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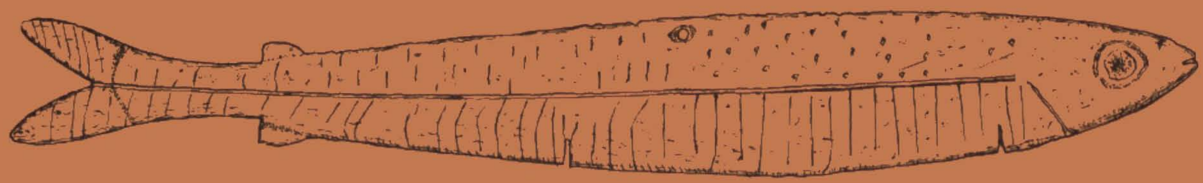

THE LATER PREHISTORY OF THE MIDDLE PORCUPINE DRAINAGE, NORTHERN YUKON TERRITORY.

RICHARD E. MORLAN

National Museum of Man
National Museums of Canada
Ottawa, April 1973

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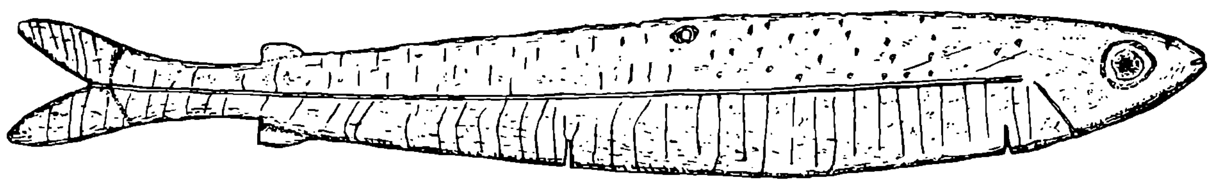

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ABSTRACT

Archaeological surveys and excavations during the past five years in the middle Porcupine drainage, northern Yukon Territory, have resulted in the discovery of one major stratified site and a number of lesser localities. Taken together these sites provide a glimpse of the later prehistory of the region, but the Klo-kut site has yielded most of the basic information.

Klo-kut is a large stratified site with a fine sediment matrix, the upper four feet of which contain the remains of human occupations spanning the last 1000 to 1500 years. On the basis of ethnohistorical information the final occupations, during the Historic period, are attributed to the ancestors of the present residents of the village of Old Crow. Likewise all previous occupants are thought to have been ancestors of the Kutchin speaking Indians who still occupy northern Yukon Territory. In spite of certain significant changes in the artifact inventories there is thought to be strong continuity throughout the Klo-kut profile.

This continuity characterizes both the technological parameters of the artifact collections and the subsistence economy as revealed by faunal remains. The major changes consist of the introduction of bifacial stone working techniques, a decline in the use of birch bark, and a general decline in the quality of bone and antler workmanship; these changes mark the boundary between the Early

Prehistoric period, ca. 1200-600 B.P., and the Late Prehistoric period, ca. 600-100 B.P. The ensuing Historic period, ca. 100 B.P. to the present, includes the abandonment of Klo-kut, the establishment of trading posts both east and west of the middle Porcupine area, and the formation in 1912 of the modern village of Old Crow.

The subsistence economy changed very little throughout the prehistoric periods, and at Klo-kut it centered primarily upon the interception of the northbound caribou migration in late spring and early summer. Klo-kut is activity-specific and season-specific and therefore cannot be taken to represent more than one aspect of the annual cycle of its occupants. But as a major village site it probably typifies that portion of Kutchin material culture, settlement pattern, and subsistence. The Vunta Kutchin should be regarded primarily as caribou hunters; only during the summer is a large part of their energy devoted to fishing.

Relationships between the Klo-kut materials and assemblages recovered from other areas of northwestern North America can be identified only tentatively at the present time. This is due mainly to the large geographical areas not yet examined by archaeologists, and much of the evidence obtained during the last five years is not yet in print and is correspondingly difficult to use in a comparative analysis. The strongest ties appear to lie to the west along the Brooks Range. These links reach as far as the Kobuk River with intervening cross-ties in a few sites along the Yukon River, in Anaktuvuk Pass, and in the Sagavanirktok valley. The bone and antler industry recovered from Klo-kut has a decidedly "Eskimoid" appearance from the perspective provided by our prior familiarity with late prehistoric Eskimo materials. This is thought to be due to a widespread technological tradition situated along the southern slopes of the Brooks Range, adapted to the northern limits of the boreal forest, based upon caribou hunting and a lesser amount of fishing, and spanning the traditional borders between Eskimo and Indian in northern Alaska and the Yukon. The time depth of this "tradition" is not yet known, but earlier occupations of the Kobuk, attributed to Indians, bear little resemblance to the Western Thule components which, along with Klo-kut, represent a part of this "Arctic Woodland culture."

Excavations at Klo-kut have revealed a distinctive complex of late prehistoric Kutchin technological traits by means of which Kutchin prehistory should be traceable in other areas. Much of the distinctiveness of this complex, however, resides in the interaction of technology and subsistence techniques which can be seen to form an overall adjustment to seasonally available resources. It is the resulting annual cycle which bears the characteristic stamp of "Eskimo" or "Indian," "Kutchin" or "Koyukon," "Vunta Kutchin" or "Kutcha Kutchin," and further research must include attention to both artifacts and faunal remains if we are to generate refined definitions of historically significant social groups.

RESUME

Des relevés et fouilles archéologiques effectuées au cours des cinq dernières années dans le bassin central de la rivière Porcupine, au Yukon septentrional, ont abouti à la découverte d'un site stratifié important ainsi que d'un certain nombre de localités de moindre importance. Dans leur ensemble, ces sites fournissent un aperçu de la pré-histoire récente de la région, mais c'est du site de Klo-kut que provient l'essentiel des données.

Klo-kut est un immense gisement stratifié à matrice sédimentaire fine dont les quatre pieds supérieurs contiennent des vestiges d'occupations humaines réparties sur les 1,000 ou 1,500 dernières années. Selon des informations ethnohistoriques, les dernières occupations, au cours de la période historique, sont attribuables aux ancêtres des habitants actuels du villages d'Old Crow. De même, il semble que tous les occupants antérieurs aient été des ancêtres des indiens de langue kutchine qui habitent toujours le Yukon septentrional. Malgré certains changements significatifs au sein des assemblages archéologiques, la séquence de Klo-kut semble suggérer une continuité évidente.

Cette continuité caractérise à la fois les paramètres technologiques des différents assemblages ainsi que l'economie de subsistence telle que révélée par les vestiges fauniques. Les principaux changements sont l'introduction

de la technique de taille bifaciale, un déclin de l'utilisation de l'écorce de bouleau, ainsi qu'une baisse générale de la qualité dans l'industrie de l'os et de l'andouiller. Ces changements délimitent la Période Préhistorique Ancienne, v. 1,200 - 600 B.P., et la Période Préhistorique Récente, v. 600 - 100 B.P. La Période Historique subséquente, v. 100 jusqu'au présent, voit l'abandon de Klo-kut, l'établissement de postes de traites à l'est et à l'ouest de la région centrale de la Porcupine et la fondation en 1912 du village moderne d'Old Crow.

L'économie de subsistence a très peu changé au cours des périodes préhistoriques; à Klo-kut, elle était surtout fondée sur l'interception du caribou lors de sa migration vers le nord, à la fin du printemps et au début de l'été. Klo-kut semble être représentatif d'un seul type d'activité saisonnière et comme tel, on ne peut donc le considérer comme témoin de plus d'un aspect du cycle annuel de ses occupants. Par contre, en tant que site d'un village important, il est probablement représentatif de ce segment du cycle annuel, tel qu'illustré par le schème d'établissement et l'économie de subsistence. Il convient de considérer les Vunta Kutchin surtout comme des chasseurs de caribou; ce n'est qu'en été qu'ils consacrent une grande partie de leur énergie à la pêche.

A l'heure actuelle on ne peut établir que d'une manière provisoire les liens qui existent entre les vestiges de Klo-kut et les assemblages qui ont été recueillis dans d'autres régions du nord-ouest de l'Amérique du Nord. Cela tient surtout au fait que de vastes régions n'ont pas encore été explorées par les archéologues et que la plupart des données obtenues au cours des cinq dernières années n'ont pas encore été publiées, rendant donc assez difficile toute tentative d'analyse comparative. Il semble que ce soit vers l'ouest, le long de la chaîne des monts Brooks que l'on puisse tracer les liens culturels les plus étroits. Ces derniers se retrouvent aussi loin que la région de la rivière Kobuk avec un certain nombre de liens intermédiaires dans quelques sites le long du fleuve Yukon, au col d'Anaktuvuk ainsi que dans la vallée de la Sagavanirktok. A en juger par nos connaissances préalables du matériel esquimau de la période préhistorique récente, l'industrie de l'os et de l'andouiller représentée à Klo-kut a un aspect incontestablement "esquimoîde". On croit pouvoir attribuer cela à la présence le long du versant sud de monts Brooks d'une vaste tradition technologique, adaptée à la zone septentrionale de la forêt boréale, fondée sur la chasse au caribou et, dans une moindre mesure, la pêche, et chevauchant les frontières traditionnelles entre les esquimaux et les indiens du nord de l'Alaska et du Yukon. La temporalité de cette tradition n'est pas encore connue, mais il semble que des vestiges plus anciens trouvés le long de la Kobuk et attribués à des groupes indiens offrent peu de similitude avec les composantes de la culture Thulé occidentale qui, de pair avec Klo-kut, représente une partie de cette "culture Arctic Woodland".

Les fouilles de Klo-kut nous ont fourni un ensemble distinctif d'éléments technologiques de la séquence pré-historique kutchine, qui devraient nous permettre de retracer la préhistoire kutchine dans d'autres régions. Toutefois, le caractère distinctif de ce complexe réside en grande partie dans l'interaction de la technologie et des moyens de subsistence, lesquels semblent constituer un ajustement général à certaines ressources saisonnières. C'est le cycle annuel qui en résulte qu'on caractérise par les termes "Esquimau ou Indien", "Kutchin ou Koyukon", ou encore "Vunta Kutchin ou Kutcha Kutchin". Enfin, si nous voulons en arriver à des définitions plus précises de groupes sociaux significatifs du point de vue historique, il faudra au cours des recherches futures porter autant d'attention aux restes fauniques qu'aux vestiges archéologiques.

PREFACE

The principal aim of this paper is the reconstruction of a portion of the culture history of the middle Porcupine drainage in northern Yukon Territory. The techniques of several disciplines must be brought to bear upon any body of data from which a holistic reconstruction is sought, and for the body of data attended here the major disciplines involved are archaeology, ethnohistory, and certain aspects of ecology and geology. The methodology of the study has been guided by the premise that a certain limited number of objects must be identified and described and that the context of these objects must be revealed and examined.

This premise permits the investigator to select the objects for study, and I have selected those objects which I believe to be most informative concerning human life in late prehistoric times. But the premise also stipulates that the temporal and spatial position of each object must be defined and that associations among objects must be elucidated. Three quotes, the full references for which I have long since forgotten, have influenced my thinking rather considerably:

> *Archaeology is only one part of the whole study of ancient communities.* I.W. Cornwall

When we know only the range of a usage, we may not yet know very much, but we have at least a point of departure for amplifying our information. When we do not know the distribution of a phenomenon..., we know nothing that is theoretically significant
R.H. Lowie

Men of conservative temperament have long suspected that one thing leads to another. J.K. Galbraith

Cornwall's remark is particularly relevant to the major site discussed in this study. Any archaeological site can be regarded as a portion of a palaeoecosystem, viz., one of those portions in which man as well as other animals lived and died. The Klo-kut site exemplifies this principle quite nicely since it consists of a series of buried ecosystems in a fine sediment matrix. These ecosystems could have been explored at any locality along the modern right bank of the Porcupine River for a distance of ten or fifteen miles, and our excavations have been conducted at Klo-kut simply because man happened to camp at that locality instead of at some other. The remains of human occupations are not the only remains found at Klo-kut, but they comprise the objects which I have selected for treatment in this study.

Lowie's observation is applicable to any level of analysis. It can be applied to intrasite as well as intersite distributions, and both will be examined in this study. Galbraith may have been joking, but his remark implies the continuity of the passage of time; our archaeological collections represent discrete samples drawn from continuous processes. This characteristic holds true also for the spatial distributions in that our archaeological efforts comprise no more than a few pinpoints on the map with large gaps intervening among all existing research areas. Spatial distribution of people and their artifacts may never have been continuous in northwestern North America, but it must have been denser than the distribution of known sites.

These comments should be taken as cautionary in the sense that they indicate several ways in which this study is incomplete. We are examining only a portion of each ecosystem in our sample, and thus we are imposing arbitrary limits on the study. Our collections represent merely another dot on the map and a discontinuous sampling of a brief segment of the known time depth of human occupation in the area; these limitations are arbitrary in a sense, but they result primarily from the fact that there is more work to be done.

> *Like everybody else, I'm searching through what I've heard.* Cat Stevens

In a more positive vein I believe this study to be complete within these limits, and I hope it will be regarded as a contribution to our understanding of culture history in northwestern North America.

Acknowledgements. My greatest debt is to Dr. William N. Irving, University of Toronto, who employed me as his field assistant in 1967 and subsequently turned over to me a large amount of information and material which my own work has merely enlarged to produce the present study. My interest in the North was stimulated and formally guided by Dr. John M. Campbell, Dr. C.S. Chard, Dr. Catherine McClellan, and my fellow graduate students at the University of Wisconsin.

Jacques Cinq-Mars, Paul F. Donahue, and Michael Stevens were able field assistants in 1968, and I benefitted in countless ways from my association with two residents of Old Crow -- Abraham Peter and Lazarus Charlie -- who served so well as guides, pilots, hunters, excavators, informants, and friends. Many other residents of Old Crow were very helpful during our visits to the village, but special thanks go to Charlie Peter Charlie, Alfred Charlie, Peter Lord, and Father Mouchet. Recent discussion with Mrs. Ann Welsh Acheson, University of Maine, have helped to bring into focus the interrelationships between her ethnographic data and my archaeological evidence.

I wish to thank the University of Wisconsin for a University Fellowship which supported me during much of the early phase of this research. Field work was supported by the National Museum of Man, Ottawa, where I have been employed since August 1969. My colleagues there, particularly Dr. Robert McGhee and Dr. Donald W. Clark, have been most helpful during the laboratory phase of this work. I wish to thank Dr. William J. Byrne, for his incisive editing of this manuscript, and Mr. Jacques Cinq-Mars for his careful translation of the abstract. The Photographic Section of the National Museums and the artistic ability of Mr. David Laverie are responsible for the high quality of the illustrations used here; only the stratigraphic profiles came from my pen. The early completion and final appearance of the original manuscript (my dissertation) were due primarily to the outstanding typing skill and enduring patience of my wife, Mrs. Heather Morlan. The revised manuscript was ably typed by Mrs. Joan Garland.

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I. INTRODUCTION

Scope

In this paper I shall describe and place in context the existing record of a finely stratified archaeological site near the village of Old Crow on the Porcupine River in northern Yukon Territory. The immediate area embraces a 300 mile stretch of the Porcupine River extending from the mouth of Bell River to the Alaskan border. A major tributary of the Porcupine River, the Old Crow River, meanders across the broad expanse of Old Crow Flats before tumbling through a bedrock-walled "Canyon" to join the Porcupine. The area of Old Crow Flats will also be included in our discussion, though the archaeological evidence thusfar recovered from the Flats is meagre.

The middle Porcupine drainage has been occupied in historic times by the Vunta Kutchin, a group of Athabaskan-speaking Indians who form one of nine Kutchin-speaking "tribes" or "bands" (Osgood 1934, 1936a, 1936b; McKennan 1935, 1965; West 1959). As I shall attempt to show in the ensuing chapters most of our prehistoric record thus far appears to represent the ancestors of the Vunta Kutchin or at least of some kind of Kutchin group; it is still difficult to tell how refined can be our distinctions among these linguistically defined categories on the basis of archaeological evidence. The site to be discussed in this paper was occupied seasonally during the last 1200 years, and for various reasons to be mentioned later we can anticipate certain difficulties in extending the record back into previous millennia.

Most of this paper will deal with one major site which is called Klo-kut and is catalogued MjVl-1. I shall defer description of the site for later chapters, but it is fair to say that it is our best site in the region thus far and can even be regarded as one of the best-stratified sites in northwestern North America. Its profile rivals that of the Onion Portage site in its finely lensed, flat-lying sedimentary units, but the time period represented by the profile is considerably less than that at Onion Portage. It is as if one "blew up" one of the Onion Portage bands to make a more highly resolved picture, spread out over a four to five foot profile instead of only a foot or so. Unfortunately Klo-kut is relatively poor as far as artifact yield is concerned, but this condition seems to characterize most of the sites of interior Alaska and the Yukon and has been mentioned by many authors before. As I shall reiterate below, our excavations to date have produced a relatively small sample, compared with some of the rich coastal middens of late prehistoric Eskimos, and sample size as well as other sampling problems continuously come to the fore as the analysis proceeds.

Following a description and discussion of Klo-kut, other sites in the middle Porcupine drainage will be arranged around the framework provided by Klo-kut, and we shall turn our attention to larger perspectives embracing most of interior Alaska and the Yukon. I should make explicit at the outset, however, that I am not inclined to rewrite the culture history of northwestern North America in this paper. I think we have had enough of that in this area for the time being, and the proliferation of the "Arctic Small-paper Tradition" has not provided enough hard data to allow every investigator to manipulate the evidence gathered by his colleagues; nor have some of the major monographs contributed what they should. Intensive work in the interior has been conducted only during the last decade or so, and much of our effort is still exploratory. It is too easy to forget, possibly since much of our field travel is by plane, that the distances separating existing research areas are still quite large. Known site density in Alaska and the Yukon must differ by one or perhaps even two orders of magnitude from site densities in the temperate zones of North America, and the distances covered by single sentences from the pens of Arctic and Subarctic specialists would seem rash if transferred to a comparable state of knowledge in the "sunny south".

Thus the scope of this paper is purposely limited. It is limited to (1) a description and analysis of the Klo-kut collections; (2) an attempt to identify these remains with an ethnographically documented group of people; and (3) the definition of certain key problems which require further field and laboratory work by a number of regional specialists.

Narrative

In August, 1966, in a quiet bar in downtown Tokyo, I had my first conversation with Dr. William N. Irving, now of the University of Toronto, concerning the possibility of my working in northwestern Canada. We met again a few months later to formulate more specific plans, and I joined him as a field assistant in the summer of 1967. Irving had spent parts of two previous field seasons in the middle Porcupine area, working out of Old Crow to run surveys along the Porcupine and Old Crow Rivers and to conduct an excavation at Klo-kut. We spent most of the summer of 1967 on survey in Old Crow Flats and along the Porcupine, but during two weeks in August I worked at Klo-kut with two Indians from Old Crow. Having thus familiarized myself with the site I returned in the summer of 1968 for a full season of excavation with a crew of six men, and we also ran downstream as far as the Alaskan border to complete our survey operations there and to reexamine two sites found the previous year.

The winter was occupied by course work which included a very informative reading course in Athabaskan ethnology, conducted by Dr. Catherine McClellan, as well as laboratory work on the large sample of faunal remains collected in 1967 and 1968 at Klo-kut. The faunal analysis continued into the summer of 1969, near the end of which I finally turned to the artifacts from Klo-kut. This effort was interrupted briefly by my move to Ottawa to join the staff of the Archaeological Survey of Canada, National Museum of Man. There, as Yukon Archaeologist, I was able to devote much of my time to the research I had already begun, and this included the preparation of this paper.

Continued survey and excavation in the summer of 1970 netted only a few new sites, but several interesting historic occupations were sampled and a good prehistoric component was found just upstream from Klo-kut. Only about half of this material has been analyzed, for I returned to Ottawa to work full time on the results of all previous work at Klo-kut.

This paper can, in a very broad sense, be regarded as an interim report in an ongoing research program, but it can also be regarded as a finished description and analysis of one major site and a number of minor ones in northern Yukon Territory. Its positive results include a definition of prehistoric Kutchin technology and subsistence, but I have purposely left it rather open-ended in the sense that it closes with the definition of some pressing problems rather than with a resounding conclusion or some profound insight into the nature of hunting societies. Given the status of our knowledge at the moment I could not realistically do anything else, but the tentative nature of our conclusions and summaries is largely responsible for the fact that archaeology in interior northwestern North America is presently a very exciting field.

II. HISTORY OF NORTHERN YUKON TERRITORY

Early Exploration

The northern part of the Yukon was one of the first regions of the territory to experience contact with Euro-Canadians. While the relatively remote areas of southern and central Yukon awaited the Klondike and Alaskan gold rushes for intensive and direct contact, the Mackenzie River channelled the movements of early explorers in the Canadian North and brought them through the eastern edge of Kutchin territory. By 1823, a trading post was established in this territory at Fort Good Hope and was quickly followed by Fort MacPherson, La Pierre House, and Fort Yukon. The native trade networks which had flourished prior to these encroachments had worked to the benefit of the Kutchin on the middle Porcupine as they found themselves in superior trading positions with respect to their northern Eskimo neighbors. This relationship was jeopardized by the appearance on the Mackenzie of a series of parties connected with Franklin's expeditions, for the explorers were well equipped to supply the Eskimos and Indians along their route with numerous items of European manufacture.

Aboriginal trade had probably first introduced European goods to the Kutchin along a network between the southern Alaskan coast and the northern interior (McKennan 1965: 25). Both English and Russian items may have been available in this way, and the activity of the Russians on the lower third of the Yukon River, in the early to middle 1800's, probably influenced the Kutchin as well. Presumably it was through this Yukon River trade that the Kutchin acquired the rifles which Murray (1910: 45 ff.) found in use in 1847.

The establishment of trading posts was soon followed by the arrival of missionaries and white trappers in numbers which increased steadily throughout the remainder of the last century and well into the beginning of the present one. The important point here is that the fur trade was well established by 1850 and very quickly brought major modifications in the native subsistence economy as well as in other aspects of Kutchin culture. The fur trade and its influence will be discussed in more detail in later chapters.

Informants at Old Crow (principally Lazarus Charlie and Charlie Peter Charlie) have mentioned several specific items for which the time of introduction is remembered. The 44-cal. rifle, for example, was first obtained after the Hudson's Bay Company abandoned New Rampart House and numerous Kutchin sought trading contacts at Herschel

Island. Similarly, the first single-shot 22 cal. rifle was acquired "around 1911" though a few men continued to use the bow and arrow as late as 1915. These dates can be used to seriate collections from historic sites.

The early history of this region is summarized below. While this list is not complete, it provides a basic framework for understanding the chronology of Kutchin culture change under the influence of white immigrants. Petitot specifically states that Kutchin (Loucheux) Indians visited Forts Good Hope, MacPherson, LaPierre House and Yukon (Savoie 1971: 98-99).

1789 - Alexander Mackenzie (1801) explored to the mouth of the Mackenzie River and became the "first European that we can be reasonably sure saw members of the Kutchin nation" (Osgood 1936b: 17).

1804-05 - Fort Good Hope was established by the Northwest Company as its most northerly post at 66°16' N. lat. (Slobodin 1962: 19). Following the amalgamation of Northwest and the Hudson's Bay Company in 1821, the post was moved north to the Lower Ramparts of the Mackenzie (67°21' N. lat.) in 1823 in a bid for the delta trade, and its present location (ca. 66°30' N. lat.) was established in 1836 (Slobodin 1962: 19; Usher 1971: 73).

1826 - Sir John Franklin's (1828) expedition brought trade to the delta Eskimo and was "violently resented" by 'Mountain Indians' thought by Slobodin (1962: 16) to have been Crow River or Porcupine River Kutchin.

1835-45 - Parties in search of Franklin journeyed several times on the lower Mackenzie and again contacted Kutchin in the southern end of Mackenzie delta and on the lower Peel River (Simpson 1843; Richardson 1851; Hooper 1853).

1839 - John Bell explored Peel River (Isbister 1845) and, in 1840, established Fort MacPherson for the Hudson's Bay Company on the lower part of the Peel. For details of its history and recent posts in the area, see Usher (1971: 83-94).

1844 - Bell extended his explorations down the Porcupine to its mouth at the Yukon River (Murray 1910: 2). The early history of La Pierre House is still uncertain in my own research to date. It was "built originally as an outpost of Fort McPherson, and, after the establishment of Fort Yukon, used in connection with the shipment of supplies and furs to and from the Yukon" (Murray 1910: 27, footnote 2). Its original location is also uncertain, but it must have been comfortably established by 1847 when Murray took his wife there to live for a year while he descended the Porcupine River (Murray 1910: 1-2, 26-28). The post was moved in 1851 (Hudson's Bay Co. Archives Folio B. 200/b/29) and again around 1868 when the buildings were dismantled and floated down Bell River to their final location just above the mouth of Waters River (Hudson's Bay Co. Archives Folio B. 200/b/36; McConnell 1891: 121D). The Hudson's Bay Company abandoned La Pierre House in 1891 (MacFarlane 1908: 273), but an independent trader named Jackson ran a small store there in the mid-1930's and attracted several Kutchin families to the area (Morlan, 1970 field notes).

1847 - Alexander Hunter Murray descended the Porcupine to its mouth and there established Fort Yukon, the westernmost post of the Hudson's Bay Company. Knowing that he was in Russian territory, Murray (1910: 95) anticipated resistance from representatives of the Russian American Trading Company. This resistance never came, however, and Murray established successful and active trade with Indians from several regions. In his journal he left valuable descriptions and drawings of Kutchin and other Indians.

1850 - Robert Campbell, another Canadian trader, journeyed down the Yukon River to Fort Yukon from his newly established post, Fort Selkirk, at the junction of the Lewes and Pelly Rivers. Soon thereafter Fort Selkirk was destroyed by "jealous Tlingit..., and until the Klondyke Gold Rush of 1898 this upper Yukon country was virtually sealed off by a Tlingit blockade which successfully prevented whites from entering the area or Athabascans from leaving it" (McClellan 1964: 5).

1860's - Two other traders (Hardisty 1867; Jones 1867) and the first missionary to enter the Porcupine region (Kirkby 1865) left brief descriptions of the Kutchin. Missionary zeal increased steadily among both Anglicans and Catholics working at both Fort MacPherson and Fort Yukon. Archdeacon Robert McDonald was especially influential as a result of a syllabic system by which he translated the Bible and the Prayer Book for the Kutchin. Native catechists were trained throughout the northern Yukon and were very potent missionizing influences.

1867 - William Healy Dall (1870: 102-115) visited Fort Yukon and described many interesting contacts with Kutchin and other Indians. His excellent descriptions of the aboriginal inhabitants of northwestern North America have provided the basis for subsequent classifications of Athabaskan speakers (Dall 1870, 1877). The purchase of Alaska by the United States carried with it a ban upon all encroachments by the Hudson's Bay Company (v. Dall 1870: 371-372), and a veritable eviction notice was served to the officers of Fort Yukon (Dawson 1889: 140B; International Boundary Commission 1918: 213). The post was then moved three times -- to Howling Dog and Old

Rampart -- before a satisfactory location was found in 1890 at New Rampart House (Davidson 1903: 113; International Boundary Commission 1918: 227), just east of the 141st meridian, but this final location proved economically unfeasible and was abandoned in 1894.

1890's - Trading with whalers wintering over at Herschel Island increased after the Hudson's Bay Company left New Rampart House.

1904 - Dan Cadzow, a private trader, descended the Porcupine to New Rampart House and opened a new trading post. He attracted widespread Indian and even Eskimo trade (Cadzow 1904-1912), and his services were enjoyed by the boundary survey parties in 1911 (International Boundary Commission 1918: 99, 227). A smallpox epidemic ravaged New Rampart House, and, by 1912, many families had left the area, some of them moving upstream to the mouth of Old Crow River. John Tizya, a Vunta Kutchin, had built a cabin there in 1906, and a new village began to take shape, particularly after a pair of white trappers provided the location with a store. This was the beginning of the modern settlement of Old Crow (Fig. 1); its subsequent history has been sketched by Balikci (1963b). A number of travelers have descended the Porcupine in this

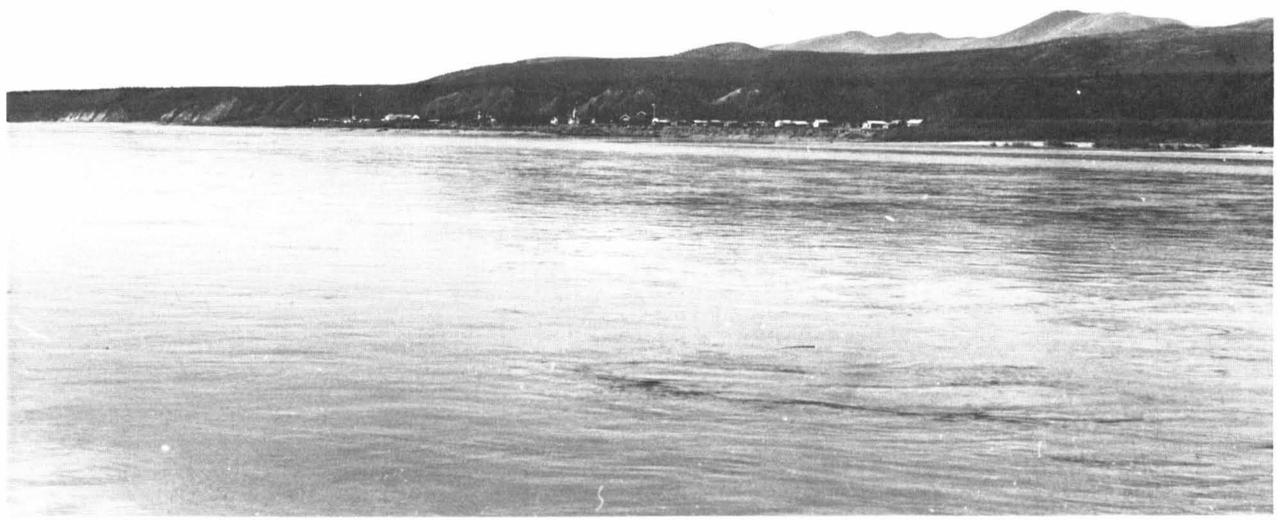


Fig. 1. Old Crow village, as seen from the Porcupine River.
National Museums of Canada Neg. No. 71-4639.

century, and their popular accounts frequently contain very useful information for ethnohistorical studies (e.g. Stewart 1908; Camsell 1954; Vyvyan 1961).

Development of Research

Only recently has the middle Porcupine been subjected to study by specialists in various disciplines. Probably the first trained scientists of any type to enter this region were Ogilvie (1889; American Meteorological Journal 1890) and McConnell (1891). The former crossed the divide into the upper Porcupine and descended the river as far as Bell River before turning east to cross the Richardson Mountains to the Mackenzie drainage. McConnell crossed the Richardsons in the opposite direction and wrote the first general description of the middle Porcupine and other areas which he visited in which modern place names allow the reader to follow his account in detail; his account is almost exclusively concerned with the general pattern of drainage, the stratigraphy of the region, and fossils which he observed in many bedrock exposures. The international boundary survey parties worked along the western margin of the area and left general descriptions of the countryside as well as their more detailed geological and topographic data (Davidson 1903; Maddren 1912; Cairnes 1914; International Boundary Commission 1918). Subsequent geological surveys have described many mapping quadrangles nearby in Alaska, but those on the lower Porcupine have stopped at the Alaskan border (Kindle 1908; Fitzgerald 1944). To the east, the nearest early survey was on Peel River (Camsell 1906). As mentioned below, the rich fossil mammal deposits in Old Crow Flats were sampled in the 1950's, by Otto Geist (1952-53; 1955) who also worked on the upper Porcupine. General papers by Bostock (1948) and Martin (1959) have included the Porcupine drainage in descriptions of the physiography of northwestern Canada. In the present decade, Operation Porcupine has included studies of the bedrock geology of the region (Norris 1963), and Pleistocene sediments and fauna have been examined in detail by Owen Hughes (1963; 1969; 1972) and C.R. Harington (Harington and Irving 1967; Irving 1968, 1971).

No climatic data are available for this region, and there have been no regional studies of fishes or flora. Recent work on mammals by Philip Youngman (n.d.) of the National Museums of Canada is still in press. An excellent and detailed analysis of the birds of Old Crow was presented by L. Irving (1960) as a part of a larger study of Arctic adaptation.

Useful ethnographic data on the Kutchin were first gathered by Murray (1910), Kirkby (1865), Jones (1867), Hardisty (1867), and Dall (1870), but these presentations are neither complete nor very systematic. Schmitter's (1910) descriptions, though attributed to the "Vunta-Kutchin," pertain to the Han (Osgood 1934: 173; McKennan

1959: 23). Field work by trained ethnographers began in the 1930's when Osgood (1934; 1936b) worked at Fort Yukon with informants from Old Crow and Peel Rivers, and McKennan (1935: 1965) studied the Kutchin of the Chandalar River. More recently, West (1959) has worked in the western part of Kutchin territory, Balikci (1963a; 1963b) and Welsh (1970) have studied settlement patterns and social change at Old Crow, and Slobodin (1960a; 1960b; 1962; 1969) has analyzed several aspects of eastern Kutchin culture. Leechman (1948; 1950; 1951a; 1952; 1954) recorded some useful and interesting ethnographic notes at Old Crow in connection with an archaeological survey in the region.

Archaeological work in this area has been even less abundant. The nearest surveys in Alaska include de Laguna's (1947) easternmost finds on the Yukon River, Alexander's (1968) recent excavations around the headwaters of the Sagavanirktok River, Solecki's (1962) problematic finds on the Katakturuk River, and the intensive work of survey crews along the Alyeska pipeline route (Univ. of Alaska 1970). In Yukon Territory, Leechman's 1946 survey found archaeological material "very scarce" (Leechman 1954: 5), and a single site has been reported from McDougal Pass (Bliss 1939). The nearest chronologically periodized sequence of prehistoric materials is from the Firth River and has been described by MacNeish (1956a; 1956b) who continued his survey along the Arctic coast as far as the Mackenzie delta.

William N. Irving, then of the National Museum of Canada, initiated a series of surveys and excavations in the middle Porcupine in 1965 (Irving 1967); the present paper is an outgrowth of this work as was a survey of the upper Porcupine by Cinq-Mars (1969). Surveys in 1968 and 1969 in the Babbage River valley produced sizeable collections from several sites located only about 25 air miles north of Old Crow Flats (Gordon 1970). Irving (1969) and Hall (1969) have recently assembled a wide variety of data in efforts to delineate the role of the Kutchin Athabaskans in the later prehistory of the Brooks Range, and Campbell's (1968) Kavik site in Anaktuvuk Pass appears to be relevant to the problem.

It should be clear from this summary that very little research of any kind has been done in the northern Yukon and especially little in the Porcupine valley. This is particularly true in archaeology, and the reader should bear in mind that the present paper is in many respects a pioneer effort.

III. THE MODERN ENVIRONMENT

Geography and Geology

The Yukon Territory is that part of Canada north of 60° N. lat. and extending west from the Canadian Cordillera to the 141st meridian. In this paper I shall be concerned primarily with the northern part of this territory lying between the Ogilvie Mountains on the south, the British Mountains on the north, and the Richardson Mountains on the east. Nearly 60% (120,500 sq. mi.) of Yukon Territory is drained by the Yukon River (Thomas 1957: 6), and the northern region is almost entirely drained by a major tributary of the Yukon, the Porcupine River, the mouth of which is located at Fort Yukon in Alaska. The Porcupine River heads on the north flanks of the Ogilvies and trends north-northeasterly for a distance of some 200-300 river miles. The valley then turns westward rather abruptly and follows a west-southwesterly course to its confluence with the Yukon. The mountains mentioned above, plus the Keele and Old Crow ranges, which intrude from the west, almost completely surround the Porcupine Plateau and Porcupine

Plain (Bostock 1948). Subdivisions of the latter are called by Bostock (1948) the Eagle Plain, the Bell Basin, and the Old Crow Plain. In general, tributaries of the Porcupine River can be said to originate on the Porcupine Plateau and to join the main valley in its course across the Porcupine Plain. A major exception to this pattern is the Old Crow River, which heads in the Davidson Mountains and crosses the Old Crow Plain to join the Porcupine River.

In particular this paper is concerned with the middle course of the Porcupine River. This region is arbitrarily defined on the basis of the area covered to date by our archaeological surveys, but it can be succinctly described as that part of the Porcupine drainage which trends east and west in the Yukon Territory. Thus the middle Porcupine extends from the mouth of Bell River, on the east, to the Alaskan border on the west. On the south it is delimited by the Keele Range, and its northern boundary is formed by the Barn, Buckland, and Davidson Mountains. This area encompasses about 10,000 square miles and measures 100 air miles east and west ($137^{\circ}30'$ - 141° W. long.) and 100 air miles north and south (67° - $68^{\circ}30'$ N. lat.).

In Bostock's (1948) terms this middle Porcupine area includes the northern unit of the Porcupine Plain, the surrounding hills, and a portion of the Porcupine Plateau near the 141st meridian. Modifications of Bostock's scheme by Martin (1959) are based mainly upon detailed tectonic considerations and need not concern us here. The Plateau near the 141st meridian is "a gently rolling surface that shows notable evenness for a few miles back on each side of the river valley, and lies altogether below the upland surface" of the Keele Range (Bostock 1948:74). The Porcupine River is entrenched 500 feet below the plateau in this area and occupies a part of its bed known as the Ramparts.

> Old Crow Range stands a few miles back from the rim on the north side of the entrenched valley of Porcupine River... North of the range, Porcupine Plateau continues as a rolling area of widely spaced hills that dip under the broad flat of Old Crow River in Porcupine Plain and rise again along the southern edge of British Mountains (Bostock 1948: 74).

The Old Crow Plain, also called Old Crow Flats, covers about 2500 sq. mi. and lies just below 1000 ft. elevation. It

> is a great, flat area thickly spotted with lakes and ponds that occupy probably more than 30 per cent of its surface, but end around the borders of the plain, where the ground rises towards the hills.... Some of the larger lakes are known to be very shallow and this is believed to be true of most of them. Old Crow River and its main tributaries meander elaborately in valleys entrenched 60-125 feet below the level of the plain on which the lakes lie (Bostock 1948: 76).

Relief in this region is quite variable, ranging from the flats, through rolling piedmont, to alpine topography. In any direction from the center of this area one can find this transition from flats to alps, but one or more low-lying passes can also be found in any of the mountain ranges. The mountains rise 2000 to 4000 feet above the flats, and their treeless summits maintain small snow-fields throughout the year. Altitudinal timberline has been estimated at about 2000 to 3000 feet for the Chandalar and Sheenjek area, just to the west, with trees extending up major stream valleys to elevations of 3000 feet (Mertie 1929); I suspect that similar values would be found in the northern half of the middle Porcupine drainage, but these might be slightly higher toward the southeast.

In recent geological time the drainage of this region has been drastically modified, though the region was not glaciated during the Wisconsinan. These changes have recently been inferred by Hughes (1969; 1972) and are summarized below. The flats represent aggraded basins formed by downwarping and/or faulting in the Tertiary or the early Pleistocene with eastward drainage through McDougal Pass in the Richardson Mountains. Following a period of aggradation by fluviatile and lacustrine sediments, the eastern outlet was dammed by advancing Laurentide ice, and a single (?) large glacial lake occupied these basins with drainage to the west across the Porcupine Ramparts. Eastward drainage was reestablished when the Laurentide ice retreated, but a subsequent advance of the Laurentide sheet dammed this outlet again, reestablished the glacial lake, and eroded the westward outlet below the level of McDougal Pass which had been filled with till and outwash. With the final retreat of the ice, discharge of glacial meltwater into the Porcupine drainage ceased. A period of widespread peat deposition marked the final lowering of glacial lake Old Crow, and the Porcupine River and its tributaries eroded to their present level. The later of the glacial lakes is thought to have formed during the classical Wisconsinan as its sediments are bracketed by radiocarbon dates of > 41,300 B.P. (GSC-199; Dyck et al. 1965: 15) and 10,740 ± 180 B.P. (GSC-121; Dyck and Fyles 1964: 6).

The lacustrine sediments now filling these basins have long been known to yield a rich fossil mammalian fauna (Geist 1952-53, 1955). Recent collections appear to contain two distinct faunistic components, both dating to the Upper Pleistocene, and several convergent lines of evidence suggest that man was one of the predators occupying the middle Porcupine region at that time (Harington and Irving 1967; Irving 1968, 1971). If so, we can expect a long prehistoric sequence to emerge from archaeological work in this region; as will be seen below, we have sampled only the last millennium or two of this regional prehistory.

These lacustrine sediments have been dissected by the Porcupine River and its tributaries and are exposed in many localities along the modern banks of the Porcupine and Old Crow rivers. Elsewhere in the valleys, former exposures are now covered with vegetation and rise abruptly along the lateral margins of the valley floors. The valley floors are as much as several miles wide, and the river beds meander from one side to the other, alternately cutting and filling in tortuous channels. At some of the meanders are located "point-bar formations" in which a point of land extends like a finger into the inside of the river bend while a gravel bar develops on the opposite bank. At other meanders the bar is found on the inside of the bend opposite a low, slumping wall being cut on the outside bank. The cut banks and points of land are composed of finely stratified layers of silt and sand, interlensed by organic layers of variable thickness. Modern, active ice wedges can often be seen in the cut banks where overhanging mats of vegetation protect them from direct sunlight. Slump blocks insolate these banks so that horizontal beds are locked in permafrost at the point of their truncation by cutting. Oxbow lakes and sloughs are abundant in these valleys, and long, nested rows of meander scars can be observed from the air.

The cutting and filling of these channels probably takes place quite rapidly and is aided by the breakup of river ice each spring. Crop marks of the ice blocks can be observed on the banks and vegetation nearly every year, and ice-raft features are numerous along the gravel bars. The general appearance of large parts of the valley can probably be changed in a few centuries, and only a year or two is required to bring about major local alterations.

Examples of recent changes of this kind are numerous. Fort MacPherson and Fort Yukon are among the posts which have been relocated due to damage by ice and water and the undermining of their respective river banks (Dall 1870: 102; Slobodin 1962: 21). On the left bank of the Porcupine River, about five river miles above the mouth of Bluefish River, a small lake was drained a few years ago by cutting at its outlet. A deposit of coarse sand is now exposed as a dissected delta on the river bank, and the lake bed has been invaded by *Equisetum*. In the spring of 1967, the Old Crow River breached a narrow neck of land on the inside of a bend at the mouth of Black Fox Creek, a major tributary of the Old Crow. As the new channel formed, the old one was aggraded; Black Fox Creek lacked the capacity to maintain a mouth at the new channel and cannot now be reached by boat except at very high stages of water. The entire drainage of the creek (covering approximately 1200 square miles) appears to have been affected by a lowering of its water table and will probably establish a new outlet through an oxbow lake until the lake basin is aggraded and a new channel is cut.

Drastic seasonal changes in the levels of northern streams are well known and are primarily due to the volume of spring runoff in conjunction with the impermeable frozen soil. Breakup in the spring swells every stream to and beyond the limits of its banks, while the brief but warm and relatively dry summers end with very low water levels.

The volume of the Porcupine also changes from year to year, independently of these seasonal factors. In most summers, the Klo-kut archaeological site, to be discussed at length below, lies opposite an island about 2000 yards long and 100 yards wide; this island, called First Island, is used as the landing strip for scheduled DC-3 flights serving Old Crow twice each week. In August 1966, water level in the Porcupine was so low that the island became a peninsula, joined to the adjacent bank along a broad area; the archaeological collections and equipment were loaded directly into a plane which taxied to within 50 feet of the bank. One year later, in August, 1967, we tied up our boat along that same bank in water so high that the island was entirely submerged. This flood occurred at the same time as the destructive rampage in the Tanana drainage at Fairbanks, and locally it appeared to have been caused by heavy rains at the headwaters of the Porcupine and its tributaries; we had comparatively little rain on the middle Porcupine, but the river rose some seven feet in 24 hours. To complete the cycle, the summer of 1968 again brought very low water; we were able to walk to the "island" throughout most of July and August, and our excavations reached 4½ feet before being terminated by the combination of permafrost and watertable. As might be expected, very little rain fell that summer, and forest fires were numerous and widespread.

In summary, the Porcupine River can be said to undergo rapid, major fluctuations in its regimen and in the position of its channel. This has important implications for archaeology in this region, since the unstable banks may include few locations where archaeological sites would remain undestroyed for any considerable period of time.

The middle Porcupine region lies north of the 15^{o} F. isotherm of mean annual air temperature and has been mapped within the zone of continuous permafrost (Geological Survey of Canada 1967). Only in shallow soils on bedrock outcrops have I failed to encounter permafrost in my test pits. The depth to permafrost varies considerably depending upon the nature of the vegetative cover (Benninghoff 1952); excavations in late June and early July usually encounter permafrost between 18-24" below the surface in grassy clearings, at 6-12" below the surface in poplar stands, and immediately at the surface under dense mats of sphagnum found in spruce forest. I am not prepared to discuss the climatic and geologic importance of permafrost, but it influences archaeological work in several ways. One of the few benefits, but a very important one, is the state of preservation conferred upon organic materials, including bone, bark, and even wood. But testing is very difficult, excavations must be carried out in several trenches simultaneously, drainage quickly becomes a serious problem in deeper levels, and active and inactive frost cracks cause significant disturbance of the fine-sediment matrix of the sites. Furthermore, the environment of the excavator is cold and damp. Undoubtedly the archaeologist can overlook these problems in view of the preservation factor, but the limitations and disturbances introduced by permafrost must figure in the plans of any excavation in this region. As will be mentioned again below, there is little or no evidence of solifluction in our work.

Climate

Kendrew and Kerr (1955: 154) outline five climatic divisions in the Yukon Territory. Most of the middle Porcupine drainage falls within the North division which extends from the Ogilvie Mountains on the south to treeline on the north. The Arctic Barrens division lies between treeline and the Arctic coast but probably includes the northern part of Old Crow Flats. Unfortunately there are no useful meteorological data from either of these divisions in the Yukon. There would seem to be two means of circumventing this lack of local data in order to obtain a general characterization of the climate of the area: (1) extrapolations from basic data collected at the nearest weather stations; (2) approximations read from maps covering all of Canada. The former approach would be highly suspect since the nearest stations are hundreds of miles from Old Crow and are either on the opposite side of a mountain range (Dawson City and Aklavik) or a considerable distance down the Porcupine valley (Fort Yukon). The latter approach may entail the former to some extent since the maps are produced by connecting data points supplied by many local stations, but these maps are generalized on the basis of very broad regional patterns so that local conditions are effectively cancelled. While this reduces somewhat their value for my purposes, I believe such maps are adequate for a general impression of the regional climate; it cannot be overemphasized, however, that whatever success is enjoyed by this means applies to the middle Porcupine region and not to the Old Crow locality. Basic climatic parameters -- temperature, humidity, wind, and precipitation -- are summarized in

Table 1; the entries in the table are the result of my interpretations of maps published by Thomas (1953).

The values in Table 1 indicate that the middle Porcupine has a continental type climate characterized by wide extremes of temperature and relatively little moisture. Precipitation and relative humidity tend to be highest in the summer season but do not reach extreme values. Snowfall is moderate, but the absence of strong winds and the presence of more or less continuous forest precludes packing and drifting of snow except on frozen water bodies and in the scattered open areas. Judging from statements by informants in Old Crow, the value of 30 inches for maximum recorded snow depth is too low.

No data are available concerning wind direction, but informants have remarked upon cold northerly prevailing winds as characteristic of winter months, especially in Old Crow Flats. During summer months I have observed generally easterly and westerly winds, paralleling the trend of the middle Porcupine valley. Certain stretches of the river are especially susceptible to wind influences and become choppy (with "waves") for several days at a time. The choppy areas move up and down the valley, and these movements appear to be related to storminess; I have not yet been able to decipher this relationship.

Temperature ($^{o}F.$)	Jan.	Apr.	Jul.	Oct.				
Mean Daily	-20	10	55	20				
Mean Daily Maximum	-10		65					
Mean Daily Minimum	-30		45					
Mean Annual Maximum = 85								
Mean Annual Minimum = -50								
Extreme Lowest Record, 1921-1950 = -65								
Extreme Highest Record, 1921-1950 = 90*								
Humidity ("Hg)								
Mean Vapor Pressure	<0.05	<0.10	0.35	0.10				
Wind (mph)					Annual			
Computed Maximum Gust Speed	90	70	70	70	90			
	Win.	Spr.	Sum.	Aut.				
Mean Seasonal Wind Speed	<10	<10	<10	<10				
Snow (inches)	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Annual
Mean Snowfall	<5	<10	<5	<10	<5	<5	<5	<40
Mean Annual Number of Days with Measureable Snowfall < 50								
Maximum Recorded Depth, 1941-1950 = 30								
Rain (inches)	Win.	Spr.	Sum.	Aut.				
Mean Seasonal Rainfall	<1	<1	<2.5	<1				
Mean Annual Rainfall > 5								
Mean Annual Total Precipitation > 5					Jan.	Apr.	Jul.	Oct.
Mean Number of Days with Precipitation 0.1" or More					<3	<3	<6	<3
Maximum Precipitation in 24 Hours, 1921-1950 < 2								

* Two days in June 1967 had recorded temperatures of 100^{o} or more.

Table 1. Approximate climatic values for the middle Porcupine region (after Thomas 1953).

Generally I would characterize the summer as quite pleasant. The surface soil thaws by the first of June but remains cold in our excavation trenches for several weeks. By middle to late August the trenches are cold and damp, and standing water begins to freeze nightly. Precipitation is extremely variable from year to year, and snow can occur in any month. A snow storm, on 28 June 1967, covered the ground overnight but did not survive the heat of the following day. Five days later, on 3 July, a hail storm pelted us for several hours, and we experienced a number of violent rainstorms during the summer. In 1968, however, gentle rain fell only a few times, and the season was generally quite dry. The summer of 1970 brought two weeks of nearly continuous rain along the Bell River in June and several violent thunderstorms were experienced on the Old Crow River in July; otherwise there was hardly any precipitation for three months (June - August). The summer was unusually short and cool: breakup occurred on schedule but was low, the mosquitoes appeared two weeks late, the king salmon never arrived in significant numbers, berries of several species ripened nearly a month later than usual, caribou began moving south two weeks early, and freezing temperatures were experienced by the end of July.

A few meteorological parameters can be calculated for the general middle Porcupine region. Thus, for example, discounting local topographic obstructions, the sun is visible above the horizon for 24 hours on 21 June at 67° N. lat. (approximately the latitude of the headwaters of the Porcupine). Likewise at this latitude the sun is never visible during the 24 hour period of 21 Dec. (Kendrew and Kerr 1955: 156). Closer to Old Crow, at 68° N. lat., the sun disappears on 9 Dec. and does not reappear until 3 Jan. (Kendrew and Kerr 1955: 156). Though I have yet to experience an Arctic winter, I have learned to enjoy the continuous daylight of the northern summer. Even at midnight a lantern is not needed to work inside a white walled tent until the second week of August. You can literally work until you get tired and sleep until you wake up; life styles in the northern summer have a freedom never enjoyed in more temperate climes.

Fauna

Mammals

Unfortunately, I have not had available any study of the mammals of the middle Porcupine comparable to L. Irving's (1960) detailed account of the regional avifauna. It has been necessary to piece together from general sources the list of mammals displayed in Table 2. The sources for this list cover Alaska (Manville and

Latin Name / English Name
Sorex cinereus / Cinerous shrew
Sorex arcticus / Tundra shrew
†**Lepus americanus* / Snowshoe hare
Marmota caligata / Hoary marmot
Spermophilus undulatus / Ground squirrel
Tamiasciurus hudsonicus / Red squirrel
†**Castor canadensis* / Beaver
Clethrionomys rutilus / Red-backed vole
Microtus pennsylvanicus / Meadow vole
Microtus oeconomus / Tundra vole
Microtus xanthognathus / Chestnut-cheeked vole
Microtus miurus / Alaska vole
†**Ondatra zibethica* / Muskrat
Lemmus trimucronatus / Brown lemming
Dicrostonyx groenlandicus / Collared lemming
**Erethizon dorsatum* / Porcupine
Canis latrans / Coyote
†**Canis lupus* / Wolf
† *Alopex lagopus* / Arctic fox
†**Vulpes fulva* / Red fox
†**Ursus americanus* / Black bear
†**Ursus horribilis* Grizzly bear
**Thalarctos maritimus* / Polar bear
†**Martes americana* / Pine marten
**Mustela erminea* / Short-tailed weasel
**Mustela rixosa* / Least weasel
†**Mustela vison* / Mink
†**Gulo luscus* / Wolverine
†**Lutra canadensis* / Otter
†**Lynx canadensis* / Lynx
†**Alces alces* / Moose
†**Rangifer tarandus* / Caribou
**Ovis dalli* / Dall sheep

Table 2. Mammals of the middle Porcupine region (after Rand 1945; Burt and Grossenheider 1952; Hall and Kelson 1959; Manville and Young 1965). * indicates that a Kutchin name is reported by Höhn (1962). † indicates that a 'Kutchi-Kutchi' (Kutcha-Kutchin) name was recorded by Murray (1910: 13).

Young 1965), the Yukon Territory (Rand 1945), and all of North America (Hall and Kelson 1959; Burt and Grossenheider 1952). The polar bear has been entered in this list though there appears to be no record in the zoological literature of its occurrence in the middle Porcupine drainage; it is included on the strength of reports obtained from the people of Old Crow (Charlie Peter Charlie and Lazarus Charlie, personal communications in 1967; also see Leechman 1954: 10).

Relatively few of these mammals were of any considerable importance as food sources in prehistoric times, but many more of them became significant economically as the fur trade was introduced to the region. The caribou can be shown to be the mainstay of the prehistoric subsistence economy, with moose occupying a secondary position and varying hares, muskrat, beaver, porcupine, and other small mammals of occasional but considerable importance as supplementary food sources. The muskrat became paramount as the fur trade developed, and marten, mink, beaver, and others also became objects of the trapline.

Specific characteristics of certain mammal species are relevant to any discussion of subsistence activities. Among these characteristics are the size and habits of the species, its abundance and distribution in the territory being considered, and the relative importance of the animal for man's purposes.

Rangifer tarandus

Undoubtedly, from man's point of view, the most important terrestrial mammal in the north is the caribou. This large, herding herbivore is unequalled as a source of food, skins, and raw material for implements and lines. Among some Eskimos, e.g. the Nunamiut (Gubser 1965) and the Caribou Eskimos (Birket-Smith 1929), as well as among some northern Athabaskan groups (v. McKennan 1959; 1965), the caribou has been the cornerstone of the subsistence economy to such a degree that other resources must, on the whole, be considered as secondary in importance. Clearly this was also true of the Vunta and Tukkuth Kutchin of the middle Porcupine, at least in the pre-contact period, so it is highly relevant to discuss at some length the occurrence and condition of the caribou in the middle Porcupine region.

The caribou is widespread in North America, occurring throughout most of Alaska, Canada and Greenland (Hall and Kelson 1959: 1019). West of the Mackenzie River, in the Yukon and Alaska, Murie (1935) recognizes five groups of herds, one of which, the northern herds, has two centers of abundance; one of these centers "lies about the upper Porcupine River and headwaters of Peel River" (Murie 1935: 63). It is probably worth mentioning that this is only one of several ways in which the caribou distribution of Alaska and the Yukon has been described; other writers have drawn herd boundaries quite differently with the result that the literature on caribou distribution and migration is quite confusing. The caribou themselves are largely responsible for this confusion as their movements are quite variable from year to year:

> The distribution and migration of caribou in the Porcupine region confirms observation in other localities that although there is a migration, it may be complicated by minor and countermovements. Furthermore, when the trek is over, it is difficult to say clearly just where the herd has gone, for the reason that animals are still scattered here and there over much of the entire range. In fact, much of the territory occupied by the northern herd is so far removed from ordinary travel that it has been extremely difficult to gather sufficient information with which to work out the entire migration route, and data are available for only a rough outline (Murie 1935: 66).

The summer and winter ranges of the caribou in northern Yukon territory appear not to have been worked out in any detail, but part of the usual migration route is known (Murie 1935: 68, 69):

> The route of migration of that part of the herd on the Canadian side, may be traced eastward by Rampart House, along the Old Crow Mountains, and southward by the high lands bordering the Porcupine River into the upper Peel River country and Nahoni Lakes. There is no question that this is the route of travel, but opinion differs as to its direction at certain seasons. During the first week in August 1926, the caribou appeared in the Old Crow Mountains, northeast of Rampart House, and the numbers were augmented by later arrivals. The natives from Old Crow Village obtained more than 400 animals during the fall hunt. According to a former member of the Royal Canadian mounted police

> at Rampart House, caribou in fall cross the Porcupine southward at that point and return northward in spring. An Indian at that station said the same thing.
> At Old Crow Village, to the eastward, the chief of the Indians informed the writer that the caribou appeared in that vicinity in fall, having come from the "Chandalar", and traveled to the head of the Porcupine. This would also be in a southerly direction. He stated that the animals returned northward in spring, and further that an influx of caribou generally occurred in August from the north, but these soon returned northward and reappeared in October on their southward trek...
> Other reports also appear to point to a southerly migration in fall. In August 1926 caribou appeared at Old Crow Mountain, as the Indians had predicted, and apparently from the north. They probably followed the mountains surrounding Old Crow River Basin, for few had been seen in the basin itself at this time.

Balikci (1963b: 6) has recently found corroboration for Murie's report, but he adds more specifically that the herds may cross the Porcupine either below Old Crow or above it. A crossing below Old Crow follows a westward movement along the Old Crow range, but the herds are also known to move eastward along this range toward a crossing on the lower Old Crow River. In this event, the canyon of the Old Crow River, just southwest of Schaeffer Mountain, is regarded as a good hunting spot. Crossings on the Porcupine above Old Crow follow a southward movement from the Barn and Richardson Mountains, reaching the Porcupine between Driftwood River and Salmon Cache, above Berry Creek. These southward movements occur between late August and early October and are followed in late October by a brief return toward the north. A subsequent southward crossing of the Porcupine brings the herd to its winter range on the headwaters of the Porcupine and around Lone Mountain in the Keele Range.

Informants in Old Crow have repeatedly described this pattern to me during recent years and have added that the northward movements in the spring season bring the pregnant does across the Porcupine in May. The spring and summer range of this herd apparently lies between the Buckland and Romanzof Mountains, possibly with a major concentration in the Firth River valley. Members of the International Boundary Commission survey party observed numerous caribou on their summer range in 1912:

> At a certain season of the year, generally in June, they assemble in great herds and feed along the hills along the south bank of the Firth River. Members of the survey parties observed different herds of more than 300 cows and calves and a few bulls...
>
> They were numerous on the tundra between the Arctic Ocean and the barren foothills of the British Mountains. Small scattered bands and individuals were always in sight... (International Boundary Commission 1918: 283-284).

Observations in 1919 included an estimate of 60,000 caribou near the international boundary in northern Alaska (Riggs 1920), and large herds were observed in the Romanzof Mountains in the summer of 1951 (Rausch 1953: 139). In 1967, I observed a broad, heavily used caribou trail running generally east and west across the Babbage River, just north of Trout Lake; this trail would appear to represent movements along the eastern end of the

Brooks Range to and from the Richardson Mountains. Rausch (1953: 140) remarks:

> The animals summering in the Romanzof Mountains region probably migrate southeast into the region around the head of the Porcupine River, southwest of the Richardson Mountains. The animals occurring in the summer in the lower Chandalar River valley, in the region of Arctic Village, migrate eastward toward the head of the Porcupine.

If the distribution and movements of the caribou are difficult to ascertain, the size and fluctuations of their population are even harder to establish. Leopold and Darling (1953) concluded that the elimination of caribou from much of Alaska resulted from destruction of their winter range, by reindeer in the west and by fire in the central and southern area. They felt that on the whole the northern herds have held their own, at least during the last fifty years, but that numerous reports in explorers' journals suggested substantial fluctuations in numbers or distribution since the turn of the century (Leopold and Darling 1953: 63-64). In contrast to complaints by Stefansson (1962: 55, 71) and others of decimation of the caribou herds in northeastern Alaska, the International Boundary Commission (1918: 284) described caribou meat as "most plentiful in the camps" in the same area. Estimates based on aerial surveys in 1948-49 placed the Chandalar herd of northeastern Alaska at 20,000 head (Scott, et al. 1950), and Balikci (1963b: 7) noted that "since local informants fail to agree on any sharp decline of the caribou population, it is reasonable to assume that the northern Yukon is one of the few places in Arctic Canada where caribou are still abundant, and where no major quantitative changes in caribou distribution have taken place during this century." Indeed recent surveys made in preparation for pipeline installations indicate that the "Porcupine herd" numbers an estimated 70,000 caribou, nearly twice the size suggested by previous observations (NPSG 1971).

Such overall patterns, however, are of less immediate importance to a native hunting population than the more local functuations in caribou numbers and distribution. Variations in local abundance are probably as high as 60-70% from year to year, and a good kill in one season provides no basis for predicting success in the next. These facts are well known to the Indians of the middle Porcupine, and undoubtedly their livelihood has often depended upon their ability to ascertain and interpret subtle changes in the movements of their most important game animal.

Alces alces

The moose deserves special mention not for its abundance but for its remarkable size. Even today the Indians of Old Crow frequently have a "moose feast" when one of these large animals is killed, and there is always enough soup and meat for the entire village on these occasions. Balikci's (1963b: 7) informants described the area as being "not good moose country," but in summer and winter, when there are few caribou about, the moose is often deliberately and intensively hunted. Though Rand (1945: 77) regarded the Porcupine as a probable northern boundary for moose, they definitely range northward into Old Crow Flats where they are occasionally found in numbers. Possibly due to northward extensions of tall willows suitable for browsing, moose seem to be gradually expanding toward the north (Leopold and Darling 1953: 87-88; Anderson 1924), but in 1912, "tracks and evidences of browsing" were observed ten miles north of Firth River, and a large bull was shot at the head of Old Crow River, near Ammerman Mountain (International Boundary Commission 1918: 282). Informants at Old Crow have described to me several moose hunts in the southern parts of Old Crow Flats, and I have seen moose as far north as the mouth of Timber Creek.

Certain areas south of the Porcupine are more dependable places in which to find moose. Among these are the lower Bluefish River, below Old Crow, and the mouths of Johnson Creek and the Whitestone River, on the upper Porcupine (Balikci 1963b: 7-8). Average annual kills of 40-50 moose have been reported in the latter areas (Balikci 1963b: 8).

Ovis dalli

"Considering their limited distribution, [Dall sheep] do not seem to have played an important part in the native diet. There are numerous hunters whose traditional hunting grounds lie in the western part of the Venta [*sic*] Kutchin country, and who have never seen a mountain sheep" (Balikci 1963b: 8). Nonetheless, Dall sheep can be found just north-west of Old Crow Flats, in the British Mountains (International Boundary Commission 1918: 281), as well as around the headwaters of the Porcupine and Miner Rivers.

Other mammals

Large carnivores and smaller mammals can be discussed more briefly. Bears (*Ursus americanus* and *U. horribilis*), wolves (*Canis lupus*) and wolverines (*Gulo luscus*) are well-known nuisance animals and occasionally are killed for that reason alone. All three destroy caches, while wolves and bears occasionally compete for caribou and threaten man's physical safety in the bush; wolverines are despised for their habit of destroying fur-bearers when they find them in traps. Osgood (1936b: 33-34) mentions pitfalls, 4 feet in diameter and five feet deep, which were dug around permanent camps and armed with sharply pointed bone stakes as defense against foxes and wolverines. The pits were covered with thin plates of crusted snow on which bait could be placed. Wolves are said to be too smart for this kind of capture, and Welsh (personal communication in 1970) and I have independently noted something of an implicit fear, presumably of supernatural powers, which surrounds any encounter with wolves. Osgood (1936b: 34) remarked that wolves were eaten only in times of starvation, but only dogs were strictly taboo as a food source.

The snowshoe rabbit (*Lepus americanus*) is common in brushy terrain along stream beds but is subject to cyclic variation in numbers. Intensive snaring of rabbits provides an important dietary supplement for the Indians of Old Crow.

The muskrat (*Ondatra zibethica*) is extremely abundant in Old Crow Flats and in pre-contact days provided food for both men and dogs; the growth of the fur trade brought about intensive muskrat trapping, and the species has remained paramount in the local quest for furs.

Balikci's (1963b: 11) informants spoke of numerous beavers (*Castor canadensis*) in Old Crow Flats and along the middle Porcupine "in traditional times," but they indicated recent drastic reductions in the beaver population. My informants have confirmed this reduction as a result of intensive trapping and have mentioned the upper Porcupine as the only remaining area with significant numbers of beavers. Beaver flesh is still regarded as a delicacy.

Lynx (*Lynx canadensis*) and marten (*Martes americana*) are found primarily in the hills along the upper Porcupine and in the Keele Range. Their importance in the fur trade far outweighs any former significance as a food resource, but the lynx in particular has markedly decreased in abundance during the past four decades.

Mink (*Mustela vison*), once quite abundant in Old Crow Flats, have likewise dwindled in the face of intensive trapping, but, along with muskrat and marten, the mink is still a major species in the fur quest.

Porcupines (*Erethizon dorsatum*) were once very numerous in this region but have declined considerably in the Old Crow area. They were sought for food and for their quills which were used to ornament clothing.

None of the other mammal species needs specific mention except to note that the coyote (*Canis latrans*) has moved into this region only during the present century (Manville and Young 1965: 38).

I have not seen a list of mammal names collected from the Kutchin in the Old Crow region. A list of "Loucheux" (Kutchin) names collected at Fort McPherson and Aklavik (Höhn 1962) includes names for all mammals larger than a squirrel listed in Table 2, except the marmot, coyote, and Arctic fox. Kutcha-Kutchin names were collected for some mammals in the Fort Yukon area (Table 2; Murray 1910: 13). Kutchin mythology includes many references to mammals, and frequently one finds featured mammal species of little or no economic significance (Osgood 1936b; Leechman 1950, 1952; McKennan 1965).

Birds

As seen in Table 3, at least 29 species of birds of potential subsistence importance nest in and/or migrate through the middle Porcupine drainage. Of these, only four species, two geese and two ducks, pass through the region on migration without remaining to nest. Four other species, all gallinaceous birds, are present throughout the year. The other 21 food species arrive during the spring migration and are available throughout the summer in their nesting habitats; these include three loons, two grebes, the whistling swan, both Canada and white-fronted geese, 12 species of ducks, and the sandhill crane. Most or all of these species arrive in the region during the month of May and depart in August or September (*cf.* Irving 1960: 287 ff).

Some indication of the abundance of waterfowl in the Old Crow Flats is gained from W.E. Stevens, of the Canadian Wildlife Service, quoted by Balikci (1963b: 13):

> The Flats are, without question, the most important waterfowl breeding grounds in the Yukon Territory. Recent surveys by the Canadian Wildlife Service and the U.S. Fish and Wildlife Service, based on an area of 1970 square miles, show a waterfowl breeding density at Old Crow of 87 birds per square mile.

Of lesser importance economically are 15 species of predatory birds, of which the feathers were sought for fletching arrows while the talons were used in making certain implements such as fish hooks (*cf.* McKennan 1965: 35-56). These include six resident species, eight nesting migrants, and one winter visitor.

It is noteworthy that the modern native inhabitants of the middle Porcupine have been shown to possess knowledge of this avifauna which far exceeds that required for

Latin Name / English Name

1. Residents present in all seasons (18 species).

Accipiter gentilis atricapillus / Goshawk
Falco rusticolus obsoletus / Gyrfalcon
†*Canachites canadensis osgoodi* / Spruce grouse
†*Bonasa umbellus* / Ruffed grouse
†*Lagopus mutus nelsoni* / Rock ptarmigan
Bubo virginianus lagophonus / Great horned owl
Surnia ulula caparoch / Hawk owl
Strix nebulosa nebulosa / Great gray owl
Aegolius funereus richardsoni / Boreal owl
Picoides tridactylus fasciatus / Northern three-toed woodpecker
Perisoreus candensis pacificus / Canada jay
Corvus corax principalis / Common raven
Parus cinctus lathami / Gray-headed chickadee
Parus hudsonicus hudsonicus / Boreal chickadee
Cinclus mexicanus unicolor / Dipper
Bombycilla garrula pallidiceps / Bohemian waxwing
Pinicola enucleator alascensis / Pine grosbeak
Loxia leucoptera leucoptera / White-winged crossbill

2. Residents and migrants (2 species).

†*Lagopus lagopus alascensis* / Willow ptarmigan
Acanthis hornemanni exilipes / Hoary redpoll

3. Migrants not remaining to nest (9 species).

†*Branta nigricans* / Black brant
†*Chen hyperborea hyperborea* / Snow goose
†*Bucephala clangula americana* / Common goldeneye
†*Bucephala islandica* / Barrow's goldeneye
Erolia melanotos / Pectoral sandpiper
Erolia bairdii / Baird's sandpiper
Larus hyperboreus barrovianus / Glaucous gull
Calcarius lapponicus alascensis / Lapland longspur
Plectrophenax nivalis nivalis / Snow bunting

4. Migrants, both nesting and transient (48 species).

†*Gavia immer* / Common loon
†*Gavia arctica pacifica* / Arctic loon
†*Gavia stellata* / Red-throated loon
†*Olor columbianus* / Whistling swan
†*Branta canadensis taverneri* / Canada goose
†*Anser albifrons frontalis* / White-fronted goose
†*Anas platyrhynchos platyrhynchos* / Mallard
†*Anas acuta* / Pintail
†*Anas carolinensis* / Green-winged teal

Table 3. Birds of the middle Porcupine region (modified after L. Irving 1960: Table 4). * indicates predatory birds of slight economic importance; † indicates species potentially important for subsistence.

Latin Name / English Name

†*Mareca americana* / American widgeon
†*Spatula clypeata* / Shoveller
†*Aythya marila nearctica* / Greater Scaup
†*Aythya affinis* / Lesser scaup
†*Clangula hyemalis* / Oldsquaw
†*Histrionicus histrionicus* / Harlequin duck
†*Melanitta deglandi* / White-winged scoter
†*Melanitta perspicillata* / Surf scoter
†*Mergus serrator serrator* / Red-breasted merganser
**Buteo lagopus* / Rough-legged hawk
**Aquila chrysaetos canadensis* / Golden eagle
**Falco peregrinus anatum* / Peregrine falcon
**Falco columbarius bendirei* / Pigeon hawk
†*Grus canadensis canadensis* / Sandhill crane
Charadrius semipalmatus / Semipalmated plover
Capella gallinago delicata / Wilson's snipe
Actitus macularia / Spotted sandpiper
Tringa solitaria cinnamomea / Solitary sandpiper
Totanus flavipes / Lesser yellowlegs
Erolia minutilla / Least sandpiper
Ereunetes pusillus / Semipalmated sandpiper
Lobipes lobatus / Northern phalarope
Stercorarius longicaudus / Long-tailed jaeger
Larus argentatus smithsonianus / Herring gull
Larus canus brachyrhynchos / Mew gull
Larus philadelphia / Bonaparte's gull
Sterna paradisaea / Arctic tern
Eremophila alpestris arcticola / Horned lark
Iridoprocne bicolor / Tree swallow
Riparia riparia riparia / Bank swallow
Petrochelidon pyrrhonota hypopolia / Cliff swallow
Turdus migratorius migratorius / Robin
Hylocichla minima minima / Gray-cheeked thrush
Anthus spinoletta rubescens / Water pipet
Euphagus carolinus carolinus / Rusty blackbird
Acanthis flammea flammea / Common redpoll
Spizella arborea ochracea / Tree sparrow
Zonotrichia leucophrys gambelli / White-crowned sparrow
Passerella iliaca zaboria / Fox sparrow

5. Migrants, nesting but not transient (24 species).

†*Podiceps grisegina holbőllii* / Red-necked grebe
†*Podiceps auritus cornutus* / Horned grebe
**Accipiter striatus* / Sharp-shinned hawk
**Haliaeetus leucocephalus alascanus* / Bald eagle
**Circus cyaneus hudsonius* / Marsh hawk
**Pandion haliaetus carolinensis* / Osprey
Numenius phaeopus hudsonicus / Whimbrel
Colaptes auratus borealis / Yellow-shafted flicker

Table 3 (Continued).

Latin Name / English Name

Sayornis saya yukonensis / Say's phoebe
Empidonax traillii traillii / Trail's flycatcher
Nuttallornis borealis / Olive-sided flycatcher
Tachycineta thalissina lepida / Violet-green swallow
Ixoreus naevius meruloides / Varied thrush
Hylocichla ustulata incana / Swainson's thrush
Oenanthe oenanthe oenanthe / Wheatear
Regulus calendula calendula / Ruby-crowned kinglet
Vermivora celata celata / Orange-crowned warbler
Dendroica petechia amnicola / Yellow warbler
Dendroica coronata hooveri / Myrtle warbler
Dendroica striata / Blackpoll warbler
Seiurus noveboracensis notabilis / Northern waterthrush
Wilsonia pusilla pusilla / Wilson's warbler
Passerculus sandwichensis anthinus / Savannah sparrow
Junco hyemalis hyemalis / Slate-colored junco

6. Visitors (5 species).
Charadrius vociferus / Killdeer
Pluvialis dominica dominica / Golden plover
Stercorarius parasiticus / Parasitic jaeger
Lanius excubitor invictus / Northern shrike
Melospiza lincolnii lincolnii / Lincoln's sparrow

7. Winter visitor (1 species).
**Nyctea scandiaca* / Snowy owl

Table 3 (Continued).

adequate economic exploitation. Kutchin Indian names have been collected for 99 of the 107 species listed in Table 3 (Irving 1958). These names were obtained from one man, named Joe Kay, a former chief at Old Crow, of whom Irving (1960: 155) remarked:

> I did not meet another Indian with such command of nomenclature. Furthermore, Joe Kay in any company was an exceptional man for his remarkable strength and ability. At about 75 years of age his wisdom and social understanding were impressive to us and respected by his own people.
>
> He remarked that even among the older people few could recognize and name all birds. I believe that the names he gave me were true designations in his language, and yet I marvel that an unwritten language could persist in so small a community where only a few individuals can have such intelligence and learning as is required to preserve the comprehensive and accurate Indian knowledge of their natural environment. It is also revealing to find among the Indians and Eskimos who socially dominate their fellows by physical strength and skill the possession of such intellectual attainment as is illustrated by perfect recognition and naming of birds. Here, in a small community living among primitive conditions, we see how refined an intelligence can be developed, for the cultivation of such knowledge as deals with small birds demonstrates mental exertion for the pure love of knowledge.

A major aim of this study is the investigation of prehistoric subsistence patterns, and the analysis of osteological remains is the major technique utilized toward this end. It is important to estimate what portion of prehistoric knowledge contributes to subsistence activities, how selective is the sample of remains which is preserved in an archaeological site, and what sort of sample is removed from the site by the archaeologist.

As will be seen later in this study, the bird bones recovered from archaeological sites in the middle Porcupine provide but a dim reflection of the Indian knowledge of the avifauna found in the region today.

Relevant data concerning the life histories of identified species will be cited in the discussion of the faunal remains.

Fishes

Information concerning the fishes of the middle Porcupine is extremely meagre. This discussion is necessarily based upon the more or less casual observations of individuals who have visited or studied Old Crow for non-ichthyological reasons. Species collected from the lower Porcupine, within the impoundment area of the proposed Rampart Canyon Dam, are listed in Table 4. Most of these are reported elsewhere for the middle Porcupine, and probably all of them occur there though their status is unknown.

The king salmon (*Oncorhynchus tschawytscha*) is perhaps the most sought species of fish for human consumption, but very few individuals of the species reach Old Crow. A run begins during the second week of July and continues for a few weeks, and the first arrival is watched for with care and some excitement. Osgood (1936b: 125) describes a "first-salmon" feast which celebrates this arrival

Latin Name / English Name
Coregonus spp. / Whitefish
Coregonus sardinella / Least cisco
Oncorhynchus keta / Dog salmon
Prosopium cylindraceum / Round whitefish
Stenodus leucichthys / Inconnu or sheefish
Thymallus arcticus / Arctic grayling
Esox lucius / Northern pike
Hybopsis plumbea / Lake chub
Catostomus catostomus / Longnose sucker
Lota lota / Burbot, ling, or loche
**Percopsis omiscomaycus* / Trout-perch
Cottus spp. / Sculpin

* Rostlund (1952: Map 32) does not include the Yukon drainage in the distribution of *P. omiscomaycus* but indicates a widespread range in Alaska for the Alaska blackfish (*Dallia pectoralis*).

Table 4. Fish species collected on the lower Porcupine River, below the mouth of Coleen River, Alaska (U.S. Dept. of Interior 1965: I, Table 31).

"because the salmon comes a long way and [the people] are very glad to see it; naturally it symbolizes the season of plentiful food." It would seem that the salmon has become less reliable as an indicator of plenty in recent years:

> There seems to be little doubt that the Yukon salmon fishery has declined within living memory, almost certainly on account of operations lower down in Alaska. On the Porcupine at Old Crow we were told that before 1914 their salmon run was sufficiently large to justify a fishery during the second week of July. Now, although the Old Crow Indians are active fishermen, they take no more than 20 king salmon a year in the whitefish nets, and have long abandoned the use of salmon nets (Cameron et al. 1947: 14).

In recent years, the dog salmon (*Oncorhynchus keta*) has been much more important economically, particularly as a source of dog food. Beginning in August and intensifying in September, the dog salmon run "continues until early winter, when fishing is conducted with nets placed under the river ice. Two other salmon species are known in the area. They occur infrequently, and seem of lesser importance" (Balikci 1963b: 13). Though fishing for dog salmon in the southern part of Old Crow Flats is reasonably productive, the number of king salmon which reach this area is entirely insignificant.

