

SUBSISTENCE AND POPULATION PATTERNS
ON THE
NORTH AMERICAN PLAINS

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The North American Plains can be generally defined as the geographic region centered in the continent and bounded on the west by the base of the Rockies, on the north and east by forests, and on the south by the southern margin of the Llano Estacado. The entire region is predominantly grassland. Within this general area, the Plains can be longitudinally subdivided into the short-grass plains on the west and the tall-grass prairies on the east. The boundary between these subdivisions very roughly follows the 100th meridian. The aboriginal inhabitants of the Plains immediately prior to white contact included both nomadic bison hunters, concentrated in the short-grass plains, and groups practicing a mixed bison-hunting and horticultural economy. The relative emphasis on horticulture tended to be more pronounced in the tall-grass prairie region (Wedel 1961; Spencer and Jennings 1965; Holder 1970).

THE OCCUPATION OF THE PLAINS

The earliest human inhabitants of the New World are generally believed to have entered through the Bering land bridge connecting Siberia and Alaska. The term "Beringia" is perhaps more suitable for this land "bridge", since at its maximum extent it was wider than the present Alaskan peninsula. This connecting landmass was present between approximately 35,000 and 12,000 BP, and was free of glacial ice at all times. Human movement through Beringia was relatively unimpeded, but movement across Alaska proper was somewhat more difficult. Movement across coastal regions was unlikely, since they consisted of high mountains cut by valleys filled with ice or sea water during this period. Movement between the Cordilleran and Laurentide ice sheets was possible throughout the late Wisconsin period in the Yukon, but this corridor may have been closed

in modern British Columbia and Alberta until the Two Creeks interval, about 12,000 BP. The Valdres readvance may have again closed the corridor until it was finally reopened between 11,000 and 10,000 BP. When open, this corridor emptied directly into the northern Plains, in the vicinity of modern Edmonton, Alberta (Flint 1971; Martin 1973). It seems clear that the Plains were the first region below the ice sheets to be occupied.

The date of this entry into the Plains is a subject of continuing controversy. The oldest dated artifacts in the New World are no older than 13,000 BP. Older dates have been proposed, but are highly questionable (Martin 1973; Spencer and Jennings 1957). The earliest clearly identifiable tool tradition is defined by the Clovis fluted point and apparently contemporary unfluted styles, such as the Sandia form. The Clovis point is clearly a sophisticated form, and has a wide distribution. Clovis points have been found over most of North America south of the line of Wisconsin glacial advance (Wormington 1957; Mason 1962). This tradition establishes a minimal upper bound for human occupation of the Plains, and the controversy centers on the time required for movement to such sites as Lehner and Naco, and on the time required for the Clovis tradition to evolve.

Martin (1973) and Haynes (1966) have both proposed a late entry of human populations into the Plains, suggesting that the earliest paleo-hunters emerged onto the Plains during the Two Creeks interval. The entry of these hunters, already equipped with the appropriate technology, was followed by a rapid expansion through a hitherto unexploited environment. Martin specifically correlates this entry with the extinction of the characteristic Pleistocene megafauna, suggesting that the Clovis subsistence pattern was based on the exploitation of a dense, native megafaunal population, whose pro-

progressive extinction along the margin of settlement drew the human population forward at an extremely rapid rate. He proposes that this mechanism could have brought the area of human settlement to the limit of South America within 1200 years. Both Martin and Haynes suggest that the passing of a single band of hunters through the inter-glacial corridor would have been sufficient to account for the subsequent growth of population.

Others, including Krieger (1953, 1964), MacNeish (1971, 1973), and Müller-Beck (1966), cite a number of objections to such a late entry date. The primary objection revolves around the rate of population expansion such a late date necessitates. If such a rate is untenable, a pre-Clovis stage must be postulated. The absence of a clearly antecedent point style in Siberia supports this position. Krieger particularly sees a pre-projectile point stage evident in a variety of tool finds which display a low level of technology. Very old radiocarbon dates, such as those at Lewisville and Tule Springs, are cited in support of these objections, although these dates are questionable, as suggested earlier. Mac Neish (1973) also lists a child's skeleton from an Alberta site dated at 60,000 BP, but this find is not discussed in any of the other cited references and no source is given.

