	45.0
ON	Ioway	1	2	41.5	36.0	30.5	103.5	104.5	107.0	89.5	85.0	82.5	76.0	76.5	83.5	124.5	126.0	102.0	44.0
ON	Leary	1	1	45.0	35.0	30.0	96.0	91.0	93.0	81.0	75.0	78.0	69.0	68.0	73.0	133.0	136.0	106.0	42.0
ON	Kansa	1	3	44.7	36.7	31.3	97.0	96.0	101.7	85.0	82.0	80.0	73.7	73.0	80.7	121.3	121.7	101.7	40.7
ON	Kansa	2	3	41.3	35.7	28.0	92.7	91.3	96.7	81.0	77.0	73.7	68.3	69.3	76.7	120.7	122.0	99.7	39.0
EQ	Historic Sioux	1	6	42.5	36.3	31.3	97.3	98.0	103.7	85.0	83.0	78.3	72.8	75.3	83.3	119.8	121.2	103.0	38.7
EQ	Intrusive Sioux	1	2	44.5	36.0	30.5	99.5	98.0	102.5	86.5	85.0	80.0	75.0	77.5	83.5	122.5	123.5	102.5	36.5
EQ	Intrusive Sioux	2	5	47.2	34.0	28.6	90.2	90.2	96.8	81.8	77.6	73.6	68.4	68.4	75.6	112.0	113.4	100.2	37.4
	Grand Means		860	46.3	35.9	29.6	94.9	96.1	101.5	83.1	80.1	77.9	72.1	72.2	80.9	116.7	119.2	101.4	40.5

Table B-7. Means by Phase, by Sex, Section 5.

TR	VAR	PHASE	SEX	N	BAR	NAA	PRA	BAA	NBA	BBA	SSA	NFA	DKA	NDA	SIA	FRA	PAA	OCA	STA	CBA
PI		Paleo-Indian	1	4	16.3	67.3	72.8	40.5	79.3	52.8	129.8	141.8	146.0	96.3	103.8	136.3	138.5	112.0	123.3	151.8
PI		Paleo-Indian	2	3	13.0	71.7	69.7	38.7	82.3	51.7	128.7	143.7	150.3	101.3	102.0	133.7	134.0	121.3	120.0	155.3
AR		Archaic	1	5	12.6	71.2	69.2	39.4	76.0	55.6	127.4	140.0	149.4	95.4	96.2	136.4	137.2	111.6	120.8	157.6
AR		Archaic	2	5	13.8	70.2	72.0	38.0	74.4	55.0	128.6	141.8	148.8	101.2	120.6	133.0	132.2	115.6	118.6	153.6
WD	M	KC Hopewell	1	2	16.5	66.5	78.0	35.0	84.5	49.0	132.0	145.0	148.0	101.5	114.5	131.0	130.5	114.0	123.5	151.0
WD	M	KC Hopewell	2	2	17.0	66.5	76.5	37.0	83.5	49.5	126.5	143.0	150.5	92.5	112.5	132.0	134.0	125.5	115.5	149.0
WD	M	Keith	1	3	15.0	69.0	69.0	41.7	76.3	56.0	133.3	146.7	149.0	104.7	110.3	129.7	131.3	109.7	123.0	153.3
WD	M	Keith	2	4	13.3	65.5	73.3	41.3	77.3	54.8	127.8	141.0	146.0	95.8	116.3	130.8	131.8	121.3	122.5	155.0
WD	M	Sonota	1	5	11.4	69.2	70.4	40.4	74.0	55.0	127.6	138.4	145.8	102.0	89.2	135.2	136.4	110.4	128.6	160.4
WD	M	Sonota	2	4	16.3	70.0	69.8	40.5	78.3	54.5	126.8	140.3	147.8	95.5	105.5	133.3	135.0	116.5	123.3	151.8
WD	M	Valley	1	1	15.0	65.0	73.0	42.0	77.0	53.0	129.0	142.0	154.0	80.0	80.0	138.0	132.0	119.0	134.0	155.0
WD	L	Truman	1	2	21.5	65.0	75.5	40.0	78.0	51.5	124.0	141.5	141.5	89.5	88.0	136.5	134.0	115.0	120.5	143.0
WD	L	Truman	2	1	14.0	73.0	69.0	38.0	77.0	56.0	122.0	139.0	144.0	108.0	129.0	131.0	132.0	108.0	118.0	153.0
WD	L	Loseke Creek	1	4	18.5	61.8	81.8	36.8	77.5	51.8	132.3	140.0	147.3	89.3	83.5	135.3	135.3	114.3	130.3	148.3
WD	L	Loseke Creek	2	2	13.0	66.0	72.5	42.0	73.5	54.5	123.5	146.5	150.5	82.5	86.0	134.5	134.5	117.0	124.5	156.0
WD	L	South Arvilla	1	7	14.4	64.0	74.4	41.7	75.7	53.7	127.4	139.0	148.9	81.0	79.4	136.0	135.3	113.7	128.4	155.7
WD	L	South Arvilla	2	6	14.2	67.2	72.0	41.2	77.8	53.5	124.0	140.0	148.7	88.8	93.0	135.7	136.3	117.8	125.8	154.3
WD	L	Great Oasis	1	2	19.0	63.0	76.5	40.5	80.0	51.5	125.5	143.5	148.0	91.0	102.0	137.0	131.5	122.0	124.0	147.5
WD	L	Great Oasis	2	3	16.7	65.3	72.3	41.7	79.7	52.0	127.0	140.7	149.0	87.0	97.7	134.7	131.3	120.0	123.3	149.0
WD	L	Devils L-Souris	1	6	13.5	65.3	73.3	41.0	73.3	56.8	128.5	135.8	143.0	91.0	92.5	137.5	139.8	111.2	127.3	156.8
WD	L	Devils L-Souris	2	4	14.8	66.8	73.8	39.8	77.3	53.3	126.5	140.3	149.3	87.0	88.0	134.5	132.5	117.3	123.0	153.3
MM	IMM	Anderson	1	1	16.0	62.0	76.0	42.0	83.0	49.0	127.0	139.0	146.0	80.0	87.0	137.0	132.0	119.0	126.0	151.0
MM	IMM	Anderson	2	2	14.5	66.0	75.0	39.0	76.5	54.0	135.0	143.5	152.5	94.0	113.0	131.5	132.0	116.0	125.0	154.5
MM	IMM	Grand Detour	1	3	13.3	68.0	72.0	40.3	77.7	52.0	128.3	137.7	148.0	86.0	85.3	133.7	133.3	113.3	127.7	157.0
MM	IMM	Grand Detour	2	2	15.0	64.5	71.0	45.0	81.0	51.5	129.5	142.0	144.0	112.0	114.5	126.0	133.0	112.0	122.5	152.5
MM	IMM	Mill Creek	1	3	18.7	64.3	75.0	40.7	83.3	50.0	124.0	143.7	149.7	95.0	97.7	133.3	134.7	119.7	126.0	147.0
MM	IMM	Mill Creek	2	1	9.0	69.0	70.0	41.0	78.0	52.0	120.0	144.0	146.0	97.0	100.0	131.0	135.0	117.0	120.0	163.0
MM	IMM	Over	1	1	20.0	62.0	74.0	44.0	80.0	50.0	141.0	148.0	131.0	93.0	85.0	133.0	120.0	119.0	124.0	145.0
MM	IMM	Over	2	5	16.8	65.0	75.6	39.4	81.0	50.0	125.6	137.6	145.0	99.8	110.2	130.6	130.8	117.8	122.0	149.2
MM	IMM	Upper Big Sioux	1	4	16.0	65.5	74.8	39.8	76.3	53.8	129.0	138.8	150.5	88.3	94.3	141.5	132.3	120.3	129.5	152.0
MM	IMM	Upper Big Sioux	2	3	13.7	65.0	73.0	41.7	75.0	56.3	123.0	138.7	145.0	87.7	92.7	132.7	138.3	116.0	126.7	155.0
MM	EMM	Ft. Yates	1	1	21.0	61.0	81.0	38.0	86.0	50.0	124.0	139.0	148.0	82.0	70.0	130.0	126.0	111.0	114.0	144.0
MM	EMM	Thomas Riggs	1	1	12.0	69.0	70.0	41.0	77.0	53.0	126.0	140.0	150.0	85.0	89.0	145.0	133.0	114.0	131.0	160.0
MM	EMM	Thomas Riggs	2	1	16.0	70.0	71.0	39.0	81.0	52.0	127.0	146.0	153.0	90.0	80.0	131.0	138.0	112.0	117.0	151.0
MM	TMM	Huff	2	1	12.0	69.0	69.0	41.0	75.0	54.0	125.0	131.0	141.0	82.0	96.0	134.0	136.0	103.0	125.0	156.0
CP		Smoky Hill	1	1	18.0	67.0	77.0	36.0	81.0	52.0	123.0	138.0	150.0	98.0	101.0	131.0	133.0	125.0	127.0	144.0
CP		Upper Republic	1	1	22.0	65.0	83.0	32.0	82.0	47.0	125.0	148.0	151.0	78.0	73.0	146.0	123.0	134.0	134.0	143.0
CP		Upper Republic	2	2	10.5	69.0	74.5	36.5	75.5	55.5	131.5	135.5	144.5	94.5	108.5	130.0	128.5	121.5	118.5	160.0
CP		Loup River	1	3	11.3	74.3	68.7	36.7	78.7	54.0	128.3	141.0	149.3	93.3	101.7	134.7	135.3	124.3	121.7	160.3
CP		Loup River	2	2	14.5	68.0	72.5	39.5	79.5	54.0	128.5	143.5	150.0	98.0	97.5	132.5	132.5	130.5	122.5	154.0
CP		Nebraska	1	2	14.0	69.5	72.0	38.5	79.5	53.0	124.5	141.0	147.0	98.0	110.0	136.0	131.5	129.0	123.0	155.0

Table B-7. Continued.

TR	VAR	PHASE	SEX	N	BAR	NAA	PRA	BAA	NBA	BBA	SSA	NFA	DKA	NDA	SIA	FRA	PAA	OCA	STA	CBA
CP		Nebraska	2	3	13.3	71.0	69.3	39.7	78.0	53.0	127.0	142.7	149.0	92.7	101.0	135.7	128.0	127.0	121.7	156.0
CP		St. Helena	1	16	13.1	67.4	71.4	41.3	78.4	54.0	127.3	141.2	147.0	99.5	105.9	134.2	131.3	124.6	123.1	157.4
CP		St. Helena	2	11	13.4	70.3	69.9	40.0	79.4	53.4	126.9	143.9	149.5	103.2	115.4	133.4	131.1	125.9	122.1	155.1
CO	IC	Anoka	2	1	5.0	75.0	68.0	36.0	74.0	54.0	130.0	139.0	140.0	106.0	120.0	140.0	134.0	125.0	120.0	170.0
CO	EC	Le Compte	1	1	13.0	63.0	73.0	43.0	78.0	53.0	126.0	134.0	146.0	85.0	89.0	145.0	132.0	135.0	128.0	157.0
CO	EC	Akaska	1	4	13.5	67.8	71.8	41.0	76.8	54.3	131.3	141.8	149.5	93.3	99.0	136.3	131.3	122.3	127.3	157.5
CO	EC	La Roche	1	88	15.4	65.9	72.7	41.4	77.7	53.3	127.2	140.4	147.7	89.6	90.2	136.0	132.2	118.9	126.6	153.8
CO	EC	La Roche	2	73	13.5	67.9	70.9	41.3	77.1	54.5	127.2	141.7	147.1	94.4	103.3	132.6	132.9	118.2	123.2	155.5
CO	PCC	Redbird	2	3	12.7	64.0	73.7	42.3	73.7	55.3	132.7	135.3	143.7	93.0	101.0	134.3	136.3	110.0	127.0	157.3
CO	PCC	Felicia	1	1	15.0	63.0	73.0	44.0	76.0	55.0	124.0	137.0	142.0	90.0	106.0	136.0	133.0	120.0	129.0	154.0
CO	PCC	Felicia	2	1	13.0	64.0	72.0	44.0	74.0	56.0	125.0	141.0	146.0	85.0	95.0	129.0	140.0	118.0	127.0	156.0
CO	PCC	Bad River 1	1	6	16.2	65.3	73.8	40.8	77.5	53.3	129.3	139.3	148.0	90.8	90.5	136.3	136.2	114.7	129.3	153.0
CO	PCC	Bad River 1	2	5	12.4	67.8	70.2	41.8	76.8	55.4	124.8	140.4	149.6	94.8	109.0	134.2	135.4	112.8	124.0	157.6
CO	PCC	Bad River 2	1	18	14.8	65.4	72.8	41.9	77.7	53.6	128.7	139.2	145.1	93.4	97.6	137.8	133.0	118.3	127.4	154.4
CO	PCC	Bad River 2	2	21	13.4	66.5	71.2	42.2	77.6	54.1	127.0	140.7	146.4	94.2	101.2	132.3	134.3	116.2	124.0	155.3
CO	PCC	Le Beau 1	1	16	15.1	66.5	71.6	41.9	76.9	54.0	127.0	142.5	151.4	89.8	83.9	136.3	132.3	120.2	128.1	154.1
CO	PCC	Le Beau 1	2	8	13.8	67.3	72.3	40.6	77.8	53.1	127.0	140.9	151.4	89.0	96.1	133.4	128.9	125.0	123.4	154.8
CO	PCC	Le Beau 2	1	23	15.0	66.2	72.1	41.6	77.5	54.0	125.4	139.3	147.0	89.2	93.7	133.8	132.4	119.4	126.0	153.7
CO	PCC	Le Beau 2	2	16	14.6	66.6	71.9	41.8	77.9	53.9	126.9	141.3	146.4	91.3	103.3	131.8	132.4	116.9	123.8	153.5
CO	PCC	Le Beau 3	1	107	15.7	66.0	71.8	42.2	77.2	53.8	126.1	139.7	145.7	90.5	92.2	135.0	132.8	117.6	125.9	152.7
CO	PCC	Le Beau 3	2	106	14.5	67.8	70.5	41.7	77.3	54.6	126.2	141.4	147.4	92.1	101.0	132.1	132.9	118.8	122.7	153.5
CO	PCC	Talking Crow	2	3	13.0	68.0	71.3	40.7	76.0	54.7	123.7	137.3	143.7	93.3	91.7	132.7	135.3	117.0	126.7	156.7
CO	PCC	Lower Loup	1	3	10.7	67.7	71.0	41.3	76.0	55.0	126.3	138.3	147.3	83.7	96.0	136.7	133.0	118.7	126.7	162.0
CO	PCC	Lower Loup	2	2	11.0	66.5	71.5	42.0	77.0	55.0	124.0	143.5	147.0	100.0	98.0	134.5	137.0	123.0	122.5	160.0
CO	PCC	Heart River 1	1	5	16.0	64.6	73.2	42.2	75.6	55.0	127.8	135.2	141.6	89.4	101.6	134.6	136.2	109.8	120.6	151.8
CO	PCC	Heart River 1	2	11	14.6	66.8	73.1	40.3	77.3	53.4	127.1	138.5	146.8	85.3	102.6	131.9	132.5	116.7	118.8	153.6
CO	PCC	Crying Hill	1	1	16.0	71.0	71.0	37.0	80.0	51.0	129.0	141.0	152.0	106.0	136.0	134.0	138.0	120.0	125.0	149.0
CO	PCC	Crying Hill	2	4	13.8	67.3	70.0	42.5	76.5	56.0	126.8	136.8	146.0	87.8	113.3	130.8	136.5	114.0	116.0	154.8
CO	DC	Pawnee	1	15	14.2	66.5	71.3	42.3	76.7	53.8	127.2	140.4	146.3	90.7	99.9	136.8	132.9	117.0	127.2	155.7
CO	DC	Pawnee	2	8	11.5	66.4	71.8	42.0	74.6	56.1	129.5	139.3	145.0	92.9	104.4	132.5	134.1	117.9	125.5	159.0
CO	DC	Arikara	1	30	15.2	66.0	71.1	42.9	76.7	54.5	126.4	139.5	147.8	88.2	91.3	134.2	133.9	114.0	126.9	153.8
CO	DC	Arikara	2	23	13.3	66.8	71.3	42.0	75.6	55.6	128.5	140.2	147.8	92.1	102.9	130.6	133.9	115.1	126.7	156.7
CO	DC	Mandan	1	4	15.5	67.0	70.0	43.0	76.5	54.5	120.5	138.0	146.5	90.8	92.0	133.0	135.3	115.0	120.0	152.5
CO	DC	Mandan	2	2	14.5	68.5	67.5	43.5	78.5	53.5	128.0	142.5	155.0	104.5	108.0	132.0	138.0	114.5	128.0	153.0
CO	DC	Hidatsa	2	1	11.0	69.0	69.0	43.0	74.0	59.0	130.0	136.0	146.0	96.0	123.0	127.0	132.0	107.0	119.0	159.0
CO	DC	Omaha	1	9	11.4	66.3	69.0	44.7	75.2	56.4	128.0	139.7	143.7	93.2	99.0	133.7	134.0	116.4	128.6	160.6
CO	DC	Omaha	2	6	11.7	65.7	70.0	44.5	76.3	54.8	127.8	141.5	142.0	98.2	101.7	132.3	135.8	118.2	127.5	159.2
CO	DC	Ponca	1	9	10.7	65.4	73.0	41.6	74.0	55.9	130.1	138.1	147.8	87.2	96.0	134.7	132.7	121.1	129.3	161.8
CO	DC	Ponca	2	10	12.0	65.7	72.6	41.4	75.0	55.4	126.4	138.5	144.2	89.2	103.9	132.9	134.5	120.0	127.1	158.9
MI	M	Steed-Kisker	1	6	12.7	68.8	72.0	39.3	76.8	54.2	126.7	142.5	145.0	97.8	101.2	136.0	131.2	124.2	125.8	158.5
MI	M	Steed-Kisker	2	3	15.3	68.3	73.3	38.3	79.7	50.7	125.7	143.0	148.0	94.0	97.0	138.3	130.7	122.7	129.3	152.3

Table B-7. Continued.

TR VAR	PHASE	SEX	N	BAR	NAA	PRA	BAA	NBA	BBA	SSA	NFA	DKA	NDA	SIA	FRA	FAA	OCA	STA	CBA
ON	Vermillion Bluf	1	2	20.0	59.5	84.0	36.5	79.5	51.5	132.0	142.0	152.5	83.5	75.5	135.0	128.0	118.5	123.0	146.0
ON	Ioway	1	2	15.5	66.5	75.5	38.0	76.5	52.0	119.5	132.5	139.5	83.5	88.0	136.0	134.5	120.0	121.5	152.5
ON	Leary	1	1	14.0	60.0	82.0	38.0	82.0	54.0	128.0	139.0	145.0	88.0	101.0	139.0	124.0	121.0	117.0	156.0
ON	Kansa	1	3	12.0	65.7	71.3	42.7	76.7	55.0	131.0	141.0	147.7	91.7	100.7	135.0	134.7	120.0	130.0	160.0
ON	Kansa	2	3	8.7	66.7	71.0	42.3	79.0	54.3	129.7	136.0	142.7	86.0	103.7	133.7	131.3	124.3	120.7	164.7
EQ	Historic Sioux	1	6	11.3	68.5	68.7	43.0	75.0	56.2	129.5	137.8	144.8	87.7	88.3	136.2	135.0	114.8	124.7	160.5
EQ	Intrusive Sioux	1	2	10.0	65.5	72.5	42.0	74.0	57.5	130.0	137.0	147.0	90.0	84.5	132.0	131.5	117.5	125.0	163.0
EQ	Intrusive Sioux	2	5	10.8	68.2	70.2	41.6	76.0	55.2	130.2	140.6	145.0	90.2	92.0	135.4	139.2	111.8	125.6	160.0
	Grand Means		860	14.3	66.8	71.8	41.4	77.2	54.0	127.1	140.3	146.9	91.9	97.7	134.1	133.1	118.0	124.8	154.6

Table B-8. Standard Deviations by Phase, by Sex, Section 1.