The silver salmon (*Oncorhynchus kisutch*) is known to enter the Porcupine River to spawn in its tributaries (U.S. Dept. of Interior 1965: I, 212), but it is not known whether the species reaches the middle Porcupine in significant numbers.

> In many lakes, rivers and creeks, whitefish grayling, loche, sucker and jackfish abound. For these species, autumn is considered the best fishing season. Old Crow River is particularly rich in fish in late summer and autumn, and it is along this river that most of the fishing camps are situated (Balikci 1963b: 13).

Summer fishing camps are also located on small streams in Old Crow Flats, far from the main valley of Old Crow River. One of these camps is described in some detail later in this paper.

In conversation with Lazarus Charlie, of Old Crow, I have learned of three kinds of whitefish -- large, medium and small -- distinguished by the Kutchin; another way of classifying them distinguishes large, small, and crooked-backed. Whitefish (*Coregonus* spp.) are presently a very important summer food source. Grayling (*Thymallus arcticus*) are prized for food as are loche. Sucker heads are a favorite delicacy, but the pike or jackfish (*Esox lucius*) often ends up in the dog yard.

The Fish Hole on the Firth River is known as a good place for finding open water in early winter; this open water attracts large numbers of Arctic char (*Salvelinus alpinus*), as many as 1000 of which have been netted by seven men in two days (Balikci 1963b: 13). I have heard of another fishing hole which remains open all winter on the Fishing Branch of the upper Porcupine, but I am not familiar with its use.

Some idea of fish abundance on the middle Porcupine is obtained from Rostlund's (1952: Map 45) inclusion of the area in his highest category of average annual production (800-1000 pounds of fish per average square mile of territory).

As will be seen in the discussion of faunal remains, the difficulty of comprehending the modern fish populations of this region is exceeded only by that of identifying the bones of these fishes.

Other Fauna

I have occasionally heard frogs calling during the middle Porcupine summer, but I know of no other amphibians or reptiles in the area.

Among invertebrates, the sub-phylum Insectivora deserves special mention. There are many beautiful insects in the northern Yukon, among which numerous species of butterflies are outstanding. A number of large flies are also found and can be seen on carcasses in the bush as well as around the Old Crow dump. I was told in Old Crow that the appearance in late June of large deer flies is thought to herald the king salmon migration; similar concepts among the Ingalik link butterfly species with salmon runs (Osgood 1959: 39).

Murie (1935: 10) describes the warble fly and nostril fly as the worst parasites faced by the caribou, and the myriad mosquitoes in the northern Yukon summer are a source of constant, if seasonal, harassment for caribou, moose, and man. The mosquitoes appear in early June and increase to incredible numbers through July before dwindling in mid-August. Several species are present and seem to complement one another in their ecological and temporal distributions so that the summer plague is quite continuous. The only respite out-of-doors is in the middle of the river and on exposed hill tops where steady breezes can usually be found. Moose employ the tactic of submergence in a river or lake until only their nostrils show, and I have found myself on survey digging test pits with all possible speed in order to hasten back to the boat and get moving again.

The mosquito swarm is followed with some overlap by abundant black flies which in turn are succeeded by gnats or "noseeums." But the last two weeks of August and the first weeks of September are almost devoid of these flying pests, and the autumn colors which pervade both forest and tundra make the North a region of incomparable beauty.

Flora

There are several reasons for seeking a complete list of the vascular plants of the middle Porcupine; (1) as a part of the description of the modern ecosystem; (2) as a comparative background for palynological and other palaeoenvironmental studies; (3) as a framework for understanding the impact of human settlement on the vegetation; and (4) in order to comprehend the relative importance of various species and communities of plants for human exploitation.

Table 5 lists the 56 families of vascular plants reported for the middle Porcupine and shows the distribution in these families of 144 genera and 293 species of plants. This list has been compiled on the basis of Hultén's (1968) maps showing the flora of Alaska and the Yukon Territory. While the list is adequate for some purposes, it is of little use in attempting to describe the modern ecosystem of the region since the data are not organized according to plant communities and their characteristics and requirements. Indeed an analysis of the plant communities in this region has not been possible since no local studies are available. The geographically nearest detailed study of plant communities was carried out in the upper Sheenjek valley, just west of the Yukon-Alaskan border, in conjunction with ornithological investigations (Kessel and Schaller 1960).

Thus, for the present, a subjective and impressionistic description of the regional vegetation, based largely on my own observations, must suffice. The middle Porcupine region is generally covered with open spruce forest in which white spruce (*Picea glauca*) is usually dominant. The forest covers all low, well drained areas and extends up to elevations of 2500 feet or more on protected slopes; along stream valleys it may continue as high as 3000 feet.

Family: Latin Name	Family: English Name	No. of Genera	No. of Species	Edible	Poisonous
Lycopodiaceae	Club Moss	1	2		1
Selaginellaceae	Spikemoss	1	1		
Equisetaceae	Horsetail	1	6		
Ophioglossaceae	Adder's Tongue	1	2		
Athyriaceae	Lady Fern	2	3		
Aspidiaceae	Shield Fern	1	1		
Pinaceae	Pine	1	2	2	
Cupressaceae	Cypress	1	1		
Sparganiaceae	Bur Reed	1	1		
Potamogetonaceae	Pondweed	1	7		
Gramineae	Grass	12	26		
Cyperaceae	Sedge	3	30	3	
Araceae	Arum	1	1	1	1
Lemnaceae	Duckweed	1	1		
Juncaceae	Rush	2	7		
Liliaceae	Lily	4	5	1	1
Orchidaceae	Orchis	4	6		
Salicaceae	Willow	2	13	2	
Betulaceae	Birch	2	5		
Urticaceae	Nettle	1	1	1	
Santalaceae	Sandalwood	1	1	1	
Polygonaceae	Buckwheat	3	6	5	
Chenopodiaceae	Goosefoot	1	1		
Caryophyllaceae	Pink	7	13		
Nymphaeaceae	Water Lily	1	1	1	
Ranunculaceae	Crowfoot	5	13	1	
Papaveraceae	Poppy	1	2		
Fumariaceae	Earth Smoth	1	1		

Table 5. **Vascular plants of the middle Porcupine region (abstracted from Hultén 1968; Heller 1953; Porsild 1953).**

Family: Latin Name	Family: English Name	No. of Genera	No. of Species	Edible	Poisonous
Cruciferae	Mustard	7	11	1	
Crassulaceae	Stonecrop	2	2	1	
Saxifragaceae	Saxifrage	4	9	2	
Rosaceae	Rose	6	11	7	
Leguminosae	Pea	4	9	2	2
Linaceae	Flax	1	1		
Callitrichaceae	Water Starwort	1	2		
Violaceae	Violet	1	1		
Elaeagnaceae	Oleaster	2	2	2	
Onagraceae	Evening Primrose	1	3	2	
Haloragaceae	Water Milfoil	2	2	1	
Umbelliferae	Parsley	2	2		1
Cornaceae	Dogwood	1	1		
Pyrolaceae	Wintergreen	2	4		
Empetraceae	Crowberry	1	1	1	
Ericaceae	Heath	9	11	6	1
Primulaceae	Primrose	2	3		
Gentianaceae	Gentian	3	4		
Polemoniaceae	Polemonium	3	3		
Boraginaceae	Borage	2	3		
Scrophulariaceae	Figwort	4	9	1	
Lentibulariaceae	Bladderwort	2	3		
Plantaginaceae	Plantain	1	1		
Rubiaceae	Madder	1	2		
Caprifoliaceae	Honeysuckle	2	2	1	
Valerianaceae	Valerian	1	1		
Campanulaceae	Bluebell	1	1		
Compositae	Composite	13	30	3	
	Totals	144	293	48	6

Table 5 (Continued).

Along the Porcupine and other large streams, stands of spruce begin at the edge of the river bank on the outside of every bend of the stream bed, and indeed, in these localities, spruce are often seen leaning downward at a sharp angle toward the water where undercutting has caused slumping of the bank (*cf.* Benninghoff 1952: Fig. 3). On the opposite bank, on the inside of the bend, however, there is usually a barren gravel bar at low water, behind which is a band of willows (*Salix*), sometimes followed by a band of poplars (*Populus*) standing in front of the spruce. Well drained slopes rising directly from the river are often covered with stands of birch (*Betula*).

As mentioned earlier, the drainage of this region is entrenched below the former basin of glacial lake Old Crow. Thus the Porcupine and Old Crow Rivers have banks rising 100 feet or more to the large flat, lake-studded areas which represent the former basin. These flats can be generally characterized as swampy muskeg in which stands of white spruce are noticeably restricted to small well drained knolls while black spruce (*Picea mariana*) is scattered more abundantly across the wetter terrain. Willows are abundant in the flats, and small streams, often choked with alder (*Alnus*), lead to groves of poplars at their mouths. Elsewhere the flats are covered by a thick growth of grasses, sedges, and herbs. Wildflowers and berries are abundant in season, and nearly pure stands of *Equisetum* are found in recently drained stream and lake beds.

The openness of the spruce forest is due to the frequent interruptions of its cover by marshy conditions which favor fewer arboreal and more non-arboreal species. Rowe (1959) maps the forest in this region as mixed forest and barrens. But the forest is also open in the sense of having very little dense underbrush, and it is frequently floored by a dense mat of mosses of many kinds and colors. Wildflowers, such as the Arctic rose, are found in the forest as well as on the flats, and mushrooms and lichens are locally abundant.

In addition to local forest boundaries determined primarily by wetness, there are many local and some large areas in which the forest reaches its altitudinal limits. Lying above these limits are typical alpine tundra communities (Rowe 1959: map) similar to those described by Kessel and Schaller (1960). At least one such area, on top of Schaeffer Mountain, is quite isolated and yet quite large and accounts for discontinuities in the distributions of small rodents as well as for the local occurrence of tundra-loving birds such as jaegers (C.R. Harington, personal communication in 1967).

Finally, along the northern margin of the middle Porcupine region the forest reaches its latitudinal limit and is replaced first by muskeg and then by tundra on the Arctic coastal plain. This treeline parallels the northern margin of the Old Crow Flats and the southern margin of the Buckland and Barn Mountains. On the east, where the forest is under the influence of both latitude and the elevation of the Richardson Mountains, the tundra extends south to within about 25 miles of the Porcupine River.

In spite of the fact that this region was not glaciated during the Wisconsinan, the modern vegetation pattern has become established only since the close of the glacial period. Much of the region was occupied by glacial lake Old Crow, and an interesting problem consists of the nature of the plant cover on the shores of that glacial lake. This region lies just east of the forest refugium of the Wisconsin maximum (Hopkins 1967: 462), but it is not yet certain that the border of the refugium is accurately mapped or that the middle Porcupine did not maintain another, smaller, one. Peat samples which I collected in 1967 from the upper section of the lacustrine bluffs in the Old Crow basin should provide data on this problem and other recent studies suggest that glacial lake Old Crow lay in a large expanse of treeless tundra (O. Hughes, personal communication in 1970).

Man's impact on the vegetation has been relatively slight compared to that in more southerly latitudes. Forest fires have burned large tracts of land in Alaska and the Yukon but, while some of these may be produced by human activity, many of them are due to natural agencies. These fires can drastically affect the ecology of both forest and tundra. They are clearly detrimental to the winter range of the caribou (Leopold and Darling 1953) and recently have been held responsible for damage to trap-lines. In addition, timber cutting for fuel and construction has recently begun to limit the source of large spruce near Old Crow village.

Another influence of man is forest clearance, on a local scale, to facilitate village construction; this allows grassy clearings to become well established. These clearings are very prominent on the banks of the Porcupine River and have been important indicators of site locations. Preliminary analysis of pollen from the Klo-kut site suggests that these clearings may be recognizable in the fossil pollen spectrum.

It is probably fair to characterize plants as relatively unimportant in the Kutchin diet. Table 5 indicates the number of edible and poisonous species found in each family of plants in the area; these data are based upon Hultén (1968), Heller (1953), and Porsild (1953). Of 293 species, 48 species are edible in some manner, and only six species are poisonous. In addition to the six poisonous species, *Calla palustris* must be boiled and dried and *Ledum palustre* must be dried to rid them of poisons before use. The edible species are useful in a variety of ways; either leaves, roots, stems, bark, or fruit, or in some cases more than one of these, can be eaten if properly prepared.

It is not certain just how many of these species are actually exploited by the Kutchin. Balikci (1963b: 19) mentions "wild onions, wild rhubarb, juice of young spruce bark, berries," while Osgood (1936b: 29) lists, for the Peel River Kutchin, berries, "a parsnip-like tuber" (*Hedysarum?*), spruce and birch inner bark, wild onion, wild rhubarb, rose bud tea, birch syrup, and mushrooms. The berries include both high- and low-bush cranberries, crowberries, blueberries, bearberries, raspberries, salmonberries, and cloudberries. Berry picking is a prominent and favorite activity in the summer season and often involves the entire family. Women and children commonly pick berries while the men gather fire wood or hunt, or a berry picking session may be associated with a picnic. I have also been instructed in the use of Labrador tea (*Ledum palustre*) and was told of its use as a cough syrup; such use may be effective due to its ledol content which causes slight paralysis (Hultén 1968: 717). It would appear, from this summary, that about one fourth of the available edible species are actually used by the Kutchin for food.

Obviously the arboreal species, particularly the spruce, birch, and willow, are quite important as raw materials for a wide variety of manufactures. Spruce and willow have long been used in house and cache construction, (Osgood 1936b: 52-55), and spruce roots provide handles and woven articles (Osgood 1936b: 72). Willow bast line is also known (Osgood 1936b: 72), and birch bark provides canoe covers and a variety of containers (Osgood 1936b: 61, 76). A fungus found on birch trees is used as tinder for making fires (Leechman 1954: 14).

Porsild (1953: 32-34) mentions a number of edible lichens and mushrooms, some of which occur in the Old Crow area. I do not know whether lichens are eaten, but some mushrooms probably are used. The deadly poisonous *Amanita phalloides* must be carefully avoided. Mosses are used in house construction, as well as for boot padding, baby diapers, and sanitary napkins.

This discussion has provided merely a bare outline of the use of plants by the Kutchin. Though relatively few plants are eaten, woody plants are extensively exploited for a wide range of purposes. Few of the articles made of wood are recoverable archaeologically, and it is important to bear in mind, when discussing archaeological data, that this aspect of prehistoric technology is largely absent from the picture.

IV. NATIVE INHABITANTS

Ethnographic Context

Nearly all the Indian inhabitants of Alaska and the Yukon are speakers of Athabaskan languages. Various attempts to classify these people into a series of "tribes" have been put forth during more than a century; the most noteworthy of these attempts are those by Dall (1870; 1877), Morice (1890; 1906-10), and Osgood (1936a). Osgood (1936a) described ten "tribes" as occurring in Alaska and the Yukon, from west to east: Ingalik, Koyukon, Tanaina, Tanana, Kutchin, Ahtena, Nabesna, Han, Tutchone, and Kaska. I do not wish to enter into a discussion of the numerous problems related to such classifications; not only the names and boundaries but also, more importantly, the nature of the social groups being named and mapped have been a source of considerable confusion and controversy (v. McClellan 1964: 6; McKennan 1969).

In this paper I shall be concerned with the Kutchin, who occupy a larger geographical area than any other "tribe" in Alaska and the Yukon. Osgood (1936a: 14) provides a very general description of the territory occupied by the Kutchin: "The region around the great bend of the Yukon River, eastward into the valley of the Mackenzie, north to the littoral of the Arctic Ocean held by the Eskimos, and south to roughly 65^{o} north." It has long been recognized that the Kutchin somehow stand apart from other Athabaskan-speakers in northwestern North America. Dall (1870: 428 ff.; 1877: 24 ff.) saw fit to isolate the Kutchin from other groupings of the "Tinneh", but his otherwise excellent account is marred by his inclusion in this category of the Tanana, Han, and Tutchone. The Kutchin can be separated from other Athabaskan-speakers by their use of the word "kutchin" to designate "one who dwells" or "those who dwell"; the word is equivalent "to other Athapaskan forms such as gotine, kotana, and xotana" (Osgood 1934) and is linked with a geographical term to designate a particular subgroup of the Kutchin. Indeed, as might be expected for a people occupying so large an area, the Kutchin have been subdivided into a number of subgroups which have been called "tribes", "communities", and "bands" by various writers (Welsh 1971). Following a review by Cadzow (1925), Osgood (1934) attempted to clarify the growing confusion over Kutchin "tribal distribution and synonymy" and described eight subgroups for the Kutchin; he called these "tribes" which together comprised the Kutchin "nation." McKennan (1935) quickly applauded Osgood's effort but went on record as recognizing a ninth "tribe" which had escaped the notice of all observers theretofore. Subsequent work by West (1959) appears to have confirmed the former existence of this ninth "tribe" so that the total roster can be summarized as follows:

1. *Dihai Kutchin* (those who dwell farthest downstream): the north fork of the Chandalar River, the middle and south forks of the Koyukuk River, north of Yukon Flats and south of the Brooks Range divide in Alaska. Depleted by famine, disease and warfare, "absorbed into the present Chandalar Kutchin" (McKennan 1965: 24; also McKennan 1935; West 1959).
2. *Natsit* (Chandalar) *Kutchin* (those who dwell off the flats): the east fork of the Chandalar, the middle and upper Sheenjek, south of the Brooks Range divide, north of Yukon Flats, in Alaska (McKennan 1965; West 1959; *cf.* Osgood 1934; 1936b).
3. *Tennuth* (Birch Creek) *Kutchin* (those who dwell on the other side of the Yukon River): the drainage of Birch Creek, a stream entering the left bank of the Yukon River, in Alaska. "This tribe is long extinct and consequently little remembered" (Osgood 1934: 172).
4. *Kutcha* (Yukon Flats) *Kutchin* (those who dwell on the flats): the modern floodplain of the Yukon River between Circle and the mouth of Birch Creek, in Alaska (Osgood 1934; 1936b).
5. *Tranjik* (Black River) *Kutchin* (those who dwell along the river): the drainage of Black River which enters the left bank of the Porcupine River a few miles above the mouth of the latter, in both Alaska and the Yukon (Osgood 1934).

6. *Vunta* (Crow River) *Kutchin* (those who dwell among the lakes): centered on the drainage of Old Crow River, notably including Old Crow Flats, extending west through the Coleen River drainage and east to the Berry Creek drainage, north to the divide of the British Mountains, south (locally) to the divide of the Keele Range, in both Alaska and the Yukon (Osgood 1934; 1936b; Leechman 1954; Balikci 1963a, 1963b; A. Charlie, personal communication in 1970).
7. *Tukkuth* (Upper Porcupine River) *Kutchin* (meaning is unknown or nonexistent): headwaters of Porcupine and downstream to the drainage of Berry Creek, entire Bell River and Eagle River drainages east to divide of Richardson Mountains, in the Yukon (Osgood 1934; A. Charlie, personal communication in 1970).
8. *Tatlit* (Peel River) *Kutchin* (those who dwell at the source of the river): drainage of Peel River downstream to or nearly to its mouth, in both the Yukon and Northwest Territories (Osgood 1934; Slobodin 1960a; 1960b; 1962; 1969).
9. *Nakotcho* (Mackenzie Flats) *Kutchin* (those who dwell on the flats [?]): the southern area of the Mackenzie delta, a small portion of the Mackenzie River, and the lower reaches of Arctic Red River drainage in Northwest Territories (Osgood 1934).

In this paper I shall be primarily concerned with the inhabitants of that portion of the middle Porcupine drainage which we have covered to date in our archaeological surveys. These surveys have included the Porcupine valley from the mouth of Bell River to the Alaska-Yukon border as well as a number of localities in Old Crow Flats. Most of this region is within the territory of the Vunta Kutchin, as outlined above, but it extends into the western edge of Tukkuth Kutchin territory.

Very little data are available for the Tukkuth Kutchin, but the Vunta Kutchin are somewhat better known. Unfortunately it is difficult to abstract a coherent picture even for the Vunta Kutchin, however, for Osgood's (1936b) discussion is secondary to his account of the Peel River people while Balikci's (1963b) data are only recently collected. Tukkuth Kutchin territory is now unoccupied as all its former inhabitants have moved to Old Crow or elsewhere. Thus the following account is based primarily upon Vunta Kutchin data with relatively little mention of the Tukkuth Kutchin.

Aboriginal Subsistence Techniques

One of the aims of the present study is an analysis of the relative importance of various food resources available in the middle Porcupine region. While it is apparent that dependence upon a given resource varies with its seasonal availability, a full discussion of this aspect of the aboriginal subsistence economy should await the presentation of faunal analyses in Chapter VI. In this section I shall discuss techniques employed in the exploitation of most of the animals and some of the plants mentioned in the previous chapter. The order of presentation will parallel that chapter and will lead to a synthesis of the annual cycle.

Rangifer tarandus. Prior to white contact several kinds of communal and individual techniques were employed in the exploitation of caribou herds. The most important communal technique appears to have been the use of surrounds. Osgood (1936b: 25) has described the construction of a Tatlit Kutchin surround as follows:

> Posts about four feet high are set up in the ground to form an enclosure roughly circular in form. Between these posts, poles and brush prevent the caribou from escaping except through narrow openings about eight feet apart in which snares are set. One side of the surround is open and from this entrance stretch out two lines of posts ever widening like the mouth of a funnel. This projecting line of posts is not a fence, strictly speaking, but a series of poles set up six feet high and hung with moss to represent men so that caribou which have entered the trap will be afraid to run in any other direction except that which leads to the snare-set enclosure. Some of these surrounds are so large that the inner part is a mile and a half in diameter.

Balikci (1963b: 15-16) has described the "principal surround" of the Vunta Kutchin, which is located at the head of Thomas Creek, on the northwest margin of Old Crow Flats; he also adds other details of the use of this surround:

> The principal surround was situated south of the Firth River, at 68°38'N 140°48'W, and was owned and operated by a man called Thomas as late as the end of the last century. Despite the fact that for a long time the people had been using guns, Thomas' relatives still considered this traditional hunting method as profitable. The opening of the surround was about 30 yards wide. The corral had an oval shape, was very large, and was covered with hundreds of snares made of caribou skin *babiche*. Such a surround...., was built with poles obtained usually from the timbered valley nearby. Each surround was owned by a single individual, an elderly and experienced hunter, who was not necessarily the tribal chief. The hunting season was in September-October, when the herds were crossing the area and moving south or west. The people were scattered in small groups along the hills, each (separate) group attending to a surround under the leadership of the surround owner and organizer of the hunt. As soon as the herd approached, boys, men and women tried to run behind the caribou, imitating the cry of the wolf, and attempting to drive the herd towards the opening of the surround. Just beside the opening a few men armed with bows and arrows and spears lay in ambush, trying to wound some caribou as they passed the entrance. Once the herd was in the surround, spear hunters went in action; this is contrary to Osgood's description. Most of the caribou, however, were caught either in the external ring of snares, or in the snares placed inside the corral.

In 1967, W.N. Irving and I observed this surround from the air and confirmed Balikci's account through conversations with informants in Old Crow, among them Charlie Thomas, the grandson of the former owner of the surround. The following year Irving flew to a small lake about five miles south of the surround and walked throughout much of the vicinity in search of a camp which might have been located nearby. Several small camps were found and the surround itself proved to be an impressive piece of architecture. Extending from a semicircular enclosure were two straight parallel arms measuring about one-half mile in length and about 20-30 yards apart. These arms led to extensions of unknown length which ran in either direction diagonally away from the long axis of the surround. The main arms and the enclosure were constructed of poles about eight feet long and spaced only about four to five feet apart. These had probably been interlaced with brush and had stood upright though nearly all have now fallen down. The diagonal extensions were made of smaller poles more widely spaced, but I would estimate that as many as 10,000 poles may have been employed in the total construction.

Another noteworthy feature of the Thomas Creek surround is its relation to the physiography and vegetation of the area. The surround is located just south of the northern limit of trees in timber dense enough to have made it difficult to detect. The opening of the main arms lies low down at the mouth of a small tributary valley of Thomas Creek, and the arms run approximately north, crossing a low ridge midway to the enclosure. Animals entering the corridor between the two arms would not have been able to see the enclosure a half mile away over the ridge and would have gone too far into the surround to turn back upon seeing the trap.

Other surrounds have been reported for a number of localities around the northern rim of Old Crow Flats (Balikci 1963b: 15). I have been told of surrounds at the headwaters of Berry Creek and of Driftwood River, but neither Irving nor I have been able to locate them. During the summer of 1970, Irving found two surrounds near the headwaters of Black Fox Creek in the Sam Lake area (Irving, personal communication in 1970). One of these was characterized by straight fences within the enclosure, and these fences must have held snares which would have effectively entangled caribou milling about in a group. This internal snaring technique has been reported by informants in Old Crow who remarked that it prevented the animals from crashing through the walls of the enclosure (Welsh, personal communication in 1970). Other reports of surrounds in the vicinity of Timber Creek completé a picture of an intermittent distribution of these devices around the entire northern rim of the Flats.

It can well be imagined that the construction of such surrounds would be a major undertaking even now, and the possibility that they were once built with the use of stone adzes is an impressive testimony to the importance of the caribou and the effectiveness of this technique of capturing them. Some surrounds are reported to have facilitated the killing of as many as 400 caribou in a day (Murie 1935). On the other hand, we have not yet found conclusive evidence that the surrounds still visible in the Old Crow region were constructed prior to the introduction of the metal axe, and we must entertain the possibility that they were introduced early in the historic period to facilitate the supply of meat to white traders in the area. Since, however, the use of surrounds was made relatively ineffective by the introduction of repeating rifles, such a late introduction would restrict the period of their construction rather severely. General ethnographic evidence in Alaska and the Yukon suggests that such surrounds were in use in prehistoric times.

Straight-line fences equipped with snares, such as reported for the Natsit Kutchin and the Nabesna (McKennan 1965: 31; 1969; Murie 1935; 2-3; Allen 1887: 138), have not been described for the Vunta Kutchin. Temporary surrounds might, however, be constructed if a caribou herd was encountered in forested country in the winter (Balikci 1963b: 16). Snares were also placed along trails, independently of surrounds.

Another communal technique was used in winter, in the forested country south of the middle Porcupine.

> There the herds did not migrate extensively, but usually moved within a restricted area. After a small herd had been located by scouts, a number of hunters encircled the caribou, gradually narrowing the circle. The frightened animals could not cross the ring of bowmen. They were killed one after the other with bone pointed arrows (Balikci 1963b: 16).

Communal hunts at crossing places along the river probably took place mainly in the spring.

> The people, standing near their birch bark canoes, wait for the caribou at their habitual river crossing places. As soon as the animals show up, they are driven into the river, where they are quickly pursued by the fast moving canoes, and speared in the water with bone tipped lances (Balikci 1963b: 16).

Leechman (1954: 6) describes such a hunt in some detail; the locale he mentions has yielded several small collections of chipped stone artifacts catalogued as MjVk-3 in the National Museum of Man, Ottawa. Leechman (1954:6) reports:

> When the caribou entered the water, men would paddle a canoe right up on the animal's back, and let it rest there. At first the caribou would strike out with its forefeet to rid itself of the canoe but would then content itself with merely swimming faster. Through fear, the herd of caribou would spread a little, making a path for the one bearing the canoe, and the man armed with a spear with a caribou-antler point would stab the animals on each side of him.

Individualistic techniques include stalking and snaring as well as the use of a decoy (Osgood 1936b: 33; Balikci 1963b: 16-17; Leechman 1954: 6). The latter practice consisted of rubbing two spruce sticks against the antlers on a dried caribou head; the sound was meant to imitate that of a caribou rubbing its antlers against a tree and, along with the odor of the skin, attracted the animals to within range of the waiting bowman. Dogs assisted in the hunting of both caribou and moose, particularly in late winter when the snow was crusted hard enough to bear the weight of a hunter but not that of his prey (Osgood 1936b: 27, 127; Welsh, personal communication in 1970).

Alces alces. Balikci (1963b: 17) states that moose were "of secondary importance" among the Vunta Kutchin. The solitary habits of the moose preclude the use of communal techniques, and moose hunting is said to have been very difficult in pre-contact days. During the summer months moose could be snared or ambushed, sometimes with the use of birch bark canoes, around favored lakes, but the excellent sense of hearing enjoyed by the moose made the winter hunt "in cold and clear weather...a very hard task indeed" (Balikci 1963b: 17). Moose could be attracted during the rutting season by rubbing a moose scapula against willow branches to imitate the noise of antlers brushing against the brush (Osgood 1936b: 33; Balikci 1963b: 17). Osgood (1936b: 27) describes for the Peel River Kutchin a winter stalking technique which may have been used by the Vunta Kutchin as well (*cf.* Balikci 1963b: 17). I have seen no specific mention in the Vunta Kutchin literature of the advantage conferred upon a hunter on snowshoes when hunting moose on soft crusted snow (*cf.* McKennan 1965: 32).

It is possible that the "secondary importance" of the moose in aboriginal times is related to the former range of the species. Evidence of a recent northward expansion of the moose population was mentioned in Chapter III

(v. Anderson 1924). McKennan's Natsit Kutchin informants indicated that moose had only recently appeared in their territory and "said that for some years after the first appearance of these animals they were so rare that the killing of them was taboo" (McKennan 1965: 18). On the other hand, archaeological evidence indicates that at least a few moose were present in the region as much as 800 years ago.

Several relatively dependable moose hunting localities were mentioned in Chapter III; among these, the lower Bluefish River is in Vunta Kutchin territory, while the Johnson Creek and Whitestone River areas are in Tukkuth Kutchin territory on the upper Porcupine.

Ovis dalli. Balikci appears to contradict himself on the importance of Dall sheep to the Vunta Kutchin. His statement that Dall sheep "do not seem to have played an important part in the native diet" (Balikci 1963b: 8) is followed by a quote from Osgood to the effect that "Mountain sheep 'rank third in importance as [*sic*] food animal'" (Balikci 1963b: 17); the quote from Osgood (1936b: 27) refers to the Tatlit Kutchin, and Balikci's first statement is probably correct.

Other mammals. Balikci's references to Osgood's remarks on bears refer, again, to the Tatlit Kutchin, but Old Crow informants contributed some information for the Vunta Kutchin (Balikci 1963b: 17-18):

> Bears have traditionally played a relatively important role in the subsistence economy of the Vunta Kutchin... Old Crow informants agreed that hunting bears with traditional weapons required rare courage. When stabbing bears in winter a heavy club..., made of moose horn with sharp points all around, was used. After the bear had been wounded with the bow and arrows, the hunter took his spear...which was about 6 feet long and had a large steel blade, knelt down and placed its butt on the ground, and pointed the blade towards the throat of the charging bear.

Welsh (personal communication in 1970) has recently told me of a bear killing technique which was described to her in Old Crow and which she accepts with certain reservations. One man would wait above the entrance to a den while others entered to drive out the bear. As the bear left the entrance the waiting hunter would thrust a heavy pole along either side of its head. These poles would trap or at least delay the bear while the other hunters closed in for the kill, presumably using spears.

There are no data available concerning local wolf killing techniques, but it is said that wolves were too smart to be caught in the pitfalls designed for foxes and wolverines (Osgood 1936b: 34). These pitfalls were dug about five feet deep and four feet in diameter and were equipped with upright, sharp-pointed bones, about eight inches long, which were tied to stakes thrust into the bottom of the pits. Thin crusts of ice covered the top of the pit in winter, and the bait was placed on top of the ice (Osgood 1936b: 33-34). "The extensive use of deadfalls took place later, with the advent of the fur trade" (Balikci 1963b: 18).

"Rabbits were snared in numbers around the camp, [and] porcupine [were] clubbed and speared" (Balikci 1963b: 18). Muskrats were hunted in the spring before breakup; they were caught with hoop nets at their runways in the snow and were shot with blunt pointed arrows (Balikci 1963b: 18).

Details of capture techniques for other mammals are not available for the Vunta Kutchin. Arrows and snares were probably used for lynx, beaver, marten, mink, weasels, and squirrels; beaver may also have been netted.

Birds. Osgood makes no mention of birds in his discussion of the Vunta Kutchin, and Balikci (1963b: 18) merely remarks that "Game birds were usually killed with the bow and arrow, mainly in spring, while in winter ptarmigans were caught in snares." I have been told of the capture of moulting birds in late summer as well as of the use of duck eggs found in abundance in certain areas of Old Crow Flats; indeed there is an area in the northeast part of the Flats known as *tsdu-ho-kai* ("place where the ducks lay eggs").

Fish. Two kinds of fish traps have been described by Osgood and comprised the most productive means of taking fish. These traps were constructed in early summer, and their use continued through autumn even after ice began to form on the streams.

> The trapping places are only on the small tributary streams of the Porcupine River where the water is shallow enough to permit building weirs across the river, yet sufficiently strong to drive the fish into the traps (Osgood 1936b: 33).

The salmon trap was designed to intercept the upstream run of the salmon and consisted of a shallow V-shaped weir and a willow pole trap. The weir spanned the stream with the point of V upstream, and the trap was positioned just below one end of the weir along the bank; the fish would move back and forth along the front of the weir and were eventually guided to the trap (Osgood 1936b: 73, Fig. 15).

The sluice trap, on the other hand, was used for a month or two in late summer and was designed to catch pike, grayling, suckers, and other fish as they swam downstream. A V-shaped weir, with the point of the V downstream, spanned the stream but had an opening in the center which permitted entrance into the "sluice" which was closed on the lower end by a U-shaped willow pole basket trap; when fish filled the sluice its entrance was closed off, and the fish were driven into the trap and lifted from the water to a platform built out from the bank (Osgood 1936b: 74, Fig. 16).

Both the construction and the operation of such traps were communal activities, and fish camps of several families were established to carry them out. Balikci (1963b: 18) reports:

> Before construction work started, the men assembled to discuss the exact location of the trap, and the distribution of tasks. Usually over 100 stakes were required for such a weir, and sometime [*sic*] two sluices were constructed. The fish was shared among all the participants, and the size of each family was taken into consideration. The catch was placed in special wooden caches, about 10 feet long and 3 feet wide, lying on the ground. There was no fish trap superintendent: construction work, actual fishing and sharing were done through common agreement. Considerable amounts of fish, up to 2000 fish in a single night, were taken in this manner.

I have been told that the fish traps were owned, much as were the caribou surrounds, by a wealthy man who organized the labor for their construction and "ran" the camp associated with their operation, but this is not mentioned by Balikci or Osgood. Balikci (1963b: 18) reports that the last traps "were seen along Old Crow River about 40 years ago." We have sought in vain for signs of a trap and associated camp said to have been located near the mouth of Old Crow River where it was operated under the leadership of the great chief, Zzhe Gitlit, around the turn of the century (v. Leechman 1954: 13; C.P. Charlie, personal communication in 1970); river ice and water erosion may have erased the entire record. We have been directed to two fish trap sites in Old Crow Flats; the remains of both the trap and the camp were found at one of them

(NbVk-1), but only the camp was located at the other (MlVm-1).

Osgood (1936b: 72) reports the use of gill nets among the Vunta Kutchin; these were made of willow bark or fine caribou babiche. Individualistic techniques included spearing, with a three-prong leister or a toggle-headed bone spear, hooking, with composite bone and antler hooks, and the use of dipnets and gaffs (Osgood 1936b: 73-75).

Plants. Little need be said of techniques for exploiting plant resources, for they had but slight effect upon the annual cycle. Most species of plants, whether arboreal or nonarboreal, are available in many localities scattered throughout the region or, as in the case of spruce, are generally available nearly everywhere in the area. Spruce was the major tree sought for large-scale construction, and its roots, along with those of the willow, were important in the manufacture of lines (Osgood 1936b: 53, 72). The tree for which specific demands were most frequently made would appear to be the birch, and, since the species occurs only in small stands in certain habitats, the procurement of birch wood probably required more planning than that of any other species. Birch wood was prized for making bows, though willow served as a very poor substitute, and the former was required for snowshoes (Osgood 1936b: 72-73, 77). Canoes and containers were made of birch bark (Osgood 1936b: 51, 75), and fungus which grows on birch trees was valued as tinder for fires (Leechman 1954: 14).

Large spruce timber suitable for making log cabins is now becoming scarce in the vicinity of Old Crow, and dead, dry, standing spruce is valued as firewood for indoor stoves since it produces less ash than other species.

Edible plants, such as berries, certain roots, and rhubarb, etc., are available in many localities in the region, and their gathering may in the past have been more or less incidental to other activities. It would be difficult to learn whether the deliberately planned and extensive berry picking trips of modern days have prehistoric counterparts.

This brief review covers the principal and most productive techniques of the aboriginal subsistence economy of the Vunta Kutchin, but it cannot be said to be complete. We can hope that archaeological data will eventually help to expand this body of information, but it should suffice for the moment to organize these techniques into a network of seasonal activities comprising the annual cycle. Such a synthesis is essential as a framework for interpreting archaeological sites in this region since it can be shown that most sites are season-specific camps.

The Annual Cycle and the Development of the Fur Trade

The aboriginal annual cycle can be reconstructed in general terms from the information given above and from accounts which I have obtained from informants in Old Crow. Balikci's (1963b) discussion of the annual cycle begins with the period of post-contact change and does not include a description of the traditional pattern; Osgood (1936b: 31) simply remarks that the "cycle of the seasons is almost identical with that of the Peel River tribe."

The general pattern can most easily be abstracted from the communal techniques practiced in hunting and fishing. The spring season was the time of communal hunts at crossing places along the river; these hunts were designed to intercept the northbound caribou migration and took place at a number of suitable localities along the east-west stretch of the Porcupine River, between the mouth of Bell River and the mouth of Coleen River. Major camps are said to have been located on the river bank a few miles below high bedrock outcrops which afforded good lookout localities. Examples of such camps and lookouts found thus far include the large Klo-kut site (MjVl-1) and its associated lookouts (MjVk-2, MjVk-3) and two sites near the mouth of Rat Indian Creek (MjVg-1, MjVg-2). Other important spring camps may have been located at the mouth of Caribou Bar Creek (MiVn-2) and the mouth of Sunaghun Creek (MiVo-1), but these sites have thus far yielded only historic components.

Muskrat and bird hunting probably began in the late spring, both along the Porcupine and in Old Crow Flats, but major summer camps were located along tributary streams of the Porcupine and Old Crow Rivers where fish traps were set for salmon and other fishes. Two such camps (MlVm-1, NbVk-1) were mentioned above. Other summer activities included egg and berry gathering, rabbit snaring, and, in late summer, the capture of moulting birds.

By late August or early September it was time to move to the northern edge of Old Crow Flats to construct or to mend the caribou fences and, presumably, to establish nearby camps. The entire fall season, at least in the early historic period, was devoted to the operation of the surrounds and the butchering and storing of the meat. The Thomas Creek surround (NdVn-1) has already been described.

The winter season was frequently lean, and winter activities are hard to define; likewise, winter camps will probably be difficult to find because of incomplete burial and disturbance by meltwater. It is noteworthy, however, that informants at Old Crow insist that the population did not split up into small, one- and two-family units but remained together through the winter in larger groups clustered about the strong and able hunters who in the previous fall had led the operation of the surrounds. Such groups are said to have retreated to the hills along the south flank of Old Crow Flats where protected valleys provided shelter from the high winds and extreme cold of the lake-dotted, open areas. The upper reaches of Surprise and Potato Creeks have been mentioned as favorite winter locations, and the latter valley contains a place called Potato Hill where sizeable numbers of Kütchin are said to have spent the winter months.

Needless to say, individualistic techniques of hunting and fishing were employed in any suitable season and locality and would provide interesting and important embellishments on this overall pattern were the data available to describe them. Arctic char fishing on the Firth River may, for example, have been carried out by a family or two after leaving the fall camp at the caribou surround. Other hunters may have crossed the Old Crow Range in search of moose along the lower course of Bluefish River, while yet others may have visited the winter range of the caribou near Lone Mountain.

Balikci (1963b: 36-45; 55 ff.) has provided detailed descriptions of the changes which took place in subsistence techniques and the annual cycle following contact with Euro-Canadian agents and their material culture. Caribou surrounds continued to be operated for fifty years after the first rifles were acquired, but the opening of Cadzow's store at New Rampart House, in 1904, improved the supply of ammunition to an extent that allowed the abandonment of the surrounds. All hunting techniques became more individualistic as the rifle conferred much greater control over the caribou herds. The use of human surrounds was continued for a while, but only one or two riflemen were required to produce the same effect: a man, perhaps with a partner, could kill a caribou at the head of a herd and then another or two at the rear until he more or less surrounded the herd with a ring of dead caribou which those left standing hesitated to cross. "Employing this strategy, a single hunter once killed over 80 caribou. This gives some idea of the efficiency of the rifle" (Balikci 1963b: 38). Such techniques were employed on the Old Crow Range, along the southern edge of Old Crow Flats, during the fall, south-bound migration. Large meat camps were established on Old Crow Mountain and provided a major portion of the winter larder.

Winter caribou hunts near Lone Mountain became more frequent, and the meat was either brought back to Old Crow or was consumed on the spot in a temporary meat camp to which the entire family was moved. Greater mobility, required for such hunts, was available because of the augmented dog teams which developed in connection with the fur trade; aboriginally dogs were used primarily for packing and less for traction.

The spring hunt at the crossings on the Porcupine was abandoned because of trapping activities which took the hunters to Old Crow Flats in early spring. Trapping activities were always interrupted, however, by the passage of small herds of northbound caribou. The river crossing places saw action in the fall when the southbound migration was intercepted by hunters working individually in canoes.

> In brief, caribou hunting has been greatly simplified, individualized, and to a certain degree intensified, following the introduction of the rifle. This process is very similar to what has been already observed among the Eskimos. The complex collaborative forms involving traditional weapons have been abandoned, and the single hunter with his rifle is capable in all seasons of travelling to where caribou may be found and of killing a score. He is often accompanied by other hunters who want to benefit from a particular game concentration. This, however, does not involve any extensive organic collaboration between hunters under an organized leadership. Rather the group is composed of autonomous hunters, each of whom accomplish [*sic*] the same acts (Balikci 1963b: 39).

Moose, sheep, bear, and other animals are also more easily hunted with rifles than with traditional weapons. Moose, in particular, has probably become more important in the economy now that highly mobile hunters, in boats powered by outboard motors, can sight a moose on the river and overtake the animal before it reaches the shelter of the brush; and the rifle has made more effective the winter moose hunts on dog sleds pulled by large, fast teams.

Fishing technology was also transformed as a result of the introduction of nets. Though the fish traps continued to be operated in the first three decades of this century, they are now entirely replaced by nets which are owned and operated by nearly every family in Old Crow.

> Comparing the net with the fish trap, several informants asserted without hesitation that the fish trap was a highly efficient structure, but that still larger amounts of fish could be caught with the net over an extended period through several seasons. The total catch with the net was more evenly distributed in time. Moreover, the abundant dog salmon along Porcupine River could not be caught with the fish traps, and this is possible with the net. Thus the fishing net not only regularized and intensified the fish supply, but brought new species under man's control (Balikci 1963b: 40).

The fur trade brought about a number of basic shifts in the subsistence economy and in residence patterns. Traditionally the population appears to have been distributed in a number of camps, each of which was occupied by a number of families gathered together for some seasonal, communal subsistence activity. It is not now possible to say how many such camps may have been occupied simultaneously in a given season, but some of them may have been quite large. Their most salient feature was probably the seasonal nature of their occupation though some camps were occupied repeatedly in successive years.

The initial contact period began with the establishment of trading posts beyond the borders of Vunta and Tukkuth Kutchin territory. Fort MacPherson lay east of the Richardson Mountains, and Fort Yukon was located many miles to the west at the mouth of the Porcupine River.

In its first year of business (1847) Fort Yukon was visited by Vunta Kutchin (Murray [1910] refers to them as "Rat Indians"), but these visits entailed lengthy journeys which were made by only a few men. For fifty years, contact was restricted in this manner and probably had little effect upon the annual cycle and residence patterns; journeys to the distant posts were merely added to the activities of some of the men, but the gradual acquisition of European items prompted new aspirations, and furs began to take on new significance. Rapid and drastic change began in this century when new posts were established within Vunta and Tukkuth Kutchin territory. Cadzow opened his store at the site of New Rampart House in 1904, and, around 1906, apparently introduced the first steel traps used for taking muskrat (Balikci 1963b: 41). Ten years later World War I prompted a spectacular rise in muskrat prices (Slobodin 1962: 36), and the Vunta Kutchin entered a business which has continued nearly to the present day. "During the last forty years muskrat trapping has become the most important activity in the fur trading economy of the Vunta Kutchin" (Balikci 1963b: 41). Declining prices and increased opportunities for wage employment have reduced the importance of trapping during the past ten years, but it may again be revived; the people of Old Crow have begun to appreciate the risks involved in participating fully in a Western economy.

A number of stores, under a variety of managements, have been operated in Old Crow since 1912, and there have been brief periods of active trading at La Pierre House and Whitestone Village (Balikci 1963b: 35). Only the store at Old Crow remains today, but they all played a part in the growth of the fur trade and the increase of reliance upon the foods and manufactures of the Europeans.

As mentioned above, the impact of direct contact, especially of rifles, was manifest in increasing individualistic hunting practices, but this impact was also a factor of change in residence patterns and in every aspect of Vunta Kutchin culture. The rather scattered nucleated pattern of seasonal camps was gradually replaced by ever larger concentrations at the trading posts. The greater fire power of the rifle and the increased mobility afforded by larger dog teams and outboard motors made it unnecessary to move camp seasonally. Except for brief periods on extended hunting trips or long trap lines, and except for a spring sojourn to Old Crow Flats for muskrat, it now became possible to settle in Old Crow or some other such community for extended periods of time; at the very least these communities served as permanently established base camps. More recently the establishment in Old Crow of a school, a mission, a nursing station, and an RCMP detachment has led to the abandonment of all other settlements on the middle and upper Porcupine (Welsh 1970), so that all Vunta and Tukkuth Kutchin in the region now call Old Crow their home.

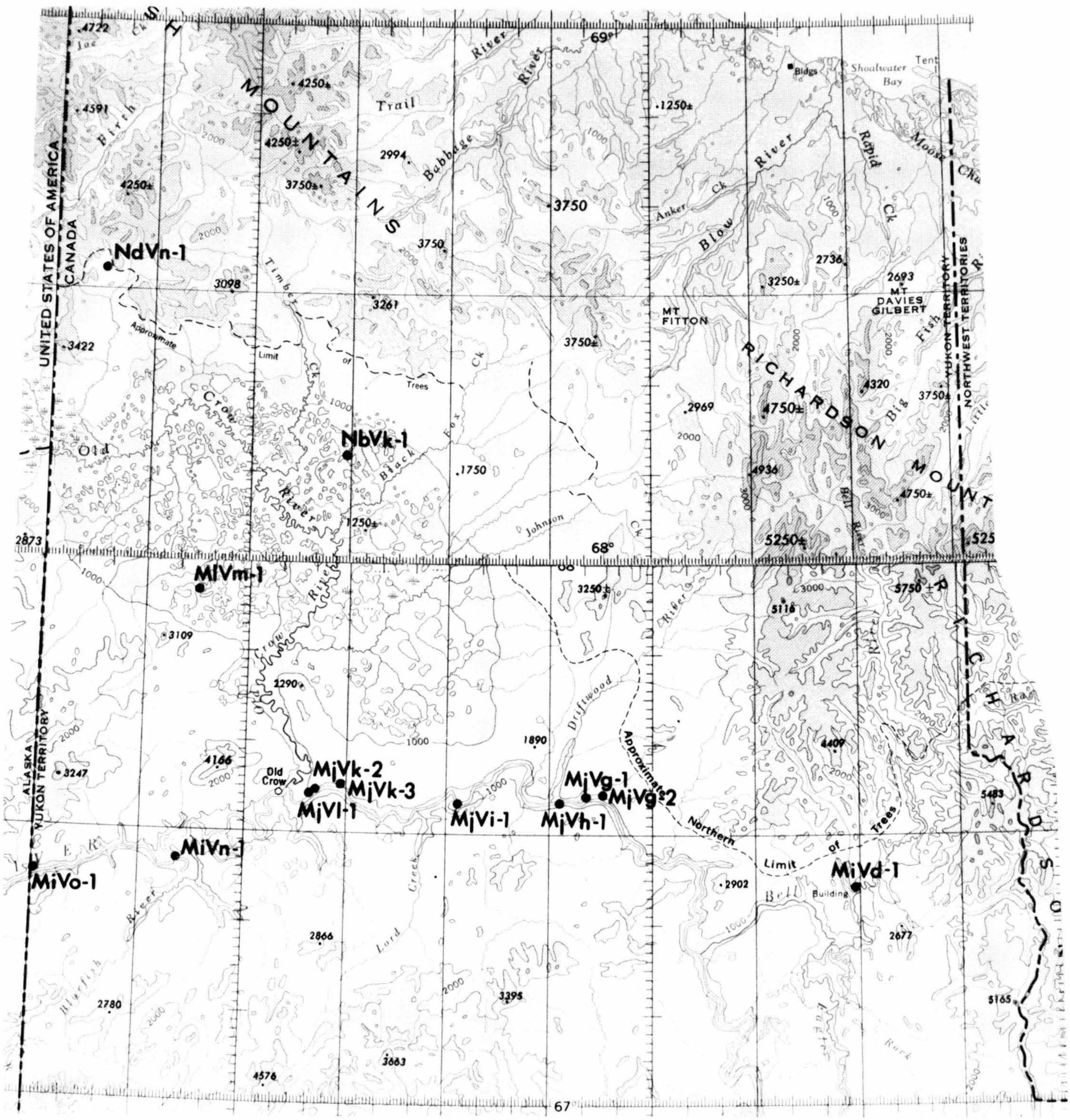
Balikci (1963a, 1963b) and Welsh (1970) have provided much fuller discussions of these changes, and their data can be expected to serve as a framework for interpreting the many interesting historic sites which can be found in the middle Porcupine region. These sites will, in turn, add important details to our knowledge of the contact period in northern Yukon Territory and should provide a basis for linking the modern inhabitants of the region with the record of their prehistory.

V. KLO-KUT: MATRIX ANALYSIS

General Description

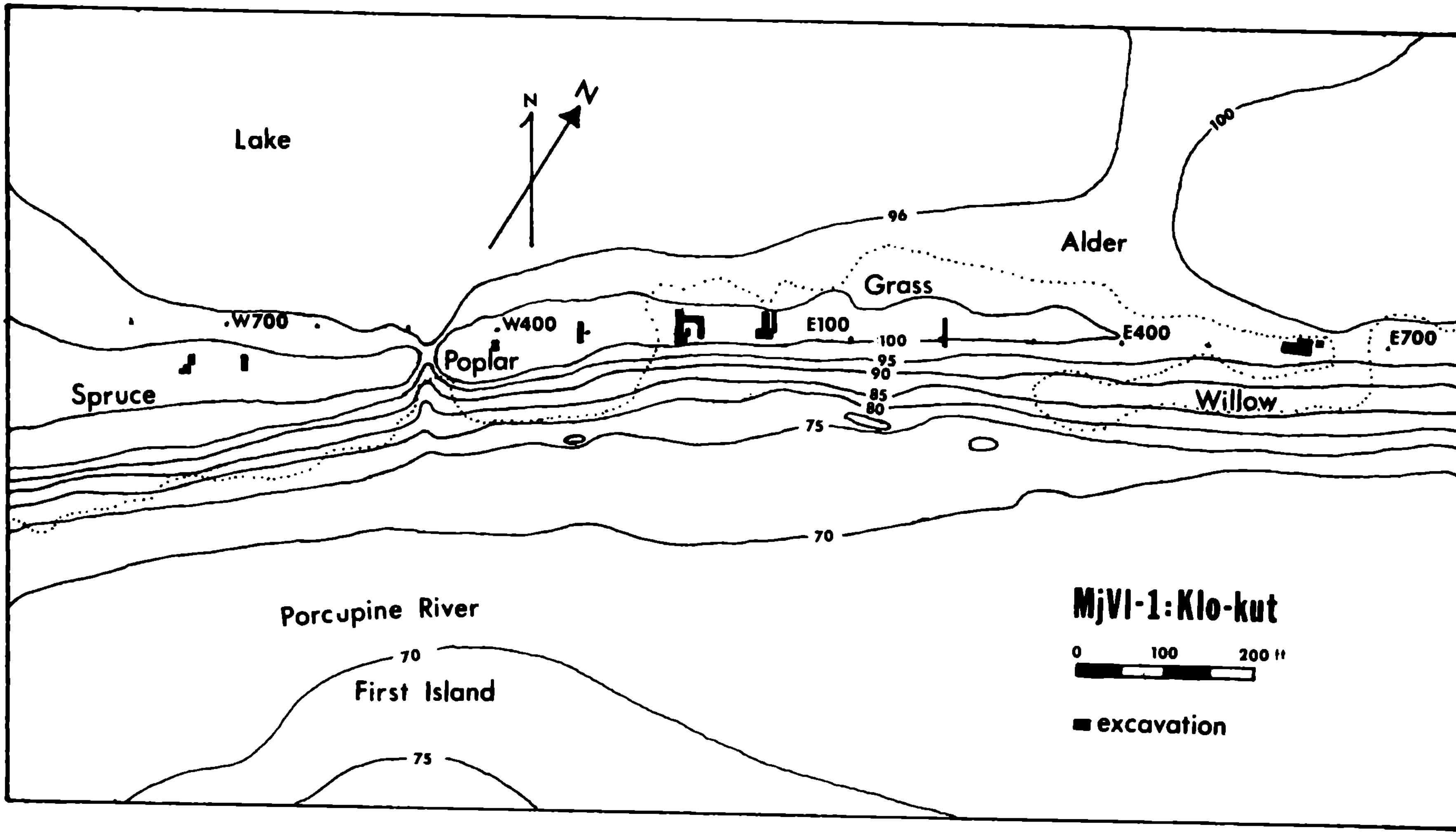
Six seasons of survey and excavations by W.N. Irving, D. MacLeod, J. Cinq-Mars, and me have led to the discovery of about two dozen sites in the middle Porcupine region. The largest and most important of these sites has been named Klo-kut, a Kutchin Indian word meaning "grassy place" or "place with lots of grass." This site was known to many Indians in Old Crow as a former major village occupied seasonally by their great-grandparents in the late 19th century. The site had earlier been tested by Gordon Lowther, but Irving's tests in 1965 led to the recent excavations.

Klo-kut is located on the right bank of the Porcupine River, about 6 river miles above Old Crow, at $67^{\circ}34'$N x $139^{\circ}41'$W. (Map 1; Fig. 2). The site is clearly visible from the river as well as from the air as the "grassy place" represents an obvious interruption of the otherwise rather continuous forest cover along the bank (Map 2; Fig. 3). This grassy clearing is about 700 feet long and 50 feet wide and marks the location of the most recent area of intensive occupation by man. The clearing was produced



Map 1. Topographic map of the middle Porcupine drainage, showing the locations of major sites in the region. Based upon National Topographic Survey sheets Nos. 106 & 116 and Nos. 107 & 117. Scale 1:1,000,000. National Museums of Canada Neg. No. 72-9161.

Fig. 2. The Klo-kut site (MjVl-1), as seen from First Island in the Porcupine River.
National Museums of Canada Neg. No. 71-4636.



Map 2. Topographic map of the Klo-kut site (MjVl-1). National Museums of Canada Neg. No. 72-8277.

Fig. 3. The grassy clearing after which Klo-kut was named
National Museums of Canada Neg. No. 71-4642.

by forest clearance during the late occupations, the recency of which has precluded reestablishment of the forest. To the west of the grasses is a pure stand of *Populus* some 400 feet in length which appears, on the basis of tree diameters, to be expanding eastward into the west end of the clearing. A small outlet stream, from a lake behind the site, borders the west end of the *Populus* grove, and mature spruce forest, with its local mixtures of alder, poplar, and birch, appears around the stream and westward across and beyond the site. A dense alder thicket occurs at the northeast corner of the clearing, and spruce forest extends eastward along the bank. This zoning of the vegetation is controlled primarily by edaphic conditions, some of which were produced or augmented by human occupation; the presence of the site, as well as the broad outlines of its recent history, can be inferred in general terms from these vegetation patterns.

The physiography of the locality also has an important bearing upon the history and development of the site. For some 10 miles upstream the right bank of the river is comprised of a high bluff which represents the northernmost position of the channel, while the river periodically leaves a comparable bluff on the left bank which is locally composed of more recent alluvial sediments. About 1½ miles above Klo-kut the channel makes a southward bend of about 40^{o}, and soon thereafter, at a prominent bedrock outcrop one mile above the site, the right bank bluff ceases to form the right bank and gradually extends further inland until it is truncated by the easternmost meanders of the Old Crow River valley. The prominent bedrock outcrop one mile above the site apparently is a resistent formation which has maintained a deflection of the stream away from its former right bank. At the position of Klo-kut the right bank bluff is about 300 yards behind the modern right bank, and the intervening area is occupied by a triangular lake with its apex at an outlet stream which crosses the site. Muskeg extends east and west from the ends of this lake, bordered on the north by the bluff and on the south by the spruce forest along the modern bank. The lake and similar ones in the vicinity appear to be remnants of the former channel of the river which have been isolated by the development of alluvial levees built up by successive flooding and surface stabilization.

In front of the site is a long, low, flat island, about one mile long at low water, which further protects the site from erosion; at all but the highest water levels the main channel is south of this island. Spring flooding and breakup, however, still raise the water level above the island, and the gouging action of floating ice masses appears to be the major erosional force presently acting upon the site. At extreme low water the island is joined to the right bank along a broad area which includes the entire length of the main site area.

Erosion by water and ice has exposed profiles 6-8 feet thick along the bank, and lenses of bone, fire-cracked rocks, artifacts, and hearths can be seen in these profiles where they have not been covered by vegetation The site has been constructed by successive floods which deposited alluvial sediments of variable texture on surfaces which had stabilized long enough for vegetation to become established. These stabilized surfaces are represented in the profiles by an increase in organic matter, giving them a darker color than the adjacent matrix, and evidence of human occupation is associated almost exclusively with these dark bands. As each flood increased the height of the bank above the channel, it must have required increasingly severe floods to deposit new units of sediment. The present surface of the site is nearly 30 feet above the summer low water level, and even the widespread and severe flooding of August, 1967 (when Fairbanks, Alaska, was devastated), failed to reach the surface of the site, though the water rose to within one foot of the surface. Twenty feet or more of this elevation is comprised of a sloping basal gravel which walls the channel itself, but the gravel is surmounted by some ten feet of layered fine sediments which make up the matrix of the site. The contact of the basal gravel and fine sediments is neither flat nor uniform, and its topographic profile should aid considerably in understanding the early stages of the site's construction; this facet of the sedimentology will require further study, and it must include an examination of the relationship between the lake and the gravel/sediment contact.

For archaeological purposes the characteristics of the sediment cap are more relevant than those of the larger sedimentological system. In this chapter I shall discuss those data which fall under the heading "matrix analysis". This includes the description of (1) the sediments, with reference to the profiles exposed by the excavations, and their relationship to the excavation levels; (2) the subdivision of the profiles into analytical units; (3) the description and interpretation of features which have developed in the matrix as a result of both human and natural agencies; and (4) the evidence for dating. This matrix analysis will proceed independently of and provide a framework for the description and interpretation of the collections which have been extracted from the matrix. The collections will be described in Chapter VI. A brief description of the excavations to date will provide background for the discussion of the matrix.

Excavation

In 1965, W.N. Irving excavated two small test pits as well as a larger 10' square. The results of these tests convinced him of the need for a full season of excavation for which he returned in 1966. The southeast corner of the 10' square was established as main datum (0/0) (Map 2), and an east-west baseline was laid out parallel to the bank; this provided a north-south line with a declination of about 70° west of magnetic north, about 35° west of true north. An iron pin was driven as a permanent datum reference at 0/E25, and this point was assigned an arbitrary elevation of 100 feet for mapping purposes. The site was mapped with a transit by D. MacLeod who included the clearing and the beach in his map but did not attempt to extend the map into the forested parts of the site. The grid system was divided into blocks 100 feet long, both east and west of datum; sets of 250 catalogue numbers were assigned to each 100-block in which an excavation was made, and a distinctive area of the site at the east end of the clearing (in the E600 and E700 Blocks) was set aside as Area 1A with its own series of catalogue numbers.

The 1966 excavations included six 5 X 10 foot pits in the W100 block as well as a deep slit in the side of the bank in an unsuccessful attempt to reach the basal gravel. In the East 100 Block, immediately adjacent to main datum, four and one half 5 x 10 foot pits were excavated; narrow test trenches were placed near E60 and E200. A major excavation in Area 1A included eight 5 X 10 foot pits. Permafrost was encountered about 30" below the surface in each of these excavations, and the combination of frost and meltwater caused termination of the excavations at about four feet.

In the W100 and E100 excavations Irving found a consistent pattern of four major layers (1-4), some of which were subdivided (1, 1A, 4A-D), as well as numerous minor layers. The 1A area proved to be distinctive stratigraphically and was removed in ten layers (1-10), none of which was subdivided; this was a major reason for separating the area for cataloguing and control.

During two weeks in August, 1967, I opened two trenches at the site as a supplement to Irving's survey activities in order to familiarize myself with the stratigraphy and to prepare for a full season of excavation. One of these trenches consisted of three 5-foot squares in the W100 Block, and the other, also three 5-foot squares, was located in the W700 Block, in the spruce-covered area of the site. Both trenches were left open during the winter, and work in the W700 Block was continued and expanded to five squares in 1968. The latter and a three-square trench in the W600 Block were controlled by means of a secondary datum (D2) which was later measured into main datum at S71'2"/W643'11".

Also in 1968, new excavations were opened in the W400 Block (two squares), the W300 Block (five squares), the W100 Block (five squares), the E100 Block (five squares), and Area 1A (five squares). Permafrost was encountered at 24-30" below the surface (B.S.) in the clearing, but in the forested parts of the site frost lay within 10-12" of the surface. Nonetheless the W400 and W700 excavations were taken to depth of 4½ feet before the combination of frost and meltwater made drainage of the trenches impossible.

In my excavations of 1967 and 1968, I decided to take a new approach to the stratigraphic profiles and to seek a basis for correlating my interpretations with Irving's. Our 1968 trench in the W100 Block formed a direct link between my 1967 trench and Irving's 1966 excavation and served to clarify the relationship between our separate profile descriptions. The 1A area, on the other hand, was excavated in terms of the same units that had been used in 1966, because the sedimentary units are much more discrete in that area than in other parts of the site. These profiles will be described in detail in the following section.

The combined results of two seasons of testing and two seasons of more extensive excavation are a total of about 6800 $ft.^3$ of excavated sediment. Three major excavated areas and six smaller trenches have been spread over a distance of 1400 feet of continuous deposits in which finely stratified sediments produce bone and other evidence of human occupation throughout a four foot profile. These excavations have sampled all these major vegetation zones with the W700 and W600 Blocks in the spruce covered area (Fig. 4), the W400 and W300 Blocks in the poplar grove (Fig. 5), and W100, E100, E300 and Area 1A in the grassy clearing (Fig. 6). The site extends considerably beyond these sampled areas, both upstream and downstream, for a total length of about 3/4 of a mile, so it can fairly be said that our effort has amounted to little more than a test of the site; I believe more extensive excavations would be justified.

Stratigraphy

The basic outline of the stratigraphy of Klo-kut can be described in terms of three large zones: A, the surface soil, underlain by a well developed buried soil and from one to four less well developed buried soils; B, a sandy loam unit capping stratified silt loam which is underlain by a silty sand; and C, a series of at least eight buried soils separated by silty clay loams and clay loams to an unknown depth. These three zones can be identified quite readily throughout the site, and this basic outline serves as a framework for more refined correlations of individual buried soils.

It must be made explicit that these "buried soils" are not horizons which have undergone extensive pedogenesis. They are "soils" in the sense that they represent stabilized surfaces on which vegetation developed and in which

Fig. 4. General view of the excavation in the W600 Block at MjVl-1.
National Museums of Canada Neg. No. 71-4564.

Fig. 5. General view of the excavation in the W400 Block at MjV1-1.
National Museums of Canada Neg. No. 71-4519.

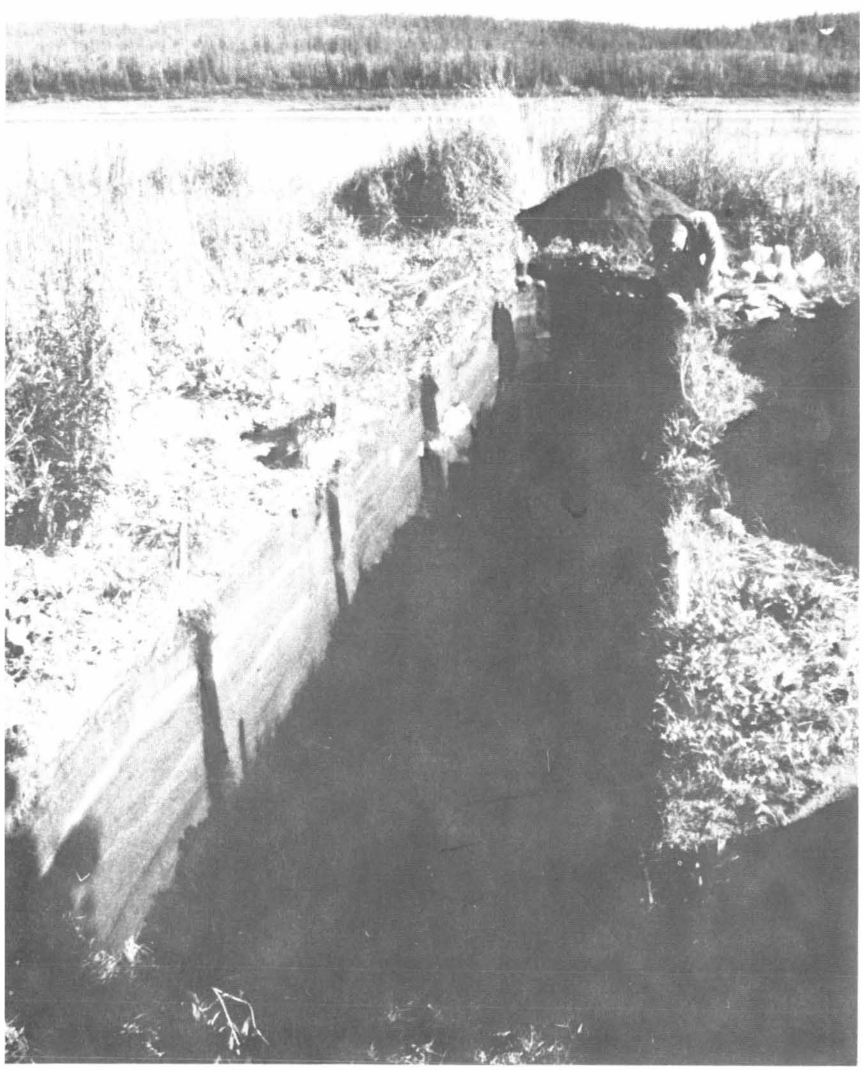


Fig. 6. General view of the excavation in the
E100 Block at MjVl-1.
National Museums of Canada Neg. No. 71-4599.

organic matter accumulated through a cycle of plant succession and alluviation. To some extent their thickness may reflect the duration of their stability between floods, but this thickness probably was affected by the nature of the local plant community and may therefore be unreliable as a tool for calibrating the profiles. Furthermore the thickness of a given soil exhibits rapid lateral variation ranging from a very thin band mapped as a line in the profiles, to a zone as much as three inches thick. In some areas two soils appear to merge with one another since the alluvium deposited by the flooding of the lower one was not of uniform thickness. Though all the layers in these profiles are generally flat-lying, there are slight, but perhaps important, changes in local topography from one soil to the next; no forest floor is perfectly flat and smooth.

In order to simplify the stratigraphic description of the site and to avoid unnecessary repetition, three profiles have been selected for separate presentation, and other trenches will simply be correlated with very little comment. The three selected profiles have been chosen on the basis of their locations and distinctiveness. The west end of the site is represented by the W600 Block, the center of the site by the W100 Block, and Area 1A (E600-700 Blocks) will represent the east end of the site.

W600 Block

The profile from the W600 Block (Fig. 7) is represented by the drawing in Fig. 8 and is described in Table 6. The description is based upon the east wall of the D2:N10/E60 square; this is the only locality for which extensive, systematic, soil sampling has been done. Even here the sampling is not adequate, however, for there are many instances in which the very thin buried soils were not properly sampled. As a result the data for organic matter content and other characteristics are not as complete as they should be. The organic matter percentages, phosphorous and potassium abundance, and pH were measured in a soils laboratory in Madison, Wisconsin. Texture classes are based entirely upon field texturing. Colors were described in the field with reference to a Munsell color chart, and all are based upon moist conditions. All the samples represented in Table 6 were collected during the excavation from the trowelled floor of D2:N10/E60.

The following abbreviations which appear in Tables 6-8 are based upon the recommendations outlined in the Soil Survey Manual (USDA 1951: 139):

Fig. 7. Stratigraphic profile of the south wall of D2: N10/E60, W600 Block. National Museums of Canada Neg. No. 71-4560.

Table 6. Description of the stratigraphic profile in Trench D_2: E60 (W600 Block)
See Fig. 8 for profile drawing of this trench

Profile Unit Nos.	Texture; Name	Color	pH	OM%	Pppm	Kppm	Depth Inches B.S.	Level	Layer		Zone
1	01 and 02 horizon						0-1		I		A
2	sil with rootlets	dark grayish brown (10YR4.5/2)	6.8	22	900	1000	1-5	1			
3	sil BS1a	dark reddish brown (5YR2/2)							II		
4	sil	very dark greyish brown (10YR3.5/2)	7.1	46	950	680	5-6	2			
5	sil BS1b	dark reddish brown (5YR2/2)									
6	sil	dark brown (10YR3.5/3)	7.0	13	600	400	6-8	3	a	III	
7	sil BS2	very dark brown (10YR2/2)	7.0	16	875	475	8-9	4			
8	fsl	brown (10YR5/3) with fld yellowish red (5YR4/6) mottles	7.3	10	555	500	9-10				
9	sil BS3a	very dark brown (10YR2/2)					10-11	5			
10	si: locally contains very thin dark brown soil (BS3b)	very dark grayish brown (10YR3/2)							b		
10/11	fsl BS4	very dark brown (7.5YR2/2)	7.4	13	500	400	11-12	6			
11	lfs	grayish brown (10YR5/2) with clf yellowish brown (10YR5/8) and gray (10YR6/1) mottles	7.5	8.6	540	250	13-15				
12	sil BS5a	very dark grayish brown (10YR3/2)									
13	lfs	cf. 11	7.7	2.6	450	250	15-16	7			
13/14	sil BS5b present only locally	very dark grayish brown (10YR3/2)									

Table 6 (Continued)

Profile Unit Nos.	Texture; Name	Color	pH	OM%	Pppm	Kppm	Depth	Level	Layer	Zone
14	fsl	very dark grayish brown (10YR3/2) with pale brown (10YR6/3) and yellowish brown (10YR5/8) sand grains	7.6	7.0	475	260	16-19	8	IV	B
15	gsl	dark gray (10YR4.5/1) with pale brown (10YR6/3) sand grains and c1f dark brown (7.5YR4/4) mottles	7.8	4.6	550	250	19-21	9	IV	B
16	sil	dark gray (10YR4.5/1) with c2f dark brown (7.5YR4/4) mottles	8.0	7.1	485	380	21-23	9	IV	B
17	gfsl	dark grayish brown (10YR4/2) with pale brown (10YR6/3) sand grains and f1f strong brown (7.5YR5/8) mottles	8.1	5.0	900	260	23-24	10	V	B
18	sicl	dark gray (10YR4.5/1)					24-25	10	V	B
19	lfs	dark brown (7.5YR3/2) patched with dark grayish brown (10YR4/2)					25-27		V	B
20	lfs OL	black (10YR2/1)	8.0	11	440	260	27-27½	11	VI	C
21	sil	gray (10YR5/1) with m2f dark brown (7.5YR3/2) mottles	8.1	7.4	475	300	27½-28½		VI	C
	cl: contact with sil is light gray (10YR7/1) line	dark gray (10YR4.5/1)	8.0	7.6	500	300			VI	C
	l	dark gray (10YR4.5/1) with m2d dark reddish brown (5YR3/4) mottles	8.1	6.3	575	300	28½-31	12	VI	C
22	l OL	black (10YR2/1)					31-31½	13	VI	C

Table 6 (Continued)

Profile Unit Nos.	Texture; Name	Color	pH	OM%	Pppm	Kppm	Depth	Level	Layer	Zone
	1	dark gray (10YR4.5/1) with m2d dark reddish brown (5YR3/4) mottles					31½-32			
	sicl	black (10YR2/1)	8.1	8.2	500	260	32-32½	14		
23	sicl	dark gray (10YR4.5/1) with cld dark reddish brown (5YR3/4) mottles					32½-33			
	cl : thinly lensed with loam and two black lines OL	dark gray (10YR4/1) with flf dark reddish brown (5YR3/3) and yellowish red (5YR5/8) mottles	8.1	9.0	750	300	33-34			
								15		
	sic	dark gray (10YR4.5/1) with cld yellowish red (5YR5/8) mottles	8.1	5.9	500	400	34-36			
24	sicl OL	black (10YR2/1)	7.6	34	700	300	36-36½	16		
	sicl	dark gray (10YR4.5/1.5) with mlf reddish brown (5YR4/4) mottles	7.9	9.2	515	375	36½-37		VII	C
25	1	very dark grayish brown (10YR3/2) with yellowish brown (10YR5/8) and light gray (10YR7/1) sand grains	7.8	8.3	440	260	37-38			
26	sicl OL	very dark gray (10YR3/1)	7.8	15	500	400	38-40	17		
27	sic	very dark gray (10YR3.5/1) with few oxidized dark reddish brown (5YR3/4) joints					40-41			

Table 6 (Continued)

Profile Unit Nos.	Texture; Name	Color	pH	OM%	Pppm	Kppm	Depth	Level	Layer	Zone
28	sicl OL	black (10YR2/1)	7.4	36	600	400	41-42	18	VII	C
	sicl (low OM)	dark gray (10YR4/1) with yellowish brown (10YR5/8) and light gray (10YR7/2) sand grains	7.6	6.1	600	400	42-43			
	sicl (high OM)	same as above	7.6	22	600	400	43-44			
29	sic OL	black (10YR2/1)	7.5	47	525	350	44-45	19		
	sic	dark gray (10YR4/1)	7.7	10	500	300	45-46			
30	sic OL	black (10YR2/1)						20		
	sic	dark gray (10YR4/1)					46-47			
base	sic OL	black (10YR2/1)					47	21		

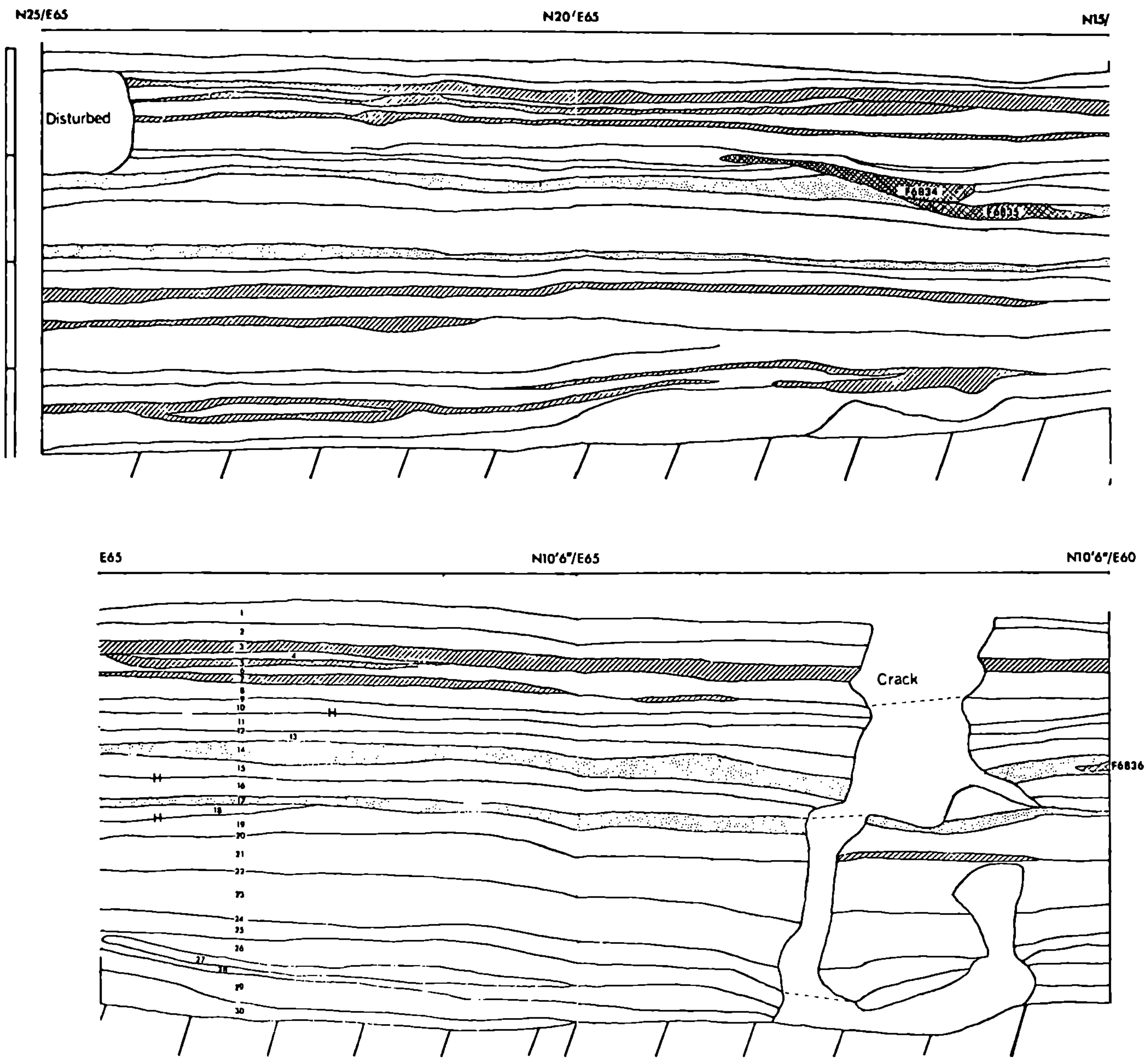


Fig. 8. Stratigraphic profile of Trench D2: E60 (W600 Block).
National Museums of Canada Neg. No. 72-8271.