Both positions have clear defects. Martin's (1973) insistence on the primary role of human hunting activities in the extinction of Pleistocene megafauna is clearly open to question. The list of extinct megafauna is rather lengthy (Hester 1960; Martin 1973), but only bison and mammoth remains are common at Paleo-Indian kill sites (Wendorf 1961b; 1962). The extinct species include forms such as the dire wolf and giant jaguar, which seem most unlikely to have been subsistence prey. The disappearance of typical

Pleistocene fauna on the Llano Estacado is tightly correlated with a sharp climatic shift (Wendorf 1961a), and it appears likely that this same relationship would occur elsewhere on the Plains. Williams (1957) has demonstrated the possibility of the persistence of the mastodon into the Archaic, and Martin (1958) has himself reported data indicating persistence of megafauna in Florida.

The case for earlier entry dates appears to be inductive, rather than based upon data. No sound data appears to substantiate human presence in the New World prior to the Two Creeks retreat, and an elemental lower bound for human entry is established at less than 40,000 BP, since only remains of Homo sapiens sapiens have been identified in the Americas (Poirier 1973; Wormington 1957).

The proponents of an early human entry into the New World appear to be bound by a misleading and simplistic understanding of population dynamics. Population growth is often viewed as a simple geometric progression, which can be graphed as a smooth J-curve. This paradigm obscures several important aspects of population growth. Population growth rates are most rapid when new subsistence resources are made available, whether through the development of new exploitation techniques or through the discovery of new food resources. The relative rate of population growth slows as an econiche is saturated. The use of a logarithmic curve reveals this pattern, and shows that the surge of population growth is most pronounced at the initial stages of the move into a new econiche (Deevey 1960). It is apparent that the models proposed by Martin and Haynes are statistically possible, and that a rapid filling of the Americas by hunters utilizing resources in a manner which required a low population density is indeed likely.

The major substantive objection to a late occupation of the

Plains is the apparent lack of clear antecedents to the Clovis tradition. This objection may have been overstated, since some affinities do appear to have been present in Siberia (Wormington 1962). Additionally, a fluted point with a clearly Clovis appearance has been reported from Alaska (Krieger 1953; Solecki 1951), and may represent an antecedent group. (Colter 1962) sees a clear link with Siberian traditions in the bone projectile point found at the Clovis site. A number of physiological characteristics of Amerindian groups suggest a strong founder effect or genetic drift operating during the occupation of the Americas. For example, blood group B was probably absent from aboriginal American populations (exclusive of Alaska and the Arctic) before white contact, although it is relatively frequent in eastern Asia (Jolly and Plog 1976). Both Martin and Haynes postulate the movement of a small population through the glacial corridor during the Two Creeks interval which was subsequently isolated during the Valdres readvance, when the corridor was probably closed (Flint 1971). This is a situation in which a founder effect is most likely to occur, and a similar founder effect in cultural traits seems equally likely.

The frequent occurrence of tools displaying a "low level of technology" has also been cited as proof of an early occupation date (Krieger 1964). This assumption minimizes an elemental aspect of lithic technologies. Crude tools simply do not drop out of the tool inventory. For example, the choppers from Hell Gap (Irwin-Williams 1973), Piney Creek (Frison 1967), and possibly Olsen-Chubbuck (Wheat 1972) are exceedingly crude and illustrate the sort of tools referenced as evidence of pre-Clovis Plains occupation. These associations with advanced forms should alone demonstrate that crude tools per se are not prima facie evidence of a

low level of technology. Crude choppers and other such tools share several characteristics. They are generally large and heavy in comparison with more carefully made forms, and their effectiveness does not depend greatly on their manufacture from superior material --- almost any available stone will do. Their effectiveness does not depend on careful or skillful flaking. These factors virtually insure that a hunting population will continue to make such tools on an ad hoc basis, since they can be manufactured almost anywhere and are unhandy to transport. Tools which have functions of the sort for which the investment of time and effort in manufacture and care in the selection of material is appropriate, such as projectile points, coexist quite comfortably with cruder forms.

It thus appears most likely that man first entered the Plains during the Two Creeks interval, fully equipped with the technology and subsistence skills expressed in the Clovis culture. The arrival of these peoples was followed by a rapid filling of the unglaciated regions of North America, which marks the beginning of the first cultural sequence on the Plains.