TR	VAR	PHASE	SEX	N	GOL	NOL	BNL	BBH	XCB	XFB	WFB	ZYB	AUB	WCB	ASB	BPL	NPH	NLH	JUB	NLB
PI		Paleo-Indian	1	4	3.70	4.57	4.80	6.45	6.70	4.97	5.68	2.63	4.93	2.75	1.50	4.55	2.50	2.52	2.00	2.45
PI		Paleo-Indian	2	3	5.86	5.20	2.08	1.53	8.39	6.00	4.36	4.04	4.36	4.04	4.58	1.53	2.65	2.00	1.53	1.00
AR		Archaic	1	5	6.44	5.07	4.00	3.39	4.82	5.72	3.16	6.14	3.36	3.70	3.44	3.16	3.51	3.51	4.27	.89
AR		Archaic	2	5	4.66	4.09	8.85	7.92	9.88	6.38	2.05	2.00	6.42	6.83	4.88	9.34	2.39	1.82	7.23	1.14
WD	M	KC Hopewell	1	2	3.54	4.24	.00	2.83	3.54	5.66	4.95	2.12	2.83	4.24	1.41	.71	9.19	2.83	.00	.71
WD	M	KC Hopewell	2	2	6.36	7.78	2.12	11.31	2.12	.00	.00	12.73	3.54	4.24	9.90	7.07	4.95	.71	4.24	1.41
WD	M	Keith	1	3	4.93	3.79	2.08	1.00	2.65	4.04	3.46	5.57	5.03	2.08	5.03	3.00	1.53	.57	5.51	1.00
WD	M	Keith	2	4	5.91	5.44	4.65	6.85	2.75	2.50	2.36	3.00	2.52	1.71	2.22	1.91	5.06	3.10	2.99	1.73
WD	M	Sonota	1	5	2.59	1.64	2.88	1.14	4.67	4.04	4.15	7.22	7.19	1.87	4.39	2.51	2.30	3.08	4.32	1.30
WD	M	Sonota	2	4	.57	.96	4.90	3.41	4.72	5.00	5.91	9.54	7.72	6.13	5.85	5.25	4.08	3.86	6.02	2.16
WD	M	Valley	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
WD	L	Truman	1	2	4.95	4.24	1.41	2.12	.71	2.83	9.19	7.78	5.66	4.95	2.12	4.24	.71	1.41	9.90	2.12
WD	L	Truman	2	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
WD	L	Loseke Creek	1	4	7.50	7.18	2.38	5.20	3.00	3.59	3.69	5.91	6.05	2.75	3.87	3.11	5.56	1.71	2.75	1.41
WD	L	Loseke Creek	2	2	6.36	4.95	.00	1.41	1.41	1.41	3.54	.71	2.83	.00	.00	1.41	3.54	1.41	2.12	.00
WD	L	South Arvilla	1	7	2.94	3.78	3.09	5.56	5.65	4.81	5.28	5.13	6.18	4.32	3.87	4.04	3.67	3.20	3.05	2.43
WD	L	South Arvilla	2	6	3.02	3.08	2.94	5.58	4.92	3.71	2.80	6.38	5.82	3.66	5.16	2.94	4.23	4.37	4.80	2.00
WD	L	Great Oasis	1	2	13.44	14.14	.00	3.54	8.49	5.66	2.12	2.83	6.36	.71	.71	5.66	.00	.00	4.95	.71
WD	L	Great Oasis	2	3	5.86	6.66	5.51	5.03	5.29	5.29	4.51	4.04	4.04	1.15	6.00	5.29	5.03	2.65	4.16	1.15
WD	L	Devils L-Souris	1	6	5.57	5.32	3.99	4.76	5.23	2.71	7.20	6.80	5.75	5.39	6.83	4.71	2.07	1.63	6.42	2.06
WD	L	Devils L-Souris	2	4	5.94	5.74	1.50	3.16	4.40	4.50	3.87	4.35	4.50	6.24	5.07	2.87	2.38	2.99	8.54	2.22
MM	IMM	Anderson	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
MM	IMM	Anderson	2	2	1.41	1.41	3.54	4.24	.71	1.41	1.41	6.36	3.54	.71	4.95	2.83	2.83	4.95	9.19	.71
MM	IMM	Grand Detour	1	3	2.52	1.53	2.08	5.13	10.44	5.13	4.04	3.61	6.93	4.36	5.57	.57	3.51	4.93	3.05	.57
MM	IMM	Grand Detour	2	2	6.36	7.07	6.36	.00	6.36	7.07	2.12	1.41	.71	2.12	.71	12.73	1.41	1.41	2.83	2.83
MM	IMM	Mill Creek	1	3	7.02	7.00	2.89	1.15	4.51	3.79	3.79	5.00	4.58	.57	2.65	2.52	3.51	.57	6.66	3.61
MM	IMM	Mill Creek	2	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
MM	IMM	Over	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
MM	IMM	Over	2	5	3.21	3.36	3.91	4.04	6.34	1.79	2.86	5.17	5.22	2.59	3.00	5.85	3.13	2.17	4.27	2.05
MM	IMM	Upper Big Sioux	1	4	10.69	9.95	3.30	5.12	5.91	7.14	4.80	1.89	2.75	2.22	4.16	5.32	3.30	2.52	4.11	1.91
MM	IMM	Upper Big Sioux	2	3	1.53	2.08	1.73	3.51	4.58	8.39	3.21	1.53	3.05	4.93	5.69	3.21	3.05	2.00	3.51	1.00
MM	EMM	Ft. Yates	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
MM	EMM	Thomas Riggs	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
MM	EMM	Thomas Riggs	2	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
MM	TMM	Huff	2	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CP		Smoky Hill	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CP		Upper Republic	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CP		Upper Republic	2	2	3.54	3.54	2.83	12.02	.00	.71	2.12	1.41	5.66	3.54	2.12	4.24	7.78	4.24	2.83	.71
CP		Loup River	1	3	7.51	6.35	6.43	5.20	10.12	5.20	3.00	5.51	7.64	2.65	4.73	5.51	2.65	1.73	3.21	2.65
CP		Loup River	2	2	7.07	6.36	4.24	5.66	3.54	4.95	4.95	2.83	.00	3.54	7.78	.00	.71	1.41	.71	3.54
CP		Nebraska	1	2	2.12	2.12	.00	7.78	1.41	.71	.00	1.41	.71	5.66	.71	.71	4.95	2.12	8.49	2.12

Table B-8. Continued.

TR	VAR	PHASE	SEX	N	GOL	NOL	BNL	BBH	XCB	XFB	WFB	ZYB	AUB	WCB	ASB	BPL	NPH	NLH	JUB	NLB
CP		Nebraska	2	3	10.12	9.24	3.51	2.00	6.56	5.86	2.65	2.00	5.86	1.15	3.05	6.81	3.79	2.65	1.73	1.53
CP		St. Helena	1	16	5.77	5.64	5.76	7.30	6.53	6.56	4.44	7.73	5.72	3.55	4.28	6.06	6.17	3.37	6.72	2.13
CP		St. Helena	2	11	6.28	6.03	3.19	5.04	4.67	3.49	2.89	6.09	4.78	3.59	3.06	2.84	3.91	2.96	4.87	1.58
CO	IC	Anoka	2	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CO	EC	Le Compte	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CO	EC	Akaska	1	4	2.65	2.22	3.83	4.97	1.50	1.73	3.46	1.41	2.38	3.70	4.65	8.42	3.65	2.45	1.50	1.71
CO	EC	La Roche	1	88	6.14	6.06	3.62	3.77	5.14	4.70	4.50	4.40	4.09	3.84	4.45	4.61	3.61	2.09	4.28	1.89
CO	EC	La Roche	2	73	6.37	6.34	3.74	4.73	4.82	4.25	3.99	4.19	4.13	3.79	5.19	4.48	4.03	2.63	3.64	1.74
CO	PCC	Redbird	2	3	5.69	6.24	5.51	9.07	6.66	1.00	2.08	3.79	6.66	3.79	4.36	3.00	1.73	1.15	1.53	.57
CO	PCC	Felicia	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CO	PCC	Felicia	2	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CO	PCC	Bad River 1	1	6	2.93	2.61	2.56	3.66	4.27	4.84	3.97	1.64	2.51	3.06	3.69	5.01	3.66	3.97	3.27	1.36
CO	PCC	Bad River 1	2	5	8.87	8.31	2.49	2.70	5.07	1.14	3.27	5.22	3.90	3.35	6.87	3.56	5.07	2.68	4.93	1.67
CO	PCC	Bad River 2	1	18	7.04	7.00	3.78	4.97	6.23	4.95	3.54	4.67	5.39	2.72	4.12	4.40	4.06	2.95	4.48	1.62
CO	PCC	Bad River 2	2	21	6.00	6.25	2.20	4.34	4.93	4.04	3.80	3.88	3.97	2.80	4.25	2.94	3.28	2.14	3.53	1.80
CO	PCC	Le Beau 1	1	16	5.00	4.85	4.23	5.42	4.19	3.77	5.20	4.65	3.76	3.32	4.20	3.76	3.42	2.66	4.04	1.99
CO	PCC	Le Beau 1	2	8	4.31	4.21	4.22	4.47	6.30	5.72	4.80	2.82	2.87	1.99	4.89	3.02	4.24	3.58	2.06	1.69
CO	PCC	Le Beau 2	1	23	5.82	5.18	3.27	4.74	4.89	4.00	4.78	5.62	5.19	3.46	4.14	5.01	4.80	3.28	6.01	1.87
CO	PCC	Le Beau 2	2	16	5.54	5.81	4.02	5.47	4.06	4.33	3.50	4.09	4.06	2.59	4.24	6.82	3.85	3.16	4.07	1.63
CO	PCC	Le Beau 3	1	107	6.05	5.91	3.85	4.35	4.47	3.69	3.82	5.17	4.93	3.34	4.32	4.15	3.93	3.12	4.04	1.60
CO	PCC	Le Beau 3	2	106	5.30	5.24	3.77	4.68	4.16	3.79	4.02	4.13	4.49	3.03	3.61	3.91	3.55	2.34	3.67	1.72
CO	PCC	Talking Crow	2	3	11.24	10.26	4.16	2.89	2.08	.57	2.89	6.66	6.24	3.61	3.46	7.02	3.21	1.53	6.81	3.05
CO	PCC	Lower Loup	1	3	4.58	5.69	3.51	4.04	4.73	1.53	3.61	2.00	1.00	1.53	1.53	5.77	3.00	4.16	1.53	2.52
CO	PCC	Lower Loup	2	2	4.24	4.95	1.41	.71	2.83	.00	.00	3.54	7.07	4.95	5.66	1.41	1.41	1.41	.00	.71
CO	PCC	Heart River 1	1	5	6.40	5.86	3.56	3.78	2.51	2.70	2.95	5.68	6.30	4.15	3.21	2.61	4.97	2.07	4.04	1.30
CO	PCC	Heart River 1	2	11	4.98	5.06	4.87	4.54	5.17	3.58	3.24	4.54	4.35	1.99	3.75	5.06	3.89	3.19	3.99	1.66
CO	PCC	Crying Hill	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CO	PCC	Crying Hill	2	4	4.42	4.04	5.19	2.87	5.12	2.63	2.87	3.86	3.30	2.38	3.83	2.50	2.75	3.86	2.45	1.71
CO	DC	Pawnee	1	15	5.22	5.18	3.41	4.39	5.62	4.56	4.33	3.40	4.56	4.03	5.65	4.57	2.23	2.06	4.30	1.36
CO	DC	Pawnee	2	8	4.37	4.23	3.62	6.20	5.37	3.04	3.11	5.38	5.44	2.42	3.37	4.37	2.32	1.85	3.50	1.51
CO	DC	Arikara	1	30	5.27	5.35	3.45	5.25	4.43	3.94	3.99	4.61	3.99	3.04	3.85	4.38	3.56	2.32	4.02	1.61
CO	DC	Arikara	2	23	5.48	5.56	3.52	3.78	5.24	3.27	2.93	4.76	4.05	1.97	4.64	5.11	3.88	2.27	5.72	2.04
CO	DC	Mandan	1	4	2.99	3.32	2.00	2.52	3.70	4.97	7.72	4.93	4.11	2.06	4.16	3.16	3.11	4.03	3.16	1.82
CO	DC	Mandan	2	2	6.36	7.07	2.83	5.66	4.24	4.95	.00	1.41	1.41	2.83	4.24	4.95	4.24	3.54	5.66	1.41
CO	DC	Hidatsa	2	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CO	DC	Omaha	1	9	7.42	7.32	3.08	4.42	4.54	3.41	3.10	5.33	5.58	3.75	2.59	2.91	5.21	3.12	3.97	1.81
CO	DC	Omaha	2	6	6.13	5.64	2.25	8.33	4.45	5.20	4.64	4.55	6.77	3.54	4.68	4.46	6.63	4.59	4.51	2.68
CO	DC	Ponca	1	9	5.51	5.46	2.62	3.82	6.20	4.58	4.12	4.39	5.27	3.75	6.94	2.95	4.16	2.93	3.88	2.40
CO	DC	Ponca	2	10	4.51	4.40	3.40	3.55	10.89	6.44	4.48	4.35	5.78	3.26	6.05	4.47	3.16	3.42	4.33	1.35
MI	M	Steed-Kisker	1	6	11.82	10.13	2.99	4.08	7.61	8.06	4.73	4.26	4.81	2.48	8.45	2.71	2.25	1.17	3.76	1.75
MI	M	Steed-Kisker	2	3	.57	.57	2.08	6.66	1.15	4.62	3.61	1.53	2.89	3.51	2.65	3.79	5.29	1.00	2.52	3.51

Table B-8. Continued.

TR VAR	PHASE	SEX	N	GOL	NOL	BNL	BBH	XCB	XFB	WFB	ZYB	AUB	WCB	ASB	BPL	NPH	NLH	JUB	NLB
ON	Vermillion Bluf	1	2	.71	1.41	.71	2.12	.71	1.41	5.66	4.24	.71	2.12	.71	4.95	4.24	1.41	1.41	1.41
ON	Ioway	1	2	4.24	4.95	15.56	11.31	2.12	7.78	4.24	3.54	2.12	2.12	1.41	7.78	2.12	.00	2.12	.71
ON	Leary	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
ON	Kansa	1	3	4.36	3.51	6.24	1.53	8.89	6.03	4.93	7.09	5.29	2.65	7.81	4.00	3.00	3.79	6.24	1.00
ON	Kansa	2	3	3.61	4.04	1.53	.57	9.61	7.23	3.05	5.13	6.51	4.62	4.04	2.89	4.04	3.21	6.11	1.53
EQ	Historic Sioux	1	6	7.00	6.57	4.46	3.45	2.99	2.99	2.74	5.83	3.61	1.33	2.58	2.26	3.39	3.02	5.95	2.10
EQ	Intrusive Sioux	1	2	10.61	9.90	7.07	6.36	.00	.71	2.12	4.24	1.41	2.83	9.19	.71	1.41	1.41	2.12	2.12
EQ	Intrusive Sioux	2	5	5.94	5.50	2.97	3.67	2.35	3.90	2.88	2.35	2.59	3.58	3.83	5.00	1.82	2.77	2.97	.45
	Within-Groups		767	5.91	5.79	3.80	4.75	5.12	4.34	4.08	4.79	4.66	3.40	4.46	4.43	3.86	2.72	4.35	1.78

Table B-9. Standard Deviations by Phase, by Sex, Section 2.

TR VAR	PHASE	SEX	N	MAB	MAL	MDH	MDB	OBH	OBB	DKB	NDS	WNB	SIS	ZMB	SSS	FMB	NAS	EKB	DKS
PI	Paleo-Indian	1	4	3.59	3.59	.50	.81	.57	.57	1.26	1.50	1.37	1.04	2.16	4.92	2.38	4.11	.81	3.56
PI	Paleo-Indian	2	3	1.15	1.00	4.58	1.15	2.00	1.00	1.53	2.08	.61	1.17	2.31	.57	2.52	1.15	1.53	1.53
AR	Archaic	1	5	.89	13.67	2.59	1.00	1.34	1.82	1.48	1.92	2.10	.90	3.49	2.07	2.83	1.22	2.83	2.70
AR	Archaic	2	5	1.67	4.97	2.70	2.39	1.14	1.34	1.92	1.30	2.24	1.00	3.35	1.48	3.27	1.92	1.67	1.79
WD M	KC Hopewell	1	2	3.54	1.41	.71	1.41	1.41	.00	.00	2.83	2.16	.71	2.83	4.95	1.41	.00	2.12	.00
WD M	KC Hopewell	2	2	7.07	9.19	2.12	.71	.71	2.83	.00	.71	.99	1.27	1.41	.71	4.24	4.24	2.83	2.83
WD M	Keith	1	3	.57	2.31	1.15	.57	1.15	1.53	1.53	1.53	.36	1.39	4.51	3.05	4.16	.57	3.79	1.53
WD M	Keith	2	4	2.89	1.29	2.22	1.50	1.50	2.06	1.29	1.26	1.46	.73	1.73	2.87	.96	.50	2.08	.57
WD M	Sonota	1	5	3.27	3.27	2.88	1.92	2.35	2.07	2.07	1.30	1.14	1.00	3.00	4.00	1.92	2.95	3.32	2.77
WD M	Sonota	2	4	3.56	3.00	1.26	2.87	1.26	1.41	1.82	.81	2.08	1.04	8.46	2.36	3.77	2.50	2.83	3.30
WD M	Valley	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.60	.10	.00	.00	.00	.00	.00	.00
WD L	Truman	1	2	5.66	2.83	.00	.71	2.83	.71	4.24	.00	1.10	.82	7.78	2.83	7.78	2.83	5.66	3.54
WD L	Truman	2	1	.00	.00	.00	.00	.00	.00	.00	.00	.90	.10	.00	.00	.00	.00	.00	.00
WD L	Loseke Creek	1	4	5.19	1.71	4.92	1.50	2.50	2.08	1.29	1.73	1.96	.88	3.11	1.26	2.63	.96	.96	1.73
WD L	Loseke Creek	2	2	.71	5.66	2.83	1.41	1.41	.71	1.41	1.41	1.52	.71	3.54	2.83	1.41	4.95	.71	.00
WD L	South Arvilla	1	7	2.37	1.90	3.21	1.15	2.15	2.08	1.81	1.46	1.47	1.19	4.08	2.44	2.81	2.37	2.87	3.73
WD L	South Arvilla	2	6	3.02	3.33	3.25	1.50	1.75	2.06	.75	.81	2.35	.79	3.88	2.23	3.50	2.99	2.80	2.34
WD L	Great Oasis	1	2	.71	2.83	2.83	1.41	4.24	2.12	2.12	.71	.99	1.00	2.83	3.54	2.83	2.83	1.41	2.12
WD L	Great Oasis	2	3	4.62	.57	4.00	1.53	.57	1.53	1.00	2.08	1.68	1.06	5.51	2.08	3.61	2.00	3.21	2.52
WD L	Devils L-Souris	1	6	6.07	3.16	4.51	1.96	1.38	1.94	2.16	1.64	2.32	1.17	2.42	2.61	4.96	1.64	3.92	1.75
WD L	Devils L-Souris	2	4	2.94	1.82	.50	.00	1.73	.96	1.26	1.00	1.59	.57	7.87	3.30	2.16	2.22	1.91	.57
MM IMM	Anderson	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.20	.80	.00	.00	.00	.00	.00	.00
MM IMM	Anderson	2	2	4.24	2.12	4.24	.00	1.41	2.12	3.54	.71	1.00	1.33	7.78	3.54	6.36	1.41	6.36	2.12
MM IMM	Grand Detour	1	3	2.52	3.51	2.08	1.15	1.53	2.89	1.15	.00	2.13	1.24	1.73	2.52	2.65	4.04	1.00	3.46
MM IMM	Grand Detour	2	2	2.83	4.24	.71	.71	.71	.71	2.83	2.12	2.83	.71	7.78	1.41	4.24	3.54	3.54	.71
MM IMM	Mill Creek	1	3	5.20	4.73	2.00	1.15	2.00	1.15	2.65	.00	1.66	.66	3.79	3.05	3.51	3.05	3.00	1.53
MM IMM	Mill Creek	2	1	.00	.00	.00	.00	.00	.00	.00	.00	.70	.80	.00	.00	.00	.00	.00	.00
MM IMM	Over	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.10	.00	.00	.00	.00	.00	.00	.00
MM IMM	Over	2	5	3.61	1.82	1.14	1.87	.84	1.00	2.17	1.34	2.57	.84	6.24	2.51	2.51	1.00	2.17	1.73
MM IMM	Upper Big Sioux	1	4	3.83	3.86	2.63	3.10	1.73	1.15	1.71	.96	1.78	.88	1.82	2.58	2.99	.00	3.32	1.29
MM IMM	Upper Big Sioux	2	3	6.08	.57	2.52	1.15	1.53	1.15	1.73	.00	.61	1.10	2.08	.57	2.31	2.65	2.08	2.00
MM EMM	Ft. Yates	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.80	.90	.00	.00	.00	.00	.00	.00
MM EMM	Thomas Riggs	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.10	.00	.00	.00	.00	.00	.00
MM EMM	Thomas Riggs	2	1	.00	.00	.00	.00	.00	.00	.00	.00	.60	.10	.00	.00	.00	.00	.00	.00
MM TMM	Huff	2	1	.00	.00	.00	.00	.00	.00	.00	.00	.60	.90	.00	.00	.00	.00	.00	.00
CP	Smoky Hill	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.70	.60	.00	.00	.00	.00	.00	.00
CP	Upper Republic	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.30	.90	.00	.00	.00	.00	.00	.00
CP	Upper Republic	2	2	5.66	4.95	1.41	1.41	2.83	2.12	.71	.71	1.73	1.58	1.41	3.54	4.95	1.41	4.95	2.12
CP	Loup River	1	3	5.13	5.20	3.21	1.53	1.00	.57	1.00	1.15	2.16	1.22	3.61	2.08	2.52	1.00	2.08	1.00
CP	Loup River	2	2	3.54	.00	.71	2.83	1.41	2.12	1.41	1.41	1.48	1.58	2.83	2.83	3.54	1.41	3.54	2.83
CP	Nebraska	1	2	9.19	.71	3.54	1.41	.71	.71	.71	2.83	2.88	1.73	6.36	.71	.00	.71	.71	.71

Table B-9. Continued.

TR	VAR	PHASE	SEX	N	MAB	MAL	MDH	MDB	OBH	OBB	DKB	NDS	WNB	SIS	ZMB	SSS	FMB	NAS	EKB	DKS
CP		Nebraska	2	3	2.31	4.00	4.51	1.15	1.73	.57	2.08	.57	1.03	.98	2.00	1.00	1.73	2.31	2.65	2.65
CP		St. Helena	1	16	4.97	3.68	2.54	1.21	2.03	2.19	2.06	.99	1.39	1.42	4.96	3.16	4.27	2.61	4.26	2.16
CP		St. Helena	2	11	4.24	3.78	2.72	1.29	1.68	1.79	1.69	1.13	1.81	.70	4.41	2.38	3.11	1.86	3.13	1.63
CO	IC	Anoka	2	1	.00	.00	.00	.00	.00	.00	.00	.00	.10	.90	.00	.00	.00	.00	.00	.00
CO	EC	Le Compte	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.10	.00	.00	.00	.00	.00	.00
CO	EC	Akaska	1	4	3.50	3.59	3.83	1.91	2.99	1.15	1.26	.50	1.86	1.53	3.00	2.63	2.22	3.51	2.50	2.75
CO	EC	La Roche	1	88	3.15	3.18	3.08	1.55	1.76	1.58	1.94	1.42	1.87	1.12	4.08	2.39	3.63	2.20	3.58	2.08
CO	EC	La Roche	2	73	3.04	3.22	3.44	1.51	1.54	1.42	1.88	1.42	2.08	1.12	4.05	2.45	3.53	2.22	3.27	2.13
CO	PCC	Redbird	2	3	2.00	1.15	2.31	1.53	1.53	.57	1.53	1.15	.90	1.35	6.11	1.00	1.73	1.73	1.00	3.05
CO	PCC	Felicia	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.50	.30	.00	.00	.00	.00	.00	.00
CO	PCC	Felicia	2	1	.00	.00	.00	.00	.00	.00	.00	.00	.40	.30	.00	.00	.00	.00	.00	.00
CO	PCC	Bad River 1	1	6	6.00	3.52	3.72	2.76	1.33	1.86	2.26	1.72	1.26	1.22	4.40	3.33	2.37	1.50	3.82	3.06
CO	PCC	Bad River 1	2	5	1.95	2.07	2.68	1.52	3.05	.89	1.52	1.22	1.45	.95	4.92	2.00	3.74	.89	3.91	1.52
CO	PCC	Bad River 2	1	18	4.12	2.97	3.26	1.54	1.80	1.92	1.53	1.54	2.04	1.10	5.04	2.92	3.36	2.14	3.48	1.88
CO	PCC	Bad River 2	2	21	3.44	2.42	2.80	1.46	2.25	1.40	1.55	1.35	1.60	1.01	3.37	2.38	2.30	2.09	2.22	1.81
CO	PCC	Le Beau 1	1	16	2.48	3.59	2.39	3.22	2.05	1.36	1.84	1.15	1.56	.98	3.14	3.59	2.61	2.14	2.48	2.00
CO	PCC	Le Beau 1	2	8	2.97	4.39	1.85	2.50	1.67	3.70	.92	.53	1.14	1.20	3.49	2.47	1.93	1.98	2.33	1.69
CO	PCC	Le Beau 2	1	23	3.00	3.07	3.19	1.82	1.29	2.11	2.22	1.39	1.83	1.27	5.88	2.10	3.92	2.40	3.70	2.14
CO	PCC	Le Beau 2	2	16	2.80	2.11	3.86	1.63	1.78	2.41	2.05	1.08	1.91	1.32	4.77	2.39	2.33	2.00	2.06	2.87
CO	PCC	Le Beau 3	1	107	2.91	2.57	3.27	1.57	1.93	1.59	2.14	1.19	1.66	.96	4.89	2.45	3.29	2.36	3.05	2.07
CO	PCC	Le Beau 3	2	106	3.14	2.58	2.68	1.66	1.77	1.56	1.86	1.29	1.50	1.11	3.95	2.49	3.41	2.12	2.91	1.92
CO	PCC	Talking Crow	2	3	5.29	15.10	7.51	1.53	1.15	.57	4.16	1.00	1.58	.49	8.54	1.15	6.11	2.89	5.13	.57
CO	PCC	Lower Loup	1	3	2.89	2.08	4.51	3.00	2.08	1.15	2.00	1.53	1.68	1.79	6.24	1.53	1.73	1.15	2.31	1.15
CO	PCC	Lower Loup	2	2	2.12	1.41	4.24	1.41	.00	.71	2.12	2.12	1.33	.00	1.41	2.12	.71	2.12	.71	2.12
CO	PCC	Heart River 1	1	5	3.27	2.07	3.05	3.21	1.52	1.87	1.52	1.14	1.38	1.55	3.96	4.09	3.27	2.39	2.61	2.07
CO	PCC	Heart River 1	2	11	2.21	3.07	2.88	2.11	1.81	2.20	2.65	1.69	1.29	1.19	3.08	2.30	3.52	2.04	3.49	1.55
CO	PCC	Crying Hill	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.80	.20	.00	.00	.00	.00	.00	.00
CO	PCC	Crying Hill	2	4	1.82	2.38	1.89	1.29	1.26	1.00	.57	.96	1.46	1.93	3.40	.96	2.16	2.36	1.82	1.29
CO	DC	Pawnee	1	15	3.46	2.71	2.33	1.92	1.91	1.62	1.84	1.73	1.54	1.22	3.81	2.35	3.44	2.27	3.63	1.73
CO	DC	Pawnee	2	8	5.10	2.42	2.76	2.00	1.99	1.77	1.85	1.46	1.27	.54	3.29	3.33	3.29	2.50	3.44	1.88
CO	DC	Arikara	1	30	3.51	2.92	3.34	1.80	1.83	1.56	1.48	1.30	2.18	1.28	5.29	3.17	3.72	1.99	3.65	1.81
CO	DC	Arikara	2	23	2.10	3.35	2.10	1.57	1.58	1.47	1.40	.96	1.71	1.11	3.95	2.79	2.55	1.50	2.58	1.97
CO	DC	Mandan	1	4	5.74	2.22	3.65	.81	.81	1.50	2.06	.50	1.37	1.00	4.99	1.50	4.57	1.73	4.86	1.15
CO	DC	Mandan	2	2	5.66	1.41	.71	1.41	.00	.71	1.41	.71	.28	.57	5.66	1.41	2.83	2.12	4.24	2.83
CO	DC	Hidatsa	2	1	.00	.00	.00	.00	.00	.00	.00	.00	.70	.90	.00	.00	.00	.00	.00	.00
CO	DC	Omaha	1	9	4.76	2.54	3.73	1.00	2.00	2.15	2.35	.97	1.87	.87	2.42	1.42	3.09	2.00	3.24	1.66
CO	DC	Omaha	2	6	2.87	2.93	2.42	1.83	1.36	1.36	1.83	.89	1.75	1.10	5.44	2.34	3.08	1.47	2.81	2.14
CO	DC	Ponca	1	9	2.37	2.06	3.00	1.39	1.66	2.35	1.27	1.22	1.57	1.40	4.09	2.24	3.39	1.76	3.77	.88
CO	DC	Ponca	2	10	3.53	3.09	2.33	1.45	2.08	1.65	1.77	1.08	1.49	1.08	3.64	1.87	4.74	3.05	3.96	2.22
MI	M	Steed-Kisker	1	6	2.32	2.45	4.23	2.14	1.86	2.14	1.17	1.26	2.33	1.05	2.97	.81	2.73	1.75	2.87	2.94
MI	M	Steed-Kisker	2	3	2.65	4.16	2.65	1.53	.57	2.08	2.52	.00	.66	.73	6.24	6.03	2.65	.57	3.00	1.73