Texture: lfs, loamy fine sand
sl, sandy loam
fsl, fine sandy loam
gsl, gravelly sandy loam
gfsl, gravelly fine sandy loam
l, loam
gl, gravelly loam
si, silt
sil, silt loam
cl, clay loam
sicl, silty clay loam
sic, silty clay
c, clay

Mottling: abundance: f, few; c, common; m, many
size: 1, fine; 2, medium; 3, coarse
contrast: f, faint; d, distinct; p, prominent
e.g., fld, few fine distinct mottles

The buried soils of Zone A are numbered as buried soils (BS), but those of Zone C, for ease of reference, have been called organic lines (OL).

As seen in Fig. 9 the pH values begin near neutral in the modern soil and increase steadily to alkaline at a depth of 20" B.S.; alkaline values continue to a depth of 35" where a return toward neutrality is evident near the base of the excavation. These values show no obvious

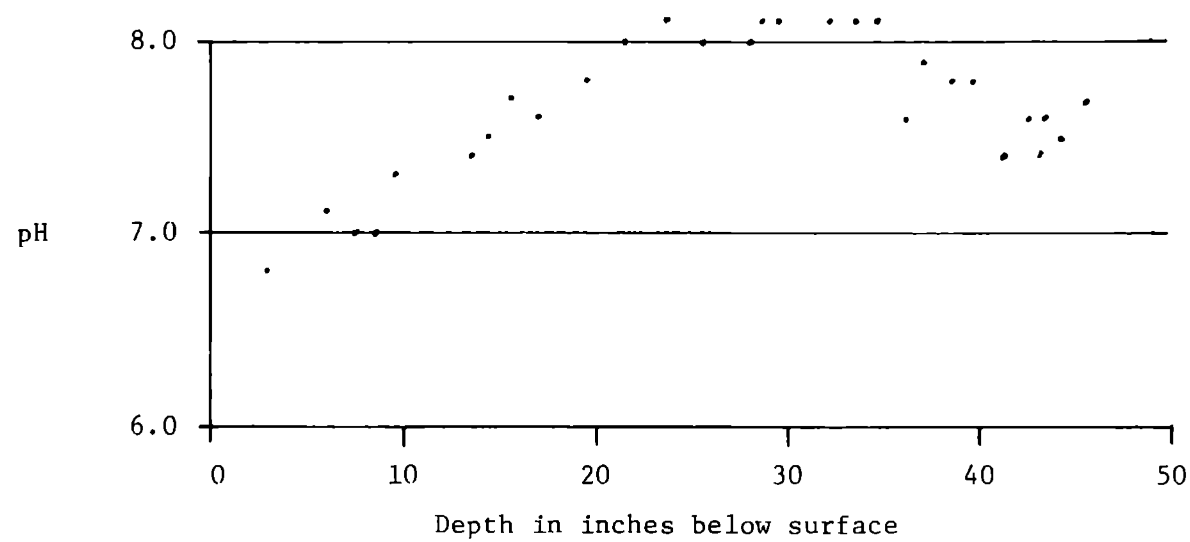


Fig. 9. Variation of pH with depth in Trench D2: E60 (W600 Block).

relation either to the location of buried soils or to the distribution of human occupation. Rather they appear to be related to the more general processes of leaching and alternate freezing and thawing which govern the profile as a whole. As would be expected, the relatively acidic values occur near the surface where humic acids are still entering the soil from decay of the 02 horizon. One might expect the sandy sediments of Zone B to provide the most alkaline values in the profile since there is little evidence of well developed plant cover in that zone. In turn slightly more acidic values could be expected in Zone C where numerous, better developed buried soils attest to more stable conditions over longer periods of time associated with more complete vegetation cover. Indeed the shape of the curve conforms to this expectation, but there is a downward displacement of the expected values by about 6-12". Perhaps this displacement is the effect of a leaching process which has gradually modified the profile as it has developed. I hasten to add that this suggestion is speculative and should be tested by a competent pedologist or sedimentologist.

The buried soils of Zones A and C have been identified on the basis of their dark color, and their distribution is shown in Table 6. That this dark color is a result of the accumulation of organic matter is apparent

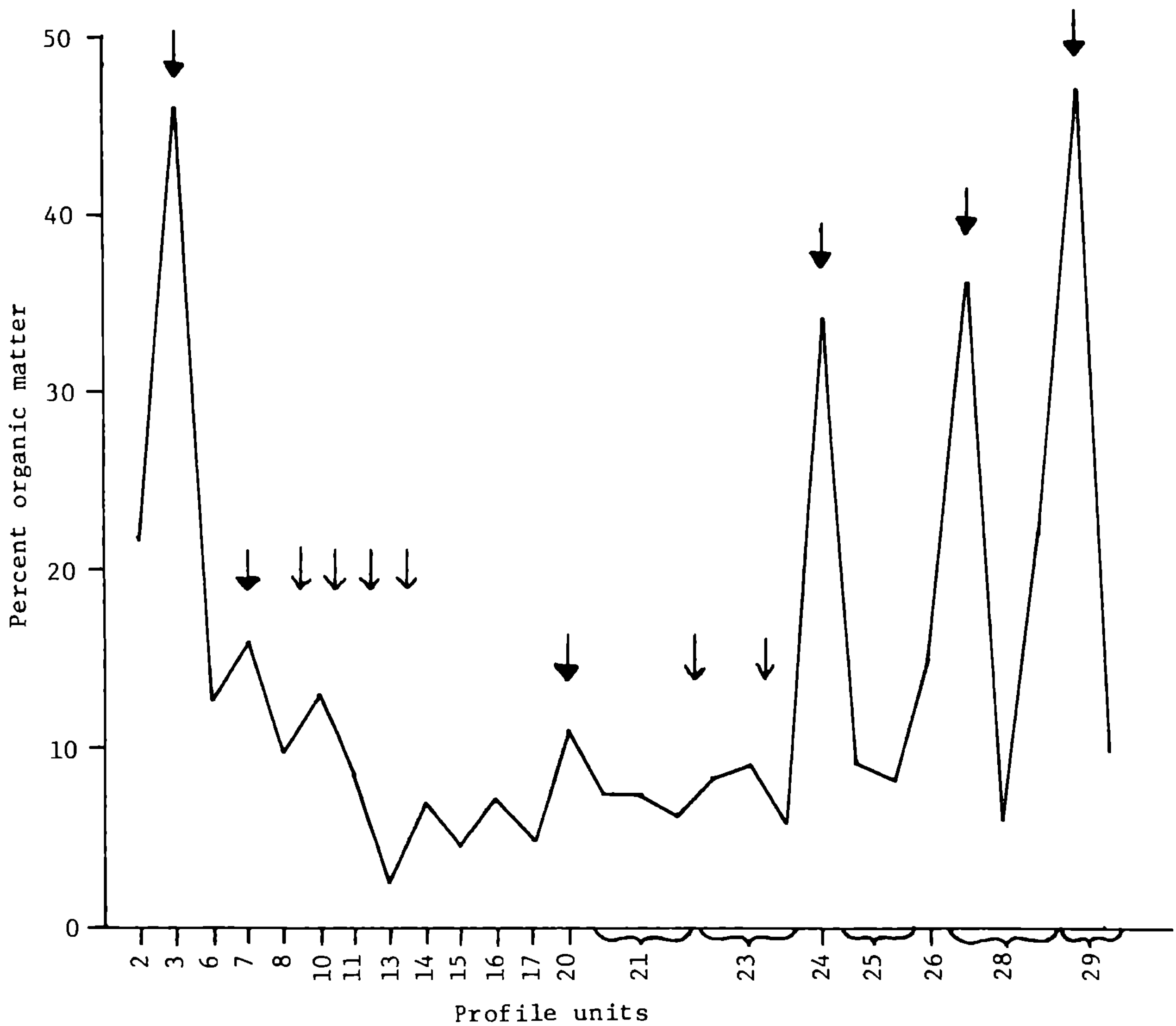


Fig. 10. Variation of organic matter content in the profile units of Trench D2: E60 (W600 Block). Arrows with solid heads indicate buried soils represented by a sample; arrows with open heads indicate the positions of buried soils not properly sampled.

from both Table 6 and Fig. 10, but it is regrettable that not all the soils were adequately sampled. Where sampling is adequate in the present data, such as in profile unit nos. 4, 7, 20, 24, 28, and 29, the difference between the organic matter content of the soils and the surrounding matrix is often quite marked. No attempt has been made to determine through chemical tests whether the source of this organic matter is natural plant cover or human occupation, but the presence of unworked fallen timbers, rooted tree stumps, spruce cone fragments, *Populus* seed pods, and scattered wood fibers on many buried soils suggests that natural plant cover is responsible for most or all of this accumulation. A general diffusion of organic matter into sediment units adjacent to the soils, as in profile unit nos. 6, 8, 10, and the lower part of 28, takes the form of very fine, local lensing and is probably a result of stirring up the surface as floodwaters first entered the site to bury each of the underlying soils.

The phosphorous and potassium data are rather difficult to interpret. It is my understanding that the phosphorous content provides an indication of the abundance of decaying bone in the sediment, and two of the highest values in Fig. 11 (profile unit nos. 4 and 7) are indeed associated with horizons which were very rich in bone.

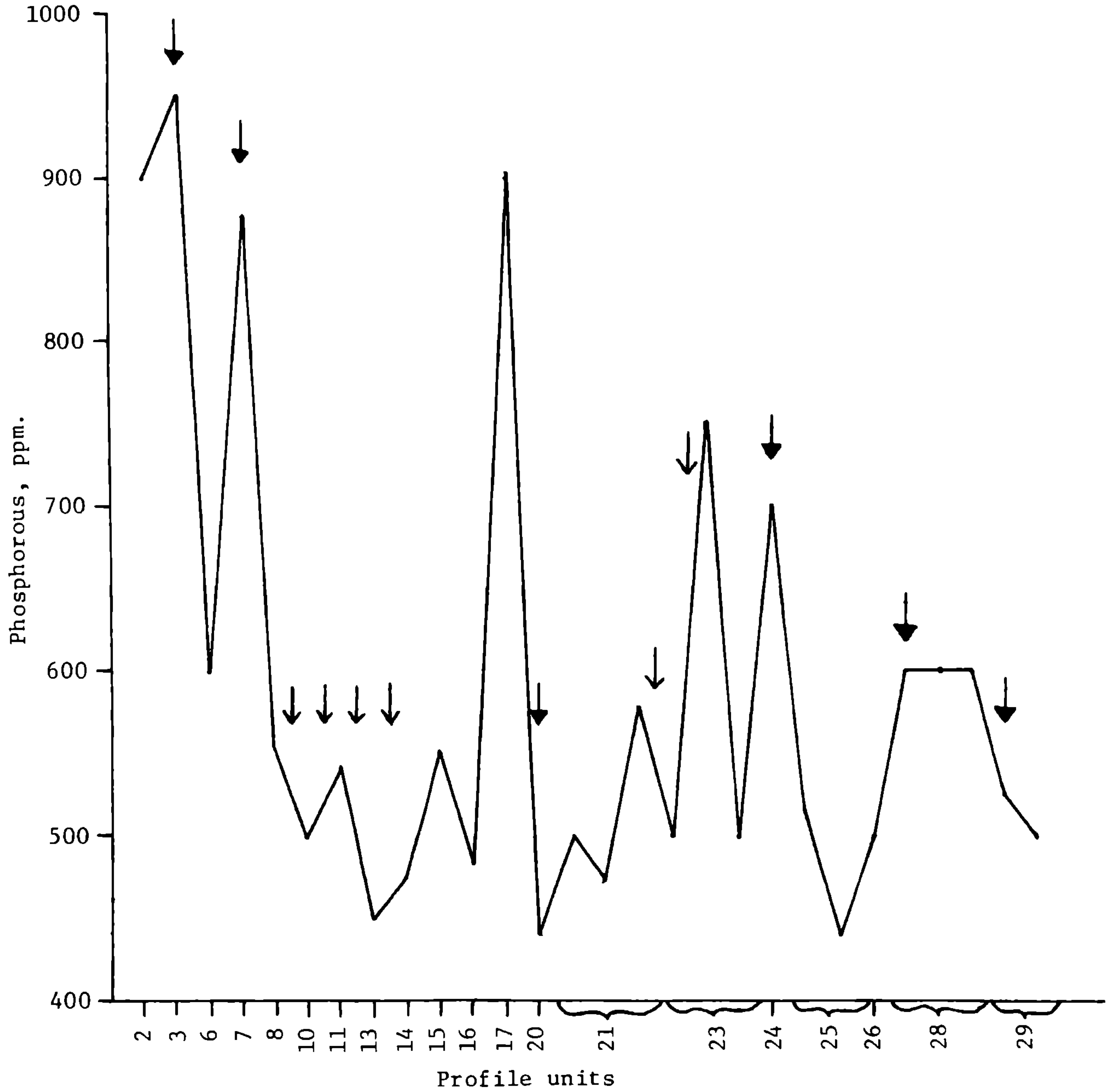


Fig. 11. Variation of the abundance of free phosphorous (P) in the profile units of Trench D2: E60 (W600 Block).

Bone was not particularly abundant, however, in the other two horizons with notably high values (profile unit nos. 2 and 17). On the other hand the entire range in Fig. 11 is between 400 and 1000 ppm whereas a sample from a bone-filled pit, F6833, yielded a phosphorous value of 5000 ppm. Perhaps the variation of the values for the general matrix is not significant as an indicator of the abundance of bone.

Potassium values ranged between 200 and 1000 ppm (Fig. 12), and are supposed to indicate the abundance of decaying wood in the sediment. Only the modern soil and the first buried soil (profile unit nos. 2 and 4) produced values which stand out from the remainder of the samples; the latter fluctuate within a rather low 300 ppm range. By contrast a number of samples from hearths yielded values in excess of 1000 ppm with one feature exceeding 5000 ppm in its most intensively burned area. This suggests that the presence of charred wood influences the abundance of available potassium and that the occurrence of uncharred wood is not accurately measured by this test. Once again the general matrix data do not provide significant variance for internal analysis but may be useful in understanding the origin of some of the features in the site.

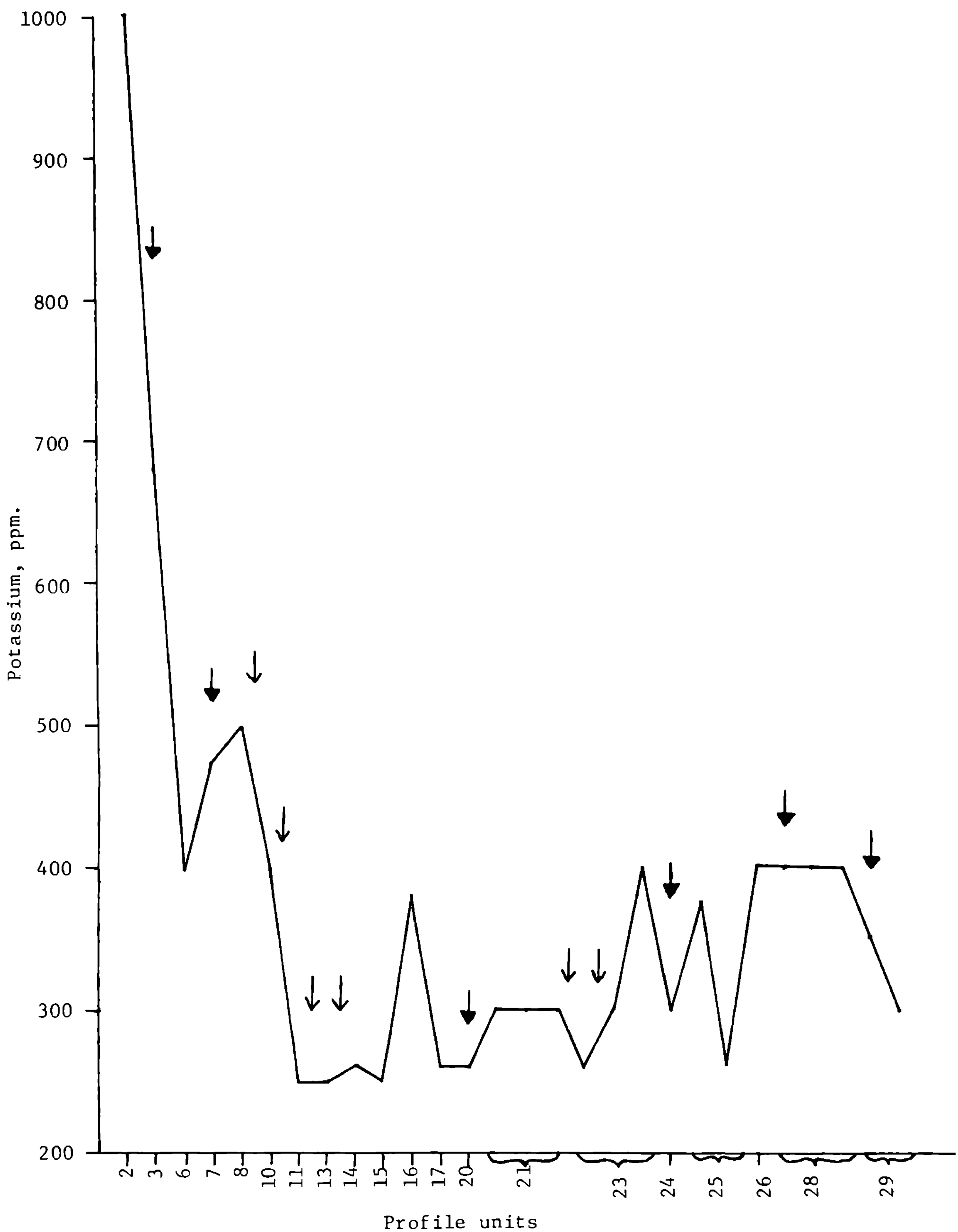


Fig. 12. Variation of the abundance of free potassium (K) in the profile units of Trench D2: E60 (W600 Block).

In general the W600 Block is noteworthy for its well developed soils in Zone A. Five buried soils were quite easily isolated in the excavation, and two of them were subdivided locally. They were distributed throughout the relatively fine sediments of Zone A with the fifth one immediately above and sometimes in contact with the fine sandy loam unit of Zone B. Furthermore, as will be seen in later chapters, they were quite productive of both bones and artifacts. In contrast the soils of Zone C were relatively poorly developed. None of them had mappable thickness throughout the length of the profile, and none were as productive as elsewhere on the site. Presumably this is evidence not only of less intensity in the early occupations of this area of the site but also of the likely reason for such lower intensity; more poorly developed soils may reflect relatively unstable surface conditions with poor drainage being a likely factor in discouraging the growth of timber and the occupation by man. This suggestion must be developed into a hypothesis which can be further tested in the field.

W100 Block

A second detailed profile description is taken from the W100 Block and is based upon the north wall of N15/W95 (Table 7, Figs. 13-14). The basic similarity between this profile and that from W600 should be obvious,

Table 7. Description of the stratigraphic profile in Trench N15 (W100 Block). See Fig. 13 for profile drawing of this trench.

Profile Unit Nos.	Texture; Name	Color	pH	OM%	Pppm	Kppm	Depth Inches B.S.	Level	Layer	Zone
1	sil	black (10YR2/1.5)					0-1	1A	I	A
2	sicl	very dark brown (10YR2.5/2)					1-2	1B		
3	sicl BS1	black (10YR2/1)	6.3 6.8	47 50	4500 1600	1150 1000	2-3	2	II	
4a	sicl	very dark grayish brown (10YR3/2)					3-5	3		
4b	sicl sicl	black (10YR2/1) very dark grayish brown (10YR3/2)					5 5-7	4	III	
5	sl: associated with black (10YR2/1) line at base and gravel lens in N15/W80-85	very dark brown (10YR2.5/2) with brownish yellow (10YR6/8) and yellow (10YR8/8) sand grains	7.8	31	450	280	7-9	5	IV	B
6	sicl	very dark grayish brown (10YR3/2)					9-13			
7	sic	very dark brown (10YR2.5/2)	8.1	6.3	450	300	13-15			
8	lfs: basal contact is a mottled light gray surface (10YR7.5/2.5)	very dark grayish brown (10YR3/2) with black (10YR2/1), very pale brown (10YR8/3), and yellowish red (5YR4/8) sand grains	8.3	3.5	500	275	15-17½		V	
9	gl	dark grayish brown (10YR4.5/2) with c2d yellowish red (5YR4/8) mottles					17½-19	6		

Table 7 (Continued)

Profile Unit Nos.	Texture; Name	Color	pH	OM%	Pppm	Kppm	Depth	Level	Layer	Zone
10	lfs: lenses out near W85; present only east of that area	very dark grayish brown (10YR3/2) with yellow (10YR7/8) and yellowish red (5YR4/8) sand grains							V	B
11	cl: upper contact is black (10YR2/1)	very dark grayish brown (10YR3/2)	8.1	7.1	700	275	19–22	7	VI	C
12	sicl O.L.1: lower contact stained dark reddish brown (7.5YR2/2)	black (10YR2/1)	7.9 7.9 8.2	28 35 25	900 700 650	350 250 350	22–23	8		
13	sicl	very dark brown (10YR2/2)					23–26	9		
14	sicl O.L.2	black (10YR2/1) and dark reddish brown (7.5YR2/2)					26–28	10	VII	
15	sl	very dark gray (10YR3/1) with yellowish brown (10YR5/8) and very pale brown (10YR8/4) sand grains	8.1	8.5	500	375	28–30			
16	sicl O.L.3	black (10YR2/1) lenses associated with very dark grayish brown (10YR3/2) sicl								
17	l	very dark grayish brown (10YR3/2) with few very pale brown (10YR8/3) and many yellowish red (5YR4/8) sand grains								

Table 7 (Continued)

Profile Unit Nos.	Texture; Name	Color	pH	OM%	Pppm	Kppm	Depth	Level	Layer	Zone
18	sicl O.L.4	black (10YR2/1) stringers forming a wide diffuse band interlensed with very dark grayish brown (10YR3/2) sicl, occasionally narrowing to a compact double band of black/ brown/black								
19	cl	very dark gray (10YR3/1.5) with flf olive brown (2.5Y4/4) mottles								
20	sic O.L.5	black (10YR2/1), distinct narrow band from W100 to W83, becoming brighter with two black (5YR2/1) bands separated by a narrow band of very dark gray (10YR3.5/1) sic							VII	C
21	sic	very dark gray (10YR-2.5Y3/1)								
22	sic O.L.6	upper dark reddish brown (5YR2/2) and lower black (5YR2/1) bands, both with high OM, separated by a dark olive gray (5Y2.5/2) band with low OM								
23	c	very dark gray (5Y3/1) with cld strong brown (7.5YR5/6) mottles								
24	c O.L.7	two distinct black (10YR2/1) bands, both with high OM, in very dark gray (5Y3/1) clay								

Table 7 (Continued)

Profile Unit Nos.	Texture; Name	Color	pH	OM%	Pppm	Kppm	Depth	Level	Layer	Zone
25	c	very dark grayish brown (10YR3.5/2) with mlf olive (5Y4/3) mottles							VII	C
26	c O.L.8	black (10YR2/1), very high OM								
27	c	very dark brown (10YR2/2), with very little OM								

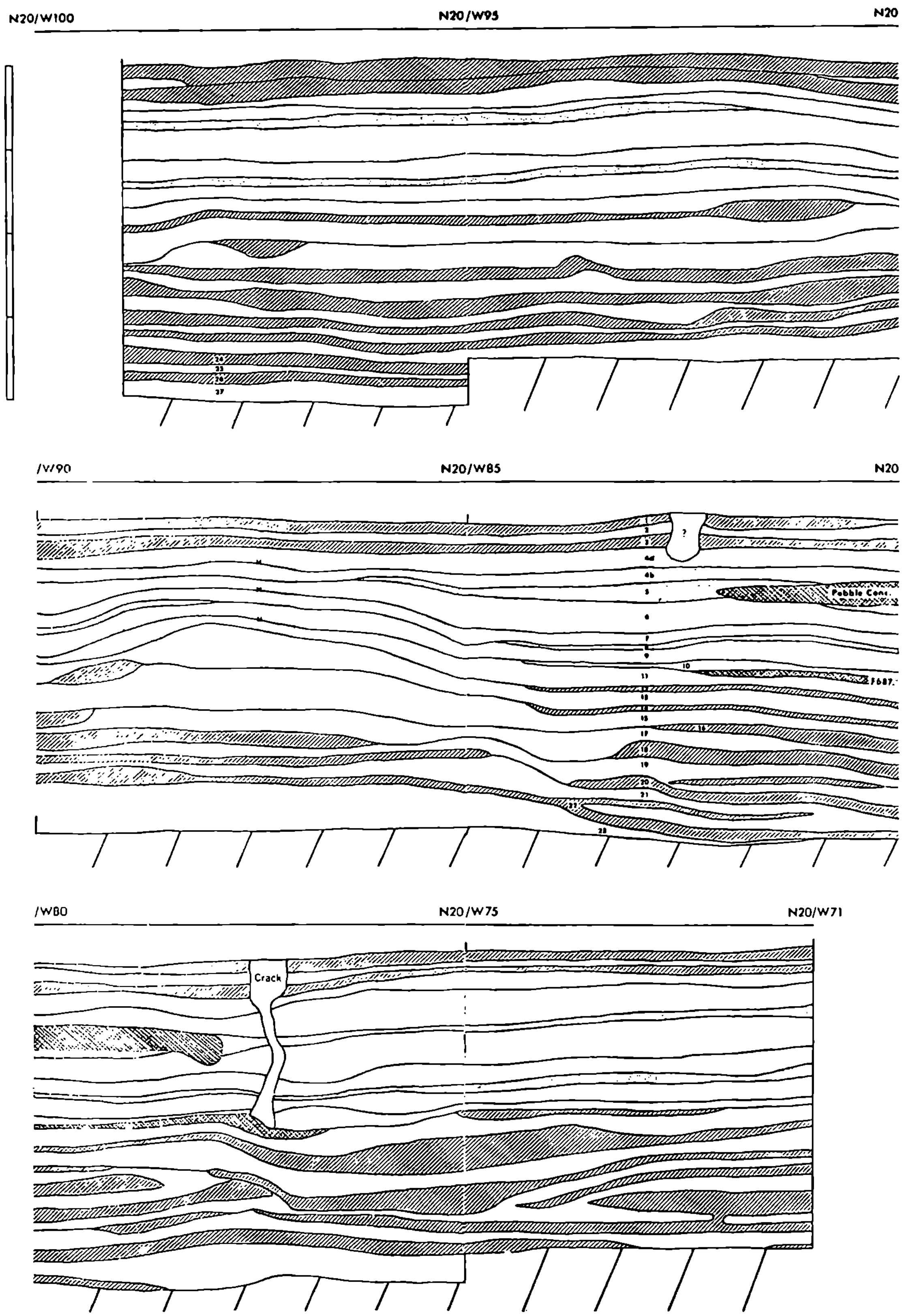


Fig. 13. Stratigraphic profile of Trench N15 (W100 Block).
National Museums of Canada Neg. No. 72-8270.

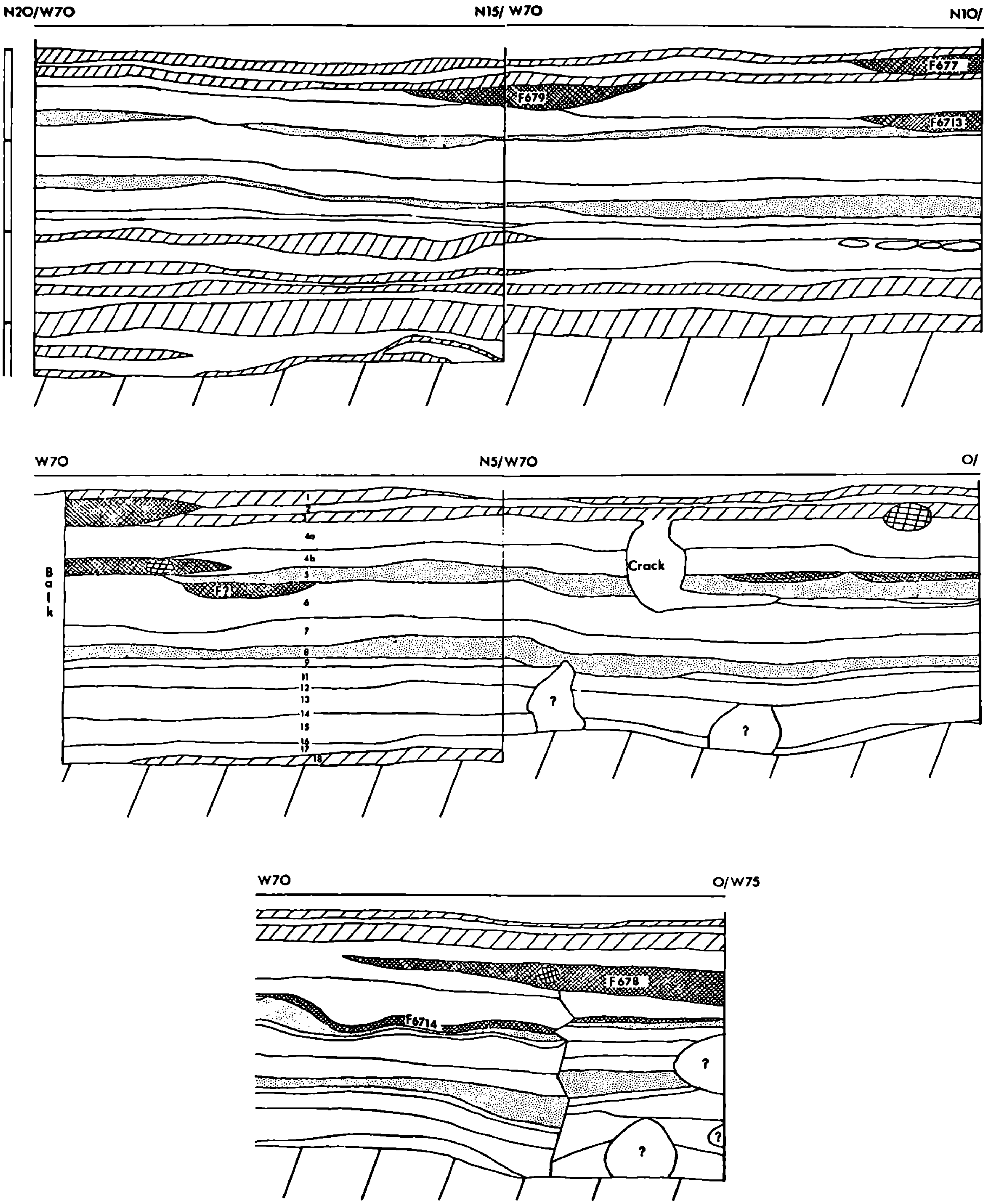


Fig. 14. Stratigraphic profile of Trench W75 (W100 Block). National Museums of Canada Neg. No. 72-8275.

but Zone A is reduced to only a half foot in thickness, as compared to 1½ feet in W600, and contains only one well developed buried soil. The soils of Zone C are very well developed in W100 and are extemely rich in organic matter; in the lower part of the zone the exposure of these normally frozen soils releases a strong and rather unpleasant odor of rotting vegetation. Systematic soil sampling has not yet been done in this part of the site, but the few data available so far are quite similar to those from W600. The uppermost buried soils of Zones A and C, respectively, stand out sharply in organic matter content, and that of Zone A also produced very high values for P and K (Table 7). A major surprise was the high organic matter content of the sandy loam unit at the top of Zone B; the sample probably included a thin black stringer which locally occurs at the lower contact of the sandy loam. A lens of gravel and pebble-size stones, about 5 feet in diameter and 4" thick, occurred at N15/W80 and may represent an ice-rafted feature. Several similar features are present on the modern beach in front of the site; these are represented as low, elongate domes or ridges on the site map (Map 2).

Area 1A

A third detailed profile description was made at Area 1A on the basis of both the north and south walls of Sq. 4 (Table 8, Figs. 15-16). This E600-700 area was

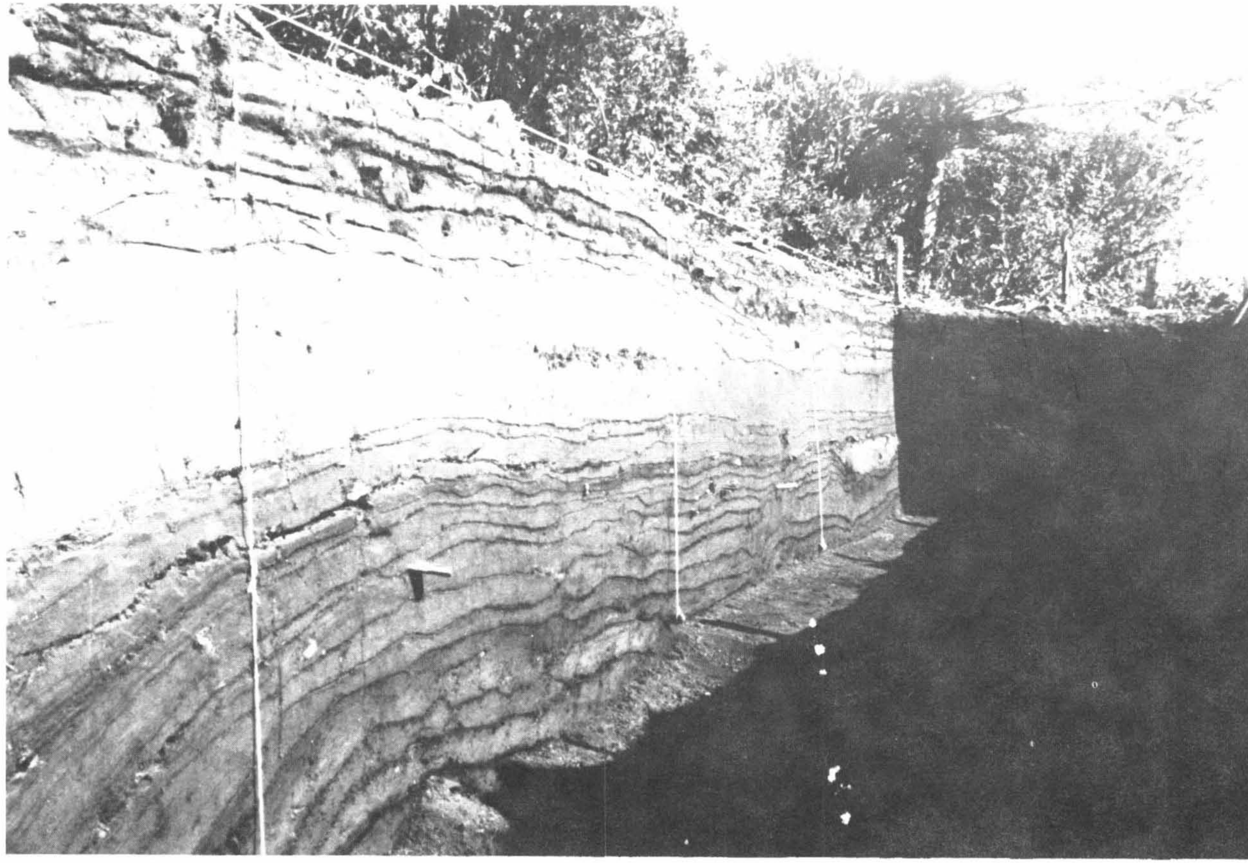


Fig. 15. Stratigraphic profile of the north wall of the 1968 trench in Area 1A. National Museums of Canada Neg. No. 71-4569.

Table 8. Description of the stratigraphic profile in Area 1A (E600-700 Blocks). See Fig. 16 for profile drawing of this trench.

Profile Unit Nos.	Texture; Name	Color	Depth Inches B.S.	Level	Layer	Zone
0	disturbed surface with backdirt of previous excavations			0	I	
1	sil	very dark gray	0-2"			
2	sil BS1	black (10YR2/1.5)	2-4	1	II	
3	sil	very dark grayish brown (10YR3.5/2.5)	4-5	2		A
4	sil BS2	black (10YR2/1.5)	5-$5\frac{3}{4}$			
5	sil	very dark grayish brown (10YR3.5/2.5)	$5\frac{3}{4}$-$6\frac{1}{4}$		III	
6	sicl BS3	black (10YR2/1.5)	$6\frac{1}{4}$-$6\frac{1}{2}$	3		
7	sicl	dark grayish brown (10YR4/2)	$6\frac{1}{2}$-$7\frac{1}{4}$			
8	sicl BS4	black (10YR2/1.5)	$7\frac{1}{4}$-$7\frac{1}{2}$			
9	l	dark grayish brown (10YR4/2) with few dark brown (7.5YR3/2) sand grains	$7\frac{1}{2}$-$10\frac{1}{2}$			
10	l	black (10YR2/1.5)	$10\frac{1}{2}$-$10\frac{3}{4}$			
11	l	dark grayish brown (10YR4/2) with few dark brown (7.5YR3/2) sand grains	$10\frac{3}{4}$-$11\frac{3}{4}$	4	IV	
12	sicl	very dark gray (10YR3/1.5)	$11\frac{3}{4}$-$14\frac{3}{4}$			B
13	cl	dark gray (10YR4.5/1) with mlf dark reddish brown (5YR3.5/4) mottles	$14\frac{3}{4}$-$17\frac{1}{4}$			
14	l	black (10YR2/1.5)	$17\frac{1}{4}$	5		
15	gl	dark gray (10YR4/1) with flf dark reddish brown (5YR3/4) mottles	$17\frac{1}{4}$-$18\frac{1}{4}$		V	

Table 8 (Continued)

Profile Unit Nos.	Texture; Name	Color	Depth	Level	Layer	Zone
16	sicl	black (10YR2/1.5)	$18\frac{1}{4}$	6	VI	C
17	sicl	very dark gray (10YR3.5/1) with flf dark brown (7.5YR3/2) mottles	$18\frac{1}{4}$-$20\frac{3}{4}$			
18	sicl	black (10YR2.5/1.5)	$20\frac{3}{4}$-$22\frac{3}{4}$	7		
19	l	dark grayish brown (10YR4/2) with flf dark reddish brown (5YR3/3) mottles	$22\frac{3}{4}$-$24\frac{3}{4}$			
20	c	dark gray (10YR4/1.5)	$24\frac{3}{4}$-26		VII	
21	cl	black (10YR2/1)	26	7A&/or 8		
22	cl	dark gray (10YR4/1.5), **with** little OM	26-30			
23	cl	dark gray (10YR4/1.5), with high OM	30-$31\frac{1}{4}$			
24	cl	very dark gray (10YR3.5/1.5), with little OM but containing bands with high OM	$31\frac{1}{4}$-$37\frac{1}{2}$			
25	cl	black (10YR2/1)	$37\frac{1}{2}$-$38\frac{1}{4}$			
26	c	very dark gray (10YR-2.5Y3.5/1), containing many black (10YR2/1) lines	$38\frac{1}{4}$-45			

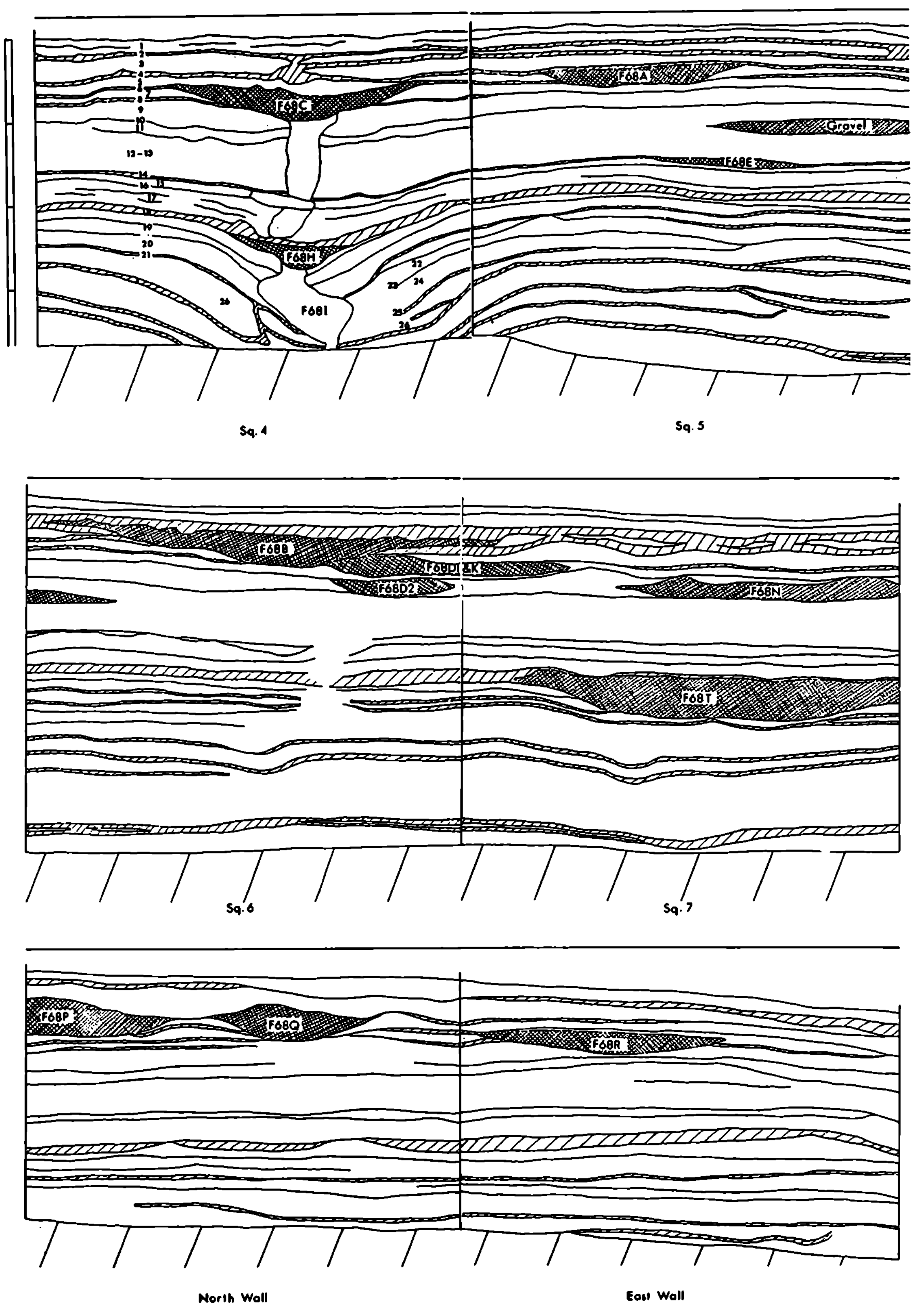


Fig. 16. Stratigraphic profile of Area 1A, 1968 trench. National Museums of Canada Neg. No. 72-8272.

assigned a separate catalogue because of its marginal location, unusually high productivity, and distinctive stratigraphy. The basic stratigraphic framework is similar to that of the rest of the site, but the buried soils in this area are better defined and more discrete. Four buried soils can be isolated in Zone A, though they are contained in only the upper 8" of the profile, and Zone B contains a rather well developed productive soil which is elsewhere very thin and relatively unproductive. The soils of Zone C are well defined but quite thin. There has been no soil sampling in Area 1A thusfar.

A concentration of pebbles and cobbles, similar to that in the W100 Block, was found in square 5 and square 6. This may also represent an ice-rafting phenomenon.

W700 Block

The other profiles from the site can be correlated with the three described above. In the W700 Block a trench 60 feet west of the W600 profile revealed only two well developed buried soils in Zone A but numerous well developed soils in Zone C (Morlan 1971: Figs. 9-10). This is just the reverse of the situation at W600 and illustrates how rapidly these sediments can change laterally. Chemical data have been obtained for only one general matrix sample at W700; the first buried soil of Zone A has pH of 6.4, 33% organic matter, 4000 ppm phosphorous, and 380 ppm potassium. These data are generally comparable to those for the same horizon in Tables 6 and 7.

W400 Block

The W400 Block trench consisted of only two pits and produced very complicated stratigraphic problems. A number of cracks and other disturbances caused dipping and off-setting of the layers, and a large bone-filled feature which occupied the eastern one third of S15/W305 truncated most of the soils of Zone C in that area. All four walls of the trench were profiled in order to aid the interpretation of the locality (Morlan 1971: Fig. 11). The west wall of the trench reveals well developed soils in Zone C, but only the uppermost buried soil of Zone A is well developed and thick. The sandy loam unit at the top of Zone B undergoes marked variation in thickness. The disturbances marked "Crack" in this and other profiles appear to represent tension cracks which likely are related to frost activity. They form polygonal patterns in some cases and are associated with off-setting or faulting of the sedimentary layers in many examples; generally they do not seriously affect the excavation because the characteristics of each layer are sufficiently distinctive that a given sediment unit may be removed on both sides of a crack even if offsetting has occurred. Most of the cracks are filled with loose sediment, bone, fire-cracked rock, and occasional artifacts; needless to say, the contents of a crack are isolated from those of the undisturbed matrix. Two areas marked "Disturbed" (Morlan 1971: Fig. 11) require further study, but

Fig. 17. Stratigraphic profile of the east wall of the 1968 trench in the E100 Block. National Museums of Canada Neg. No. 71-4598.

they differ from the "Cracks". These two areas were filled with more compact matrix, but the sediments were quite heterogeneous as if they had been mixed. The truncation of the disturbances suggests that they represent "fossil cracks" which would have been active during the later part of Zone C. They do not, however, possess all the characteristics of fossil ice wedges.

W300 Block

The W300 Block profile (Morlan 1971: Fig. 12) shows very little disturbance, and there were two well developed soils in Zone A and several in Zone C. Marked variation in thickness characterizes the lower sandy unit of Zone B. A soil sample from the sandy unit at the top of Zone B (profile unit no. 9) yielded the following data: pH, 7.4; organic matter, 2.6%; phosphorous, 525 ppm; potassium, 400 ppm. These data are similar to those for the same unit in W600 and the low organic matter content further points up the uniqueness of the W100 measurement.

E100 Block

The E100 trench exposed a clear-cut profile with several well developed buried soils in both Zones A and C (Fig. 17; Morlan 1971: Fig. 13). A unique feature in this trench was a unit of loaded soil about 5 feet in diameter in the southeast corner of N10/E10. This loaded material

Fig. 18. An ice-rafted feature in the E100 Block showing an associated stone adze still *in situ* near trowel on the right. National Museums of Canada Neg. No. 71-4544.

was identified by its heterogeneous color and texture and its truncation of buried soil 1a; the unit rests upon buried soil 1b and it is sealed by the modern soil and turf. The possibility that the unit represents the spoil from a large prehistoric or early historic excavation should be examined by further sampling in the E100 Block. Near N20/E15 a concentration of cobble- and boulder-size stones, about three feet in diameter, may represent an ice-rafted feature on the second sandy unit of Zone B (Fig. 18). Associated with this feature was a stone adze which lay upon the upper contact of the sandy unit; every stone adze I have found in the northern Yukon has been located on a beach, and it seems quite likely that this specimen occurred on a prehistoric beach which has since been buried. There was no apparent reason to suspect that the stones had been concentrated there by man.

Analytical Units

The correlations among these trenches are shown in Table 9 which matches the profile unit numbers used in Figs. 8, 13-14, 16 (see also Morlan 1971: Figs. 1, 6-13). These correlations are based upon the stratigraphic data reviewed here as well as other field notes, photographs and sketches.

In the more detailed discussion (Morlan 1971) from which this paper was condensed, I provided specific provenience data, including the excavation level, for each artifact.

Zones	Layers	Trenches, by Block Numbers						
		W700	W600	W400	W300	W100	E100	IA
			1					0
	I	1	2	1	1	1	1	1
		2		2		2	2	
		3	3	3	2	3	3	2
	II	4	4	4	3	4a	4	
		5	5	5	4		5	
A		6	6	6	5	4a	6	3
		H	7	H	6	H	7	4
		7	8	7	7	4b	8	5
		H	9	H	H		H	6
	III		10				9	7
			H				H	8
		8	11	8	8		10	
		H	12					
		9	13					
		10	14	9	9	5	11	9
		11	15	10	10	6	12	
	IV	12	H	H	H	H	H	10
		13		11			13	11
		H		H			H	12
B		14	16	12	11	7	14	13
		15	17	13	12	8	15	14
	V	16	18	14	13	9	16	15
		17	19			10		
		18	20	H		H	H	16
		19	21	15	14	11	17	17
	VI	20	22	16	15–16	12	18	18
		21		17	17–18	13		19
		22	23	18	19		19	20
		H		19	20	14	20	21
		23		20	21	15	21	22
		24	24	21	22	16	22	23
		25	25	22	23	17	23	24
C		26	26	23	24	18	24	25
		27	27	24	25	19	25	26
		28	28					
	VII	29	29	25	26	20	26	
		30		26	27	21	27	
				27	28			
		31	30	28	29	22	28–30	
		32		29		23	31	
		33				24		
		34				25		
		35				26		
		36				27		

Table 9. Inter-trench correlation of profile units (see Figs. 8, 13-14, 16; Morlan 1971: Figs. 1, 6-13).

In all areas of the site except Area 1A the various pits of each trench were excavated more or less independently in order to maintain flexibility in the stratigraphic interpretations. Careful records were kept concerning the relationships between the excavation levels of adjacent pits and their positions in the profile, but each excavator was allowed to proceed in terms of his own understanding of the sediments as he encountered them. As a result the numbers assigned to the excavation levels vary considerably within each trench, and there are many cases in which the sediments of one level in a given pit were removed in several levels elsewhere in the trench. Some of these differences admittedly are due to differences in training and experience among the excavators, but many of them result from real lateral changes in the characteristics of the sediments; these changes, which are often very subtle, were forcefully indicated by our approach to the excavation. Some of the differences between levels of adjacent pits can be regarded as errors, but these are almost entirely eliminated when the excavation levels are lumped to form "analytical layers."

As mentioned earlier, the stratigraphy of Area 1A is comprised of more discrete and better defined soils than elsewhere on the site (Figs. 15-16). Lateral changes are considerably less pronounced, and it is much easier to remove uniform levels which are stratigraphically comparable throughout each trench. Thus the excavation levels of a given pit are equivalent to those of all other pits in the area, because the 1968 excavation in Area 1A was conducted in terms of the same levels used in 1966 in that part of the site.

Ideally the archaeologist would (1) sample the Klo-kut site in such a manner that one profile unit was represented by each excavation level; and (2) find each excavation level suitable as an analytical unit. Neither of these ideals can be met at the present time. The first of these goals has been only partially attained, though I believe that the relationship between the profile units and excavation levels is clearly understood. The second ideal is not yet possible because of the small size of the sample from each level. The total collection from the site is of substantial size, but when it is divided among 15-20 excavation levels each lot becomes pitifully small. Even the faunal remains are not yet sufficiently abundant to inspire confidence in statements based upon the contents of single profile units. Eventually, as more of the site is excavated, it should become possible to handle increasingly smaller segments of the profile as units of analysis. Until such time as the sample sizes are increased, it does not seem useful to include detailed level correlations in a paper of this kind. Such details are available on microfilm (Morlan 1971).

With the present sample there are two major ways to lump the excavation levels into meaningful units for analysis. These combinations have been indicated in the Tables in this chapter, but they should be described more explicitly. A combination of seven analytical "layers" appears to be suitable for the faunal analysis, since each such layer contains a significant number of bones but the combined sequence retains meaningful variance among the layers. Layer 1 has been defined so as to include the modern soil, usually removed in one or two excavation levels. Layer II is restricted to the first buried soil which is also represented by only one to three excavation levels. The remaining buried soils of the upper part of the profile (Zone A) are included in Layer III which is represented by as many as 6-7 levels in some trenches. Layer IV extends from the top of the first sandy loam unit to the top of the second sandy unit, and Layer V includes the latter sandy sediment and extends to the first buried soil of the lower part of the profile. Layer VI includes one buried soil which is always well developed, as well as a soil which varies in its development from one trench to another. Layer VII extends from the bottom of VI to the base of the excavation and may include as many as seven buried soils, not all of which are productive of cultural remains.

These seven layers represent subdivisions of the three zones described above on the basis of stratigraphic characteristics. Zone A includes the soils of Layers I-III; Zone B includes the two sandy units and adjacent sediments of Layers IV-V; and Zone C comprises the soils of Layers VI-VII. I will describe in Chapter VI yet another combination of these units based upon the distribution of the artifacts (Morlan 1970a), because a framework useful for one interpretive problem cannot necessarily be used for another. Obviously it would be desirable to increase the power of the detailed stratigraphic profiles available at Klo-kut, but I believe the existing data are adequate for a basic understanding of the archaeology of this site. Our picture of prehistory in this region can be more highly resolved in the future as continued excavation increases sample sizes from all the sedimentary units of the profile.

Features

A discussion of hearths and other features encountered at Klo-kut will be included in this chapter on matrix analyses since the techniques of documentation are similar to those for the general matrix. Detailed descriptions of the location, shape, size, probable function or origin, and other characteristics of each feature have been presented elsewhere (Morlan 1971: 150-199) and will not be repeated here. The features can be classified in three major categories: (1) hearths of various sizes; (2) bone and refuse pits or lenses; and (3) noteworthy concentrations of stones, including three possibly ice-rafted features. The distribution of these types and some metric data for the hearths are shown in Table 10.

It can be seen in Table 10 that hearths occur in every one of the seven analytical layers but are abundant only in Layers II and III, common in Layer VI, and rare in Layers I, IV, V, and VII. This distribution closely parallels the abundance of caribou bone in these layers (see Chapter VI) and provides a general indication of the fluctuation in size and frequency of human occupations of the site. Refuse pits and bone lenses follow a similar pattern but are everywhere less numerous than hearths. Other than the three possibly ice-rafted features, two in Layer IV and one in layer V, only two noteworthy concentrations of unworked stone occurred; one was in Layer II, the other in Layer VII, and both may have been related to hearth use or construction. The measured and estimated dimensions of the hearths show some interesting trends. Mean diameter appears to decrease through time (from Layer VII to Layer I) while mean thickness tends to increase. The decrease in diameter may result from the recovery of a greater number of hearths in Layers II and III, since large hearths (60" or more) are as common in these layers as in the deeper layers while small hearths have less often been found in Layer VI and have not occurred at all in Layer VII. In other words the smaller sample size of Layer VI-VII features may be providing noncomparable data. It is possible that hearths of different sizes and shapes were functionally distinct; small round hearths might be smudges while larger ones might have been used for cooking and heating. There are too few data to provide a consistent basis for judgements concerning function, but the failure of some of the small hearths to produce bone fragments may indicate that they were smudge fires.

The tendency for hearth thickness to increase through time is apparent from a glance at the wall profiles (Figs. 8, 13-14, 16; Morlan 1971: Figs. 1, 6-13). This trend is measurable, as seen in Table 10, and it is consistent if the measurement for one massive hearth (F68S and F68T) in Layer VII is ignored. Mean thickness nearly doubles from Layer VI to Layer II, and Fig. 19 shows that Layer III is much more similar to Layer II than to Layer VI. There is no evidence that any of the hearths was prepared in a purposely excavated pit, though some of the refuse pits were prepared in that manner; thus the thickness of the hearth profiles developed as a result of the oxidation of the sediments on which the fires were built. Presumably the duration and intensity of the fire would control the depth of oxidation and the thickness of the profile, and this relationship is at least partially confirmed by my own experiments with campfires. Other possible variables, however, include the kind of wood being used for fuel and the amount of compaction of the ash before and during burial. Poplar, for example, produces a much larger quantity of ash than does spruce, and, for that reason alone, the latter is now greatly preferred for use in wood stoves in Old Crow. Several inches of loose ash can be compacted to a thin lens by an afternoon of steady, light rain. Because of the number of variables related to

Layer	Hearths			Refuse	Stone
	No.	Mean Diam.	Mean Thick.		
I	2	21"	3.5"	1	
II	18	37.6	3.9	6	1
III	20	47.1	3.5	7	
IV	4	60	2	2	2
V	3	49.5	2		1
VI	11	60.2	2	4	
VII	3	111.0	4.5		1

Table 10. Distribution of features by layer and type.

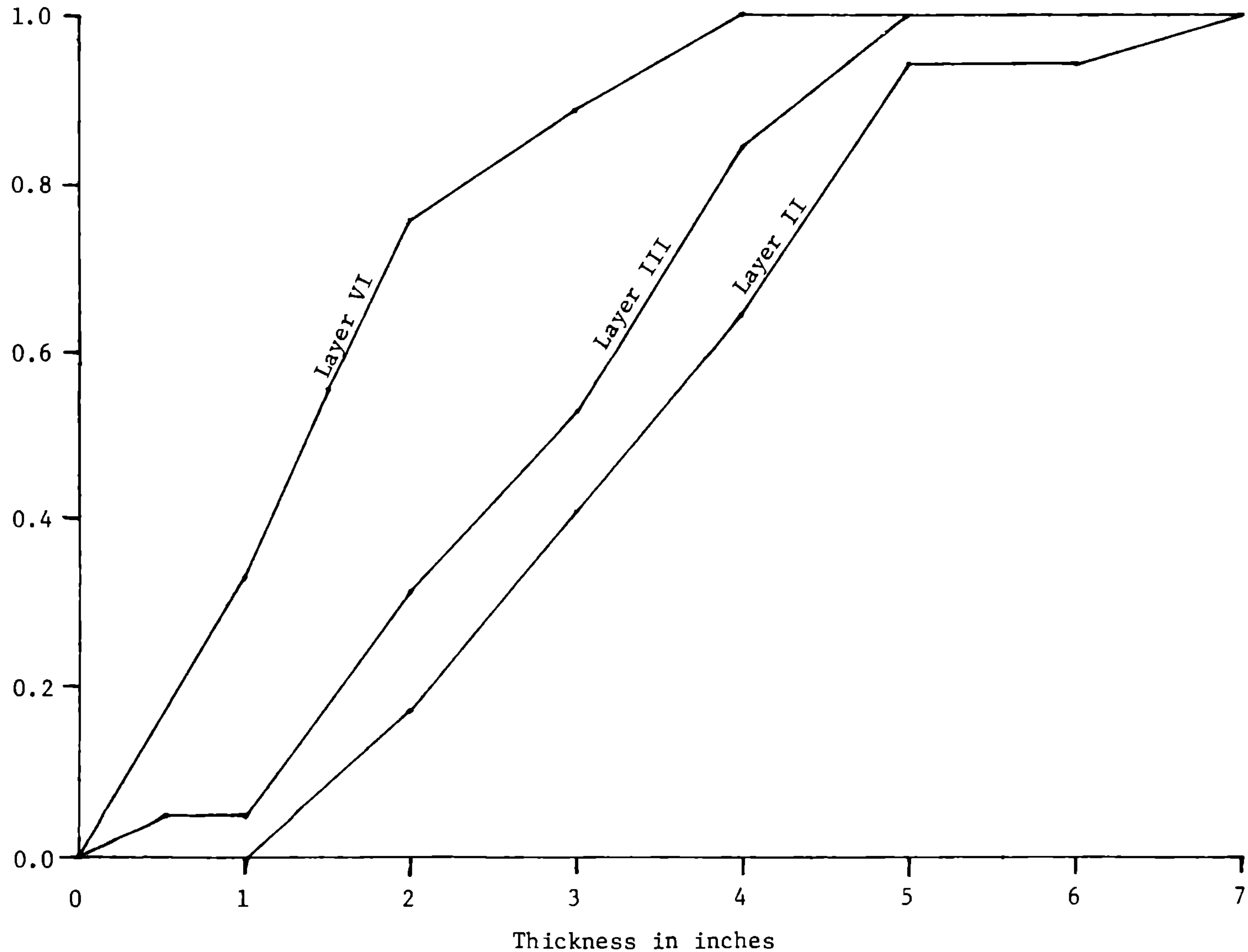


Fig. 19. Cumulative percentage distributions of hearth thickness, averaged for all 1968 excavations, in Layers II, III, and VI.

hearth thickness, it is difficult to interpret the trend apparent in Table 10, but I suspect that most of these variables would average out to a nil effect upon the Klo-kut hearths. With these qualifications in mind, I am nonetheless inclined to view this trend as a general indication that the human occupations at Klo-kut were either of shorter duration or by smaller groups of people in the early phases of the sequence than in the later ones. Other indications of a similar pattern will be seen in the ensuing chapters.

Dating

The stratigraphic profiles described in this chapter provide the most direct means of relative dating for an understanding of chronological relationships within the site. Presumably some formula can be established for estimating the rate of sedimentation in various parts of the profile, but there is not likely to be a simple relationship between time and the accumulation of sediment. Each of the soils of Zone C may have been stable for a considerable period before another increment of alluvial sediment was added to the profile. As much as a millenium may have been required for the development of the lower two feet of our exposures.

Zone B, on the other hand, probably accumulated very quickly. Each sandy unit in Zone B, as well as the adjacent, relatively sterile sediments, probably represents a single flood. In that case there would be two floods responsible for a foot or more of sediment accumulation, and the two floods could have taken place in successive spring thaws. The rate of sedimentation in Zone B may differ by an order of magnitude from that in Zone C.

Zone A appears to represent a return to more frequently stable conditions, but most of the soils of this zone are nowhere as well developed as those of Zone C. This implies that flooding was more frequent than in Zone C, and only a half millennium may have been required for the accumulation of the upper foot of the profiles. The first buried soil of Zone A must have been stable for a longer period than any of the other buried soils of this zone for it is well developed in every part of the site yet examined.

I hasten to add that the estimates mentioned above are meant to be extreme and are intended to suggest limits for a chronological framework. The estimates are based primarily upon logical extrapolations from the analysis of the profiles, but they are also aided by a suite of radiocarbon dates obtained from charcoal samples collected by Irving, MacLeod, and Cinq-Mars in 1966 and bone samples collected by me in 1968. Some of these dates have been published recently (Lowden *et al*. 1969: 36-37; Kigoshi *et al*. 1969: 309-311; Wilmeth 1969a: 70-72), but they require some comment. Samples collected in 1968 have not yet been published; collagen was used as the sample material for these dates. The dates are plotted in Fig. 20

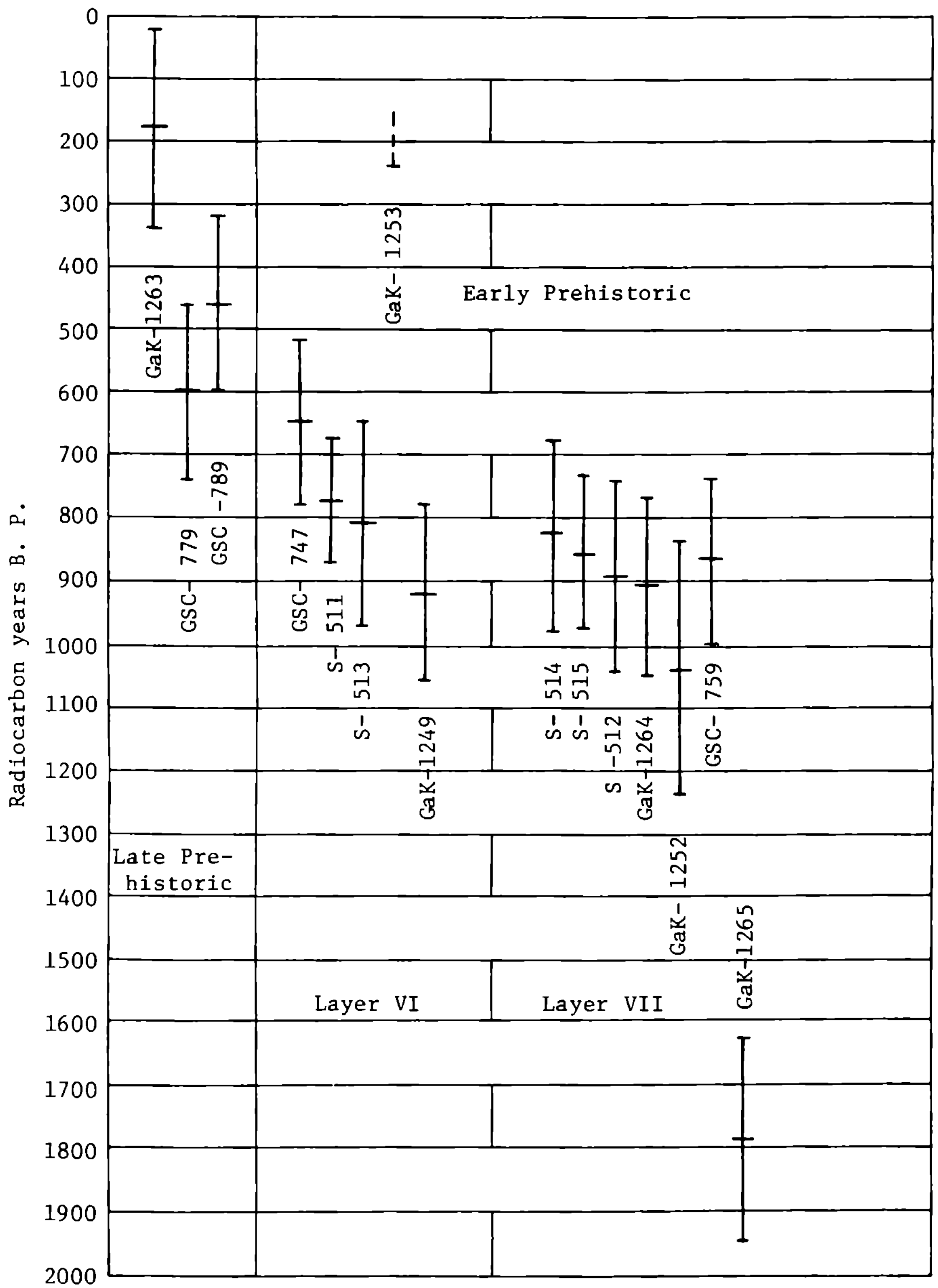


Fig. 20. Radiocarbon dates from MjV1-1.

where they are shown, with a 2σ error, on a scale of radiocarbon years B.P. The dates have been arranged, from left to right, in the order of their stratigraphic occurrence regardless of horizontal location.

GaK-1263 180 ± 160

Charcoal from a hearth (F6611), in N5/0 (E100 Block), in Zone A, LII-III (Base of Irving's Layer IA). Should date end of Late Prehistoric or beginning of Historic period.

GSC-779 (charcoal) 600 ± 140
GSC-789 (bone) 460 ± 140

These two samples were obtained from the bottom of a hearth basin in the W100 Block (0-N5/W100), directly above sterile silt, in Zone A, Layer III. Should date middle of Late Prehistoric period.

Irving noted that F6611 had been used twice and that GaK-1263 could be expected to date the latest prehistoric component of the site. Irving expressed some concern that GSC-779 and GSC-789 gave older dates than GaK-1263 but noted that there was no stratigraphic basis in the W100 Block for discounting the former two dates. I do not think these dates are necessarily contradictory, because the lower basin of F6611 originates from the second buried soil of Zone A (Layer III) on a stratigraphic level comparable to that of F6814 Basin 1 West (Morlan 1971: Figs. 13, 39).

It is not possible, on the other hand, to determine which of the poorly developed buried soils of Zone A is associated with the hearth basin in the W100 Block from which GSC-779 and GSC-789 were obtained. Indeed this is a major reason for separating the first buried soil (Layer II) from the others of Zone A (Layer III), but it is quite likely that the W100 dates pertain to an earlier buried soil than that represented by GaK-1263. The combined trio of dates gives a 600-700 year range for Layers I-III and is quite compatible with the estimated 500 year span mentioned above.

The next five samples, from left to right, in Fig. 20, come from Zone C, Layer VI.

GSC-747 650 ± 130

Charcoal from a hearth in Area 1A, Sq. 23, F664, Layer 6 (my Layer VI, Level 6).

S-511 775 ± 100

Uncharred caribou bone. A combined sample from three adjacent five-foot squares in the W700 Block, depths from 30-34" B.S., in N15/0, N10/0, and N5/W5. All levels represent profile unit nos. 20 and 21, in Zone C, Layer VI (Morlan 1971: Figs. 9-10). Should date the later part of the Early Prehistoric period.

S-513 810 ± 160

Uncharred caribou bone from N10/E10, Level 14, representing profile unit no. 18, in Zone C, Layer VI. Should date the later part of the Early Prehistoric period.

GaK-1253 <240

Charcoal from a hearth in Area 1A, Sq. 22, F667, Layer 6A (my Layer VI, Level 7).

GaK-1249 920 ± 140

Charcoal from a trench-like refuse pit, F6619, in a narrow test trench at N20/E205, 31" B.S. Irving correlated this feature with his Layer 4, in the W100 Block, which is part of my Layer VI.

These five samples from Layer VI are in agreement with the stratigraphic sequence except for GaK-1253 which is way out of line. The other four dates suggest a range of about 600 years for Layer VI; while I believe this range is somewhat too large, it does bear the expected relationship with the time span of Layers I-III. It was expected from the stratigraphic analysis that Zone A would follow with very little elapsed time upon Zone C; Zone B represents a rapid accumulation of sediment and encompasses very little time.

The last seven samples in Fig. 20 represent Layer VII.

S-514 830 ± 150

Uncharred caribou bone. A combined sample from two five-foot squares in the E700 Block (Area 1A), Squares 5 and 7, Level 8. Both parts of the sample represent profile unit no. 21, Zone C, Layer VII (Fig. 16). Should date the later part of Layer VII or the middle of the Early Prehistoric period.

S-515 855 ± 120

Charred caribou bone from E700 Block (Area 1A), Square 7, Level 8, F68T. Large hearth on profile unit no. 21, Zone C, Layer VII. Should agree with S-514.

S-512 895 ± 150

Uncharred caribou bone. A combined sample from three adjacent five-foot squares in the W600 Block, 32-35" B.S., in N20/, N15/, and N10/E60. All levels represent profile unit no. 23, Zone C, Layer VII (Fig. 8). Should date the later part of Layer VII or the middle of the Early Prehistoric period.

GaK-1264 910 ± 140

Scattered charcoal fragments from 0/W100, Layer 4B, ca. 30" B.S. (my 2nd or 3rd organic line in Layer VII).

GaK-1252 1040 ± 200

Charcoal from Area 1A, Sq. 13/22, Layer 7 (my Layer VII, Level 8).

GSC-759 870 ± 130

Charcoal from Area 1A, Sq. 16/25, Layer 10, 43" B.S. This layer corresponds approximately to the base of the 1968 excavations in Area 1A. Irving expected the date to indicate the time of a "forest fire which effected initial clearing of the site thus rendering the area readily habitable for the first time" (Wilmeth 1969a: 70-71).

GaK-1265 1790 ± 160

Charcoal from S10/W96, below a hearth (F6616) which is in turn below Irving's Layer 5 (my 6th organic line, Layer VII).

These seven samples are in excellent agreement with the stratigraphic sequence except for GSC-759 which appears to be somewhat too recent. GaK-1265 suggests that the stabilization and development of the Zone C soils occupied more time than estimated above with nearly 1500 years elapsing between the soils at the base of our excavations and the floods of Zone B.

Irving remarked concerning the samples collected in 1966 that "the dates are plausible if GSC-759 and GaK-1253 are discarded", and the five samples assessed more recently lend confirmation to this interpretation. The general picture indicates an initial human occupation about 1000 years ago and a relatively continuous archaeological record thereafter.

Several possible sources of contamination must be borne in mind, among them modern rootlets, alternate freezing and thawing with attendent leaching in the profile, and the possible use of ancient driftwood as fuel in the prehistoric hearths. The use of bone from the 1968 collections was designed to avoid as many of these pitfalls as possible, and the resulting suite of charcoal and bone assessments has provided an acceptable chronological framework for our immediate needs.

VI. KLO-KUT: COLLECTIONS

Introduction

The collections extracted from the Klo-kut matrix include a variety of different kinds of objects, some of which are instructive concerning the natural environment and some of which are more specifically related to man. Rather than enumerate the artificial disciplinary lines which must be crossed in the study of such collections one can simply note that the Klo-kut site consists of a levee built up through successive alluviation which buried one living ecosystem after another. The characteristics of sediment and climate conferred an unusual state of preservation upon most of these buried ecosystems, and many objects often destroyed before or during burial elsewhere have been protected at Klo-kut and can now be recovered. These include, for example, a large number and variety of plant remains such as pollen, seeds, cones, siliceous plant stalks, charred wood fibers, and, in the lowest layers, rooted stumps. The animal kingdom is represented by bones, shells, the chitinous remains of insects, and the artifacts of man.

A comprehensive palaeoenvironmental study could and should be attempted at sites of this kind, but there is one major set of variables which is difficult to evaluate and to control: the influence of man. It is clear, on the basis of the modern vegetation of the site, that man exerted both intensive and extensive influence upon the plant communities at Klo-kut, and his influence must have altered the record of pollen, seed, and cone. Likewise nearly all the bone in the site owes its occurrence there to the hunting skills of man, and the faunal remains at Klo-kut must therefore be examined with due regard to man's selective abilities and requirements as a hunter living in social groups.

In order to place man in ecological perspective it would be necessary to sample localities off the site where parallel records of plant and animal life could be documented independently. This has not yet been done in this region, since my principal focus has been on recent human prehistory. Likewise not all the remains from Klo-kut itself have been analyzed to date; I have selected for analysis those kinds of remains which are most informative concerning man and his activities: the artifacts he made and the bones of the animals he ate. These will be discussed in this chapter, both in general descriptive terms and with reference to the stratigraphic framework outlined in Chapter V.

Artifact Descriptions

The artifacts have been classified first on the basis of raw material and second on the basis of how the material has been modified by man. This approach has produced a series of classes which have technological integrity but which may in some cases cross-cut categories of functional and typological significance. I have taken this approach in order to avoid certain pitfalls of other kinds of artifact classification. Thus, for example, functional classes have been set aside for later revelation since there is so little direct evidence of prehistoric artifact use in the ethnographic data available for the northern Yukon. To classify the Klo-kut artifacts on the basis of generalized ethnographic analogies might lead to a formulation of a prehistoric culture not clearly identifiable with an ethnographically documented group of people. The use of analogies based upon our abundant Eskimo data (Murdoch 1892; Nelson 1899) might deny the elucidation of a distinctive non-Eskimo pattern. Since there are other lines of evidence concerning the ethnographic identity of the inhabitants of Klo-kut it seems more appropriate to attempt a definition of this prehistoric culture through the most direct evidence available, and I deem this to be evidence of man's technology -- his manipulation of raw material.

I do not wish to argue the validity of typological approaches, but I have felt it useful to avoid a strict adherence to types since much of the variance of an artifact assemblage can be lost through type definitions. Also I have no desire to enter into discussions concerning the reality of types. A few typological concepts have emerged from my analysis of the Klo-kut artifacts, and I would call them artificial since I have selected the criteria which define them. Furthermore I believe that any type definition is likely to undergo bewildering dilution in regions as little understood archaeologically as north-western North America, and such dilution often defeats the purpose of the definition. My use of types provides economic expressions in some cases, but it is explicitly open to question as far as historically significant categories are concerned.

Many of the technological classes which follow have been given names with functional connotations, and I hope this is not misleading. In many cases these implications of function may be quite accurate; I have locally-based evidence that this is so for some of them, but for others such accuracy cannot be documented at the present time. Thus, for example, my use of the term "scraper" is supported by local ethnographic observation in the case of bone specimens, but for those of stone the term refers to specific morphological characteristics which will be enumerated below.

In the following discussion each class of artifacts will be defined with reference to tables which provide both metric and non-metric data for the class. Elsewhere I have provided detailed listings of each specimen or lot of specimens, arranged by excavation levels (Morlan 1971: Appendix A), and the tables in this chapter comprise syntheses of the data arranged in terms of larger analytical units. Needless to say there are many ways in which these data could be recombined, and the detailed tables are available on microfilm for those who want to try combinations which differ from mine.

Seven layers and three zones were defined in Chapter V as analytical units based upon the stratigraphic profiles at Klo-kut. Vertical provenience for artifacts has been phrased in terms of layers (I-VII) for the 1967-68 collections and in terms of zones (A-C) for the 1965-66 collections. This difference arises primarily from the difficulty of matching in detail the stratigraphic analyses of two observers working independently of one another. A preliminary analysis of the artifact distributions (Morlan 1970a) indicated that a significant break occurs in the middle of Zone B, between Layers IV and V. This break is now taken to mark the boundary between the "Early Prehistoric" and "Late Prehistoric" periods. A third period, "Historic" is confined to Layers I and II in the W100, E100, and E300 Blocks.

Blocks	Historic	Late Prehistoric	Early Prehistoric
W700 W600 W400 W300	Not Represented	Layers 1-IV	Layers V-VII
W100 E100	1966: Zone A, L1 1968: Layers I-II	1966: Zone A, L1A Zone B 1968: Layers III-IV	1966: Zone C 1968: Layers V-VII
E300	Zone A	Zone B	Zone C
1A	Not Represented	1966 & 1968: Layers I-IV	1966 & 1968: Layers V-VII

Table 11. Relationships among layers, zones, and periods in MjVl-1 (Klo-kut).