Paleo-Indians on the Plains

The earliest Paleo-Indians appear to have consistently been primarily mammoth hunters (Haynes 1966; Mason 1962; Wormington 1957). Other species were hunted, particularly bison (Wendorf 1962), but this earliest pattern appears to have been specifically focused on the utilization of the mammoth, particularly in the Plains. These groups appear to have nearly universally used Clovis points.

During this earliest period, the Plains were markedly more moist and cooler than the present. With local exceptions the

entire region was forested to some extent, grading from open savanna in the southern Plains into woodland and boreal forest to the north, except for a strip of tundra at the glacial margin (Flint 1971; Wendorf 1961a). The mammoth seems to have been more common in the more open regions in the south, and Clovis sites found in association with mammoth remains have clustered there (Wormington 1957; Haynes 1966). Since the Plains were open parkland or savanna rather than grassland, it is unlikely that bison were as significant within the ecosystem as they later became. A broadly similar environment stretched across the continent east of the Rockies, and it is probable that the Plains were not differentiated as a culture or subsistence zone during this period (Mason 1962). A general homogeneity in both aspects seems to exist instead, characterized by a pattern of small, wide-ranging, and intercommunicating bands sharing the same primary subsistence base (Griffin 1960; Martin 1973; Mason 1962; Haynes 1966). The existence of Clovis-style tool traditions in South America suggests that this pattern had a panhemispheric distribution as well (Mayer-Oakes 1963).

This earliest pattern terminated with the extinction of the mammoth. This extinction may be associated with human hunting activities (Martin 1973), although a synergistic effect of such hunting with climatic variation appears more probable. The extinction of the mammoth seems to have come earliest in the Plains (Mason 1962). The Plains thus appears to have begun to differentiate as a culture area and as an ecosystem with the exhaustion of the mammoth as a food resource and with the drying of the Plains associated with concurrent climatic changes, approximately 10,500 BP (Wendorf 1961b).

The first distinctive Plains cultural and subsistence

pattern is defined by the shift from the mammoth to the bison as the primary food resource. The bison remained the primary food resource. The bison remained the primary food resource in the Plains from this point until the white settlement of the region in historic times. This singular dependence upon bison was generally limited to the region considered here. Culturally this pattern can be defined by the use of Folsom and Plano style points (Wendorf 1962).

This period has often been divided into two subsequent stages on the basis of presumed differences in the species of bison hunted by peoples using these characteristic tool patterns, Folsom hunters being assumed to have exploited extinct species (Bison occidentalis, B. antiquus, and B. tayloris) and Plano groups being assumed to have subsisted on the modern form (B. bison) (Jennings 1968). This division is at best somewhat oversimplified, since ample evidence indicates that the differences between bison varieties are largely nominal and that these varieties often coexisted (Hester 1960; 1962; Wedel 1961; Wilson 1969). There is also substantial evidence that Folsom and other post-Clovis fluted point styles coexisted with unfluted styles from very near the beginning of primary dependence on bison (Wendorf 1961a; 1961b; Wormington 1957).

A major readjustment in subsistence economies seems to occur across North America at the end of the Pleistocene and upon the disappearance of the mammoth. This shift may be viewed as a "settling in" to particular ecosystems, defined by the development of exploitation techniques tailored to the resources and potentials specific to those ecosystems (Caldwell 1958; Fitting 1968; Griffin 1960; Mason 1962). The beginnings of the linguistic diversity so marked in precontact North America has been traced to this period,

reflecting decreasing intercommunication and cultural similarities between populations (Griffin 1960). These all appear to be a function of increasing territoriality and more restricted ranges. These events are associated with an increase in population size, as resources began to be more efficiently exploited (Fitting 1968).

On the Plains this period is marked by progressive warming and drying throughout the region (Flint 1971; Wendorf 1961a; 1961b). These geological changes caused the Plains to shift from savanna and woodland to prairie and grassland. This shift in the character of the ecosystem greatly reduced its biological diversity (Harris 1969), and caused the bison to become the predominant genus, since the short-grass plains are its optimal environment (Reeves 1973).

The shift to bison hunting appears to have been minimal in technological terms, as the obvious continuity between Clovis, Folsom, and Plano styles indicates. The shift was between one gregarious grazing ungulate to another, consistent with the shifts in the character of the ecosystem and the dominant faunal resource within it. The hunting techniques were initially similar, but shifted through time from stalking of individual and small groups of prey to more efficient driving and surround techniques (Wendorf 1962).