Table B-9. Continued.

TR VAR	PHASE	SEX	N	MAB	MAL	MDH	MDB	OBH	OBB	DKB	NDS	WNB	SIS	ZMB	SSS	FMB	NAS	EKB	DKS
ON	Vermillion Bluf	1	2	.71	1.41	1.41	1.41	.71	.71	.71	1.41	.71	1.58	.00	2.83	.71	2.12	1.41	.71
ON	Ioway	1	2	.71	2.12	.71	2.12	2.12	1.41	.71	.00	1.48	2.20	3.54	2.83	3.54	2.83	2.83	2.12
ON	Leary	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.50	.30	.00	.00	.00	.00	.00	.00
ON	Kansa	1	3	1.00	3.61	5.13	1.15	1.15	1.00	1.53	1.00	.81	1.11	3.51	2.52	3.51	2.31	4.36	2.52
ON	Kansa	2	3	4.04	3.51	4.04	1.00	1.53	1.73	1.00	1.53	.87	1.22	7.02	2.65	3.05	3.61	3.05	2.65
EQ	Historic Sioux	1	6	2.32	2.00	3.19	2.04	.75	1.33	3.49	1.52	1.92	.91	3.83	1.94	4.41	1.21	4.68	1.17
EQ	Intrusive Sioux	1	2	.00	.71	3.54	1.41	2.12	1.41	2.83	.00	.91	.82	2.83	.71	2.83	2.83	6.36	1.41
EQ	Intrusive Sioux	2	5	1.10	3.27	2.95	1.92	2.05	.89	1.79	1.14	2.74	.95	4.15	2.07	2.45	2.45	2.51	1.92
	Within-Groups		767	3.33	3.21	3.07	1.71	1.78	1.69	1.91	1.31	1.67	1.00	4.38	2.56	3.37	2.21	3.20	2.07

Table B-10. Standard Deviations by Phase, by Sex, Section 3.

TR	VAR	PHASE	SEX	N	IML	XML	MLS	WMH	SOS	GLS	STB	STS	FRC	FRS	FRF	PAC	PAS	PAF	OCC	OCS
PI		Paleo-Indian	1	4	2.71	2.99	1.29	1.26	.50	1.71	5.91	6.00	6.29	2.99	1.91	4.50	1.82	1.50	5.26	3.41
PI		Paleo-Indian	2	3	.57	1.15	1.00	2.89	.00	1.15	5.51	3.79	2.52	2.89	2.00	2.00	1.00	3.05	4.04	4.51
AR		Archaic	1	5	3.08	2.59	1.41	1.30	1.48	1.14	2.49	5.94	4.16	1.79	3.11	7.33	2.86	6.31	6.67	4.64
AR		Archaic	2	5	3.51	1.41	1.41	1.52	.84	.71	6.20	3.27	6.22	2.51	2.39	9.42	4.28	5.97	5.79	3.03
WD	M	KC Hopewell	1	2	.71	1.41	.71	1.41	.71	1.41	4.24	4.24	.71	.00	14.85	10.61	6.36	5.66	4.95	.00
WD	M	KC Hopewell	2	2	1.41	1.41	1.41	1.41	.71	.00	1.41	6.36	.71	.00	.71	.71	2.83	1.41	4.24	2.83
WD	M	Keith	1	3	2.31	4.16	1.53	1.15	1.00	1.15	6.11	1.53	.00	1.00	2.52	3.05	1.00	1.53	6.56	6.24
WD	M	Keith	2	4	1.29	3.87	.96	3.16	.81	.96	3.86	3.40	3.86	4.36	5.07	4.92	1.71	2.99	6.27	2.63
WD	M	Sonota	1	5	1.67	3.08	3.11	2.28	1.00	1.14	6.20	5.93	6.11	2.28	7.64	6.57	3.32	4.39	1.14	2.45
WD	M	Sonota	2	4	2.50	3.30	2.75	2.06	.96	1.50	8.49	8.18	5.32	1.82	4.36	7.93	2.83	3.87	.81	1.26
WD	M	Valley	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
WD	L	Truman	1	2	.71	2.83	.00	2.12	2.12	.00	3.54	3.54	4.95	4.95	2.12	1.41	2.83	.71	.71	2.83
WD	L	Truman	2	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
WD	L	Loseke Creek	1	4	1.82	2.50	.57	.50	.96	.50	10.42	6.19	4.80	2.52	5.69	4.99	1.50	3.16	2.75	2.52
WD	L	Loseke Creek	2	2	4.24	4.24	.71	2.83	.00	.71	4.95	4.95	2.83	.71	1.41	1.41	1.41	.71	2.83	2.12
WD	L	South Arvilla	1	7	1.91	1.60	.81	1.15	1.07	.95	8.71	4.72	5.79	2.52	6.16	2.69	1.89	4.50	2.54	1.62
WD	L	South Arvilla	2	6	3.56	4.00	1.72	2.10	.98	.51	7.09	6.42	4.14	2.28	1.33	3.88	3.14	8.01	5.20	5.43
WD	L	Great Oasis	1	2	3.54	.71	1.41	.00	.71	1.41	9.19	.00	4.95	1.41	4.24	16.97	1.41	16.26	9.19	2.12
WD	L	Great Oasis	2	3	3.46	2.65	.00	2.00	1.53	1.00	4.73	2.52	6.66	2.65	5.51	6.81	2.65	6.66	1.53	3.00
WD	L	Devils L-Souris	1	6	2.93	2.73	1.86	1.63	.84	.89	7.10	4.59	3.19	1.87	2.83	6.24	1.22	7.74	6.41	2.53
WD	L	Devils L-Souris	2	4	2.65	4.35	2.06	3.30	.50	.96	6.22	3.30	1.73	1.00	3.87	2.22	1.29	2.22	3.10	2.00
MM	IMM	Anderson	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
MM	IMM	Anderson	2	2	4.24	6.36	2.12	3.54	1.41	.71	5.66	4.24	1.41	.71	3.54	2.12	2.12	2.83	.71	.00
MM	IMM	Grand Detour	1	3	1.15	.57	1.00	3.05	.57	.57	5.57	3.00	.57	2.31	3.05	13.08	4.51	3.00	6.66	1.00
MM	IMM	Grand Detour	2	2	2.83	2.12	.71	2.83	.71	.00	6.36	2.83	.00	4.95	2.83	1.41	2.12	.71	3.54	1.41
MM	IMM	Mill Creek	1	3	.57	1.53	2.00	1.00	.57	.57	1.73	3.46	5.86	2.65	8.72	2.08	2.08	1.15	5.03	2.65
MM	IMM	Mill Creek	2	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
MM	IMM	Over	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
MM	IMM	Over	2	5	4.16	4.97	1.41	4.38	.84	.45	4.22	4.16	1.30	1.79	3.56	6.50	2.24	5.22	5.36	1.82
MM	IMM	Upper Big Sioux	1	4	3.77	4.83	2.08	2.38	1.00	.96	9.33	2.38	7.46	3.30	9.81	5.92	3.50	4.80	7.51	5.10
MM	IMM	Upper Big Sioux	2	3	3.00	3.61	1.00	.57	1.53	.57	7.23	4.51	4.36	3.51	1.15	5.69	2.52	4.00	11.53	4.16
MM	EMM	Ft. Yates	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
MM	EMM	Thomas Riggs	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
MM	EMM	Thomas Riggs	2	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
MM	TMM	Huff	2	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CP		Smoky Hill	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CP		Upper Republic	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CP		Upper Republic	2	2	1.41	.00	.71	.71	2.12	.00	9.90	7.07	3.54	.71	3.54	5.66	4.95	1.41	7.78	.71
CP		Loup River	1	3	3.05	2.52	1.00	1.53	.57	2.00	7.37	3.00	7.23	.57	7.64	3.51	5.29	.57	4.73	.57
CP		Loup River	2	2	2.83	4.24	2.83	1.41	.71	.00	4.95	6.36	2.12	2.12	4.24	8.49	1.41	2.83	7.78	4.95
CP		Nebraska	1	2	.71	.71	.71	2.12	.71	1.41	2.12	4.24	1.41	2.12	1.41	9.19	4.95	5.66	10.61	2.83

Table B-10. Continued.

TR	VAR	PHASE	SEX	N	IML	XML	MLS	WMH	SOS	GLS	STB	STS	FRC	FRS	FRF	PAC	PAS	PAF	OCC	OCS
CP		Nebraska	2	3	3.00	4.73	1.15	2.08	.57	.00	6.81	2.89	2.52	2.65	7.09	9.07	3.51	7.55	5.57	6.56
CP		St. Helena	1	16	4.46	4.47	1.96	2.22	1.36	1.33	7.14	4.02	5.05	1.96	4.74	7.27	3.60	4.54	8.21	4.30
CP		St. Helena	2	11	2.84	3.30	1.40	1.79	.78	.83	4.12	3.16	4.62	2.44	3.68	5.40	3.07	5.26	5.65	3.33
CO	IC	Anoka	2	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CO	EC	Le Compte	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CO	EC	Akaska	1	4	2.50	1.29	1.71	1.73	1.41	.57	2.50	1.71	4.76	1.89	2.75	4.79	2.87	.81	3.86	2.87
CO	EC	La Roche	1	88	2.89	3.24	1.55	1.97	1.06	1.22	6.58	3.53	3.79	2.68	4.65	5.15	2.94	4.20	5.62	3.74
CO	EC	La Roche	2	73	3.02	3.21	1.26	2.10	1.02	1.07	5.61	3.81	4.58	2.62	3.45	5.43	2.98	4.69	5.88	3.60
CO	PCC	Redbird	2	3	2.52	2.89	.57	1.73	1.00	.57	3.51	2.52	1.53	.57	5.13	4.73	1.73	5.20	4.93	1.73
CO	PCC	Felicia	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CO	PCC	Felicia	2	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CO	PCC	Bad River 1	1	6	2.25	2.50	1.72	2.10	1.41	1.05	4.88	2.58	3.90	2.80	3.56	1.72	2.80	4.87	6.77	2.23
CO	PCC	Bad River 1	2	5	1.10	2.07	.45	1.58	.84	.45	5.05	3.71	2.92	.84	3.54	5.93	1.92	1.48	3.29	4.83
CO	PCC	Bad River 2	1	18	3.14	3.58	1.46	2.53	1.19	.66	5.93	3.36	4.71	2.44	3.93	5.02	1.81	4.26	5.52	3.80
CO	PCC	Bad River 2	2	21	2.66	3.46	1.75	2.32	.81	.75	6.10	3.98	2.98	2.00	4.08	5.74	3.08	4.47	6.74	4.52
CO	PCC	Le Beau 1	1	16	3.09	3.91	1.26	1.69	1.15	1.30	6.70	3.77	4.37	3.20	4.48	4.16	2.26	4.39	5.30	3.09
CO	PCC	Le Beau 1	2	8	2.83	3.25	.92	1.83	1.03	.88	6.39	2.71	2.96	2.71	4.26	3.04	1.77	1.92	2.36	2.62
CO	PCC	Le Beau 2	1	23	2.99	3.68	1.87	3.02	1.69	1.53	5.20	4.38	3.92	2.69	4.62	5.68	3.13	5.15	7.52	3.82
CO	PCC	Le Beau 2	2	16	3.01	4.02	1.36	1.93	.93	.71	5.60	4.16	3.98	2.10	3.42	4.92	2.19	3.91	5.21	3.50
CO	PCC	Le Beau 3	1	107	3.55	3.57	1.32	2.07	1.10	1.10	5.34	4.16	3.89	2.22	4.01	5.89	3.03	5.95	4.93	3.70
CO	PCC	Le Beau 3	2	106	3.07	3.65	1.28	2.07	.92	.79	5.17	3.69	4.09	2.15	3.19	4.81	2.44	3.91	4.57	2.75
CO	PCC	Talking Crow	2	3	4.36	4.93	1.53	.00	2.08	.00	2.31	4.16	2.08	1.00	4.04	8.96	2.00	6.43	10.82	2.65
CO	PCC	Lower Loup	1	3	3.61	3.05	2.65	2.08	.57	1.00	4.93	2.52	3.05	2.31	.57	2.00	1.53	4.00	7.57	3.05
CO	PCC	Lower Loup	2	2	.71	2.12	.71	1.41	.71	.00	3.54	2.12	1.41	.71	2.12	6.36	3.54	.71	6.36	1.41
CO	PCC	Heart River 1	1	5	1.92	1.52	1.52	2.05	1.92	1.34	3.67	3.90	5.24	2.68	4.98	4.45	1.64	2.12	5.37	1.95
CO	PCC	Heart River 1	2	11	3.13	3.22	1.30	1.75	1.08	1.00	5.34	3.49	5.70	2.73	4.19	5.01	2.45	4.90	3.46	1.96
CO	PCC	Crying Hill	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CO	PCC	Crying Hill	2	4	2.71	2.89	1.50	1.73	1.26	.57	3.70	2.75	4.43	3.46	.81	5.32	1.29	5.00	1.26	2.50
CO	DC	Pawnee	1	15	3.18	3.40	1.47	1.67	.96	1.12	6.09	4.11	3.44	2.19	2.45	6.13	3.26	6.22	4.76	3.82
CO	DC	Pawnee	2	8	3.44	3.85	1.58	1.36	.53	.99	4.98	2.96	3.29	1.85	3.44	4.83	1.96	2.56	3.62	2.97
CO	DC	Arikara	1	30	2.60	3.16	1.35	2.36	1.19	1.08	4.51	3.05	6.20	2.62	4.02	5.35	3.25	5.57	5.22	4.02
CO	DC	Arikara	2	23	2.05	3.17	1.32	2.47	.73	.85	5.66	3.22	3.81	2.85	2.85	4.86	2.18	4.58	5.74	4.16
CO	DC	Mandan	1	4	1.63	3.74	.50	.96	.81	1.29	4.55	4.35	1.29	1.41	5.20	1.71	.57	2.06	3.70	.96
CO	DC	Mandan	2	2	1.41	2.83	.71	1.41	.71	.71	7.78	2.83	4.95	.71	2.83	2.12	1.41	.71	10.61	6.36
CO	DC	Hidatsa	2	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CO	DC	Omaha	1	9	2.44	3.56	1.64	1.67	1.50	1.00	5.15	3.87	4.09	2.12	3.91	5.36	3.14	4.24	4.86	4.29
CO	DC	Omaha	2	6	3.73	3.26	1.10	13.02	.89	.98	5.54	6.37	4.97	1.94	2.86	7.25	2.94	2.93	8.83	3.67
CO	DC	Ponca	1	9	2.86	2.24	.93	1.51	1.05	.73	5.59	4.40	4.40	3.12	3.91	4.77	1.85	3.06	4.03	3.10
CO	DC	Ponca	2	10	3.20	3.79	.66	2.01	1.13	.99	9.55	4.32	2.86	1.79	3.94	3.54	3.25	3.66	4.65	2.38
MI	M	Steed-Kisker	1	6	3.39	4.85	1.21	1.63	.98	1.17	9.00	2.93	3.58	1.47	3.26	7.49	3.56	4.45	7.56	6.27
MI	M	Steed-Kisker	2	3	4.58	1.73	2.08	1.00	.57	.57	8.50	3.61	2.08	1.73	1.73	4.36	2.00	2.89	1.53	1.53

Table B-10. Continued.

TR VAR	PHASE	SEX	N	IML	XML	MLS	WMH	SOS	GLS	STB	STS	FRC	FRS	FRF	PAC	PAS	PAF	OCC	OCS
ON	Vermillion Bluf	1	2	1.41	.71	.71	2.83	1.41	.00	4.95	2.83	2.83	1.41	1.41	.71	2.12	2.12	.00	2.12
ON	Ioway	1	2	2.12	2.12	1.41	.71	2.83	.71	7.78	.00	.71	.71	.00	.71	2.12	2.83	.71	3.54
ON	Leary	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
ON	Kansa	1	3	6.03	6.00	1.73	1.15	2.08	1.53	8.08	1.53	6.66	5.57	3.61	5.69	2.52	7.00	2.31	1.00
ON	Kansa	2	3	3.51	2.08	1.00	2.52	.57	.00	6.51	1.15	1.73	.57	5.51	8.02	3.05	6.00	.57	1.00
EQ	Historic Sioux	1	6	2.90	2.93	1.76	1.17	1.97	.84	5.22	3.98	2.73	1.76	4.92	2.04	2.34	3.08	4.87	3.41
EQ	Intrusive Sioux	1	2	4.24	7.07	.71	.00	1.41	.00	4.95	1.41	.71	.00	1.41	2.83	1.41	4.24	3.54	7.07
EQ	Intrusive Sioux	2	5	2.00	1.79	2.05	2.35	.45	.45	4.34	2.45	.84	1.73	2.35	8.93	3.78	3.11	4.87	2.55
	Within-Groups		767	3.09	3.49	1.43	2.39	1.11	1.02	5.79	3.88	4.23	2.43	4.04	5.47	2.84	4.76	5.46	3.53

Table B-11. Standard Deviations by Phase, by Sex, Section 4.