The relationships among layers, zones, and periods is shown in Table 11. As will be seen below the distinctions among these periods are significant both statistically and substantively, and in this chapter I have chosen this three-period framework as a convenient means of summarizing the artifact characteristics.

Stone Artifacts

Several major characteristics must be considered in an evaluation of a stone artifact: (1) stone type; (2) size; and (3) the nature of modifications which have made the specimen an artifact. Stone types in this collection have been classified from the point of view of my own limited understanding of petrology, but I have frequently consulted Bowser et al. (1968) and Pough (1953). Initially I examined all the flakes with an eye toward estimating the number of cores which would have been required to produce them, but an unmanagable list of nearly 100 types of stone emerged from this effort and could not be related directly to the cores from Klo-kut. The first list was then regrouped to form a set of 18 major kinds of stone, some of which were subdivided on the basis of colour in order to produce 33 stone types. These were numbered and lettered in such a way that the list generally proceeds from glassy material with excellent flaking properties through a series of microcrystalline stones to a few amorphous and layered types. Thus, in general, the higher the number the less tractable for stone knapping. This list is outlined in Table 12.

Two different indicators of size have been used. Linear measurements have been employed whenever an accurate indication of size and proportion seemed necessary or useful for analytical purposes and whenever a consistent set of "landmarks" could be defined so as to make the measurements verifiable. For some artifact classes it is very difficult to define suitable landmarks with which to orient the specimens for linear measurement, and I have resorted to measurements of weight in such cases. Both kinds of measurement have been provided for some classes in order to help calibrate one against the other, but there appears to be no significant amount of variation in the density of the stone types involved so that the weights can be taken at face value. Some of the flake classes were merely counted and weighed by provenience lot so that a mean weight is available for each stone type. For more detailed descriptions most of my terminology is derived from the series of shape, juncture, and flaking classes proposed by Binford (1963).

Patterns of human modification provided the most important criteria for defining classes of stone artifacts. The artifacts were separated into groups of flaked, pecked, and ground specimens, and the flaked ones were further

1.	Obsidian	9.	Andesite
2a.	Light grey chalcedony	10a.	Quartz crystal
2b.	Dark grey chert	10b.	Quartz
2c.	Blue chert	11a.	Brown quartzite
2d.	Brown, translucent chert	11b.	Blue-grey quartzite
2e.	Brown, opaque chert	11c.	White quartzite
2f.	White chert	11d.	Red quartzite
2g.	Green chert	12.	Granite
3a.	Banded agate	13.	Graywacke
3b.	"Mossy" agate	14.	Breccia
3c.	Greenstone	15.	Sandstone
4a.	Red jasper	16.	Schist
4b.	Yellow jasper	17a.	Red shale
5.	Argillite	17b.	Grey shale
6.	Mudstone	17c.	Green shale
7.	Basalt	18.	Limestone
8.	Rhyolite		

Table 12. Stone types used in the classification of artifacts from MjVl-1. Numbers will be used for reference in tabular presentations of other data.

subdivided into categories of cores and flakes. Cores are defined as those specimens from which flakes have been removed, and flakes are those specimens which have been removed from a core; an intermediate category includes core fragments or broken cores. This classificatory approach produced a list of 27 classes of stone artifacts modified by flaking techniques; nos. 1-21 are represented predominantly by cryptocrystalline stone types and nos. 22-27 consist primarily of microcrystalline specimens. Classes nos. 28-30 are either pecked or ground or both and are made of microcrystalline and layered types of stone.

1. *Waterworn Pebbles.* Many waterworn pebbles were observed during the Klo-kut excavations, but only a few of them were collected. Those in the collection were selected because of their size and shape, their occurrence in a dense concentration of artifacts or other pebbles, or their resemblance to nodules of chert or chalcedony. Many pebbles and cobbles were discarded at the site because they appeared to have been brought there for use in boiling water. Fire-cracked rock was quite abundant in most areas of the site, and I was not inclined to ship large quantities of uncracked boiling stones across the continent. Also included in this waterworn pebble class are three differentially weathered pebbles which might have been brought

Block	Historic No.	Historic Wt.	Historic $\overline{\text{Wt.}}$	Historic Range	Late Prehistoric No.	Late Prehistoric Wt.	Late Prehistoric $\overline{\text{Wt.}}$	Late Prehistoric Range	Early Prehistoric No.	Early Prehistoric Wt.	Early Prehistoric $\overline{\text{Wt.}}$	Early Prehistoric Range	Totals
W700					3	47.2	15.73	11-19	1	27.6	27.60	-	4
W100	1	3.6	3.60	-	2	7.3	3.65	3-5	27	913.8	33.84	?	30
E100	4	103.1	25.78	3-68	3	26.3	8.77	3-19	1	33.6	33.60	--	8
1A					1	3.9	3.90	-					1
*W100					2	38.8	19.40	8-30					2 *
*1A									1	10.5	10.50	-	1 *
Totals	5	106.7	21.34	3-68	11	123.5	11.23	3-30	30	985.5	32.85	?	46

--Stone Type--

Block	Historic 2b	Historic 2c	Historic 2e	Historic 3a	Historic 15	Historic ?	Late Prehistoric 2b	Late Prehistoric 2c	Late Prehistoric 2e	Late Prehistoric 3a	Late Prehistoric 15	Late Prehistoric ?	Early Prehistoric 2b	Early Prehistoric 2c	Early Prehistoric 2e	Early Prehistoric 3a	Early Prehistoric 15	Early Prehistoric ?	Totals
W700												3						1	4
W100						1	1				1		1					26	30
E100	2		1	1								3		1					8
1A												1							1
*W100												2							2 *
*1A																		1	1 *
Totals	2		1	1		1	1				1	9	1	1				28	46

* Differentially weathered pebbles.

Table 13. Distribution of stone type and weight for 46 waterworn pebbles from MjV1-1, arranged by period.

to the site simply because of their curious shapes. The stone types of many of the waterworn pebbles are difficult to determine because of their completely cortical surfaces; nonetheless these pebbles are included here as possible sources of raw material for stone knapping. The distributions of weight and, when discernible, stone types are shown in Table 13 for 46 waterworn pebbles (see also Morlan 1971: Table 93). It is perhaps noteworthy that they occur only in the most productive trenches and are absent in the W600, W400, W300, and E300 blocks.

2. *Broken Pebbles.* These are simply broken waterworn pebbles which have been fractured along a cleavage plane or a stress line. Some of them may indeed have been fractured in the river bed, but most of the fractures are "fresh" in appearance and were probably made on the site. Some of them can be reconstructed from as many as 8-10 fragments. The majority of them are of cryptocrystalline rock and likely represent the first step toward systematic core use. Some of the microcrystalline and layered examples may have been discarded after the nature of the stone was discovered, for the stone type often cannot be certainly determined until the nodule has been fractured and a fresh surface exposed. The distributions of weight and stone type are shown in Table 14 for 42 broken pebbles (see also Morlan 1971: Table 94). The distribution on the site is fairly continuous, but more than half of them occur in the Late Prehistoric period.

Block	Historic No.	Historic Wt.	Historic $\overline{\text{Wt.}}$	Historic Range	Late Prehistoric No.	Late Prehistoric Wt.	Late Prehistoric $\overline{\text{Wt.}}$	Late Prehistoric Range	Early Prehistoric No.	Early Prehistoric Wt.	Early Prehistoric $\overline{\text{Wt.}}$	Early Prehistoric Range	Totals
W700					8	258.2	32.27	2-128	2	6.7	3.35	-	10
W600					2	21.6	10.80	2-20					2
W300					3	61.4	20.47	7-31	1	116.2	116.20	-	4
W100	3	69.3	23.20	6-41	5	103.4	20.68	3-41					8
E100	4	27.3	6.83	3-12	1	412.8	412.80	-					5
1A					4	83.8	20.95	2-71	9	181.4	20.16	1-78	13
Totals	7	96.6	13.80	3-41	23	941.2	40.92	2-413	12	304.3	25.36	1-116	42

Period	Block	--Stone Type-- 2b	2c	2e	3a	3c	4a	4b	5	6	11a	11b	14	16	17b	18	Totals
Hist.	W100	1	2														3
	E100	1	2	1													4
	Total	2	4	1													7
Late Prehist.	W700	1	2								3	1				1	8
	W600	1											1				2
	W300		2												1		3
	W100		1			1	1							1	1		5
	E100										1						1
	1A	1	1		1					1							4
	Total	3	6		1	1	1			1	4	1	1	1	2	1	23
E. Pre.	W700		1					1									2
	W300		1														1
	1A	4	3						2								9
	Total	4	5					1	2								12
	Totals	9	15	1	1	1	1	1	2	1	4	1	1	1	2	1	42

Table 14. Distribution of stone type and weight for 42 broken pebbles from MjVl-1, arranged by period.

3. *Core Fragments.* This category includes both fragments of cores and cores which lack identifiable platforms (Fig. 21b). Any core with a discrete, conchoidal flake scar and without a recognizable platform was placed in this category, since the presence of a platform is required for systematic, verifiable measurements. This class comprises the largest of the core-related categories and is to some extent a rubric which should be subdivided when a larger sample becomes available. Meanwhile, however, it is probably safe to conclude that most of the core use at Klo-kut consisted of the flaking of small river cobbles with frequent rotation of the cobble and infrequent development of a discrete platform. The high frequency of core breakage is probably a result of stress lines and fractures established in the raw material prior to its use by man. The distributions of weight and stone type are shown in Tables 15-16 for 176 core fragments (see also Morlan 1971: Table 95). It can be seen in Table 15 that these specimens are distributed quite uniformly throughout the site; their frequencies vary directly with the overall density of artifacts and faunal remains.

4. *Cores with Platforms.* There are relatively few cores with discrete platforms in this collection, and even some of these have been rotated during flake removal. This category has been isolated since the presence of platforms provides the necessary landmarks for making linear measurements on the cores. Each of these platforms is associated

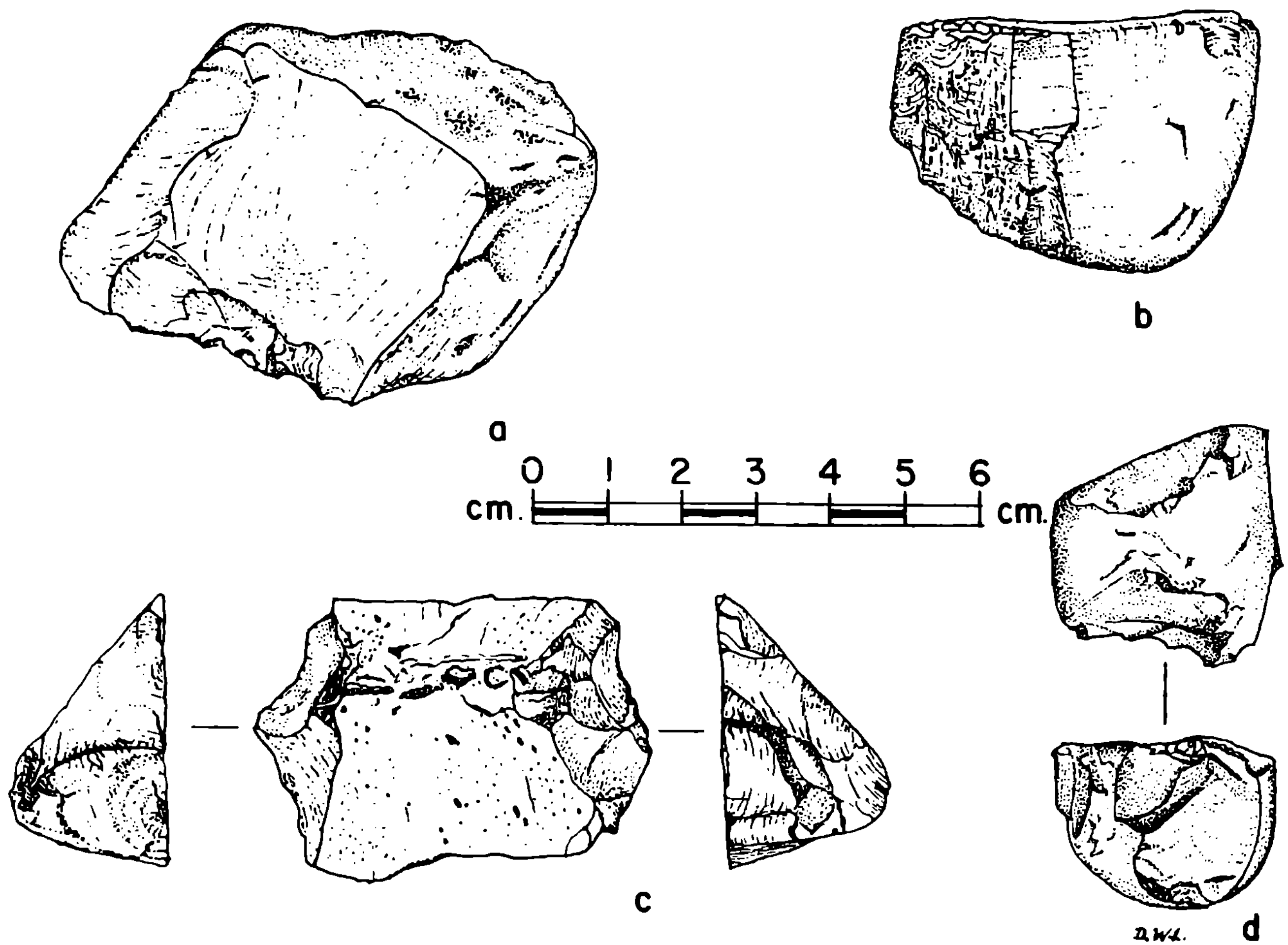


Fig. 21. Cores from MjVl-1. a, core with platform (Early Prehistoric, MjVl-1A: 329); b, core fragment (Late Prehistoric, MjVl-1: 250); c, core with platform (Early Prehistoric, MjVl-1A: 331); d, core with platform (Late Prehistoric, MjVl-1A: 118). National Museums of Canada Neg. No. 72-8273.

Block	Historic				Late Prehistoric				Early Prehistoric				Totals
	No.	Wt.	$\overline{\text{Wt.}}$	Range	No.	Wt.	$\overline{\text{Wt.}}$	Range	No.	Wt.	$\overline{\text{Wt.}}$	Range	
W700					7	104.4	14.91	8-26					7
W600					6	83.3	13.88	5-27	1	20.3	20.30	-	7
W400					3	35.7	11.90	4-25	2	136.3	68.15	10-129	5
W300					9	108.1	12.01	1-30	1	14.0	14.00	-	10
W100	10	57.4	5.74	1-24	8	74.3	9.29	3-28	3	18.7	6.23	3-13	21
E100	27	413.0	15.30	2-76	10	126.6	12.66	2-40	2	45.5	22.75	19-26	39
1A					34	417.0	12.26	1-72	53	668.7	12.62	1-68	87
Totals	37	470.4	12.71	1-76	77	949.4	12.33	1-72	62	904.0	14.58	1-129	176

Table 15. Distribution of weight for 176 core fragments from MjVl-1, arranged by period.

--Stone Type--

		2a	2b	2c	2d	2e	2g	3a	3b	3c	4a	5	10b	11a	11b	11c	15	17b	Totals
Hist.	W100	4	4	1	1														10
	E100	1	15	6				1					3	1					27
	Total	5	19	7	1			1					3	1					37
Late Prehistoric	W700		3	1		1						1						1	7
	W600	2	2	2															6
	W400		1	2															3
	W300		2	3	1						1	1					1		9
	W100			5	2										1				8
	E100	4	1	2	1								1			1			10
	1A	3	23	3	1	2	1		1										34
	Total	9	32	18	5	3	1		1		1	2	1		1	1	1	1	77
Early Prehist.	W600		1																1
	W400						1				1								2
	W300		1																1
	W100		1	1						1									3
	E100		2																2
	1A	2	34	8	3		1		3		1				1				53
	Total	2	39	9	3		2		3	1	2				1				62
	Totals	16	90	34	9	3	3	1	4	1	3	2	4	1	2	1	1	1	176

Table 16. Distribution of stone type for 176 core fragments from MjVl-1, arranged by period.

with a discrete and continuous fluting arc; that is, a platform margin along which flakes have been removed. Platform length was measured perpendicular to the chord of this arc, platform width was taken parallel to the chord and often equalled the length of the chord itself, and core height was measured perpendicular to the plane of the platform (see Fig. 22). The only consistent pattern of core manufacture and use observed among these specimens proceeded by breaking off the end of a relatively flat cobble and establishing the broken surface as a flaked face adjacent to a flat platform which might itself be either cortical or flaked; in the latter case the platform was prepared by the removal of a single, large, thin flake. No more than half of the cores with platforms, however, possess these characteristics; the others are highly variable with forms and flaking patterns following the particular characteristics of each specimen as core use proceeded (Fig. 21 a, c, d; Plates 1a, b, d; 2a-c, g). Distributions of weight, linear measurements, and stone type are provided in Table 17 for 38 cores with identifiable platforms (see also Morlan 1971 : Table 96). As might be expected the distribution in the site is generally similar to that of core fragments.

5. *Exhausted Cores.* A few flat specimens have been classified as exhausted cores because they are fully flaked on one face and only slightly flaked or entirely cortical on the other face. Some of them still possess the remnant

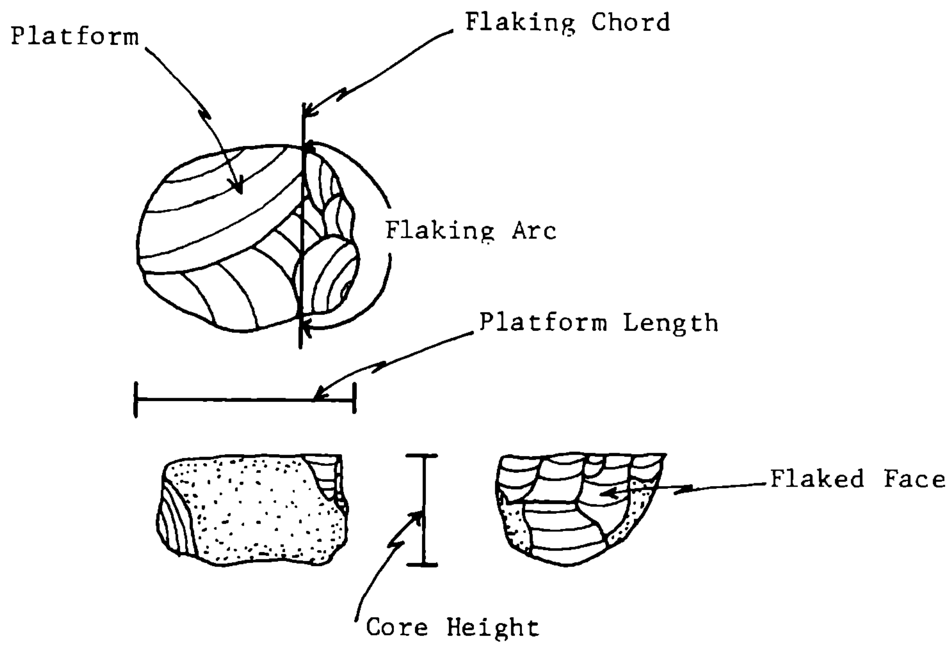


Fig. 22. Generalized core with platform showing landmarks for measurement and terminology used in descriptions.

Period	Block	No.	Weight	Mean Weight	Range	Length	Mean Length	Range	Width	Mean Width	Range	Height	Mean Height	Range
Hist.	W100	1	7.5	7.50	-	22.4	22.40	-	24.6	24.60	-	17.9	17.90	-
	E100	6	201.9	33.65	3-100	159.0	26.50	11-47	197.9	32.98	20-55	136.5	22.75	14-42
	Total	7	209.4	29.91	3-100	181.4	25.91	11-47	222.5	31.79	20-55	154.4	22.06	14-42
Late Prehist.	W700	2	27.6	13.80	11-17	48.5	24.25	11-38	48.9	24.45	21-28	37.9	18.95	13-25
	W600	1	13.2	13.20	-	19.5	19.50	-	29.8	29.80	-	21.2	21.20	-
	W300	2	29.9	14.95	11-19	29.8	14.90	-	63.3	31.70	22-41	57.4	28.70	25-33
	W100	1	4.0	4.00	-	17.8	17.80	-	9.2	9.20	-	21.2	21.20	-
	E100	2	59.0	29.50	9-50	56.8	28.40	26-31	58.3	29.15	16-42	52.1	26.05	21-32
	1A	5	93.7	17.74	6-24	107.6	21.52	15-29	144.8	28.96	19-38	134.5	26.90	11-36
	Total	13	227.4	17.49	4-50	280.0	21.54	11-38	354.3	27.25	9-42	324.3	24.95	11-36
E. Pre.	W300	2	40.9	20.45	14-27	37.8	18.90	18-20	67.1	33.55	17-50	47.0	23.50	19-28
	W100	1	22.0	22.00	-	27.6	27.60	-	40.3	40.30	-	24.6	24.60	-
	1A	15	449.5	29.97	4-166	406.0	27.07	12-57	435.5	29.03	14-52	325.9	21.73	11-35
	Total	18	512.4	28.47	4-166	471.4	26.19	12-57	542.9	30.16	14-52	417.5	22.08	11-35
	Totals	38	949.2	24.98	3-166	932.8	24.55	11-57	1119.7	29.46	9-55	896.2	23.35	11-42

	--Stone Type-- Historic						Late Prehistoric						Early Prehistoric					
	2b	2c	2d	2e	3a	Total	2b	2c	2d	2e	3a	Total	2b	2c	2d	2e	3a	Total
W700							1	1				2						
W600								1				1						
W300								1	1			2	2					2
W100	1					1	1					1	1					1
E100	5			1		6	1		1			2						
1A							3	1	1			5	9	3	1	1	1	15
Total	6			1		7	6	4	3			13	12	3	1	1	1	18

Table 17. Distribution of stone type and metric data for 38 cores with platforms from MjVl-1, arranged by period.

of a platform along which most of the blows have been struck, but apparently they have become too thin to be manipulated for further flake removal (Plate lc). Some of these cores are so completely exhausted that there is no longer enough of a platform to provide orientation for the measurements outlined above. Measurements of maximum length, width, and thickness have been taken, with the most conspicuous axis of flake removal oriented parallel to the length measurement. The length measurement for exhausted cores is therefore the geometric counterpart of the height measurement for cores with platforms. These measurements, as well as weights and stone types, are provided in Table 18 for 14 exhausted cores (See also Morlan 1971a: Table 97). The distribution of exhausted cores in the site is highly restricted compared with those of the other categories of cores, but this may be a function of the small sample size and should not receive too much emphasis.

Several terms should be defined before the flakes from Klo-kut are described. The usual distinctions between dorsal and ventral, proximal and distal will be used, and right and left will be assigned to the margins of a given flake when it is seen with the proximal end at the top and the dorsal face visible to the observer. When the flake is turned so that the ventral face is visible the terms right and left apply to the same margins as before.

Period	Block	No.	Weight	Mean Weight	Range	Length	Mean Length	Range	Width	Mean Width	Range	Thick.	Mean Thick.	Range
Historic	W100	2	72.3	36.15	29-43	96.4	48.20	44-52	75.2	37.60	30-45	29.0	14.50	11-18
	E100	2	84.1	42.05	9-75	96.7	48.35	34-63	74.1	37.05	22-52	32.9	16.45	10-23
	E300	2	21.5	10.75	-	84.2	42.10	-	45.8	22.90	22-24	18.5	9.25	8-10
	Total	6	177.9	29.65	9-75	277.3	46.22	34-63	195.3	32.55	22-52	80.4	13.40	8-23
L. P.	W100	2	44.3	22.15	14-31	76.5	38.25	33-44	73.0	36.50	32-41	26.5	13.25	11-16
	1A	3	36.8	12.27	8-15	115.3	38.43	34-46	77.1	25.70	22-28	38.1	12.70	10-14
	Total	5	81.1	16.22	8-31	191.8	38.36	33-46	150.1	30.02	22-41	64.6	12.92	10-16
E. P.	1A	3	29.7	9.90	3-24	107.4	35.80	21-62	61.4	20.47	12-30	26.5	8.83	7-12
	Totals	14	288.7	20.62	3-75	576.5	39.75	21-63	406.8	29.06	12-52	171.5	12.25	7-23

		--Stone Type--					
		2a	2b	2c	2d	5	Totals
Historic	W100		1		1		2
	E100			2			2
	E300			2			2
	Total		1	4	1		6
L. P.	W100		1	1			2
	1A		1			2	3
	Total		2	1		2	5
E. P.	1A	1	2				3
	Totals	1	5	5	1	2	14

Table 18. Distribution of stone type and metric data for 14 exhausted cores from MjVl-1, arranged by period.

Some of this terminology is illustrated in Fig. 23. Each flake has two faces (dorsal and ventral) bordered by margins (proximal, left, distal, right) which extend no more than 25% of the distance from the edge to the midline of the flake. The edge is defined as a line which forms the juncture of the two faces; it cannot be retouched or otherwise modified since it is a hypothetical feature with only two dimensions. The margins, however, can be retouched, and the most abundant forms of retouch at Klo-kut are marginal. Facial retouch is relatively rare at Klo-kut in spite of the fact that my definition of the margins, using 25% as a cut-off point, should favor identification of facial retouch. A full description of marginal retouch should include a phrase such as "retouched along the distal margin of the ventral face," but this phrase will be shortened for some purposes to "ventral retouch". Hopefully such abbreviated phraseology will not lead to confusion between marginal and facial retouch, and it can be assumed that all the retouch in the following descriptions and discussions is marginal retouch unless otherwise indicated.

Some flake margins can be more accurately described by referring to segments rather than whole margins. If, for example, a left margin is clearly subdivisible into two segments, the segments will be called "proximal/left" and "distal/left." In many of the tables which accompany

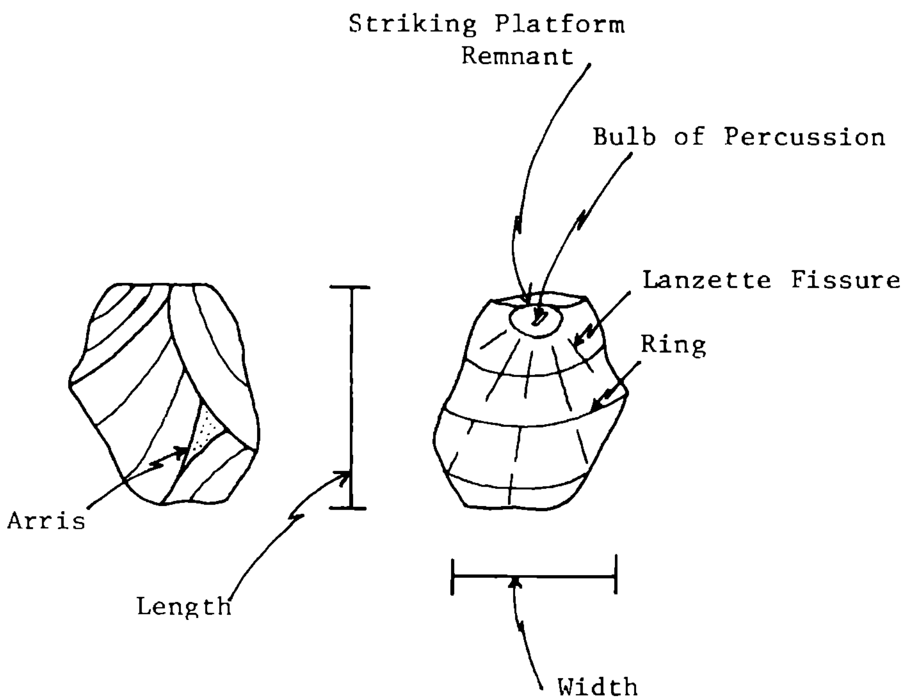


Fig. 23. Generalized flake showing landmarks for measurement and terminology used in descriptions.

this chapter the following abbreviations have been used to designate flake margins and faces: proximal (P), left (L), distal (D), right (R), proximal/left (P/L), etc., for margins; and dorsal (D) and ventral (V) for faces. Three other features have been abbreviated: corner (Cor.), concavity (Con.), and snap (Sn.). Three kinds of retouch, to be defined below, have been abbreviated in the tables: thinned (T), nicked (N), and blunted (B).

6. *Unretouched Flakes.* All the flakes and most of the other specimens from Klo-kut were examined microscopically at magnification of about 30 diameters. Particular attention was paid the margins of the flakes, and any form or degree of marginal modification was sufficient to exclude a given specimen from this unretouched category. Thus this category excludes both "retouched" and "utilized" flakes. The weights and stone types of 4194 unretouched flakes are provided in Tables 19-20 (see also Morlan 1971 : Table 98).

7. *Microscopically Retouched Flakes.* After all unretouched flakes had been set aside with the aid of the microscope the retouched flakes were reexamined without visual aids. I found that the retouch on many of them could be seen with the unaided eye as a modified area but that the characteristics of the individual retouch scars could not be observed in this way. This precluded further classification of these flakes without extensive microscopic effort and also implied that the origin of this kind

Block	Historic				Late Prehistoric				Early Prehistoric				Totals
	No.	Wt.	$\overline{Wt.}$	Range	No.	Wt.	$\overline{Wt.}$	Range	No.	Wt.	$\overline{Wt.}$	Range	
W700					253	108.4	0.43	0.2-2.4	16	21.8	1.36	1.1-1.7	269
W600					86	94.8	1.10	0.1-13.5	4	4.4	1.10	0.9-1.2	90
W400					57	57.0	1.00	0.3-4.1	34	24.8	0.73	0.4-5.2	91
W300					100	192.0	1.92	0.5-9.9	37	32.5	0.88	0.1-3.1	137
W100	200	223.1	1.12	0.1-12.7	814	316.5	0.39	0.1-30.6	21	27.5	1.31	0.2-10.0	1035
E100	312	473.4	1.52	0.1-14.4	522	414.9	0.79	0.1-9.9	5	4.8	0.96	0.7-1.0	839
E300	24	74.2	3.09	0.2-8.5	2	5.9	2.95	-	6	44.9	7.48	0.3-13.9	32
1A					745	1109.9	1.49	0.1-5.2	956	1983.9	2.08	0.2-10.0	1701
Totals	536	770.7	1.44	0.1-14.4	2579	2299.4	0.89	0.1-30.6	1079	2144.6	1.99	0.1-13.9	4194

Table 19. Distribution of weight for 4194 unretouched flakes from MjV1-1, arranged by period.

		--Stone Type--																		
		1	2a	2b	2c	2d	2e	2f	2g	3a	3b	4a	4b	5	6	7	8	9	10a	10b
Historic	W100		9	42	47	31	6				1						9			7
	E100		37	52	90	30	8				1	3	1			2			2	20
	E300		8	8	3									1						1
	Total		54	102	140	61	14				2	3	1	1		2	9		2	28
Late Prehistoric	W700			150	8	53	13							2						
	W600	6	2	26	26	5								1	1	1				
	W400		1	15	33	1														
	W300			29	12	11		1			1				3					
	W100		6	501	75	42	19			3		2		113	1	1	2		2	1
	E100		23	229	41	152	3			1										5
	E300			2																
	1A		61	290	224	65	7		4	1	16	9		32						
	Total	6	93	1242	419	329	42	1	4	5	17	11		148	5	2	2		2	6
Early Prehistoric	W700			10	3															
	W600															1				
	W400			12	18										1					
	W300			8	4															
	W100			4	3						1				1					
	E100				1															
	E300		1	4								1								
	1A	5	42	412	273	71	9	2	1		47	3	1	52				1		
	Total	5	43	450	302	71	9	2	1		48	4	1	52	2	1		1		
	Totals	11	190	1794	861	461	65	3	5	5	67	18	2	201	7	5	11	1	4	34

Table 20. Distribution of stone type for 4194 unretouched flakes from MjVl-1, arranged by period.

--Stone Type--

		11a	11b	11c	11d	12	13	14	15	16	17a	17b	18	Totals
Historic	W100	11	1	1		6		1	7	16			5	200
	E100	2	3	12			4		3	40			2	312
	E300		3											24
	Total	13	7	13		6	4	1	10	56			7	536
Late Prehistoric	W700	12	2							13				253
	W600	5	2			4				7				86
	W400	5								2				57
	W300	11				5			7	15	2		3	100
	W100	3	2	2		5	9		4	17	1		3	814
	E100	61		1	1	1			1	3				522
	E300													2
	1A	3	9	4	1	1			4	13	1			745
	Total	100	15	7	2	16	9		16	70	4		6	2579
Early Prehistoric	W700			1					2					16
	W600	3												4
	W400								1				2	34
	W300	3				1				2	19			37
	W100							1	2	5			4	21
	E100									4				5
	E300													6
	1A	2	9	6		5				9		6		956
	Total	8	9	7		6		1	5	20	19	6	6	1079
	Totals	121	31	27	2	28	13	2	31	146	23	6	19	4194

Table 20(Continued).

of retouch -- and, therefore, possibly the function of the flakes -- differed from that of macroscopically modified specimens. Microscopically retouched flakes might correspond to some extent to the "utilized flake" categories of other writers, but I have not examined the possibility that there is a continuous range of variation in the size of retouch scars. In any case if I could not see the scars I could not classify the flakes in the categories described below. The weights and stone types of 201 microscopically retouched flakes are provided in Tables 21-22 (see also Morlan 1971: Table 99).

It should be noted that the broad distinction between microscopic and macroscopic retouch is not explicitly indicated in the list of artifact classes. All modified flakes with retouch scars large enough to be examined with the unaided eye were classified in a series of categories characterized by macroscopic retouch. A major subdivision of this series distinguishes shaped flakes from unshaped flakes. If the outline of a flake has been noticeably altered by modifications of its margins it is called a shaped flake. Such alteration is usually inferred from observations of the ventral face, because the rings, the fissures, the bulb of percussion, and the platform remnant may be truncated by such alteration. If these features appear to be intact and if there are no concavities or convexities developed by means of marginal retouch, the flake is classified as unshaped.

Block	Historic				Late Prehistoric				Early Prehistoric				Totals
	No.	Wt.	$\overline{\text{Wt.}}$	Range	No.	Wt.	$\overline{\text{Wt.}}$	Range	No.	Wt.	$\overline{\text{Wt.}}$	Range	
W700					14	3.8	0.27	0.1-1.6					14
W600					10	7.6	0.76	0.3-2.6					10
W400					8	7.0	4.63	0.3-23.3	4	2.3	0.58	0.1-1.0	12
W300					8	16.7	2.09	0.6-7.1					8
W100	18	45.1	2.51	0.3-7.4	33	58.8	1.78	0.1-17.1	1	5.1	5.10	-	52
E100	19	11.7	0.62	0.1-2.5	14	5.9	0.42	0.3-1.0	1	10.8	10.80	-	34
1A					30	34.8	1.16	0.2-3.6	41	90.2	2.20	0.3-12.0	71
Totals	37	56.8	1.54	0.1-7.4	117	164.6	1.41	0.1-23.3	47	108.4	2.31	0.1-12.0	201

Table 21. Distribution of weight for 201 microscopically retouched flakes from MjVl-1, arranged by period.

--Stone Type--

Period		1	2a	2b	2c	2d	2e	3b	4a	4b	5	10a	10b	11b	15	16	Totals
Hist.	W100			3	6	2	2		1			2		1		1	18
	E100		6	4	1	6						1		1			19
	Total		6	7	7	8	2		1			3		2		1	37
Late Prehistoric	W700			12		1	1										14
	W600	2		4	4												10
	W400			3	3											2	8
	W300			4	1	1							1		1		8
	W100		3	12	12	4					1					1	33
	E100		3	5	2	4											14
	1A		2	11	11	3		1			2						30
	Total	2	8	51	33	13	1	1			3		1		1	3	117
Early Pre.	W400			1	2	1											4
	W100			1													1
	E100			1													1
	1A	1	5	12	12	6		2		1	2						41
	Total	1	5	15	14	7		2		1	2						47
	Totals	3	19	73	54	28	3	3	1	1	5	3	1	2	1	4	201

Table 22. Distribution of stone type for 201 microscopically retouched flakes from MjVl-1, arranged by period.

Period	Block	No.	Weight	Mean Weight	Range	Length	Mean Length	Range	Width	Mean Width	Range	Thick.	Mean Thick.	Range
L. Pre.	W600	2	6.6	3.30	3-4	37.1	18.55	17-20	51.3	25.65	23-29	18.0	9.00	5-13
	W400	1	0.5	0.50	-	12.8	12.80	-	14.0	14.00	-	2.8	2.80	-
	1A	11	34.4	3.13	1-8	230.4	20.95	12-35	234.1	21.28	8-34	61.7	5.61	3-9
	Total	14	41.5	2.96	1-8	280.3	20.02	12-35	299.4	21.39	8-34	82.5	5.89	3-13
E. P.	W300	1	9.5	9.50	-	40.7	40.70	-	29.3	29.30	-	7.4	7.40	-
	1A	13	34.2	2.63	1-10	249.3	19.18	8-36	247.5	19.04	9-40	62.6	4.82	2-10
	Total	14	43.7	3.12	1-10	290.0	20.71	8-41	276.8	19.77	9-40	70.0	5.00	2-10
	Totals	28	85.2	3.04	1-10	570.3	20.37	8-41	576.2	20.58	8-40	152.5	5.45	2-13

		Dorsal									Ventral										Stone Type					
		P	P/L	L	L/D	D	D/R	R	R/P	2M	P	P/L	L	L/D	D	D/R	R	R/P	2M	Total	1	2a	2b	2c	5	Total
L. Pre.	W600																1		1	2	1		1			2
	W400			1																1				1		1
	1A				1			3		1	1		1	1		1	2			11		1	7	3		11
	Total			1	1			3		1	1		1	1		1	3		1	14	1	1	8	4		14
E. P.	W300			1																1			1			1
	1A	3	1	1	1	2					2		2					1		13			6	5	2	13
	Total	3	1	2	1	2					2		2					1		14			7	5	2	14
	Totals	3	1	3	2	2		3		1	3		3	1		1	3	1	1	28	1	1	15	9	2	28

Table 23. Distribution of metric and non-metric data for 28 thinned flakes from MjVl-1, arranged by period.

Three categories of unshaped flakes were distinguished on the basis of the characteristics of the retouch scars. Unshaped flakes rarely have retouch scars greater than one mm. in length, but the retouch scars may be continuous or discontinuous, adjacent or overlapping, and may form various angles with the unmodified face.

8. *Thinned Flakes.* Flakes with margins modified by retouch scars forming angles of less than 45° with the unmodified face are classified in this category since the effect of the modification is to thin the margin. The length of the scars may be quite variable on such margins, but the distribution of the scars is usually continuous. Metric and non-metric data are provided in Table 23 for 28 thinned flakes (see also Morlan 1971: Table 100).

9. *Nicked Flakes.* Retouch scars forming angles of greater than 45° with the unmodified face have the effect of thickening the modified margin. If the scars are discontinuous or adjacent the specimen is classified as a nicked flake. Often the scars are highly variable in size, and denticulate or serrated margins are fairly common in this class. Metric and non-metric data are provided in Tables 24-26 for 117 nicked flakes (see also Morlan 1971: Table 101).

10. *Blunted Flakes.* Thickened margins characterized by continuous, usually overlapping retouch scars are found on blunted flakes. Metric and non-metric data are provided in Tables 27-29 for 286 blunted flakes (see also Morlan 1971: Table 102).

Period	Block	No.	Weight	Mean Weight	Range	Length	Mean Length	Range	Width	Mean Width	Range	Thick.	Mean Thick.	Range
Historic	W100	4	12.2	3.05	1-5	93.9	23.48	20-26	110.5	27.63	16-41	24.7	6.18	3-12
	E100	7	20.3	2.90	1-7	149.2	21.31	9-33	166.7	23.81	8-34	39.6	5.66	3-8
	E300	2	20.0	10.00	1-19	45.1	22.55	10-35	62.0	31.00	18-44	15.6	7.80	5-11
	Total	13	52.5	4.04	1-19	288.2	22.17	9-35	339.2	26.09	8-44	79.9	6.15	3-12
Late Prehistoric	W700	2	2.9	1.45	1-2	46.8	23.40	20-27	19.0	9.50	6-13	7.5	3.75	2-5
	W600	3	5.3	1.77	1-4	42.7	14.23	8-22	58.2	19.40	8-33	13.3	4.43	3-6
	W400	1	4.7	4.70	-	40.3	40.30	-	19.0	19.00	-	4.5	4.50	-
	W300	2	10.0	5.00	1-10	60.5	30.25	21-39	47.8	23.90	7-41	10.8	5.40	5-6
	W100	8	25.9	3.24	1-9	161.8	20.23	10-33	157.3	19.66	9-41	51.7	6.46	2-14
	E100	3	26.6	8.87	3-15	78.3	26.10	21-30	115.7	38.57	27-56	22.8	7.60	5-9
	1A	15	33.3	2.22	1-5	277.3	18.49	10-32	277.5	18.50	10-30	81.6	5.44	3-14
	Total	34	108.7	3.20	1-15	707.7	20.81	8-40	694.5	20.43	6-56	192.2	5.65	2-14
Early Pre.	W700	2	2.2	1.10	-	26.9	13.45	13-14	27.6	13.80	-	8.0	4.00	-
	W400	1	2.2	2.20	-	17.7	17.70	-	26.7	26.70	-	6.2	6.20	-
	W100	1	4.6	4.60	-	26.7	26.70	-	20.8	20.80	-	8.4	8.40	-
	1A	66	218.9	3.32	1-14	1444.0	21.88	9-42	1265.7	19.18	7-52	395.7	6.00	2-12
	Total	70	227.9	3.26	1-14	1515.3	21.65	9-42	1339.8	19.13	7-52	418.3	5.96	2-12
	Totals	117	389.1	3.34	1-19	2511.2	21.46	8-42	2373.5	20.21	6-56	690.4	5.90	2-14

Table 24. Distribution of metric data for 117 nicked flakes from MjVl-1, arranged by period.

		Dorsal								Ventral										
		P	P/L	L	L/D	D	D/R	R	R/P	P	P/L	L	L/D	D	D/R	R	R/P	2M	3M	Totals
Historic	W100				1	2											1			4
	E100		1	1		1	1	1							1			1		7
	E300					2														2
	Total		1	1	1	5	1	1							1		1	1		13
Late Prehistoric	W700			1		1														2
	W600					3														3
	W400			1																1
	W300							1										1		2
	W100				1	3		1										2	1	8
	E100					2												1		3
	1A				1	3		2				1		1	1	1		5		15
	Total			2	2	12		4				1		1	1	1		9	1	34
Early Pre.	W700					1										1				2
	W400					1														1
	W100					1														1
	1A	1		8	1	10	1	10		1		3		7		6		17	1	66
	Total	1		8	1	13	1	10		1		3		7		7		17	1	70
	Totals	1	1	11	4	30	2	15		1		4		8	2	8	1	27	2	117

Table 25. Distribution of marginal retouch for 117 nicked flakes from MjVl-1, arranged by period.

Period	Unit	1	2a	2b	2c	2d	3b	4a	5	6	7	11a	11c	Totals
		--Stone Type--												
Historic	W100		1	3										4
	E100		3		2			1		1				7
	E300			2										2
	Total		4	5	2			1		1				13
Late Prehistoric	W700			1	1									2
	W600				2							1		3
	W400				1									1
	W300			2										2
	W100	1		5	1				1					8
	E100		1								2			3
	1A			8	5	1	1							15
	Total	1	1	16	10	1	1		1		2	1		34
Early Pre.	W700			2										2
	W400			1										1
	W100			1										1
	1A	1	2	18	20	10	7	1	6				1	66
	Total	1	2	22	20	10	7	1	6				1	70
	Totals	2	7	43	32	11	8	2	7	1	2	1	1	117

Table 26. Distribution of stone type for 117 nicked flakes from MjVl-1, arranged by period.

Period	Block	No.	Weight	Mean Weight	Range	Length	Mean Length	Range	Width	Mean Width	Range	Thick.	Mean Thick.	Range
Historic	W100	18	33.6	1.87	1-6	335.3	18.63	10-34	319.1	17.73	9-30	85.8	4.77	2-11
	E100	16	48.5	3.03	1-22	290.3	18.14	9-40	320.0	20.00	8-59	71.9	4.49	1-14
	E300	5	8.7	1.74	1-4	90.5	18.10	9-27	59.9	11.98	4-22	18.2	3.54	2-6
	Total	39	90.8	2.33	1-22	716.1	18.36	9-40	699.0	17.92	4-59	175.9	4.51	1-14
Late Prehistoric	W700	14	23.5	1.68	1-7	235.6	16.83	5-35	235.4	16.81	8-42	46.3	3.31	1-9
	W600	7	17.0	2.43	1-7	148.7	21.24	15-33	125.2	17.89	13-23	41.4	5.91	2-12
	W400	6	20.3	3.38	1-8	121.5	20.25	14-33	119.0	19.83	7-35	34.8	5.80	2-12
	W300	11	34.5	3.14	1-9	225.1	20.46	5-41	208.1	18.91	6-30	76.7	6.97	2-13
	W100	17	28.9	1.70	1-12	237.4	13.96	4-29	273.3	16.08	6-38	64.4	3.79	2-11
	E100	24	46.0	1.92	1-6	399.1	16.63	8-40	358.7	14.95	5-33	101.5	4.23	1-10
	1A	49	113.6	2.32	1-10	900.9	18.39	6-30	891.0	18.18	6-35	215.7	4.40	1-11
	Total	128	283.8	2.22	1-12	2268.3	17.67	4-41	2230.7	17.43	5-42	580.8	4.54	1-13
Early Prehist.	W700	1	1.0	1.00	-	12.1	12.10	-	10.7	10.70	-	2.8	2.80	-
	W400	4	13.4	3.35	1-8	87.3	21.83	12-32	84.2	21.05	17-24	20.6	5.15	2-11
	W300	1	7.1	7.10	-	31.6	31.60	-	22.9	22.90	-	10.7	10.70	-
	W100	3	6.7	2.23	2-3	58.6	19.53	16-24	53.5	17.83	9-24	21.2	7.07	6-9
	E100	1	1.1	1.10	-	14.8	14.80	-	17.8	17.80	-	3.5	3.50	-
	1A	109	329.8	3.03	1-27	2209.3	20.27	3-49	2143.5	19.67	5-51	594.9	5.46	1-14
	Total	119	359.1	3.02	1-27	2413.7	20.28	3-49	2332.6	19.60	5-51	653.7	5.49	1-14
	Totals	286	753.7	2.64	1-27	5398.1	18.87	3-49	5262.3	18.40	4-59	1410.4	4.93	1-14

Table 27. Distribution of metric data for 286 blunted flakes from MjVl-1, arranged by period.

		Dorsal								Ventral										
		P	P/L	L	L/D	D	D/R	R	R/P	P	P/L	L	L/D	D	D/R	R	R/P	2M	3M	Totals
Historic	W100			4	2	4	1			2			1			2		2		18
	E100				1	4		5				1		1		2		2		16
	E300			1		1		2										1		5
	Total			5	3	9	1	7		2		1	1	1		4		5		39
Late Prehistoric	W700			1	1	7		1		1				1				2		14
	W600			1		2		1				2		1						7
	W400					2							1	1				2		6
	W300			1		3	1						1	2	1			2		11
	W100			2		9	1	1	1					3						17
	E100	1		2	1	9		5	1		1	1				1		2		24
	1A	1		4	2	17	2	3	1		1	2	1	5		3	1	6		49
	Total	2		11	4	49	4	11	3	1	2	5	3	13	1	4	1	14		128
Early Prehist.	W700					1														1
	W400			2														2		4
	W300																		1	1
	W100			1		1								1						3
	E100													1						1
	1A	2	2	10	5	22	1	13			1	8	4	9	1	5	1	22	3	109
	Total	2	2	13	5	24	1	13			1	8	4	11	1	5	1	24	4	119
	Totals	4	2	29	12	82	6	31	3	3	3	14	8	25	2	13	2	43	4	286

Table 28. Distribution of marginal retouch for 286 blunted flakes from MjVl-1, arranged by period.

		--Stone Type--																
		1	2a	2b	2c	2d	2e	2f	3a	3b	4a	5	10b	11a	11b	11c	16	Totfls
Historic	W100		2	6	3	4						1			2			18
	E100		1	6	4	2						1				2		16
	E300		1	2	1	1												5
	Total		4	14	8	7						2			2	2		39
Late Prehistoric	W700			9	2	2		1										14
	W600	1		1	3				1								1	7
	W400			1	5													6
	W300			3	3	3			1					1				11
	W100		1	9	5		1				1							17
	E100		3	12	6	1	1						1					24
	1A	1	4	21	10	5	1				1	5			1			49
	Total	2	8	56	34	11	3	1	2		2	5	1	1	1		1	128
Early Prehist.	W700			1														1
	W400			2	1												1	4
	W300			1														1
	W100				3													3
	E100			1														1
	1A		8	41	35	14				4		7						109
	Total		8	46	39	14				4		7					1	119
	Totals	2	20	116	81	32	3	1	2	4	2	14	1	1	3	2	2	286

Table 29. Distribution of stone type for 286 blunted flakes from MjVl-1, arranged by period.

11. *Rough Shaped Flakes.* A few relatively large specimens, of low-grade cherts or quartzites, are characterized by irregular, non-uniform retouch scars and rough, poorly shaped margins. These do not conveniently fit into the other classes of shaped flakes. Metric and non-metric data for five such flakes are provided in Table 30 (see also Morlan 1971 : Table 103).

12. *Poorly Shaped Flakes.* Some of the shaped flakes are characterized by short (< 1 mm.) retouch scars which are distributed rather irregularly so that the thickened margin is poorly formed. Six types of poorly shaped flakes were defined on the basis of the distribution of retouch. Metric and non-metric data for 29 poorly shaped flakes are provided in Table 31 (see also Morlan 1971 : Table 104).

13. *Well Shaped Flakes.* Retouch scars of intermediate length (1-2 mm) consistently were found on well formed thickened margins with continuous, if restricted, retouch. As in the case of poorly shaped flakes, the distribution of retouch on the margins of the flakes varies considerably, and more than one margin may be modified. Eight types of well shaped flakes were defined on the basis of the distribution of retouch scars, but this procedure had the unfortunate effect of subdividing the sample into such small lots that comparisons of their characteristics are not very meaningful. One of the type VII specimens is illustrated as Fig. 24a. Metric and non-metric data for 54 well shaped flakes are provided in Table 32 (see also Morlan 1971 : Table 105).

Period	Block	No.	Weight	Mean Weight	Range	Length	Mean Length	Range	Width	Mean Width	Range	Thick.	Mean Thick.	Range
Hist.	W100	1	14.4	14.40	-	37.6	37.60	-	35.7	35.70	-	11.7	11.70	-
Hist.	E100	1	18.5	18.50	-	41.6	41.60	-	30.6	30.60	-	11.5	11.50	-
Hist.	Total	2	32.9	16.45	14-19	79.2	39.60	38-42	66.3	33.15	31-36	23.2	11.60	-
L. P.	W100	1	8.4	8.40	-	29.7	29.70	-	30.1	30.10	-	8.7	8.70	-
E. P.	W100	2	41.7	20.85	9-33	74.0	37.00	32-42	73.9	36.45	27-47	31.2	15.60	8-23
	Totals	5	83.0	16.60	8-33	182.9	36.58	30-42	170.3	34.06	27-47	63.4	12.68	8-23

		--Marginal Retouch--																		Stone Type			
		Dorsal								Ventral													
Period	Block	P	P/L	L	L/D	D	D/R	R	R/P	P	P/L	L	L/D	D	D/R	R	R/P	2M	Totals	2b	2c	11b	Totals
Hist.	W100														1				1	1			1
Hist.	E100													1					1	1			1
Hist.	Total													1	1				2	2			2
L. P.	W100							1											1			1	1
E. P.	W100																	2	2	1	1		2
	Totals							1						1	1			2	5	3	1	1	5

Table 30. Distribution of metric and non-metric data for five roughly shaped flakes from MjVl-1, arranged by period.

Period	Block	No.	Weight	Mean Weight	Range	Length	Mean Length	Range	Width	Mean Width	Range	Thick.	Mean Thick.	Range
Type I: flakes with one concave modified margin.														
H.	E100	1	2.1	2.10	-	25.0	25.00	-	18.5	18.50	-	3.2	3.20	-
L. P.	W100	1	1.6	1.60	-	20.3	20.30	-	19.4	19.40	-	4.2	4.20	-
E. P.	1A	3	7.0	2.33	1-3	67.3	22.43	15-29	54.9	18.30	17-19	15.8	5.27	5-7
Type II: flakes with one straight modified margin.														
H.	W100	1	1.3	1.30	-	14.1	14.10	-	23.0	23.00	-	3.1	3.10	-
L. P.	W700	1	0.4	0.40	-	9.4	9.40	-	9.4	9.40	-	2.2	2.20	-
L. P.	W100	4	1.7	0.43	-	42.9	10.73	10-12	48.8	12.20	9-17	13.0	3.25	2-6
L. P.	1A	1	0.5	0.50	-	13.6	13.60	-	10.7	10.70	-	3.8	3.80	-
L. P.	Total	6	2.6	0.43	-	65.9	10.98	9-14	68.9	11.48	9-17	19.0	3.17	2-6
E. P.	W300	1	0.4	0.40	-	7.1	7.10	-	10.8	10.80	-	1.8	1.80	-
Type III: flakes with one convex modified margin.														
L. P.	W400	1	1.3	1.30	-	15.3	15.30	-	18.6	18.60	-	3.4	3.40	-
L. P.	1A	1	4.6	4.60	-	19.1	19.10	-	36.2	36.20	-	9.7	9.70	-
L. P.	Total	2	5.9	2.95	1-5	34.4	17.20	15-19	54.8	27.40	19-36	13.1	6.55	3-10
Type IV: flakes with retouch associated with a point.														
L. P.	1A	4	5.5	1.38	1-2	74.4	18.60	14-24	73.8	18.45	14-25	14.1	3.53	2-5
E. P.	W300	1	1.7	1.70	-	29.1	29.10	-	15.4	15.40	-	2.9	2.90	-
E. P.	1A	1	1.5	1.50	-	17.1	17.10	-	18.5	18.50	-	5.0	5.00	-
E. P.	Total	2	3.2	1.60	-	46.2	23.10	17-29	33.9	16.95	15-19	7.9	3.95	3-5
Type V: flakes retouched on opposite margins of the same face.														
L. P.	1A	1	1.0	1.00	-	13.6	13.60	-	15.8	15.80	-	4.4	4.40	-
E. P.	1A	5	8.0	1.60	1-3	98.0	19.60	15-27	91.3	18.26	13-24	16.2	3.24	2-4
Type VI: flakes retouched on left dorsal and right ventral margins.														
L. P.	W100	1	1.0	1.00	-	17.1	17.10	-	17.2	17.20	-	2.7	2.70	-
E. P.	1A	1	0.9	0.90	-	11.7	11.70	-	13.3	13.30	-	4.2	4.20	-

Table 31. Distribution of metric data and stone type for 29 poorly shaped flakes from MjVl-1, arranged by period.

Type/ Period	No.	Weight	Mean Weight	Range	Length	Mean Length	Range	Width	Mean Width	Range	Thick.	Mean Thick.	Range
Type I	5	10.7	2.14	1-3	112.6	22.52	15-29	92.8	18.56	17-19	23.2	4.64	3-7
Type II	8	4.3	0.54	-	87.1	10.89	7-14	102.7	12.84	9-23	23.9	2.99	2-6
Type III	2	5.9	2.95	1-5	34.4	17.20	15-19	54.8	27.40	19-36	13.1	6.55	3-10
Type IV	6	8.7	1.45	1-2	120.6	20.10	14-29	107.7	17.95	14-25	22.0	3.67	2-5
Type V	6	9.0	1.50	1-3	111.6	18.60	14-27	107.1	17.85	13-24	20.6	3.43	2-4
Type VI	2	1.9	0.95	-	28.8	14.40	12-17	30.5	15.25	13-17	6.9	3.45	3-4
Total	29	40.5	1.39	1-5	495.1	17.07	7-29	495.6	17.09	9-36	109.7	3.78	2-10
Hist.	2	3.4	1.70	1-2	39.1	19.55	14-25	41.5	20.75	19-23	6.3	3.15	-
L. P.	15	17.6	1.17	1-5	225.7	15.05	9-24	249.9	16.66	9-36	57.5	3.83	2-10
E. P.	12	19.5	1.63	1-3	230.3	19.19	7-29	204.2	17.02	11-24	45.9	3.83	2-7
Total	29	40.5	1.39	1-5	495.1	17.07	7-29	495.6	17.09	9-36	109.7	3.78	2-10

	--Stone Type--							
	1	2a	2b	2c	2d	3b	5	Totals
Type I	1		2	1		1		5
Type II		1	5	1			1	8
Type III				2				2
Type IV			2	4				6
Type V			4	1	1			6
Type VI			2					2
Total	1	1	15	9	1	1	1	29
Hist.		1		1				2
L. P.	1		6	7			1	15
E. P.			9	1	1	1		12
Total	1	1	15	9	1	1	1	29

Table 31 (Continued).

Period	Block	No.	Weight	Mean Weight	Range	Length	Mean Length	Range	Width	Mean Width	Range	Thick.	Mean Thick.	Range
	Type I: flakes with one straight modified margin.													
Hist.	W100	1	6.2	6.20	-	34.3	34.30	-	19.7	19.70	-	6.9	6.90	-
	E300	1	13.1	13.10	-	49.5	49.50	-	31.1	31.10	-	10.9	10.90	-
	Total	2	19.3	9.65	6-13	83.8	41.90	34-50	50.8	25.40	20-31	17.8	8.90	7-11
L. P.	W700	1	0.5	0.50	-	10.9	10.90	-	15.9	15.90	-	2.3	2.30	-
	1A	1	2.6	2.60	-	15.5	15.50	-	32.8	32.80	-	5.0	5.00	-
	Total	2	3.1	1.55	1-3	26.4	13.20	11-16	48.7	24.35	16-33	7.3	3.65	2-5
E. P.	W300	1	5.8	5.80	-	26.9	26.90	-	27.2	27.20	-	7.2	7.20	-
	E300	1	3.9	3.90	-	21.5	21.50	-	29.5	29.50	-	6.1	6.10	-
	1A	6	26.7	4.45	1-6	194.2	32.72	11-47	123.6	20.60	11-34	45.4	7.57	5-10
	Total	8	36.4	4.30	1-6	242.6	30.33	11-47	180.3	22.54	11-34	58.7	7.34	5-10
	Type II: flakes with one concave modified margin.													
L. P.	1A	2	2.2	1.10	1-2	30.8	15.40	11-20	35.2	17.60	16-19	6.5	3.25	3-4
E. P.	1A	4	14.3	3.58	1-10	83.2	20.80	15-26	74.4	18.60	13-31	23.0	5.75	2-11
	Type III: flakes retouched on opposite margins of the same face.													
L. P.	W100	1	2.2	2.20	-	31.1	31.10	-	19.2	19.20	-	3.3	3.30	-
	1A	1	0.8	0.80	-	18.9	18.90	-	15.3	15.30	-	2.2	2.20	-
	Total	2	3.0	1.50	1-2	50.0	25.00	19-31	34.5	17.25	15-19	5.5	2.75	2-3
E. P.	1A	3	5.2	1.73	1-3	71.9	23.97	18-28	44.8	14.93	10-20	12.4	4.13	2-7
	Type IV: flakes retouched dorsally on one margin, ventrally on the opposite margin.													
E. P.	W700	1	3.3	3.30	-	31.7	31.70	-	16.9	16.90	-	4.6	4.60	-
	1A	4	7.4	1.85	1-4	93.2	23.30	16-32	75.1	18.78	12-28	14.7	3.68	3-5
	Total	5	10.7	2.14	1-4	124.9	24.98	16-32	92.0	18.40	12-28	19.3	3.86	3-5

Table 32. Distribution of metric data and stone type for 54 well shaped flakes from MjVl-1, arranged by period.

	Block	No.	Weight	Mean Weight	Range	Length	Mean Length	Range	Width	Mean Width	Range	Thick.	Mean Thick.	Range
	Type V: flakes with retouch on one face associated with a point.													
H.	E100	1	5.3	5.30	-	25.5	25.50	-	26.1	26.10	-	11.2	11.20	-
L. P.	1A	2	6.1	3.05	3-4	49.6	24.80	24-26	40.9	20.45	17-25	10.2	5.10	4-6
E. P.	1A	10	29.4	2.94	1-8	236.8	23.68	16-32	234.5	23.45	13-35	56.4	5.64	2-9
	Type VI: flakes with points retouched on opposing faces of opposing margins.													
L. Pre.	W700	1	2.3	2.30	-	19.9	19.90	-	23.0	23.00	-	4.6	4.60	-
L. Pre.	W300	1	1.8	1.80	-	17.3	17.30	-	26.5	26.50	-	5.3	5.30	-
L. Pre.	1A	1	1.9	1.90	-	27.0	27.00	-	17.8	17.80	-	3.3	3.30	-
L. Pre.	Total	3	6.0	2.00	-	64.2	21.40	17-27	67.3	22.43	18-27	13.2	4.40	3-5
	Type VII: flakes with a notch retouched in one margin.													
L. Pre.	W700	1	2.6	2.60	-	23.5	23.50	-	27.1	27.10	-	6.3	6.30	-
L. Pre.	W100	1	1.6	1.60	-	22.1	22.10	-	17.4	17.40	-	3.7	3.70	-
L. Pre.	1A	1	1.0	1.00	-	16.0	16.00	-	15.8	15.80	-	2.6	2.60	-
L. Pre.	Total	3	5.2	1.73	1-3	61.6	20.53	16-24	60.3	20.10	16-27	12.6	4.20	3-6
E. Pre.	E300	1	2.2	2.20	-	23.2	23.20	-	25.1	25.10	-	4.8	4.80	-
E. Pre.	1A	4	8.1	2.03	1-5	74.7	18.68	12-29	66.8	16.70	6-34	16.1	4.03	2-6
E. Pre.	Total	5	10.3	2.06	1-5	97.9	19.58	12-29	91.9	18.38	6-34	20.9	4.18	2-6
	Type VIII: miscellaneous well shaped flakes.													
H.	W100	1	1.4	1.40	-	27.4	27.40	-	16.3	16.30	-	3.4	3.40	-
L. P.	W400	1	2.6	2.60	-	17.1	17.10	-	29.5	29.50	-	7.2	7.20	-

Table 32 (Continued).

Type/ Period	No.	Weight	Mean Weight	Range	Length	Mean Length	Range	Width	Mean Width	Range	Thick.	Mean Thick.	Range
Type I	12	58.8	4.90	1-13	352.8	29.40	11-50	279.8	23.32	11-34	83.8	6.98	2-11
Type II	6	16.5	2.75	1-10	114.0	19.00	11-26	109.6	18.27	13-31	29.5	4.75	2-11
Type III	5	8.2	1.64	1-3	121.9	24.58	18-31	79.3	15.86	10-20	17.9	3.58	2-7
Type IV	5	10.7	2.14	1-4	124.9	24.98	16-32	92.0	18.40	12-28	19.3	3.86	3-5
Type V	13	40.8	3.14	1-8	311.9	23.99	16-32	301.5	23.19	13-35	77.8	5.98	2-11
Type VI	3	6.0	2.00	-	64.2	21.40	17-27	67.3	22.43	18-27	13.2	4.40	3-5
Type VII	8	15.5	1.94	1-5	159.5	19.94	12-29	152.2	19.03	6-34	33.5	4.19	2-6
Type VIII	2	4.0	2.00	1-3	44.5	22.25	17-27	45.8	22.90	16-30	10.6	5.30	3-7
Total	54	160.5	2.97	1-13	1293.7	23.96	11-50	1127.5	20.88	6-35	285.6	5.29	2-11
Hist.	4	26.0	6.50	1-13	136.7	34.18	26-50	93.2	23.30	16-31	32.4	8.10	3-11
L. P.	15	28.2	1.88	1-4	299.7	19.98	11-31	316.4	21.09	15-33	62.5	4.17	2-7
E. P.	35	106.3	3.04	1-10	857.3	24.49	11-47	717.9	20.50	6-35	190.7	5.45	2-11
Total	54	160.5	2.97	1-13	1293.7	23.96	11-50	1127.5	20.88	6-35	285.6	5.29	2-11

	--Stone Type--									
	1	2a	2b	2c	2d	2e	3b	5	11b	Totals
Type I			9	2				1		12
Type II		1	2	1	1		1			6
Type III		1	3					1		5
Type IV	1		1	3						5
Type V	1		7	3	1		1			13
Type VI		2				1				3
Type VII			4	2	1				1	8
Type VIII			2							2
Total	2	4	28	11	3	1	2	2	1	54
Hist.			4							4
L. P.		3	5	4	1	1	1			15
E. P.	2	1	19	7	2		1	2	1	35
Total	2	4	28	11	3	1	2	2	1	54

Table 32 (Continued).

14. *Scrapers*. This category contains all examples of extremely thickened, well formed margins. Any flake shaped by continuous retouch of which the scars are more than two mm. in length is classified as a scraper. Needless to say there is quite a variety of scrapers in the collections, but it was gratifying to note that the rigorous application of the retouch characteristics described here yielded a complete sorting of specimens normally called scrapers on other grounds. Hopefully this category will eventually be found to include historically significant types of artifacts, and, in that hope, the scrapers have been individually described in some detail. For the same reasons, surface finds have also been included in the descriptions. The large number of attributes to be considered for the scrapers precludes the kind of simple tabular presentation of data which has been used for other artifact classes. In addition to the usual provenience and metric data I have classified the outline and cross-section of each specimen, and each modified margin is separately described. The margin descriptions include a general adjective (e.g. steep retouch), a measurement of the margin length (M), the average length of the retouch scars (R), the angle formed by the scars and the unmodified face (θ), and other noteworthy characteristics (e.g. presence of crushing or polishing). Furthermore it seems useful

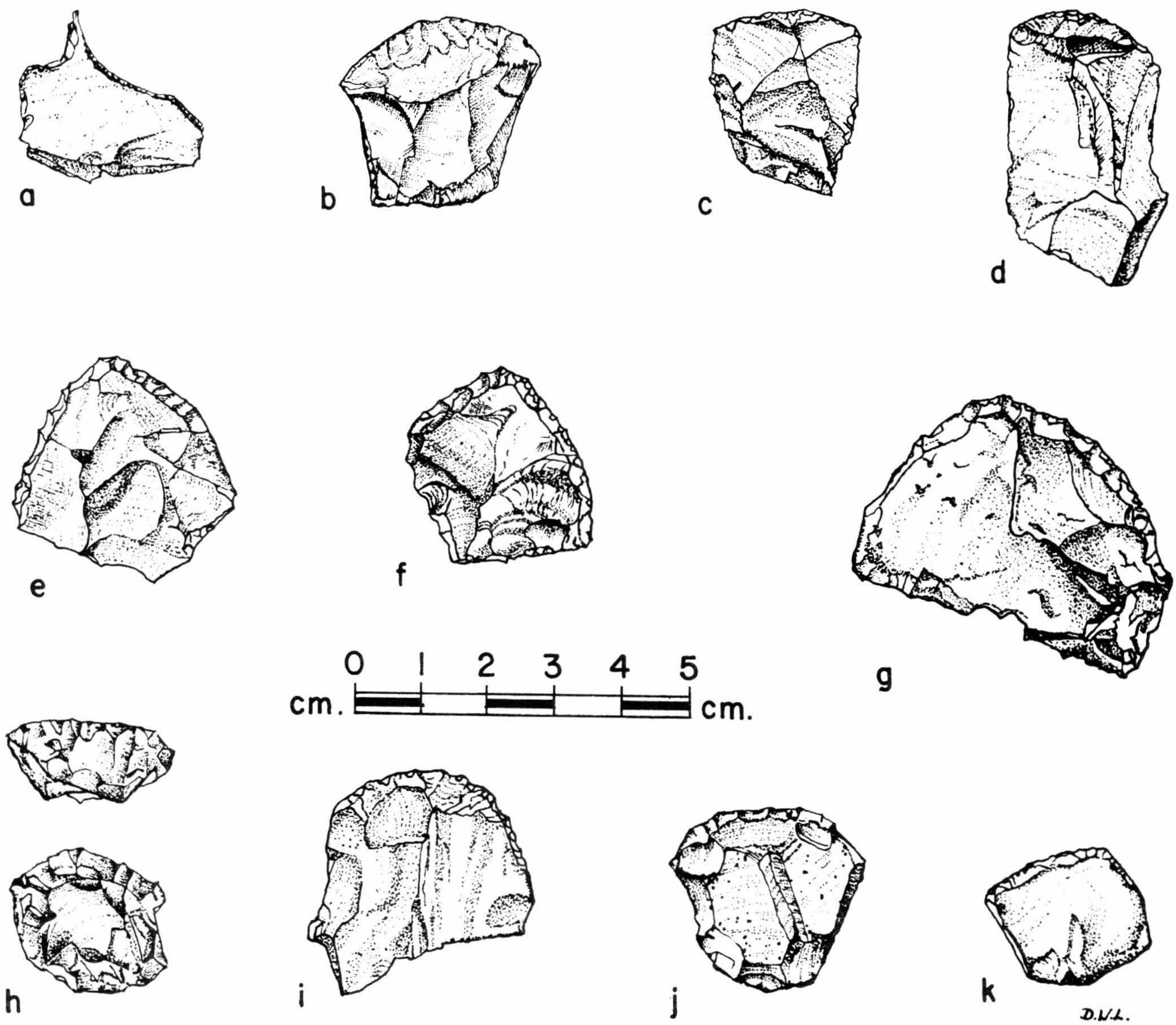


Fig. 24. Shaped flakes from MjVl-1. a, Type VII well shaped flake; b, Type I scraper; c-d, Type II scrapers; e-f, Type IIIa scrapers; g, k, Type IIIb scrapers; h-j, Type IV scrapers. National Museums of Canada Neg. No. 72-8282.

to consider the relationship between adjacent margins, particularly when both margins have been modified; for many of the specimens I have expressed this relationship as a chord angle, i.e., the angle formed by the respective chords of two adjacent margins. The scrapers have been grouped into ten types, but each specimen has been described according to the following format:

Period Layer Level Cat. No. Stone type
Weight Length Width Thickness Outline Cross-Section
Left margin: description, margin length (M), retouch scar length (R), angle with unmodified face (θ).
Distal margin:
Right margin:
Proximal margin:
Chord angles:
Other remarks:
Plate reference:

Some of the data presented in this format have also been summarized in tabular form.

Type I: end scraper with graver spur (2).

L.P. III N10/W75, L4 168 2b
8.0 26.1 29.3 9.7 Flaring Biconvex
L: Blunt dorsal.
D: Steep retouch dorsal, with steepness decreasing left to right toward the thinned graver spur. $M = 29.3$; $R = 7.1 \rightarrow 3.1$; $\theta = 81^{\circ} \rightarrow 50^{\circ}$.
R: Steep retouch dorsal with steepness and thickness increasing distal to proximal away from the spur. $M = 28.3$; $R = 0.4 \rightarrow 1.0$; $\theta = 65^{\circ} \rightarrow 83^{\circ}$.
P: Unretouched.
D/R chord angle = 82°.
Spur further thinned by two long (6.0 mm.) scars.
Plate 3a, Fig. 24b.

? ? Beach 943 2c

5.5 25.5 33.2 6.3 Trapezoidal Plano-convex

L: Unretouched

D: Ventral notch, 7.9 mm. wide. $R = 2.2$; $\theta = 70^{\circ}$.
Steep dorsal retouch at right corner.
$M = 10.6$; $R = 3.5$; $\theta = 68^{\circ}$.

R: Steep dorsal retouch at distal corner. $M = 10.7$;
$R = 1.4$; $\theta = 83^{\circ}$.

P: Unretouched.

L/D chord angle = 65°; D/R chord angle = 77°.

The retouched corner (D/R) forms a graver spur with an angle of 87° at the tip.

Type II: snub-nosed end or side scrapers (5).

L.P. A Test A, L2, ca. 12" 25 2b

3.6 22.5 19.2 4.4 Rectangular Biplano

L: Burinated twice. $M = 20.4$.

D: Steep dorsal retouch. $M = 14.8$; $R = 3.5$; $\theta = 83^{\circ}$.

R: Steep dorsal retouch. $M = 19.8$; $R = 1.8$; $\theta = 82^{\circ}$.

P: Unretouched.

D/R chord angle = 90^{0}.

Plate 3k.

E.P. VI Sq. 4, L7 1A 237 2b

1.3 11.9 18.6 4.9 Expanding Plano-Convex

L: Snapped.

D: Steep dorsal retouch. $M = 18.6$; $R = 3.5$; $\theta = 80^{\circ}$.

R: Cortical

P: Snapped.

Plate 4e.

E.P. VI Sq. 13/22, L6 1A 126 2c

6.0 25.1 22.5 9.3 Slightly expanding Plano-convex

L: Blunted dorsal.

D: Steep dorsal retouch. $M = 21.3$; R varies with thickness of cross-section, viz., $1.5 \rightarrow 6.9 \rightarrow 1.0$; $\theta = 90^{\circ}$.

R: Blunted dorsal.

P: Unretouched

Plate 4c, Fig. 24c.

E.P. VI Sq. 41/44, L6A 1A 189 2b

4.4 25.7 21.1 7.1 Rectangular Triangular

L: Steep dorsal retouch. M = 23.8; R = 3.4; $\theta = 65^{o}$.

D: Steep dorsal retouch. M = 19.7; R = 1.6 → 7.4 → 2.7; $\theta = 76^{o}$. Margin is heavily crushed.

R: Unretouched.

P: Snapped and steep dorsal retouch along 10.2 mm. of the 16.6 mm. length of the margin; R = 4.0; $\theta = 80^{o}$.

L/D chord angle = 70^{o}.

Plate 4h, Fig. 24d.

? ? Beach 941 2b

3.0 21.3 22.9 6.1 Rectangular Triangular

L: Steep dorsal retouch. M = 17.1; R = 2.6; $\theta = 81^{o}$.

D: Blunted ventral

R: Unretouched.

P: Blunted dorsal.

Type IIIa: convergent scrapers with dorsal thinning (3).

L. P. A 0-N5/W90, L1A 111 2e

7.6 29.9 28.2 8.2 Expanding Plano-convex

L: Steep dorsal retouch. M = 29.4; R = 3.5; $\theta = 70^{o}$.

D: Steep dorsal retouch. M = 27.5; R = 5.6; $\theta = 79^{o}$.

R: Unretouched.

P: Unretouched.

L/D chord angle = 68^{o}.

Plate 3d, Fig. 24e.

E.P. VI Sq. 14/23, L6 1A 267 2b

4.6 21.6 26.6 5.7 Expanding Biconvex

L: Steep dorsal retouch. M = 20.0; R = 3.0; $\theta = 82^{o}$.

D: Steep dorsal retouch. M = 26.4; R = 3.7; $\theta = 86^{o}$.

R: Steep dorsal retouch. M = 11.9; R = 2.3; $\theta = 74^{o}$.

P: Unretouched.

L/D chord angle = 65^{o}; D/R chord angle = 80^{o}.

Plate 4g.

? ? Beach 756 2b
6.6 27.1 25.5 6.8 Rectangular Biplano
L: Steep dorsal retouch. M = 28.6; R = 3.8; $\theta = 69^{o}$.
D: Steep dorsal retouch. M = 18.5; R = 4.3; $\theta = 85^{o}$;
R: Thinned dorsal. M = 19.4; R = 2.4; $\theta = 45^{o}$.
P: Unretouched.
L/D chord angle = 85^{o}; D/R chord angle = 110^{o}.
Plate 3c, Fig. 24f.

Type IIIb: convergent scrapers without dorsal thinning (2).

L.P. A S5-10/W95, L1A 89 2c
3.9 22.0 20.6 7.7 Rectangular Biconvex
L: Steep ventral retouch. M = 20.9; R = 2.6; $\theta = 74^{o}$.
D: Steep ventral retouch. M = 16.6; R = 1.6; $\theta = 71^{o}$.
R: Flat and cortical.
P: Unretouched.
L/D chord angle = 95^{o}.
Plate 3b, Fig. 24k.

E.P. VI Sq. 12/21, L6 1A 93 2b
14.6 46.0 32.1 8.7 Expanding Biplano
L: Steep dorsal retouch. M = 38.3; R = 3.5; $\theta = 75^{o}$.
D: Steep dorsal retouch. M = 32.6; R = 4.2; $\theta = 85^{o}$.
R: Burinated three times on D/R corner to thin half of ventral face to 4.0 mm.
P: Unretouched.
L/D chord angle = 85^{o}.
Plate 4c, Fig. 24g.

Type IV: round-nosed end scrapers (11).

L.P. IIIb D2: N20/E60, L6 1793 2b
5.5 19.9 22.4 9.6 Rectangular Plano-convex
L: Burin facet, 8.6 mm. long, proximal to distal.
D: Steep dorsal retouch. M = 21.3; R = 8.1; $\theta = 82^{o}$.
R: Unretouched.
P: Thinned on bulb of percussion.
Plate 3h, Fig. 24h.

L.P. B N20-25/0, L2 253 5
9.7 35.5 32.2 10.2 Rectangular Plano-convex
L: Blunted dorsal.
D: Steep dorsal retouch. M = 29.2; R = 4.3; $\theta = 72^{o}$.
R: Unretouched.
P: Snapped.
Plate 3g, Fig. 24i.

L.P. III Sq. 6, L3 1A 358 1
0.6 16.7 8.0 2.9 Triangular Biplano
L: Snapped.
D: Unretouched.
R: Steep dorsal retouch. M = 16.3; R = 3.9; $\theta = 51^{o}$.
P: Snapped and blunted ventral.