These adaptations are clear manifestations of the same readjustment seen across the continent during this period, in that they represent an adaptation to the particular resources within the Plains ecosystem and a gradually increasing efficiency in the exploitation of those resources. The increase in population evident in the changes in hunting techniques and the increasing variation in cultural manifestations such as tool styles (Wormington 1957) show the operation of the same forces seen elsewhere in North

America. The fact that the major subsistence resource on the Plains was the bison should not obscure this essential similarity.

The Altithermal on the Plains

The Paleo-Indian sequence on the Plains is generally considered to have terminated during the climatic optimum or Altithermal, approximately the period between 5500 and 4500 BC (Antevs 1955). It has been widely assumed that this period represents a hiatus in the occupation of the Plains, either by hunting groups per se or by any significant cultural group (Krieger 1953; Meyer-Oakes 1959; Willey 1966), because of the greater temperature and consequent aridity during this interval. Although there is some evidence of Desert Culture intrusion into the Plains from the west during this period (Wedel et al 1968), it seems clear that the bison hunting tradition continued without interruption, although the size of the population was probably somewhat reduced (Frison 1976; Irwin-Williams 1973; Reeves 1973; Wedel 1961).

The concept of a cultural or occupational hiatus on the Plains seems to result from sampling error (Reeves 1973). The dryness of the Plains during the Altithermal would cause campsites to cluster near to permanent sources of water, where such sites would be highly vulnerable to burying and dispersal through paleo-hydraulic action. Relatively few sites on the Plains have been dug in soils of sufficient age to contain Altithermal artifacts.

Most significantly, the climatic changes during the Altithermal probably did not produce an arid or semi-desert environment. Rather, there was simply an increase in the extent of the short-grass plains. This is the optimal environment for bison. During dry periods the productivity of the grasses in this region is greatly reduced, so it is likely that the density of bison was in

fact reduced, but it appears doubtful that the cultural continuity of the region was seriously disrupted. This continuity seems to be documented at such sites as Signal Butte (Irwin-Williams 1973; Reeves 1973; Wedel 1961).¹

Woodland Intrusions into the Plains

After the passing of the Altithermal, Plains cultures included both nomadic groups primarily dependent on bison hunting and village-dwelling groups who combined essentially eastern patterns of subsistence with bison hunting. The Woodland subsistence patterns of the village groups shifted with the patterns of the core areas to the east, moving from a generalized hunting-gathering pattern to horticulture over time, but bison hunting was nearly universally a major feature of all Plains economies (Wedel 1961; Willey 1966).

The Indians of the eastern woodlands consistently moved toward the attainment of primary forest efficiency through the Archaic and Woodland stages. This pattern is essentially an elaboration of a generalized hunting and gathering economy, involving the intensive utilization of wild plant and animal resources. This pattern appears to have been analogous in its cultural potential to the development of agriculture in the Old World (Caldwell 1958). The development of the Adena and Hopewell patterns in the Ohio and Illinois valleys suggest the vigor of this cultural pattern. Population appears to have radiated outward from such centers as a result of population growth. The Hopewell colonies near modern Kansas City appear to be

¹ It seems likely that the assumption that a reduction in moisture and an increase in temperature in grasslands leads to desertification is based on the association of these conditions with desertification during the historical period in such places as the American Southwest and the margins of the Sahara. In these instances, however, it is demonstrable that the proximate cause of desertification has been overgrazing by domestic herds (MacLeod 1974).

a manifestation of this radiation (Caldwell 1958, Wedel 1961). The use of the term "colonies" suggests the essentially intrusive nature of this pattern in the Plains. In the Plains proper this pattern was necessarily largely limited to the gallery forests which extended into the Plains along the valleys of permanent rivers, since the food resources utilized in this pattern were not found abundantly elsewhere on the Plains.