TR	VAR	PHASE	SEX	N	OCF	FOL	FOB	NAR	SSR	PRR	DKR	ZOR	FMR	EKR	ZMR	AVR	BRR	VRR	LAR	OSR
PI		Paleo-Indian	1	4	9.00	3.50	4.99	3.00	4.57	4.57	2.22	2.36	.81	1.63	.50	1.91	5.19	4.99	4.03	1.73
PI		Paleo-Indian	2	3	2.52	1.00	2.52	1.15	1.15	1.00	1.53	.00	2.52	2.65	2.08	3.00	2.52	.57	4.00	3.61
AR		Archaic	1	5	5.81	1.82	.84	4.44	4.92	2.00	3.94	2.95	4.34	2.41	3.81	1.58	4.92	3.83	6.20	2.24
AR		Archaic	2	5	5.83	3.77	2.59	4.56	4.15	5.73	4.97	2.51	3.56	3.91	4.66	5.36	6.76	5.41	3.70	5.36
WD	M	KC Hopewell	1	2	.71	1.41	.71	3.54	8.49	2.12	4.95	4.24	2.83	3.54	2.83	2.83	7.07	2.12	4.24	.71
WD	M	KC Hopewell	2	2	17.68	.71	.00	2.12	4.95	10.61	2.12	4.24	2.83	.71	3.54	9.90	9.90	11.31	4.24	1.41
WD	M	Keith	1	3	8.74	2.65	2.00	1.73	3.46	4.04	.00	2.31	2.65	2.52	3.51	2.08	2.31	4.04	8.50	3.05
WD	M	Keith	2	4	2.45	3.56	2.06	2.99	2.65	1.50	1.63	1.29	2.50	1.41	1.89	2.38	3.74	1.73	3.11	2.52
WD	M	Sonota	1	5	4.87	2.61	3.03	2.49	1.30	3.11	2.51	2.19	1.92	2.07	3.63	2.12	1.34	1.48	3.11	3.29
WD	M	Sonota	2	4	4.51	1.15	2.08	2.89	4.12	4.11	2.94	3.30	2.52	4.08	2.94	4.12	3.11	3.16	1.89	.96
WD	M	Valley	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
WD	L	Truman	1	2	2.83	.00	.71	2.83	2.83	2.12	2.83	1.41	.00	.71	.71	2.83	3.54	.71	.71	1.41
WD	L	Truman	2	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
WD	L	Loseke Creek	1	4	8.62	2.38	.50	3.30	2.22	1.89	3.70	2.22	3.10	2.89	2.00	7.05	6.24	4.57	5.56	3.20
WD	L	Loseke Creek	2	2	.00	3.54	2.12	1.41	.71	2.12	.00	2.12	2.12	5.66	2.12	1.41	4.95	4.95	.00	4.95
WD	L	South Arvilla	1	7	5.09	2.07	.95	3.91	2.93	3.04	3.55	2.36	2.50	1.95	2.37	1.35	5.61	5.01	2.82	2.44
WD	L	South Arvilla	2	6	8.56	2.14	2.14	2.56	3.02	2.28	3.01	2.48	3.27	3.31	2.71	2.23	3.97	3.78	4.03	3.26
WD	L	Great Oasis	1	2	.71	2.12	.71	2.83	4.24	4.95	3.54	7.07	6.36	5.66	.71	4.95	4.95	4.24	9.90	1.41
WD	L	Great Oasis	2	3	4.36	.57	1.73	4.36	5.69	6.81	2.89	3.79	2.08	1.53	3.46	2.65	6.11	7.09	7.51	2.00
WD	L	Devils L-Souris	1	6	7.95	4.23	2.66	2.07	1.50	2.06	2.10	1.47	1.22	1.50	3.19	4.03	4.13	4.55	5.08	3.27
WD	L	Devils L-Souris	2	4	2.63	4.51	2.38	4.27	8.81	6.34	4.27	6.14	4.12	5.12	6.27	7.63	2.45	2.58	3.59	3.70
MM	IMM	Anderson	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
MM	IMM	Anderson	2	2	.00	1.41	4.24	2.12	4.24	.71	2.83	2.12	.00	.71	.71	2.83	.71	1.41	1.41	2.12
MM	IMM	Grand Detour	1	3	8.74	2.08	.57	5.03	3.51	4.36	4.73	2.89	4.16	3.05	2.08	1.73	1.53	2.52	5.51	3.21
MM	IMM	Grand Detour	2	2	3.54	2.12	2.83	4.95	7.78	9.19	3.54	7.07	.71	2.12	8.49	9.90	.71	2.83	.71	2.83
MM	IMM	Mill Creek	1	3	4.58	1.53	1.00	4.58	2.65	3.61	3.79	1.53	2.89	2.08	1.53	2.31	2.31	2.31	4.04	1.15
MM	IMM	Mill Creek	2	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
MM	IMM	Over	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
MM	IMM	Over	2	5	7.92	2.30	2.68	4.27	3.91	4.32	4.16	4.30	4.97	5.24	4.28	4.72	5.15	5.31	2.51	3.16
MM	IMM	Upper Big Sioux	1	4	2.87	1.41	2.45	3.86	4.11	4.65	3.56	6.95	4.65	3.51	4.24	4.97	4.57	4.92	6.55	1.26
MM	IMM	Upper Big Sioux	2	3	6.11	2.00	1.53	3.79	2.08	3.61	2.89	1.15	6.08	4.51	2.08	6.08	2.31	1.53	4.16	2.65
MM	EMM	Ft. Yates	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
MM	EMM	Thomas Riggs	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
MM	EMM	Thomas Riggs	2	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
MM	TMM	Huff	2	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CP		Smoky Hill	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CP		Upper Republic	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CP		Upper Republic	2	2	2.12	2.12	.00	2.12	2.12	4.95	1.41	3.54	3.54	3.54	4.24	3.54	4.95	9.19	5.66	4.95
CP		Loup River	1	3	2.08	2.52	1.53	4.16	3.79	3.00	3.21	2.31	2.65	1.53	3.05	1.73	2.08	1.00	2.89	5.51
CP		Loup River	2	2	4.95	.71	2.12	2.83	.00	.71	3.54	2.83	.71	2.12	2.12	1.41	4.24	4.95	5.66	1.41
CP		Nebraska	1	2	4.24	1.41	.71	.00	2.12	2.83	.71	.71	.00	2.83	2.12	4.95	3.54	4.95	2.12	1.41

Table B-11. Continued.

TR	VAR	PHASE	SEX	N	OCF	FOL	FOB	NAR	SSR	PRR	DKR	ZOR	FMR	EKR	ZMR	AVR	BRR	VRR	LAR	OSR
CP		Nebraska	2	3	10.54	.57	1.53	3.61	3.21	5.57	4.04	3.61	3.46	2.65	2.52	4.00	1.53	.00	2.08	2.00
CP		St. Helena	1	16	9.38	2.66	2.37	4.91	4.80	5.09	5.15	3.34	3.04	2.70	3.47	4.94	5.79	4.91	4.94	2.83
CP		St. Helena	2	11	5.12	1.75	1.42	3.63	4.71	2.39	3.18	2.17	4.01	2.98	2.60	2.52	4.60	4.99	5.78	3.18
CO	IC	Anoka	2	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CO	EC	Le Compte	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CO	EC	Akaska	1	4	2.87	3.77	2.94	2.50	6.18	6.98	2.89	3.86	2.99	3.40	4.42	7.27	3.59	4.76	3.56	1.73
CO	EC	La Roche	1	88	6.50	2.37	2.05	3.36	3.46	3.91	3.28	3.16	3.52	2.90	3.23	4.23	3.72	3.51	4.90	3.30
CO	EC	La Roche	2	73	5.32	2.32	3.16	3.67	3.75	4.17	3.39	3.28	3.47	3.11	3.41	3.94	4.24	4.50	5.17	3.94
CO	PCC	Redbird	2	3	.57	.00	2.52	2.89	2.52	4.00	2.52	2.31	2.00	1.15	1.73	1.73	2.52	3.51	5.86	3.21
CO	PCC	Felicia	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CO	PCC	Felicia	2	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CO	PCC	Bad River 1	1	6	4.59	2.48	2.32	1.86	3.58	3.69	2.48	1.17	1.22	1.10	1.03	5.66	4.23	3.20	5.88	3.39
CO	PCC	Bad River 1	2	5	8.35	2.35	2.51	.84	1.67	1.92	2.35	2.28	1.67	2.28	1.34	2.17	4.47	4.02	6.98	3.36
CO	PCC	Bad River 2	1	18	4.27	1.57	2.68	4.21	4.84	4.98	3.41	4.18	3.18	3.29	3.34	3.63	4.82	4.41	4.40	3.01
CO	PCC	Bad River 2	2	21	4.89	2.22	1.78	3.26	3.68	3.88	3.18	2.85	3.02	2.79	3.08	3.68	3.58	4.04	5.48	3.33
CO	PCC	Le Beau 1	1	16	4.77	2.19	1.94	3.83	4.37	4.01	3.26	2.23	2.19	2.12	2.12	3.81	4.02	3.52	4.60	2.95
CO	PCC	Le Beau 1	2	8	4.79	3.41	1.36	2.55	2.88	3.33	2.26	1.88	2.00	1.58	2.17	2.97	1.88	2.47	3.84	2.97
CO	PCC	Le Beau 2	1	23	7.59	2.67	2.73	3.27	3.27	3.85	2.87	2.55	2.74	2.52	2.91	4.65	4.77	4.26	4.79	4.23
CO	PCC	Le Beau 2	2	16	4.08	2.63	2.90	2.82	4.24	4.31	2.84	3.88	3.69	3.04	3.76	4.19	3.32	3.42	3.63	3.81
CO	PCC	Le Beau 3	1	107	6.25	2.64	2.24	3.94	3.58	3.77	3.66	3.38	3.41	2.99	3.25	4.01	3.72	3.95	4.16	3.66
CO	PCC	Le Beau 3	2	106	4.76	2.17	2.17	3.69	3.34	3.67	3.28	3.27	3.33	2.89	3.25	3.84	3.63	3.54	3.78	3.51
CO	PCC	Talking Crow	2	3	2.08	.57	.57	4.04	7.64	8.62	4.04	4.04	5.77	3.05	5.13	8.39	3.21	3.51	7.94	.57
CO	PCC	Lower Loup	1	3	1.73	1.00	.00	2.00	3.61	4.93	3.21	5.03	4.00	5.00	8.62	7.09	2.52	3.51	7.00	2.31
CO	PCC	Lower Loup	2	2	.71	2.12	2.12	2.12	2.83	3.54	.00	.71	1.41	.71	.00	1.41	1.41	2.83	2.12	6.36
CO	PCC	Heart River 1	1	5	5.32	3.65	6.06	3.49	1.79	2.83	2.05	1.67	3.51	2.59	3.78	3.36	2.19	2.30	1.92	4.85
CO	PCC	Heart River 1	2	11	2.02	3.27	2.44	4.26	3.60	4.55	2.99	3.03	2.58	2.29	3.29	4.32	4.59	4.55	3.94	2.98
CO	PCC	Crying Hill	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CO	PCC	Crying Hill	2	4	2.65	2.22	.96	3.32	2.63	2.89	2.22	2.65	1.26	2.06	2.45	3.20	3.56	2.58	4.57	2.87
CO	DC	Pawnee	1	15	5.48	2.46	1.30	3.11	2.49	2.00	2.59	3.23	2.99	2.61	3.25	2.63	4.22	2.87	3.99	4.31
CO	DC	Pawnee	2	8	4.13	1.12	2.45	2.78	3.58	4.00	2.05	2.33	1.03	1.36	2.27	3.34	4.92	3.33	4.13	2.36
CO	DC	Arikara	1	30	7.31	2.76	2.47	3.22	4.13	4.25	3.01	3.62	2.79	2.76	3.67	3.94	4.55	4.37	4.89	4.14
CO	DC	Arikara	2	23	7.24	2.58	2.36	2.68	2.50	3.38	2.66	2.08	2.44	2.22	2.33	3.11	3.78	4.04	5.16	3.63
CO	DC	Mandan	1	4	2.16	1.91	3.30	3.20	3.77	2.63	2.50	4.19	1.41	2.06	3.37	2.38	2.99	2.65	2.63	2.87
CO	DC	Mandan	2	2	11.31	.71	1.41	1.41	2.12	4.24	2.12	2.83	3.54	4.95	2.83	4.24	5.66	6.36	7.78	.00
CO	DC	Hidatsa	2	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CO	DC	Omaha	1	9	5.57	1.51	1.74	2.03	2.40	3.28	1.51	2.35	2.18	2.62	2.65	2.83	3.36	3.67	6.87	1.41
CO	DC	Omaha	2	6	10.05	2.94	1.47	2.06	3.08	4.35	2.16	4.07	3.20	3.26	3.27	3.43	5.12	5.61	5.34	2.71
CO	DC	Ponca	1	9	5.34	2.82	2.03	2.29	3.02	2.37	2.50	2.85	1.69	2.19	2.93	2.57	4.56	4.59	4.00	4.17
CO	DC	Ponca	2	10	4.58	2.08	1.77	4.23	3.12	3.57	4.35	3.98	2.68	2.74	2.92	2.88	2.50	3.13	3.21	4.01
MI	M	Steed-Kisker	1	6	10.50	4.41	2.07	4.18	5.37	4.13	4.87	4.71	3.78	3.78	5.75	4.20	3.87	2.94	6.88	4.63
MI	M	Steed-Kisker	2	3	8.54	2.08	1.15	1.73	4.51	5.51	1.73	2.08	.00	.57	2.00	4.58	5.29	5.86	4.04	2.08

Table B-11. Continued.

TR VAR	PHASE	SEX	N	OCF	FOL	FOB	NAR	SSR	FRR	DKR	ZOR	FMR	EKR	ZMR	AVR	BRR	VRR	LAR	OSR
ON	Vermillion Bluf	1	2	2.12	.00	2.83	1.41	1.41	.00	.71	.71	.71	.00	.71	1.41	.00	2.83	4.24	2.83
ON	Ioway	1	2	.71	.00	.71	9.19	7.78	4.24	10.61	7.07	7.78	7.07	3.54	2.12	6.36	4.24	.00	4.24
ON	Leary	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
ON	Kansa	1	3	4.62	2.89	1.53	3.61	4.36	2.89	3.61	2.65	.00	1.53	4.58	5.51	2.52	3.05	3.51	3.05
ON	Kansa	2	3	3.79	.57	1.00	1.15	5.69	5.13	1.00	4.36	2.52	3.05	3.05	5.86	3.05	3.46	2.31	.00
EQ	Historic Sioux	1	6	3.94	1.50	1.21	4.46	3.16	3.56	3.35	3.74	5.01	3.82	3.08	2.58	2.14	2.64	4.10	3.61
EQ	Intrusive Sioux	1	2	3.54	4.24	4.95	9.19	7.07	3.54	9.19	9.90	7.07	5.66	7.78	9.19	4.95	3.54	3.54	7.78
EQ	Intrusive Sioux	2	5	5.22	3.16	1.82	3.27	1.48	2.77	4.55	1.95	3.85	3.21	2.07	2.88	3.16	2.51	2.77	5.03
	Within-Groups		767	5.96	2.48	2.35	3.61	3.71	3.94	3.36	3.27	3.24	2.90	3.27	4.03	4.05	4.01	4.59	3.54

Table B-12. Standard Deviations by Phase, by Sex, Section 5.

TR	VAR	PHASE	SEX	N	BAR	NAA	PRA	BAA	NBA	BBA	SSA	NFA	DKA	NDA	SIA	FRA	FAA	OCA	STA	CBA
PI		Paleo-Indian	1	4	3.30	2.06	2.50	1.91	2.99	1.71	8.88	8.34	10.03	9.78	21.33	3.77	1.91	5.60	7.72	5.32
PI		Paleo-Indian	2	3	2.00	.57	1.15	1.53	1.15	2.08	2.31	2.08	4.51	15.04	9.00	4.04	1.73	6.51	3.61	4.51
AR		Archaic	1	5	3.36	4.21	3.70	2.97	2.74	1.14	3.05	2.24	7.50	13.69	12.32	2.88	4.55	3.36	9.36	5.90
AR		Archaic	2	5	4.60	2.95	1.73	2.92	3.51	4.95	3.91	3.35	4.97	7.69	15.47	3.32	4.71	4.56	4.93	9.40
WD	M	KC Hopewell	1	2	2.12	2.12	2.83	5.66	2.12	1.41	8.49	.00	.00	16.26	2.12	1.41	6.36	2.83	9.19	4.24
WD	M	KC Hopewell	2	2	1.41	6.36	9.19	2.83	7.78	4.95	.71	7.07	6.36	3.54	2.12	.00	4.24	6.36	9.19	2.83
WD	M	Keith	1	3	1.73	2.65	1.00	1.53	1.53	.00	5.77	2.52	4.36	9.07	9.87	1.53	2.31	6.66	.00	3.05
WD	M	Keith	2	4	4.65	4.80	2.50	2.36	4.57	4.86	5.74	1.41	.00	9.39	15.59	6.95	4.03	4.35	4.04	8.29
WD	M	Sonota	1	5	1.14	4.09	3.21	1.14	2.55	2.92	6.27	6.19	7.12	4.85	6.34	3.03	5.50	4.22	7.40	2.51
WD	M	Sonota	2	4	4.19	1.15	1.89	1.29	1.71	2.65	3.77	4.19	8.66	3.32	13.03	2.22	2.45	2.08	9.84	6.50
WD	M	Valley	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
WD	L	Truman	1	2	3.54	4.24	4.95	.00	1.41	2.12	8.49	3.54	9.19	10.61	15.56	7.78	4.24	4.24	3.54	7.07
WD	L	Truman	2	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
WD	L	Loseke Creek	1	4	1.73	2.99	5.74	3.77	1.29	.50	1.89	1.63	5.19	10.59	15.02	3.30	2.22	3.40	8.10	2.99
WD	L	Loseke Creek	2	2	2.83	.00	2.12	1.41	2.12	2.12	3.54	10.61	.71	10.61	4.24	.71	3.54	5.66	6.36	4.24
WD	L	South Arvilla	1	7	2.57	3.65	1.72	2.36	3.15	1.89	3.91	4.51	9.55	4.20	7.52	3.21	2.87	2.56	5.44	4.54
WD	L	South Arvilla	2	6	3.31	3.60	2.45	1.94	2.14	2.26	4.20	6.16	6.02	4.87	15.21	4.13	4.88	7.91	9.15	5.57
WD	L	Great Oasis	1	2	1.41	4.24	3.54	.71	.00	.71	4.95	4.95	4.24	8.49	15.56	4.24	3.54	.00	4.24	.71
WD	L	Great Oasis	2	3	1.53	1.53	.57	1.53	1.15	2.65	4.36	3.05	6.24	9.00	11.68	2.08	2.08	5.29	4.62	2.00
WD	L	Devils L-Souris	1	6	2.43	1.21	.81	1.55	2.06	2.23	4.85	3.37	6.00	9.14	13.72	3.39	2.86	3.54	6.02	3.76
WD	L	Devils L-Souris	2	4	2.50	2.36	1.71	1.89	2.22	1.26	5.00	5.19	2.06	6.27	9.06	2.52	1.91	4.79	3.16	4.86
MM	IMM	Anderson	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
MM	IMM	Anderson	2	2	4.95	5.66	4.24	1.41	.71	1.41	4.24	.71	4.95	14.14	9.90	2.12	2.83	.00	4.24	7.78
MM	IMM	Grand Detour	1	3	4.62	2.65	1.73	1.53	4.73	1.73	4.16	6.66	6.93	3.46	6.51	3.79	3.79	3.05	4.93	8.66
MM	IMM	Grand Detour	2	2	1.41	7.78	1.41	5.66	2.83	.71	6.36	5.66	1.41	7.07	4.95	9.90	4.24	.00	7.78	2.12
MM	IMM	Mill Creek	1	3	2.52	1.53	2.00	1.53	3.79	2.65	4.36	6.43	4.73	7.00	6.66	4.04	4.73	2.08	5.20	4.58
MM	IMM	Mill Creek	2	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
MM	IMM	Over	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
MM	IMM	Over	2	5	3.49	2.55	1.95	2.07	4.06	1.41	6.07	2.41	4.53	9.31	15.07	3.51	3.56	4.15	5.48	6.50
MM	IMM	Upper Big Sioux	1	4	6.22	1.91	2.22	.50	3.59	4.11	5.71	.96	2.89	1.26	19.79	4.65	4.99	6.65	5.74	11.17
MM	IMM	Upper Big Sioux	2	3	4.73	1.00	1.73	1.15	4.00	3.79	.00	4.93	5.57	4.62	6.03	5.51	3.05	1.00	5.51	8.89
MM	EMM	Ft. Yates	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
MM	EMM	Thomas Riggs	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
MM	EMM	Thomas Riggs	2	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
MM	TMM	Huff	2	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CP		Smoky Hill	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CP		Upper Republic	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CP		Upper Republic	2	2	7.78	4.24	9.19	4.95	4.95	3.54	7.78	4.95	7.78	6.36	20.51	2.83	6.36	4.95	6.36	15.56
CP		Loup River	1	3	3.51	6.81	6.03	3.05	4.04	5.57	2.31	1.00	2.52	4.16	6.11	2.52	8.74	2.89	3.05	7.02
CP		Loup River	2	2	.71	2.83	3.54	.71	3.54	4.24	6.36	2.12	7.07	11.31	20.51	3.54	.71	6.36	7.78	1.41
CP		Nebraska	1	2	4.24	2.12	1.41	3.54	6.36	4.24	2.12	1.41	1.41	14.14	5.66	4.24	4.95	.00	5.66	7.07

Table B-12. Continued.

TR	VAR	PHASE	SEX	N	BAR	NAA	PRA	BAA	NBA	BBA	SSA	NFA	DKA	NDA	SIA	FRA	FAA	OCA	STA	CBA
CP		Nebraska	2	3	3.21	3.61	4.04	.57	2.00	1.73	1.00	4.62	7.00	2.52	7.00	5.03	5.29	11.53	1.53	7.00
CP		St. Helena	1	16	3.70	3.37	3.48	2.59	3.12	2.37	5.17	4.83	5.16	5.82	14.40	3.37	5.13	7.01	4.50	6.43
CP		St. Helena	2	11	4.10	3.29	2.74	1.61	2.94	2.46	5.11	3.81	4.52	8.21	9.02	3.64	4.44	4.95	4.61	7.88
CO	IC	Anoka	2	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CO	EC	Le Compte	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CO	EC	Akaska	1	4	1.29	4.92	3.59	3.46	.96	.50	3.95	7.32	7.23	3.95	14.38	3.30	3.50	5.38	2.87	2.38
CO	EC	La Roche	1	88	3.06	3.42	3.58	2.41	2.82	2.22	4.42	4.12	5.44	8.16	12.36	4.33	4.30	5.72	4.48	5.21
CO	EC	La Roche	2	73	3.27	3.06	3.04	2.54	3.06	2.66	4.83	4.37	5.87	9.92	12.83	3.80	4.32	5.07	4.63	5.91
CO	PCC	Redbird	2	3	7.02	2.65	4.04	1.53	3.51	4.04	5.03	3.79	8.74	8.00	22.34	.57	1.15	6.00	3.61	13.20
CO	PCC	Felicia	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CO	PCC	Felicia	2	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CO	PCC	Bad River 1	1	6	2.71	5.12	4.79	1.83	1.05	2.06	5.89	2.42	8.85	13.48	8.71	4.13	4.31	3.14	4.97	4.69
CO	PCC	Bad River 1	2	5	4.04	1.30	3.56	2.95	2.49	2.07	4.87	3.13	4.62	4.92	15.18	1.30	3.21	6.76	4.36	7.70
CO	PCC	Bad River 2	1	18	3.29	2.38	2.73	1.64	2.63	2.59	4.73	3.71	4.35	6.55	14.90	3.70	2.83	5.59	4.92	5.60
CO	PCC	Bad River 2	2	21	3.15	2.46	2.82	2.68	3.32	2.19	4.43	3.99	4.37	8.51	13.47	3.41	4.63	6.57	5.27	6.16
CO	PCC	Le Beau 1	1	16	2.98	2.83	2.68	1.58	1.93	2.13	5.85	4.00	5.06	7.20	11.11	5.30	3.62	5.32	4.86	4.52
CO	PCC	Le Beau 1	2	8	3.81	3.62	4.40	2.26	2.92	3.56	5.71	4.55	5.53	4.66	15.15	3.93	3.91	4.98	2.82	7.03
CO	PCC	Le Beau 2	1	23	2.79	3.04	3.53	2.69	2.31	1.81	4.40	4.64	5.31	8.62	15.23	4.46	4.80	7.92	6.02	4.59
CO	PCC	Le Beau 2	2	16	3.24	5.15	3.80	3.32	2.80	2.36	4.73	4.28	7.68	6.87	11.16	2.90	3.96	5.90	5.01	5.28
CO	PCC	Le Beau 3	1	107	2.96	2.88	2.91	2.54	2.50	2.29	4.56	4.26	5.29	7.86	12.01	3.44	4.27	5.64	5.47	5.20
CO	PCC	Le Beau 3	2	106	3.06	2.76	3.12	2.21	2.56	2.18	4.75	4.14	5.23	9.11	13.55	3.47	3.77	4.15	4.65	5.40
CO	PCC	Talking Crow	2	3	2.65	3.46	2.08	1.53	1.00	.57	4.93	6.66	1.15	8.33	10.12	1.53	5.13	2.65	5.86	3.51
CO	PCC	Lower Loup	1	3	1.15	2.08	2.65	1.53	.00	.00	5.69	2.89	4.04	7.09	14.80	4.16	3.61	5.77	2.52	1.73
CO	PCC	Lower Loup	2	2	1.41	.71	.71	1.41	1.41	1.41	4.24	4.95	5.66	18.38	2.83	.71	4.24	.00	2.12	1.41
CO	PCC	Heart River 1	1	5	3.24	2.70	1.48	2.68	1.14	1.87	8.61	4.44	5.86	6.80	19.23	4.04	2.39	1.64	4.72	4.27
CO	PCC	Heart River 1	2	11	1.57	4.19	3.62	1.90	1.95	3.11	4.85	3.30	3.89	11.10	15.43	4.61	3.39	3.29	4.58	3.04
CO	PCC	Crying Hill	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CO	PCC	Crying Hill	2	4	6.18	3.40	3.74	.57	3.00	3.83	2.22	4.11	3.16	3.30	18.93	4.99	1.73	4.24	2.94	11.32
CO	DC	Pawnee	1	15	3.63	2.92	2.76	1.94	2.91	1.97	4.36	4.78	4.86	10.32	15.21	3.51	4.67	6.41	5.20	6.20
CO	DC	Pawnee	2	8	2.14	4.10	4.13	2.39	3.33	1.55	6.44	5.42	5.81	7.24	9.36	3.16	2.75	5.69	3.34	3.85
CO	DC	Arikara	1	30	2.66	3.00	3.06	2.04	2.23	2.76	5.13	3.94	4.76	7.81	15.56	3.60	5.02	5.77	4.35	4.55
CO	DC	Arikara	2	23	3.82	3.44	4.19	2.35	2.90	2.81	5.62	3.27	5.18	6.51	15.29	5.09	3.12	5.77	4.36	6.91
CO	DC	Mandan	1	4	1.29	2.00	2.71	.81	1.91	1.00	.57	2.94	1.73	7.23	11.22	2.71	1.71	2.16	5.23	2.39
CO	DC	Mandan	2	2	.71	.71	2.12	.71	.71	.71	5.66	3.54	8.49	7.78	5.66	1.41	1.41	4.95	1.41	1.41
CO	DC	Hidatsa	2	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CO	DC	Omaha	1	9	3.43	1.50	4.18	3.20	1.64	1.94	2.83	4.33	4.50	10.15	17.06	2.55	5.70	5.70	4.64	5.66
CO	DC	Omaha	2	6	3.56	4.03	2.00	5.61	3.67	2.23	4.62	2.74	5.51	8.16	16.56	1.63	4.53	6.01	8.69	7.17
CO	DC	Ponca	1	9	2.83	2.60	3.57	3.09	2.45	2.80	4.48	3.14	2.82	7.21	22.40	4.74	3.35	6.09	5.94	5.19
CO	DC	Ponca	2	10	2.26	3.47	2.12	2.12	2.79	1.90	3.98	5.95	6.14	5.51	14.59	3.00	5.23	4.81	4.65	3.96
MI	M	Steed-Kisker	1	6	2.25	1.60	1.67	2.06	1.94	1.47	1.50	3.21	6.51	7.14	17.23	2.61	6.24	10.23	3.71	3.94
MI	M	Steed-Kisker	2	3	2.52	.57	3.21	2.08	3.21	2.08	8.08	1.73	3.46	6.56	8.72	3.21	2.31	3.79	2.89	4.51