E.P. C 0-N5/W100, L4A 40 3b
4.5 25.3 23.3 7.3 Expanding Triangular
L: Unretouched.
D: Steep dorsal retouch. M = 20.7; R = 4.1; $\theta = 82^{o}$.
R: Nicked ventral.
P: Snapped.

E.P. V Sq. 41/44, L5 1A 170 2b

5.3 27.5 24.4 6.6 Expanding Plano-convex

L: Unretouched.

D: Cortical.

R: Steep dorsal retouch. M = 26.0; R = 4.7; $\theta = 75^{\circ}$.

P: Unretouched.

Plate 4b.

E.P. VI Sq. 4, L7 1A 216 2b

28.1 50.4 48.3 12.4 Expanding Plano-convex

L: Blunted dorsal.

D: Steep dorsal retouch. M = 44.8; R = 2.7; $\theta = 65^{\circ}$.

R: Rough, irregular dorsal retouch. M = 33.7; R = 4.3; $\theta = 61^{\circ}$.

P: One ventral thinning flake on bulb of percussion.

D/R chord angle = 82°.

Plate 4a.

E.P. VI Sq. 9, L7 1A 461 2b

3.4 21.7 25.7 7.0 Expanding Plano-convex

L: Snapped.

D: M = 25.7. Steep dorsal retouch along 19.4 mm R = 3.2; $\theta = 75^{\circ}$. Remainder is cortical with ventral blunting.

R: Blunted ventral.

P: Unretouched.

Plate 4j.

E.P. VI Sq. 13/22, L6A 1A 130 2c

5.6 25.9 28.5 5.4 Expanding Plano-convex

L: Nicked dorsal.

D: Steep dorsal retouch. M = 28.5; R = 2.6; $\theta = 65^{\circ}$.

R: Blunted dorsal.

P: Unretouched.

Plate 4k, Fig. 24j.

E.P. VI Sq. 15/24, L6 1A 283 5
4.4 27.8 20.4 5.7 Rectangular Triangular
L: Steep dorsal retouch. M = 24.3; R = 1.6; $\theta = 55^{o}$.
D: Steep dorsal retouch. M = 19.5; R = 1.9; $\theta = 80^{o}$.
R: Unretouched.
P: Unretouched.

E.P. VII Sq. 11/20, L7 1A 59 2b
5.1 22.7 25.1 9.7 Rectangular Plano-convex
L: Unretouched.
D: Steep dorsal retouch. M = 24.8; R = 5.6; $\theta = 62^{o}$.
One large thinning scar ventral.
R: Roughly crushed and step flaked.
P: Snapped.
Plate 4d.

? ? Beach 766 5
4.6 25.2 24.4 7.3 Expanding Biconvex
L: Unretouched.
D: Steep dorsal retouch. M = 24.3; R = 4.6; $\theta = 84^{o}$.
R: Unretouched.
P: Unretouched.
L/D chord angle = 68^{o}; D/R chord angle = 68^{o}.

Type V: round-nosed end scrapers with dorsal keel (4).

L.P. A S5-10/W100, L1A 68 2b
16.1 43.2 33.0 15.4 Expanding Triangular
L: Snapped.
D: Steep dorsal retouch. M = 33.0; R = 12.0; $\theta = 87^{o}$.
R: Unretouched.
P: Unretouched.
Plate 3e.

E.P. V Sq. 12/21, L5 1A 85 5
6.4 37.2 14.2 10.4 Rectangular Triangular
L: Half blunted dorsal.
D: Thinned dorsal. M = 15.8; R = 10.7; $\theta = 40^{o}$.

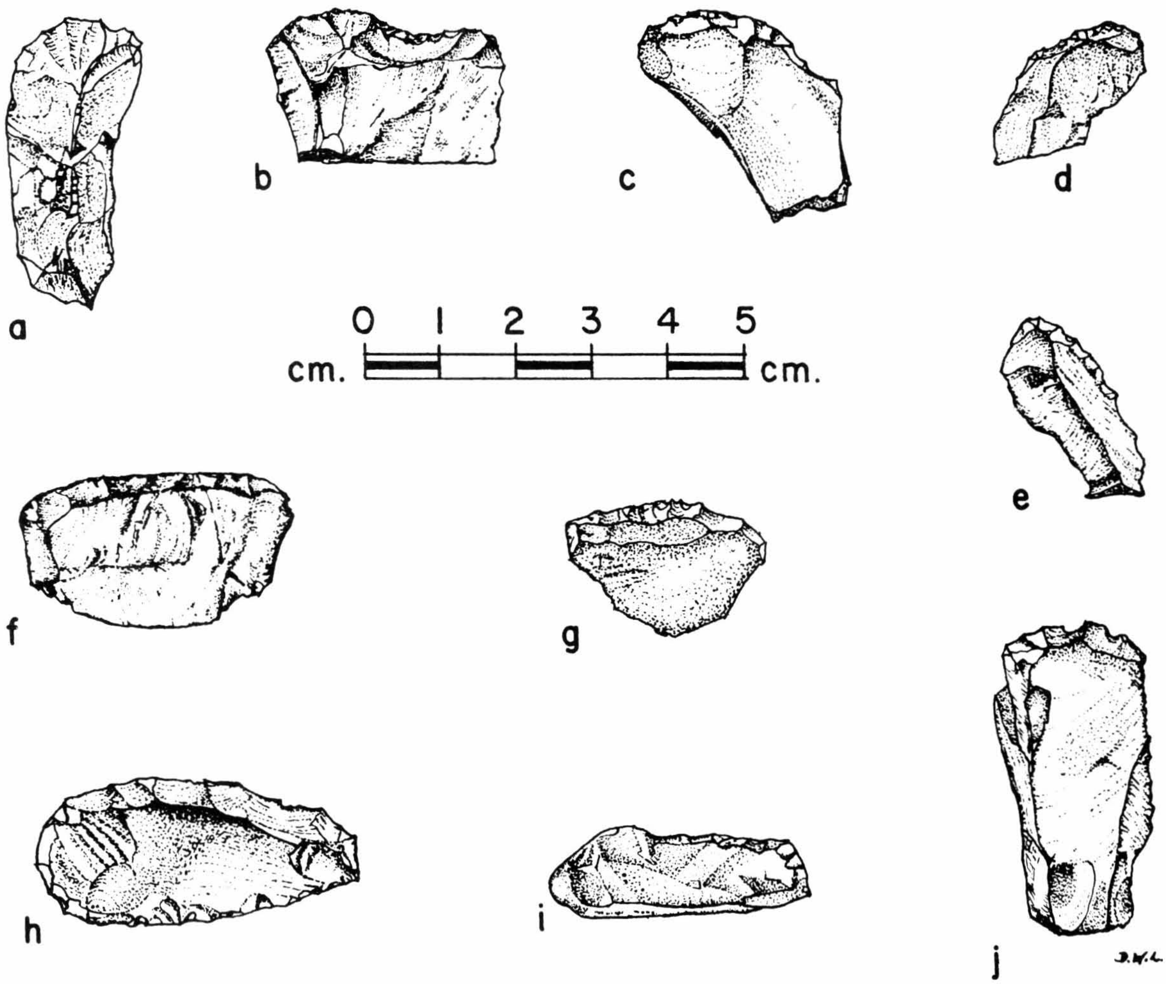


Fig. 25. Shaped flakes from MjV1-1. a, Type V scraper; b, Type VI c-e, Type VII scrapers; f-g, Type VIII scrapers; h-i, Type IX scrapers; j, Type X scraper. National Museums of Canada Neg. No. 72-8280.

R: Steep dorsal retouch and crushing. M = 29.7; R = 2.0; θ = 85°.

P: Crushed on both sides of a sharp point but otherwise unretouched.

Fig. 25a

E.P. VI Sq. 16/25, L6A 1A 323 2c

9.5 21.4 40.6 9.0 Rectangular Plano-convex

L: Snapped.

D: Nicked ventral.

R: Steep dorsal retouch. M = 19.0; R = 4.3; θ = 61°.

P: Snapped.

E.P. VI Sq. 41/44, L6A 1A 189 2b

11.0 34.8 26.4 11.3 Rectangular Triangular

L: Nicked dorsal.

D: Steep dorsal retouch. M = 23.8; R = 5.3; θ = 86°.

R: Nicked in short segments, alternately dorsal and ventral.

P: Snapped.

Plate 4f

Type VI: notched end scraper (1).

L.P. III D2: N5/W5, L5 785 2b

5.5 20.1 31.1 7.5 Rectangular Biplano

L: Steep ventral retouch. M = 14.0; R = 2.0; θ = 74°.

D: Steep dorsal retouch. M = 29.3; R = 2.3; θ = 77°. Notch in center of margin is 13.2 mm. wide and 2.3 mm. deep.

R: Thinned ventral. M = 16.4; R = 16.4; θ = ca. 20°.

P: Snapped.

Fig. 25b, Plate 3f

Type VII: end/side scrapers (3).

L.P. A Test A, L2, ca. 12" 24 2b

1.0 15.2 10.3 4.2 Rectangular Triangular

L: Unretouched.

D: Steep dorsal retouch. M = 14.6; R = 3.8; $\theta = 85^{\circ}$.

R: Steep dorsal retouch. M = 11.4; R = 1.0; $\theta = 75^{\circ}$.

P: Snapped.

Fig. 25d.

E.P. V Sq. 12/21, L5 1A 86 2b

2.7 17.3 33.6 4.0 Rectangular Biplano

L: Unretouched.

D: Snapped.

R: Steep dorsal retouch. M = 20.2; R = 2.6; $\theta = 80^{\circ}$.

P: Snapped.

Fig. 25c, Plate 4m

E.P. VI Sq. 15/24, L6A-7 1A 300 5

1.0 12.0 26.1 3.5 Expanding Triangular

L: Unretouched.

D: M 26.0. Steep dorsal retouch along the right 14.8 mm. R = 2.0; $\theta = 72^{\circ}$.

R: M 7.8. Steep dorsal retouch along the distal 4.0 mm. R = 3.3; $\theta = 62^{\circ}$.

P: Snapped.

Fig. 25e, Plate 4 l.

Type VIII: side scrapers with one straight modified margin (2).

L.P. B S15/W90, L2-3 104 2b

7.2 34.6 19.5 8.2 Rectangular Triangular

L: Steep ventral retouch. M = 32.1; R = 4.5; $\theta = 78^{\circ}$.

D: Unretouched.

R: Unretouched.

P: Unretouched.

Fig. 25f, Plate 3j

E.P. VI Sq. 13/22, L6 1A 127 2c

2.2 25.6 17.2 5.3 Bivectoral left Triangular

L: Unretouched

D: One dorsal thinning scar.

R: Steep ventral retouch. M = 25.9; R = 4.5; $\theta = 75^{\circ}$.

P: Unretouched.

Plate 4n, Fig. 25g

Type IX: side scrapers with crushed proximal margins (2).

L.P. A Test A, L2, ca. 12" 23 2b

7.3 42.1 19.3 8.1 Rectangular Triangular

L: Steep dorsal retouch. M = 38.3; R = 3.9; $\theta = 53^{\circ}$.

D: Thinned ventral. M = 6.7; R = 7.2; Polished both dorsal and ventral and on dorsal arris.

R: Steep dorsal retouch. M = 39.5; R = 8.1; $\theta = 65^{\circ}$.

P: Crushed and polished both dorsal and ventral. M = 13.8.

Plate 3i, Fig. 25h

E.P. VI Sq. 14/23, L6 1A 267 2b

3.4 32.8 10.2 7.1 Rectangular Triangular

L: Nicked ventral.

D: Crushed both dorsal and ventral. M = 8.2; R = 1.9. Three small burin facets along left margin, distal to proximal, 8.2 mm. long.

R: Steep dorsal retouch. M = 24.4; R = 3.1; $\theta = 67^{\circ}$.

P: Crushed and polished both dorsal and ventral. M = 10.8.

Plate 4o, Fig. 25i

Type X: steep shaped margins on tabular flakes lacking distinct bulbs (4).

L.P. IV Sq. 41/44, L3 1A 161 2a
8.1 27.4 27.4 8.9 Rectangular Biplano
"D": Steep "ventral" retouch. M = 17.2; R = 4.1; $\theta = 72^o$.
"P": Thinned "ventral". M = 12.8.
Other margins snapped.
"Dorsal" is cortical.

E.P. VI N10/W75, L7 173 2c
8.5 26.4 20.8 15.1 Rectangular Biplano/ Rectangular
"D": Steep "dorsal" retouch. M = 16.2; R = 5.5; $\theta = 63^o$.
All other margins and faces cortical.

E.P. VI Sq. 15/24, L6A-7 1A 300 2b
14.5 31.2 38.9 13.1 Expanding Plano-convex
"L": Steep "dorsal" retouch. M = 12.5; R = 8.4; $\theta = 83^o$.
"D": Steep "dorsal" retouch. M = 31.8; R = 11.3; $\theta = 72^o$.
"R": Steep "dorsal" retouch. M = 19.6; R = 4.0; $\theta = 68^o$.
"P": Cortical.
The retouch scars on all three modified margins are crushed.
"Ventral" face is cleaved.

E.P. VI Sq. 16/25, L6A 1A 323 11b
13.0 39.0 25.5 8.9 Rectangular Biplano
"D": Steep "dorsal" retouch. M = 21.5; R = 4.1; $\theta = 70^o$.
Other margins snapped.
Fig. 25j

Type/ Period	No.	Weight	Mean Weight	Range	Length	Mean Length	Range	Width	Mean Width	Range	Thick.	Mean Thick.	Range
Type I	2	13.5	6.75	6-8	51.6	25.80	-	62.5	31.25	29-33	16.0	8.00	6-10
Type II	5	18.3	3.66	1-6	106.5	21.30	12-26	104.3	20.86	19-23	31.8	6.36	4-9
Type IIIa	3	18.8	6.27	5-8	78.6	26.20	22-30	80.3	26.77	25-28	20.7	6.90	6-8
Type IIIb	2	18.5	9.25	4-15	68.0	34.00	22-46	52.7	26.35	21-32	16.4	8.20	8-9
Type IV	11	76.8	6.98	1-28	298.6	27.15	17-50	282.7	25.70	8-48	84.1	7.65	3-12
Type V	4	43.0	10.75	6-16	136.6	34.15	21-43	114.2	28.55	14-41	46.1	11.53	9-15
Type VI	1	5.5	5.50	-	20.1	20.10	-	31.1	31.10	-	7.5	7.50	-
Type VII	3	4.7	1.57	1-3	44.5	14.83	12-17	70.0	23.33	10-37	11.7	3.90	-
Type VIII	2	9.4	4.70	2-7	60.2	30.10	26-35	36.7	18.35	17-20	13.5	6.75	5-8
Type IX	2	10.7	5.35	3-7	74.9	37.45	33-42	29.5	14.75	10-19	15.2	7.60	7-8
Type X	4	44.1	11.03	8-15	124.0	31.00	26-39	112.6	28.15	21-39	46.0	11.50	9-15
Total	39	263.3	6.75	1-28	1063.6	27.27	12-50	976.6	25.04	8-48	309.0	7.92	3-15
L. P.	13	84.1	6.47	1-16	355.2	27.32	15-43	300.5	23.12	8-33	105.0	8.08	3-15
E. P.	22	159.5	7.25	1-28	609.3	27.70	12-50	570.1	25.91	10-48	177.5	8.07	4-15
Total	35	243.6	6.96	1-28	964.5	27.56	12-50	870.6	24.87	8-48	282.5	8.07	3-15

	--Types--											
	I	II	IIIa	IIIb	IV	V	VI	VII	VIII	IX	X	Total
L. P.	1	1	1	1	3	1	1	1	1	1	1	13
E. P.		3	1	1	7	3		2	1	1	3	22
Beach	1	1	1		1							4
Total	2	5	3	2	11	4	1	3	2	2	4	39

Table 33. Distribution of metric data for 39 scrapers from MjVl-1, arranged by type and period; distribution of types in periods.

Type/ Period	--Stone Type-- 1	2a	2b	2c	2e	3b	5	11b	Totals
Type I			1	1					2
Type II			4	1					5
Type IIIa			2		1				3
Type IIIb			1	1					2
Type IV	1		5	1		1	3		11
Type V			2	1			1		4
Type VI			1						1
Type VII			2				1		3
Type VIII			1	1					2
Type IX			2						2
Type X		1	1	1				1	4
Total	1	1	22	7	1	1	5	1	39
L. P.	1	1	8	1	1		1		13
E. P.			12	5		1	3	1	22
Beach			2	1			1		4
Total	1	1	22	7	1	1	5	1	39

	Margins								Face			
	L	L&D	D	D&R	R	R&L	L&D&R	Totals	D	D&V	V	Totals
Type I				2				2	2			2
Type II	1	1	2	1				5	5			5
Type IIIa		2					1	3	3			3
Type IIIb		2						2	1		1	2
Type IV		1	7	1	2			11	11			11
Type V			2		2			4	4			4
Type VI		1						1		1		1
Type VII				2	1			3	3			3
Type VIII	1				1			2			2	2
Type IX					1	1		2	2			2
Type X	--Not Classified--							-				-
Total	2	7	11	6	7	1	1	35	31	1	3	35
L. P.	1	3	3	3	1	1		12	9	1	2	12
E. P.		3	7	2	6		1	19	18		1	19
Beach	1	1	1	1				4	4			4
Total	2	7	11	6	7	1	1	35	31	1	3	35

Table 34. Distribution of stone type and steep retouch for 39 scrapers from MjVl-1, arranged by period and type.

Some of the metric data presented above have been summarized in Table 33; distributions of steep retouch and stone type are shown in Table 34. Though the Early Prehistoric period yielded nearly twice as many scrapers as the Late Prehistoric period, there appears to be no significant clustering of particular types in one period or the other. Nearly all the types are represented in both prehistoric periods, but there are no stone scrapers in the Historic period. This general decline in the frequency of stone scrapers through time is paralleled by an increase in the frequency of bone scrapers; I shall return to this point later in this chapter. As in the case of the other shaped flake categories the sample size is too small to support extensive subdivision into types, and my type definitions are, therefore, intended as a convenient means of organizing the data; they may or may not have lasting typological integrity or historical validity. Hopefully, however, they will provide a fairly rigorous framework applicable to other collections from northwestern North America.

15. *Burinated Flakes*. Many flakes in the collection are characterized by one or more small burin facets along one or more margins. There appears to be no consistent burin technique represented by these specimens, no special preparation of a platform for the burin blow, and no regular pattern of wear on or adjacent to the facets.

These flakes are classified as burinated because the axis of the blow which formed the retouch scar is parallel to the long axis of the modified margin; all forms of retouch described above were produced by blows delivered perpendicular to the long axis of the modified margin. These specimens have been isolated in a separate category simply because of this distinctive kind of marginal modification. They should be regarded as a variety of shaped flake and no implication of an engraving function is intended by their name. Indeed there are probably many functions represented among the burinated flakes, but I have yet to find a basis for sorting them into functional categories. Many of them may even be the results of accidental slippage of tools designed for scraping, cutting, or piercing functions. Partially because of their uncertain status in the tool kit and also because I suspect they have been overlooked in many northern assemblages, I have collected a number of measurements in addition to the overall length, width, thickness, and weight. The burinated margin was named and its length was measured. The length and width of the burin facet was measured, the direction of the burin blow was determined, and the face from which the facet is visible was recorded; other forms of retouch were also noted when present. These data have been assembled in Tables 35-38 for 87 burinated flakes (see also Morlan 1971 : Table 106); one example is illustrated as Fig. 26a.

Period	Block	No.	Weight	Mean Weight	Range	Length	Mean Length	Range	Width	Mean Width	Range	Thick.	Mean Thick.	Range
Hist.	W100	6	6.6	1.10	1-2	95.3	15.88	6-25	91.7	15.28	11-23	23.8	3.97	3-5
	E100	10	6.6	0.66	-	129.8	12.98	8-20	115.9	11.59	4-24	29.7	2.97	1-6
	E300	1	2.3	2.30	-	18.4	18.40	-	20.4	20.40	-	9.3	9.30	-
	Total	17	15.5	0.91	1-2	243.5	14.32	6-25	228.0	13.41	4-24	62.8	3.69	1-9
Late Prehist.	W700	4	3.8	0.95	1-2	75.6	18.90	10-28	42.5	10.63	5-15	12.2	3.05	2-5
	W600	3	10.2	3.40	3-4	74.1	24.70	15-35	41.1	13.70	11-18	20.4	6.80	5-8
	W300	4	5.0	1.25	1-2	74.4	18.60	8-31	43.8	10.95	7-17	17.9	4.48	2-6
	W100	19	11.9	0.63	1-4	230.8	12.15	4-24	181.9	9.57	4-23	52.3	2.75	1-7
	E100	3	2.1	0.70	-	41.0	13.67	11-15	38.0	12.67	8-18	8.9	2.97	2-4
	1A	20	31.1	1.56	1-5	361.4	18.07	6-35	261.3	13.07	5-29	91.5	4.58	2-10
	Total	53	64.1	1.21	1-5	857.3	16.18	4-35	608.6	11.48	4-29	203.2	3.83	1-10
E. P.	W700	1	1.5	1.50	-	23.3	23.30	-	11.2	11.20	-	5.2	5.20	-
	1A	16	25.1	1.57	1-4	288.3	18.02	8-34	230.1	14.38	6-29	81.9	5.12	2-10
	Total	17	26.6	1.57	1-4	311.6	18.33	8-34	241.3	14.19	6-29	87.1	5.12	2-10
	Totals	87	106.2	1.22	1-5	1412.4	16.24	4-35	1077.9	12.39	4-29	353.1	4.06	1-10

Table 35. Distribution of metric data for 87 burinated flakes from MiV1-1, arranged by period.

Period	Block	Burinated Margin No.*	Burinated Margin Length	Burinated Margin Mean Length	Burinated Margin Range	Burin Facet No.*	Burin Facet Length	Burin Facet Mean Length	Burin Facet Range	Burin Facet Width	Burin Facet Mean Width	Burin Facet Range
Hist.	W100	6	89.3	14.88	8-24	6	66.0	11.00	6-21	15.1	2.52	1-7
	E100	10	121.4	12.14	8-24	10	111.5	11.15	5-21	20.3	2.03	1-5
	E300	1	18.3	18.30	-	1	18.3	18.30	-	4.2	4.20	-
	Total	17	229.0	13.47	8-24	17	195.8	11.52	5-21	39.6	2.33	1-7
Late Prehist.	W700	5*	95.4	19.08	10-28	6*	42.4	7.07	2-10	11.6	1.93	1-4
	W600	4*	89.5	22.38	15-33	4	69.0	17.25	9-33	17.7	4.43	3-6
	W300	4	72.5	18.13	9-29	4	39.7	9.93	7-15	13.6	3.40	1-5
	W100	21*	231.5	11.02	4-19	21	189.7	9.03	4-14	35.0	1.62	1-4
	E100	3	47.4	15.80	13-18	3	37.0	12.33	7-16	6.8	2.27	1-3
	1A	22*	352.2	16.01	9-31	22	261.3	11.88	4-21	72.9	3.31	1-7
	Total	59*	888.5	15.06	4-33	60*	639.1	10.65	2-33	157.6	2.63	1-7
E. P.	W700	1	21.5	21.50	-	1	7.3	7.30	-	3.5	3.50	-
	1A	17*	314.4	18.49	9-33	17	190.8	11.22	3-24	50.2	2.95	1-6
	Total	18*	335.9	18.66	9-33	18	198.1	11.01	3-24	53.7	2.98	1-6
	Totals	94*	1453.4	15.46	4-33	95*	1034.0	10.88	2-33	250.9	2.64	1-7

Table 36. Distribution of metric data for burin facets on 87 burinated flakes from MjVl-1, arranged by period. * indicates multiple burinated margins on one flake or multiple facets on one margin.

	Block	No.	Margin: Left	Margin: Right	Direction: ↓	Direction: ↑	Margin: Prox.	Margin: Dist.	Direction: →	Direction: ←	Face: D	Face: V	Face: –
Hist.	W100	6	1	3	2	2	1	1		2	1	4	1
	E100	10	3	4	6	1	2	1	1	2	4	2	4
	E300	1	1		1							1	
	Total	17	5	7	9	3	3	2	1	4	5	7	5
Late Prehist.	W700	5*	2	3	3*	3*					2*	1*	3
	W600	4*	1	3	3	1					3	1	
	W300	4	2	2	2	2					2	2	
	W100	21*	9	9	13	5	2	1	2	1	7	9	5
	E100	3		2	1	1		1		1	1	2	
	1A	22*	9	9	14	4	3	1	2	2	11	9	2
	Total	59*	23	28	36*	16*	5	3	4	4	26*	24*	10
E. P.	W700	1	1			1					1		
	1A	17*	5	10	11	4	2		2		9	5	3
	Total	18*	6	10	11	5	2		2		10	5	3
	Totals	94*	34	45	56*	24*	10	5	7	8	41*	36*	18

Table 37. Distribution of non-metric data for burin facets on 87 burinated flakes from MjVl-1, arranged by period. * indicates multiple burinated margins on one flake or multiple facets on one margin.

		--Stone Type--								
	Block	1	2a	2b	2c	2d	2e	3b	10a	Totals
Hist.	W100		3	1	1			1		6
	E100	1	2	2	2	2			1	10
	E300			1						1
	Total	1	5	4	3	2		1	1	17
Late Prehist.	W700			1		2	1			4
	W600			2		1				3
	W300			2	1			1		4
	W100			12	4	3				19
	E100			3						3
	1A		3	4	4	6		3		20
	Total		3	24	9	12	1	4		53
E. P.	W700			1						1
	1A	1	1	5	6	1		2		16
	Total	1	1	6	6	1		2		17
	Totals	2	9	34	18	15	1	7	1	87

Table 38. Distribution of stone type for 87 burinated flakes from MjVl-1, arranged by period.

Period	Block	No.	Weight	Mean Weight	Range	Length	Mean Length	Range	Width	Mean Width	Range	Thick.	Mean Thick.	Range
L. P.	W100	1	0.2	0.20	-	9.9	9.90	-	2.8	2.80	-	2.1	2.10	-
L. P.	E100	1	0.2	0.20	-	14.0	14.00	-	3.8	3.80	-	1.6	1.60	-
L. P.	Total	2	0.4	0.20	-	23.9	11.95	10-14	6.6	3.30	3-4	3.7	1.85	-
E. Pre.	W300	1	0.2	0.20	-	7.2	7.20	-	3.2	3.20	-	1.8	1.80	-
E. Pre.	W100	1	0.2	0.20	-	15.0	15.00	-	4.5	4.50	-	1.6	1.60	-
E. Pre.	1A	3	1.2	0.40	-	43.4	14.47	9-17	15.6	5.20	4-8	8.1	2.70	-
E. Pre.	Total	5	1.6	0.32	-	65.6	13.12	7-17	23.3	4.66	3-8	11.5	2.30	2-3
	Totals	7	2.0	0.29	-	89.5	12.74	7-17	29.9	4.27	3-8	15.2	2.17	2-3

Period	Block	Stone Type 1	Stone Type 2a	Stone Type 2b	Stone Type 2d	Totals	Cross-section Triangular	Cross-section Rectangular	Totals
L. P.	W100				1	1		1	1
L. P.	E100			1		1	1		1
L. P.	Total			1	1	2	1	1	2
E. Pre.	W300			1		1	1		1
E. Pre.	W100				1	1	1		1
E. Pre.	1A	1	1	1		3	2	1	3
E. Pre.	Total	1	1	2	1	5	4	1	5
	Totals	1	1	3	2	7	5	2	7

Table 39. Distribution of metric and non-metric data for seven burin spalls from MjVl-1, arranged by period.

16. *Burin Spalls*. A few flakes were identified as burin spalls since they are long, narrow, triangular or rectangular in cross-section, and the arris is formed by a former flake margin. Metric and non-metric data for seven such specimens are provided in Table 39 (see also Morlan 1971: Table 107).

17. *Burins*. A few flakes are burinated on several margins in such a way as to suggest that an engraving function may have been intended. Some preparation of a platform may have preceded the burin blow in some cases, and some of the facets are associated with crushed areas which may represent intensive use of the margins adjacent to the facets. Seveb burins have been described in a format similar to that used for the scrapers, but the outline description refers only to the burinated margin(s) in this case. Dimensions of the burin facets are designated FL, facet length, and FW, facet width, and the direction of the burin blow(s) is indicated with arrows. D (dorsal), V (ventral), and L (lateral) indicate orientation of the facet. Any flake margin not mentioned in the description can be assumed to be unretouched.

Hist. II N5/W75, L2 1059 4a
1.0 15.7 9.5 4.2
L: convex, M = 15.5. Burinated ↑↑↑ (FL = 11.8; FW = 1.8; V) from a crushed area on the distal margin.

L.P. III Sq. 14/23, L2 1A 254 2c
1.9 28.1 11.2 5.8

R: straight, M = 26.5. Burinated ↓↓↓ (FL = 23.6; FW = 5.6; D) from a crushed area on the proximal margin.

L.P. IV Sq. 41/44, L3 1A 163 2a

1.5 17.5 11.1 6.0

L: straight, M = 16.4. Burinated ↓ (FL = 8.0; FW = 2.1; D) from a crushed area on the proximal margin.

E.P. VI Sq. 5, L7 1A 367 2a

1.0 19.9 11.0 3.5

P: straight, M = 12.5. Burinated ← (FL = 12.5; FW = 3.9; V) from a crushed area on the right margin.

Fig. 26c

E.P. VI Sq. 5, L7 1A 481 2b

7.0 42.0 13.8 11.1

P/L: concave, M = 24.3. Burinated ↓↓ (FL = 14.1; FW = 3.2; L) from a crushed area on the proximal margin.

E.P. VII Sq. 7, L7A 1A 760 2b

4.1 31.9 18.4 8.3

L: straight, M = 22.4. Burinated ↓↓ (FL = 13.6; FW = 2.7; D) after flake removal from a retouched and crushed area on the striking platform remnant.

E.P. VII Sq. 12/21, L7 1A 108 2b

3.6 25.8 20.3 5.5

R: convex, M = 26.9. Burinated ↓ (FL = 3.6; FW = 4.4; V) to a retouched area (M = 8.2; R = 2.2; θ = 75°) which is in turn truncated by a burin facet ↑ (FL = 12.5; FW = 2.9; D) formed by a blow on a crushed area 2.4 mm. long.

D/L: straight, M = 11.2. Burinated ↑ (FL = 11.2; FW = 3.4; L) from a crushed area on the distal end of the right margin.

Fig. 26b

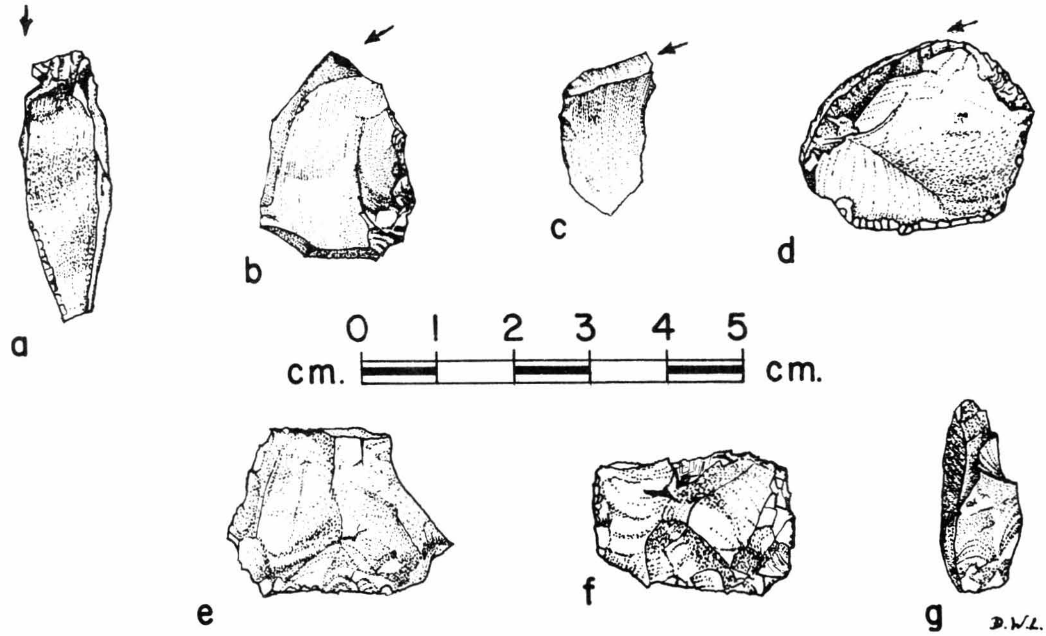


Fig. 26. Burinated flakes, burins, and wedges from MjV1-1. a, burinated flake (Early Prehistoric, MjV1-1A: 131); b-c, burins; d, Type I wedge (Early Prehistoric, MjV1-1A: 268); e, Type II wedge (Historic, MjV1-1:19); f, Type II wedge (Late Prehistoric, MjV1-1A: 161); g, Type III wedge (Late Prehistoric, MjV1-1A: 255). National Museums of Canada Neg. No. 72-8278.

18. *Wedges*. This category is a rubric which includes all flakes with limited facial as well as marginal retouch on opposite margins of both faces. In a few cases the bifacial retouch along one margin is opposite a margin with a flat area which would have precluded the thinning seen on most specimens, but there seems to be a continuous gradation from such flat margins to the highly angular, bifacial thinning typical of the class. I have arbitrarily subdivided this variation to distinguish between flat and angular "platforms". Some specimens are modified only along the margins, but most of them have a few or even many scars extending further onto the faces. Even so the orientation of the scars usually lies in a discrete and definable axis which can be related to the axis of the original flake. The axis of the scars is usually parallel (¦) or perpendicular (—) to the axis of the flake. A few specimens have been rotated 90^{o} so that there are two such axes of bifacial retouch (┼). Such discrete axes are not characteristic of the specimens classified as bifaces (see below), and this implies that much or all of the retouch is a result of patterned use of the flakes. Three types of wedges have been distinguished on the basis of the degree to which they have been thinned and crushed on opposite margins; the extreme case of such damage is associated with a flat fracture lying parallel to the axis of retouch, and many such fractures exhibit a small negative

Period	Block	No.	Weight	Mean Weight	Range	Length	Mean Length	Range	Width	Mean Width	Range	Thick.	Mean Thick.	Range
	Type I: slightly crushed and thinned on opposite margins.													
H.	E100	1	2.9	2.90	-	29.1	29.10	-	18.7	18.70	-	4.3	4.30	-
L. Pre.	W600	2	10.9	5.45	5-6	54.7	27.35	25-30	48.9	24.45	23-26	11.8	5.90	-
L. Pre.	W100	1	5.5	5.50	-	23.9	23.90	-	30.9	30.90	-	7.7	7.70	-
L. Pre.	1A	2	2.6	1.30	1-2	34.8	17.40	13-22	31.1	15.55	10-21	9.0	4.50	4-5
L. Pre.	Total	5	19.0	3.80	1-6	113.4	22.68	13-30	110.9	22.18	10-31	28.5	5.70	4-8
E. P.	1A	7	16.3	2.33	1-4	148.9	21.27	16-28	137.9	19.70	15-25	36.1	5.16	4-7
	Type II: heavily crushed and thinned on opposite margins.													
Historic	W100	1	3.3	3.30	-	17.4	17.40	-	15.0	15.00	-	11.4	11.40	-
Historic	E100	4	21.2	5.30	3-9	89.6	22.40	21-26	91.8	22.95	19-33	32.4	8.10	6-11
Historic	E300	1	7.8	7.80	-	28.5	28.50	-	17.7	17.70	-	13.3	13.30	-
Historic	Total	6	32.3	5.38	3-9	135.5	22.58	17-29	124.5	20.75	15-33	57.1	9.52	6-13
L. Pre.	W600	3	17.0	5.67	3-11	75.9	25.30	25-27	71.6	23.87	15-30	29.4	9.80	5-15
L. Pre.	W300	1	0.5	0.50	-	10.2	10.20	-	12.6	12.60	-	4.4	4.40	-
L. Pre.	W100	1	2.7	2.70	-	18.2	18.20	-	22.9	22.90	-	6.7	6.70	-
L. Pre.	1A	6	19.0	3.17	2-6	125.6	20.93	15-27	123.2	20.53	16-27	39.7	6.62	4-11
L. Pre.	Total	11	39.2	3.56	1-11	229.9	20.90	10-27	230.3	20.94	13-30	80.2	7.29	4-11
E. P.	E300	1	7.3	7.30	-	30.2	30.20	-	25.4	25.40	-	9.4	9.40	-
E. P.	1A	12	29.9	2.49	1-5	225.2	18.77	13-25	257.9	21.49	13-38	71.3	5.94	3-9
E. P.	Total	13	37.2	2.86	1-7	255.4	19.65	13-30	283.3	21.79	13-38	80.7	6.21	3-9
	Type III: heavily crushed and thinned on opposite margins and split with bipolar fracture.													
Historic	W100	5	10.4	2.08	1-5	102.4	20.48	16-28	71.1	14.22	11-25	30.8	6.16	5-8
Historic	E100	1	3.6	3.60	-	31.6	31.60	-	20.1	20.10	-	5.3	5.30	-
Historic	E300	1	1.7	1.70	-	21.3	21.30	-	11.4	11.40	-	5.3	5.30	-
Historic	Total	7	15.7	2.24	1-5	155.3	22.19	16-32	102.6	14.66	11-25	41.4	5.91	5-8

Table 40. Distribution of metric data for 90 wedges from MjVl-1, arranged by period.

Block	No.	Weight	Mean Weight	Range	Length	Mean Length	Range	Width	Mean Width	Range	Thick.	Mean Thick.	Range
Type III (cont.)													
L. Pre. W700	2	2.2	1.10	-	28.7	14.35	14-15	24.2	12.10	-	14.1	7.05	7-8
L. Pre. W400	1	2.4	2.40	-	18.5	18.50	-	17.9	17.90	-	5.7	5.70	-
L. Pre. W100	7	18.0	2.57	1-5	141.8	20.26	15-25	96.5	13.79	8-19	51.9	7.41	6-10
L. Pre. 1A	9	17.2	1.91	1-3	165.7	18.41	10-24	119.1	13.23	9-22	70.8	7.87	5-11
Total	19	39.8	2.09	1-5	354.7	18.67	10-25	257.7	13.56	8-22	142.5	7.50	5-11
E. Pre. W700	1	2.3	2.30	-	21.9	21.90	-	12.8	12.80	-	8.6	8.60	-
E. Pre. W400	1	5.8	5.80	-	25.7	25.70	-	20.5	20.50	-	10.9	10.90	-
E. Pre. E100	1	1.4	1.40	-	21.0	21.00	-	15.5	15.50	-	4.4	4.40	-
E. Pre. 1A	18	36.7	2.04	1-8	356.7	19.82	15-29	242.1	13.45	10-17	112.9	6.27	4-11
Total	21	46.2	2.20	1-8	425.3	20.25	15-29	290.9	13.85	10-21	136.8	6.51	4-11
Totals.													
Type I	13	38.2	2.94	1-6	291.4	22.42	13-30	267.5	20.58	10-31	68.9	5.30	4-8
II	30	108.7	3.62	1-11	620.8	20.69	10-30	638.1	21.27	13-38	218.0	7.27	3-13
III	47	101.7	2.16	1-8	935.3	19.90	10-32	651.2	13.86	8-25	320.7	6.82	4-11
Total	90	248.6	2.76	1-11	1847.5	20.53	10-32	1556.8	17.30	8-38	607.6	6.75	3-13
Hist.	14	50.9	3.64	1-9	319.9	22.81	16-32	245.8	17.56	11-33	102.8	7.34	4-13
L. P.	35	98.0	2.80	1-11	698.0	19.94	10-30	598.9	17.11	8-31	251.2	7.18	4-11
E. P.	41	99.7	2.43	1-8	829.6	20.24	13-30	712.1	17.37	10-38	253.6	6.19	3-11
Total	90	248.6	2.76	1-11	1847.5	20.53	10-32	1556.8	17.30	8-38	607.6	6.75	3-13

Table 40 (Continued).

Type/ Period	Stone Type 1	2a	2b	2c	2d	3b	5	Totals
Type I	2		5	4	1	1		13
Type II	1	5	12	8	2	2		30
Type III		7	14	19	2	2	3	47
Total	3	12	31	31	5	5	3	90
Hist.		5	4	3	1	1		14
L. P.	3	7	8	11	3	1	2	35
E. P.			19	17	1	3	1	41
Total	3	12	31	31	5	5	3	90

Type/ Period	Orientation ⊥	=	╪	?	Totals
Type I	9	2	2		13
Type II	10	10	2	8	30
Type III	20	7	6	14	47
Total	39	19	10	22	90
Hist.	6	3	2	3	14
L. P.	10	10	4	11	35
E. P.	23	6	4	8	41
Total	39	19	10	22	90

Type/ Period	"Platform" Angular	Ang/Flat	Flat	Totals
Type I	9		4	13
Type II	22		8	30
Type III	32	4	11	47
Total	63	4	23	90
Hist.	9	1	4	14
L. P.	21	1	13	35
E. P.	33	2	6	41
Total	63	4	23	90

Type/ Period	Other Retouch: Dorsal P	P/L	L	L/D	D	D/R	R	R/P	Ventral P	P/L	L	L/D	D	D/R	R	R/P	2M	Totals
Type I			1								1						1	3
Type II					2								2				1	5
Type III																		0
Total			1		2						1		2				2	8
Hist.					1						1							2
L. P.			1		1								1					3
E. P.													1				2	3
Total			1		2						1		2				2	8

Table 41. Distribution of non-metric data for 90 wedges from MjV1-1, arranged by period and type.

bulb of percussion both proximally and distally implying some form of bipolar percussion in their formation. I have attempted to base these three types on morphological characteristics, but they may have functional parameters as well. The relatively recent recognition of wedges in Northern American collections (MacDonald 1968: 85-90) has led to a sudden upsurge of their popularity as an artifact class. Considerably more intensive analysis and, probably, some experimentation will be required to subdivide the category into units of functional and historical significance. Distributions of metric and non-metric data are provided for 90 wedges in Tables 40-41 (see also Morlan 1971 : Table 108); a few are illustrated in Fig. 26 and Plates 1 e-h and 2 d-f.

19. *Rough Bifaces.* A few rough bifaces appear to be unfinished specimens or roughed-out preforms. They are quite different from the wedges in having thicker cross-sections, irregular facial flaking with no discrete axial orientation, and little or no crushing on the margins. Four such bifaces have been described in a format similar to that used for scrapers and burins.

Hist. A N5-10/W0-5, L1 17 2c
33.3 73.3 33.2 13.5 Ovate Biconvex
Thick, roughly flaked, symmetrical.
Crushing along part of one margin may represent use as a knife, but the specimen probably is a pre-form for a point.
Plate 5e

L.P. A N5/E5, L1A 290 2b
16.1 34.1 23.6 15.2 Ovate Rhomboidal
Thick, roughly flaked, symmetrical.
Crushing along part of one margin may represent use as a knife, but the specimen probably is a pre-form for a point.
Plate 5d.

L.P. II Sq. 10/19, L2 1A 7 2c
19.0 84.0 22.8 9.7 Rectangular Biplano
Tabular flake, cortical on one face, cleaved and flaked on the other.
One long margin is flat and cleaved, the other is angular and steeply retouched. M = 72.5; R = 1.2; $\theta = 67^{o}$.
Around one end the cortical face is thinned. R = 4.6; $\theta = 40^{o}$.
Would be an effective hand-held knife with the cleaved margin forming a back and the thinned end a convex cutting edge.

L.P. III Sq. 13/22, L2-3, F666 1A 114 2d
6.1 35.5 20.2 8.0 Ovate? Planoconvex
Asymmetrical, snapped longitudinally along a linear inclusion.
Both faces thinned by irregular scars.
Intact margin is finely blunted and crushed along a complex outline formed by four straight segments joined by obtuse angular convex junctures and one obtuse angular concave juncture.
Probably used as a knife with the snapped margin forming a back and the segmented cutting edge providing a variety of uses; the concave juncture may represent a stem for hafting purposes.

20. *Finished Bifaces.* Several different forms of finished bifaces are generally characterized by complete facial flaking, fine marginal retouch, and sharpened margins associated with tips or points. Most of these can be identified as arrowheads on the basis of local ethnographic information, but some of them can be speculatively classified as drills and knives on the basis of differential forms of retouch and patterns of crushing and polishing. The following descriptions include both surface finds and excavated specimens among which are 19 arrowheads, two possible knives, and two possible drills or perforators.

Bifacial Knives (2):

Hist. II 0/W75, L2 136 2b

3.4 31.8 16.0 6.2 Cvate Biconvex

Roughly flaked on both faces with expanding scars, many hinged.

One margin slightly crushed near tip; other margin crushed along entire length and tip not well thinned.

Poorly developed stem, 9.2 mm. long, at base with edges crushed but not rubbed.

Probably a hafted knife.

Plate 5b

L.P. II D2: N5/W5, L3 781 2c

7.5 37.2 21.3 9.6 Ovate Biconvex

Asymmetrical ovate flaked bifacially with expanding and lamellar scars.

One margin is straight, fresh, sharp, and unretouched.

Other margin is convex, blunted, and crushed, especially near the tip.

Base is snapped and may have been stemmed.

Probably a hafted knife.

Plate 5a

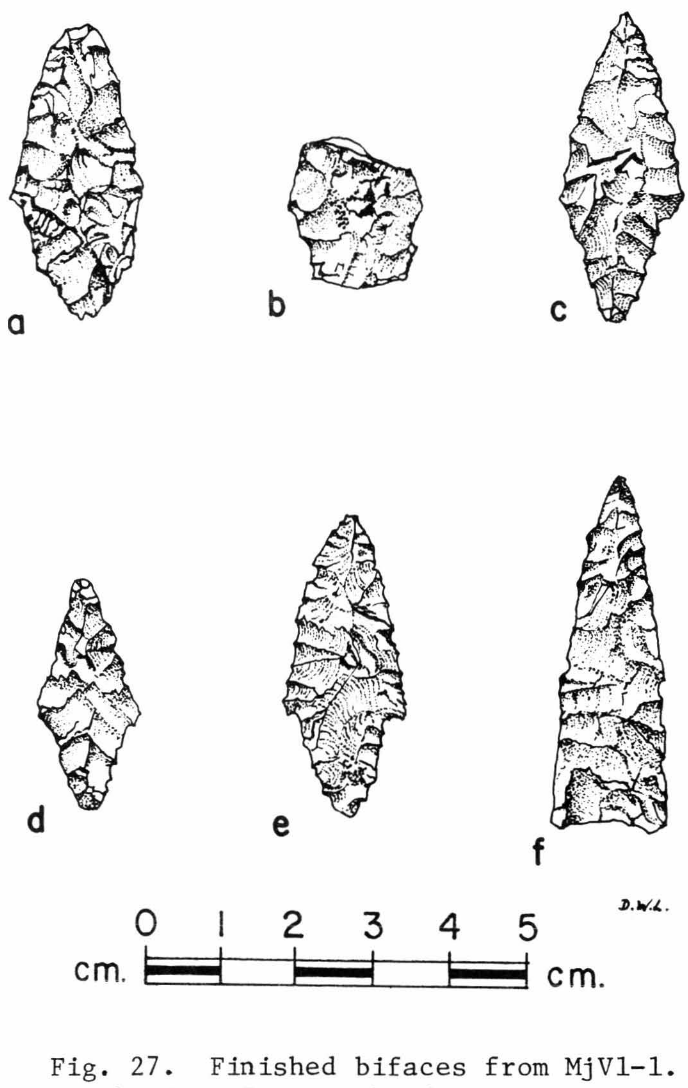


Fig. 27. Finished bifaces from MjVl-1. a-b, Type Ia arrowheads; c-e, Type Ib arrowheads; f, Type IV arrowhead. National Museums of Canada Neg. No. 72-8283.

Bifacial Drills (2):

L.P. II D2: N10/0, L3 877 2a
1.6 32.3 13.8 4.1 Ovate Planoconvex

Proximal 20 mm. flaked with broad lamellar scars; margins are fresh and sharp.

Distal 12 mm. has triangular outline, contracting to a symmetrical sharp point; flaked with narrow lamellar scars which are pronounced and associated with slight crushing at left dorsal and right ventral margins.

Probably a hand-held drill which was rotated counter-clockwise.

Plate 5c.

Hist. A S5-10/W95, L1 75 2e
7.6 27.4 36.3 6.3 Trapezoidal Planoconvex

Large flake with dorsal thinning scars along proximal margin, ventral thinning scars along proximal and right margins; ventral scars are crushed.

On left margin is a short drill tip, 4.0 mm. long and 4.4 mm. wide at the base. The tip is defined by a small dorsal notch on one margin and a small ventral notch on the other.

Probably a drill or perforator.

Type Ia Arrowheads (6):

Hist. A N10/W100, L1 47 2d
4.8 37.2 17.6 8.3 Triangular Biconvex

Triangular blade and contracting stem worked bifacially with expanding flake scars.

Local crushing on margins of stem but not on margins of blade.

Stem is poorly defined by a change in the direction of the blade margins. Stem contracts to a blunt point from a width of 17.6 mm. where it joins the blade.

Small section of tip snapped off.

Plate 6h, Fig. 27a.

L.P. IIIa D2: N20/E60, L3, F6832 1773 2e
2.2 28.8 17.1 4.0 Triangular Biconvex
Triangular blade with contracting stem flaked bifacially with expanding scars.
Blade margins are fresh, stem margins slightly rubbed.
Stem is poorly defined by change in the direction of the blade margins; stem is 9.8 mm. long and contracts from width of 17.1 mm where it joins the blade to a width of 7.6 mm.
Small sections of the base and tip are snapped off.
Plate 6g.

L.P. III 0/W75, L3 137 2c
1.0 18.5 12.9 4.2 Ovoid Biconvex
Flaked bifacially with expanding scars.
All margins are fresh.
Shoulder, 4.3 mm. long, formed along one margin of base; other margin straight [unfinished?].
Small section of both tip and base snapped off.
Plate 6c.

L.P. A N10-15/0, L1A 270 2c
2.5 18.1 17.5 5.9 ? Biconvex
Midsection flaked bifacially with expanding and lamellar scars; probably had a contracting stem.
Margins fresh.
A stem may have been defined by poorly developed shoulders.
Snapped proximally but burinated distally; no apparent use of burin facet or corner.
Plate 6r, Fig. 27b.

L.P. III Sq. 6, L3 1A 348 2c
1.2 23.5 12.9 4.0 Ovate Biconvex
Ovate blade with contracting stem flaked bifacially with lamellar scars dorsally and expanding scars ventrally.

Margins fresh but tip snapped off.

Stem poorly defined, 6.2 mm. long, contracting to a point from 8.9 mm. width.

Plate 6d.

?	?	Beach	833	2b
	4.0	29.2 17.7 7.2	Triangular ?	Biconvex

Cannot distinguish blade and stem but change in direction of margins indicates the juncture of the two elements.

Blade probably triangular with contracting stem flaked bifacially with expanding and lamellar scars.

Waterworn on faces and margins.

Snapped near center at one end, small section snapped off at other end.

Type Ib Arrowheads (9):

L.P.	II	S5/W210, L3	1256	2d
	1.3	32.6 15.0 3.2	Triangular	Planoconvex

Triangular blade with contracting stem flaked bifacially with expanding and lamellar scars.

Blade margins fresh and sharp; right stem margin blunted dorsally, left stem margin blunted ventrally.

Stem well defined, with blade slightly barbed; stem 9.7 mm. long, contracts from 8.4 mm. width to a point at the proximal end.

Made on flake with tip of blade formed at the proximal end of the flake.

Plate 6 1.

L.P.	III	N5/W75, L3	139	2a
	4.6	44.2 18.5 7.7	Triangular	Biconvex

Triangular blade with median ridge on one face, contracting stem, flaked bifacially with expanding and lamellar scars.

All margins fresh.

Tip finely thinned on both faces.

Stem defined by notching dorsally on right margin, ventrally on left margin; stem, 12.1 mm. long, contracts from 10.7 mm. width to 5.1 mm. width.

Two separate notches on each margin of stem produce small knobs on stem and barbs at base of blade.

Plate 6i.

L.P. A S10/W100, L1A 69 4a

2.5 39.0 16.2 5.8 Triangular Biconvex

Triangular blade with median ridge on one face, contracting stem, flaked bifacially with expanding and lamellar scars; dorsal face retains a small cortical area.

All margins fresh.

Stem well defined by shoulders at base of blade; stem, 14.8 mm. long, contracts from 11.1 mm. width to a blunt point.

Plate 6k, Fig. 27c.

L.P. A S10/W100, L1A 70 2c

1.3 29.6 13.9 4.4 Triangular Biconvex

Triangular blade with contracting stem, flaked bifacially with expanding and lamellar scars.

Blade margins fresh, stem margins slightly rubbed.

Stem well defined by shoulders; stem, 10.9 mm. long, contracts from 10.8 mm. width to 3.5 mm. width.

Plate 6m, Fig. 27d.

L.P. IV 0/W75, L6 153 2b

2.9 39.0 14.8 5.8 Triangular Biconvex

Triangular blade with contracting stem flaked bifacially with expanding and lamellar scars.

Margins are fresh except for one small section which is polished near the base of the blade; stem margins are fresh.

Stem defined by poorly developed shoulders; stem, 12.0 mm. long, contracts from 12.0 mm. width to 5.9 mm. width.

Plate 6n.

L.P. II Sq. 9, L1 1A 422 (tip) + 1A 429 2b

1.2 27.8 16.4 3.5 Triangular Biconvex

Triangular blade with contracting stem, flaked bifacially with expanding and lamellar scars.

All margins fresh and sharp.

Stem defined by well developed shoulders; stem, 10.3 mm. long contracts to a point from 12.3 mm width.

Plate 6f.

L.P. III Sq. 11/20, L2 1A 34 2c

2.2 38.8 15.8 4.4 Triangular Biconvex

Triangular blade with contracting stem flaked bifacially with lamellar scars.

All margins fresh.

Slight barbing on one blade margin at stem; stem, 13.0 mm. long, contracts to a point from 11.2 mm. width.

Plate 6j, Fig. 27e.

? ? Beach 762 3a

0.9 25.2 13.5 3.0 Triangular Planoconvex

Triangular blade with contracting stem flaked bifacially with expanding scars.

Margins finely retouched but fresh.

Shoulders formed by a dorsal notch on the right margin and a ventral notch on the left margin.

Stem, well defined by shoulders, 10.2 mm. long, contracts to a blunt point from 7.4 mm. width.

Plate 6e.

? ? Beach 777 2d
5.5 37.9 18.8 6.7 Parallel-ovate Biconvex
Parallel-ovate blade with contracting stem flaked with lamellar scars dorsally and expanding scars ventrally.
Margins fresh.
Stem snapped off (6.0 mm. long) but well defined by shoulders and contracting from 15.5 mm. width to 14.5 mm. width at snap.
Plate 6p.

Type II Arrowhead (1):
L.P. B S15/W90, L2-3 103 4a
4.4 37.8 15.9 6.5 Triangular Biconvex
Triangular blade with parallel-sided stem flaked bifacially with expanding and lamellar scars.
Blade margins fresh; one stem margin crushed.
Stem poorly defined by change in direction of margins; stem ca. 16.5 mm. long.
Base snapped but specimen may be complete.
Plate 6q.

Type III Arrowheads (2):
L.P. II Sq. 9, L1 1A 411 2c
1.1 26.3 10.4 3.9 Parallel-ovate Biconvex
Both faces roughly flaked with expanding and lamellar scars.
Margins fresh and sharp except for a 6.3 mm. area at the base where margins are distinctly blunted to form a poorly defined contracting stem.
Plate 6b.

L.P. II Sq. 9, L1 1A 412 2b
1.5 25.4 12.1 5.3 Ovate Biconvex
Both faces flaked with expanding and lamellar scars.
One margin slightly crushed, the other margin fresh; tip is slightly asymmetrical in both outline and cross-section.
Stem defined by slight shoulder on one margin and crushing and polishing on the other margin; stem 7.9 mm. long.
Arrowhead, or could have been used as a knife.
Plate 6a.

Type IV Arrowhead (1):
Hist. A N10-15/0, L1 266 2b
2.6 45.3 13.5 4.7 Triangular Biconvex
Triangular point with a subconvex base flaked bifacially with expanding and lamellar scars.
All margins are fresh.
Base is thinned by short (5-7 mm.) longitudinal scars; concavity in the base is 1.2 mm. deep.
Plate 6o, Fig. 27f.

Each of the arrowheads has been assigned to a type, and some general "definitions" of the types can now be outlined:

Type Ia. Stemmed point with triangular or ovate blade and poorly defined, contracting stem. Stem defined by change in direction of blade margins. All six examples in the Klo-kut sample have biconvex cross-sections, and the facial flaking includes both expanding and lamellar scars.

Type Ib. Stemmed point with triangular blade and well defined, contracting stem; one example has a parallel-ovate blade. Stem defined by shoulders at the base of the blade, some of which are associated with a slight tendency toward barbing. Of the nine examples in the Klo-kut sample, seven have biconvex cross-sections, and two are planoconvex in section. Both expanding and lamellar scars are characteristic.

Type II. Stemmed point with triangular blade and parallel-sided stem. The one example of this type might in fact be a Type I point from which the stem has been broken, but its length and the presence of crushing along one margin of the parallel-sided element suggest that it is a complete specimen of a distinct type.

Type III. Unstemmed points with ovate or parallel-ovate outlines and biconvex cross-sections. Each of the two Klo-kut examples possesses some attribute which serves to define a haft element and which may even indicate incipient stemming. Their small size and the "finished" appearance of their flaking, however, suggests that they represent a bipointed or lozenge-shaped form of arrowhead.

Type IV. Unstemmed point with triangular blade and subconvex base. The one example of this type is biconvex in section and has been thinned at the base.

Type/ Period	No.	Weight	Mean Weight	Range	Length	Mean Length	Range	Width	Mean Width	Range	Thick.	Mean Thick.	Range
Type Ia	6	15.7	2.62	1-5	155.3	25.88	18-37	95.7	15.95	13-18	33.6	5.60	4-8
Type Ib	9	22.4	2.49	1-6	314.1	34.90	25-44	142.9	15.88	14-19	44.5	4.94	3-8
Type II	1	4.4	4.40	-	37.8	37.80	-	15.9	15.90	-	6.5	6.50	-
Type III	2	2.6	1.30	1-2	51.7	25.85	25-26	22.5	11.25	10-12	9.2	4.60	4-5
Type IV	1	2.6	2.60	-	45.3	45.30	-	13.5	13.50	-	4.7	4.70	-
Total	19	47.7	2.51	1-6	604.2	31.80	18-45	290.5	15.29	10-19	98.5	5.18	3-8
Hist.	2	7.4	3.70	3-5	82.5	41.25	37-45	31.1	15.55	14-18	13.0	6.50	5-8
L. P.	14	29.9	2.14	1-5	429.4	30.67	18-44	209.4	14.96	10-19	68.6	4.90	3-8
Beach	3	10.4	3.47	1-6	92.3	30.77	25-38	50.0	16.67	14-19	16.9	5.63	3-7
Total	19	47.7	2.51	1-6	604.2	31.80	18-45	290.5	15.29	10-19	98.5	5.18	3-8

	--Stone Type--							
	2a	2b	2c	2d	2e	3a	4a	Totals
Type Ia		1	3	1	1			6
Type Ib	1	2	2	2		1	1	9
Type II							1	1
Type III		1	1					2
Type IV		1						1
Total	1	5	6	3	1	1	2	19
Hist.		1		1				2
L. P.	1	3	6	1	1		2	14
Beach		1		1		1		3
Total	1	5	6	3	1	1	2	19

Table 42. Distribution of metric data and stone type for 19 arrowheads from MjVl-1, arranged by type and period.

Metric data for these arrowheads have been summarized in Table 42. The most noteworthy feature of the distribution is that the arrowheads and indeed all the finished bifaces are confined to the Late Prehistoric and Historic periods. We shall return to this point in later discussions.

21. *Artifact Fragments.* Most of the specimens in this category are bifacially worked fragments which could be related either to the finished biface class or to the wedges. They are too small to classify with certainty, but they have been tentatively identified in Table 44. Metric and non-metric data are summarized in Table 43 (see also Morlan 1971 : Table 109). It is particularly noteworthy that only seven of these 27 fragments occur in the Early Prehistoric period and that each of the seven appears to represent a fragment of a wedge rather than of a finished biface.

22. *Unshaped Boulder Spalls.* Large hide scrapers are usually numbered among the distinctive, if ubiquitous, artifact types of the interior of northwestern North America. Not only can they be shown to have considerable time depth, but they also are among the few aboriginal stone artifact forms which have survived to the present day. Their scraping and planing functions can still be observed in Old Crow, and the stone specimens can be matched in detail with metal counterparts which first appeared in the northern Yukon in the early historic period. The Klo-kut

Period	Block	No.	Weight	Mean Weight	Range	Length	Mean Length	Range	Width	Mean Width	Range	Thick.	Mean Thick.	Range
Hist.	W100	1	0.3	0.30	-	15.0	15.00	-	6.2	6.20	-	3.4	3.40	-
	E100	3	4.2	1.40	1-2	49.7	16.57	10-22	41.8	13.93	8-20	17.6	5.87	3-9
	Total	4	4.5	1.13	1-2	64.7	16.18	10-22	48.0	12.00	6-20	21.0	5.25	3-9
Late Prehist.	W700	4	5.4	1.35	1-3	70.5	17.63	7-37	53.2	13.30	10-19	26.0	6.50	4-13
	W600	1	1.3	1.30	-	6.8	6.80	-	21.7	21.70	-	8.5	8.50	-
	W300	2	1.9	0.95	-	36.6	18.30	16-21	16.6	8.30	-	11.5	5.75	5-6
	W100	3	1.3	0.43	-	48.8	16.27	11-21	31.6	10.53	6-19	12.6	4.20	3-5
	E100	2	4.6	2.30	1-4	36.6	18.30	12-25	30.6	15.30	11-20	13.0	6.50	4-9
	1A	5	11.7	2.34	2-4	118.7	23.78	16-39	80.1	16.02	10-26	29.4	5.99	4-8
	Total	17	26.2	1.54	1-4	318.0	18.71	7-39	233.8	13.75	6-26	101.4	5.96	3-13
E.P.	W400	1	4.1	4.10	-	26.6	26.60	-	18.6	18.60	-	7.9	7.90	-
	1A	6	12.4	2.07	1-4	110.6	18.43	8-31	106.2	17.70	10-24	35.7	5.95	2-9
	Total	7	16.5	2.36	1-4	137.2	19.60	8-31	124.8	17.97	10-24	43.6	6.23	2-9
	Totals	28	47.2	1.69	1-4	519.9	18.57	7-39	406.6	14.52	6-26	166.0	5.93	2-13

		--Stone Type--								
Period	Block	2a	2b	2c	2d	6	10a	10b	17c	Totals
Hist.	W100		1							1
	E100		1		1		1			3
	Total		2		1		1			4
Late Prehist.	W700		4							4
	W600					1				1
	W300		2							2
	W100		2		1					3
	E100		1					1		2
	1A	1	3						1	5
	Total	1	12		1	1		1	1	17
E.P.	W400			1						1
	1A		4	2						6
	Total		4	3						7

Table 43. Distribution of metric data and stone type for 28 artifact fragments from MjVl-1, arranged by period.

Period	Provenience	Wedge or Biface Fragment ?	Biface Trimming Flake ?	Scraper Fragment ?	Totals
Hist.	W100	1			1
	E100	2		1	3
	Total	3		1	4
Late Prehist.	W700	3		1	4
	W600	1			1
	W300		2		2
	W100	2	1		3
	E100	2			2
	1A	5			5
	Total	13	3	1	17
E. P.	W400	1			1
	1A	6			6
	Total	7			7
	Totals	23	3	2	28

Table 44. Distribution of tentative classes of 28 artifact fragments from MjV1-1, arranged by period.

collections include 81 stone hide scrapers of several types. I have divided them into two groups: boulder spalls and *tci-de-tho*. Each of these groups has been further subdivided to separate shaped and unshaped specimens. The boulder spalls include all large flakes struck from rounded cobbles of microcrystalline types of stone, and one chert specimen has also been classified as a boulder spall on the basis of its size and shape. Most of these specimens show little or no modification of the margins and do not appear to have been shaped after removal from the cobble. Marginal retouch, when present at all, usually takes the form of crushing and nicking distributed along the margins of both faces. Most of the boulder spalls have completely cortical dorsal faces, but some of them were detached after other flakes had been removed from the cobble. The former group comprises Type I: primary unshaped boulder spalls, and the latter group is called Type II: secondary unshaped boulder spalls . Both types occur throughout the Klo-kut sequence, though both tend to decrease in number through time (Plates 7a, 8f). Metric and non-metric data for 52 excavated examples are provided in Tables 45 - 46 (see also Morlan 1971 : Table 110).

23. *Shaped Boulder Spalls*. Two of the boulder spalls have been deliberately shaped after removal from the cobble. Both of them are primary; i.e., the dorsal faces are entirely cortical, and in both cases the shaping was

Period	Block	No.	Weight	Mean Weight	Range	Length	Mean Length	Range	Width	Mean Width	Range	Thick.	Mean Thick.	Range
	Type I: primary unshaped boulder spalls													
Hist.	W100	2	243.6	121.80	29-215	130.4	65.20	51-79	157.8	78.90	55-103	31.3	15.65	8-24
Hist.	E100	4	306.8	76.70	34-140	269.6	67.40	36-96	218.5	54.63	45-59	64.2	16.05	12-19
Hist.	Total	6	550.4	91.73	29-215	400.0	66.67	36-96	376.3	62.72	45-103	95.5	15.92	8-24
Late Prehist.	W700	1	175.7	175.70	-	81.7	81.70	-	86.1	86.10	-	24.1	24.10	-
Late Prehist.	W600	5	238.1	47.62	26-62	272.7	54.54	40-63	295.8	59.16	47-85	67.7	13.54	10-19
Late Prehist.	W400	1	18.6	18.60	-	47.0	47.00	-	35.5	35.50	-	10.0	10.00	-
Late Prehist.	W100	1	84.9	84.90	-	47.6	47.60	-	90.6	90.60	-	17.3	17.30	-
Late Prehist.	E100	5	963.6	192.72	33-384	413.8	82.76	57-129	400.9	80.18	50-126	125.5	25.10	9-46
Late Prehist.	1A	2	52.5	26.25	9-43	100.5	50.25	50-51	91.8	45.90	24-68	24.6	12.30	10-15
Late Prehist.	Total	15	1533.4	102.23	9-384	963.3	64.22	40-129	1000.7	66.71	24-126	269.2	17.95	9-46
Early Pre.	W400	1	33.6	33.60	-	35.1	35.10	-	71.3	71.30	-	17.1	17.10	-
Early Pre.	W100	3	372.5	124.17	72-195	206.8	68.93	56-93	250.1	83.37	75-94	67.0	22.33	15-29
Early Pre.	E100	1	8.7	8.70	-	31.0	31.00	-	50.3	50.30	-	7.0	7.00	-
Early Pre.	1A	14	1532.3	109.45	12-227	990.3	70.74	28-114	965.1	68.94	31-119	245.1	17.51	9-26
Early Pre.	Total	19	1947.1	102.48	9-227	1263.2	66.48	28-114	1336.8	70.36	31-119	336.2	17.69	7-29
	Totals	40	4030.9	100.77	9-384	2626.5	65.66	28-129	2713.8	67.85	24-126	700.9	17.52	7-46
	Type II: secondary unshaped boulder spalls													
H.	E100	2	54.0	27.00	18-36	119.2	59.60	59-61	63.4	31.70	28-36	22.6	11.30	10-12
L. Pre.	W300	1	51.6	51.60	-	64.6	64.60	-	58.9	58.90	-	12.6	12.60	-
L. Pre.	E100	2	378.3	189.15	142-236	155.5	77.75	58-97	170.7	85.35	82-89	49.2	24.60	23-26
L. Pre.	1A	1	71.1	71.10	-	48.3	48.30	-	79.5	79.50	-	20.8	20.80	-
L. Pre.	Total	4	501.0	125.25	52-236	268.4	67.10	48-97	309.1	77.28	59-89	82.6	20.65	13-26
E. P.	1A	6	368.4	61.40	21-127	346.0	57.67	42-90	415.9	69.32	56-102	83.5	13.92	11-19
	Totals	12	923.4	76.95	18-236	739.6	61.63	42-97	788.4	65.70	28-102	268.7	22.39	10-26

Table 45. Distribution of metric data for 52 unshaped boulder spalls from MjVl-1, arranged by period.

Period	Block	2b	9	11a	11b	11c	11d	12	13	15	16	Totals	P	L	D	R	-	Totals
		--Stone Type--											Marginal Retouch					
	Type I: primary unshaped boulder spalls																	
Hist.	W100			1				1				2			1		1	2
	E100		1				1	2				4			2	1	1	4
	Total		1	1			1	3				6			3	1	2	6
Late Prehist.	W700									1		1					1	1
	W600			1				3		1		5			3		2	5
	W400									1		1			1			1
	W100							1				1			1			1
	E100			2	2						1	5			3		2	5
	1A			1						1		2			1		1	2
	Total			4	2			4		4	1	15			9		6	15
Early Pre.	W400							1				1			1			1
	W100			1			1			1		3		1			2	3
	E100							1				1					1	1
	1A			6	3	1	1	3				14			8	2	4	14
	Total			7	3	1	2	5		1		19		1	9	2	7	19
	Totals		1	12	5	1	3	12		5	1	40		1	21	3	15	40
	Type II: secondary unshaped boulder spalls																	
H.	E100							1	1			2					2	2
L. Pre.	W300							1				1			1			1
	E100			1						1		2		1	1			2
	1A	1										1			1			1
	Total	1		1				1		1		4		1	3			4
E. P.	1A			3			1	1		1		6			4		2	6
	Totals	1		4			1	3	1	2		12		1	7		4	12

Table 46. Distribution of non-metric data for 52 unshaped boulder spalls from MjVl-1, arranged by period.

accomplished by means of both dorsal and ventral thinning along two or more margins. Both belong to the Early Prehistoric period, and they have the following characteristics:

E.P. VI Sq. 11/20, L6 1A 54 7
172.7 100.5 81.3 21.0
The distal and right margins have been thinned both dorsal and ventral.

E.P. VII S20/W305, L14 1533 11a
408.4 98.8 126.8 20.2
The left, distal, and right margins have been thinned both dorsal and ventral. Plate 8e.

24. *Boulder Spall Fragments.* These are small fragments of microcrystalline and layered stone types which likely result from either the production or the use of boulder spalls. They have little or no diagnostic value, but it is noteworthy that all but two occur in the Historic and Late Prehistoric periods. This distribution would seem to run counter to the apparent decline in boulder spall frequency toward the later periods, but perhaps the frequency of these fragments provides a partial explanation for the decrease in the number of complete specimens. Weights and stone types are provided in Table 47 for 17 boulder spall fragments (see also Morlan 1971 : Table 111).

25. *Unshaped* tci-de-tho. This category has been separated from the boulder spalls on the basis of the flaking characteristics of the specimens. Whereas the

Period	Block	No.	Wt.	$\overline{Wt.}$	Stone Type 11a	12	16	17b	Totals
Hist.	W100	4	3.6	0.90	1		3		4
	E100	1	1.2	1.20				1	1
	Total	5	4.8	0.96	1		3	1	5
Late Prehist.	W700	1	2.7	2.70		1			1
	W300	4	3.9	0.98	3		1		4
	W100	3	3.1	1.03	3				3
	E100	1	3.9	3.90		1			1
	1A	1	3.2	3.20				1	1
	Total	10	16.8	1.68	6	2	1	1	10
E.P.	1A	2	4.6	2.30			1	1	2
	Totals	17	26.2	1.54	7	2	5	3	17

Table 47. Distribution of weight and stone type for 17 boulder spall fragments from MjVl-1, arranged by period.

Period	Block	No.	Weight	Mean Weight	Range	Length	Mean Length	Range	Width	Mean Width	Range	Thick.	Mean Thick.	Range
Hist.	W100	1	94.1	94.10	-	76.4	76.40	-	65.6	65.60	-	9.8	9.80	-
	E300	2	32.8	16.40	5-28	97.4	48.70	35-63	80.0	40.00	27-53	9.4	4.70	4-6
	Total	3	126.9	42.30	5-94	173.8	57.96	35-76	145.6	48.53	27-66	19.2	6.40	4-10
L. Pre.	W700	1	33.6	33.60	-	59.7	59.70	-	65.8	65.80	-	6.9	6.90	-
	W600	1	12.7	12.70	-	44.5	44.50	-	32.4	32.40	-	5.1	5.10	-
	W300	1	10.7	10.70	-	30.2	30.20	-	36.1	36.10	-	5.9	5.90	-
	1A	3	45.7	15.23	7-25	118.5	39.50	37-43	138.6	46.20	26-65	16.8	5.60	4-8
	Total	6	102.7	17.12	7-34	252.9	42.15	30-60	272.9	45.48	26-66	34.7	5.78	4-8
E. P.	1A	14	330.6	23.61	2-65	671.1	47.98	14-89	791.8	56.56	33-101	67.9	4.85	2-7
	Totals	23	460.2	20.01	2-94	1098.4	47.76	14-89	1210.3	52.62	26-101	121.8	5.30	2-10

		Stone Type							Marginal Retouch							
Period	Block	6	11a	11c	15	16	17b	Totals	P	L	D	R	2M	3M	-	Totals
Hist.	W100			1				1			1					1
	E300				2			2			1		1			2
	Total			1	2			3			2		1			3
L. Pre.	W700				1			1			1					1
	W600						1	1							1	1
	W300				1			1			1					1
	1A		2				1	3			2		1			3
	Total		2		2		2	6			4		1		1	6
E. P.	1A	1	3		1	3	6	14			11		1	1	1	14
	Totals	1	5	1	5	3	8	23			17		3	1	2	23

Table 48. Distribution of metric and non-metric data for 23 unshaped *tci-de-tho* from MjVl-1, arranged by period.

boulder spalls are large struck flakes, the *tci-de-tho* are tabular specimens which exhibit little or no bulb of percussion and highly regular biplano cross-sections. Many of them are made of distinctly layered stone types, though there are also a number of microcrystalline specimens which have fractured along planar inclusions. A striking platform remnant is usually recognizable and was used as a basis for orienting the specimens for measurement. Marginal modification is usually present and extends onto both faces. Both shaped and unshaped *tci-de-tho* can be recognized, but there is no distinction between primary and secondary. The name *tci-de-tho* is a Kutchin term meaning hide scraper. Metric and non-metric data for 23 unshaped *tci-de-tho* are provided in Table 48 (see also Morlan 1971: Table 112).

26. *Shaped* tci-de-tho. A few tabular *tci-de-tho* have been shaped by means of both dorsal and ventral thinning on several margins. As in the case of the boulder spalls the excavated shaped specimens are confined to the Early Prehistoric period; one example was found on the beach. Their characteristics are as follows.

E.P. V Sq. 16/25, L5 1A 313 11a

28.8 58.4 64.4 4.4

Left, distal, and right margins thinned both dorsal and ventral.

Plate 8b.

E.P. VI Sq. 4, L6 1A 211 11b

123.0 93.2 104.6 9.0

Left, distal, and right margins thinned both dorsal and ventral.

Plate 8d.

E.P. VI Sq. 16/25, L6A 1A 326 16

83.5 63.7 75.6 12.4

Proximal, left, distal, and right margins thinned both dorsal and ventral.

Plate 8a.

E.P. VII Sq. 7, L8, F68T 1A 465 11a

60.9 69.1 90.0 6.5

Proximal, left, distal, and right margins thinned both dorsal and ventral.

Plate 8c.

? ? Beach 772 16

180.8 83.9 164.3 9.6

Left, distal, and right margins thinned both dorsal and ventral.

27. *Cleavers and Choppers*. Several heavy implements may have been used as hand-held cutting and chopping tools, but their specific functions are uncertain. They are flaked rather than pecked, ground, or simply crushed by use, but they are quite variable in form and size. Only one of the seven excavated specimens belongs to the Early Prehistoric period; five represent the Late Prehistoric period, one belongs to the Historic period, and another was found on the beach.

Hist. II N10/E10, F6814, Upper Basin 338 2e

57.0 63.1 48.1 20.4

A large cleaved flake blunted along one margin to form a rough, sinuous cutting edge. Specimen was found with this edge oriented upward in the site, and it was surrounded by finely divided bone fragments.

Very likely an anvil chopper. Plate 7b.

L.P. A S5/W95, L1A 113 12

1365.2 209.0 105.3 35.3

A large tabular cobble covered primarily with cortex.

One margin roughly chipped to form a steep back.

The opposite margin has been roughly thinned on both faces to form a rugged cutting or chopping edge.

One end is thinned on one face, the other end is thinned and battered on both faces.

This specimen bears the dubious distinction of being the largest artifact yet found in the site, and it would have made an effective hand-held cleaver or chopper.

L.P. A N5/E5, L1A 291 7

63.7 98.2 33.0 12.6

A large flake with plano-convex cross-section and cortical dorsal face.

One margin roughly blunted, the other thinned on both faces and heavily battered.

Could have been hafted or hand-held as a chopper or cleaver.

L.P. IIIb D2: N10/E60, L6 1788 12

164.0 83.3 54.7 28.6

A cobble with triangular cross-section.

One margin thinned and battered on both faces. Remainder is cortical.

Possibly a hand-held chopping tool.

L.P. IV S15/W305, L6 1551 3c

216.4 87.0 80.6 24.3

A tabular cobble flaked along one margin to form a rough, sinuous cutting edge.

Possibly a hand-held chopper.

L.P. B N20-25/0, L2 258 2c
75.7 56.8 46.7 28.9
A cobble with diamond-shaped cross-section.
Faces are roughly flaked. One margin is thinned and crushed along both faces.
Possibly a hand-held chopping tool.