Another major increase of population is evident in the eastern woodlands after the adoption of maize horticulture (Caldwell 1958). The Mississippian pattern was a widespread and vigorous cultural form which showed clear Mesoamerican influences in both subsistence technology and in other cultural aspects, such as the Southern Cult. The primary dependence on maize seen in this pattern, as well as its rapid growth, probably resulted from the introduction of new, high-yielding varieties of maize from Mexico, which replaced and supplemented older varieties of maize which had been known for millenia without becoming established as a subsistence staple (Caldwell 1958; MacNeish 1964). This pattern seems to have generated a second radiation out on to the Plains, where horticulture became an integral aspect of the Plains village economy. Horticulture was perhaps even more strictly concentrated along river valleys because of the rapid rate at which maize depletes soils outside of the self-fertilizing flood plains (Caldwell 1958)

Wedel (1941) has suggested that horticulture has always been a precarious subsistence base on the Plains. He suggests that horticulturists have occupied the High Plains only periodically, "having ventured far out into the Great Plains during favorable times only to withdraw when droughts set in (1941:27)." The climatic history of the Plains since the Altithermal has been marked by great varia-

bility in annual and seasonal moisture, to which horticulture is highly sensitive. The Plains village blend of horticulture and bison hunting (Spencer and Jennings 1965; Wedel 1961; Willey 1966), appears to be an adaptive compromise between the uncertainties of horticulture and the resource potential of the bison, and is graphic evidence of the essentially intrusive nature of woodland subsistence patterns.

The nomadic bison hunters concentrated in the short-grass plains appear to have retained essentially the same cultural and subsistence pattern as that documented for pre-Altithermal bison hunters (Frison 1967; Reeves 1973; Wedel 1961). A symbiotic relationship appears to have developed between these hunters and the horticultural villages (Holder 1970), but this relationship appears to have been an overlaid characteristic which did not materially influence the subsistence pattern (Wedel 1961; Wheat 1972).

The Plains in the Historical Period

The historical period on the Plains is differentiated from earlier sequences almost solely by changes generated by or introduced through white contact. The most significant new factors introduced into the Plains ecosystem appear to have been new epidemic diseases, the horse, and a major influx of new aboriginal groups from both the east and west (Spencer and Jennings 1965).

The introduction of epidemic diseases into North America probably played a central role in its subsequent history. (Dobyns (1966) has suggested that such diseases were the primary factor in the reduction of aboriginal populations. He proposes that aboriginal populations may have been reduced by a factor of 25, a figure fully in accord with ethnographic data (Dobyns 1966;

Ewers 1973). This massive depopulation among both Plains groups and those which entered the Plains after 1500 made the subsequent shifts into the Plains possible, since it is unlikely that such shifts could have been made if precontact population size had been maintained.

The shift of montane and woodland groups into the Plains seems to have been primarily a consequence of white settlement and trade relationships on both sides of the Plains. Until rather late in the historical period this pressure was indirect, a movement toward population homeostasis after the settlement of European populations and the displacement of Indian groups near those settlements. The loss of tribal identity and the collapse of social structures often associated with extensive depopulation undoubtedly facilitated this process.

Even assuming the massive reduction of population proposed by Dobyns, it is unlikely that the Plains ecosystem could have supported the influx of new peoples during the historical period without the simultaneous introduction of the horse. The horse was essentially a new tool, a technological innovation which, by providing greater mobility, increased the subsistence potential of the bison herds and made possible the maintenance of a relatively high population on a hunting rather than mixed or horticultural subsistence base. There is strong ethnographic evidence that the capacity of the bison herds to absorb exploitation had approached its limit during the late historic period, suggesting that the historic Plains pattern of mounted bison hunting may well have been transitory even if the United States government had not made a concerted attempt to exterminate the bison and thus deprive the Plains Indians of their food resource (Holder 1970).

The Plains as a Subsistence Ecosystem

The North American Plains, like all mid-altitude grasslands, is a highly specialized natural ecosystem. Such ecosystems are characterized by a low diversity index (ratio of species to individuals) and have a small variety of species, each represented by a large number of individuals. Such specialized ecosystems are inherently less stable and productive than more generalized ecosystems, such as the eastern woodlands. Specialized ecosystems are typically occupied by specialized hunters who exploit relatively few wild species. Such specialized hunters must be mobile, but will have a well-integrated social system, since successful exploitation of the ecosystems depends upon cooperative hunting methods (Harris 1969).