Table B-12. Continued.

TR VAR	PHASE	SEX	N	BAR	NAA	PRA	BAA	NBA	BBA	SSA	NFA	DKA	NDA	SIA	FRA	PAA	OCA	STA	CBA
ON	Vermillion Bluf	1	2	2.83	3.54	5.66	2.12	.71	.71	5.66	4.24	2.12	4.95	9.19	1.41	2.83	3.54	2.83	4.24
ON	Ioway	1	2	6.36	3.54	9.19	5.66	.71	5.66	3.54	3.54	4.95	2.12	12.73	1.41	3.54	5.66	3.54	10.61
ON	Leary	1	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
ON	Kansa	1	3	2.00	1.15	3.05	2.52	1.53	4.36	4.36	5.29	6.51	7.23	19.42	8.00	4.73	1.00	1.00	3.61
ON	Kansa	2	3	4.51	3.51	3.61	2.52	2.00	1.15	3.79	6.24	6.66	6.56	11.72	2.08	2.08	2.52	1.53	7.64
EQ	Historic Sioux	1	6	1.63	2.35	3.39	2.00	4.00	1.94	3.39	3.19	2.71	7.31	11.45	2.40	3.58	5.00	4.76	2.74
EQ	Intrusive Sioux	1	2	4.24	4.95	6.36	1.41	1.41	3.54	2.83	4.24	2.83	7.07	3.54	.00	3.54	10.61	.00	7.07
EQ	Intrusive Sioux	2	5	1.10	4.97	4.02	2.41	2.45	1.30	4.76	4.98	6.24	8.07	14.30	3.21	5.02	5.45	4.04	1.87
	Within-Groups		767	3.20	3.18	3.30	2.44	2.78	2.43	4.81	4.26	5.48	8.35	13.61	3.82	4.23	5.42	5.02	5.66

APPENDIX C

SPECIMEN LIST

Table C-1. Original Observers.

OBSERVER	INITIAL	SPECIMENS	VARIABLES*	CODE NAMES
W. W. HOWELLS	H	69	56	GOL, NOL, BNL, BBH, XCB, XFB, ZYB, AUB, WCB, ASB, BPL, NPH, NLH, JUB, NLB, MAB, MDH, MDB, OBH, OBB, DKB, NDS, WNB, SIS, ZMB, SSS, FMB, NAS, EKB, DKS, IML, XML, MLS, WMH, SOS, GLS, FRC, FRS, FRF, PAC, FAS, PAF, OCC, OCS, OCF, FOL, NAR, SSR, PRR, DKR, ZOR, FMR, EKR, ZMR, AVR, VRR,
RICHARD JANTZ	J	70	35	GOL, BNL, BBH, XCB, XFB, WFB, ZYB, AUB, ASB, BPL, NPH, NLH, NLB, MAB, MAL, OBH, OBB, ZMB, SSS, FMB, NAS, XML, MLS, WMH, GLS, FRC, FRS, FRF, PAC, PAS, PAF, OCC, OCS, OCF, FOL
PATRICK KEY	K	520	65	GOL, NOL, BNL, BBH, XCB, XFB, WFB, ZYB, AUB, WCB, ASB, BPL, NPH, NLH, JUB, NLB, MAB, MAL, MDH, MDB, OBH, OBB, DKB, NDS, WNB, SIS, ZMB, SSS, FMB, NAS, EKB, DKS, IML, XML, MLS, WMH, SOS, GLS, STB, STS, FRC, FRS, FRF, PAC, PAS, PAF, OCC, OCS, OCF, FOL, FOB, NAR, SSR, PRR, DKR, ZOR, FMR, EKR, ZMR, AVR BRR, VRR, LAR, OPR, BAR
PAUL LIN	L	206	32	GOL, BNL, BBH, XCB, XFB, WFB, ZYB, AUB, BPL, NPH, NLH, NLB, MAB, MAL, MDH, OBH, OBB, DKB, NDS, ZMB, SSS, FMB, NAS, WMH, SOS, FLS, FRC, FRS, FRF, PAC, PAS, PAF

*The remaining variables (up to 65) were filled in by the author and 15 additional angles calculated.

Table C-2. Specimen List.

N	SITE	ID	#	SEX	N	SITE	ID	#	SEX	N	SITE	ID	#	SEX	N	SITE	ID	#	SEX
1	13LO2	M1 B3	K096	1	41	25BU1	S26	K384	1	81	25DK13	15176	K401	2	121	25KX1	S21	J293	1
2	13LO2	M1 B4	K097	1	42	25BU1	S21	K385	1	82	25DK13	7172	K402	2	122	25KX1	S22	J294	1
3	13PM1	B10	K098	1	43	25BU1	S58	K386	1	83	25DK13	6159	K403	2	123	25KX1	S37	J298	1
4	13PM1	B3	K100	1	44	25BU1	S45	J315	2	84	25DK2	A S1	J253	1	124	25KX1	S47	J299	1
5	13PM1	B4	K099	2	45	25BU1	S42	J316	2	85	25DK2	A S21	J255	1	125	25KX1	S15	K424	1
6	13PM4	B100	K159	1	46	25BU1	S22	K387	2	86	25DK2	A S25	J256	1	126	25KX1	S16	J289	2
7	13WD--	BT	K102	1	47	25CC157	3--9-13	K439	1	87	25DK2	B S27	J259	1	127	25KX1	S17	J290	2
8	13WD--	BX	K101	2	48	25CC157	8--9-13	K438	2	88	25DK2	A S19	J254	2	128	25KX1	S20	J292	2
9	14DP2	B4	K260	1	49	25CD11	1	J252	1	89	25DK2	A S26	J257	2	129	25KX1	S23	J295	2
10	14DP2	B10	K261	1	50	25CD21	F13	K431	1	90	25DK2W	B S10	J258	1	130	25KX1	S24	J296	2
11	14DP2	H1 B3	K259	2	51	25CD4	S8	K392	1	91	25DK9	F4 1270	J265	1	131	25KX1	S26	J297	2
12	14DP2	B11	K262	2	52	25CD4	S125	K393	1	92	25DK9	I14	J266	1	132	25KX1	S49	J300	2
13	14LV330	B2	K174	1	53	25CD7A	1651	K441	1	93	25DK9	F4 1268	J267	1	133	25KX12	S146	K432	1
14	14LV330	B4	K173	2	54	25CD7B	5765	K440	1	94	25DK9	I1	J260	2	134	25KX13	S144	J307	1
15	14OS--	OSAGE	K106	2	55	25CM2	UN30632	K426	1	95	25DK9	F3 1	J262	2	135	25KX207A	SEC1 B2	K168	1
16	14PH4	1436	K258	2	56	25CM2	UN30631	K425	2	96	25DK9	F4 1281	J263	2	136	25KX207A	SEC3	K167	2
17	14SA1	KSHS	K478	1	57	25CU201	1	K250	2	97	25DK9	F4 1264	J264	2	137	25KX207A	SEC1 B1	K169	2
18	14SC2	B3	K382	2	58	25CX1	S1	J328	2	98	25DO26	2	K412	2	138	25KX207B	SEC1 IV	K170	1
19	14SC2	B5	K383	2	59	25DK10	F25 1	J268	1	99	25DO4	S64 B9	K256	2	139	25KX5	S43	J301	1
20	14TO301	B1 153	K479	1	60	25DK10	F20 1	J271	1	100	25DO4	S65 B10	K257	2	140	25KX6	S54B	J302	2
21	23PL--	S4	K376	2	61	25DK10	F18 1	J273	1	101	25DX4	S12	J283	2	141	25KX9	S45	J304	2
22	23PL120	S1	K377	1	62	25DK10	F29-1	K423	1	102	25DX4	S13	J285	2	142	25KX9	S55	J305	2
23	23PL120	S5	K379	1	63	25DK10	F28 1	J270	2	103	25DX4	S15	J286	2	143	25MP2	B3 138	K406	1
24	23PL120	S3	K378	2	64	25DK10	F20 101	J272	2	104	25FN22	1	K388	1	144	25MP2	B1 37	K405	2
25	23PL13	S9	K380	1	65	25DK10	F3 1	J274	2	105	25FT--	UN31444	K427	1	145	25NC1	E132	K407	2
26	23PL13	S15	K381	1	66	25DK10	F4-1I43	K422	2	106	25FT13	3845	K248	1	146	25NC20	SURFACE	K408	2
27	23PL58	B 80	K458	1	67	25DK13	1141	J276	1	107	25HK13	F1 B1	K413	1	147	25NC3	S10	J329	1
28	23PL58	B 39	K459	1	68	25DK13	1428	J277	1	108	25HK13	S2 1014	K414	1	148	25NH4	S14	K255	2
29	23PL58	B 95	K462	1	69	25DK13	5747	J279	1	109	25HK13	1245	K415	1	149	25PT1/31	S1	K410	1
30	23PL58	B 90	K463	1	70	25DK13	5891	J280	1	110	25HK13	F6 B3	K416	2	150	25PT1/31	1978	K475	1
31	23PL58	B 24	K460	2	71	25DK13	12647	J281	1	111	25HK16	S1-1	K417	1	151	25PT30	2	K409	2
32	23PL58	B 36	K461	2	72	25DK13	12675	J282	1	112	25HN2	U-30	K252	2	152	25RH1	MISC	K411	1
33	23PL58	B 84	K464	2	73	25DK13	2666	K394	1	113	25HT3	H2 S1	K421	2	153	25SD31	B2	J309	1
34	25BD1	301X59	K430	2	74	25DK13	1039	K395	1	114	25HW1	B184	K251	1	154	25SF1	L3 B3	K249	2
35	25BO7	12	K433	1	75	25DK13	3569	K398	1	115	25HW2	S2	K253	2	155	25SF10	1B 854	K428	1
36	25BO7	8	K434	2	76	25DK13	15884	K404	1	116	25HW3	S48	K389	1	156	25SF10	852	K429	2
37	25BU1	S38	J311	1	77	25DK13	494	K396	2	117	25HW3	S6 B6	K391	1	157	25ST12	1	J336	1
38	25BU1	S44	J312	1	78	25DK13	262	K397	2	118	25HW3	S4 B7	K390	2	158	25ST12	2	J335	2
39	25BU1	S48	J313	1	79	25DK13	6016	K399	2	119	25HW8	S3 B3	J330	1	159	25SY16	1	J337	2
40	25BU1	S36	J314	1	80	25DK13	11755	K400	2	120	25KX1	S18	J291	1	160	25SY55	3-13-13	K435	1

Table C-2. Continued.

N	SITE	ID	#	SEX	N	SITE	ID	#	SEX	N	SITE	ID	#	SEX	N	SITE	ID	#	SEX
161	25SY55	2-13-13	K436	1	201	32M026		L661	2	241	39CA4	SAL 2	L012	1	281	39C032-3	C2 G12	K296	1
162	25SY55B	23-6-08	K437	1	202	32M029	10757	L662	2	242	39CA4	SAL 3	L013	1	282	39C032-3	C2 G14	K298	1
163	25VY3	S1	J308	1	203	32M031	10751	L608	1	243	39CA4	SAL 4	L014	1	283	39C032-3	C2 G16	K299	1
164	25WN3	S1	K418	2	204	32M031	10747	L664	2	244	39CA4	SAL 5	L015	1	284	39C032-3	C2 G20	K301	1
165	25WT1	A530	K254	1	205	32M031	10748	L665	2	245	39CA4	GAG4293	L016	1	285	39C032-3	C2 G23	K303	1
166	25WT1	S12	J317	1	206	32M031	10749	L666	2	246	39CA4	MON 1	L017	1	286	39C032-3	C2 G24	K304	1
167	25WT1	S2	J318	1	207	32M031	10752	L667	2	247	39CA4	MON 3	L018	1	287	39C032-3	C2 G25	K305	1
168	25WT1	S4	J319	1	208	32M037		L668	2	248	39CA4	U-E,B2	K210	1	288	39C032-3	C2 G26	K306	1
169	25WT1	A549	J320	1	209	32M081	81.98.1	K448	2	249	39CA4	101 13	L002	2	289	39C032-3	C2 G32A	K309	1
170	25WT1	S26	J322	1	210	32RM--	8906	K457	1	250	39CA4	101 15	L051	2	290	39C032-3	C2 G35	K310	1
171	25WT1	S37	J323	2	211	32SI1	M2 B2	K074	1	251	39CA4	4055	L053	2	291	39C032-3	C2 G37	K312	1
172	25WT1	A531	J324	2	212	32SN31	91	K271	1	252	39CA4	4904	L055	2	292	39C032-3	C2 G15	K327	1
173	25WT1	A539	J325	2	213	32WA--	S228876	K263	1	253	39CA4	4913	L056	2	293	39C032-3	C2 G1A	K287	2
174	25WT1	A533	J326	2	214	32WA--	S228878	K264	1	254	39CA4	4923	L057	2	294	39C032-3	C2 G1B	K288	2
175	25WT4	V9	K419	2	215	32WA--	S228880	K265	1	255	39CA4	XX	L058	2	295	39C032-3	C2 G2	K289	2
176	25WT4	V10	K420	2	216	32WA--	S228890	K270	1	256	39CA4	GAG4292	L060	2	296	39C032-3	C2 G4	K290	2
177	32BL4	JVR1903	L601	1	217	32WA--	S228884	K266	2	257	39CA4	MON 2	L061	2	297	39C032-3	C2 G7	K292	2
178	32BL4		L651	2	218	32WA--	S228885	K267	2	258	39CA4	2542	L009	2	298	39C032-3	C2 G13	K297	2
179	32BL8	FS13 8	K058	1	219	32WA--	S228886	K268	2	259	39CA4	U-F,B4	K211	2	299	39C032-3	C2 G17	K300	2
180	32BL8	2707	K443	1	220	32WA--	S228889	K269	2	260	39CA4	U-F,B3	K212	2	300	39C032-3	C2 G22	K302	2
181	32BL8	FS11 3A	K057	2	221	32WE401	4319	K446	1	261	39CH7	10726	K222	2	301	39C032-3	C2 G28	K307	2
182	32BL8	FS6 5	K059	2	222	32WE401	4320	K447	1	262	39CL--	OM2212	K140	1	302	39C032-3	C2 G31	K308	2
183	32BL8	FS7 B6	K467	2	223	32WI--	B2	K072	2	263	39CL1A	OM17118	K115	1	303	39C032-3	C2 G36	K311	2
184	32BL8	FS14B7	K468	2	224	32WI--	B1	K073	2	264	39CL1A	OM15510	K116	1	304	39C09	LC3	K028	1
185	32BL8	GFW1936	L652	2	225	39BF--	B2	K105	1	265	39CL1B	OM17876	K117	1	305	39C09	LC9	K030	1
186	32BL9	4337	K449	1	226	39BF--	S380272	K200	1	266	39CL1B	OM17877	K118	1	306	39C09	LC-	K031	1
187	32EM1	3856	K071	1	227	39BF--	S380273	K201	1	267	39C011B	OM17680	K165	1	307	39C09	LC2	K032	1
188	32GT101	11872	K445	1	228	39BF2	MBP1338	K213	1	268	39C011B	OM17683	K166	1	308	39C09	101 7	L101	1
189	32ME12	L1304	K444	2	229	39BF224	M4,F1	K218	1	269	39C014		K068	1	309	39C09	101 18A	L102	1
190	32ME2A	9321	K452	1	230	39BF224	M3F2B2	K219	1	270	39C031	C3 G1	K272	1	310	39C09	101 27A	L103	1
191	32ME2A	9325	K453	1	231	39BF225	MDF1 B2	K091	1	271	39C031	C3 G2	K273	1	311	39C09	101 30	L104	1
192	32ME2A	9326	K454	1	232	39BF225I	M2F1B1	K090	1	272	39C031	C3 G4	K274	1	312	39C09	102 3C	L105	1
193	32ME2A	9327	K455	2	233	39BF225I	M1F5 B4	K089	2	273	39C031	C3 G6	K275	2	313	39C09	102 12A	L106	1
194	32ME2B	9330	K456	1	234	39BF234	M1F2 16	K088	2	274	39C032-3	101-5	K093	1	314	39C09	102 17	L107	1
195	32ME5	B1A	K450	1	235	39BF3	B1	K023	2	275	39C032-3	101-4	K094	1	315	39C09	102 18D	L108	1
196	32ME5	B1B	K451	2	236	39CA4	101 16	L003	1	276	39C032-3	101-1A	K095	1	316	39C09	102 22	L109	1
197	32M011	B1	K442	2	237	39CA4	1014860	L004	1	277	39C032-3	C2 G6	K291	1	317	39C09	102 46	L110	1
198	32M026	10756	L607	1	238	39CA4	301SALB	L006	1	278	39C032-3	C2 G8	K293	1	318	39C09	102 50	L111	1
199	32M026	8290	L655	2	239	39CA4	2	L008	1	279	39C032-3	C2 G10	K294	1	319	39C09	120 2A	L112	1
200	32M026	10755	L660	2	240	39CA4	SAL 1	L011	1	280	39C032-3	C2 G11	K295	1	320	39C09	202 3	L114	1

Table C-2. Continued.