E.P. VI Sq. 10/19, L6 1A 18 2b
606.4 96.0 85.4 67.9
A large cobble roughly flaked on both faces to form a heavily battered, sinuous cutting edge.
Possibly a hand-held chopping tool.

? ? Beach 771 11a
820.5 176.3 84.4 40.7
A large cobble with plano-convex cross-section.
One face entirely cortical; other face half cortical but thinned from both long margins and one end.
Possibly a hand-held cleaver.

28. *Pestles and Hammerstones*. A number of heavy implements show little or no signs of flaking or else have been both flaked and pecked. In addition most of them are heavily battered and crushed, apparently by use, and they must have served one or more pounding and crushing functions. Of 12 excavated examples, one belongs to the Historic period, three represent the Late Prehistoric period, and eight belong to the Early Prehistoric period; three other examples were recovered from the beach. The differences between the distributions of pestles and hammerstones on the one hand, and cleavers and choppers on

the other, are quite striking, but the sample sizes may be too small to support firm conclusions concerning their significance.

Hist. II N15/W95, L2 222 14
238.3 107.3 42.9 24.3 (one end)
44.5 27.8 (other end)
A cobble with rectangular cross-section.
All surfaces are cortical, but the larger end is battered on a low dull point.
Possibly a hand-held hammerstone or pestle.

L.P. IIIb D2: N10/E60, L6 1803 12
301.1 90.5 47.9 35.4
40.8 38.0
A cobble with square to rectangular cross-section.
All surfaces cortical, but the narrower, thicker end is heavily battered.
Possibly a hand-held hammerstone or pestle.

L.P. III Sq. 16/25, L2 1A 307 11a
597.4 153.5 51.2 43.8 (unsplit end)
50.0 29.1 (split end)
50.9 43.1 (in groove)
An elongate cobble with a groove, ca. 24 mm. wide, pecked approximately midway between two flat ends.
All faces natural except for pecked groove and battering on ends.
Groove crosses one broad face and an adjacent margin.
One end split to groove, apparently by use.
Hammerstone grooved for hafting. Plate 7d.

L.P. B N20-25/0, L2 256 15
284.1 115.6 36.8 29.8
30.0 27.8
Cobble with rectangular cross-section.

All surfaces cortical, but smaller end slightly
battered.
Possibly a hand-held hammerstone or pestle.

E.P. VI S10/W210, L11 1336 12
314.6 108.9 60.1 31.1
50.8 22.2
Cobble pecked to form a round cross-section but split in half, apparently by use.
Tapers from one end to the other, and smaller end is broken, larger end battered.
Probably a hand-held hammerstone or pestle.

E.P. VI Sq. 11/20, L6 1A 53 11a
831.8 121.2 87.3 55.8
65.3 60.8
Cobble with an oval cross-section.
All surfaces cortical, but larger end heavily battered and smaller end split diagonally by a single large blow (use?)
Probably a hand-held hammerstone or pestle.

E.P. VI Sq. 13/22, L6 1A 125 11b
722.4 176.8 61.5 31.0
28.5 62.7
Cobble with rectangular cross-section.
Narrow, thick end is chipped and battered as if by use.
Probably a hand-held hammerstone or pestle.

E.P. VI Sq. 16/25, L6A 1A 328 11a
338.6 128.0 51.5 35.5
30.5 29.5
Cobble with rectangular cross-section.
All surfaces cortical, but larger end battered.
Probably a hand-held hammerstone or pestle.

E.P. C 0-N5/W100, L4B 44 12
431.0 127.4 48.1 39.5
49.4 39.3
Cobble with plano-convex cross-section.
All surfaces cortical, but both ends battered and wider end forms a battered dull point.
Probably a hand-held hammerstone or pestle.

E.P. C N10-15/W100, L4D, F664 55 11a
272.3 105.3 46.2 38.0
38.8 31.3
Cobble with oval cross-section.
All surfaces cortical, but both ends battered, and larger end bevelled and heavily battered.
Probably a hand-held hammerstone or pestle.

E.P. C N10-15/W100, L4D, F664 56 11b
1005.4 173.8 68.7 58.0
43.5 38.1
Cobble with conical outline and round cross-section.
Most surfaces cortical, but locally pecked to form a smoothly tapering outline from one end to the other.
Both ends heavily battered.
Probably a hand-held pestle. Plate 10a.

E.P. C N10-15/W100, L4D, F664 57 11a
1009.8 184.1 72.5 60.1
43.3 39.1
Identical technically and functionally to No. 56.
Probably a hand-held pestle. Plate 10b.

? ? Beach 758 11b
1443.6 184.1 78.4 71.1
71.9 40.0
71.1 52.8 (in groove)
Elongate cobble with round to oval cross-section.

Groove, ca. 25 mm. wide, pecked on both margins slightly nearer the larger end.
All surface cortical except for groove, but both ends battered.
One margin of smaller end battered as if used as an unhafted maul.

? ? Beach 807 11a
235.1 89.7 43.7 34.4
40.4 33.5
Cobble with oval cross-section.
All surfaces cortical, but both ends slightly battered.
Probably a hand-held hammerstone or pestle.

? ? Beach 808 12
553.4 115.0 72.9 38.0
64.3 47.7
Cobble with triangular cross-section.
All surfaces cortical, but both ends battered.
Natural hand grip near smaller end.
Probably a hand-held hammerstone or pestle.

29. *Adzes*. Another kind of artifact for which there is local ethnographic testimony is the grooved adze. Though such adzes are no longer made or used today, they are readily recognized by many of the people in Old Crow who remember stories about contests between a man with a Hudson's Bay axe and a man with a stone adze; the outcome of the contest varies with the speaker and the hour of the evening. Stone adzes are said to have been used until about 100 years ago, and adze-cut stumps are numerous in certain areas around Old Crow. The Klo-kut collections

include four excavated adzes, two Late Prehistoric and two Early Prehistoric, and four examples from the beach.

L.P. II Sq. 9, L1 1A 423 7
292.7 108.1 68.4 23.2
Faces and groove shaped by pecking and polishing.
Entire adze split by use and broken transversely at groove.
Remaining bit heavily battered and split. Plate 7c.

L.P. IV Sq. 41/44, L4 1A 166 16
249.6 117.5 60.1 20.7
Probably a broken adze, but no groove is present.
Roughly pecked and polished.
One end broken, the other battered and split.

E.P. V N15/E10, L8 398 7
361.3 102.4 64.0 26.3
59.3 24.2 (in groove)
Groove and grooved face pecked and polished; ungrooved face and lateral margins polished smooth.
Bit at each end; both bits extensively chipped and battered.
Groove, ca. 18 mm. wide, centered between the two bits and extending across one face and both margins.
Plate 9a.

E.P. V Sq. 16/25, L5 1A 314 7
498.2 141.8 61.1 23.6 (split)
61.9 35.7 (unsplit)
61.7 28.3 (in groove)
Shaped primarily by pecking with very little polish apparent.
One end split, the other heavily battered but unsplit.
Groove, ca. 31 mm. wide, centered between the two bits and extending across one face and both margins.
Plate 9b.

? ? Beach 750 7

263.5 113.7 50.3 34.4

49.5 30.5 (in groove)

All faces and groove shaped by pecking and polishing.
Entire adze split longitudinally.
Groove, ca. 24 mm. wide, centered between two heavily battered bits and extending across one face and both margins.

? ? Beach 751 7

340.9 92.9 62.9 39.0

58.1 38.3 (in groove)

All faces and groove shaped by pecking and polishing.
Entire adze split longitudinally
Groove, ca. 21 mm. wide, centered between two heavily battered bits and extending across one face and both margins.

? ? Beach 763 7

317.6 125.1 51.0 23.9 (split bit)

51.3 32.8 (split maul?)

46.7 33.4 (in groove)

All faces and groove shaped by pecking and polishing.
Adze bit split on both faces and heavily battered.
Maul (?) split mainly on one face and heavily crushed.
Groove, ca. 25 mm. wide, positioned 70 mm. from adze bit and 50 mm. from maul.

? ? Beach 837 7

424.4 129.7 53.2 43.0 (unsplit)

54.1 22.6 (split)

53.3 39.8 (in groove)

All faces and groove shaped by pecking and polishing.
One bit split to groove; both bits heavily battered.
Groove centered between the two bits and extending across one face.

30. *Polished Fragments.* The polished fragments from Klo-kut probably include implements of a variety of functions. Abraders and whetstones may have been used to fashion some of the stone artifacts, and, as will be seen below, they were important tools in the shaping of bone implements. Other uses would include the grinding of mineral pigment and the polishing of wood. I have been unable to distinguish particular functional types among the polished fragments, so they have been treated together with some attention to the distribution of polished facets. In this regard it is noteworthy that there is not a single example of the sort of polished cutting edge which characterizes late prehistoric Eskimo ground slate collections. All the polish occurs on a flat face, and the use of "margin" in this connection refers to a face which is narrower than adjacent faces. Metric and non-metric data are provided in Tables 49-50 and 50 polished fragments (see also Morlan 1971 : Table 113).

Summary. This completes the description of the stone artifacts from Klo-kut. Thirty categories have been utilized in the presentation of 5679 excavated specimens as well as 16 surface finds. Further discussion and analysis of distribution and comparative data will be deferred until the other artifacts have been described, but a tabulation of the stone artifact frequencies can be found in Table 59.

Period	Block	No.	Weight	Mean Weight	Range	Length	Mean Length	Range	Width	Mean Width	Range	Thick.	Mean Thick.	Range
Hist.	W100	3	24.6	8.20	4-16	125.9	41.93	29-59	53.4	17.80	15-21	21.5	7.17	5-10
	E100	6	37.1	6.18	1-19	175.1	29.18	20-41	106.2	17.70	11-32	40.7	6.78	2-11
	Total	9	61.7	6.86	1-19	301.0	33.44	20-59	159.6	17.73	11-32	62.2	6.91	2-11
Late Pre.	W700	4	78.7	19.68	6-40	158.8	39.70	29-44	92.9	23.23	13-36	49.9	12.48	9-18
	W600	4	40.2	10.05	1-33	96.1	24.03	15-40	74.2	18.55	11-32	43.4	10.85	5-21
	W100	7	72.8	10.40	1-41	243.7	34.81	15-74	131.3	18.76	9-41	37.5	5.36	2-9
	E100	1	82.0	82.00	-	67.9	67.90	-	57.6	57.60	-	11.9	11.90	-
	1A	11	61.7	5.61	1-43	251.1	22.83	9-60	138.5	12.60	5-29	33.5	3.05	1-10
	Total	27	335.4	12.42	1-82	817.6	30.28	9-74	494.5	18.31	5-58	176.2	6.53	1-21
Early Pre.	W400	1	30.1	30.10	-	75.9	75.90	-	42.6	42.60	-	5.4	5.40	-
	W100	3	20.0	6.67	6-7	84.0	28.00	27-29	59.9	19.97	13-27	29.7	9.90	9-12
	E100	1	7.2	7.20	-	17.9	17.90	-	17.9	17.90	-	17.2	17.20	-
	1A	9	23.5	2.61	1-9	194.5	22.72	14-47	114.7	12.74	8-20	32.6	3.62	1-9
	Total	14	80.8	5.77	1-30	380.3	27.16	14-76	235.1	16.79	8-43	84.9	6.06	1-17
	Totals	50	477.9	9.56	1-82	1498.9	29.98	9-76	889.2	17.78	5-58	323.3	6.47	1-21

Table 49. Distribution of metric data for 50 polished fragments from MjVl-1, arranged by period.

Period	Block	Stone Type: 6	11b	15	16	17b	17c	18	Totals	No. Polished Faces/Margins: 1M	2M	3M	1F	2F	1M1F	2M1F	-	Totals
Hist.	W100			1		2			3	1	1		1					3
	E100			1		1	1	3	6	2	2		1	1				6
	Total			2		3	1	3	9	3	3		2	1				9
Late Pre.	W700			4					4	1	2		1					4
	W600			1	1			2	4	1			3					4
	W100					6		1	7	1	2	1	1		2			7
	E100					1			1			1						1
	1A	1	1			9			11	1	1		8			1		11
	Total	1	1	5	1	16		3	27	4	5	2	13		2	1		27
Early Pre.	W400					1			1		1							1
	W100			1				2	3	1					1		1	3
	E100							1	1				1					1
	1A			2	1	6			9	2	2		2	1	2			9
	Total			3	1	7		3	14	3	3		3	1	3		1	14
	Totals	1	1	10	2	26	1	9	50	10	11	2	18	2	5	1	1	50

Table 50. Distribution of non-metric data for 50 polished fragments from MjVl-1, arranged by period.

Bone Artifacts

This section includes artifacts made of bone, antler, and tooth. Such specimens pose certain special descriptive problems not encountered in the presentation of stone artifacts. In general, for example, the bone and antler specimens are much more variable than are those of stone; not only are there more categories of artifacts recognized here, but also there is more variation within each category. This results in part from the nature of the raw material and the range of technological skills to which it can be subjected. Whereas most of the stone specimens are made on flakes which have certain repetitive properties owing to the way in which stone fractures, the bone and antler specimens are made from naturally occurring organic forms the structure of which has less influence on most technological processes. A piece of antler, for example, may be relatively uniform in size and density, and its structure has radial rather than bilateral symmetry. As a result, barring the presence of tines or damaged areas, it is just as easy to remove a longitudinal splinter from one side of the antler beam as it is from the other, and once the splinter is removed it can be cut and polished in almost any way the artisan chooses. Consequently it is necessary for the archaeologist to describe such specimens in terms of cutting techniques which must be inferred from observations of the finished and unfinished surfaces of the implements.

Several major characteristics will be considered: (1) the anatomical origin of the raw material, when discernible; (2) the size and proportions of the specimen and its significant elements; and (3) the techniques utilized to modify the raw material in order to achieve a finished artifact. All the bone, antler, and tooth artifacts were analyzed along with the unworked faunal remains and so were classified as to anatomical element and species. Unless specified otherwise it can be assumed that a given specimen is made of caribou (*Rangifer tarandus*) bone or antler since that species furnished nearly all the raw material for this industry.

Size and proportion will be communicated entirely in terms of linear measurements (mm.) which will be presented either in the context of individual descriptions or in the form of tabulated data. The bone and antler specimens were not weighed because of the influence of moisture on their density.

Several cutting techniques have been defined on the basis of striations and other marks visible on the artifacts. While I have made reference to Semenov (1964) on many occasions during the collection of the data, I have not attempted to follow his or any other approach since I find them all rather confusing. Several terms have been used in the descriptions to summarize the inferences I have made concerning cutting techniques:

(1) scraping, a method of producing longitudinal facets

on the surface of a bone or antler in order to reduce its size or alter its outline. The facets are characterized by small transverse ridges which represent loss of purchase by the cutting tool. Presumably this form of cutting is accomplished by means of a strong, abrupt cutting edge held nearly perpendicular to the surface of the bone and drawn in long strokes in one direction.

(2) whittling, a method of producing smooth longitudinal facets on the surface of a bone or antler in order to reduce its size or modify its shape. Transverse ridges are absent from the facets produced by this techniques, but a facet may be more variable in width and may have an undulating surface as the purchase of the cutting edge varied through the stroke. This technique is probably quite similar to the whittling of wood and must have required a thin, sharp cutting edge held at an acute angle to the surface of the bone and drawn or pushed in one direction.

(3) polishing, a method of reducing the size and angularity of a bone or antler in order to produce a smooth, finished artifact. Nearly all the finished bone and antler artifacts from Klo-kut have been polished, and this technique was probably accomplished with small whetstones or perhaps with pieces of hide and a fine abrasive powder.

(4) incising, a method of decorating the surface of a bone and a part of the process involved in dividing a

bone. Incising must have required a strong, sharp cutting edge which could be applied with repeated, strong strokes and which could be accurately controlled to make straight lines and short deep grooves.

(5) grooving, part of a process used to divide bone and antler in the initial step of fashioning a blank on which an artifact could be made. Grooving may be an exaggerated form of incising or else may have required a broader cutting edge which could be used as a gouge.

(6) splintering, a form of breaking associated with grooving. After forming a thin septum by means of a grooving technique the specimen could be splintered by breaking the septum to obtain a long, straight margin.

As in the case of the stone artifacts the major criteria used in defining categories of bone specimens are technological in nature; i.e., they pertain to the ways in which the raw material was modified. In addition, however, functional characteristics were more explicitly involved in the definition of bone and antler artifact classes. These include both very general functional concepts such as piercing, scraping, and cutting, and more specific functional designations such as arrowhead, scraper or beamer, and awl. Ethnographic evidence concerning function is somewhat more abundant for bone than for stone artifact types.

The bone, antler, and tooth artifacts have been classified in 40 categories, numbered 31-70. Nos. 31-38 are piercing implements, most of which were used as projectile heads of one sort or another. Scrapers and the byproducts of their manufacture comprise nos. 39-44, and hand-held piercing tools and their byproducts are listed as nos. 45-55. Fish hooks and lures comprise nos. 56-57, a variety of kinds of cut antler make up nos. 58-65, and nos. 66-68 are miscellaneous categories. No. 69 consists of a variety of pitted bones, and no. 70 includes all bones which exhibit butchering scars.

31. *Bilaterally Barbed Point.* One bilaterally barbed point was found at Klo-kut, and it is not certain that it was a finished, functional artifact.

L.P. A N5/E5, L1A 277 antler

54.1 15.7 9.3

Diamond shaped cross-section with well defined median ridges.

Tang, now 8 mm. long, but broken, is squared to a rectangular cross-section and tapers slightly; it is set off by well defined but sloping shoulders.

Five very small barbs, 4-6 mm. apart, and 4-6 mm. long, project 2 mm. from the blade along each margin. Barbs are not precisely opposed, and the distal-most barb is 18.2 mm. from the tip.

Each row of barbs is lined by a longitudinal incision (barb line) on each face, and the barb lines are slightly lateral to the base of the barbs.

The tip was sharply pointed but has been crushed as if by impact.

Longitudinal incision, 17.0 mm. long, parallels the median ridge on one face.

Specimen was made primarily by whittling an antler beam, and very little polishing is evident.

General workmanship is relatively poor, and the point may not have been finished.

Plate 11a, Fig. 30a.

32. *Unilaterally Barbed Points*. Of 19 specimens in this category 11 are complete or nearly complete, and the other eight are tip fragments. There is considerable variation among these points with respect to overall size, cross-section, form of the tang, form, size and number of the barbs, and the mode of decoration. I have not found it possible to define meaningful types, but some general trends will become apparent.

Hist. A N5-10/W0-5, L1 15 antler

103.4 17.3 4.2

Plano-convex: cancellous face is plano, compact face is subconvex with a very poorly defined median ridge. Both margins worked to a flat face along proximal half of point, giving the specimen a rectangular cross-section with rounded corners.

Base is broken, and part of a small round notch in the base appears to be a remnant of a small line hole drilled from both sides.

One barb is located 48.5 mm. from the tip, is 14.1 mm. long, and projects 6.2 mm. from the blade. The barbed margin between the barb and tip is worked to a sharp, double bevelled edge and is very finely serrated by short transverse nicks along 33 mm. adjacent to the barb.

The tip is sharp and undamaged.

Specimen was made by removing a thin sliver of antler and polishing it; the barb was formed by grooving from both faces and polishing the adjacent margin to a flat surface.

Fig. 28c

Hist. A N10-15/0, L1 267 antler

168.5 9.1 6.3

Thin diamond-shaped cross-section at the tip grading to a pentagonal cross-section with the barbs at the apex.

Tang is wedge-shaped with rectangular cross-section. It tapers slightly in the plane of the barbs but tapers strongly in a perpendicular plane beginning 36.3 mm. from the base.

Nine barbs, 8-11 mm. apart, project 1.5 mm. from the blade. Proximal-most barb is 49.4 mm. from the base, distal-most barb is 47.2 mm. from the tip.

No barb line or other incisions are present.

Tip probably was sharp but is crushed as if by impact.

Specimen was made by whittling and polishing an antler blank. Barbs were cut by whittling and slight undercutting but without sawing. Tang was rather roughly cut to a wedge-shape.

Fig. 29c, Plate 11c

L.P. II S5/W210, L2 1250 bone

142.1 10.4 9.3

Equilateral triangular cross-section with barbs along one apex.

Conical tang, 18.0 mm. long, is set off by very poorly defined sloping shoulders.

Eight major barbs, 11-13 mm. apart, project 2.3 mm. from the blade. The distal-most barb is 27.9 mm. from the tip. Three very small barbs at the base are 2.7 mm. apart and project 1.4 mm. from the blade.

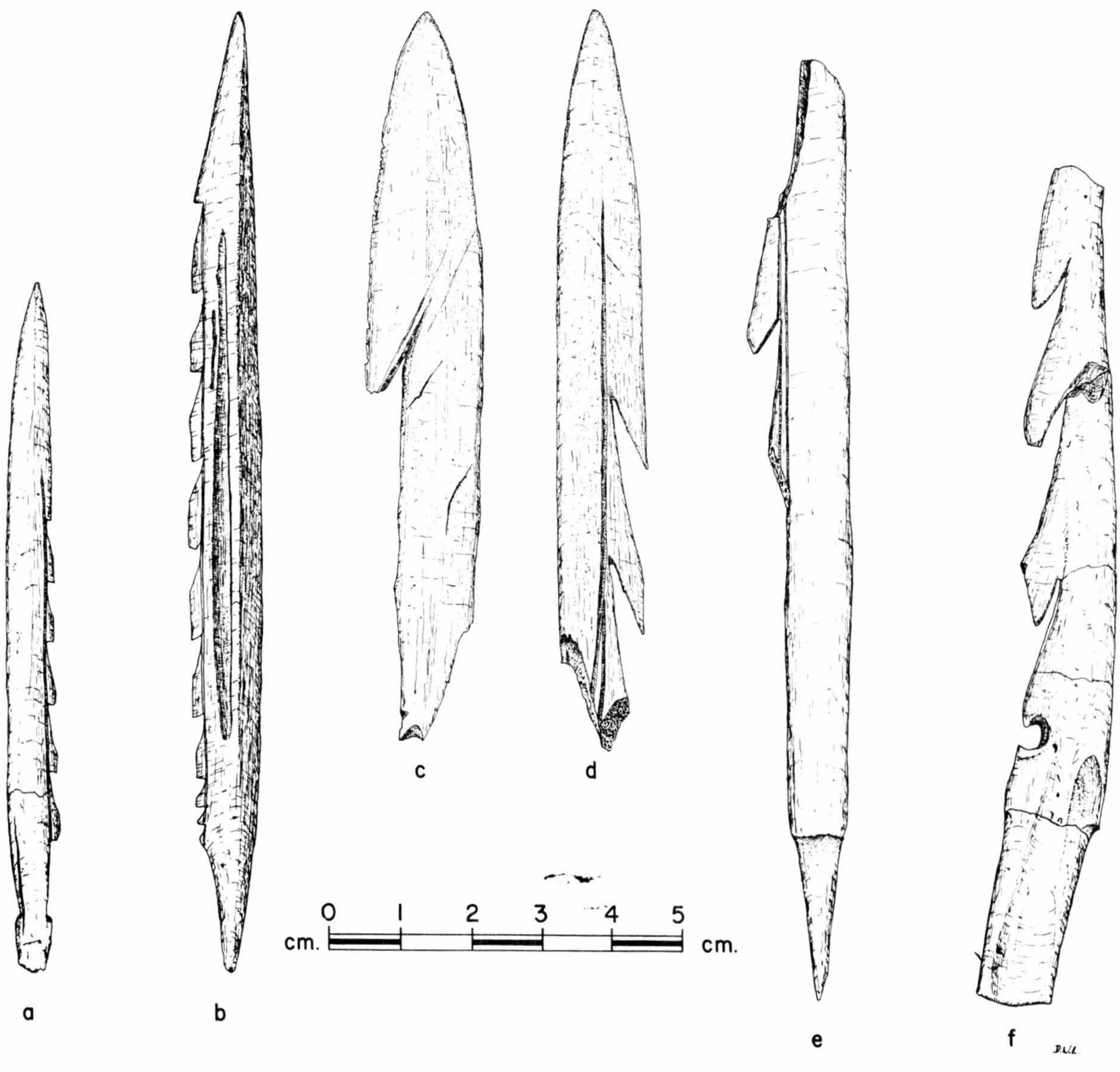


Fig. 28. Unilaterally barbed points from MjVl-1. National Museums of Canada Neg. No. 72-8279.

One barb line occurs on each face at the base of the barbs. One face adjacent to the barbs is occupied by the medullary cavity of the bone blank. A longitudinal incision extends along the face opposite the barbs from the tang to near the distal end of the barbed area.

Tip is sharp and undamaged.

Specimen made by scraping and polishing a bone blank, probably from a metapodial shaft; barbs were formed by whittling and slight undercutting with no apparent sawing.

The small barbs at the base may have been related to a hafting technique.

Plate 11f, Fig. 28b.

L.P. III S10/W210, L4 1278 bone

99.5 7.5 4.7

Diamond-shaped cross-section.

Tang is wedge-shaped, thinned laterally, but knobbed in the plane of the barbs.

Six barbs, 8-10 mm. apart, project 1.4 mm. from blade. Proximal-most barb is 18.2 mm. from the base, distal-most barb is 34.3 mm. from tip.

Barb line along only the proximal-most barb on one face; a complete barb line on the other face adjacent to a decorative longitudinal incision extending 18.2 mm. from the tang.

Tip is sharp and undamaged.

Specimen made by scraping a long bone (?) fragment. Barbs cut by whittling and undercutting with no apparent sawing.

Plate 11e, Fig. 28a.

L.P. A N5/E5, L1A 279 bone

91.4 8.9 5.0

Planoconvex cross-section with barbs along one margin.

Base broken.

15 small barbs, 3-5 mm. apart, project 1.4 mm. from body. Distal-most barb is 18.5 mm. from tip.

No barb line or other incisions. Plano face occupied by medullary cavity of bone blank.

Tip broken as if by impact.

Specimen made by scraping and polishing a long bone fragment. Barbs cut by rather rough, irregular nicking.

Plate 11d.

L.P. III Sq. 12/21, L2 1A 76 antler

25.4 8.4 5.3

Oval cross-section.

Base broken.

Two remaining barbs, 13.6 mm. apart.

Deep barb line on one face, shallow barb line on the other.

Tip broken.

Specimen made by whittling and polishing antler blank; barbs formed by grooving and sawing.

Associated with hematite and stained red.

L.P. III Sq. 41/44, L2 1A 150 antler

49.2 8.8 3.8

Flat oval cross-section.

Base broken.

Barb broken, 42.9 mm. from tip.

Tip sharp and highly polished.

Barb formed by grooving and sawing.

L.P.	III	N5/W75, L4	161 (Plate 11b)	bone
E.P.	C	N20/E202'6", F6619, 32"	512 (Plate 13g)	antler
E.P.	VI	Sq. 4, L7	1A 219 (Plate 13e)	bone
E.P.	VI	Sq. 13/22, L6	1A 123 (Plate 13d)	bone
E.P.	VI	Sq. 15/24, L6A	1A 290 (Plate 13f)	bone

16.3 - 53.5 mm. long.
Five small barbed point tips with broken bases.
All sharply pointed with pointed ovate cross-sections.
One to three barbs remaining, 12-15 mm. apart, projecting 1.4-1.5 mm. from blade.
All with barb lines on each face at base of barbs.
Appear to be made like the large specimens with the barbs formed by whittling and slight undercutting.

E.P. VI 0/W210, L10 1323 antler
129.5 14.3 7.7
Asymmetrical pointed oval cross-section at distal end grading to symmetrical oval section near base.
Conical tang, 22.5 mm. long, set off by rounded, well defined shoulders.
Two remaining barbs, 95.0 and 68.8 mm., respectively from base, project 5.1 mm. from blade.
Single barb line on one face, double barb line on other, along base of barbs.
Tip broken.
Specimen made by grooving and sawing barbs in margin of pointed ovate blank which is highly polished on all surfaces.
Plate 12c, Fig. 28e.

E.P. VI N15/W80, L10, F689 1032 bone
70.1 10.9 7.4
Pointed ovate cross-section with barbs along pointed margin.
Base broken near the base of a barb.
Two remaining barbs, 46.6 mm. apart, are 27.1 mm. long and project 8.1 mm. from blade.
Barb lines intersect base of barbs on both faces, one of them becoming a double incision at one place.

Tip broken near base of a barb.

Specimen made on a thick long bone fragment by whittling and polishing. Barbs made by grooving and sawing; diagonal and transverse striations are visible on the underside of the barbs and on adjacent surface of the blade. Barbs also thinned slightly relative to blade.

Plate 12j.

E.P. C N0-5/W100, L4B 42 bone

58.8 7.4 3.2

Very thin diamond-shaped cross-section.

Base gradually tapers to a point beginning about 30 mm. from its tip; no well defined differentiation of base.

Three "barbs", 5 mm. apart, are actually three transverse incisions cut 2.1-2.7 mm. into one margin. They may be unfinished barbs. Distal-most "barb" is 9.8 mm. from break, proximal-most "barb" is 37.5 mm. from base.

No barb lines or other incisions.

Specimen made by scraping and polishing a long bone (?) fragment; "barbs" are merely nicks along one margin.

Probably not a functional projectile.

Plate 12h.

E.P. VI Sq. 5, L7 1A 350 + 352 + 353 bone

118.6 13.6 6.7

Cross-section rectangular near tip grading to asymmetrical oval near base.

Tang, 25.5 mm. long, set off by sloping shoulders on margins but not shouldered on faces; concavo-convex cross-section.

Line hole, 38 mm. from base, is 4 mm. in diameter and drilled from both faces; lateral third of line hole is broken away. Three large barbs, 16.7 and 24.1 mm. apart, project 5-6 mm. from blade.

No barb lines or other incisions.

Tip probably was sharp but a small part is broken away.

Specimen was made by a combination of whittling and scraping with little or no polishing. Barbs were fashioned by grooving and sawing.

Specimen was found near a hearth and is completely calcined.

Plate 12a, Fig. 28f.

E.P. VI Sq. 7, L7 1A 444 bone

87.9 11.9 7.6

Isosceles triangular cross-section with barbs at apex.

Base broken.

One remaining barb, 67.6 mm. from tip, projects 5.7 mm. from blade.

Barb line along base of barb on one face; the other face occupied by the medullary cavity of the long bone fragment.

Tip probably was sharp but has been broken as if by impact.

Specimen made by scraping and polishing; apex of cross-section particularly polished to a sharp edge and barb grooved and sawn in that edge.

Plate 12d.

E.P. VII Sq. 12/21, L7 1A 97 bone

75.9 8.7 7.3

Round to oval cross-section.

One small barb, 14.3 mm. from one bluntly pointed end, was formed by whittling and no undercutting.

Entire specimen highly polished. Probably a point with a small barb at the tip but could be a point base with a small step on the tang.

E.P. VI Sq. 41/44, L6A 1A 183 antler

104.3 12.8 6.7

Asymmetrical diamond-shaped cross-section at tip grading to pointed ovate section with the point formed by the barbed margin.

Base broken.

Two barbs, 54.1 and 78.9 mm., respectively, from the tip, project 5.1 mm. from the blade, are quite sharp.

Barb lines intersect base of the barbs on each face, one line becoming a double incision in two areas. The distal end of a longitudinal incision occurs on the face opposite the barbs.

Tip probably was sharp but is crushed as if by impact.

Specimen made by whittling and polishing an antler blank to a pointed ovate cross-section; barbs cut in the pointed margin by grooving and sawing; both transverse and diagonal striations are visible in the notches which form the barbs.

Plate 12b, Fig. 28d.

It should be obvious from the foregoing descriptions that the barbed points from Klo-kut are quite variable in form and size; one might even refer them all to one type -- called "unique". The sample size is too small to be certain of trends through time, but there seems to be a gradual diminution in the size of the barbs and in the degree to which they project from the blade; there may also be an associated increase in the number of barbs. Both wedge-shaped and conical tangs are present, only two specimens appear to have had line holes, and barb lines characterize all the very well made examples but are absent on poorly fashioned points. There may be a variety of functions represented among these points but none of them is too large to be hafted on an arrow shaft or too small to be used as a dart head. Informants in Old Crow insist that they were not used to kill caribou but must have been employed in various fishing techniques; this, however, is difficult to reconcile with the evidence provided by the faunal remains.

33. *Unbarbed Points*. Twenty-seven specimens have been included in this category, but 18 of them are small fragments, four are tip sections, and only five are relatively complete. As in the case of the barbed points these unbarbed forms are quite variable in size and shape and probably represent a number of functions. I have not found it possible to group them into meaningful types, so they have been individually described.

L.P. A 0-N5/W100, L1A 30 antler
84.3 12.5 4.5
Asymmetrical plano-convex cross-section thinned to a sharp edge along one margin.
Base broken.
Blade parallel-ovate in outline. One longitudinal groove cut in the center of one face.
Tip broken.
Specimen made by splitting an antler beam and whittling to shape; not polished and may not be finished.

L.P. III Sq. 9, L2 1A 425 bone
22.0 4.7 3.4
Plano-convex cross-section.
Base broken.
Distal end of longitudinal incision on plano face.
Tip damaged as if by impact.
Specimen scraped and highly polished.

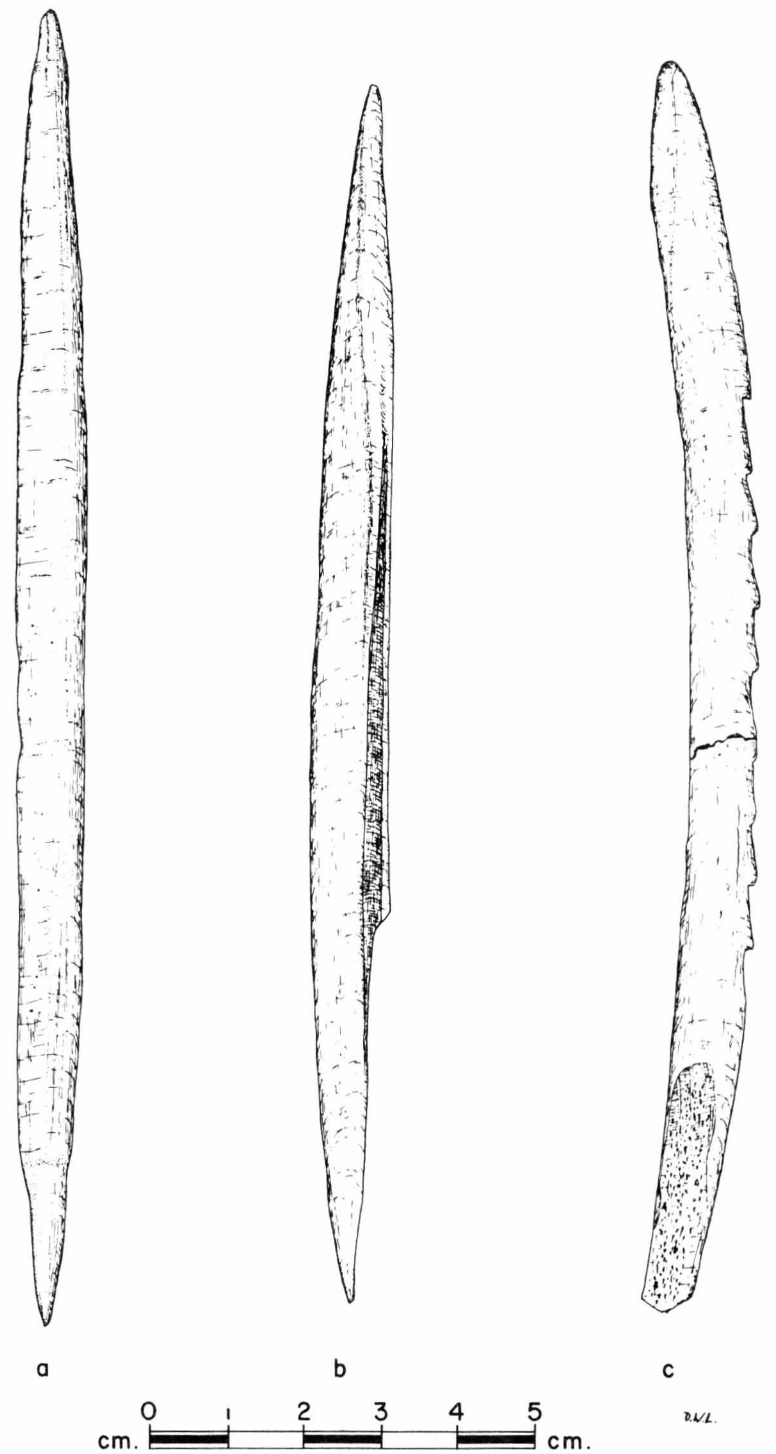


Fig. 29. Bone points from MjVl-1. a-b, unbarbed points; c, unilaterally barbed point. National Museums of Canada Neg. No. 72-8281.

E.P. V D2: N5/W5, L7 787 bone

161.6 9.9 7.4

Isosceles triangular cross-section with rounded corners.

Conical tang, 50.5 mm. long, formed by slight shouldering in the corners of the cross-section; tang is sharply pointed.

One face occupied by the medullary cavity of the bone.

Tip sharply pointed.

Specimen made by scraping and polishing a metapodial shaft fragment.

Plate 12e, Fig. 29b.

E.P. VI N15/W75, L9 1038 bone

68.1 14.3 5.7

Subconvexo-convex cross-section with slight median ridge on subconvex face.

Base broken, but slight shoulders indicate former presence of tang.

Blade parallel-ovate in outline with a very shallow channel extending 16.0 mm. from the basal break on the subconvex face. The median ridge runs from this channel to the tip, and the channel may represent a poorly developed bed.

Two longitudinal incisions, one prominent and one faint, parallel the midline on the distal half of the convex face. Several small irregular carved elements on the subconvex face may represent decoration but do not form a clear design.

Specimen made by scraping and whittling a long bone fragment. It is highly polished, but both faces are heavily striated.

Plate 13j.

E. P. VI N15/W85, L9 245 antler

173.7 8.8 5.7

Pointed ovate cross-section.

Conical tang, 19.9 mm. long, set off by very poorly defined sloping shoulders.

Tip fairly sharp.

Specimen made by whittling and polishing an antler sliver.

Could be a blank for a barbed point, but the high polish and well formed tang suggest the specimen is complete.

Plate 12f, Fig. 29a.

E. P. VII N10/W75, L8 1056 bone

25.9 9.8 4.9

Scalene triangular cross-section.

Base (?) broken.

Longitudinal incision on face forming base of triangle.

Tip damaged as if by impact.

E. P. VI Sq. 13, L6-7 1A 136 bone

63.2 8.8 5.4

Right triangular cross-section with intersection of long leg and hypotenuse forming a sharp edge.

Base broken.

Longitudinal incision on each face adjacent to the sharp edge.

Tip fairly sharp but blunted as if by impact.

Specimen made by scraping, whittling, and polishing a long bone fragment.

Probably the tip of a unilaterally barbed point on which the longitudinal incisions represent the distal ends of barb lines.

Plate 12i.

E.P. VI Sq. 16/25, L6A 1A 315 bone

59.3 7.9 5.7

Asymmetrical oval cross-section.

Base broken but a small knob, formed by whittling with no undercutting, is adjacent to the break.

One face occupied by a medullary cavity, the other by a longitudinal incision.

Tip sharply pointed.

Specimen is highly polished; the knob is more knob-like and less barb-like than the similar feature on 1A 97 (see unilaterally barbed points, above).

Plate 13m.

E.P. VII Sq. 12/21, L7 1A 106 bone

77.4 13.2 7.3

Cross-section is probably plano-convex, but specimen is broken diagonally.

Base broken.

Longitudinal incision near center and another along one margin of plano face; a third incision along margin of convex face.

Tip rounded and crushed as if by impact.

Highly polished.

Hist.	II	N15/E10, F6814, U. Basin	356	bone
L.P.	III	N15/W95, L3	228	bone
L.P.	III	Sq. 4, L3	1A 199	bone
L.P.	III	Sq. 14/23, L2	1A 251	bone
E.P.	V	S15/W305, L9	1534	bone
E.P.	V	Sq. 4, L5	1A 207	antler
E.P.	VI	Sq. 4, L7	1A 217	antler
E.P.	VI	Sq. 6, L7, F68L	1A 415 + 416	bone
E.P.	VI	Sq. 16/25, L6A	1A 316 (2)	bone
E.P.	VI	Sq. 41/44, L6	1A 171	bone
E.P.	VII	Sq. 7, L8, F68T	1A 447	bone
E.P.	VII	Sq. 7, L8, F68T	1A 448	bone

E.P.	VII	Sq. 7, L8, F68T	1A 457 + 462	bone
E.P.	VII	Sq. 7, L8, F68T	1A 772 (3)	bone
E.P.	VII	Sq. 13/22, L7	1A 142	bone

18 small charred fragments from midsections of unbarbed points.

All made by scraping, whittling, and polishing. Though the unbarbed points appear to be concentrated in the Early Prehistoric period, the small sample size precludes a firm conclusion at this time. According to informants in Old Crow, long unbarbed specimens, such as No. 787 and 245, would have been hafted as lance heads for use in killing swimming caribou from the vantage point of a floating canoe. The lack of barbs would have permitted repeated thrusts at one or more animals. The frequency of crushing and other kinds of damage on the tips of these specimens suggests they were indeed hafted as heads on piercing weapons, but there is no clear evidence to distinguish between lance heads, dart heads, and arrowheads.

34. *Points With Knobbed Stems*. Five examples of knobbed stems seem worth isolating as a separate category since all the tangs on the complete points described above lacked knobs regardless of their shape. Two possible knobs were included in the earlier descriptions, but they are both unlike the knobs described here. Presumably this form of stem treatment reflects a distinctive hafting technique and may be related to a particular function.

L.P. IV 0/W75, L7 1087 antler

26.3 3.7 3.0

Oval cross-section.

Base sharply pointed, but blade and tip broken away.

Two small knobs have been whittled on one face, 10.8 and 16.1 mm., respectively, from the base.

The specimen is badly weathered and somewhat smaller than the stems of complete points.

Plate 13h.

E.P. V Sq. 4, L5 1A 208 bone

73.8 14.1 4.9

Plano-convex cross-section with plano face formed by the remnant of the medullary cavity of a long bone fragment.

Tapering stem, 29.8 mm. long, is set off by sharply cut shoulders and tapers to a point from a width of 10.6 mm. One small, heavily worn knob, 11.5 mm. from the base, on one face of the stem; other face formed by an extension of the medullary cavity from the blade.

Blade is parallel-ovate in outline.

Tip is quite sharp.

Specimen made entirely by whittling and polishing.

Plate 13i.

E.P. VI Sq. 12/21, L6 1A 89 bone

53.3 8.4 4.9

Concavo-convex cross-section with concavity formed by medullary cavity of a long bone fragment.

Small knob whittled on one face, 13.8 mm. from base; on opposite face medullary cavity extends to within 13.3 mm. of base.

Blade and tip broken away.

Specimen made by scraping, whittling, and polishing.

Would have been an even longer stem than those on complete points and would have had a much deeper cavity or channel than the other specimens.

E.P. VI Sq. 14/23, L6 1A 262 bone

71.6 14.1 4.5

Thin, diamond-shaped cross-section with poorly defined median ridges.

Stem, 40.4 mm. long, tapers to a point from width of 8.7 mm. Stem set off by well defined shoulders. Four small knobs, 4.1, 7.9, 14.8, and 27.3 mm., respectively, from the base have been whittled on one face of the stem. Other face of stem flattened.

Blade lanceolate in shape with the median ridge on one face terminating in a flattened area which extends distally 11.7 mm. from the flattened face of the stem.

Tip blunted as if by impact.

Specimen made entirely by whittling and polishing.

Plate 13k, Fig. 30d.

E.P. VII Sq. 12/21, L7 1A 96 bone

51.7 14.6 7.1

Thin diamond shaped cross-section with prominent median ridges.

Well defined stem, 23.1 mm. long, tapers to a point from width of 8.4 mm. Three small knobs, 7.2, 11.5, and 16.6 mm., respectively, from the base, have been whittled on one face. Other face of stem is flattened with flat area extending 7 mm. onto the blade as a shallow groove truncating the median ridge.

Blade is lanceolate in shape.

Tip sharply pointed.

Specimen made entirely by whittling and polishing.

Plate 13 l, Fig. 30c.

It may be noteworthy that all these specimens, except for one badly weathered example, occur in the Early Prehistoric period, but, as usual, the sample size supplies a cautionary note. Two nearly identical specimens, 1A 96 and 1A 262, may be copies of copper points, and they might have functioned as lance or arrow heads which would have been permanently fixed to the shaft by means of the knobbed stems.

35. *Blunt Arrowheads*. There are two complete blunt arrowheads in the collection and a fragmentary specimen probably represents a broken example. In addition, an awl which could have been hafted as a blunt arrowhead will be described below.

Hist. I N10/E10, L1 490 antler

61.8 18.2 14.3

Tapering asymmetrical oval cross-section, complete.

Bifurcate tang, 30.5 mm. long, made by slotting an antler beam through the longest diameter; the slot averages 4.4 mm. wide.

A low collar has been formed at the proximal tip of each tang element.

Four lobes have been cut into the distal end by rough notching, and the end was cut off smoothly and abruptly.

Specimen made by scraping, whittling, and polishing a small antler beam; cancellous tissue is exposed at the distal end and between the tang elements.

E.P. VI N15/W80, L10 1027 antler

54.8 19.5 17.6 (diameter)

Tapering oval cross-section.

Base broken, but an indented area adjacent to the break probably set off either a wedge-shaped or bifurcate tang.

Four lobes are formed on the distal end by rough notching; the lobes are heavily crushed as if by repeated impact.

Specimen made by scraping, whittling, and polishing a small antler beam; cancellous tissue is exposed in the center of the broken base and at the intersection of the four lobes.

Fig. 30b, Plate 12g.

E.P. VI Sq. 5, L7 1A786 bone

20.3 11.9 11.8

Fragment of a blunt arrowhead split longitudinally.

Completed cross-section would be plano-convex.

Specimen made by cutting through a thick long bone fragment at the diaphysis in order to form a flat distal end at an 85° angle to the outer table of the shaft. The specimen is highly polished.

36. *Unbarbed Bedded Points*. Two very similar antler points have shallow beds in one face and a collar on the other face at the proximal end. The distal end tapers to a sharp point with a diamond-shaped cross-section. The bedded face is characterized by a flat extension of the bed formed by longitudinal grooves which converge toward the point.

E.P. VI Sq. 10/19, L6A 1A 64 antler

61.1 7.5 4.9

A transverse groove, 34.5 mm. from the base is interrupted by the bed on one face and by a longitudinal incision on the other face.

Collar is 1.8 mm. wide.

Bed is deeper than on 1A 63, is 18.6 mm. long and is extended by longitudinal grooves to about 45 mm. long.

Plate 13b.

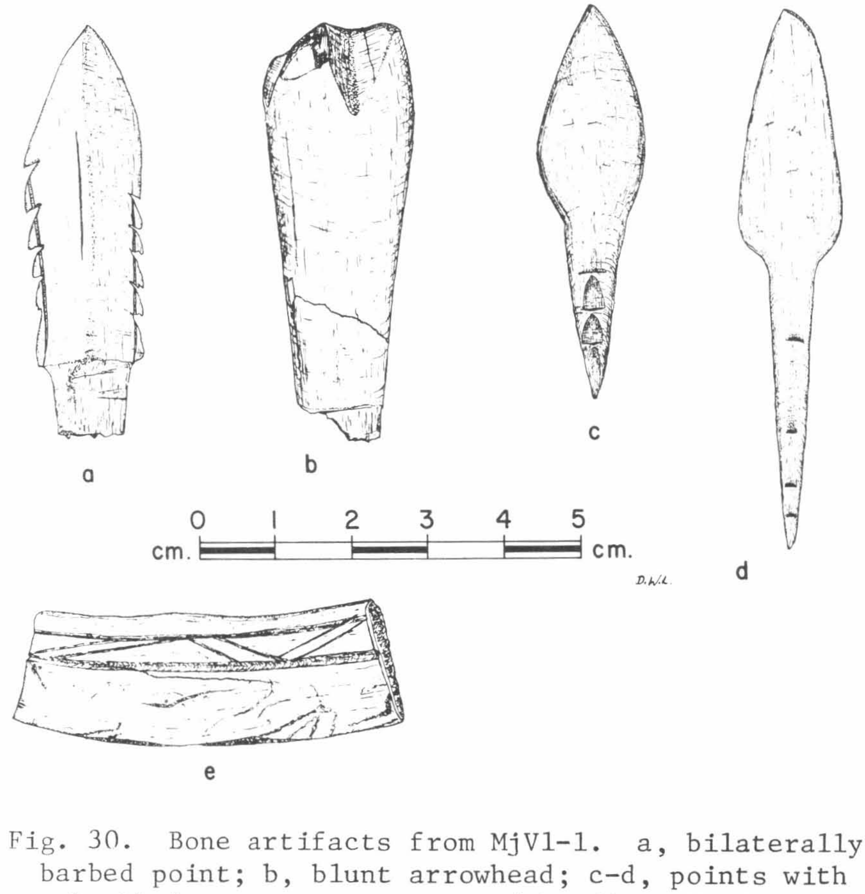


Fig. 30. Bone artifacts from MjVl-1. a, bilaterally barbed point; b, blunt arrowhead; c-d, points with knobbed stems; e, ornamented handle. National Museums of Canada Neg. No. 72-8274.

E.P. VI Sq. 20, L6A 1A 63 antler
70.9 8.8 5.6
Transverse groove, 31.0 mm. from the base, around entire perimeter except for bedded area.
Collar is 2.8 mm. wide.
Bed is 18.2 mm. long and is extended to about 44 mm. long.
Plate 13c.

Both specimens are made by scraping and polishing. They may have functioned as side barbs for a bird spear, as barbs for composite fish hooks, as reverse barbs for a leister, or as unbarbed projectile points.

37. *Leister Barbs*. One complete specimen and one fragment have been classified as leister barbs because of their curvature and apparent hafting technique.

E.P. VI Sq. 10/19, L6A 1A 65 bone
Basal half is 33.6 mm. long and has a plano-convex cross-section tapering to a blunt point from a width of 9.2 mm. and thickness of 4.1 mm. A knob on the base of the convex face is 5 mm. long.
Tip half is 30.6 mm. long and tapers from an oval cross-section, 6.9 X 4.4 mm. in diameter, to a round cross-section forming a blunt point. One longitudinal groove occupies one face.
Tip and basal halves are separated by a low collar on the convex face.
Specimen made by scraping and polishing.
Plate 13a.

E.P. VI Sq. 6, L7, F68M 1A 789 antler
40.6 11.7 4.5 (at break)
Possible tip half of a leister barb.
Tapers to a point from a concavo-convex cross-section at the break.
One shallow longitudinal incision on each face is identical to the facial groove on 1A 65; curvature is also identical to that of 1A 65.
Specimen made by scraping and polishing; it is now badly charred.

The plano-convex basal section of 1A 65 could have been hafted flush against the side prong of a leister so that the tip half would have protruded as a reverse barb. The close association in the site between these specimens and the two barbs described in Class no. 36 above may indicate similar or identical functions for all four artifacts, but I have separated them because of the considerable geometri-cal and technical differences between the two categories.

38. *Thick Antler Points.* Two large, thick, pointed antler specimens are of unknown function.

L.P. A N10-15/0, L1A 269 antler
92.3 30.5 13.7
Rectangular cross-section, of above dimensions, tapers to a point with a round section.
Specimen made by snapping an antler beam transversely and then grooving, splintering and polishing longitudinally to form a rectangular blank. Tapered to a round point by scraping and polishing.

E.P. VI Sq. 16/25, L6A 1A 321 antler
66.4 16.8 8.8
Plano-convex cross-section, of above dimensions, tapers to a plano-convex tip with sharp margins.
Specimen made by snapping an antler beam transversely and splitting it longitudinally to form a plano-convex section. Tapered by scraping and polishing.
A longitudinal groove on the convex face extends 42 mm. from the break and is decorated by five round holes spaced 6-9 mm. apart.

39. *Ornamented Bone Beamers*. Three beamers, or two-hand scrapers, are decorated with distinctive motifs, and styles. The function of these specimens as hide scrapers is well known in Old Crow where beamers are still used quite frequently. A number of Old Crow residents, both men and women, expressed surprise at the refined decorative elements on these three specimens and remarked that beamers no longer receive such elaborate attention. I have dispensed with most measurements in the case of these and other beamers since the size of such implements is closely controlled by the nature of the raw material from which they are made. Beamers are made by splitting a metapodial, usually a metatarsal, bone longitudinally. The indented cross-section of the bone affords two scraping edges if the splitting operation is successful. Two edges are obtained whether the bone is split in the sagittal or in the coronal plane, but in many cases these edges may have been deliberately sharpened

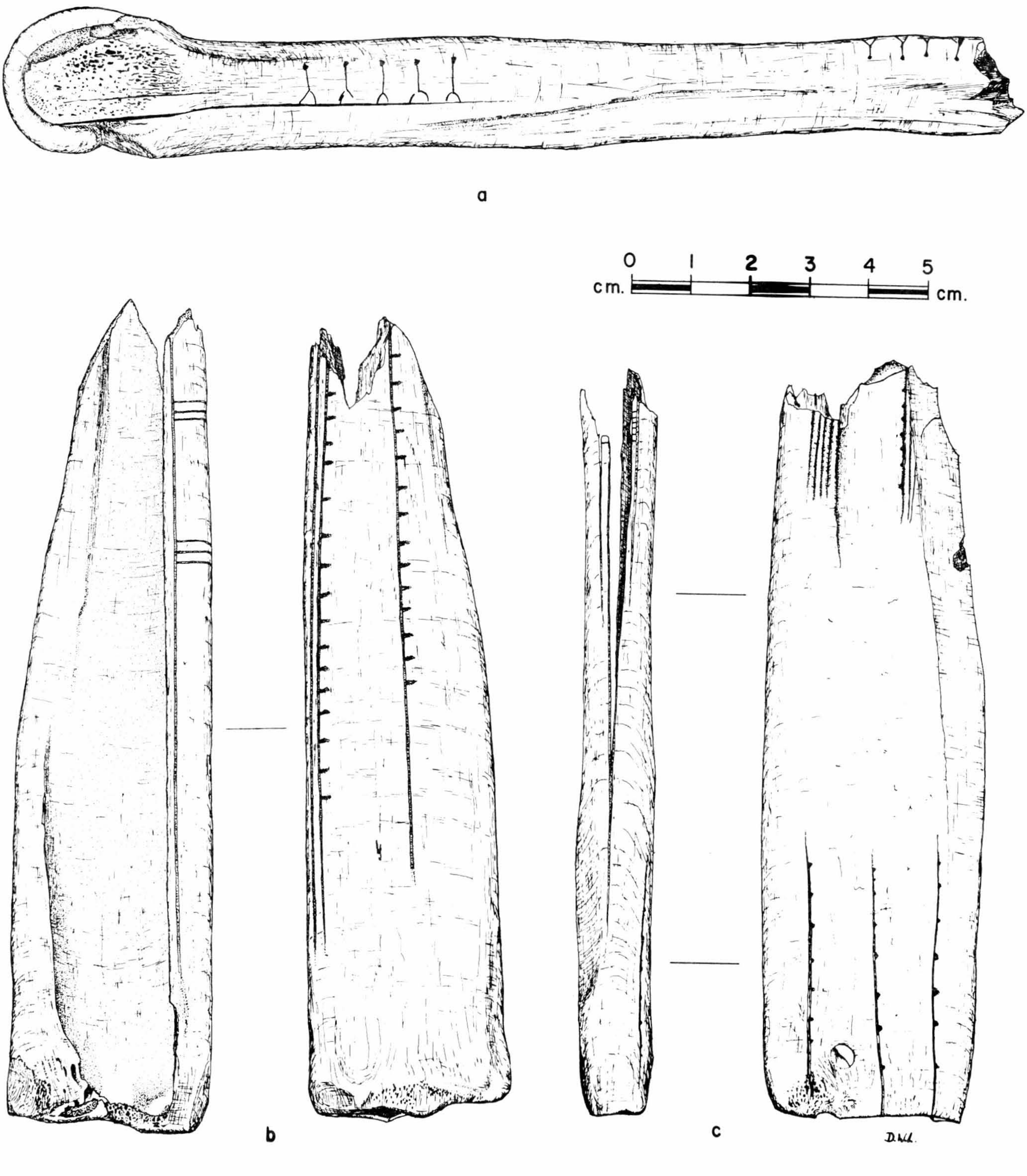


Fig. 31. Ornamented beamers from MjVl-1. National Museums of Canada Neg. No. 72-8276.

prior to use. A few examples seem to have been used without such sharpening. Nearly all the Klo-kut beamers were produced by splitting in the sagittal plane so that the outer face of the beamer is formed by either the medial or the lateral face of the metapodium. The cutting edges of such beamers are formed by flanges along the anterior and posterior margins of the split bone; the posterior flange can be said to form the primary cutting edge and the anterior flange forms the secondary cutting edge.

L.P. III D2: N5/W5, L5 786

Length: 135 mm., distal half of shaft missing.

Three long incisions parallel the long axis of the bone on the outer face of the beamer. One of them, in the center of the face, is decorated with 14 short nicks which extend at right angles from the incision toward the primary cutting edge.

The other long incisions are closely spaced near the anterior margin of the outer face, opposite the secondary cutting edge. One of these is decorated with 17 nicks extending toward the primary cutting edge. In each case the nicks are 4-5 mm. apart and 2 mm. long; they were made by nicking the bone along one side of the incision.

The nicked incisions are truncated by a break at one end, and they taper out to uncut bone at the other end.

The face of the anterior flange, which forms the secondary cutting edge, is also decorated by a long incision from which two groups of three lines each have been carved at right angles to the incision. Two cm. of uncut bone separate the two groups; within each group the lines are two mm. apart and 6.5 mm. long. This incision is also truncated by a break at one end and tapers out to uncut bone at the other.

Plate 14a, Fig. 31b.

E.P. VI S15/W305, F6837 1531

Length: 170 mm., proximal portion of shaft missing.

The distal epiphysis of the bone forms one end of the specimen, and the lateral ridge of the epiphyseal condyle has been cut away to form a flat surface from which extends a longitudinal incision, 75 mm. long. "Standing" on this incision, 6-7 mm. apart, are five stick figures with their heads pointing away from the primary cutting edge. Each figure is 7 mm. high and is comprised of a long torso with two legs which form an equilateral triangle with the incision; the head is represented by a round dot, but there are no arms or other anatomical parts represented.

Adjacent to the break at the other end of the specimen is another group of four stick figures which "stood" on an incision along which the secondary flange was broken off. These figures are oriented with the heads toward the primary cutting edge; they are only 4 mm. high and are spaced 4-6 mm. apart but are otherwise identical to the figures in the group of five.

Plate 14c, Fig. 31a.

E.P. VI Sq. 9, L7 1A 464

Length: 125 mm., distal half of shaft missing.

Extending from the proximal epiphysis are three longitudinal incisions 45 mm. long and 10 mm. apart. From each of these incisions seven tiny chevrons spaced 5 mm. apart extend toward the primary cutting edge.

The opposite end of the specimen is broken, and two groups of longitudinal incisions are truncated by the break. The group nearest the secondary flange includes five closely spaced incisions, of which the one nearest the flange is decorated by four irregularly spaced chevrons facing away from the primary cutting edge. One cm. of uncut bone separates this group from the second group of incisions. The latter adjoins and is partially truncated by the worn primary cutting edge, and it includes three closely spaced incisions, of which the one nearest the flange is decorated with seven chevrons, 2-3 mm. apart, facing away from the primary cutting edge.

The curved margin which joins the outer face with the flange of the secondary cutting edge is also decorated with longitudinal incisions. One of these extends nearly the length of the specimen, and two others, closely spaced on each side of the long one, extend 40 mm. from the break. Six tiny nicks, 1.5 mm. apart, join the central incision with one of the lateral incisions; this pattern may have characterized the other lateral incision but has been truncated by the break where only one nick can be seen.

Near the proximal epiphysis is a hole, 4 mm. in diameter, formed by a blow on the outer face of the specimen. I doubt that this perforation is intentional.

Plate 14b, Fig. 31c.

All three of these beamers were made by splitting a metatarsal in the sagittal plane and whittling and scraping the cutting edges as well as the outer face. Each specimen was finished with polishing.

40. *Unornamented Bone Beamers*. Sixteen beamers were made on at least 14 metapodial shafts. Two of the beamers (1552 and 1553) can be rejointed to form a left metatarsal, and two others appear to have been made from a single left metatarsal but cannot be rejointed. All but two of the beamers appear to have been made by splitting the bone in the sagittal plane; grooves which may have controlled these splits have been removed in all but one example by subsequent finishing and use of the cutting edges. The other two specimens are small shaft fragments which might have been produced by coronal splits, but they could also have resulted from damage to a sagittally split bone. Beamers which have been completely finished and more or less extensively worn are characterized by a double bevelled cutting edge formed by whittling and polishing after the bone was split. Extensively worn specimens are marked by a broad, rather deep concavity in the primary cutting edge and are usually broken in this concavity. The

length of complete specimens is governed by the length of the bone, but the five longest examples have been shortened by the removal of the distal epiphyses. Most of the beamers have straight, neatly finished cutting edges, but four of them are roughly cut with ragged, irregular cutting edges exposed by a heavy cutting tool. The roughly cut specimens are nonetheless highly polished, as if by use, suggesting that this variation represents a difference in the quality of workmanship rather than in the stage of completion of the beamer.

Hist.	I	N15/E10, L2	308	
Hist.	I	N20/E10, L1	310	
Hist.	I	N20/E10, L1	494	
Hist.	II	N25/E10, L2	2000	
Hist.	A	0-N5/E202'6", L1	503	(Plate 15c)
Hist.	A	N10/E202'6", L1-1A	507	
L.P.	II	D2: N15/E60, F6830	1868	
L.P.	I	D2: N10/E60, L1	1751	
L.P.	II	S15/W305, L3	1575	
L.P.	III	0/W210, L4	1264	
L.P.	A	0-N5/W90, L1A	110	(Plate 15b)
L.P.	III	Sq. 16/25, L2	1A 303	(Plate 15d)
L.P.	IV	Sq. 14/23, L3-4	1A 256	
E.P.	VI	Sq. 14/23, L6	1A 265	
Surf.	-	S4/W300	1552	(Plate 15a)
Surf.	-	S4/W300	1553	

One long bone shaft fragment (1253) with a double bevelled edge is a fragment of a beamer and probably came from No. 1264. A similar fragment (1A 32) also has a double bevelled edge. In addition there are five long bone fragments with chipped and polished edges which appear to be pieces of unfinished or poorly finished beamers.

L.P.	II	S5/W210, L2	1253
L.P.	III	Sq. 11/20, L2	1A 32
L.P.	IV	Sq. 11/20, L3-4	1A 38
E.P.	VI	N10/E10, L14	489
E.P.	VI	Sq. 6, L6	1A 381
E.P.	VI	Sq. 13/22, L6	1A 124
E.P.	VI	Sq. 14/23, L6	1A 265

41. *End of Bone Scraper*. One end of the bone scraper was made by splitting a metatarsal shaft in the coronal plane and scraping and whittling the distal half of the ventral face. The finished specimen tapers to a thin spatulate margin at the distal end where a finely serrated cutting edge has been worn nearly smooth. The entire specimen was finished by polishing:

E.P. VI Sq. 14/23, L6 1A 261 (Plate 18a)

200.0 32.6 8.4

42. *Coronally Split Metapodials*. One right metacarpal and six left and two right metatarsals have been split in the coronal plane with the aid of two grooves cut on the medial and lateral faces, respectively, leaving the anterior half of the

shaft and proximal epiphysis. The distal epiphysis is missing on six of these specimens, but on the other three the posterior half of the bone has been snapped out at the distal end in line with the grooving of the rest of the bone. In one case (927) this distal snap was guided by a diagonal groove above the epiphysis. One of these specimens has been reconstructed from five pieces: two major segments are nos. 178 and 1085, with which three small shaft fragments, nos. 178, 1085, and 1088, have been jointed. The groove-and-splinter technique has provided straight, parallel splits as much as 240 mm. in length on these specimens, but the edges of the grooves lack any sign of use following their exposure by this process. The function of these specimens is unknown:

Hist.	I	N30/E10, L1	496
Hist.	II	N10/E10, L3B	2007
Hist.	A	N0-5/W0-10, L1	4 (Plate 16c)
L.P.	IV	0/W75, L6	178/1085 (Plate 16a)
L.P.	III	Sq. 12/21, L2	1A 72 (Plate 16b)
E.P.	VI	D2: N15/0, L14	927 (Pla[illegible] 1[illegible]c, bottom)
E.P.	VI	Sq. 13/22, L6	1A 124 (Plate 17c, top)
E.P.	VI	Sq. 15/24, L6A	1A 284 (Plate 17a)
E.P.	VII	Sq. 13/22, L7	1A 141 (Plate 17b)

One right metacarpal and a left metatarsal were split in the coronal plane, without the aid of grooves, so as to leave the posterior half of each bone. One margin of the metacarpal and both margins of the metatarsal were then subjected to use, probably as scrapers, but these specimens were not finished or used in the same way as the beamers:

L.P.	III	Sq. 16/25, L2	1A 306
E.P.	VI	Sq. 15/24, L6A-7	1A 298

43. *Quartered Metapodials.* Five long bone fragments have been removed from either the lateral or medial posterior flange of a metatarsal. Three are made from left metatarsals and two came from the right side. Grooves up to 230 mm. long guided very straight fractures on these specimens, and each example is grooved on one or both margins. These metatarsals appear to have been roughly split in either the sagittal or coronal plane and then further split more carefully by means of the groove-and-splinter technique. Their function is unknown:

L.P.	A	S5-10/W100, L1A	67 (Plate 16d)
L.P.	III	N10/W75, L3	1049
L.P.	IV	0/W75, L3	1085
L.P.	IV	N5/W75, L6b	1066
E.P.	VII	Sq. 9, L7A	1A 466 (Plate 17d)

The posterior/lateral quarter of a right metatarsal (1560) was removed from the bone by a combination of splitting and grooving. The specimen has a grooved length of 230 mm. and has further been modified, particularly on the distal half, by whittling and scraping of the lateral face. The distal one-eighth has been thinned by this work to produce a flattened cross-section, the long axis of which is perpendicular to that of the rest of the specimen. Such modification might represent the initial steps in the preparation of a bone arrowhead. The posterior/medial quarter of a left metatarsal (1592) has been isolated by a split not controlled by grooving. The resulting rough, subparallel margins were then subjected to use, probably as scraping edges, so that a high but irregular polish developed on the edges in association with intermittent scratches and striations which cross the margins at right angles. One margin which was especially damaged was partially removed by repeated blows struck on the lateral face of the specimen.

L.P.	II	S20/W305, L3	1560 (Plate 16e)
E.P.	VI	S15/W305, F6837	1592 (Plate 17e)

44. *Splinters With One Grooved Margin.* These splinters are irregularly fractured along one margin and split with the aid of a groove along the other margin. In all but two examples the groove is made from the outer table of the bone; two specimens were grooved from the inner table after the bone had been split open. The grooves are broad and shallow, with V-shaped cross-sections, but they nearly penetrate the bone in most cases; all grooves penetrate at least half the thickness of the bone. The grooves are made by repeated strokes with a sharp but rather ragged cutting edge; multiple subparallel scratches appear on the grooved surfaces. The mean length of these grooved fragments is about 8 cm., and the mean length of the grooved margins is about 7 cm., indicating that the grooves were

Period	Block	No.	Length	Mean Length	Range	Groove Length	Mean Groove Length	Range	Angle	Mean Angle	Range
H.	W100	1	20	20.0	-	10	10.0	-	135	135.0	-
Late Prehistoric	W700	2	200	100.0	70-130	180	90.0	65-115	295	147.5	145-150
	W600	3	240	80.0	50-85	210	70.0	50-85	355	118.3	105-130
	W400	3	160	53.3	45-60	120	40.0	30-50	415	138.3	135-145
	W300	2	205	102.5	105-155	185	92.5	75-110	260	130.0	105-155
	W100	5	250	50.0	25-80	210	42.0	25-70	555	111.0	90-150
	E100	2	205	102.5	85-120	155	77.5	60-95	230	115.0	105-125
	1A	14	815	58.2	25-140	650	46.4	15-135	1780	127.1	90-150
	Total	31	2075	66.9	25-155	1710	55.2	15-135	3890	125.5	90-155
E. P.	W300	2	180	90.0	75-105	95	47.5	40-55	285	142.5	140-145
	1A	18	1365	75.8	30-165	1275	70.8	25-155	2425	134.7	105-160
	Total	20	1545	77.3	30-165	1370	68.5	25-155	2710	135.5	105-160
	Totals	52	3640	70.0	20-165	3090	59.4	10-155	6735	129.5	90-160

Table 51. Distribution of metric data for 52 bone splinters with one grooved margin from MjVl-1, arranged by period.

nearly 90% effective in controlling the position and direction of the fractures with which they are associated. These length measurements have been tabulated for 52 excavated specimens. (Table 51; see also Morlan 1971: Table 114). Also included in these tables is the final cutting angle; i.e., the angle formed by the outer table of the bone and the intact wall of the groove. The function of these specimens is not clear, but they are quite likely byproducts of beamer production.

45. *Awl, Type I.* The term "awl" is applied to any piece of bone or antler which has been sharpened to a point with a round cross-section and which lacks bevelled margins, barbs, haft elements, and other characteristics of bone and antler projectiles. The awls have been arranged in five types based solely upon the extent to which the raw material has been modified. Type I includes all awls on which only the sharpened point has been polished; all other surfaces of the blank are unmodified. Awls made on long bone fragments have been excluded from this type since their production requires splitting of the bone as well as polishing. The cross-section of the bone is intact in Type I awls though such awls may be snapped transversely. The following list includes the usual provenience data, an approximate measurement of length (to the nearest five millimeters), the anatomical identify of the bone blank, and occasional remarks.

Hist. A N10-30/E202'6", L1 514
90 made on a moose splint bone; broken proximal and distal.

L.P. IIIb D2: N20/E60, L6 1800 (Plate 11h)
170 made on a moose splint bone; proximal epiphysis intact.

L.P. III S15/W305, L4 1521 (Plate 11i)
120 made on a moose splint bone; proximal epiphysis intact.

L.P. III N10/W75, L4 1051
50 made on caribou costal cartilage.

L.P. A 0-N5/W100, L1A 29
100 made on caribou ulna; tip broken off.

E.P. V Sq. 4, L5 1A 210 (Plate 18g)
150 made on distal end of caribou rib.

E.P. VI Sq. 7, L6 1A 435 (Plate 18f)
130 made on distal end of caribou rib.

46. *Awl, Type II*. This type consists of awls made on long bone fragments with little or no polishing except at the tip. A few other kinds of bones can also be included in this type, as long as the awl is made by splitting the raw material and polishing a sharp tip at one end of the blank.

Hist. II 0/W75, L2 1077
95 made on a scapula blade fragment, snapped off and whittled to a point; tip broken.

Hist. A N0-5/W0-10, L1 5
180 made on a long bone fragment; polished margins suggest this may be a reworked scraper; intact as an awl.

E.P. VI 0/W210, L10 1373 (Plate 18b)
90 made on a mandibular corpus fragment; cross-section at tip is irregular oval; intact but possibly unfinished.

E.P. VI N10/W75, L7 1054
45 made on a long bone fragment; one double bevelled margin suggests this may be a reworked broken scraper; butt broken but tip sharp.

E.P. VI Sq. 9, L7 1A 470
90 made on a long bone fragment; intact.

E.P. VI Sq. 13/22, L6-7 1A 135 (Plate 18d)
105 made on a long bone fragment; intact.

E.P. VII S20/W305, L18 1547 (Plate 18c)
100 made on a long bone fragment; cross-section at tip is rounded oval; intact.

E.P. VII Sq. 12/21, L7 1A 99
55 made on a long bone fragment; butt broken.

E.P. VII Sq. 12/21, L7 1A 99
65 made on a long bone fragment; intact.

47. *Awl, Type III.* Type III awls are scraped and polished on all faces, but a remnant of a medullary cavity or a section of cancellous tissue permits identification of the blank as a split long bone fragment or a section of antler:

Hist. II 0/W75, L2 135 (Plate 11 l)
150 made on a long bone fragment; may have been bipointed but a small section is broken from each end.

Hist. A N5-10/W0-5, L1 10 (Plate 11k)
90 made on a long bone fragment; both ends broken.

Hist. A N5-10/W0-5, L1 13
95 made on an antler fragment removed by grooves on both margins and snapped through cancellous tissue. Ground to irregular

trapezoidal cross-section with distal 20 mm. ground to a tapering point with round cross-section. Sinuous (decorative?) line on one face. Tip broken.

L.P.	IIIa	D2: N20/E60, F6832	1869
65		made on a long bone fragment; both ends broken.	
L.P.	III	Sq. 4, L3	1A 203 (Plate 11g)
50		made on a long bone fragment; butt broken.	
L.P.	III	Sq. 9, L2	1A 431
45		made on a long bone fragment; butt broken.	
L.P.	III	Sq. 16/25, L2	1A 304
105		made on a long bone fragment; butt broken.	
E.P.	V	N15/W80, L8	1012
70		made on an antler fragment. Too weathered to see grooving but shaped to a triangular cross-section grading to a round section at the tapering tip. Intact.	
E.P.	C	N8/E204, 30"	510
65		made on a long bone fragment; butt broken.	
E.P.	V	Sq. 12/21, L5	1A 81 (Plate 18e)
135		made on a long fragment. Broken beamer with two well-formed cutting edges reworked by scraping and polishing to form a tip, 25 mm. long, with a round cross-section.	
E.P.	VI	Sq. 15/24, L6A	1A 286 (Plate 18k)
70		made on a small mammal or bird long bone fragment; butt broken.	
E.P.	VI	Sq. 41/44, L6A	1A 186
40		made on an antler fragment by splitting and grinding to a rounded rectangular cross-section (proximal 30 mm.) and a round cross-section (distal 10 mm.), intact.	
?	?	Beach	947
100		made on a long bone fragment; both ends broken.	

48. *Awl, Type IV.* These awls appear to be made on long bone fragments, but all surfaces are so completely scraped and polished that identification of the blank is uncertain.

Hist.	A	N5-10/W0-5, L1	11 (Plate 19f)
	40	well worked tip.	
L.P.	I	S20/W305, L1	1500 (Plate 11m)
	110	rectangular cross-section at butt grades to round section at tip; both ends broken.	
E.P.	V	N20/E10, L8	426 (Plate 19d)
	25	well worked tip.	
E.P.	V	N25/E10, L9	440
	65	flattened area at butt provides a hand-hold.	
E.P.	VI	Sq. 41/44, L6A	1A 184
	15	well worked tip.	
E.P.	VI	Sq. 41/44, L6A	1A 184
	20	broken at both ends.	
E.P.	VII	N15/W75, L12	1159 (Plate 19e)
	35	fragment removed by groove-and-splinter technique. Diamond-shaped cross-section at broken butt grades to round section at well worked tip.	

49. *Awl, Type V.* This is the most elaborate category of awls and includes specimens reworked from other elaborate kinds of artifacts. The only three examples of the type represent the Early Prehistoric period, and in each case the identification of the specimen as an awl was made by a process of elimination from other artifact classes.

E.P. VI Sq. 6, L7 1A 391

75 Apparently made on an arrowhead broken at the base of the proximal-most barb. The butt of the awl is indented at one corner where the barb had been cut, and a deep longitudinal incision, probably a barb line, parallels a pronounced ridge leading to this indentation. A broad shallow groove on the opposite side of the ridge is a remnant of the medullary cavity of the long bone fragment. Adjacent to the barb line is a narrow, shallow decorative incision; a similar groove occurs on the third face of the specimen, the "back" of the arrowhead, and is decorated with a row of six closely spaced chevrons.

The tang is long, 29.4 mm., tapering and conical with well defined but rounded shoulders. After the arrowhead was broken the break was smoothed by polishing to form a hand-hold, and the tang was resharpened to form an awl tip.

The chevrons may have been added after the specimen was reworked to form an awl, but all three incised lines are truncated by the polished break. Two small transverse incisions on the barb ridge may also have been added and might represent ownership marks.

Plate 18m.

E.P. VI Sq. 10/19, L6 1A 14

55 Completely modified long bone fragment, polished on all surfaces. Distal 45 mm. worked to a round cross-section, 5.3 mm. in diameter, tapering to a blunt point. Proximal 10 mm. thinned to a rectangular cross-section, 3.3 mm. thick, set off by well defined rounded shoulders and cut off obliquely by grooving and snapping. The specimen appears to be a hafted awl, but it could have been used as an unbarbed projectile.

Plate 19g.

E.P. VI Sq. 14/23, L6 1A 263

60 Apparently made on a broken antler arrowhead, possibly unbarbed. The blank was removed by grooving and splintering and was polished to a rounded rectangular cross-section. A tapering conical tang, 26.4 mm. long, is set off by poorly defined rounded shoulders. The opposite end has been grooved and snapped and left unfinished. The tang would have served as an awl tip.

Plate 18 l.

50. *Creaser, Type I.* The term "creaser" is applied to any piece of bone or antler which has been sharpened to a point with a triangular or rectangular cross-section and which lacks bevelled margins, barbs, haft elements, and other characteristics of bone and antler projectiles. The creasers have been arranged in two types based solely upon the extent to which the raw material has been modified. Type I includes all creasers made of long bone fragments on which only the tip has been worked. The blank may be produced by grooving and splintering or by simple fracturing.

Hist. II N15/E10, F6814 340

90 sharp tip with scalene triangular cross-section; very little polish.