Analysis by these parameters suggests that the Plains bison hunting tradition is the optimal subsistence strategy for this environment. The Plains are the optimal environment for the bison, which makes up the major portion of the biomass available for human nutrition. The bison's own food resources are resistant to fluctuations in temperature and moisture which are characteristic of this region. Intrusive elements from either sides of the Plains, both Desert Culture and Woodland, are adapted to more generalized ecosystems and are therefore unsuitable for the Plains and have generally assimilated the bison-hunting tradition.

The varieties of bison present in the Plains during the period of human occupation have been generally similar. There are two clear changes occurring in the varieties of bison during this period. There is a moderate decrease in overall size, and there has been a set of changes in skull features associated with a reduction of horn size and length (Wilson 1969). Chrono-specific relationships

among the different varieties are complex, but as a subsistence resource the changes within the genus appear to be broadly inconsequential, and having no major effect upon the subsistence system (Forbis 1962; Hester 1960; Wilson 1969).

The short-grass plains are the optimal environment for the bison, although its range extends throughout North America (Reeves 1973; Wedel 1961). As a result, this region appears to have been the core Plains region in both a cultural and ecological sense. This is also the area least suitable for intrusive cultural patterns based upon the generalized exploitation patterns (Wedel 1941). There is no evidence that the bison population within this region was ever stressed as a result of human hunting activities until very late in the historical period. Baumhoff's (1963) work suggests that the factor limiting populations in pre-industrial economies is not the absolute carrying capacity of the ecozone, but is rather the exploitation potential of the food resource on which the culture focuses, given its characteristic subsistence technology. In other words, the culture core in Steward's (1955) sense defines the carrying capacity of a cultural ecological system. Plains bison hunting shows a marked continuity in this core. Only two major shifts are evident; the shift to mass driving and surround hunting methods, and the shift to mounted hunting at the very end of the sequence. Both shifts redefined the carrying capacity of the ecosystem and permitted populations to increase.

The technology of the Plains throughout the period of human occupation also reflects the preeminence of the bison-hunting pattern. The persistence of lanceolate and fluted point styles on the Plains is probably indicative of their superiority in bison hunting. Spears or lances, used primarily as thrusting implements, are most appro-

priate for use in mass hunting techniques, while barbed forms are more suitable for the hunting of solitary animals or for stalking hunting methods (Caldwell 1958). This suggests that the atlatal was most likely not an important tool in the Plains region, and that the technological conservatism seen in Plains tool traditions had a functional basis. The persistence of the spear into historic times on the Plains (Driver 1961) may indicate this same relationship.

OVERVIEW OF THE PLAINS SEQUENCE

The most striking aspect of the Plains subsistence pattern is its continuity, which extends throughout the entire period of human occupation until white settlement (Reeves 1969). This continuity is somewhat obscured by an excessive emphasis on projectile point typology (Wendorf 1962), an overemphasis on changes within the bison population through time (Jennings 1968), and efforts to fit the Plains sequence into pattern sequences established in other areas (Willey 1958; 1966). The subsistence pattern appears to have been established at the beginning of human occupation of the Plains, and subsequent changes have been generally shifts to more efficient techniques in the utilization of the Plains resources. Unlike either the eastern woodlands or the Great Basin, the Plains region is a specialized natural ecosystem with an inherently more limited set of exploitable natural resources. Once these resources began to be exploited, change could only occur in the methods of exploitation and could not be qualitative. Each of the major improvements in these techniques of utilization increased the capacity of the environment and probably generated population increases, except under such stresses as the Altithermal peak and more local droughts. Reeves (1969) believes that the population density of the Plains was essentially constant, but it

is clear that technological improvements probably did permit population expansion, as the introduction of the horse verifies (Holder 1970).

This essential continuity is also masked by the relative lack of ethnographically recorded Indian groups having clear roots in the Plains beyond the immediate prehistoric period. It appears that the subsistence economy discussed here was maintained by a sequence of peoples rather than by a stable population within the Plains (Reeves 1969). Wedel (1961), following Linton, notes that a cultural pattern which has become established in a particular environment tends to persist through immigration and population changes, and the inherently limited set of resources within the Plains certainly enhanced this tendency. The Plains people were among the most biologically diverse in North America, reflecting a constant movement of groups in, out, and through the Plains throughout the prehistoric period (Wedel 1961). The pressures brought into operation after white contact accelerated this process, and amalgamation of tribal groups as a result of depopulation through disease further obscured the continuities in the cultural patterns of the Plains (Dobyns 1966; Ewers 1973).

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