N	SITE	ID	#	SEX	N	SITE	ID	#	SEX	N	SITE	ID	#	SEX	N	SITE	ID	#	SEX
321	39C09	202 12	L115	1	361	39DW2	B20	K018	2	401	39LM33	3567	K065	1	441	39SL4A	5147	H797	1
322	39C09	202 13	L116	1	362	39DW2	B18	K019	2	402	39MH1	293 B8	K108	1	442	39SL4A	5153	H798	1
323	39C09	101 3B	L151	1	363	39DW2	B34	K020	2	403	39MH1	292 B7	K109	1	443	39SL4A	5169	H799	1
324	39C09	101 24	L153	1	364	39DW2	B35	K021	2	404	39MH1	291 B6	K110	1	444	39SL4A	5221	H801	1
325	39C09	102 55	L161	1	365	39DW2	B3	K469	2	405	39MH1	288 B3	K111	1	445	39SL4A	5228	H802	1
326	39C09	C4 G3	K277	1	366	39DW2	B24	K470	2	406	39MH1	290 B5	K112	2	446	39SL4A	5701	H805	1
327	39C09	C4 G13	K280	1	367	39DW2	B25	K471	2	407	39MH1	289 B4	K113	2	447	39SL4A	5715	H806	1
328	39C09	C4 G-	K281	1	368	39DW233	M2 B6	K086	1	408	39MH1	287 B2	K114	2	448	39SL4A	5736	H807	1
329	39C09	C4 G16	K282	1	369	39DW233	M2 B5	K085	2	409	39MK1	MON3	K474	1	449	39SL4A	5743	H808	1
330	39C09	C4 G21	K285	1	370	39DW233	M2 B3	K087	2	410	39PN--	77-2345	K142	1	450	39SL4A	5745	H809	1
331	39C09	LC1	K027	2	371	39DW240	M2B2180	K465	1	411	39P01	561	K077	1	451	39SL4A	5748	H810	1
332	39C09	LC7	K029	2	372	39DW240	M1 B2	K092	2	412	39P0207	3	K078	1	452	39SL4A	5760	H811	1
333	39C09	101 31A	L154	2	373	39DW252	M1B164A	K083	1	413	39P0207	NONE	K080	1	453	39SL4A	5770	H812	1
334	39C09	101 35	L155	2	374	39DW252	M1B2 66	K466	1	414	39P0207	1	K079	2	454	39SL4A	5788	H813	1
335	39C09	101 37	L156	2	375	39DW252	M1B164B	K084	2	415	39P07	WG3	K171	1	455	39SL4A	5815	H814	1
336	39C09	101 48A	K156	2	376	39GR1	93	K081	1	416	39R010	313	K134	1	456	39SL4A	9415	H828	1
337	39C09	102 4	L157	2	377	39GR1	GYB-2	K082	2	417	39R010	319	K137	1	457	39SL4A	5216	H800	2
338	39C09	101 12	K157	2	378	39HS1	OM983	K123	1	418	39R010	M6 DA7	K135	2	458	39SL4A	5128	H838	2
339	39C09	102 11A	L158	2	379	39HS1	OM980	K124	2	419	39R010	M5 DA10	K136	2	459	39SL4A	5168	H839	2
340	39C09	102 16	L159	2	380	39HT1/3	B12 48	K060	2	420	39R010I	310	K133	2	460	39SL4A	5212	H840	2
341	39C09	102 41A	L160	2	381	39HT1/3	B22 47	K061	2	421	39R010I	M2 315	K163	2	461	39SL4A	5215	H841	2
342	39C09	201 4	L162	2	382	39HT1/3	2354	K062	2	422	39R02	OM15003	K164	1	462	39SL4A	5227	H842	2
343	39C09	201 6	L163	2	383	39HT2	F1B4S5	K104	1	423	39R03	302	K129	1	463	39SL4A	5687	H844	2
344	39C09	202 10B	L164	2	384	39HT2	F1B4S2	K103	2	424	39R03	308	K132	1	464	39SL4A	5713	H845	2
345	39C09	202 17C	L165	2	385	39HU1	21057	K067	2	425	39R03	304	K127	2	465	39SL4A	5727	H846	2
346	39C09	220 9C	L166	2	386	39HU2	B190B15	K002	1	426	39R03	305	K130	2	466	39SL4A	5768	H847	2
347	39C09	C4 G1	K276	2	387	39HU2	B20B2	K004	1	427	39R03I	300	K126	1	467	39SL4A	5778	H848	2
348	39C09	C4 G6	K278	2	388	39HU2	B50B4	K005	1	428	39R03I	301	K125	2	468	39SL4A	9387	H857	2
349	39C09	C4 G12	K279	2	389	39HU2	B210B17	K003	2	429	39R03I	307	K131	2	469	39SL4B	5248	H803	1
350	39C09	C4 G17	K283	2	390	39LK2	OM762	K172	1	430	39R04	242	K128	1	470	39SL4B	5253	H804	1
351	39C09	C4 G19	K284	2	391	39LM2A	F32 B1	K070	2	431	39R04	243	K162	1	471	39SL4D	5927	H815	1
352	39C09	C4 G22	K286	2	392	39LM2B	MDC1	K121	1	432	39R04	248	K160	2	472	39SL4D	5937	H816	1
353	39C09	C4 G-	K328	2	393	39LM2B	MDC3	K473	1	433	39R04	244	K161	2	473	39SL4D	5988	H817	1
354	39DA3	EN2	K120	1	394	39LM209	780	K069	2	434	39SL10	MBP2	K214	2	474	39SL4D	5998	H818	1
355	39DV2	S378593	K375	2	395	39LM227	B2	K075	1	435	39SL2	7	K143	1	475	39SL4D	6003	H819	1
356	39DW2	B19	K014	1	396	39LM227	B1	K076	1	436	39SL2	9	K145	1	476	39SL4D	6028	H820	1
357	39DW2	B2	K015	1	397	39LM26-7	S1	K141	2	437	39SL2	11	K144	2	477	39SL4D	6043	H821	1
358	39DW2	B33	K022	1	398	39LM26-7	S2	K472	2	438	39SL29	860	K216	1	478	39SL4D	6078	H822	1
359	39DW2	B22	K016	2	399	39LM33	3560	K063	1	439	39SL4	5080	H796	1	479	39SL4D	9270	H824	1
360	39DW2	B41	K017	2	400	39LM33	3561	K064	1	440	39SL4	5529	H843	2	480	39SL4D	9306	H825	1

Table C-2. Continued.

N	SITE	ID	÷	SEX	N	SITE	ID	÷	SEX	N	SITE	ID	÷	SEX	N	SITE	ID	÷	SEX
481	39SL4D	9328	H826	1	521	39ST1	5032	K225	2	561	39ST235	G7SP6	K006	1	601	39WW1A	301 7A	L363	2
482	39SL4D	9351	H827	1	522	39ST1	5065	K226	2	562	39ST235	G1SP5	K010	1	602	39WW1A	301 26A	L364	2
483	39SL4D	320 13A	L253	2	523	39ST1	5096	K228	2	563	39ST235	SP2	K158	1	603	39WW1A	201 1I	K514	2
484	39SL4D	6090	H823	2	524	39ST1	5279	K231	2	564	39ST235	SP7	K008	2	604	39WW1B	OM S3	K147	1
485	39SL4D	5958	H849	2	525	39ST1	5293	K232	2	565	39ST235	SP1	K011	2	605	39WW1B	OM S2	K148	1
486	39SL4D	5961	H850	2	526	39ST1	5330	K234	2	566	39ST235	SP11	K012	2	606	39WW1B	OM S21	K154	1
487	39SL4D	5966	H851	2	527	39ST1	5414	K235	2	567	39ST235	SP12	K013	2	607	39WW1B	OM S26	K155	1
488	39SL4D	5981	H852	2	528	39ST1	5408	K236	2	568	39ST30	3806 B1	K199	1	608	39WW1B	302 5B	L317	1
489	39SL4D	6030	H853	2	529	39ST11	F10,B2	K217	2	569	39ST53	1	K247	1	609	39WW1B	402 14C	K334	1
490	39SL4D	9295	H854	2	530	39ST15	74	K220	1	570	39UN1	AR1	K139	1	610	39WW1B	402 14D	K335	1
491	39SL4D	9296	H855	2	531	39ST15	395	K221	2	571	39UN1	AR5	K138	2	611	39WW1B	402 19C	K336	1
492	39SL4D	9342	H856	2	532	39ST16A	273	K239	1	572	39WW—	BACHMIR	K482	2	612	39WW1B	402 23B	K337	1
493	39SL4D	9449	H858	2	533	39ST16A	259	K238	2	573	39WW1A	101 12B	L301	1	613	39WW1B	402 34A	K338	1
494	39SL4D	9459	H859	2	534	39ST16B	328	K241	1	574	39WW1A	101 19F	L302	1	614	39WW1B	402 46A	K339	1
495	39SL4E	421 1	L211	1	535	39ST16B	324	K240	2	575	39WW1A	101 22B	L303	1	615	39WW1B	402 46B	K340	1
496	39SL4E	421 2A	L212	1	536	39ST203	B12A	K204	1	576	39WW1A	101 22D	L304	1	616	39WW1B	402 55D	K341	1
497	39SL4E	421 125	L225	1	537	39ST203	1177	K205	1	577	39WW1A	101 25C	L305	1	617	39WW1B	402 55E	K342	1
498	39SL4E	9534	H829	1	538	39ST203	1179	K207	1	578	39WW1A	101 29A	L307	1	618	39WW1B	402 56	K343	1
499	39SL4E	9585	H830	1	539	39ST203	1187	K208	1	579	39WW1A	101 25D	L308	1	619	39WW1B	402 58C	K344	1
500	39SL4E	9674	H831	1	540	39ST203	224	K202	2	580	39WW1A	201 1K	L309	1	620	39WW1B	402 60B	K345	1
501	39SL4E	9755	H833	1	541	39ST203	229	K203	2	581	39WW1A	201 8C	L311	1	621	39WW1B	402 66H	K351	1
502	39SL4E	9820	H834	1	542	39ST203	1178	K206	2	582	39WW1A	201 26E	L312	1	622	39WW1B	402 66I	K352	1
503	39SL4E	9917	H835	1	543	39ST203	231	K209	2	583	39WW1A	301 6	L313	1	623	39WW1B	402 70C	K353	1
504	39SL4E	9920	H836	1	544	39ST215	621	K242	1	584	39WW1A	301 7B	L314	1	624	39WW1B	402 71C	K355	1
505	39SL4E	9957	H837	1	545	39ST215	629	K243	1	585	39WW1A	301 7D	L315	1	625	39WW1B	402 88	K357	1
506	39SL4E	421 9B	L260	2	546	39ST215	660	K245	1	586	39WW1A	301 10	L316	1	626	39WW1B	402 90B	K359	1
507	39SL4E	9704	H832	2	547	39ST215	684	K246	1	587	39WW1A	101 29D	K513	1	627	39WW1B	402 91	K360	1
508	39SL4E	9592	H860	2	548	39ST215	647	K244	2	588	39WW1A	301 12A	K515	1	628	39WW1B	402 92H	K361	1
509	39SL4E	9677	H861	2	549	39ST216	366	K188	1	589	39WW1A	101 27C	L306	2	629	39WW1B	402 93B	K363	1
510	39SL4E	9748	H862	2	550	39ST216	1	K189	1	590	39WW1A	201 8B	L310	2	630	39WW1B	402 94B	K365	1
511	39SL4E	9834	H863	2	551	39ST216	4	K192	1	591	39WW1A	101 2A	L351	2	631	39WW1B	402 99D	K367	1
512	39SL4E	9887	H864	2	552	39ST216	5	K193	1	592	39WW1A	101 4B	L352	2	632	39WW1B	402102B	K370	1
513	39ST1	CR4	K122	1	553	39ST216	2	K190	2	593	39WW1A	101 9E	L353	2	633	39WW1B	402110A	K374	1
514	39ST1	5035	K224	1	554	39ST216	3	K191	2	594	39WW1A	101 10E	L354	2	634	39WW1B	OM S46	K485	1
515	39ST1	5084	K227	1	555	39ST216	7	K194	2	595	39WW1A	101 19E	L356	2	635	39WW1B	OM S32	K486	1
516	39ST1	5136	K229	1	556	39ST216	10	K195	2	596	39WW1A	101 22C	L358	2	636	39WW1B	OM S43	K490	1
517	39ST1	5246	K230	1	557	39ST216	11	K196	2	597	39WW1A	201 2B	L359	2	637	39WW1B	OM S47	K491	1
518	39ST1	5320	K233	1	558	39ST216	12	K197	2	598	39WW1A	201 11F	L360	2	638	39WW1B	302 12B	K494	1
519	39ST1	3011	K237	1	559	39ST216	13	K198	2	599	39WW1A	201 17	L361	2	639	39WW1B	302 9	K495	1
520	39ST1	5028	K223	2	560	39ST23	MBP210	K215	1	600	39WW1A	201 36D	L362	2	640	39WW1B	302 24	K498	1

Table C-2. Continued.

N	SITE	ID	#	SEX	N	SITE	ID	#	SEX	N	SITE	ID	#	SEX	N	SITE	ID	#	SEX
641	39WW1B	302 27C	K502	1	681	39WW1B	302 26B	K501	2	721	39WW2	201 55I	L415	1	761	39WW2	201146B	L539	1
642	39WW1B	302 27D	K503	1	682	39WW1B	302 27E	K504	2	722	39WW2	201 56E	L416	1	762	39WW2	301 17	L545	1
643	39WW1B	302 32	K505	1	683	39WW1B	302 33A	K506	2	723	39WW2	201 63B	L417	1	763	39WW2	301 50G	L555	1
644	39WW1B	302 33A	K507	1	684	39WW1B	302 37D	K508	2	724	39WW2	201 66	L418	1	764	39WW2	301 62B	L559	1
645	39WW1B	302 38C	K509	1	685	39WW1B	302 44C	K511	2	725	39WW2	201 68A	L419	1	765	39WW2	VLG 922	K175	2
646	39WW1B	302 44D	K510	1	686	39WW1C	C1 G1	K313	1	726	39WW2	201 69B	L420	1	766	39WW2	VLG4084	K176	2
647	39WW1B	302 44E	K512	1	687	39WW1C	C1 G9A	K315	1	727	39WW2	201 75A	L422	1	767	39WW2	VLG 936	K177	2
648	39WW1B	OM S1	K146	2	688	39WW1C	C1 G9B	K316	1	728	39WW2	201 84I	L424	1	768	39WW2	VLG6406	K181	2
649	39WW1B	OM S5	K149	2	689	39WW1C	C1 G8A	K319	1	729	39WW2	201 85	L425	1	769	39WW2	301 1K	K182	2
650	39WW1B	OM S8	K150	2	690	39WW1C	C1 G8B	K320	1	730	39WW2	201 86	L426	1	770	39WW2	301 3E	K184	2
651	39WW1B	OM S13	K151	2	691	39WW1C	C1 G11B	K321	1	731	39WW2	201 94	L427	1	771	39WW2	201 47F	L413	2
652	39WW1B	OM S16	K152	2	692	39WW1C	C1 G11C	K326	1	732	39WW2	201 95	L428	1	772	39WW2	201 84C	L423	2
653	39WW1B	OM S20	K153	2	693	39WW1C	C1 G-	K330	1	733	39WW2	201 97G	L429	1	773	39WW2	201113D	L431	2
654	39WW1B	402 60C	K346	2	694	39WW1C	C1 G10A	K331	1	734	39WW2	201113B	L430	1	774	39WW2	201130C	L437	2
655	39WW1B	402 62A	K347	2	695	39WW1C	C1 G2B	K333	1	735	39WW2	201124B	L432	1	775	39WW2	201142	L438	2
656	39WW1B	402 62B	K348	2	696	39WW1C	C1 G11	K314	2	736	39WW2	201124G	L433	1	776	39WW2	301 2B	L443	2
657	39WW1B	402 64	K349	2	697	39WW1C	C1 G4A	K317	2	737	39WW2	201127B	L434	1	777	39WW2	101 10C	L501	2
658	39WW1B	402 66G	K350	2	698	39WW1C	C1 G4B	K318	2	738	39WW2	201129A	L435	1	778	39WW2	101 10D	L502	2
659	39WW1B	402 71B	K354	2	699	39WW1C	C1 G2C	K322	2	739	39WW2	201130B	L436	1	779	39WW2	101 12B	L503	2
660	39WW1B	402 84A	K356	2	700	39WW1C	C1 G7A	K323	2	740	39WW2	201145D	L439	1	780	39WW2	102 1A	L504	2
661	39WW1B	402 90A	K358	2	701	39WW1C	C1 G10C	K324	2	741	39WW2	201148G	L440	1	781	39WW2	102 2	L505	2
662	39WW1B	402 93A	K362	2	702	39WW1C	C1 G-	K325	2	742	39WW2	301 1D	L441	1	782	39WW2	102 3C	L506	2
663	39WW1B	402 93D	K364	2	703	39WW1C	C1 G10D	K329	2	743	39WW2	301 1I	L442	1	783	39WW2	201 3A	L507	2
664	39WW1B	402 99A	K366	2	704	39WW1C	C1 G5E	K332	2	744	39WW2	301 2F	L444	1	784	39WW2	201 6B	L508	2
665	39WW1B	402 99E	K368	2	705	39WW2	VLG 270	K178	1	745	39WW2	301 3D	L445	1	785	39WW2	201 9A	L510	2
666	39WW1B	402102A	K369	2	706	39WW2	VLG 981	K179	1	746	39WW2	301 3H	L446	1	786	39WW2	201 12I	L511	2
667	39WW1B	402106C	K371	2	707	39WW2	VLG 979	K180	1	747	39WW2	301 12C	L447	1	787	39WW2	201 13A	L512	2
668	39WW1B	402107A	K372	2	708	39WW2	301 1M	K183	1	748	39WW2	301 19D	L448	1	788	39WW2	201 14D	L513	2
669	39WW1B	402 109	K373	2	709	39WW2	101 3	L401	1	749	39WW2	301 27D	L449	1	789	39WW2	201 19D	L514	2
670	39WW1B	OM S23	K483	2	710	39WW2	101 29C	L402	1	750	39WW2	301 29C	L450	1	790	39WW2	201 26B	L515	2
671	39WW1B	OM S22	K484	2	711	39WW2	101 32B	L403	1	751	39WW2	301 38A	L451	1	791	39WW2	201 33	L516	2
672	39WW1B	OM S33	K487	2	712	39WW2	101 33E	L404	1	752	39WW2	301 42	L452	1	792	39WW2	201 34B	L517	2
673	39WW1B	OM S34	K488	2	713	39WW2	201 3E	L406	1	753	39WW2	301 54D	L453	1	793	39WW2	201 35C	L518	2
674	39WW1B	OM S36	K489	2	714	39WW2	201 4C	L407	1	754	39WW2	301 60C	L454	1	794	39WW2	201 38B	L520	2
675	39WW1B	OM S44	K492	2	715	39WW2	201 6A	L408	1	755	39WW2	VLG 940	L455	1	795	39WW2	201 38C	L521	2
676	39WW1B	OM S45	K493	2	716	39WW2	201 8D	L409	1	756	39WW2	VLG 973	L456	1	796	39WW2	201 55F	L522	2
677	39WW1B	302 21D	K496	2	717	39WW2	201 22B	L410	1	757	39WW2	VLG 974	L457	1	797	39WW2	201 64A	L523	2
678	39WW1B	302 22	K497	2	718	39WW2	201 32B	L411	1	758	39WW2	VLG 990	L458	1	798	39WW2	201 84F	L524	2
679	39WW1B	302 25D	K499	2	719	39WW2	201 32C	L412	1	759	39WW2	VLG1405	L459	1	799	39WW2	201 84H	L525	2
680	39WW1B	302 27B	K500	2	720	39WW2	201 54B	L414	1	760	39WW2	201 8A	L509	1	800	39WW2	201 93B	L526	2

Table C-2. Continued.

N	SITE	ID	#	SEX	N	SITE	ID	#	SEX	N	SITE	ID	#	SEX	N	SITE	ID	#	SEX
801	39WW2	201 97D	L527	2	816	39WW2	301 16	L544	2	831	39WW2	VLG5238	L562	2	846	39WW7	2191	K050	1
802	39WW2	201111C	L528	2	817	39WW2	301 25	L546	2	832	39WW203	B5	K024	1	847	39WW7	2179	K051	
803	39WW2	201114B	L529	2	818	39WW2	301 29B	L547	2	833	39WW203	B6	K025	1	848	39WW7	2155	K052	1
804	39WW2	201117	L530	2	819	39WW2	301 33C	L548	2	834	39WW203	B1	K026	1	849	39WW7	2178	K054	1
805	39WW2	201124C	L531	2	820	39WW2	301 36B	L549	2	835	39WW7	B61	K033	1	850	39WW7	2206	K055	1
806	39WW2	201124F	L532	2	821	39WW2	301 41A	L550	2	836	39WW7	B52	K034	1	851	39WW7	2213	K056	1
807	39WW2	201129B	L533	2	822	39WW2	301 43	L551	2	837	39WW7	B17	K036	1	852	39WW7	BASS	K185	1
808	39WW2	201130A	L534	2	823	39WW2	301 47	L552	2	838	39WW7	B2	K037	1	853	39WW7	2185	K187	1
809	39WW2	201132	L535	2	824	39WW2	301 49A	L553	2	839	39WW7	B58	K038	1	854	39WW7	B19	K035	2
810	39WW2	201135	L536	2	825	39WW2	301 50B	L554	2	840	39WW7	B31	K039	1	855	39WW7	B23	K041	2
811	39WW2	201137C	L537	2	826	39WW2	301 54E	L556	2	841	39WW7	B20	K040	1	856	39WW7	B54	K046	2
812	39WW2	201148D	L540	2	827	39WW2	301 58F	L557	2	842	39WW7	2198	K043	1	857	39WW7	B38	K047	2
813	39WW2	201 SAL	L541	2	828	39WW2	301 60B	L558	2	843	39WW7	B33	K044	1	858	39WW7	2187	K049	2
814	39WW2	301 1G	L542	2	829	39WW2	301 73	L560	2	844	39WW7	B53	K045	1	859	39WW7	2177	K053	2
815	39WW2	301 3C	L543	2	830	39WW2	VLG1004	L561	2	845	39WW7	B40	K048	1	860	39WW7	WEEKS	K186	2

APPENDIX D

PRINCIPAL COMPONENTS MATRIX

Table D-1. Varimax Rotated Principal Components Matrix.