E.P. C 0-N5/W100, L4A 41

85 sharp tip with equilateral triangular cross-section; one long margin polished.

E.P. VI Sq. 10/19, L6 1A 15

65 sharp tip with scalene cross-section; scattered polish.

E.P. VI Sq. 11/20, L6 1A 41 (Plate 18i)

85 dull tip with scalene cross-section; scattered polish.

E.P. VI Sq. 14/23, L6 1A 264
75 sharp tip with rectangular cross-section.
E.P. VI Sq. 41/44, L6A 1A 187 (Plate 18h)
105 sharp tip with scalene cross-section formed by one sharp, curved margin and one flat, thick, straight, highly polished margin.

51. *Creaser, Type II.* Type II consists of creasers on which all surfaces have been modified by scraping and polishing. The blank may be produced by either grooving and splintering or simple fracturing, and either bone or antler may be used.

Hist. II 0/W75, L2 126
35 made on a long bone fragment; all faces polished to form a tapering tip with equilateral triangular cross-section; tip blunt and butt broken.
L.P. IIIb D2: N15/E60, L8 1872
30 made on a cut tooth (?); all faces worked to form a blunt tip with irregular cross-section.
L.P. IV S20/W305, L7 1537
65 made on an antler fragment, grooved and polished on both margins to a triangular cross-section tapering to a sharp, highly polished tip; short longitudinal incision on one face; butt broken.
L.P. III N20/E10, L4 415 (Plate 11j)
73 made on a long bone fragment; rectangular cross-section; sharp tip with one margin indented and highly polished.

L.P. III Sq. 10/19, L2 1A 4
85 made on a long bone fragment; broken blade of a beamer reworked to a sharp tip with trapezoidal cross-section at each end. Specimen warped and very thin; could have functioned as a fish gorge.

E.P. VI 0/W75, L12 1091
30 made on a long bone fragment; all faces taper to a blunt tip with trapezoidal cross-section; butt broken.

E.P. VI N10/W75, L7 172 (Plate 18j)
70 made on a long bone fragment; rectangular cross-section tapering to a dull tip.

E.P. VI Sq. 41/44, L6A 1A 185
45 made on a long bone fragment; broken primary blade of a beamer reworked to a sharp tip with scalene triangular cross-section.

E.P. VII Sq. 10/19, L7 1A 23
75 made on a long bone fragment; both margins grooved, splintered, and polished, both ends broken, but tip adjacent to break is indented to form polished flat surfaces and plano-convex cross-section.

52. *Needles*. The specimens in this category were sorted on the basis of size with particular attention to thickness. These are slender fragments of bone and antler on which one end has been modified to form a sharp tip of variable cross-section. None of them is eyed, and the function as needles is feasible but highly questionable.

Hist. II 0/W75, L2 1077
30 made on an antler fragment; tip broken; spatulate butt; pointed ovate cross-section; 2.2 mm. diameter.

Hist. II N10/E10, F6814, Bone pit 2010
30 made on a slender bone splinter with a round cross-section; base and tip are broken; 2.3 mm. diameter.

L.P. II D2: 0/W5, L2 916
55 made on an antler fragment; tip broken; spatulate butt; plano-convex cross-section; 1.9 mm. thickness.

L.P. IIIa D2: N10/E60, L3 1770
70 made on a long bone fragment; butt broken; pointed spatulate tip with concavo-convex cross-section. Remnant of medullary cavity extends the length of the specimen, and its margins are highly polished.

L.P. II S15/W305, L3 1512
60 made on costal cartilage fragment; butt broken; sharp tip with round cross-section; 3.2 mm. diameter.

L.P. II S15/W305, L3 1576
65 made on a small mammal fibula; polished broken tip with round cross-section; diagonally broken flat butt; 1.4 mm. thickness.

L.P. III N10/W75, L4 1050
50 made on a small mammal fibula; butt unworked; polished broken tip with oval cross-section; 1.5 mm. diameter.

L.P. IV Sq. 4, L4 1A243
55 made on a slender bone splinter by whittling and polishing after grooving and splintering; oval cross-section; base and tip are broken; 2.1 mm. thickness.

E.P. VI D2: N10/E60, L13 1840
25 made on an antler fragment; tip and butt broken; plano-convex cross-section; 2.7 mm thickness.

E.P. VI S15/W305, L12 1598
60 made on a small mammal fibula; butt unworked; slightly polished tip with oval cross-section; 1.8 mm. diameter.

E.P. VII N15/W75, L15 1161
85 made on a small mammal fibula; butt broken; shaped, flat tip; 1.9 mm. thickness.

E.P. VI Sq. 7, L6 1A784
50 made by whittling and polishing a small mammal rib; round to oval cross-section; tip broken, butt cut off squarely; 2.4 mm. thickness.

E.P. VI Sq. 6, L7 1A788
40 made by whittling and polishing a small mammal rib; very flat oval cross-section; tip and base are broken; 1.1 mm thickness.

E.P. VI Sq. 6, L7 1A788
45 made on a slender bone splinter by whittling and polishing; plano-convex cross-section; tip broken; 1.3 mm. thickness.

E.P. VII Sq. 5, L8 1A794
45 made on a long bone splinter by some whittling but no polishing; both ends broken; asymmetrical plano-convex cross-section; 3.4 mm. thickness.

E.P. VI Sq. 41/44, L6A 1A187
65 made on costal cartilage fragment; tip broken; shaped, flat butt with oval cross-section; 2.9 mm. diameter.

53. *Splinters with Two Grooved Margins.* This category was created primarily to accommodate byproducts of awl and

creaser manufacture, but it also includes a number of artifacts in various stages of completion which could have served a variety of functions. Some of them might have served as sinew twisters, marlin spikes, fids, probes, spacers, or even toothpicks, and there seems to be no basis for sorting them in a functional classification. Except for one antler specimen, all these splinters are made from long bone fragments, and all are characterized by more or less complete grooving along both long margins. In addition to the grooving some of them are worked on the outer surface of the bone. Several sub-categories have been distinguished, though it does not seem useful to characterize them as numbered types.

Six specimens are cleanly grooved and splintered along one margin, but the other margin is incompletely grooved and irregularly fractured. Length has been measured to the nearest five millimeters:

Hist.	II	N10/W75, L2	1095	30 mm.
L.P.	II	D2: N15/0, L2	859	80
		Polished along both margins; one end is cut to form poorly defined notches and is highly polished.		
L.P.	III	N5/W75, L4	1061	35
L.P.	III	Sq. 5, L3	1A 345	35
E.P.	V	Sq. 9, L5	1A803	30
E.P.	VI	Sq. 15/24, L6A, F668	1A295	60

Seven specimens are completely grooved and splintered along both margins, and some of them have been further modified by polishing:

L.P.	II	D2: N15/0, F6842	937	40

Grooved on both faces along both margins

L.P.	III	D2: 0/W5, L4	908	105

Double grooved and cleanly splintered along each margin.

L.P.	III	Sq. 14/23, L2	1A 251	60

Cleanly splintered and polished along both margins; outer surface highly polished; both ends roughly squared and highly polished.

Plate 21d

L.P.	III	Sq. 41/44, L2	1A 151	25

Triple grooved and cleanly splintered along one margin; other margin grooved on both faces and snapped through septum.

L.P.	IV	Sq. 14/23, L3-4	1A 256	55

Single groove on one margin, double groove on other, both margins cleanly splintered and highly polished; one end tapers to a rounded point.

E.P.	C	N10-15/W100, L4	52	35

Cleanly splintered and polished along both margins; outer surface highly polished; both ends roughly squared and highly polished (cf. 1A 251).

E.P.	VII	Sq. 7, L8, F68T	1A 455 + 1A 456	40

Double grooved and cleanly splintered along each margin (cf. 908).

Seven specimens are grooved on both margins and worked on the outer surface:

L.P.	III	S15/W305, L4	1578	20

Whittled on outer surface.

L.P.	III	N15/W75, L3	1169	50

Whittled on outer surface.

L.P.	III	N15/W90, L3	1118 + 219	55

Shallow grooves on outer surface as well as along margins.

L.P.	III	N15/W90, L3 N15/W95, F682, B3	1118 1164 } Jointed	95

Shallow grooves on outer surface as well as along margins; probably part of 1118 + 219, but cannot be jointed.

E.P.	V	Sq. 6, L5	1A 373	75

Antler fragment removed from split beam by grooving and splintering; 15 mm. whittled to smaller diameter at one broken end; other end tapers to a blunt point where a small transverse step is cut into the tip, possibly to gauge the device.

E.P.	VI	Sq. 7, L7	1A 441	35

Whittled on outer surface and grooved along one margin on inner surface as well as along both margins on outer surface.

E.P.	VI	Sq. 10/19, L6	1A16	90

Scraped and polished along one margin and on outer surface.

54. *Splinters with Central Grooves.* This category is also designed to accommodate byproducts of the groove-and-splinter technique, but it is unlikely that there are any finished artifacts among these specimens. Several sub-categories can be distinguished.

Thirteen long bone fragments have a broad, V-shaped groove more or less centrally located on the outer surface. One (1A 137) is splintered along the groove for half its length and another (1A 124) is splintered along a marginal groove which is separate from the central one:

Hist.	II	0/W75, F678	1096	20 mm.
Hist.	II	0/W75, F678	1096	60
L.P.	I	D2: N15/E60, L1	1843	20
L.P.	II	D2: N10/E60, F6830	1866	65
L.P.	III	N10/W75, L4	1051	55
L.P.	IV	N15/W80, L5	246	80
L.P.	IV	Sq. 4, L4	1A243	35
E.P.	V	Sq. 6, L5	1A782	40
E.P.	VI	N15/W90, L9	1127	55
E.P.	VI	Sq. 4, L6	1A245	25
E.P.	VI	Sq. 13/22, L6	1A124	50
E.P.	VI	Sq. 13/22, L6-7	1A137	120
E.P.	VI	Sq. 5, L7	1A785	25

Three long bone fragments have a broad groove on the inner surface:

Hist.	II	0/W75, F678	1096	15
L.P.	III	N5/W75, L5	1063	15
E.P.	V	S15/W305, L9	1583	15

Five long bone fragments have one or more narrow grooves centrally located on the outer surface. Two specimens (1060, 1583) are also splintered along marginal grooves:

Hist.	A	N10-15/0, L1	263	45
L.P.	II	S15/W305, L3	1576	75
L.P.	III	N5/W75, L3	1060	80
E.P.	V	S15/W305, L9	1583	15
E.P.	V	S15/W305, L9	1583	15

One small polished fragment which resembles ivory is characterized by two narrow subparallel grooves on the outer surface:

E.P.	VII	D2: 0/W5, L685	905	15

55. *Miscellaneous Polished Splinters*. A few polished long bone fragments may have been used as tools of the moment for scraping purposes or else may represent initial steps in the preparation of blanks for more formal tool types.

Six unidentified shaft fragments are quite thick and may have been obtained from moose long bones. They were removed by grooving and splintering one margin and fracturing the other; they are scraped and highly polished on the outer surfaces. One example (1A 187) has been cut at one end by two subparallel diagonal grooves on the outer surface and by a similar pair of grooves on the inner surface:

Hist.	II	N15/W85, L2	1130	30
L.P.	B	N5/E5, L2	285	130

L.P.	III	Sq. 6, L3	1A 347	125
L.P.	III	Sq. 12/21, L2	1A 77	55
E.P.	VI	Sq. 13/22, L6	1A 124	50
E.P.	VI	Sq. 41/44, L6A	1A 187	40

Thirteen long bone fragments were removed entirely by fracturing and were scraped and/or polished on the outer surfaces. One (309), a metapodial shaft fragment, is highly polished along one margin which tapers toward the opposite straight margin near one end; this specimen might be a beamer fragment. Another (511) is a fragment of a right tibia shaft which is highly polished on the proximal end of the anterior crest. The other fragments cannot be classified:

Hist.	I	N20/E10, L1	309	115
Hist.	II	N25/E10, L3	424	30
L.P.	II	S15/W305, L3	1576	135
L.P.	A	N10-15/0, L1A	271	50
L.P.	II	Sq. 6, L1	1A 339	45
E.P.	VI	N10/W210, L10	1386	50
E.P.	VI	N15/W80, L10	1026	75
E.P.	C	N10-15/E202'6", 30-35"	511	60
E.P.	V	Sq. 4, L5	1A 206	120
E.P.	VI	Sq. 5, L7	1A 360	140
E.P.	VI	Sq. 6, L7	1A 382	40
E.P.	VI	Sq. 16/25, L6A	1A 334	20
E.P.	VII	Sq. 10/19, L7	1A 24	50

56. *Compound Fish Hook.* There are two compound fish hooks in the collection, one from the Historic period and the other from the Late Prehistoric period.

Hist. A N5-10/W0-5, L1 14 77.6 mm.

Antler fish hook shank with general fish-like outline. Oval cross-section, 9.6 X 6.7 mm., at the barb hole tapers to oval section, 3.5 X 3.9 mm. at the proximal end where a slight thickening facilitated attachment of the line.

Hole for barb drilled from both sides, and the convex face has an extension of the hole toward the proximal end. This extension has the form of a broad groove, 10.8 mm. long, 2.5 mm. wide, and 1.9 mm. deep, which would have facilitated an angular mount of the barb.

Made by scraping and polishing.

Plate 21a.

L.P. III Sq. 14/23, L2 1A 250 45.6 mm

Antler shank with copper barb. Shank has a fish-like outline which tapers from a rectangular cross-section, 7.3 X 5.3 mm., at the barb to a square cross-section, 3.6 X 3.6 mm., at the proximal end. Barb extends from the convex face of the shank about 14 mm. and recurves 90^{o} to extend 12 mm. toward proximal. Barb is a copper nail with rectangular cross-section, 3.2 X 2.4 mm., and flat head. Barb was inserted in a prepared hole.

Shank prepared by scraping and polishing.

Plate 21b.

57. *Fish Lure.* Three fish lures represent the Late Prehistoric period, but one of them is so highly ornamented and exquisitely finished that it may be ornamental or have some other non-utilitarian function.

L.P. III N10/W75, L4 167

Two lures: 37.9 4.7 3.7
29.6 5.3 3.4

A single long bone shaft fragment was whittled and polished to shape, and the tail section was formed by whittling tail fins to a previously drilled hole. The bone was then split by sawing, and heads were whittled on the two lures. Details are obscured by extensive etching from rootlet acids.

Plate 21 f-g.

L.P. A S5-10/W100, L1A 66

155.0 21.5 4.6

A long bone shaft fragment was whittled, scraped, and polished to form a basic outline. The following ornamentation was then applied, though not necessarily in this sequence:

1. Mouth represented by a short transverse groove, and mandibles drawn by short longitudinal incisions on the ventral margin;

2. Oblique incisions extending from the ends of the mandibles represent gill slits;

3. Eyes are hollowed and encircled by incisions. The eyes probably held insets;

4. Body of the fish was divided on each side into dorsal and ventral halves by a longitudinal incision extending from gills to tail;

5. Above the midline, scales are represented by small dots and short vertical nicks;

6. Below the midline, longer vertical or oblique scratches represent the scales;

7. Dorsal and ventral fins are present near the tail;

8. Tail fins are thinned and scratched obliquely;

9. Two slots in the ventral margin probably held removable wood or bone fins;

10. A hole near the dorsal margin was drilled from both sides and provides excellent balance when used for suspension.

Whether ornamental or a functional lure, the specimen is a striking representation of a grayling. Plate 20, cover design.

58. *Gaming Pieces*. Four rectangular pieces of antler are of uncertain function, but their standardized size and proportions suggest similar function for them all.

L.P. II Sq. 4, L1 1A 196
35.3 12.9 5.9

L.P. III N10/W75, L4 163 (Plate 21c)
28.2 13.5 4.8

These two examples are roughly made. One face is split from an antler beam and left unfinished. Division from the blank by groove-and-splinter in the long axes; 163 is grooved and snapped transversely, 1A 196 is simply snapped transversely. Neither is highly polished. Both outline and cross-section are rectangular.

E.P. VI Sq. 12/21, L6 1A 90 (Plate 19c, bottom)
31.4 13.8 3.3

E.P. VII Sq. 12/21, L7 1A 98 (Plate 19c top)
31.3 13.7 3.1

These two examples are smoothly finished and symmetrically shaped. Made by scraping and polishing an antler strip which had probably been removed by groove-and-splinter; divided by grooving and snapping and finished by polishing. Both outline and cross-section are rectangular.

59. *Barking Tools*. Three pieces of worked antler have in common tapering, spatulate or wedge-shaped tips which might have been suitable for removing bark from trees, but there is no local ethnographic evidence to support this functional inference.

E.P. VI Sq. 4, L7 1A 214
75.9 14.9 5.9

Antler beam grooved on one margin and split longitudinally. Roughly whittled to a wedge-shaped tip at one end and a flattened margin at the other end.

E.P. VI Sq. 5, L7 1A 357
66.6 6.5 4.9

Antler tine grooved on both margins, whittled on both faces, grooved and snapped at one square end; opposite end tapers to a spatulate tip.

E.P. VI Sq. 14/23, L6 1A 265
165.7 18.4 6.5

Antler sliver split from the surface of a beam and polished along both margins; gradually tapering tip has a squared and crushed end and is highly polished on both margins and both faces; one margin is sharpened to a knife-like edge near the tip. Natural curvature might facilitate barking operation.

60. *End-Notched Antler Beams.* Three antler beams have semi-circular notches cut in one or both ends, but their function is unknown. Length measurements are accurate to the nearest five millimeters:

Hist. II N10/W75, L2 149 100 mm.

Notch, 13 mm. deep, made in one face adjacent to a broken end.

Hist. I N10/E10, L1 306 55

Notch, 15 mm. deep, made in one end without extending onto face; notch forms a concavity in two planes.

Hist. I N20/E10, L1 470 210

Notch, 35 mm. deep, made in one face adjacent to a broken end; at other end is a notch, 5 mm. deep, in the same face made from the side, and a third notch, 15 mm. deep, in the same face made from a roughly cut diagonal end. Adjoining tine transversely severed. These notches resemble the patterns of cutting attributed by Semenov (1964: 165-166) to claw-shaped metal burins, and their occurrence exclusively in the Historic period suggests that such tools may indeed have been used here.

61. *Grooved and Split Antler Fragments.* A variety of antler beams, branches, and tines have been grooved and split longitudinally or split without the aid of grooves. Most of them are probably byproducts from the manufacture of antler artifacts, but some may be unfinished blanks.

One fragment is diagonally grooved at one end:

E.P.	VI	Sq. 4, L7	1A248	

Two fragments have narrow grooves on the surface and may represent unsuccessful or unfinished uses of the groove-and-splinter technique:

L.P.	III	0/W75, L4	1080	
L.P.	III	N10/W75, L4	1051	

Six fragments have been grooved and splintered along one margin and fractured along the other margin:

Hist.	II	0/W75, L2	1076	60
Hist.	II	0/W75, L2	1076	100
L.P.	II	D2: N10/0, L2	858	55
L.P.	IIIb	D2: N15/E60, L8	1851	40
L.P.	IV	Sq. 11/20, L3-4	1A 37	65
E.P.	VI	Sq. 15/24, L6A-7	1A 297	40

Eight fragments have been grooved and splintered along both margins:

Hist.	II	0/W75, L2	1076	40
Hist.	II	N15/W85, L2	214	55
Hist.	A	N5-10/W0-5, L1	12	100
L.P.	II	D2: N15/0, F6842	937	30
L.P.	III	S10/W210, L4	1262	120
L.P.	III	N10/W75, L4	162	105
L.P.	III	N15/W90, L3	226	35
L.P.	III	N20/E10, L4	416	100

Six fragments have been split without the aid of grooves. No. 1076 is very soft and punky:

Hist.	II	0/W75, L2	1076	80
Hist.	II	N10/E10, L3B	2008	25
L.P.	II	S20/W305, L2	1558	50
L.P.	III	0/W75, L4	1080	45
E.P.	VI	Sq. 9, L7	1A792	85
E.P.	VI	Sq. 14/23, L6	1A 265	20

Three fragments are unique and may represent blanks for antler artifacts:

L.P. A 0-N10/E60-62'6" 294 65

Grooved and splintered along both margins: both ends broken; cortex scraped and polished. Cancellous tissue cut smooth. Possibly a broken blank for a point.

L.P. II S15/W305, L2 1530 130

Grooved and splintered along both margins; tapered to a rounded point at one end, broken at other end; all surfaces smoothed by polishing. Possible a blank for a point.

E.P. VI Sq. 11/20, L6 1A 49 45

Grooved and splintered along both margins, split longitudinally, broken at both ends; cortex scraped and polished; two parallel longitudinal incisions along one margin on the cortical face. Possibly a broken point or point blank.

62. *Grooved, Split, and Sawn Antler Fragments.* In addition to the longitudinal divisions which characterized the last category these specimens have been divided transversely. As with the last category these techniques occur in a variety of combinations and geometric forms, and some of the specimens may be merely by products of antler artifact production while others are blanks.

Four beams have been grooved and splintered longitudinally and partially divided transversely:

Hist.	II	N5/W75, L2	140	120

Roughly cut transversely.

L.P.	A	0-N10/E60-62'6", L1-3	293	160

Cleanly grooved and split; clean transverse saw cut at one end.

E.P.	VI	Sq. 41/44, L6	1A 174	45

Clean transverse saw cut.

E.P.	VI	Sq. 41/44, L6A	1A 187	90

Split with aid of double grooves; two additional grooves begun on outer surface and truncated by transverse saw cuts adjacent to breaks.

Three fragments have been grooved and splintered along both margins and severed by a transverse saw cut at one end:

E.P.	VI	Sq. 7, L7	1A 436	50
E.P.	VI	Sq. 14/23, L6	1A 265	40
E.P.	VII	Sq. 12/21, L7	1A 100	20

One fragment was grooved and splintered along one margin and severed by a diagonal saw cut at one end:

E.P.	VI	Sq. 13/22, L6	1A 124	75

Two fragments were grooved and splintered along both margins, split longitudinally, and severed by transverse saw cuts at each end:

L.P.	II	D2: 0/W10, L3	920	10
E.P.	VI	Sq. 16/25, L6A	1A 320	35

Six unique examples may include artifact blanks or broken artifacts:

L.P. B N10-30/E202'6", L2 518
76.6 22.7 11.2

Antler beam split with aid of grooving and splintering along both margins; surface scraped down to leave partial collar at one end, and beam divided transversely by rough sawing to leave collar, 2.8 mm. wide. Cancellous tissue removed to form hollowed area inside collar. Plate 21e.

E.P. VI Sq. 4, L7 1A 225 110

Grooved and splintered along both margins; sawn and snapped at both ends, cortical surfaces scraped and polished; 35 mm. of one end whittled to smaller diameter. Possibly an unfinished point.

E.P. VI Sq. 7, L7 1A 790
20.3 7.8, 4.4

Antler tine roughly whittled to a dull point and sawn and snapped at other end. No finishing polish.

E.P. VI Sq. 15/24, L6A-7 1A297 210

Grooved and splintered from both faces longitudinally and grooved and snapped transversely across one tine.

E.P. VI Sq. 16/25, L6A 1A 320 40

Grooved and splintered along both margins; split transversely, sawn and snapped at one end, broken at other end; all surfaces scraped and polished. Possibly a broken awl or creaser.

E.P. VI Sq. 41/44, L6A 1A 187 25

Grooved and splintered along one margin, fractured along other margin; sawn and snapped at one end, broken at other end; cortex highly polished; one longitudinal incision. Function unknown.

63. *Sawn and Chopped Fragments.* These antler fragments are divided transversely but not longitudinally. Many of these specimens are unique since there are many ways to saw and chop an antler beam. Furthermore there are two

states of preservation which can be separated among these artifacts: firm antler with a hard cortex, and soft, punky antler lacking such cortex. It is not clear to me whether this necessarily represents variation in the state of maturation of the antlers, in which case more than one season must be represented, or whether it is due to local differences in soil characteristics. Possibly artificial scraping of the cortex facilitates preservation; complete antler artifacts are often more heavily weathered on incompletely worked areas than on well finished, highly polished zones.

Fourteen excavated specimens and one example from the beach consist of firm antler with hard cortex.

Three beams have been roughly chopped transversely at one end and diagonally at the other end:

Hist.	A	N5-10/W0-5, L1	7	135
L.P.	II	D2: 0/W5, L2	916	45
L.P.	II	S10/W210, L3	1344	40

Three beams have been sawn and snapped at one end and broken at the other end:

Hist.	II	N10/E10, L3B	2008	20
L.P.	III	0/W75, L4	1080	110
E.P.	VI	Sq. 13/22, L6	1A 124	30

Eight examples are unique:

Hist. I N10/W75, L1 1046 130

One complete unbranched beam sawn through at the base.

Hist. II N15/W75, L1 1151 65

One branched beam roughly chopped diagonally at one end and broken at the other end.

Hist.	II	N15/W85, L2	218	45

Beam split without the aid of grooves, sawn and snapped at one end, broken at the other end; Cortex whittled, tapering to a wedge at one end; no crushing or battering observed on wedge.

Hist.	I	N15/E10, L1	304	170

Complete branched beam sawn transversely at base.

L.P.	I	S15/W305, L1	1507	45

Beam sawn and snapped transversely at both ends; four other transverse saw cuts on one face, three transverse axe cuts on the other face.

L.P.	III	Sq. 12/21, L2	1A 75	390

Complete unbranched beam roughly severed by transverse chopping at base.

E.P.	C	0-N5/W100, L4B	43	110

Unbranched beam cut and snapped at base, broken at other end.

?	?	Beach	26	80

Branched beam sawn and snapped at one end, broken at other end and at branch.

Eleven excavated specimens consist of soft, punky antler which lacks a hard cortex and is often badly decomposed. All are roughly cut except No. 313 which is cleanly saw-cut to form a thin slice of antler.

Four beams have been severed transversely at one end, broken at the other end, and an adjoining branch has also been severed transversely:

Hist.	I	N10/W75, L1	1046	125
Hist.	I	N15/W80, L1	1139	150
Hist.	I	N15/W90, L1	1115	95
Hist.	I	N10/E10, L1	302	95

Two beams have been severed transversely at one end and broken at the other end:

Hist.	II	N20/E10, L2	472	200
E.P.	VI	N5/W210, L11	1334	90

Two beams have been severed transversely at one end and diagonally at the other end:

Hist.	I	N15/W80, L1	213	110
Hist.	I	N15/W90, L1	1115	120

Three beams have been severed diagonally at both ends:

Hist.	II	0/W75, L2	1076	75
Hist.	I	N15/W90, L1	1115	90
Hist.	I	N10/E10, L1	313	50

64. *Crushed Antler Tines.* Four antler tines with crushed tips might have been used as flakers or the tines of antler rakes. Three of them are merely small tine sections with crushed tips, but the fourth (1A 13) has been scraped and polished to an oval cross-section; a transverse groove has been cut half way through near the tip.

Hist.	II	N15/W75, L1	1151	
L.P.	II	D2: 0/W10, L2	918	
L.P.	II	S20/W305, L2	1516	
E.P.	VI	Sq. 10/19, L6	1A 13	15

65. *Cranium with Cut Antlers.* Four caribou crania retain the roughly cut bases of the antlers, and on one of them (1592) the endocranial cast is heavily charred as if fire had been concentrated in the skull; possibly the brains

were cooked in the cranium or the skull cap might have been used as a lamp.

Hist.	I	N15/W85, L1	1129
Hist.	I	N30/E10, L1	485
Hist.	II	N15/E10, F6814	2012
E.P.	VI	S15/W305, F6837	1592

66. *Worked Incisors.* Three rodent incisors have been cut and/or polished. Presumably they were intended as engraving tools or represent the byproducts of the manufacture of such tools.

L.P. IV 0/W75, F6714 1102

Cut and split muskrat incisor: the enamel of the labial and lingual faces has been cut back to the plane of the inner wall of the buccal enamel.

E.P. V S5/W210, L11 1399

Fragment of a split beaver incisor, obliquely cut and polished on the proximal end.

E.P. VI Sq. 10/19, L6A 1A 67

Both halves of a split beaver incisor, obliquely cut and polished at the proximal end. Plate 19 a-b.

67. *Cut Loon Beaks.* Five loon mandibles are cut near the proximal end. All are cut near snaps except no. 887 which is severed. No. 418 was found in a vertical position with the distal end of the mandible embedded in a buried soil. No. 1823 was associated with other portions of a loon skull but was the only bone which was cut. These mandibles might have been effective awls for delicate work on bird skins or they might have some ceremonial or ornamental significance (cf. Jenness 1922: Pl. I; 1946: Fig. 22).

L.P.	III	N10/E10, L4	418
E.P.	V	D2: 0/W10, L681	887
E.P.	VI	D2: 0/W5, L682	922
E.P.	VI	D2: N10/E60, L13	1823
E.P.	VI	Sq. 15/24, L6A	1A 286

68. *Miscellaneous Cut and Polished Bones.* A number of cut and polished bones may represent artifact fragments or the byproducts of artifact manufacture, but they cannot be identified with certainty. They have been organized by anatomical element in so far as possible:

A. Twenty-five scapula fragments bear a variety of cuts and breaks. Four fragments may have been worked to form scrapers of some kind:

L.P.	II	D2: N15/E60, L2	1844	Left

Spine removed and large concavity cut into the blade; possibly a concave scraper.

L.P.	IIIa	D2: N20/E60, L3	1861	Right

Blade and anterior half of spine cut off longitudinally, as if to form a scraping edge.

L.P.	IIIb	D2: N10/E60, L6	1834	Right
L.P.	IIIb	D2: N15/E60, L8	1852	Left

Blades broken along posterior margins; broken edges chipped as if to form scraping edges.

Fourteen specimens have either longitudinal or transverse cuts on the blade and/or spine. This scoring could be related either to butchering or to scapulimancy, though Osgood (1936b: 33) reports that scapulimancy is unknown to the Vunta Kutchin.

Hist.	I	0/W75, L1	1073	Right
Hist.	I	N15/W90, L1	1114	Right
Hist.	I	N15/W90, L1	1114	Right
Hist.	I	N15/W95, L1A	1103	Left
Hist.	II	N15/W95, L2	1107	Left
Hist.	II	N15/W95, L2	1107	Right
E.P.	VI	S20/W305, L13	1569	Right
E.P.	VI	0/W210, L10	1374	Right

Eight scapulae scored longitudinally in the suprascapular fossa posterior to the spine; they bear no other cuts though a few are also pitted.

Hist. I N5/W75, L1 1057 Right

Cut longitudinally in both the supra- and sub-scapular fossae; the posterior portion of the blade has been cut away along the distal half of the spine as if to prepare a concave scraping edge; the basal half of the spine was exposed in cross-section by this cutting.

Hist. I N15/W85, L1 1129 Right

Scored on the lateral face anterior to the spine, but most of the blade posterior to the spine has been broken away.

Hist. I 0/W75, L2 1077 Unid.

Cut transversely on one face near the distal end of the blade.

L.P. II D2: N15/E60, F6830 1868 Unid.

Blade fragment scored longitudinally on one face.

L.P. III 0/W75, L4 1080 Unid.

Blade fragment scored longitudinally on both faces.

E.P. VI N15/W75, L9 1157 Right

Cut several times on the posterior face of the spine, but the blade is not scored.

One specimen has had the spine removed from the blade by a combination of cutting and snapping, related either to butchering or to the preparation of an artifact:

L.P.	I	D2:N10/0, L1	929	Unid.

Four scapula blade fragments have cut and polished margins; one thick specimen (1391) may be from a moose scapula:

L.P.	II	S5/W210, F6812	1391	Unid.
L.P.	II	0/W210, L2	1364	Unid.
L.P.	III	Sq. 13/22, L2	1A 112	Unid.
E.P.	VI	Sq. 16/25, L6A	1A 318	Unid.

Two scapula blade fragments have a double bevelled margin:

Hist.	II	0/W75, L2	1077	Unid.
Hist.	II	0/W75, L2	1077	Unid.

B. Eight ribs and rib fragments have been variously cut and polished either as a result of butchering or through use as artifacts:

Hist. I N10/W75, L1 1044

Intact rib with a slight but obvious concavity along the posterior margin, extending from 45 to 85 mm. from the distal end. This concavity may have resulted from a pathological condition in the live animal, but it might be the result of extensive use of the rib as a scraper.

Hist.	I	N10/W75, L1	1044	75 mm.
Hist.	I	N10/W75, L1	1044	100

Two rib fragments split in the coronal plane, apparently without the aid of grooves.

Hist. I N15/W80, L1 1138

Rib fragment with an extensively worn posterior margin along a distance of 70 mm. from the distal end. This wear has produced a pronounced rounding to a pointed tip and likely resulted from the use of the rib for scraping purposes.

L.P. II D2: N10/0, L3 931 50 mm.

Rib fragment with two narrow subparallel grooves on the medial face.

L.P. IV D2: 0/W10, L7 921

Rib fragment extensively chipped along the posterior margin for a distance of 58.7 mm. from the distal end. Such damage might have resulted from a dog's chewing but more likely was caused by the use of the rib as a scraping implement.

E.P. VI N15/W80, L9 1015 110 mm.

Rib fragment split in the sagittal plane and grooved along part of one margin.

E.P. VI Sq. 6, L7 1A 788 20 mm

Rib fragment split and highly polished on one face.

C. Seven long bone fragments have been damaged:

Hist. I N15/W95, L1B 1105

Left metatarsal cut longitudinally, as if by a rough-edged scraper, in the "channel" on the posterior face. This cutting could have resulted from butchering but might have been a byproduct of artifact preparation.

L.P. II D2: 0/W10, L2 918

Unidentified tibia shaft fragment cut transversely through the proximal end of the anterior crest; either due to butchering or a byproduct of artifact manufacture.

L.P. IV N5/W210, L7 1299

Small unidentified shaft fragment with a single bevel cut along one margin; either due to butchering or a byproduct of artifact manufacture.

L.P. III N15/W85, L3 217

Unidentified shaft fragment with numerous oblique striations on one face; either due to butchering or a byproduct of grinding and polishing.

L.P. IV 0/W75, L6 1085

Unidentified metapodial shaft fragment bearing three longitudinal, rather sinuous, shallow grooves on one face. Unless they are butchering scars these grooves are probably "accidental" cuts resulting from the groove-and-splinter technique.

L.P. IV S10/W210, L7 1351

Small unidentified shaft fragment with numerous, small, shallow, irregular, rough pits on one face. These pits are unlike those described for pitted bones (see below) and may have resulted from the use of this specimen as an anvil.

L.P. II Sq. 9, L1 1A795

Unidentified metatarsal fragment cut on edge of anterior groove.

D. Eleven fragments from a variety of anatomical positions have been variously cut and polished as a result of butchering or artifact production:

Hist. I N15/W80, L1 1170

Unidentified moose (?) innominate fragment with a large concave cut area along one margin; significance unknown.

L.P. II D2: 0/W5, L2 916

Distal end of a proximal phalanx with two roughly cut transverse notches on one face; possibly used as an anvil.

L.P. II D2: N10/0, F6841 906

Long bone fragment severed at one end by a transverse groove and snap.

L.P. IV D2: 0/W10, L6 923

Distal end of a metatarsal with lateral ridges removed from both condyles and fractured from the shaft; may be a byproduct of scraper manufacture.

L.P. IV S20/W305, L7 1565

Thoracic neural spine with longitudinal cuts on both faces, either a result of butchering or, more likely, scraping for artifact preparation.

L.P.	IV	N15/W90, L5	227	
		Long bone fragment severed at one end by a transverse groove and snap.		
L.P.	IV	N15/W95, L4/5	1160	
		Cut and polished muskrat femur shaft.		
E.P.	VI	N5/W210, L11	1381	
		Unidentified fragment, possibly from a mandibular corpus, with multiple oblique cuts on one face.		
E.P.	VI	N5/W75, L9	1092	
		Highly polished vertebral centrum of a fish.		
E.P.	VI	Sq. 6, L7	1A 788	
		Long bone fragment cut and polished on two faces.		
E.P.	VI	Sq. 41/44, L6	1A173	
		Left bird humerus, severed 2 mm. from distal end.		

E. Nine small unidentified polished fragments:

Hist.	I	0/W75, L1	1073	20 mm.
Hist.	I	N10/E10, L1	319	20
L.P.	III	S20/W305, L5	1562	20
E.P.	VII	N10/W75, L8	1056	20
E.P.	VII	N10/W75, L8	1056	25
E.P.	VI	Sq. 16/25, L6A	1A 317	25
E.P.	VI	Sq. 41/44, L6	1A 172	45
E.P.	VII	Sq. 7, L8, F68T	1A 791	20
E.P.	VII	Sq. 13/22, L7	1A143	30

69. *Pitted Bones.* Eight categories of pitted bones have been defined on the basis of anatomical position and include 126 specimens; seven of these have already been described and tabulated in other categories. The pits may have been produced in several ways: (1) weapon impact; (2) dog chewing; (3) use as an anvil; (4) accidental or incidental damage. Some of these methods can be eliminated for a given specimen on the basis of its anatomical position, but it is seldom if ever possible to determine exactly how

a bone became pitted. Some of the pits are "opposed", i.e., a pit on one face of the bone is exactly opposite a pit on the other face; in such cases chewing by dogs may be regarded as a likely source for the pits. A few of the bones are perforated, and in the case of skull fragments this may indicate penetration by a weapon.

Detailed descriptions of these pitted bones are available elsewhere (Morlan 1971: 387-395), and it does not seem worthwhile to repeat them here. The distribution of these specimens by anatomical element and period can be seen in Table 52. It may be noteworthy that unopposed pits on scapulae, vertebral neural spines, and innominates are most frequent in the Early Prehistoric and Late Prehistoric periods. Such pits could have resulted from weapon impact in view of the exposed position of the back when a swimming caribou is confronted by a hunter using a lance from a canoe. The introduction of rifles in the Historic period may have brought a change in hunting techniques wherein caribou were shot as they reached the river bank and emerged from the water. Such a change could explain the higher frequency of pitted ribs in the Historic period.

In passing it should be noted that 124 of these pitted bones represent caribou or moose, but two of the Late Prehistoric innominates represent small mammals. The right iliac blade of a snowshoe hare has one small unopposed pit on the lateral face, and a muskrat left innominate has a perforation, 3.7 mm. in diameter, in the acetabulum.

	Historic	Late Prehistoric	Early Prehistoric	Totals
Skull	1	2	2	5
Scapula	7	4	10	21
Rib	17	9	4	30
Vertebra	4	22	9	35
Innominate	3	19	2	24
Sternum		1	2	3
Calcaneus		1		1
Long Bone	4	2	1	7
Totals	36	60	30	126

Table 52. Distribution of 126 pitted bones from MjVl-1, arranged by anatomical element and period.

70. *Butchered Bones.* Nine categories of bones with butchering scars were based upon the apparent significance of the scars with respect to dismembering a carcass; they are only indirectly related to the sorts of anatomical classes used for pitted bones. These nine categories accommodate 91 cut bones which appear to have been cut as a result of butchering techniques; three specimens have already been described and tabulated in other categories. This may seem to be quite a small sample in view of the collection of faunal remains which includes over 100,000 specimens, but the skills and techniques employed today by the residents of Old Crow produce very few scars on the bones of butchered animals. It is certainly to a hunter's advantage to avoid dulling his knife by striking bone, and this same advantage would have obtained in prehistoric times when the cutting edge of a stone knife would have become blunted quite readily upon contact with bone or antler. The small size of the butchered bone sample may be an indication of the great time depth which lies behind Kutchin knowledge of anatomy and butchering technique.

As is the case of pitted bones, detailed descriptions of the butchered bones have appeared elsewhere (Morlan 1971 : 396-401) and will not be repeated here. Table 53 summarizes the distribution of these specimens, but it does not reveal to me any particularly significant trends. Neither this distribution nor the details behind it contribute new understanding of butchering practices in the area, but a few

	Historic	Late Prehistoric	Early Prehistoric	Totals
Cuts on or near joints	3	13	7	23
Severed at joints or along vertebral column	9	11	1	21
Fetal bones severed near joints	2		4	6
Cuts on long bone shafts	8	4	3	15
Cuts on scapulae and innominates	1	4	1	6
Cuts on skull fragments	4	1	2	7
Cuts on ribs and vertebral spines	5	2		7
Cut hyoid bones		1	2	3
Cut splint bones			3	3
Totals	32	36	23	91

Table 53. Distribution of 91 butchered bones from MjVl-1, arranged by class and period.

aligned fractures on adjacent vertebrae may indicate that some caribou carcasses were butchered while at least partially frozen.

Summary. This completes the description of 652 excavated bone, antler, and tooth artifacts from Klo-kut as well as six specimens from the surface of the site. A tabulation of the frequencies of forty classes of these artifacts is provided in Table 62, but further discussion and comparison of these specimens will await the completion of this descriptive section.

One other antler artifact deserves special mention though I declined to classify it with the other specimens because it is unique and was found on the surface. It is a finished handle, 49.0 X 16.8 X 6.9 mm., made by scraping and polishing an antler sliver which was removed from the beam by grooving and snapping. One margin is split by a narrow groove, 8 mm. deep, which was probably cut with a metal tool in order to haft a metal blade; the opening of this groove is only 2.3 mm. in maximum width. One face is ornamented by two longitudinal grooves, 3 mm. apart, connected by a number of oblique grooves (Fig. 30e). In an Eskimo site this would be regarded as a typical ulu handle. At Klo-kut it might have functioned in a similar manner, possibly to hold a metal counterpart to the *tci-de-tho*, but whether it was made by the Indians or traded from the Eskimos must remain a moot point.

Bark and Wood Artifacts

The bark artifacts have been divided into four major categories: trays, slabs, rolls, and strips. In addition to these there are a number of small fragments of bark and wood, most of which probably resulted from breakage during the handling of the collections. Bark is generally well preserved at Klo-kut, but it becomes quite brittle and fragile upon drying. In some cases the bark retained enough moisture to retard the melting of permafrost in the lower layers, and such specimens had to be removed with extreme care. Attempts to preserve large pieces by coating them with water-soluble white glue prior to removal have been largely unsuccessful.

Nearly all the bark has been identified as birch, but a few pieces of poplar and spruce bark have been worked in the same ways as the more common variety. Each bark artifact has been measured to the nearest millimeter, with length measured across the grain and width parallel to the grain. These data, as well as the numbers of cut margins observed on the specimens, are summarized in Tables 54-56 (see also Morlan 1971 : Table 115).

No canoe covers, house covers, or deep containers have been recognized, but the fragmentary nature of much of this material must have been responsible for reducing the collection to a pale reflection of the ethnographically documented bark industry. Pieces of bark, including slabs, rolls and strips, were found concentrated in the bases of a number of pits. Apparently the bark formed a loose but continuous lining in the bottom of the pits, some of which were used as hearths and others of which were packed with finely comminuted bone likely related to the rendering of bone grease.

71. *Bark Trays*. The most important category of bark artifacts consists of the trays. These are the only potentially diagnostic bark specimens in the collection, but none of them is complete. Eight specimens have been identified as trays or tray fragments. Two represent the Historic period, and the other six are from the Early Prehistoric period.

Hist. II N10/E10, L3D 413

42 (long) 31 (wide)

Fragment of a folded tray corner. One stitching hole, 3.8 X 1.4 mm., passes through both folded pieces.

Hist. A N10-15/0, L1 268

21 18

A small slab with two cut margins and one stitching hole, 2.4 X 1.0 mm., nearly centered on the specimen.

E.P. V 0/W75, L9 171
104 23

Slab with two cut margins and a cluster of four stitching holes, all ca. 1 mm. in diameter, arranged in a diamond-shaped area, 10.2 X 4.3 mm.; several other possible holes may be cracks.

E.P. V N15/E10, L8 399
67 50

Folded tray corner stitched in a triangular pattern with three holes which are too eroded to measure; the height of the wall of this tray must have exceeded 50 mm.

E.P. VI D2: N10/E60, L11 1820
45 24

Possible tray corner fragment. One slab folded in half with a smaller folded slab fitted inside the first one. Each piece cut on two margins.

E.P. VI 0/W210, F6819 1396
21 50

Slab cut on two margins with three rows of stitching holes running subparallel to the grain. A row of four, a row of three and one of two are arranged as follows:

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oo
oo
o
 o
  o
o
  o
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These holes are 1.5 - 2.3 mm. long and 0.3-0.9 mm. wide.

E.P. VI N20/E10, L9 469
31 26

A folded slab cut along one margin, possibly from a tray corner.

E.P. VII N15/W90, L10 1006
100 225

Complete tray cut and rolled at the margins, and folded at the corners. Both slabs and rolls were present among the fragments associated with the specimen. The tray was removed on a block and treated with white glue, but it disintegrated into many small pieces during shipment from the field.

72. *Bark Slabs.* A slab is any relatively large, flat piece of bark which may or may not be cut along its margins; a few examples have been pierced for stitching. Stitched specimens are almost certainly fragments of more or less finished artifacts, but they are classified as slabs unless the artifact could be identified. Metric and non-metric data are provided in Table 54 for 173 slabs. Several slabs require special comment:

L.P. II D2: N5/W5, L2 789

One end of this slab is rounded by curving cross-grain cuts; the other end is cut diagonally across the grain to form a concave margin.

E.P. VI S10/W210, L11 1335

Of the 15 slabs in this lot, five have one or more stitching holes:

1. One stitching hole, 2.2 X 0.9 mm.
2. Two stitching holes, 1.8 X 1.5 and 2.5 X 1.4 mm.; others are associated with a break.
3. Two stitching holes, 1.7 X 0.9 and 1.0 X 0.8 mm.; a diagonal fold is largely broken away.
4. Three small stitching holes at a break.
5. A cluster of five stitching holes, 1.7-2.2 X 0.9-1.3 mm.: $o_{o}o_{o}o$

Period	Block	No.	Length	Mean Length	Width	Mean Width	Cut Margins 0	1	2
Hist.	W100	1	46	46	54	54			1
	E100	4	251	63	181	45	2	1	1
	Total	5	297	59	235	47	2	1	2
Late Prehist.	W700	2	59	30	82	41		1	1
	W600	3	202	67	112	37	1	1	1
	W300	3	125	42	57	19	1	1	1
	W100	6	132	22	134	22	2	1	3
	E100	1	12	12	36	36	1		
	1A	3	316	105	252	84		1	2
	Total	18	846	47	673	37	5	5	8
Early Prehistoric	W700	14	594	42	749	54	5	3	6
	W600	2	63	32	170	85	1	1	
	W400	44	1549	35	1383	31	5	18	21
	W300	38	676	18	1129	30	22	11	5
	W100	4	117	29	124	31	2		2
	E100	45	1011	22	1239	28	9	19	17
	1A	3	235	78	266	89		2	1
	Total	150	4245	28	5060	34	44	54	52
	Totals	173	5389	31	5968	34	51	60	62

Table 54 . Distribution of metric and non-metric data for 173 bark slabs from MjVl-1, arranged by period.

E.P. VII D2: N15/0, L17 901

Of the four slabs in this lot, one is folded across the grain at one margin, one is folded diagonally at one corner, and one is folded diagonally in half.

E.P. VII 0/W210, L15 1340

One slab, tightly rolled to 9 mm. diameter at one end.

73. *Bark Rolls.* Rolls are sections of bark which have curled at one or both ends and which may or may not be cut along the margins. Specimens curled from both ends can be distinguished as double rolls. Most of these cannot be unrolled without damaging the bark extensively. Some of them might have been used as tinder boxes or some other sort of container. Since the axis of the curl is perpendicular to the grain of the bark, the length of the roll was measured across the grain, as in the case of the slabs, and the width of these specimens might also be called the diameter. Metric and non-metric data are provided in Table 55 for 202 bark rolls.

L.P. III D2: 0/W10, F675 791

A long bone splinter was found inserted in this roll, but neither bone nor bark shows any sign of cutting or polishing.

E.P. V 0/W75, L9 171

One stitching hole, 1.9 X 0.9 mm., is located 8 mm. from one end; this roll might be a fragment of an associated tray, described above, but they cannot be rejointed.

Period	Block	No.	Length	Mean Length	Width	Mean Width	Cut Margins 0	1	2
Hist.	W100	1	50	50	17	17		1	
	E100	18	665	37	378	21	11	3	4
	Total	19	715	38	395	21	11	4	4
Late Prehist.	W700	3	68	23	51	17	2	1	
	W600	11	346	32	138	13	10	1	
	W300	2	33	17	18	9	2		
	W100	4	163	41	79	20	2	2	
	E100	5	108	22	85	17	4	1	
	1A	1	78	78	20	20	1		
	Total	26	696	27	391	15	21	5	
Early Prehist.	W700	18	722	40	258	14	9	1	8
	W600	1	47	47	19	19		1	
	W400	10	462	46	189	19		1	9
	W300	16	500	31	194	12	10	3	3
	W100	17	859	50	462	27	3	3	11
	E100	83	3389	41	1090	13	9	17	57
	1A	12	560	47	260	22	3	3	6
	Total	157	6539	42	2472	16	34	29	94
	Totals	202	7950	39	3256	16	66	38	98

Table 55. Distribution of metric and non-metric data for 202 bark rolls from MjVl-1, arranged by period.

Period	Block	No.	Length	Mean Length	Width	Mean Width	Cut Margins 0	1	2
H.	E100	8	197	25	61	8			8
Late Prehist.	W700	2	98	49	31	16			2
	W600	2	68	34	23	12			2
	W300	1	17	17	8	8			1
	W100	3	74	25	27	9		1	2
	E100	5	142	28	74	19			5
	1A	1	12	12	18	18			1
	Total	14	411	29	181	13		1	13
Early Prehist.	W700	6	310	52	108	18			6
	W600	2	73	37	25	13			2
	W400	27	811	30	385	14			27
	W300	39	1286	33	563	14			39
	W100	17	740	44	232	14			17
	E100	388	9748	25	4722	12		1	387
	1A	26	863	33	320	12			26
	Total	505	13831	27	6355	13		1	504
	Totals	527	14439	27	6597	13		2	525

Table 56. Distribution of metric and non-metric data for 527 bark strips from MjVl-1, arranged by period.

E.P. V N10/E10, L12 432

This roll has a black outer coating which might be charred spruce pitch; pitch might have been used as a sealant for a watertight covering or container.

E.P. VII N15/W90, L11 1017

E.P. VII N15/W90, L12 1023

These rolls are curled diagonally across the grain and might have been part of tray #1006, which was found nearby, but they cannot be rejointed.

74. *Bark Strips.* Strips are relatively long, narrow pieces of bark characterized by parallel or sub-parallel cut margins (see Table 56). They must have been formed in the process of trimming artifacts, and they do not appear to have been used for any particular purpose. Only one of the 527 strips requires special comment:

E.P. VI N15/W75, L9 1011

In addition to cuts on the margin, this strip has two longitudinal incisions on the inner face.

75. *Wood Artifacts.* Relatively few pieces of cut wood were found at Klo-kut since wood is poorly preserved except in the deepest layers of the site. Unfortunately the zone of good wood preservation lies deeper in the profile than the apparent first appearance of man on the site. The few wooden specimens in the collection can be individually but briefly described as follows.

Hist. I N10/W75, L1 1047

32 (long) 7 (wide) 4 (thick)

Whittled willow stick.

Hist. I N15/W95, L1 209

71 9 3

Whittled willow stick, thinned at one end.

Hist. II N15/W80, L2 1140
17 8 2
Small whittled stick.

Hist.? L.P.? A N10-30/E202'6", L1-2 513
135 55 30
Spruce stake sharpened to a point, probably by a metal axe; butt broken, and it could be intrusive from the surface.

L.P. I S20/W305, L1 1506
33 13 9
Small spruce fragment, sharply bevelled, possibly by a metal tool.

L.P. I S20/W305, L1 1529
Spruce stake, sharpened to a point, probably by a metal axe; butt broken, and it could be intrusive from the surface.

L.P. II D2: N5/W5, F672 827
50 27 8
Charred and cut fragment, one margin thinned to a sharp edge, ca. 20 mm. long, adjacent to a flattened inset area; might be a bow fragment.

L.P. II S20/W305, L3 1524
34 16 7
Small chip sharply bevelled on one face near the end; possibly metal axe-cut.

L.P. III Sq. 4, L2 1A 241
42 11 5
Charred and cut fragment.

L.P. III Sq. 5, L2 1A 775
31 7 4
Small grooved and whittled stick.

L.P. III Sq. 10/19, L2 1A 2
75 31 10
Charred and cut fragment.

L.P. III Sq. 11/20, L2 1A 31
18 6 diam.
Round whittled blunt point on a small stick; possibly intended as a wooden bird point or as an arrow shaft.

E.P. V D2: 0/W5, L6 795
10 17 5
Small fragment roughly sawn transversely.

E.P. VII D2: 0/W5, L685 904
34 20 11
Charred and roughly whittled fragment.

Summary. Unfortunately we can learn very little from these bark and wood artifacts since they are so fragile and relatively scarce. Though the bark is well preserved there are very few specimens of any diagnostic value, probably because most bark artifacts underwent considerable attrition prior to burial. It is clear, however, that bark was used to make trays at Klo-kut and that these were made by a combination of cutting, folding, and stitching, presumably with spruce roots. Preservation of wood artifacts is nearly exclusively confined to the upper layers of the culture-bearing section of the profile. The small sample of specimens includes only two clearly identified stakes, and the possible bow fragment and arrow shaft (?) contribute more frustration than information. It might prove worthwhile to look for a waterlogged deposit along the shore of the small lake behind Klo-kut where wooden materials could be better preserved, but there would be complicated technical problems involved in any excavation there and each trench excavated thusfar has shown its poorest yield in the end nearest the lake. There is a rather marked differential distribution of bark in all the trenches at Klo-kut. Bark is much more abundant in the Early Prehistoric period than in later horizons, and I shall return to this point below.

Mineral Pigments

Both hematite (artifact class #76) and limonite (#77) occur in considerable quantity in Klo-kut where they must have been used for making red and yellow paints, respectively. I am not familiar with the manner of occurrence of limonite in the northern Yukon area, but hematite is available locally in the form of river cobbles. In addition there are two major localities known to the people of Old Crow where large veins of hematite outcrop in cliff faces. One of these is located on the Fishing Branch of the upper Porcupine, over 400 river miles above Old Crow, and the other is near the Alaskan border, about 50 river miles below the village. I have visited the latter outcrop and was quite impressed by the size and accessibility of the vein.

Hematite is still used in Old Crow for decorating a number of aboriginal artifacts which can be made on request. I am not familiar with the modern process by which it is

Period	Block	Hematite Lots	Hematite No.	Hematite Wt.	Hematite $\overline{\text{Wt.}}$	Hematite Hard	Hematite Soft	Limonite Lots	Limonite No.	Limonite Wt.	Limonite $\overline{\text{Wt.}}$	Limonite Hard	Limonite Soft
Hist.	W100	9	95	26.3	0.28	32	63	3	3	2.6	0.87		3
Hist.	E100	12	33	30.2	0.92	3	30	4	4	16.3	4.08	1	3
Hist.	Total	21	128	56.5	0.44	35	93	7	7	18.9	2.70	1	6
Late Prehist.	W700	6	31	39.1	1.26	23	8	1	1	24.3	24.30	1	
Late Prehist.	W600	4	7	2.5	0.36	1	6	1	2	3.9	1.95	2	
Late Prehist.	W400	4	27	2.1	0.08	1	26						
Late Prehist.	W300	5	24	8.2	0.34	16	8	3	3	9.9	3.30	1	2
Late Prehist.	W100	11	102	55.0	0.54	3	100	4	4	28.7	7.18	1	3
Late Prehist.	E100	2	2	1.1	0.55	1	1	1	1	2.2	2.20		1
Late Prehist.	1A	7	76	17.5	0.23		76	1	1	0.4	0.40	1	
Late Prehist.	Total	39	269	125.5	0.47	44	225	11	12	69.4	5.78	6	6
Early Pre.	W300	1	1	0.5	0.50		1						
Early Pre.	W100	1	1	7.2	7.20	1							
Early Pre.	E300	1	1	167.0	167.00	1							
Early Pre.	1A	3	19	7.2	0.38	19		1	250	80.6	0.32	250	
Early Pre.	Total	6	22	181.9	8.27	21	1	1	250	80.6	0.32	250	
Early Pre.	Total (-E300)	5	21	14.9	0.71	20	1						
	Totals	66	419	363.9	0.87	100	319	19	269	168.9	0.63	257	12
	Totals (-E300)	65	418	196.9	0.47	99	319	(-1A) 18	19	88.3	4.65	7	12

Table 57. Distribution of weight and non-metric data for hematite and limonite fragments from MjV1-1, arranged by period.

turned into a paint, but I was told that bone grease is used as a binder. There are a number of plants which can also be used as a source of pigment.

The minerals at Klo-kut occur in two different forms. Hard nodules are gathered from the river bed and broken and polished to produce a powder. The powder is then mixed with grease to form a soft coherent mass which readily streaks any object to which it is applied. The hard and soft consistencies have been distinguished in Table 57 (see also Morlan 1971 : Table 116), and all the samples were weighed by provenience unit and type. In Table 57 I have summed the samples by piece and by lot, and the lot sums will be used in the analysis of artifact distributions since the number of pieces in a given lot varies widely for many reasons.

Metal Artifacts

The metal artifacts (Class No. 78) from Klo-kut include both obvious examples of direct Euro-Canadian trade and a few examples of prehistoric aboriginal trade. Two specimens, an iron ring (#780) and a small fragment of lead (#1570), are of Euro-Canadian origin but have been tabulated as representing the Late Prehistoric period since they are unique in their respective provenience units. The occupation in each case appears to represent an aboriginal setting with little or no European influence, and these two items might have reached Klo-kut by an indirect route which brought no significant change to the pattern of life at the site. The three small copper specimens probably represent prehistoric trading of native copper which is widely distributed in northwestern North America. Most of the metal artifacts were obtained from Layers I and II and Zone A, Level 1, of the W100 and E100 blocks, and they, along with beads and a few other items are responsible for my assignment of these units to the Historic period; as will be seen below, the influence of the fur trade may be discernible in the faunal remains from these layers. Since the metal artifacts are distinctive and potentially useful for refined dating and trade network analysis they will be individually described.

Hist. I N10/W75, L1 143

84.5 35.2 0.8

Iron scraper, semilunar in outline, badly corroded. One straight margin was folded repeatedly in order to snap the specimen from a larger piece of sheet metal. The other margin is convex and heavily serrated to form a cutting edge. The serrations are spaced 2.5-4.5 mm. apart and were made by cuts, 0.5-1.0 mm. deep, which resemble the marks made by heavy shears on sheet metal.

Plate 22b

Hist. I N20/E10, L1 315

56.0 18.7 0.7

Tin can fragment from a reclosable can. Red and gold painted geometric designs on a green background cannot be read but have a metallic luster and resemble the markings on a number of cans produced for the Nabob Company of western Canada.

Hist. I Sq. 7, L0 1A 377

This unit represents the Late Prehistoric period, but two iron straps appear to be intrusive and occurred just below the surface, only partially buried. The straps are machine cut and have machine punched perforations; they are painted gold. One is stamped "3" and the other either "6" or "9". They probably reached the site through the activities of an oil exploration company which camped at the site in the mid-1950's.

Hist. II N15/W90, L2 220

18.1 7.6 2.5

Steel scissor tip, identified by bevelled cross-section.

Plate 22c.

Hist. II N20/E10, L2 331

22.3 diam. 7.5 thick

Spent lead bullet weighing 15.5 grams, shows no discernable marks to indicate its caliber or origin of manufacture. Plate 22j.

Hist. A N5/W0-10, L1, F651 6

Pocket knife with overlaid bone handles, badly corroded. Handles, 84.7 mm. long. Had two movable blades, the smaller of which is #289. It is typical of late 19th century personal wares found in southern Alaska (Stephens 1972:3).

Hist. A N5/0, F6611 289

Small blade of pocket knife #6. 39.1 mm. long, joints with end of handle. Plate 22k.

Hist. A N5/0, F6611 287

Knife handle, 83.6 mm. long, with fixed blade snapped off. Handle formed by metal (?) casing around base of blade. The specimen functioned as a utility knife and was made in the latter half of the 19th century (Stephens 1972:3). Plate 22g.

Hist. A N5/0, F6611 286

Can lid with crimped margins, 40.8 mm. diameter, margins 6.8 mm. high. Raised "Y" and "T" are the only visible letters. It functioned as a press-on top for a percussion cap container (Stephens 1972: 3).

Hist. A N5-10/W0-5, L1 16

Cartridge case, center fire, externally primed, no headstamp. Illustrated by Logan (1959: 137). It is a .44 Smith and Wesson calibre first introduced in 1870 and last listed in the catalogues of 1908 (Stephens 1972: 4). Snapped off 26.3 mm. from head and pinched closed. Plate 22i.

Hist. A N10-15/0, L1 260

168.8 56.1 1.5

Wrought iron fragment, badly corroded, tentatively identified as part of a frying pan manufactured in the latter half of the 19th century (Stephens 1972: 3).

Hist. A N10-15/0, L1 261

45.3 31.6 2.0

Harmonica fragment with three reeds still intact. Plate 22h.

Hist. A N10-15/0, L1 262

64.7 5.2 3.7

Square iron nail; head 7.0 X 6.2 mm. Plate 22d.

L.P. I D2: 0/W10, L1 780

Iron ring made of sheet metal, 12.7 mm. wide, 22.2 diameter, 0.6 thick. One margin is machine cut with an inset at a tab inserted through a slot and folded back to form the ring. The other margin is roughly hand-cut in an effort to match the first margin; even the inset is crudely formed.

L.P. I S15/W305, L1 1570

15.8 6.7 1.6

Small fragment of lead (?). One face is creased to form an arcuate ridge; may be excess from a bullet mold.

L.P. III Sq. 14/23, L2 1A 250

Copper hook in the compound fish hook described above (artifact class no. 56).

E.P. VI Sq. 4, L7 1A 246
29.9 7.3 1.2
Small pointed copper fragment

E.P. VI Sq. 15/24, L6A 1A 291
22.6 8.1 0.3
Folded copper fragment.

Glass Beads

Of 41 glass beads (artifact class no. 79) in the Klo-kut collection, 39 were obtained by means of excavation, and two were found on the surface of the site. All but one of the excavated specimens represent the Historic period, and the exception is a large bead from the Late Prehistoric period which must have reached Klo-kut through aboriginal trade networks. This specimen is unique among the Klo-kut examples and appears to have been used as an ornament fastened to a fairly hard, flat surface; a frosted band 3 mm. wide entirely encircles the bead at the midline and must represent a wear facet resulting from the manner in which it was attached.

All the other beads are standard forms well known in the trade inventories of Russian, British, and American companies. The only one of these thought to have any particular value as a diagnostic form is the Cornaline d'Aleppo bead of which both the green-lined and brown-lined varieties are represented; one white-lined example occurred on the beach. "This type of bead was widely distributed among Indians of North America in the nineteenth century..." (VanStone 1970: 84-85).

The other bead from the surface is a modern "seed" bead such as those used today in Old Crow. Colors and metric data for all these beads are summarized in Table 58 (see also Morlan 1971: Table 117).

Miscellaneous Trade Goods

Only six artifacts fall into this category (no. 80), and they will be individually described. Four of them represent the Historic period, but one small piece of glass (#779) was found in a predominantly Late Prehistoric context.

Hist. I N15/W75, L0 200

39.5 38.0 4.2

Basal sherd of handpainted ironstone china plate. A raised footring increases the thickness to 7.2 mm. A red and green floral pattern is painted on a white background; it is called a "cottage motif" and indicates a cheap ware. No potter's marks are visible. Stephens (1972) notes the following concerning the manufacture and history of this specimen:

> This piece of pottery probably belonged to a serving dish with a base diameter of 5 cm.... It utilizes the high fire colour technique, which was introduced in England after 1825 until 1870. It was extremely popular in the 1850's with over 43 English potters manufacturing this type of ware. The Hudson's Bay Company contracted...one of the Staffordshire potters to supply their posts with similar examples of this ironstone ware.

Many sites in western Canada and southwestern Alaska have yielded such pottery (Stephens 1972: 2).

Plate 22a.

Hist. I N15/E10, L1 305

14.3 diam. 2.3 thick.

Bone button with four crude holes, 1.5 mm. in diameter, drilled from the outer face in a square pattern which is centered within an incised circle,

Period	Block	Color	No.	Length	Mean Length	Diam.	Mean Diam.
Historic	W100	Green-lined Red	8	30.1	3.77	39.4	4.93
		Brown-lined Red	1	4.2	4.20	5.0	5.00
		Opaque Black	3	13.8	4.60	20.5	6.83
		White	24	113.1	4.71	157.4	6.56
		Translucent Dark Blue	1	4.6	4.60	5.4	5.40
	E100	Translucent Light Blue	1	1.4	1.40	3.3	3.30
	Total		38	165.8	4.36	227.7	5.99
L. P.	1A	Translucent Dark Blue	1	10.4	10.40	12.2	12.20

Table 58. Distribution of 39 glass beads from MjV1-1, arranged by period.

7.2 mm. in diameter. "This type was first manufactured between 1880 and 1830 and probably found its way into the Northwest between 1837 and 1865" (Stephens 1972: 2).

Plate 22f.

Hist. I N30/E10, L1 420

Amber-colored bottle rim, 25.7 high, 26.3 diameter at lip, with a collar 10.4 mm. wide which increases the diameter to 30.2 mm. beginning 5.1 mm. below the lip. The sherd is of the "champagne" finish type, used also for liquor bottles.

> This neck section was from a bottle with a hand-finished neck, which can be determined because the seam from the mould in which it was made does not extend across the lip of the neck. Therefore, it can definitely be said to date before 1910. Hunt (1959: 9-10) noted that these types of bottles were fitted with cork stoppers, which also dates it in the latter part of the 19th century since the majority of bottles made after the early part of the 20th century were fitted with metal caps (Stephens 1972: 2).

Plate 22e.

Hist. II 0/W75, L2 1172

13.7 diam. 3.3 thick

Mother-of-pearl button set on a brass ring-type post, 5.0 mm. high and 5.5 mm. diameter.

Hist. A N20-25/0, L1-1A 251

Small fragment of the amber-colored bottle rim described as #420. This fragment cannot be rejointed with the larger piece, but it shares a distinctive flaw in the glass.

L.P. I D2:0/W75, L1 779

7.5 6.1 2.0

Small glass fragment from a bottle or a window pane; one face is facetted.

Artifact Analysis

The foregoing descriptive section has completed the presentation of basic data for 7403 artifacts in 80 classes and three periods . In this section we shall examine certain characteristics of the distributions of the artifacts with respect to both their horizontal locations in the site and their vertical positions in the profile. I have experimented with a number of statistical tests and have found most of them unsuitable for these purposes, either because they lack the power efficiency to discriminate the variations in which I am interested or because the samples are too small for reliable use of the tests. One test, however, appears to be reasonably suitable for an analysis of these artifact distributions, and the sample characteristics generally satisfy its requirements.

The Kolmogorov-Smirnov test for two independent samples measures the significance of the maximum divergence (D) between two cumulative distributions. The samples must be independent, and they must be of equal size unless each of them is larger than 40. With samples larger than 40 the critical values of D apply to both tails of the distribution. The Kolmogorov-Smirnov test is thought to be "more powerful in all cases than either the χ^2 test or the median test" (Siegel 1956: 136).

Vertical Distribution

I have used Kolmogorov-Smirnov tests with several combinations of the artifact classes described above. The overall distribution of stone artifacts is shown by period in Table 59, and these thirty classes have been regrouped into twelve clusters of classes shown in Table 60 with their cumulative percentage distributions. The distributions have been graphed in Fig. 32, and the Kolmogorov-Smirnov tests in Table 60 show that the divergence of the Early Prehistoric period is highly significant whereas that between the Late Prehistoric and Historic periods is of low significance.

It can be seen in Table 60 that the high incidence of unretouched flakes (class 6, 65-80%) masks the variations among the other, potentially more significant categories. This "mask" has been removed in Table 61, and the relative divergence of all three periods is reflected more clearly by the Kolmogorov-Smirnov tests. These cumulative distributions are graphed in Fig. 33. It is noteworthy that the divergence between the two prehistoric periods is highly significant whereas that between the Late Prehistoric and Historic periods is of only moderate or low significance. Over one-fourth of the divergence between the prehistoric periods is attributable to the biface categories (classes 19 and 20) which are absent in the Early Prehistoric

	Hist.	L. P.	E. P.	Totals
1. Waterworn Pebbles	5	11	30	46
2. Broken Pebbles	7	23	12	42
3. Core Fragments	37	77	62	176
4. Cores with Platforms	7	13	18	38
5. Exhausted Cores	6	5	3	14
6. Unretouched Flakes	536	2579	1079	4194
7. Microscopically Retouched Flakes	37	117	47	201
8. Thinned Flakes		14	14	28
9. Nicked Flakes	13	34	70	117
10. Blunted Flakes	39	128	119	286
11. Rough Shaped Flakes	2	1	2	5
12. Poorly Shaped Flakes	2	15	12	29
13. Well Shaped Flakes	4	15	35	54
14. Scrapers		13	22	35
15. Burinated Flakes	17	53	17	87
16. Burin Spalls		2	5	7
17. Burins	1	2	4	7
18. Wedges	14	35	41	90
19. Rough Bifaces	1	3		4
20. Finished Bifaces	4	16		20
21. Artifact Fragments	4	17	7	27
22. Unshaped Boulder Spalls	8	19	25	52
23. Shaped Boulder Spalls			2	2
24. Boulder Spall Fragments	5	10	2	17
25. Unshaped *tci-de-tho*	3	6	14	23
26. Shaped *tci-de-tho*			4	4
27. Cleavers and Choppers	1	5	1	7
28. Pestles and Hammerstones	1	3	8	12
29. Adzes		2	2	4
30. Polished Fragments	9	27	14	50
Totals	763	3245	1671	5679

Table 59. Distribution of thirty stone artifact classes from MjVl-1, arranged by period. See also Tables 13-50.

period. The appearance of bifacial stone working techniques in the Late Prehistoric period was also reflected in Table 60 by the increase from 65% to 80% in the frequency of unretouched flakes, many Late Prehistoric examples of which appear to be trimming flakes from bifacial blanks. Other noteworthy differences between these two periods include the higher frequencies of tabular *tci-de-tho* and both shaped and unshaped retouched flakes in the Early Prehistoric period. By way of contrast there are no categorical changes and very few major cardinal changes from the Late Prehistoric period to the Historic period. Obviously there is continuity in the lithic technology throughout this sequence, and the introduction of historic trade goods and the beginnings of the fur trade had had little effect on tool making by the time of the historic occupations at Klo-kut. On the other hand, the introduction of bifacial stone working techniques in the Late Prehistoric period seems to me to be of profound significance and will be further discussed below.

The distributions of 40 categories of bone artifacts are shown by period in Table 62. These categories have been regrouped into eleven clusters in Table 63 where they are shown with their cumulative percentage distributions (see also Fig. 34). Unfortunately the Kolmogorov-Smirnov tests are not sufficiently powerful to discriminate certain divergences in these distributions which I thought might

	Historic			Late Prehistoric			Early Prehistoric			
	No.	Percent	Cumulative Percent	No.	Percent	Cumulative Percent	No.	Percent	Cumulative Percent	Totals
1-5	62	0.081	0.081	129	0.040	0.040	125	0.075	0.075	316
6	536	0.702	0.783	2579	0.795	0.835	1079	0.646	0.721	4194
7-10	89	0.117	0.900	293	0.090	0.925	250	0.150	0.871	632
11-14	8	0.011	0.911	44	0.014	0.939	71	0.042	0.913	123
15-17	18	0.024	0.935	57	0.018	0.957	26	0.016	0.929	101
18	14	0.018	0.953	35	0.011	0.968	41	0.025	0.954	90
19-20	5	0.007	0.960	19	0.006	0.974			0.954	24
21	4	0.005	0.965	17	0.005	0.979	7	0.004	0.959	28
22-24	13	0.017	0.982	29	0.009	0.988	29	0.017	0.976	71
25-26	3	0.004	0.986	6	0.002	0.990	18	0.011	0.987	27
27-29	2	0.003	0.989	10	0.004	0.994	11	0.007	0.994	23
30	9	0.012	1.001	27	0.008	1.002	14	0.008	1.002	50
Totals	763			3245			1671			5679

Kolmogorov-Smirnov:	n1	n2	D	Probability
Historic/Late Prehistoric	763	3245	0.095	< 0.001
Late Prehistoric/Early Prehistoric	3245	1671	0.157	< 0.001
Historic/Early Prehistoric	763	1671	0.082	0.005 > 0.001

Table 60. Cumulative percentage distributions for twelve clusters of stone artifact classes from MjV1-1, showing the probability for all possible pairs that two period samples were drawn from the same population.

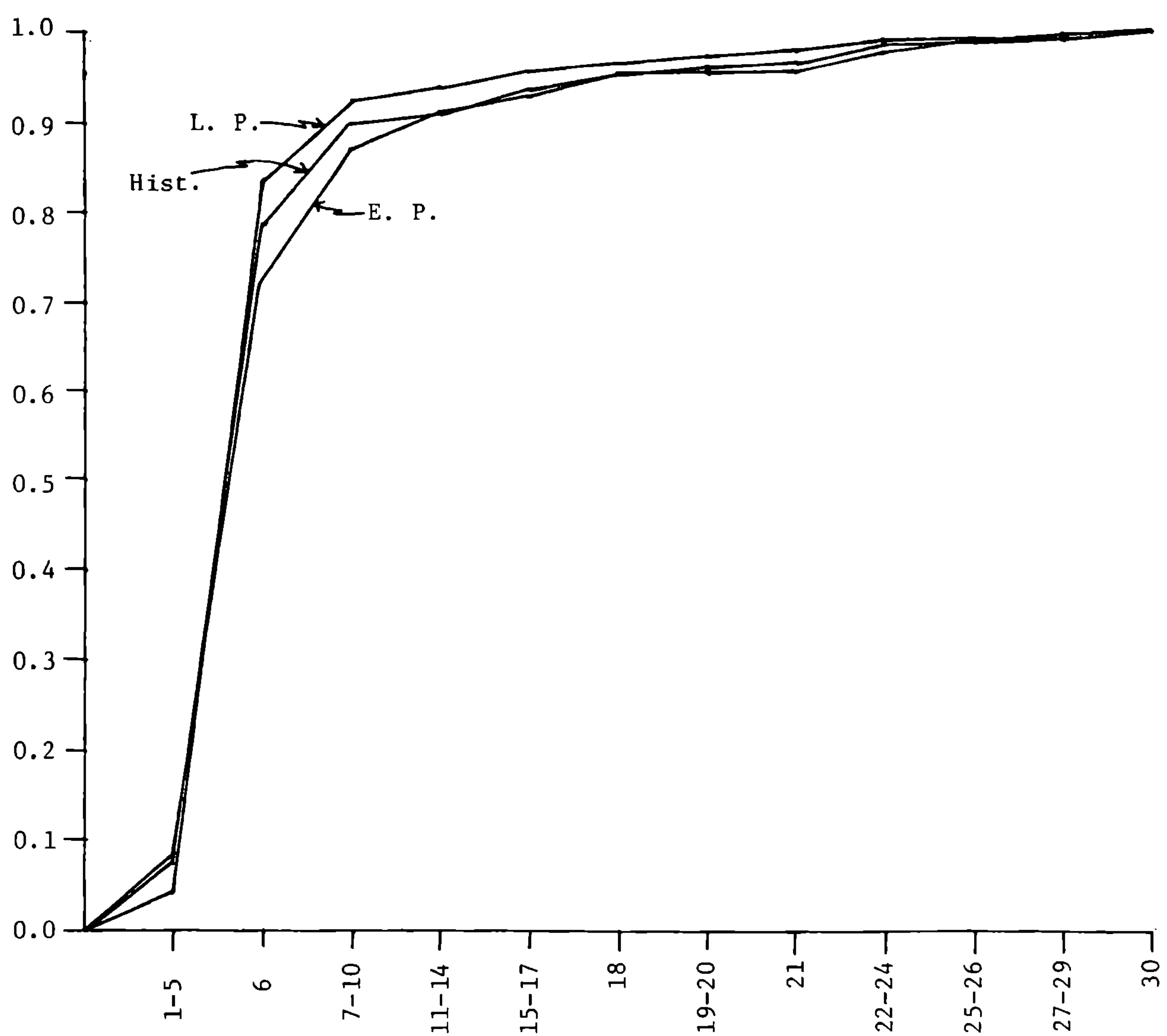

Fig. 32. Cumulative percentage distributions for twelve clusters of stone artifact classes from MjV1-1, arranged by period.

	Historic			Late Prehistoric			Early Prehistoric			
	No.	Percent	Cumulative Percent	No.	Percent	Cumulative Percent	No.	Percent	Cumulative Percent	Totals
1-5	62	0.273	0.273	129	0.194	0.194	125	0.211	0.211	316
7-10	89	0.392	0.665	293	0.440	0.634	250	0.422	0.633	632
11-14	8	0.035	0.700	44	0.066	0.700	71	0.120	0.753	123
15-17	18	0.079	0.779	57	0.086	0.786	26	0.044	0.797	101
18	14	0.062	0.841	35	0.053	0.839	41	0.069	0.866	90
19-20	5	0.022	0.863	19	0.029	0.868			0.866	24
21	4	0.018	0.881	17	0.025	0.893	7	0.012	0.878	28
22-24	13	0.057	0.938	29	0.043	0.936	29	0.049	0.927	71
25-26	3	0.013	0.951	6	0.009	0.945	18	0.030	0.957	27
27-29	2	0.009	0.960	10	0.015	0.960	11	0.019	0.976	23
30	9	0.040	1.000	27	0.040	1.000	14	0.024	1.000	50
Totals	227			666			592			1485

Kolmogorov-Smirnov:	n1	n2	D	Probability
Historic/Late Prehistoric	227	666	0.106	0.05 > 0.025
Late Prehistoric/Early Prehistoric	666	592	0.118	< 0.001
Historic/Early Prehistoric	227	592	0.149	0.005 > 0.001

Table 61. Cumulative percentage distributions for eleven clusters of stone artifact classes from MjVl-1, showing the probability for all possible pairs that two period samples were drawn from the same population.