VARIABLE			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	COM
1	GOL	Glab-occip l	45	02	28	10	05	04	67	13	02	15	02	19	26	08	12	06	02	16	04	-01	10	95
2	NOL	Nas-occip l	44	-01	29	14	06	02	66	13	03	14	01	20	27	10	14	08	01	09	04	02	10	94
3	BNL	Basion-nasion l	67	11	12	22	00	35	00	-02	02	-15	07	11	22	20	17	00	-05	16	00	-14	08	86
4	BBH	Basion-bregma	15	15	62	00	-07	64	-09	14	05	10	18	01	06	05	04	-04	04	15	-03	06	00	95
5	XCB	Max cranial br	06	76	24	-06	-05	-29	-07	-06	07	10	03	-01	03	10	-08	00	00	03	01	-04	04	77
6	XFB	Max frontal br	12	65	25	01	00	-13	-14	06	11	27	25	08	03	-06	00	05	-02	-04	09	-06	-04	71
7	WFB	Min frontal br	12	42	11	24	06	-10	-02	-01	11	18	41	32	-03	03	19	06	-03	-09	06	-04	05	65
8	ZYB	Bizygomatic br	25	76	-03	-02	02	05	04	-01	14	-09	-09	20	10	04	11	08	-08	14	-02	07	07	79
9	AUB	Biauricular br	17	83	-01	-05	-05	-06	02	-02	11	-03	-05	07	10	08	03	06	00	14	00	06	10	80
10	WCB	Min cranial br	08	51	10	-01	05	00	01	04	-03	07	-06	39	11	-07	-03	09	01	-05	15	31	11	59
11	ASB	Biasterion br	-04	49	32	-09	-02	-12	21	-01	03	-11	-05	02	30	00	05	05	02	06	08	-05	07	53
12	BPL	Bas-prosthion l	46	01	08	01	75	05	-01	-08	-05	-15	04	08	15	11	11	00	05	09	-09	-04	05	90
13	NPH	Nas-prosthion	20	15	10	09	23	00	03	-01	85	-03	00	10	04	01	01	06	07	03	07	13	07	91
14	NLH	Nasal ht	28	22	03	07	-01	04	01	-05	73	-02	00	11	11	13	02	07	12	09	-02	05	06	75
15	JUB	Bijugal br	27	60	-02	03	07	07	03	-02	11	-07	-05	36	04	-05	27	19	-06	10	01	16	01	76
16	NLB	Nasal br	21	11	07	-16	05	-03	05	-03	-06	-05	01	17	04	06	49	-04	15	02	-26	14	06	50
17	MAB	Ext alveolar br	02	42	04	01	32	20	03	05	14	03	-04	04	02	-04	04	00	04	-04	12	42	02	55
18	MAL	Ext alveolar l	22	07	05	05	72	-04	01	03	13	01	02	03	07	-01	07	02	05	09	11	00	14	65
19	MDH	Mastoid ht	-06	12	10	03	20	12	09	04	07	08	00	15	-06	15	-10	04	-06	03	00	14	72	71
20	MDB	Mastoid br	12	11	00	-01	-08	-10	-02	-01	03	-10	-03	-05	-06	-11	17	-05	03	06	04	02	72	63
21	OBH	Orbit ht, left	09	12	11	06	-06	02	00	06	51	07	-16	37	05	08	-04	-16	03	-04	-01	-29	-14	61
22	OBB	Orbit br, left	15	22	02	24	03	-03	01	01	16	-10	05	74	06	07	-11	09	00	03	02	-11	08	76
23	DKB	Interorbit br	10	18	05	17	07	04	06	02	-04	02	-04	01	-02	-33	71	01	-12	08	-01	12	-06	75
24	NDS	Nas-dacr subt	10	11	03	05	01	00	05	00	00	-01	-02	01	02	83	21	00	01	04	21	06	-02	81
25	WNB	Simotic chrd	-01	-02	12	16	04	-01	03	03	-04	01	11	04	-01	16	74	15	-03	-19	10	-06	11	72
26	SIS	Simotic subt	10	08	04	10	-01	-01	-01	-01	06	-04	09	02	-03	29	25	00	01	-01	84	-04	07	91
27	ZMB	Bimaxillary br	21	34	01	-08	11	04	04	02	12	-02	-08	22	09	07	28	-20	-01	08	-06	58	04	73
28	SSS	Zygo-max subt	07	01	-03	21	21	12	-01	-02	15	-03	-02	-02	06	07	03	-11	88	04	00	06	00	93
29	FMB	Bifrontal br	23	41	07	19	12	-01	03	02	17	-04	04	63	02	-03	29	13	-12	14	-04	08	01	86
30	NAS	Nasio-frntl sub	13	01	00	81	02	03	07	02	03	-06	06	18	-03	16	17	09	14	07	09	08	-08	84
31	EKB	Biorbital br	23	41	06	14	08	-01	04	01	11	-08	04	67	04	-07	30	12	-13	11	-05	09	00	86
32	DKS	Dacryon subt	15	02	00	85	-05	-06	-01	05	09	05	04	17	02	-15	-03	-08	06	-07	-04	-08	09	85
33	IML	Malar l, inf	28	11	00	12	10	04	00	00	02	-06	01	10	01	01	01	78	-16	02	-09	-16	-02	80
34	XML	Malar l, max	30	22	-02	08	01	-02	-02	02	05	-05	-04	-01	03	-01	03	79	00	02	-02	12	05	80
35	MLS	Malar subt	20	-01	05	-29	00	-05	-02	06	04	-02	00	14	-06	00	11	66	03	06	01	05	-05	61
36	WMH	Cheek ht, min	16	02	06	03	10	-03	02	-08	24	-07	05	-14	10	05	00	11	-15	16	-09	60	15	60
37	SOS	Supraorb proj	30	14	-04	22	05	07	10	-06	16	-06	31	06	04	09	19	12	-11	23	-08	-15	00	46
38	GLS	Glabella proj	16	16	-07	-09	-01	06	04	-02	00	-16	-06	06	03	-06	-07	03	-08	74	05	-08	08	69
39	STB	Bistephanic br	-02	47	23	01	03	-13	-13	-02	03	23	65	06	00	-01	-03	03	-04	-08	06	-08	-02	82
40	STS	Stephanic subt	-05	00	15	04	-01	-03	01	06	-07	19	93	00	-07	-01	02	-02	01	00	04	00	-02	94
41	FRC	Frontal chrd	18	18	43	09	01	-08	01	02	07	64	12	08	04	15	02	05	05	38	-02	15	02	91
42	FRS	Frontal subt	03	04	08	00	-07	-05	08	00	01	89	25	-07	-07	-04	-01	-08	-02	-06	-04	-04	-02	91

Table D-1. Continued.

VARIABLE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	COM
43 FRF Frontal fract	06	07	18	04	08	-07	-03	04	01	08	07	05	02	07	-02	04	13	70	07	22	01	65
44 PAC Parietal chrd	12	-07	24	02	02	04	23	78	-02	06	11	14	10	04	04	09	02	00	00	08	09	82
45 PAS Parietal subt	-04	05	-02	02	03	10	-15	91	00	-03	-04	-06	-09	-01	01	01	-06	02	-05	-10	01	90
46 PAF Parietal fract	11	-06	10	08	-12	-03	01	57	-02	-05	20	12	11	-02	-02	05	04	-06	09	12	00	48
47 OCC Occipital chrd	05	02	67	-03	06	11	33	-42	01	-05	00	08	10	02	06	09	-03	-13	02	06	02	80
48 OCS Occipital subt	02	01	18	01	01	-03	90	-26	02	02	01	-04	-13	00	02	-02	-03	-06	-03	03	00	94
49 OCF Occipital fract	-05	10	45	00	08	-04	15	-47	-04	-13	08	00	05	00	-01	05	-11	-06	02	-02	11	53
50 FOL For magnum l	10	06	07	03	-01	03	-05	02	08	-06	-07	06	79	-09	-04	05	12	-02	03	12	-06	71
51 FOB For magnum br	-08	28	-01	03	04	13	-13	-05	05	06	-05	-04	60	14	-01	-05	-03	03	-10	07	-16	57
52 NAR Nasion rad	82	16	07	36	-02	-10	06	04	11	02	04	16	-03	13	11	09	04	11	08	-02	03	94
53 SSR Subspinale rad	71	06	-03	18	42	14	05	00	04	-06	-02	05	02	06	05	11	36	02	00	09	-03	91
54 PRR Prosthion rad	60	02	00	12	65	13	04	01	12	-03	-02	07	01	02	07	09	23	01	03	12	-03	92
55 DKR Dacryon rad	84	11	06	35	-02	-10	05	02	08	05	01	12	-02	-09	00	06	06	02	02	01	05	91
56 ZOR Zygoorbit rad	86	06	01	11	20	-02	07	00	00	01	-01	05	-03	01	03	20	-02	02	01	15	01	87
57 FMR Frontomalar rad	86	16	11	-15	-09	-12	02	04	07	10	-04	07	-01	-01	-02	05	-02	05	04	-05	07	87
58 EKR Ectoconch rad	91	13	08	-14	01	-06	03	03	03	04	-03	-02	-04	00	00	09	-01	03	07	10	02	91
59 ZMR Zygomaxilla rad	80	05	02	00	26	04	05	01	-04	-05	-01	05	00	01	00	26	-20	-02	01	05	-06	84
60 AVR M1 alveolus rad	53	09	-04	07	56	18	06	01	11	-01	-03	04	-02	-01	08	11	13	05	01	16	-08	73
61 BRR Bregma rad	22	25	78	05	-05	00	-08	16	08	14	26	01	-08	00	05	-04	-01	13	-02	05	-03	88
62 VRR Vertex rad	12	22	84	00	01	02	-05	28	10	08	12	-01	-02	-01	08	-03	-02	11	-03	-01	01	90
63 LAR Lambda rad	10	-04	71	-06	06	-04	41	-18	04	-02	01	12	26	01	10	03	-01	-06	00	00	08	82
64 OSR Opisthion rad	-08	06	09	-11	11	38	-01	-05	-11	-18	-04	05	76	04	05	-08	-05	06	-03	-10	09	85
65 BAR Basion rad	00	-11	-06	00	-06	92	00	03	-02	-02	-09	01	16	02	-01	03	09	04	00	04	00	92
66 NAA Nas angl,ba-pr	-03	-11	-03	-19	83	-21	-02	-07	-35	-05	00	-01	-01	-02	-01	-02	07	-04	-13	02	-03	94
67 PRA Pros angl,na-ba	19	04	01	18	-78	32	-01	05	-28	-01	04	00	07	10	08	-02	-12	08	05	-16	02	94
68 BAA Bas angle,na-pr	-22	09	02	00	-03	-14	04	03	86	08	-06	02	-09	-11	-10	05	07	-07	11	20	03	92
69 NBA Nas angle,ba-pr	-32	-01	37	-20	-09	63	-10	17	00	-24	10	-11	-07	-16	-06	-09	05	-18	-02	05	-06	89
70 BBA Bas angl,na-pr	-08	04	-05	06	06	-64	08	-08	04	61	-03	04	-06	07	-04	09	02	25	00	14	00	91
71 SSA Zygomax angl	02	13	06	-23	-15	-10	02	02	-09	02	-02	11	-02	-04	09	02	-87	00	-02	18	01	93
72 NFA Nas-frntl angl	-06	11	02	-82	02	-03	-07	-02	02	05	-05	-01	03	-19	-10	-06	-19	-04	-11	-06	10	81
73 DKA Dacryal angl	-12	03	01	-85	06	06	02	-05	-05	-07	-02	-01	-01	18	00	11	-06	07	05	05	-08	83
74 NDA Nas-dacryl angl	-03	01	00	05	03	05	00	02	-04	02	00	00	-02	-91	25	00	-08	02	-18	01	-02	94
75 SIA Simotic angl	-10	-10	06	01	03	01	03	03	-09	04	-02	00	02	-19	28	11	-02	-13	-82	-01	01	85
76 FRA Frontal angl	04	02	09	04	10	02	-10	02	01	-78	-24	11	10	11	01	12	05	28	03	13	03	84
77 PAA Parietal angl	10	-10	15	-02	-03	-11	31	-72	-02	07	10	14	16	02	00	04	10	02	06	16	03	78
78 OCA Occipital angl	-01	01	15	-02	02	09	-88	07	-03	-06	00	08	20	02	01	07	02	00	04	00	01	87
79 STA Bistephan angl	05	22	-07	-05	02	-03	-08	-08	10	-13	-87	02	07	00	-04	05	-03	-04	-03	-04	02	88
80 CBA Cranl base angl	02	23	05	00	05	-91	01	-03	04	01	08	00	-14	00	01	-02	-09	-02	00	-02	01	92
Eigenvalue	8.03	5.06	4.02	6.99	3.87	3.79	3.18	3.08	2.94	2.85	2.85	2.53	2.27	2.26	2.24	2.23	2.16	1.87	1.78	1.74	1.35	
Percnt of Trace	10.0	6.3	5.0	5.0	4.8	4.7	4.0	3.8	3.7	3.6	3.6	3.2	2.8	2.8	2.8	2.8	2.7	2.3	2.2	2.2	1.7	

APPENDIX E

PRINCIPAL COMPONENT MEANS BY PHASE

Table E-1. Sex-Centered Principal Component Score Means by Phase, Section 1.

PHASE		N	XBAR1	XBAR2	XBAR3	XBAR4	XBAR5	XBAR6	XBAR7	XBAR8	XBAR9	XBAR10
1	Akaska	4	0.3340	0.8230	-0.0537	-0.2933	0.2714	-0.3873	-1.0551	-0.2058	-0.6681	-0.1657
2	Anderson	3	-0.1505	0.4109	-0.1002	-0.2121	-0.7192	0.4721	0.0004	-0.1170	-0.5209	-0.2621
3	Anoka	1	2.5503	-0.8925	1.6637	0.4234	0.6146	-2.9917	-1.6331	-0.1087	-1.7216	-2.1516
4	Archaic	10	0.4396	-1.0208	0.0083	-0.3700	0.5338	-0.5210	1.1757	0.3724	-1.0369	-0.1849
5	Arikara	53	-0.1740	0.1816	-0.3277	-0.0661	0.1032	0.0219	0.6381	-0.1690	0.4920	0.4921
6	Bad River 1	11	0.1295	0.1484	0.4390	-0.0445	-0.1336	-0.1486	0.8190	0.2538	-0.3300	0.0239
7	Bad River 2	39	-0.2445	-0.0544	-0.0654	0.1768	-0.3161	-0.1704	-0.1343	-0.0459	0.1134	-0.2331
8	Crying Hill	5	-0.1512	-1.1070	-0.1029	0.3059	0.3251	0.1892	0.6531	-0.1818	0.2165	0.3565
9	Devils L-Souris	10	0.6185	-0.1243	0.1751	0.6047	-0.0774	-0.1869	1.0059	-0.2186	0.0056	-0.0035
10	Felicia	2	-0.5939	-0.3501	-0.6931	0.4478	-0.6099	-0.4042	-0.6279	-0.5148	0.8658	0.7558
11	Ft. Yates	1	-2.2648	1.0404	-0.3532	0.0845	-1.4707	2.9967	1.1029	0.7597	-2.3692	0.3017
12	Grand Detour	5	0.3652	0.4068	0.1522	-0.3222	0.0887	0.3291	0.9683	0.1800	-0.0659	0.0576
13	Great Oasis	5	-0.0404	-0.3663	0.6945	0.2697	0.0016	1.3446	-0.4040	0.0553	0.3502	-0.3406
14	Heart River 1	16	0.2624	-0.1494	0.2400	0.6568	0.0975	0.4357	0.9313	-0.0007	0.0403	0.1406
15	Hidatsa	1	0.1824	-0.9831	0.2723	0.3468	0.1968	-1.2202	2.3306	1.1779	0.3151	1.3989
16	Historic Sioux	6	-0.3914	0.0409	-0.0585	0.7014	0.6706	-1.2939	0.3545	0.5968	0.3207	-0.0053
17	Huff	1	2.4867	-1.2767	0.9605	1.5561	1.3832	-0.3834	3.1650	1.4402	1.3829	-0.8860
18	Intrusive Sioux	7	-0.3603	0.0630	0.0205	0.5250	-0.0878	-1.1781	0.5246	-0.6299	-0.2736	-0.3721
19	Ioway	2	1.6695	-1.0270	0.9402	1.5653	0.1084	0.2482	-0.7692	-0.0940	-0.6829	-0.3030
20	Kansa	6	-0.3662	1.5940	0.7895	0.5606	-0.4371	-1.2145	-0.8362	0.4315	-0.3596	-0.3841
21	KC Hopewell	4	0.8195	-0.2786	2.2004	-0.6295	-0.9198	1.3607	0.1922	0.9096	-1.5086	-0.4917
22	Keith	7	-0.1805	-0.5946	0.0752	-0.4856	-0.0003	-0.1326	0.2099	0.2808	0.0420	1.0000
23	La Roche	161	0.1145	0.1274	-0.1135	-0.1642	-0.0159	0.0773	-0.0849	0.1015	0.0828	-0.1094
24	Leary	1	-1.5537	1.3834	3.0684	0.5984	-2.3790	-0.1524	-0.1851	2.8898	-1.6800	-0.5548
25	Le Beau 1	24	0.2177	-0.3642	-0.3524	-0.8022	-0.0326	-0.0319	-0.6489	0.3136	-0.0018	-0.1816
26	Le Beau 2	39	-0.0798	-0.1583	-0.0940	-0.1323	-0.1413	0.2459	-0.0792	-0.1209	-0.0014	0.2844
27	Le Beau 3	213	-0.1105	-0.2884	-0.1430	0.0099	0.1791	0.2534	-0.0027	0.1114	0.2548	0.2809
28	Le Compte	1	-0.2064	-0.7442	0.5480	0.9149	-0.9483	-0.6518	-2.0827	0.0748	0.4554	-1.9162
29	Loseke Creek	6	0.8664	-0.4679	-0.2214	-0.1561	-1.5232	0.4642	0.6731	-0.4985	-0.9069	-0.1716
30	Loup River	5	0.3637	0.9176	1.0475	-0.5837	0.8387	-0.3438	-1.8104	-0.1926	-1.8221	0.0217
31	Lower Loup	5	-0.1650	0.8864	-0.3932	0.1464	-0.1107	-1.1869	-0.6167	0.0568	-0.4619	-0.5361
32	Mandan	6	0.4620	-1.0527	-0.1949	-0.3661	0.4707	0.1296	0.6566	-0.1053	0.8257	0.2541
33	Mill Creek	4	-0.0591	-0.2241	1.5849	-0.7671	-0.5315	1.1438	-0.5249	-1.0916	-0.0373	-0.2000
34	Nebraska	5	-0.0762	0.4113	0.8203	-0.2007	0.8079	0.0525	-2.4358	-0.4166	-1.0886	-0.3833
35	Omaha	15	-0.5359	0.8415	-0.6061	0.4642	-0.2577	-1.1551	-0.3726	-0.9369	1.0291	-0.1635
36	Over	6	0.4923	-0.2202	0.1830	0.2729	-0.5700	1.4879	-0.2333	0.4874	-0.1678	-0.1836
37	Paleo-Indian	7	0.9901	-0.6169	1.5294	-0.3475	0.4568	0.2332	0.6887	-0.0214	-0.7608	-0.7128
38	Pawnee	23	-0.5562	0.2976	-0.5629	0.3177	0.0228	-0.4639	0.0333	-0.4132	0.2580	-0.4043
39	Ponca	19	-0.6454	0.9125	-0.8026	0.5459	-0.6747	-1.1526	-0.5527	-0.4270	-0.1513	-0.1652

Table E-1. Continued.

PHASE		N	XBAR1	XBAR2	XBAR3	XBAR4	XBAR5	XBAR6	XBAR7	XBAR8	XBAR9	XBAR10
40	Redbird	3	0.1169	0.9369	-0.4964	1.1381	-0.6348	-0.6114	1.4302	0.0199	0.4279	-0.3568
41	Smoky Hill	1	-0.4081	-3.1249	1.9150	0.3412	-0.2962	1.0252	-1.2275	-0.4964	-2.0407	0.5773
42	Sonota	9	0.6321	0.4709	-0.4873	0.0063	0.3572	-0.3094	1.3233	-0.3758	-0.3307	-0.3473
43	South Arvilla	13	0.5507	0.0647	0.0762	-0.1237	-0.5353	-0.1682	0.9902	0.0820	-0.0243	-0.4662
44	St. Helena	27	-0.4947	-0.0079	1.0963	-0.2470	0.2632	-0.2274	-1.4898	-0.2854	-0.4178	-0.1273
45	Steed-Kisker	9	0.0514	1.1889	1.2769	-0.0416	0.5512	-0.0637	-1.1534	-0.1604	-0.9251	-0.4986
46	Talking Crow	3	0.5344	0.3353	-0.3483	0.7452	-0.4397	-0.3192	0.2247	-0.0096	-0.3678	-0.2104
47	Thomas Riggs	2	0.6595	0.4267	0.5043	-1.1533	0.5652	-0.0029	0.7917	0.7956	-0.7547	-0.8388
48	Truman	3	0.1966	-0.6762	-0.3882	0.2003	-0.1465	0.5927	1.0858	0.3817	-1.1662	-0.1030
49	Upper Big Sioux	7	0.6477	-0.5519	-0.0990	0.0663	-0.7636	-0.4896	0.2879	0.4198	-0.5028	-0.4115
50	Valley	1	0.8984	0.5305	0.6409	-0.5489	0.2546	0.2988	0.1866	-0.3737	0.5961	-0.7756
51	Vermillion Bluf	2	-0.1509	0.2667	0.1791	-0.5704	-2.2569	1.7430	-0.3249	-0.0138	-1.1196	-0.0420
52	Upper Republic	3	0.4450	-0.5649	0.9073	0.3163	-0.4904	-0.0326	-1.1719	1.2447	-2.2903	-0.4472
53	WD-Generalized	6	0.3011	0.1706	0.0335	0.4741	0.0456	-0.0858	1.0820	0.4276	-0.6155	-0.2572

Table E-2. Sex-Centered Principal Component Score Means by Phase, Section 2.

PHASE		N	XBAR11	XBAR12	XBAR13	XBAR14	XBAR15	XBAR16	XBAR17	XBAR18	XBAR19	XBAR20	XBAR21
1	Akaska	4	-0.2963	0.1228	-0.5259	-0.6718	-0.8464	1.1697	-0.4992	-0.1686	0.2342	-0.4121	1.5416
2	Anderson	3	-0.0677	-0.0721	0.0429	0.1047	-0.5812	0.6224	-1.1617	-0.3496	0.0220	-0.9277	-1.1111
3	Anoka	1	0.4536	0.4914	0.4744	-1.2243	0.7915	-1.0883	0.0432	-0.8079	-1.1575	0.6083	-0.6128
4	Archaic	10	0.7716	0.4614	-0.1591	-0.5764	0.8278	-0.4365	-0.1229	0.9987	-0.3168	0.0646	0.3996
5	Arikara	53	-0.3675	0.3325	0.0271	0.2943	-0.0559	-0.0550	0.0513	-0.3507	0.0329	0.1327	-0.1761
6	Bad River 1	11	-0.4147	0.5221	0.7865	-0.1204	-0.0950	0.6735	0.2052	0.0061	0.2107	0.5953	-0.1239
7	Bad River 2	39	-0.1687	-0.0303	-0.0269	-0.2250	0.0653	0.1857	0.0063	-0.3587	0.1848	0.3239	-0.5684
8	Crying Hill	5	0.7488	-0.2714	-0.6256	0.6476	1.1726	0.3814	-0.2825	0.2260	-0.8414	0.0446	-0.6818
9	Devils L-Souris	10	-0.3538	-0.2322	0.5986	0.4621	-0.2161	0.3267	-0.2934	1.0681	-0.0412	0.1895	-0.6079
10	Felicia	2	-0.4356	0.9878	0.6090	0.5814	1.0887	-1.1232	0.7884	-0.4350	0.1662	0.4484	0.1176
11	Ft. Yates	1	1.5189	-1.5289	-1.4233	0.5227	-2.0416	-0.4676	0.6658	-0.4849	1.1710	0.6065	3.2272
12	Grand Detour	5	-0.3242	0.3207	-1.0600	-0.8954	0.6462	-1.1881	-0.1053	-0.8597	0.7871	-0.8642	1.2484
13	Great Oasis	5	0.1289	-0.3455	0.2211	0.2623	0.4147	0.4899	-0.2462	1.0407	0.2505	-0.1975	0.1646
14	Heart River 1	16	0.6736	-0.7728	0.2955	0.6848	-0.0402	-0.3685	-0.5890	0.3747	0.0526	-0.6241	0.2276
15	Hidatsa	1	0.4505	-1.6120	0.9416	0.1819	0.0109	2.2791	-0.2554	-0.5494	-1.1345	0.4908	-1.2994
16	Historic Sioux	6	0.0781	0.4135	0.2378	0.3687	-0.5815	0.7156	-0.5471	-0.2252	0.4038	1.2092	-0.7015
17	Huff	1	0.2703	0.2814	-0.3539	0.9276	0.2305	-1.6041	0.5253	1.2927	-0.0810	0.8160	-0.6542
18	Intrusive Sioux	7	-0.3007	-0.3247	-0.2099	0.0187	-0.5443	0.4737	-0.7060	-0.4357	0.7658	0.4979	-1.3013
19	Ioway	2	1.0531	-0.4248	0.1863	0.9916	-0.2058	-0.7868	0.6900	-0.3946	0.0003	-1.3542	-0.9340
20	Kansa	6	-0.1320	-0.7525	0.0977	0.4241	-0.2904	-0.2755	-0.2218	-1.0058	-0.4564	0.8012	-0.0486
21	KC Hopewell	4	0.3560	-0.3429	-0.2489	-0.3605	0.5529	0.0960	-0.4295	0.0239	-1.0921	-0.9455	-0.7071
22	Keith	7	-0.0344	-0.3077	0.2940	-0.8830	0.2915	-0.1334	-0.6336	-0.1090	-0.5145	-0.5286	0.5865
23	La Roche	161	0.0226	-0.0052	-0.0071	-0.0008	0.0141	0.0959	0.0131	0.0727	-0.0253	-0.0954	0.1817
24	Leary	1	1.0754	0.6462	-0.6287	1.2934	1.3725	-1.4415	0.2174	0.1627	-0.9576	-0.0979	-1.0996
25	Le Beau 1	24	-0.2093	-0.1304	0.3391	-0.0504	-0.4689	0.4590	0.1765	0.1713	0.3966	0.1892	0.8955
26	Le Beau 2	39	-0.2231	0.0432	-0.8366	0.0433	-0.1115	0.0012	0.2273	-0.1299	0.1744	-0.7627	0.0532
27	Le Beau 3	213	0.0460	0.0680	-0.0266	0.1076	-0.1181	0.0013	0.0508	-0.0257	0.0173	0.0531	-0.0298
28	Le Compte	1	-0.5240	0.8593	0.7490	0.7048	-0.8528	-0.8701	0.3205	0.1009	0.0393	1.8489	-1.7475
29	Loseke Creek	6	-0.9480	-0.2112	1.1252	0.3760	-0.6384	-0.5306	-0.6341	0.0960	0.5350	-0.1294	-0.0067
30	Loup River	5	0.9615	0.2943	-0.7179	-0.3076	0.8583	-0.5513	0.3537	-0.1173	0.1176	0.5740	-0.2942
31	Lower Loup	5	0.3685	-0.3928	0.2532	0.0600	0.0460	-0.1121	0.3653	-0.1389	0.1206	0.2275	-0.4838
32	Mandan	6	0.4782	-0.3047	0.4932	-0.6271	-0.1559	0.6620	0.7090	-0.5628	0.1386	0.4778	-0.7847
33	Mill Creek	4	-0.0062	0.0089	-0.8931	-0.6734	-0.4271	-0.3612	0.8971	0.4190	-0.7182	-0.7084	-0.4933
34	Nebraska	5	0.5626	0.6901	-0.5301	-0.1925	0.7304	-0.9171	0.6165	0.2197	-0.3782	1.0114	0.6711
35	Omaha	15	0.0391	-0.3233	-0.0754	-0.5225	-0.1740	-0.4152	-0.1087	-0.4000	-0.2880	0.5497	-0.4126
36	Over	6	-0.1991	-0.3869	-0.8274	-0.6764	0.4801	-0.5639	-0.3319	-0.8930	0.0548	-1.0068	0.4781
37	Paleo-Indian	7	0.6335	-0.9858	0.4089	-0.9847	-0.1489	-0.6180	-0.5891	0.2296	-0.2105	0.7980	0.2381
38	Pawnee	23	-0.0856	0.1381	0.2455	0.0572	0.0204	-0.1351	-0.3382	-0.0067	-0.3987	-0.2131	-0.2313
39	Ponca	19	-0.2415	-0.5223	0.3041	0.5483	0.0484	-0.1944	-0.1400	0.2535	-0.1457	-0.4092	-0.2644

Table E-2. Continued.

PHASE	N	XBAR11	XBAR12	XBAR13	XBAR14	XBAR15	XBAR16	XBAR17	XBAR18	XBAR19	XBAR20	XBAR21
40 Redbird	3	-0.3939	0.2592	0.0910	0.2812	-0.1213	0.0894	-1.1683	-0.7713	0.2531	-0.0051	-0.7347
41 Smoky Hill	1	-0.7816	-0.7031	-0.5021	-0.6771	0.6686	-0.5279	-0.1132	-0.6805	0.2149	-0.3137	0.4677
42 Sonota	9	-0.3387	-0.0965	0.1683	-0.8048	0.0387	0.5078	0.1534	0.5247	-0.0182	0.3504	-0.4226
43 South Arvilla	13	-0.5125	-0.7094	0.6287	0.7649	-0.5908	0.4337	0.2733	-0.5675	0.6732	0.3865	0.2993
44 St. Helena	27	0.5147	0.4326	-0.3473	-1.0071	0.6177	-0.0699	0.2069	0.0676	-0.4585	0.1015	0.2740
45 Steed-Kisker	9	-0.0734	0.1604	-1.1298	-0.3211	1.4528	-0.7385	0.2885	1.0158	-0.0125	-0.3462	0.9566
46 Talking Crow	3	-0.1480	-0.4347	-0.4427	0.0907	-0.3217	0.4264	0.4161	0.1525	0.3661	-0.4926	-0.4745
47 Thomas Riggs	2	0.4001	0.6955	0.1764	0.0599	-0.4443	-0.3138	0.7654	-0.7156	1.3844	1.0215	0.1026
48 Truman	3	0.8363	-0.0969	1.3137	-0.7412	-0.1901	-0.5278	0.8915	-0.6653	-0.0052	0.1426	0.0801
49 Upper Big Sioux	7	-0.6905	0.0775	0.9708	0.3978	-0.2440	0.4406	0.4298	0.0752	0.1178	1.2424	-0.1158
50 Valley	1	-1.6955	-1.9973	-0.0683	0.7313	-0.3351	0.2095	-1.0725	2.0540	1.1513	-0.5811	0.9189
51 Vermillion Bluf	2	0.5059	-0.3486	0.3925	1.1486	0.3033	-0.5644	-1.2471	1.4248	0.7687	-0.5097	-0.4174
52 Upper Republic	3	-0.0855	1.7249	0.0282	0.6827	-0.0773	-1.2733	-0.4129	0.2546	-0.2298	-0.8193	0.0568
53 WD-Generalized	6	0.4653	0.3196	0.7772	0.4111	-0.2509	-0.4700	-0.1261	0.4675	-0.4170	-0.3477	0.0597

APPENDIX F

D-SQUARE MATRIX

Table F-1. D-Square Matrix, Section 1.

PHASE		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	Akaska	.0	12.5	19.1	12.7	12.2	10.8	22.8	17.1	14.8	14.2	16.6	16.6	16.0	14.3	25.8	11.6	7.5	6.1	7.6	10.1
2	Anderson	12.5	.0	17.8	7.5	8.8	5.4	12.7	8.9	17.1	9.7	8.8	13.1	7.5	13.9	14.0	10.2	5.8	10.4	7.4	6.7
3	Archaic	19.1	17.8	.0	11.2	9.5	11.1	8.9	10.0	13.0	13.2	9.8	15.7	17.0	24.3	18.0	8.4	8.2	11.6	10.6	8.7
4	Arikara	12.7	7.5	11.2	.0	3.6	2.4	7.3	5.3	9.7	8.6	6.0	6.8	7.2	12.1	22.0	5.8	2.0	6.1	3.4	1.3
5	Bad River 1	12.2	8.8	9.5	3.6	.0	3.5	11.2	4.1	13.9	8.7	8.5	6.2	7.5	12.1	17.5	7.9	3.5	5.9	7.3	3.9
6	Bad River 2	10.8	5.4	11.1	2.4	3.5	.0	7.5	5.7	11.9	7.0	7.4	5.8	4.2	8.4	17.7	6.4	1.5	4.9	3.8	1.6
7	Crying Hill	22.8	12.6	8.9	7.4	11.3	7.5	.0	8.4	18.7	9.0	7.0	12.8	12.9	21.0	18.7	9.1	7.2	13.7	8.6	5.7
8	Devils L-Sourisford	17.1	8.9	10.0	5.3	4.1	5.7	8.4	.0	18.6	7.7	4.6	8.1	7.2	15.7	19.3	10.1	5.0	9.5	8.9	5.1
9	Grand Detour	14.8	17.1	13.0	9.7	13.9	11.9	18.7	18.6	.0	16.5	12.4	22.9	19.8	21.4	22.3	9.7	8.9	13.3	6.5	10.1
10	Great Oasis	14.2	9.7	13.1	8.6	8.7	7.0	9.0	7.7	16.5	.0	6.4	16.4	16.0	19.4	13.9	9.4	4.6	6.7	6.6	4.8
11	Heart River 1	16.6	8.8	9.8	6.0	8.5	7.4	7.0	4.6	12.4	6.4	.0	12.7	11.6	15.7	16.6	7.4	4.7	9.9	6.3	4.5
12	Historic Sioux	16.6	13.1	15.7	6.8	6.2	5.8	12.8	8.1	22.9	16.4	12.7	.0	4.8	10.9	31.8	14.1	8.0	11.0	13.0	7.1
13	Intrusive Sioux	16.0	7.5	17.0	7.2	7.5	4.2	12.9	7.2	19.8	16.0	11.6	4.8	.0	10.8	26.8	14.1	8.1	12.7	10.8	8.0
14	Kansa	14.3	13.9	24.4	12.1	12.1	8.4	21.0	15.7	21.4	19.4	15.7	10.9	10.8	.0	24.8	16.4	9.8	13.9	14.0	11.7
15	KC Hopewell	25.8	14.0	17.9	22.0	17.5	17.7	18.7	19.3	22.3	13.9	16.6	31.7	26.8	24.8	.0	16.8	15.6	21.5	17.1	17.4
16	Keith	11.6	10.2	8.4	5.8	7.9	6.4	9.1	10.1	9.7	9.4	7.4	14.1	14.1	16.4	16.8	.0	4.3	6.5	5.0	4.1
17	La Roche	7.5	5.8	8.2	2.0	3.5	1.5	7.2	5.0	8.9	4.6	4.7	8.0	8.1	9.8	15.6	4.3	.0	2.5	1.8	.6
18	Le Beau 1	6.1	10.4	11.6	6.1	5.9	4.9	13.7	9.5	13.3	6.7	9.9	11.1	12.7	13.9	21.5	6.5	2.5	.0	4.4	3.4
19	Le Beau 2	7.6	7.4	10.6	3.4	7.3	3.8	8.6	8.9	6.5	6.6	6.3	13.0	10.8	14.0	17.2	5.0	1.8	4.4	.0	2.0
20	Le Beau 3	10.1	6.7	8.7	1.3	3.9	1.6	5.7	5.1	10.1	4.8	4.5	7.1	8.0	11.7	17.5	4.1	.6	3.4	2.0	.0
21	Loseke Creek	19.0	9.2	16.9	10.3	8.9	9.9	19.5	7.9	17.6	13.1	10.0	19.5	13.3	20.2	19.8	12.9	9.3	10.5	11.4	10.1
22	Loup River	16.3	20.8	17.8	19.4	18.4	14.5	21.5	23.8	21.3	18.8	22.4	22.4	21.3	14.8	20.6	19.6	13.4	16.8	15.8	15.2
23	Lower Loup	11.4	9.4	13.8	7.1	7.6	3.6	13.4	9.4	16.9	13.2	10.8	7.7	6.6	5.1	23.6	11.5	4.3	7.5	8.3	6.0
24	Mandan	19.6	13.5	12.8	6.0	6.9	5.7	8.8	9.1	18.1	11.3	10.9	10.3	11.1	21.3	23.4	9.0	6.5	8.6	9.7	5.0
25	Mill Creek	18.8	13.8	19.3	13.9	15.7	11.5	16.6	16.8	17.9	9.8	16.1	27.4	20.7	22.6	12.2	14.3	10.3	14.7	8.9	10.8
26	Nebraksa	16.4	25.8	19.9	19.9	20.3	15.4	22.9	25.7	23.1	17.0	24.2	24.2	26.3	16.6	26.6	20.4	13.5	15.0	15.9	14.8
27	Omaha	15.1	12.7	20.0	6.5	11.6	4.9	14.6	11.9	17.7	16.7	13.6	9.4	7.3	8.4	33.4	12.0	7.0	11.8	10.0	7.5
28	Over	14.3	10.3	16.3	10.6	14.2	8.8	14.0	16.4	6.4	9.4	9.7	23.6	19.4	19.0	12.1	8.6	7.0	11.2	5.3	7.7
29	Pawnee	11.2	6.1	11.1	2.7	5.9	2.2	8.0	5.8	13.0	8.8	6.4	7.1	6.0	9.4	22.3	6.7	2.2	6.7	4.8	2.7
30	Paleo-Indian	19.1	17.1	9.1	15.0	10.9	11.8	15.7	11.3	16.6	11.8	10.0	18.2	16.3	18.4	12.6	11.2	10.2	12.8	14.8	11.2
31	Ponca	13.2	8.7	18.1	7.3	10.7	5.5	14.0	9.2	19.1	13.9	10.2	11.1	8.0	7.5	28.0	11.7	5.9	10.0	8.2	7.3
32	Redbird	19.4	8.3	17.4	6.4	8.2	7.1	13.9	6.0	16.6	16.6	8.8	8.0	6.0	13.6	27.6	14.5	8.5	16.0	11.9	9.2
33	Sonota	13.5	10.4	8.2	5.4	4.0	5.5	11.2	4.2	13.6	11.8	9.2	9.6	7.6	16.7	21.8	9.8	5.0	9.2	8.8	6.2
34	South Arvilla	14.0	10.1	15.6	5.5	4.3	5.8	14.7	6.0	14.7	11.1	7.4	9.8	8.3	12.0	22.1	11.9	5.3	6.2	8.1	6.1
35	St. Helena	10.5	14.6	12.7	11.8	11.6	7.3	13.7	16.7	15.4	9.9	15.6	16.3	16.2	12.7	16.6	8.9	6.6	9.2	8.2	7.6
36	Steed-Kisker	14.3	22.2	15.8	18.0	18.4	15.3	20.6	20.7	14.0	13.5	18.2	26.2	24.7	17.0	19.9	17.2	11.6	16.1	11.9	14.6
37	Talking Crow	10.5	6.2	12.5	5.2	6.1	3.3	10.2	4.8	13.0	9.6	6.4	9.6	6.0	11.2	18.7	10.3	3.3	7.4	4.1	4.3
38	Truman	21.6	15.3	10.0	10.4	8.1	9.6	15.3	12.3	15.5	15.4	10.1	17.3	17.1	21.0	19.5	10.7	8.9	11.5	12.2	8.6
39	Upper Big Sioux	16.3	15.9	12.7	7.5	3.2	5.4	14.3	5.7	20.9	12.2	12.1	8.3	9.6	13.0	22.0	12.5	6.2	6.2	11.1	6.7
40	Upper Republican	22.9	19.1	17.7	22.1	19.3	18.8	25.8	22.4	23.3	21.2	21.0	26.2	27.0	22.9	16.8	21.1	16.5	19.3	17.2	17.6

Table F-2. D-Square Matrix, Section 2.

PHASE		21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	FDIAG
1	Akaska	19.0	16.3	11.3	19.6	18.8	16.4	15.1	14.3	11.2	19.1	13.2	19.4	13.5	14.0	10.5	14.3	10.5	21.6	16.3	22.8	8.4
2	Anderson	9.2	20.8	9.4	13.5	13.8	25.7	12.7	10.3	3.0	17.1	8.7	8.3	10.4	10.1	14.6	22.2	6.2	15.3	12.9	19.1	5.3
3	Archaic	16.9	17.8	13.8	12.8	19.3	19.9	19.9	16.3	11.1	9.1	18.1	17.4	8.2	15.6	12.7	15.8	12.5	10.0	12.7	17.7	7.1
4	Arikara	10.3	19.4	7.1	6.0	13.9	19.9	6.5	10.6	2.7	15.0	7.3	6.4	5.4	5.5	11.8	18.1	5.2	10.4	7.5	22.1	2.4
5	Bad River 1	8.9	18.4	7.6	6.9	15.7	20.3	11.6	14.2	5.9	10.9	10.7	8.2	4.0	4.3	11.6	18.4	6.1	8.1	3.2	19.3	2.9
6	Bad River 2	9.9	14.5	3.6	5.7	11.5	15.4	4.9	8.8	2.2	11.8	5.5	7.1	5.5	5.8	7.3	15.3	3.3	9.6	5.4	18.8	1.2
7	Crying Hill	19.5	21.5	13.4	8.8	16.6	22.9	14.6	14.0	8.0	15.7	14.0	13.9	11.2	14.7	13.7	20.6	10.2	15.3	14.3	25.8	6.9
8	Devils L-Sourisford	7.9	23.8	9.4	9.1	16.8	25.7	11.9	16.4	5.8	11.3	9.1	6.0	4.2	6.0	16.7	20.7	4.8	12.3	5.7	22.4	4.2
9	Grand Detour	17.6	21.3	16.9	18.2	17.9	23.1	17.9	6.4	13.0	16.6	19.1	16.6	13.6	14.7	15.4	14.0	12.9	15.5	20.9	23.3	9.1
10	Great Oasis	13.1	18.8	13.2	11.3	9.8	17.0	16.7	9.4	8.8	11.8	13.9	16.6	11.8	11.1	9.9	13.5	9.6	15.4	12.2	21.2	5.3
11	Heart River 1	10.0	22.4	10.8	10.9	16.0	24.2	13.6	9.7	6.4	10.0	10.2	8.8	9.2	7.4	15.6	18.2	6.4	10.1	12.1	21.0	4.3
12	Historic Sioux	19.5	22.4	7.7	10.3	27.4	24.2	9.4	23.6	7.1	18.2	11.1	8.0	9.6	9.8	16.3	26.2	9.6	17.3	8.3	26.2	7.4
13	Intrusive Sioux	13.3	21.3	6.6	11.1	20.7	26.3	7.3	19.4	6.0	16.2	8.0	6.0	7.6	8.3	16.2	24.7	6.0	17.1	9.6	27.0	6.2
14	Kansa	20.2	14.8	5.1	21.2	22.6	16.6	8.4	19.0	9.4	18.4	7.5	13.6	16.7	12.0	12.7	17.0	11.2	21.0	13.0	22.9	8.5
15	KC Hopewell	19.8	20.6	23.6	24.9	12.2	26.6	33.4	12.1	22.3	12.6	28.0	27.6	21.8	22.1	16.6	19.9	18.6	19.5	22.0	16.8	13.6
16	Keith	12.9	19.6	11.5	9.0	14.3	20.4	12.0	8.6	6.7	11.2	11.7	14.5	9.8	11.9	8.9	17.2	10.3	13.7	12.5	21.1	4.5
17	La Roche	9.3	13.3	4.3	6.5	10.3	13.5	7.0	7.0	2.2	10.2	5.9	8.5	5.0	5.3	6.6	11.6	3.3	8.9	6.2	16.5	.4
18	Le Beau 1	10.5	16.8	7.5	8.6	14.7	15.0	11.8	11.2	6.7	12.8	10.0	16.0	9.2	6.2	9.2	16.1	7.4	11.5	6.2	19.3	3.7
19	Le Beau 2	11.4	15.8	8.3	9.7	7.9	15.9	10.0	5.2	4.8	14.8	8.2	11.9	8.8	8.1	8.2	11.9	4.1	12.2	11.1	17.2	2.5
20	Le Beau 3	10.1	15.2	6.0	5.0	10.8	14.8	7.5	7.7	2.7	11.2	7.3	9.2	6.2	6.1	7.6	14.6	4.2	8.6	6.7	17.6	1.1
21	Loseke Creek	.0	29.1	14.9	16.4	19.3	30.4	18.8	13.9	11.4	14.9	13.2	12.1	11.7	6.6	22.7	27.7	9.8	11.5	7.3	19.2	8.1
22	Loup River	29.1	.0	11.1	24.2	17.4	4.0	20.5	20.1	17.7	17.4	19.2	30.5	20.6	25.3	6.2	7.6	17.7	22.8	22.1	16.8	11.9
23	Lower Loup	14.9	11.1	.0	12.1	17.8	13.5	5.0	15.8	3.8	15.5	2.9	10.3	8.1	8.8	8.9	13.9	4.7	12.6	8.3	19.5	3.8
24	Mandan	16.4	24.2	12.1	.0	16.2	26.4	12.3	15.6	9.4	12.8	17.2	15.8	7.6	8.9	15.0	28.6	9.6	8.9	9.4	32.8	6.8
25	Mill Creek	19.3	17.4	17.8	16.2	.0	16.9	18.6	12.0	14.3	15.2	20.0	26.1	17.2	19.6	8.9	14.7	13.8	20.0	20.8	23.3	9.8
26	Nebraksa	30.4	4.0	13.5	26.1	16.9	.0	19.5	20.6	17.0	19.9	19.8	33.9	24.2	27.4	4.9	7.1	21.1	24.7	21.9	17.2	13.1
27	Omaha	18.8	20.5	5.0	12.3	18.6	19.5	.0	18.1	3.6	20.0	4.8	9.3	10.2	12.9	11.9	20.3	8.8	19.0	13.8	32.1	7.0
28	Over	13.9	20.1	15.8	15.6	12.0	20.6	18.1	.0	11.7	14.8	17.0	17.4	15.7	14.1	12.5	15.3	9.9	13.6	18.0	18.5	7.2
29	Pawnee	11.4	17.8	3.8	9.4	14.3	17.0	3.6	11.7	.0	15.0	2.9	5.8	6.0	8.2	9.1	15.5	4.8	11.8	8.8	19.9	2.3
30	Paleo-Indian	14.9	17.4	15.5	12.8	15.3	20.0	20.0	14.8	15.0	.0	22.3	20.5	11.1	12.8	13.0	18.3	15.0	11.2	13.2	23.5	8.1
31	Ponca	13.2	19.2	2.9	17.2	20.0	19.8	4.8	17.0	2.9	22.3	.0	8.4	10.9	10.6	13.3	16.9	5.5	17.8	11.3	22.2	5.7
32	Redbird	12.1	30.5	10.3	15.8	26.1	33.9	9.3	17.4	5.8	20.5	8.4	.0	7.5	9.0	22.8	26.4	6.8	18.0	11.8	27.5	7.7
33	Sonota	11.7	20.6	8.1	7.6	17.2	24.2	10.2	15.7	6.0	11.1	10.9	7.5	.0	7.4	15.0	18.9	5.1	10.1	7.7	27.5	4.5
34	South Arvilla	6.6	25.3	8.8	8.9	19.6	27.4	12.9	14.1	8.2	12.8	10.6	9.0	7.4	.0	19.3	24.3	5.7	10.2	4.1	25.6	5.1
35	St. Helena	22.7	6.2	8.9	15.0	8.9	4.9	11.9	12.5	9.1	13.0	13.3	22.8	15.0	19.3	.0	6.8	13.0	17.1	16.1	16.5	6.1
36	Steed-Kisker	27.7	7.6	13.9	28.6	14.7	7.1	20.3	15.3	15.5	18.3	16.9	26.4	18.9	24.3	6.9	.0	16.1	26.8	24.0	18.0	11.2
37	Talking Crow	9.8	17.7	4.7	9.6	13.8	21.1	8.8	9.9	4.8	15.0	5.5	6.8	5.1	5.7	13.0	16.1	.0	11.4	7.6	19.6	2.8
38	Truman	11.5	22.8	12.6	8.9	20.0	24.7	19.0	13.6	11.8	11.2	17.8	18.0	10.1	10.2	17.1	26.8	11.4	.0	9.8	21.4	7.8
39	Upper Big Sioux	7.3	22.1	8.3	9.4	20.8	21.9	13.8	18.0	8.8	13.2	11.3	11.8	7.8	4.2	16.1	24.0	7.6	9.8	.0	19.6	5.5
40	Upper Republican	19.2	17.0	19.5	32.8	23.3	17.2	32.1	18.5	19.9	23.5	22.2	27.5	27.5	25.6	16.5	18.0	19.6	21.4	19.6	.0	14.5

VITA

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