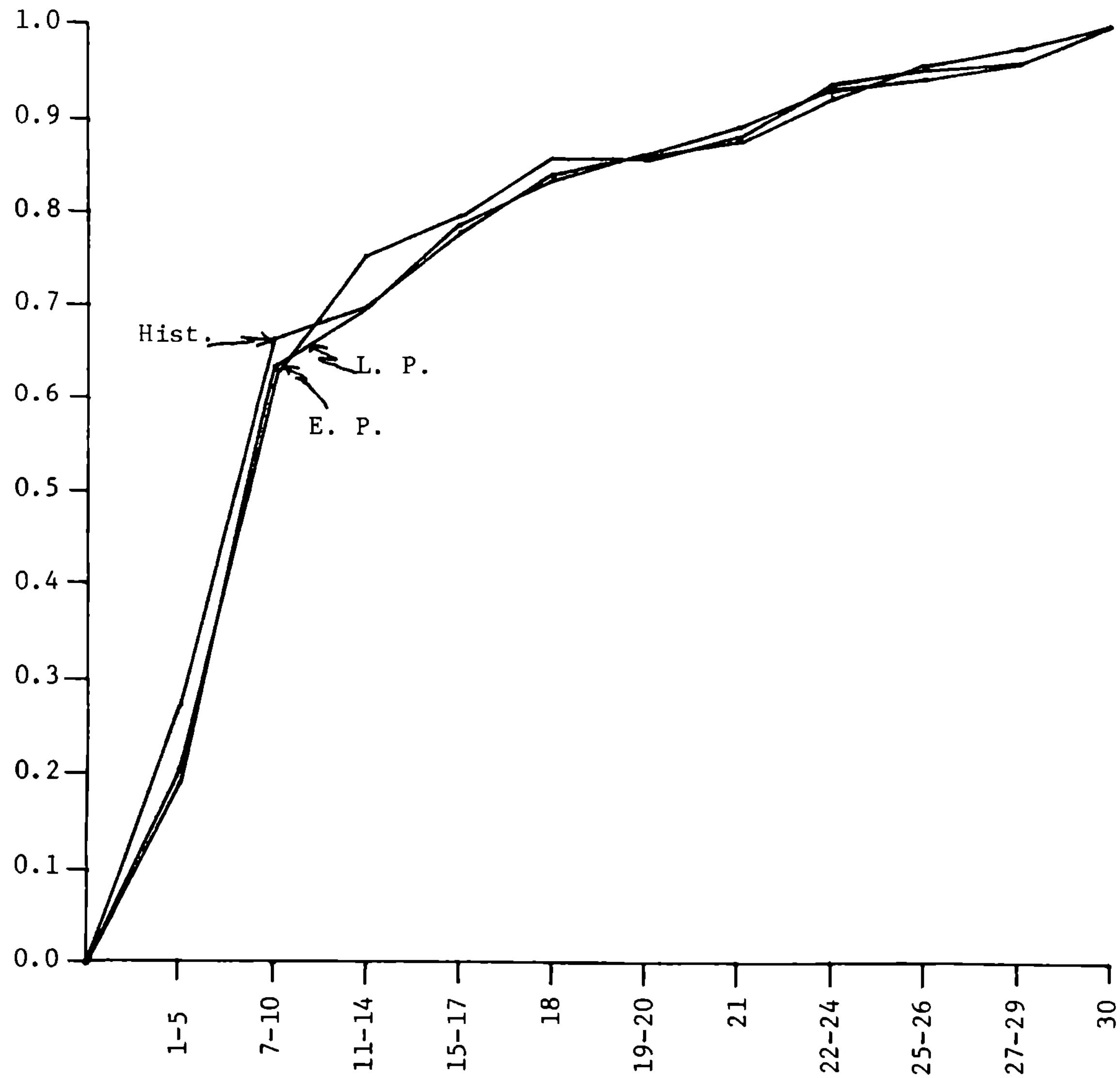

Fig. 33. Cumulative percentage distributions for eleven clusters of stone artifact classes from MjVl-1, arranged by period.

	Hist.	L. P.	E. P.	Totals
31. Bilaterally Barbed Points		1		1
32. Unilaterally Barbed Points	2	6	11	19
33. Unbarbed Points	1	5	21	27
34. Points with Knobbed Stems		1	4	5
35. Blunt Arrowheads	1		2	3
36. Unbarbed Bedded Points			2	2
37. Leister Barbs			2	2
38. Thick Antler Points		1	1	2
39. Ornamented Bone Beamers		1	2	3
40. Unornamented Bone Beamers	6	10	5	21
41. End of the Bone Scraper			1	1
42. Coronally Split Metapodials	3	3	5	11
43. Quartered Metapodials		5	2	7
44. Splinters with One Grooved Margin	1	31	20	52
45. Awl, Type I	1	4	2	7
46. Awl, Type II	2		7	9
47. Awl, Type III	3	4	5	12
48. Awl, Type IV	1	1	5	7
49. Awl, Type V			3	3
50. Creaser, Type I	1		5	6
51. Creaser, Type II	1	4	4	9
52. Needles	2	6	8	16
53. Splinters with Two Grooved Margins	1	12	7	20
54. Splinters with Central Grooves	4	8	10	22
55. Miscellaneous Polished Splinters	3	6	10	19
56. Compound Fish Hooks	1	1		2
57. Fish Lures		3		3
58. Gaming Pieces		2	2	4
59. Barking Tools			3	3
60. End-notched Antler Beams	3			3
61. Grooved and Split Antler Fragments	7	14	5	26
62. Grooved, Split and Sawn Antler Frags.	1	3	12	16
63. Sawn and Chopped Antler Fragments	16	5	3	24
64. Crushed Antler Tines	1	2	1	4
65. Cranium with Cut Antler	3		1	4
66. Worked Incisors		1	2	3
67. Cut Loon Beaks		1	4	5
68. Miscellaneous Cut and Polished Bones	19	25	16	60
69. Pitted Bones	30	60	29	119
70. Butchered Bones	31	36	23	90
Totals	145	262	245	652

Table 62. Distribution of forty bone artifact classes from MjVl-1, arranged by period.

be significant; all the test results indicate highly significant divergence among the three periods. If all stone and bone categories of questionable importance are eliminated, however, the tests provide rewarding results. Table 64 shows the cumulative percentage distributions of thirteen clusters of potentially diagnostic artifact classes, and the divergence between the two prehistoric periods is in marked contrast to the lack of significant divergence between the Late Prehistoric period and the Historic period. These distributions are graphed in Fig. 35.

The important changes from the Early Prehistoric and Late Prehistoric periods can be summarized as follows:

1. a decrease in the frequency of shaped flakes (classes 11-14), particularly of scrapers (class 14), associated with

2. an increase in the frequency of bone beamers and associated classes (39-43) which is partially masked in Table 64 by the frequencies of split metapodials; Table 62 indicates twice as many beamers in the Late Prehistoric period as in the Early Prehistoric, and the sample totals are of nearly equal size;

	Historic			Late Prehistoric			Early Prehistoric			
	No.	Percent	Cumulative Percent	No.	Percent	Cumulative Percent	No.	Percent	Cumulative Percent	Totals
31-38	4	0.028	0.028	14	0.054	0.054	43	0.176	0.176	61
39-43	9	0.062	0.090	19	0.073	0.127	15	0.061	0.237	43
44	1	0.007	0.097	31	0.118	0.245	20	0.082	0.319	52
45-49	7	0.048	0.145	9	0.034	0.279	22	0.090	0.409	38
50-52	4	0.028	0.173	10	0.038	0.317	17	0.069	0.478	31
53-55	8	0.055	0.228	26	0.099	0.416	27	0.110	0.588	61
56-57	1	0.007	0.235	4	0.015	0.431			0.588	5
58-65	31	0.214	0.449	26	0.099	0.530	27	0.110	0.698	84
66-68	19	0.131	0.580	27	0.103	0.633	22	0.090	0.788	68
69	30	0.207	0.787	60	0.229	0.862	29	0.118	0.906	119
70	31	0.214	1.001	36	0.132	1.000	23	0.094	1.000	90
Totals	145			262			245			652

Kolmogorov-Smirnov:	n1	n2	D	Probability
Historic/Late Prehistoric	145	262	0.232	< 0.001
Late Prehistoric/Early Prehistoric	262	245	0.231	< 0.001
Historic/Early Prehistoric	145	245	0.361	< 0.001

Table 63. Cumulative percentage distributions for eleven clusters of bone artifact classes from MjV1-1, showing the probability for all possible pairs that two period samples were drawn from the same population.

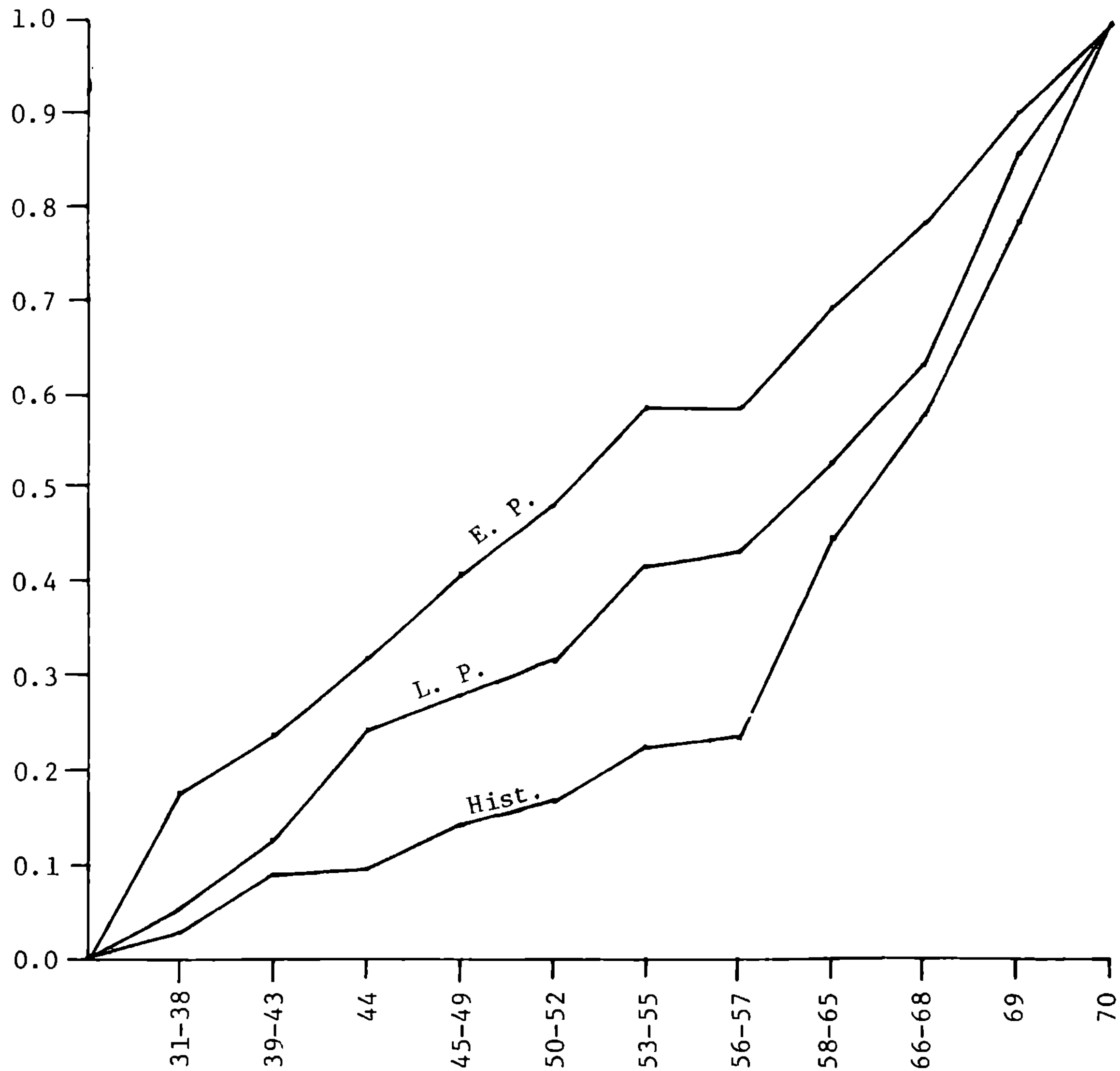

Fig. 34. Cumulative percentage distributions for eleven clusters of bone artifact classes from MjVl-1, arranged by period.

	Historic			Late Prehistoric			Early Prehistoric			
	No.	Percent	Cumulative Percent	No..	Percent	Cumulative Percent	No.	Percent	Cumulative Percent	Totals
11-14	8	0.082	0.082	44	0.156	0.156	71	0.231	0.231	123
15-17	18	0.186	0.268	57	0.201	0.357	26	0.085	0.316	101
18	14	0.144	0.412	35	0.124	0.481	41	0.134	0.450	90
19-20	5	0.052	0.464	19	0.067	0.548			0.450	24
22-24	13	0.134	0.598	29	0.103	0.651	29	0.095	0.545	71
25-26	3	0.031	0.629	6	0.021	0.672	18	0.059	0.604	27
27-29	2	0.021	0.650	10	0.035	0.707	11	0.036	0.640	23
30	9	0.093	0.743	27	0.095	0.802	14	0.046	0.686	50
31-38	4	0.041	0.784	14	0.050	0.852	43	0.140	0.826	61
39-43	9	0.093	0.877	19	0.067	0.919	15	0.049	0.875	43
45-49	7	0.072	0.949	9	0.032	0.951	22	0.072	0.947	38
50-52	4	0.041	0.990	10	0.035	0.986	17	0.055	1.002	31
56-57	1	0.010	1.000	4	0.014	1.000			1.002	5
Totals	97			283			307			687

Kolmogorov-Smirnov:	n1	n2	D	Probability
Historic/Late Prehistoric	97	283	0.133	> 0.10
Late Prehistoric/Early Prehistoric	283	307	0.274	< 0.001
Historic/Early Prehistoric	97	307	0.305	< 0.001

Table 64. Cumulative percentage distributions for thirteen clusters of potentially diagnostic stone and bone artifact classes from MjVl-1, showing the probability for all possible pairs that two period samples were drawn from the same population.

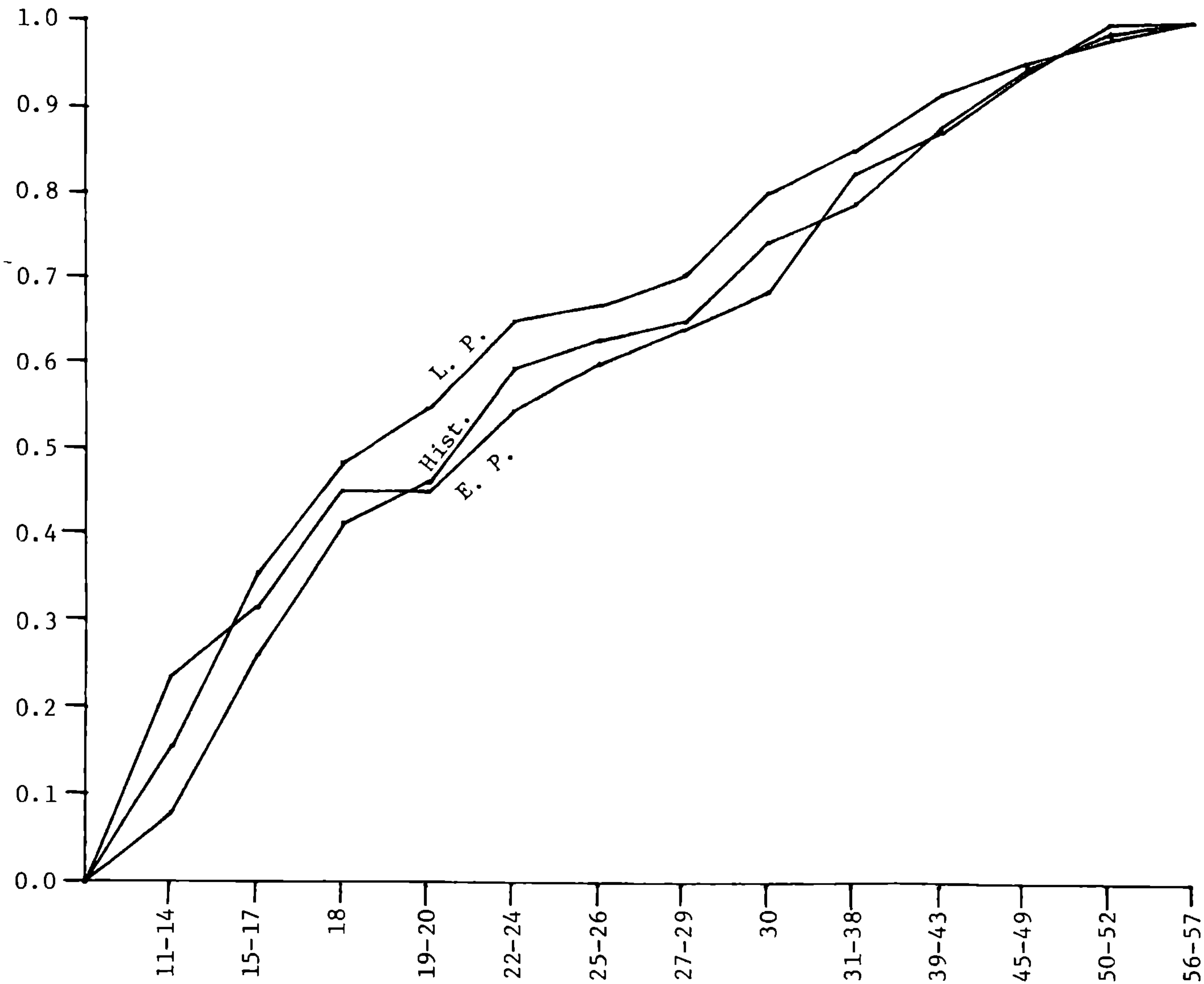

Fig. 35. Cumulative percentage distributions for thirteen clusters of potentially diagnostic stone and bone artifact classes from MjVl-1, arranged by period.

3. the appearance of bifacial stone artifacts (classes 19-20), associated with a marked increase in unretouched flakes (class 6, Table 60), as well as with

4. a decrease in the frequency of bone and antler projectiles (classes 31-38);

5. a marked increase in the frequency of burinated flakes (classes 15-17),

6. an increase in the frequency of polished fragments (class 30), and

7. a marked decrease in the frequency of awls.

The differences between the Late Prehistoric period and the Historic period must be evaluated more conservatively, because of the smaller sample size of the latter, but the only major change appears to be a further decline in the frequency of shaped flakes which, for whatever reason, is associated with an increase in the frequency of core fragments (class 3) and unshaped retouched flakes (classes 7-10). In some artifact classes, notably the bone beamers and stone scrapers, there appears to be a general decline in the quality of workmanship from the Late Prehistoric period to the Historic period, and the increases in core fragments and unshaped flakes may also be a reflection of this trend.

Five categories of bark and wood artifacts (Table 65) are plotted with their cumulative percentage distributions in Table 66 and Fig. 36, and the Kolmogorov-Smirnov tests for these samples yielded the same results as those for the diagnostic artifact classes. It should be noted, however, that the small sample sizes for the Late Prehistoric and Historic periods may have contributed to the low significance of their relative divergence.

Also in Table 66 and Fig. 36 are tests of the divergence among the periods for all 80 classes of artifacts sorted on the basis of raw material. The uniformly significant results of these tests is, once again, an indication of masking by the highly variable byproduct classes; the many fluctuations which make up the divergences merely reinforce one another so that any grouping of such diverse materials would yield results of high significance.

I attempted to run a number of Kolmogorov-Smirnov tests on the distribution of stone types among the three periods, but sampling problems made the results unreliable. Tests on the unretouched flakes indicated highly significant divergence ($P < 0.001$) among all three periods, suggesting that certain stone types may have been more readily available during some than during others. The Historic period is characterized by a relatively high frequency of microcrystalline and layered stone types (types 12-18) and a low frequency of black cherts (type 2b).

	Hist.	L. P.	E. P.	Totals
71. Bark Trays	2		6	8
72. Bark Slabs	5	18	150	173
73. Bark Rolls	19	26	157	202
74. Bark Strips	8	14	505	527
75. Wood Artifacts	4	8	2	14
Totals	38	66	820	924
76. Hematite (lots)	21	39	6	66
77. Limonite (lots)	7	11	1	19
Totals	28	50	7	85
78. Metal Artifacts	13	3	2	18
79. Glass Beads	38	1		39
80. Miscellaneous Trade Goods	5	1		6
Totals	56	5	2	63

Table 65. Distribution of ten bark, mineral, metal, and glass artifact classes from MjVl-1, arranged by period.

The only categorical variations are the absence or near absence of quartz and quartz crystal in the Historic period. If these divergences in the stone types of unretouched flakes reflected preferences in the stone use habits of the knappers at Klo-kut,one would expect them to be repeated in the retouched flake categories. Unfortunately only one category, blunted flakes (class 10), provides suitable samples for tests among the three periods, and these tests indicate divergences of low or moderate significance for the stone types of blunted flakes among the three periods. This suggests that availability rather than preference is responsible for the divergences among the unretouched flakes but that this factor was overcome by careful selection of suitable stone types for the manufacture of finished artifacts. Similar results for other artifact types were made questionable by the small sample sizes for any given period. If either sample size decreases to 40 or less the two samples must be of equal size for the use of a one-tailed Kolmogorov-Smirnov test, and these requirements cannot be met by the Klo-kut data.

Horizontal Distribution

Ideally an analysis of horizontal distribution would include delineations of house structures and other features related to the activities and community patterns which characterized the site. Unfortunately the excavations

	Historic			Late Prehistoric			Early Prehistoric			
	No.	Percent	Cumulative Percent	No.	Percent	Cumulative Percent	No.	Percent	Cumulative Percent	Totals
71	2	0.053	0.053				6	0.007	0.007	8
72	5	0.132	0.185	18	0.273	0.273	150	0.183	0.190	173
73	19	0.500	0.685	26	0.394	0.667	157	0.191	0.381	202
74	8	0.211	0.896	14	0.212	0.879	505	0.616	0.997	527
75	4	0.105	1.001	8	0.121	1.000	2	0.002	0.999	14
Totals	38			66			820			924

Kolmogorov-Smirnov:	n1	n2	D	Probability
Historic/Late Prehistoric	38	66	0.158	> 0.10
Late Prehistoric/Early Prehistoric	66	820	0.411	< 0.001
Historic/Early Prehistoric	38	820	0.456	< 0.001

	Historic			Late Prehistoric			Early Prehistoric			
	No.	Percent	Cumulative Percent	No.	Percent	Cumulative Percent	No.	Percent	Cumulative Percent	Totals
1-30	763	0.741	0.741	3245	0.895	0.895	1671	0.609	0.609	5679
31-70	145	0.141	0.882	262	0.072	0.967	245	0.089	0.698	652
71-75	38	0.037	0.919	66	0.018	0.985	820	0.298	0.996	924
76-77	28	0.027	0.946	50	0.014	0.999	7	0.003	0.999	85
78-80	56	0.054	1.000	5	0.001	1.000	2	0.001	1.000	63
Totals	1030			3628			2745			7403

Kolmogorov-Smirnov:	n1	n2	D	Probability
Historic/Late Prehistoric	1030	3628	0.154	< 0.001
Late Prehistoric/Early Prehistoric	3628	2745	0.297	< 0.001
Historic/Early Prehistoric	1030	2745	0.261	< 0.001

Table 66. Cumulative percentage distributions for five classes of bark and wood artifacts and for five categories of raw material from MjVl-1, showing the probability for all possible pairs that two period samples were drawn from the same population.

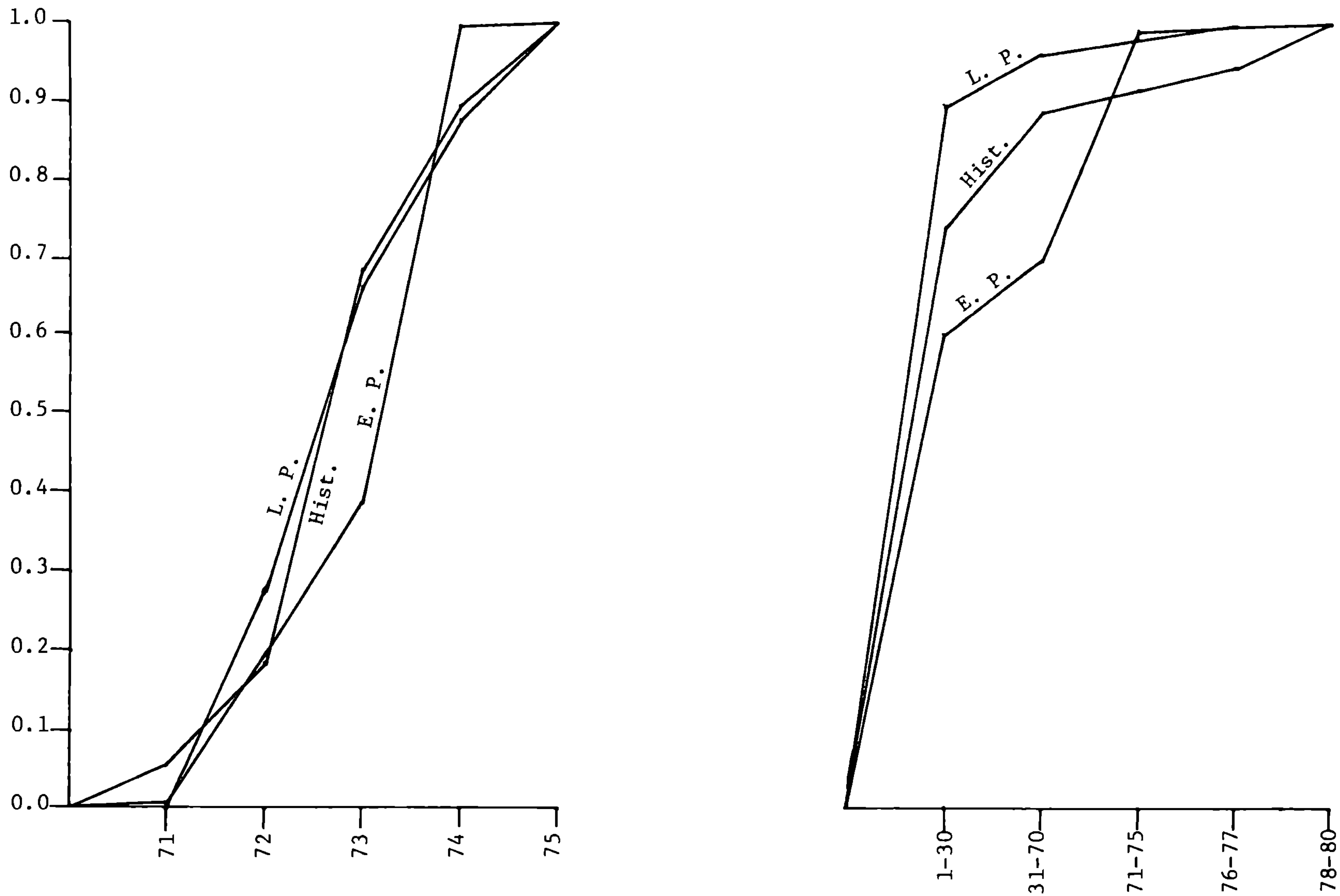

Fig. 36. Cumulative percentage distributions for five classes of bark and wood artifacts and for five categories of raw material from MjV1-1, arranged by period.

to date were not designed for this purpose, because it seemed more important to sample as many areas of the site as possible; working with small crews in short excavation seasons this has meant the use of long, narrow trenches in each of which we exposed as much of the profile as permafrost and watertable would allow. The present sample was derived from a series of such trenches, as described in Chapter V, and the horizontal distribution provided by any one trench is not broad enough to indicate significant activity areas or to reveal the former presence of surface structures.

This aspect of the analysis focussed upon comparisons of the separate trench samples, each of which was obtained independently and fitted into the overall collection by means of careful stratigraphic correlations. A detailed discussion of horizontal distribution was provided elsewhere (Morlan 1971: 444-457), and it is sufficient here to note that only one significant conclusion emerged from the analysis. Kolmogorov-Smirnov tests of paired trench samples indicated far more homogeniety within periods than between periods. Specifically, the Early Prehistoric sample from Area 1A diverged consistently from each of the seven Late Prehistoric samples whereas significant divergences among the latter revealed no consistent, interpretable patterns. Similar results were obtained from comparisons between the two major Historic samples. Furthermore the Historic samples diverged more significantly from the Early Prehistoric 1A sample than from the various Late Prehistoric samples. It should be emphasized that small sample sizes placed severe constraints upon this aspect of the analysis, and such constraints could only be lifted by further excavation.

Density

The approximate volume of sediment representing each period is shown in Table 67 for each block except the insignificant E300 block. The Late Prehistoric period comprises about two-fifths of the total volume in each trench, with the remaining volume representing the Early Prehistoric period or both the latter and the Historic period. Density distributions have been plotted in Figs. 37-39 on the basis of the data in Tables 68-69. The graphs are displayed on 3-4 cycle logarithmic scales since the density values range through several orders of magnitude. Fig. 37 shows that unretouched flakes dominate the collection in density as well as in number, and that other stone artifacts comprise the next most abundant class followed by bone artifacts, bark, mineral pigments, and trade goods. Exceptions to this pattern include the high bark density in the Early Prehistoric period and the high trade goods density in the Historic period. Fig. 38 shows the density distributions for unretouched flakes and illustrates another point of similarity between the Historic and Late Prehistoric periods. These two periods are not only similarly located in terms of order of magnitude but they are also much less variable from one trench to another than is the Early Prehistoric period which, with the exception of area 1A, is located one or two

	Historic	Late Prehistoric	Early Prehistoric	Totals
W700		225	250	475
W600		150	125	275
W400		75	150	225
W300		175	275	450
W100	250	575	950	1775
E100	225	425	500	1150
1A		800	1050	1850
Totals	475	2425	3300	6200

Table 67. Volume of sediment ($ft.^3$) representing each period in each trench at MjVl-1.

	Historic	Late Prehistoric	Early Prehistoric
1-5, 7-30.	0.478	0.275	0.179
6.	1.128	1.064	0.327
31-70.	0.305	0.108	0.074
71-75.	0.080	0.027	0.248
76-77.	0.059	0.021	0.002
78-80.	0.118	0.002	0.0006

Table 68. Density distributions for six major categories of artifacts in MjVl-1, arranged by period.

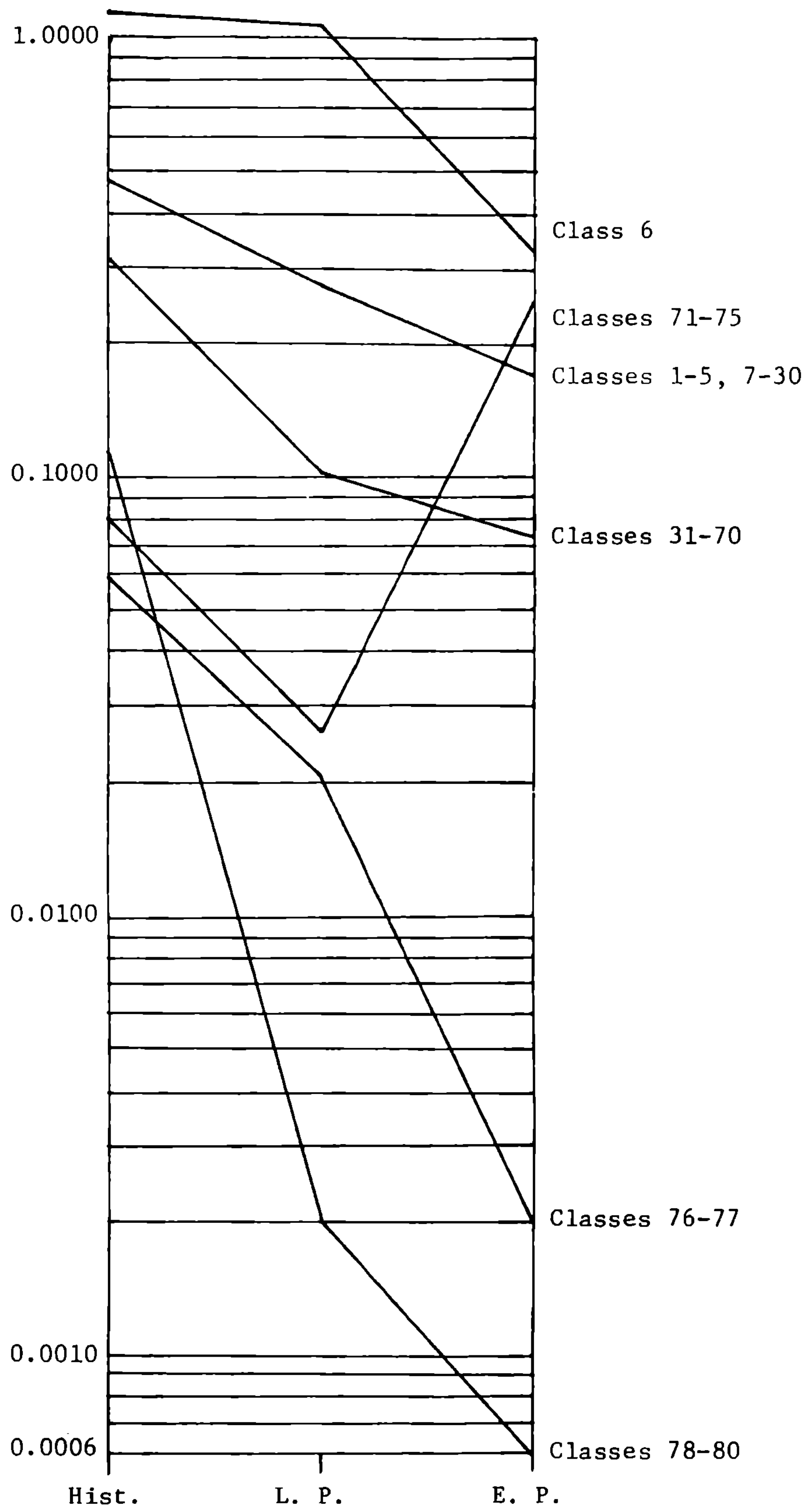

Fig. 37. Density distributions for six major categories of artifacts in MjVl-1, arranged by period on a 4-cycle logarithmic scale.

orders of magnitude below the other two. The same pattern obtains for the other stone artifacts (Fig. 39); indeed these generalizations are even more clearly apparent. Area 1A is quite distinctive in providing the only area where the Early Prehistoric period is more productive than the Late Prehistoric period. Presumably these variations in density indicate differences in the intensity of occupation of various parts of the site, but the nature of the excavation plan necessitates caution with respect to such interpretations. In general, however, I would return to Area 1A for a significant enlargement of our Early Prehistoric sample and would examine any other area of the site for data concerning the Late Prehistoric period.

Summary

Each of the three periods is distinctive in certain ways and bears a peculiar relation to the adjacent period. These characteristics can be summarized as follows.

Early Prehistoric. This initial period of human occupancy at Klo-kut began approximately 1000 years ago, and the occupations continued intermittently for about 400 years. At least some evidence of man is present for this time range in every area of the site yet sampled, but in most areas the density of artifacts is quite low. Only the 1A area seems to have been occupied intensively, and its sample can be regarded as the best available representative of the period. The technology of the Early Prehistoric period is characterized by a lack of bifacial stone working

	Historic	Late Prehistoric	Early Prehistoric
Unretouched flakes:			
W700		1.124	0.064
W600		0.573	0.032
W400		0.760	0.227
W300		0.571	0.135
W100	0.800	1.416	0.022
E100	1.387	1.228	0.010
1A		0.931	0.910
Other stone artifacts:			
W700		0.329	0.036
W600		0.360	0.008
W400		0.320	0.107
W300		0.286	0.040
W100	0.352	0.252	0.054
E100	0.551	0.184	0.018
1A		0.301	0.469

Table 69. Density distributions for unretouched flakes and for all other stone artifacts in MjVl-1, arranged by period and trench.

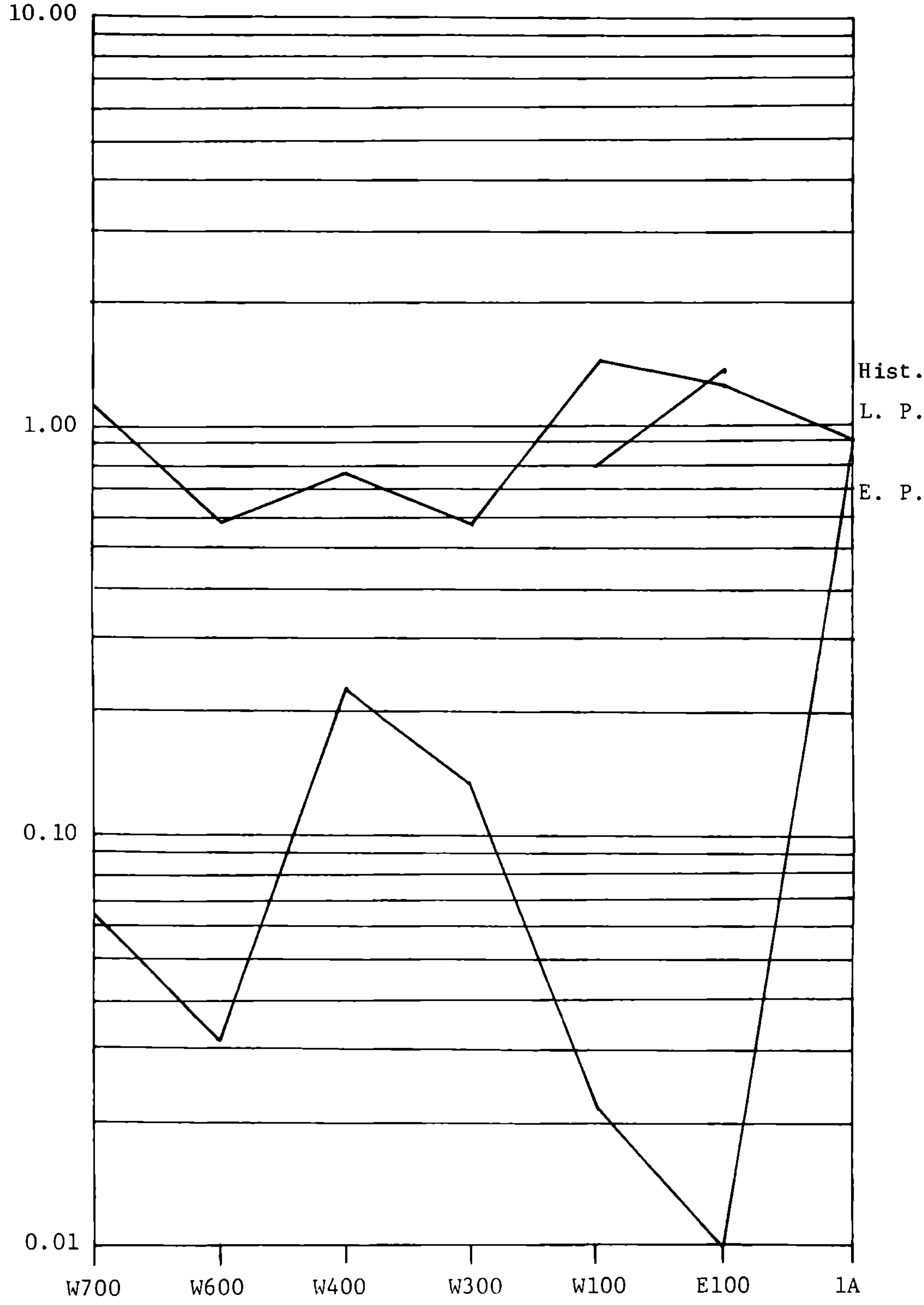

Fig. 38. Density distributions for unretouched flakes in MjVl-1, arranged by period and trench on a 3-cycle logarithmic scale.

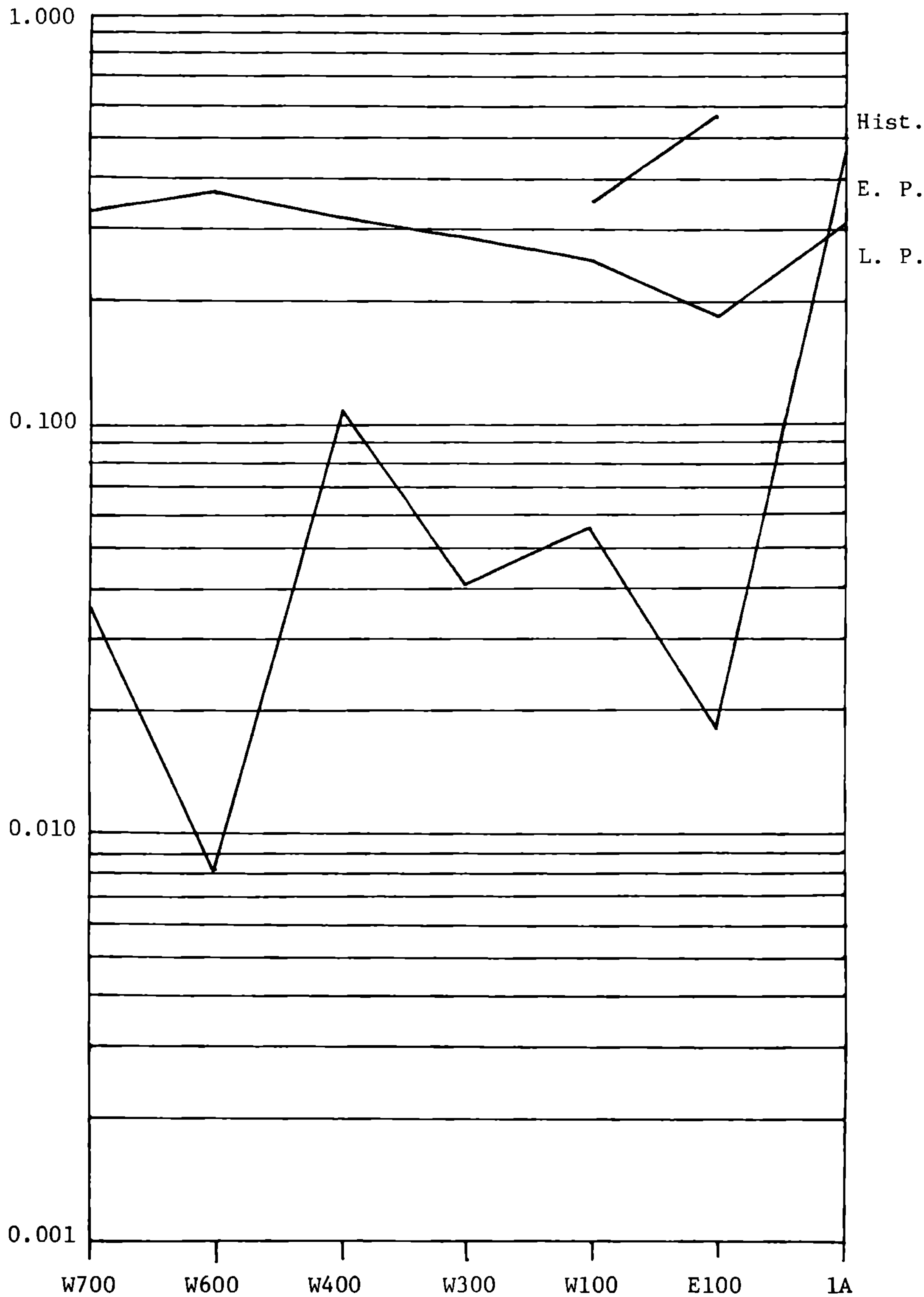

Fig. 39. Density distributions for all stone artifacts except unretouched flakes in MjVl-1, arranged by period and trench on a 3-cycle logarithmic scale.

techniques, a reliance upon bone and antler as raw material for hunting weapons, a high incidence of stone scrapers, a tendency toward the application of decorative elements on beamers and awls, a generally excellent quality of workmanship in bone and stone, extensive use of bark, very little use of mineral pigments, and the appearance of native copper presumably obtained through aboriginal trade networks.

Late Prehistoric. During this period, between 600 years ago and about 100 years ago, the entire site was more or less uniformly occupied by intermittent seasonal (see below) camps which left a denser concentration of artifacts throughout the site. It would appear that a much larger area of the site had become fully suitable for human occupation following a brief period of major flooding which must have cleared the area for a more or less complete replacement of vegetation communities. The technology of the Late Prehistoric period is characterized by the appearance of bifacial stone working techniques, a concommitent decline in the significance of bone weapons, a general decline in the quality of workmanship (particularly of bone and antler), a marked reduction in the use of bark, and an increase in the use of mineral pigments; aboriginal trade is represented by one large blue bead.

Historic. This period is represented in only one major area of the site, viz., the grassy clearing which comprises the most conspicuous feature of the locality today. The western end of this clearing seems to have been occupied intensively during two or more seasons about 100 years ago, but the full extent of the historic occupation may not have been realized by the excavations to date. Both the density and the distribution of the artifacts are quite similar to those of the Late Prehistoric period. There is clear continuity between the latter and the Historic period with respect to the overall composition of the technology, and the major change is the appearance of metal, glass, and other trade goods which serve arbitrarily to define the Historic period. The frequency of bone artifacts increased in the Historic period, but this increase consists of an abundance of bone and antler byproducts which must have resulted from experimentation with the newly available metal cutting tools. Bifacial stone working techniques continue to provide part of the hunting weaponry in spite of the appearance of firearms; the use of bark shows no significant change, but mineral pigments are used even more heavily than in the Late Prehistoric period.

In general I would conclude that there is technological continuity throughout the Klo-kut sequence. No major changes such as population replacement seem to have occurred there, but the appearance of bifacial stone working techniques begs explanation. I shall return to this problem after a brief review of other late prehistoric manifestations in northwestern North America.

Faunal Remains

All bones from the 1967 and 1968 excavations were saved, including fragments of long bone shafts and other unidentifiable specimens. This effort resulted in a large sample of bone and antler which can be subjected to a somewhat more refined analysis than was possible with the distributions of artifacts. On the other hand, the large sample size necessitated a considerable expenditure of time for analysis, and the E100 and 1A samples were not included in the earlier study (Morlan 1971). Furthermore the methodology was changed substantially during the recent analysis of the E100 and 1A samples since not all lines of evidence were productive with the detailed methods used earlier. For example I was not satisfied with conclusions regarding individual estimates and horizontal distribution, because the nature of the samples precluded the definition of commensal units which could provide a basis for inferring amounts of usable meat consumed or length or intensity of occupation.

The samples from W700, W600, W400, W300, and W100 have been described in detail elsewhere (Morlan 1971: Appendix B). All caribou bones were counted and tabulated for these samples, but for E100 and 1A the non-caribou bone was isolated and tabulated while the caribou bone was simply weighed. Thus for some aspects of the analysis the entire collection can be brought to bear, but for other aspects only the detailed data from the west half of the site is useful.

The identification of the bones from Klo-kut was simplified rather considerably by the prevalence of caribou; that species so predominates the entire sample that a given bone can be assumed to be caribou until proven otherwise, and most of the fragmentary, unidentifiable material has been counted and weighed by provenience lot as either "long bone shaft fragments, probably caribou" or "miscellaneous fragments, probably caribou." The result is a major distinction between unclassified and classified bone as well as the usual distinction between identified and unidentified bone. A bone is classified if it can be named as a particular portion of an anatomical element; it is identified if it can be assigned to a particular genus or species.

All identifications were based upon direct comparisons between the bones in the Klo-kut samples and identified reference materials in my own comparative faunal collection and in the Department of Zoology, University of Wisconsin, Madison. Identified specimens were tabulated on data sheets designed for each major class of animals, and the data were later recombined in a series of tables available elsewhere (Morlan 1971 : Appendix B). Those tables provide all the basic data available for the faunal remains, and it is hoped that the data are specific enough for any analytical purpose. I have experiemented at length with these distributions and have found very few significant patterns which lend themselves to interpretation in cultural terms. Presumably this is due to the nature of the linear trenches which fail to expose representative living areas.

For these reasons the analysis of the faunal remains will consist of a series of tests concerning the vertical and horizontal distributions of the bones, the density of faunal remains, the ratio of classified and unclassified bones, the numbers of individuals, the distribution of species, and inferences concerning seasonality and subsistence economy.

Classified/Unclassified Ratio

I examined the variations in this ratio both within trenches and within layers for the west half of the site in an effort to explore the possibility that the degree of comminution of the bones might be correlated with the frequency of unclassified material. The prehistoric inhabitants of Klo-kut were members of the "soup culture" in that they made bone grease by breaking up long bones and rendering the fat for use in cooking and as a condiment; bone grease may also have been used as a binder for mineral pigments. The people of Old Crow still prepare bone grease for these purposes (Leechman 1951b; 1954: 7-9).

Unfortunately I have been unable to find a clearcut pattern in the data for Klo-kut. The distributions of classified and unclassified bones and the percentages of classified specimens are shown in Table 70, and it can be seen that the percentages range from 20% to over 80%. The mean values for the three periods have a range of only 5%, but with such large sample sizes even the slight divergence between the percentages of the Early Prehistoric and Late Prehistoric periods is highly significant in a

		I-II	III	IV	V	VI	VII	Totals	L.P.	E.P.
Classified	W700	2845	694	178	593	368	91	4769	3717	1052
	W600	1035	1357	44	72	198	190	2896	2436	460
	W400	806	251	144	95	635	61	1992	1201	791
	W300	1677	1830	184	71	551	19	4332	3691	641
	W100	5169*	2877	258	79	1226	1065	10674	3135†	2370
	Totals	6363†	7009	808	910	2978	1426	24663	14180†	5314
Unclassified	W700	11719	1428	210	622	394	221	14594	13357	1237
	W600	1506	1960	106	185	289	299	4345	3572	773
	W400	1489	260	161	157	2160	91	4318	1910	2408
	W300	808	1918	331	117	912	12	4098	3057	1041
	W100	7702*	2941	733	240	1950	421	13987	3674†	2611
	Totals	15522†	8507	1541	1321	5705	1044	41342	25570†	8070
% Classified	W700	.195	.327	.459	.488	.483	.292	.246	.218	.460
	W600	.407	.409	.293	.280	.407	.389	.400	.405	.373
	W400	.351	.491	.472	.377	.227	.401	.316	.386	.247
	W300	.675	.488	.357	.378	.377	.613	.514	.547	.381
	W100	.402*	.494	.260	.248	.386	.815	.433	.460†	.476
	Totals	.291†	.452	.344	.408	.343	.577	.374	.357†	.397

* Historic period; † minus Historic (W100) period.

Table 70. Distributions of classified and unclassified bones in the trenches, layers, and periods of the west half of MjV1-1; percentages of classified bones.

Kolmogorov-Smirnov test. Furthermore the variations in mean weight of long bone fragments and miscellaneous fragments bear no clear relationship to changes in these ratios. The ratios have been provided here since they represent an important variable in the estimates of numbers of individuals. It will become apparent below that the numbers of individuals do not increase arithmetically with increases in the numbers of classified bones upon which the estimates are based, and the relationship between the estimates and the numbers of unclassified bones is even more complex.

Though I have failed to quantify evidence for the frequency of bone grease manufacture, it should be noted that several dense lenses of finely comminuted bone represented clear indications of this activity. In one case, in Layer II of the E100 trench, a chopper was imbedded vertically with only its ragged cutting edge exposed above the soil. Finely divided bone lay densely scattered all around this artifact.

Density

The volumetric data shown in Table 67 have been subdivided in Table 71, which also shows the density distributions for classified and unclassified bones; these distributions have been graphed in Figs. 40-41. They are quite similar to the density distributions of stone artifacts (Figs. 37-39) but reflect the low densities of Layers IV and V when major flooding must have made the site less suitable than usual for human occupation. Table 72 provides similar density distributions for caribou bone by weight, and the very high values for the Early Prehistoric period in Area 1A

		I-II	III	IV	V	VI	VII	Totals	L. P.	E. P.
Volume (ft.^{3})	W700	75	60	90	50	50	150	475	225	250
	W600	40	70	40	20	35	70	275	150	125
	W400	20	25	30	20	30	100	225	75	150
	W300	35	70	70	45	85	145	450	175	275
	W100	75*	100	125	85	85	255	650	225†	425
	Totals	170†	325	355	220	285	720	2150	850†	1225
Classified Bones/ft.^{3}	W700	37.9	11.6	2.0	11.9	7.4	0.6	10.0	16.5	4.2
	W600	25.9	19.4	1.1	3.6	5.7	2.7	10.5	16.2	3.7
	W400	40.3	10.0	4.8	4.8	21.2	0.6	8.9	16.0	5.3
	W300	47.9	26.1	2.6	1.6	6.5	0.1	9.6	21.1	2.3
	W100	68.9*	28.8	2.1	0.9	14.4	4.2	16.4	13.9†	5.6
	Totals	37.4†	21.6	2.3	4.1	10.4	2.0	11.5	16.7†	4.3
Unclassified Bones/ft.^{3}	W700	156.3	23.8	2.3	12.4	7.9	1.5	30.7	59.4	4.9
	W600	37.7	28.0	2.7	9.3	8.3	4.3	15.8	23.8	6.2
	W400	74.5	10.4	5.4	7.9	72.0	0.9	19.2	25.5	16.1
	W300	23.1	27.4	.8	2.6	10.7	0.8	9.1	17.5	3.8
	W100	102.7*	29.4	.9	2.8	22.9	1.7	21.5	16.3†	6.1
	Totals	91.3†	26.2	4.3	6.0	20.0	1.5	19.2	30.1†	6.6

*Historic period; † minus Historic (W100) period.

Table 71. Volumetric measurements and density distributions for classified and unclassified bones in the trenches, layers, and periods of the west half of MjV1-1.

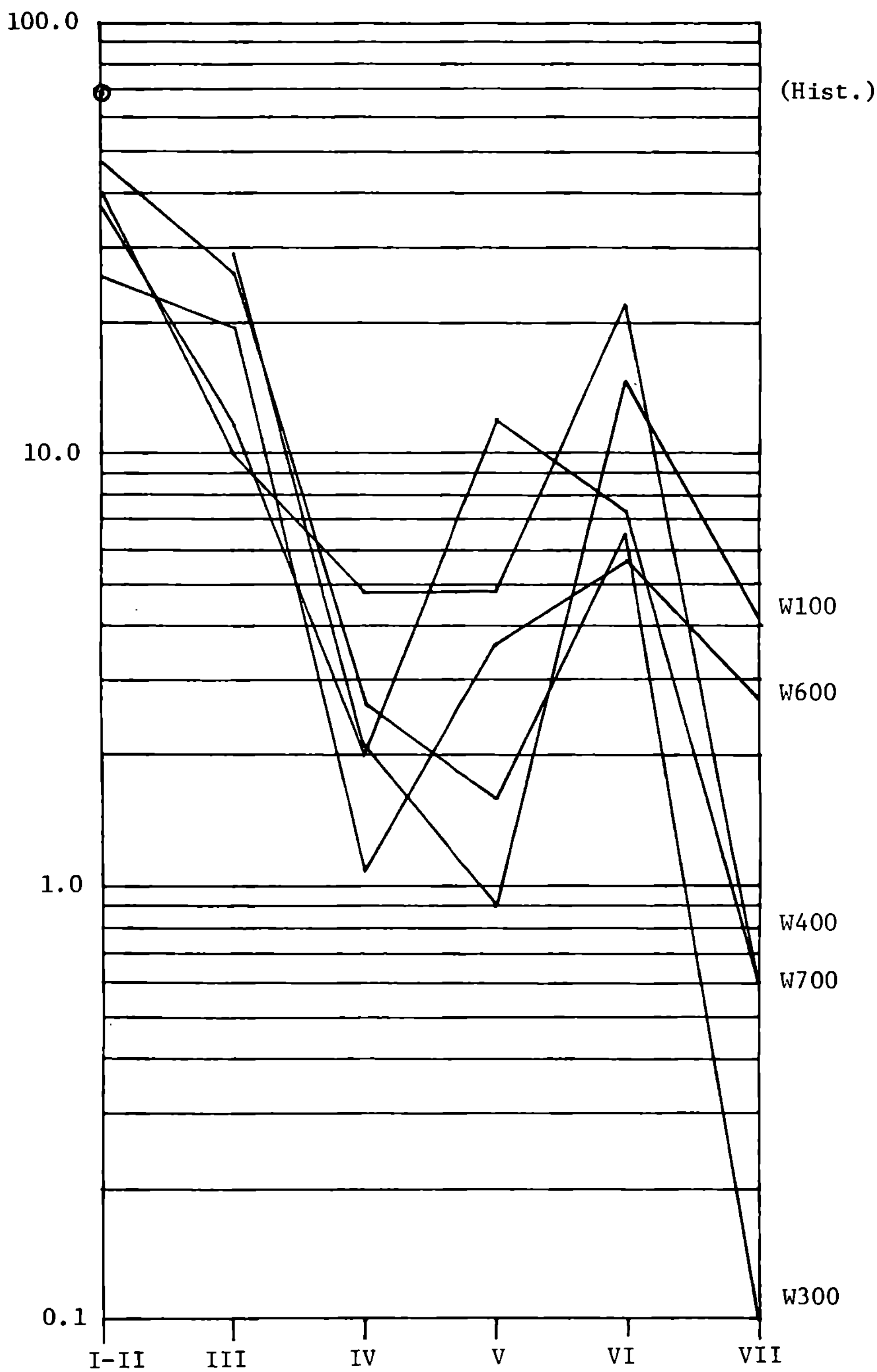

Fig. 40. Density distributions for classified bones in the west half of MjV1-1, arranged by period and trench.

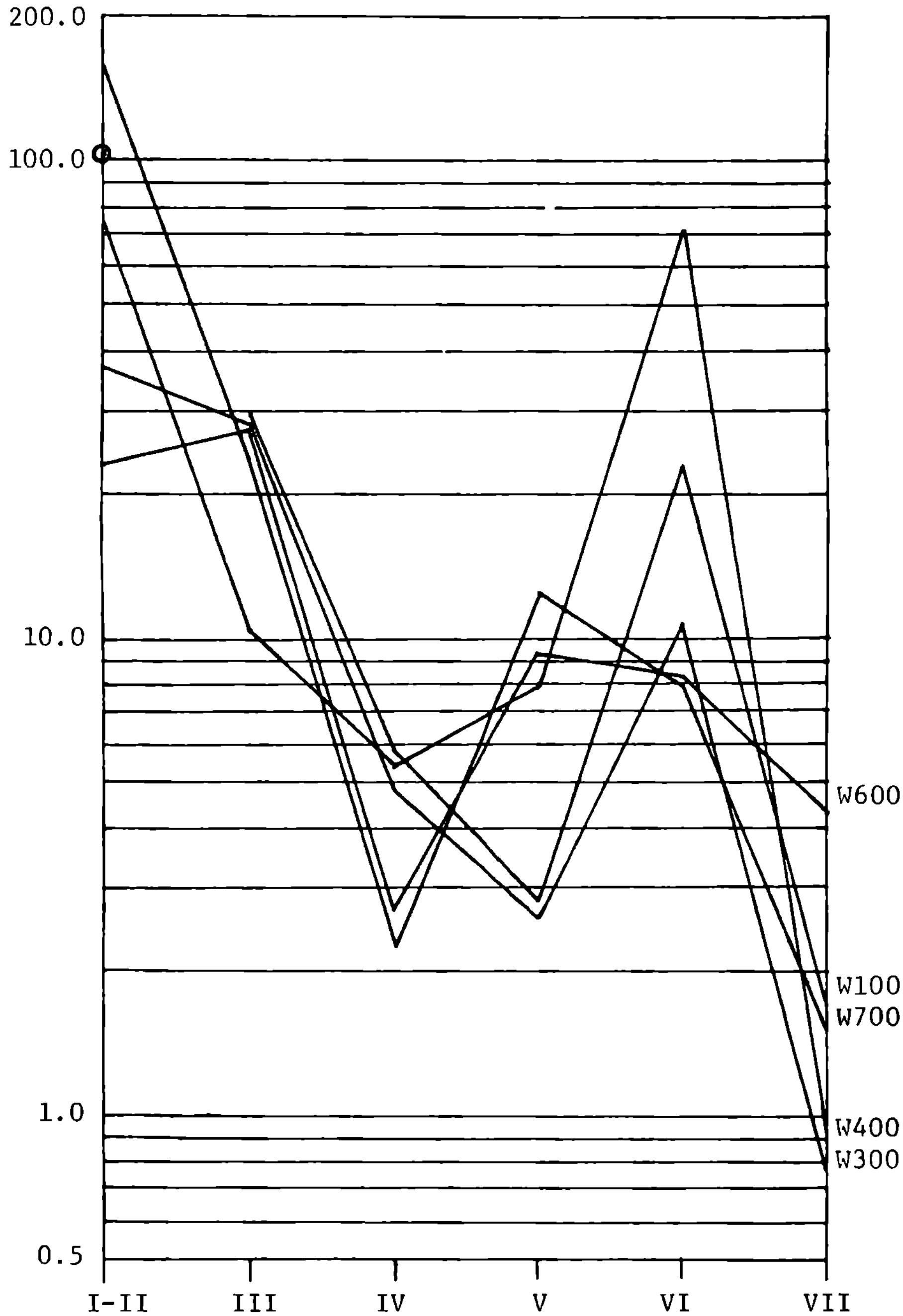

Fig. 41. Density distributions for unclassified bones in MjV1-1, arranged by period and trench on a 3-cycle logarithmic scale.

		I-II	III	IV	V	VI	VII	Totals	L. P.	E. P.
Volume (ft.^{3})	W700	75	60	90	50	50	150	475	225	250
	W600	40	70	40	20	35	70	275	150	125
	W400	20	25	30	20	30	100	225	75	150
	W300	35	70	70	45	85	145	450	175	275
	W100	75*	100	125	85	85	255	650	225†	425
	E100	70*	40	85	40	50	30	315	125†	120
	1A	40	40	100	20	60	20	280	180	100
	Totals	210†	405	540	280	395	770	2745	1155	1445
Grams of caribou bone	W700	20182	5175	1308	1438	2325	468	30896	26665	4231
	W600	8289	10764	280	453	1370	571	21727	19333	2394
	W400	5399	1135	1086	656	5725	955	14956	7620	7336
	W300	3638	5437	778	214	2276	357	12700	9853	2847
	W100	23528*	8777	1614	382	5845	2522	42668	10391†	8749
	E100	33005*	1989	1771	262	4647	238	41912	3760†	5147
	1A	7807	14734	1087	1023	11992	13225	49868	23628	26240
	Totals	45315†	48011	7924	4428	34180	18336	214727	101250	56944
Grams of caribou bone/ft.^{3}	W700	269.1	86.3	14.5	22.8	46.5	3.1	65.0	118.5	16.9
	W600	207.2	153.8	7.0	22.7	39.1	8.2	79.0	128.9	19.2
	W400	270.0	45.4	36.2	32.8	19.1	9.6	66.5	101.6	48.9
	W300	103.9	77.7	11.1	4.8	26.8	2.5	28.2	56.3	10.4
	W100	313.7*	87.8	12.9	4.5	68.8	9.9	58.9	46.2†	20.6
	E100	471.5*	49.7	20.8	6.6	92.9	7.9	133.1	30.1†	42.9
	1A	195.2	368.4	10.9	51.2	199.9	661.3	178.1	131.3	262.4
	Totals	215.8†	118.5	14.7	15.8	86.5	23.8	78.2	87.7	39.4

* Historic period; † minus Historic period.

Table 72. Volumetric measurements and density distributions for caribou bones by weight in the trenches, layers, and periods at MjVl-1.

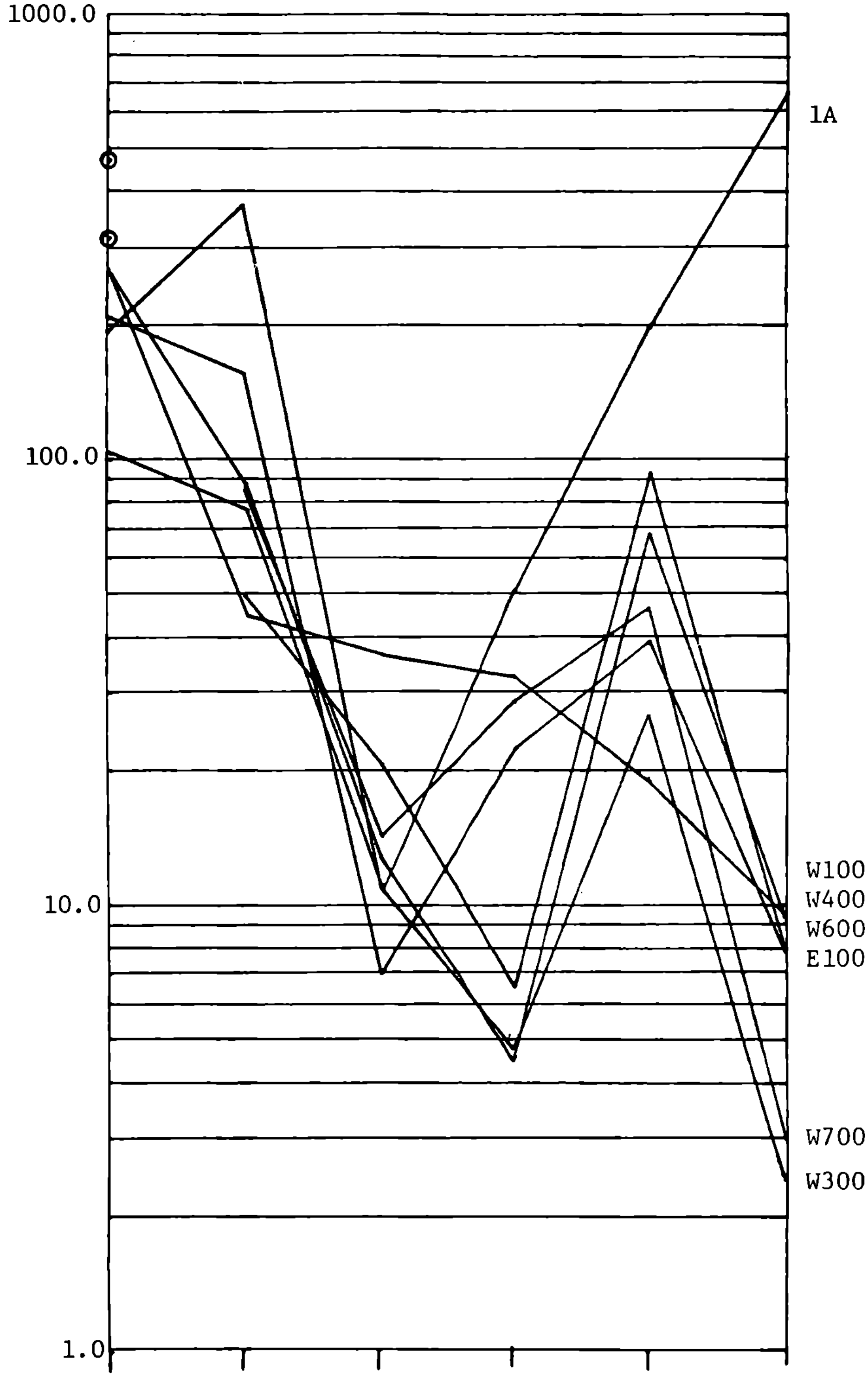

Fig. 42. Density distributions for caribou bones by weight in MjV1-1, arranged by period and trench.

are quite apparent in Fig. 42.

Vertical Distribution

In a preliminary analysis of vertical distributions of the faunal remains (Morlan 1970b) I found that a major change in the cumulative percentages took place within the latter part of the Early Prehistoric period at the boundary between Layers V and VI. Table 73 shows the distribution by layer of all classified and identified bones in the west half of the site along with the cumulative percentage distributions for these data. The latter distributions have been graphed in Fig. 43, and the results of Kolmogorov-Smirnov tests of the divergences are displayed for easier analysis as a matrix in Table 74. The values in the matrix refer to the order of magnitude of the probability that a given pair of samples was drawn from the same population. A "2" in Table 74 indicates a low level of significance, or a probability greater than 0.10 that the two samples were drawn from the same population; a "1" indicates moderate significance, or $0.10 > P > 0.01$ and a "0" indicates a highly significant divergence, or $P < 0.01$. The lower left half of the matrix contains the actual test results, and the upper right half contains hypothetical results which describe maximum sorting of the three periods. The actual results approach the model quite closely, and the only departures concern Layer V which is more similar to the Late Prehistoric period than to the other layers of the Early Prehistoric period. To some extent there is gradual change throughout the prehistoric sequence, and this is in marked contrast to the abrupt change associated with the Historic period.

The Early Prehistoric period is characterized by 86-89% caribou bones and high frequencies of fish in Layers VI and VII but not in Layer V. In the Late Prehistoric period the caribou frequencies increase to 93-95% with a decrease in muskrat, rabbit and fish. The Historic period brings a reversal of these trends as caribou drops to 70% while muskrat, rabbit, other small mammals, and fish reach their highest frequencies. The distributions of non-caribou bone give a similar but more highly resolved picture. Table 75 and Fig. 44 show these distributions for the entire sample, including E100 and Area 1A. The major changes through time consist of variations in the ratio of muskrats and fishes with rabbits, other mammals, and birds responsible for only 10-20% of the collection. Fish remains comprise 50% of the Early Prehistoric distribution; a comparable 50% represents muskrat in the Late Prehistoric period as fishes drop to 27%; and in the Historic period fish remains increase to more than 70%. It must be made explicit that these frequencies are based upon bone count rather than individual estimates, so these distributions give an exaggerated significance to fishes; this bias appears to be uniform throughout the collection, however, so that comparisons among the periods are probably valid.

The changes in abundance of fish may have resulted from changes in the suitability of the Klo-kut area for fishing.

	I-II*	III	IV	V	VI	VII	Totals	Hist.	L. P.	E. P.
Caribou	6022	6598	748	805	2560	1238	21578	3607	13368	4603
Muskrat	164	233	28	66	127	14	819	187	425	207
Rabbit	3	8	2	4	27	14	300	242	13	45
Other Mammals	29	51	10	12	50	16	280	112	90	78
Birds	35	28	5	7	20	0	132	37	68	27
Fishes	110	91	15	16	194	144	1554	984	216	354
Totals	6363	7009	808	910	2978	1426	24663	5169	14180	5314
Caribou	.947	.942	.926	.885	.860	.868	.875	.698	.943	.866
Muskrat	.025	.033	.035	.072	.042	.010	.033	.036	.030	.039
Rabbit	.001	.001	.002	.005	.009	.010	.012	.047	.001	.009
Other Mammals	.004	.007	.012	.013	.017	.011	.012	.022	.006	.014
Birds	.006	.004	.006	.007	.007	.000	.005	.007	.005	.005
Fishes	.017	.013	.019	.018	.065	.101	.063	.190	.015	.067
Caribou	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Muskrat	.053	.058	.074	.115	.140	.132	.125	.302	.057	.134
Rabbit	.028	.025	.039	.043	.098	.122	.092	.266	.027	.095
Other Mammals	.027	.024	.037	.038	.089	.112	.080	.219	.026	.086
Birds	.023	.017	.025	.025	.072	.101	.068	.197	.020	.072
Fishes	.017	.013	.019	.018	.065	.101	.063	.190	.015	.067

* minus Historic (W100) period.

Table 73. Cumulative percentage distributions of classified and identified bones from the west half of MjVl-1, arranged by layers and periods.

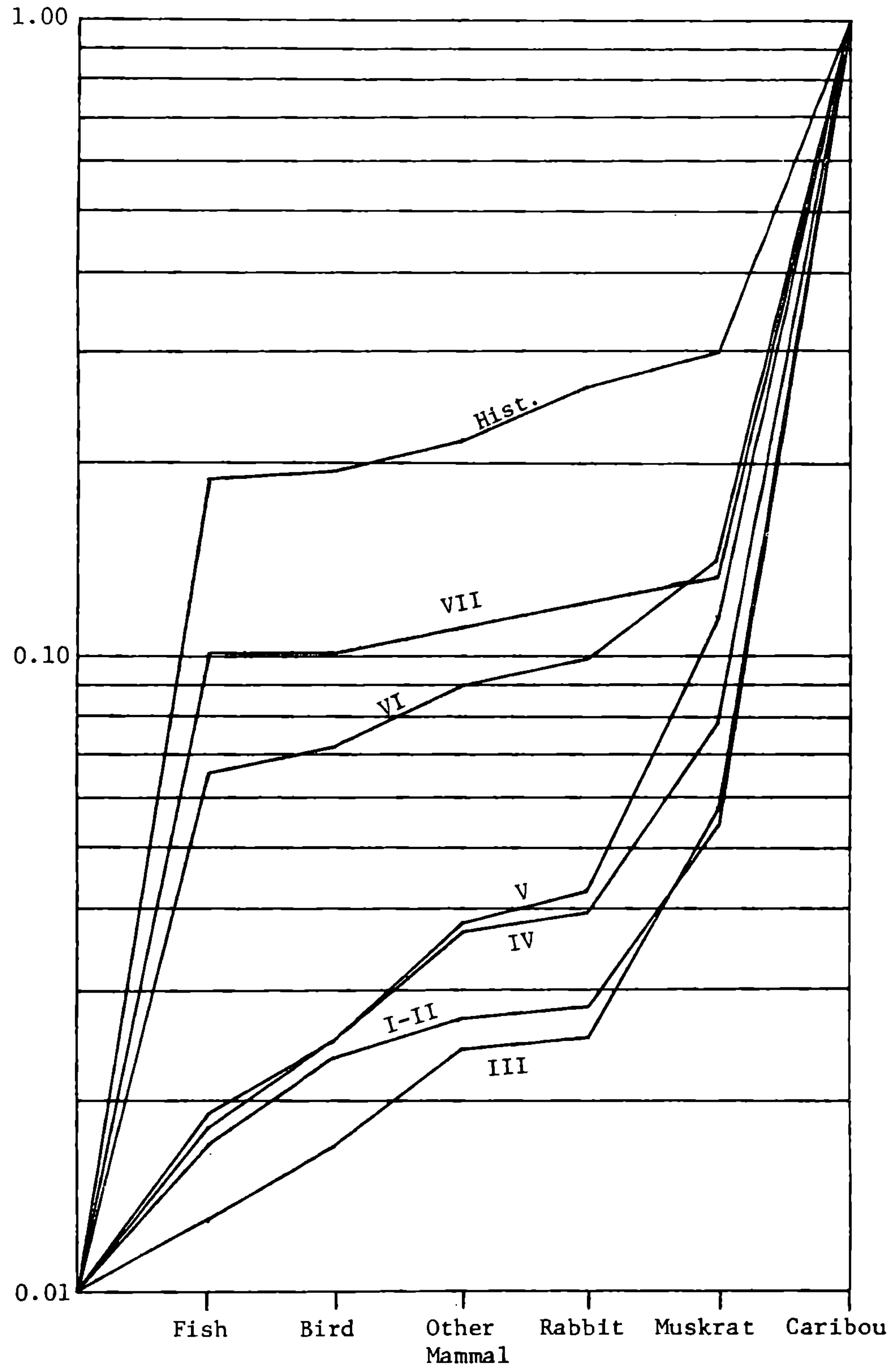

Fig. 43. Cumulative percentage distributions for six classes of bone in MjVl-1, grouped by layer on a 2-cycle logarithmic scale.

		Hist.	Late Prehistoric I-II	Late Prehistoric III	Late Prehistoric IV	Early Prehistoric V	Early Prehistoric VI	Early Prehistoric VII
	Hist.		0	0	0	0	0	0
L. P.	I-II	0		2	2	0	0	0
L. P.	III	0	2		2	0	0	0
L. P.	IV	0	2	2		0	0	0
E. P.	V	0	0	1	2		2	2
E. P.	VI	0	0	0	0	1		2
E. P.	VII	0	0	0	0	0	2	

Table 74. Matrix illustration of the probabilities that paired layer samples were drawn from the same population. Lower left half contains actual test results; upper right half contains hypothetical results based on a model of maximum sorting among three periods.

	I-II*	III	IV	V	VI	VII	Totals	Hist.	L. P.	E. P.
Muskrat	314	433	44	72	280	18	1767	606	791	370
Rabbit	3	8	2	16	35	15	334	255	13	66
Other Mammals	29	56	17	13	58	17	306	116	102	88
Birds	47	53	12	12	38	6	249	81	112	56
Fishes	110	105	27	33	324	155	3492	2738	242	512
Totals	503	655	102	146	735	211	6148	3796	1260	1092
Muskrat	.624	.662	.431	.493	.381	.085	.287	.160	.628	.339
Rabbit	.006	.012	.020	.110	.049	.071	.054	.067	.010	.060
Other Mammals	.058	.085	.166	.089	.079	.081	.050	.031	.081	.081
Birds	.093	.081	.118	.082	.052	.028	.041	.021	.089	.051
Fishes	.219	.160	.265	.226	.441	.735	.568	.721	.192	.469
Muskrat	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Rabbit	.376	.338	.569	.507	.619	.915	.713	.840	.372	.661
Other Mammals	.370	.326	.549	.397	.572	.844	.659	.773	.362	.601
Birds	.312	.241	.383	.308	.493	.763	.609	.742	.281	.520
Fishes	.219	.160	.265	.226	.441	.735	.568	.721	.192	.469

* minus Historic period.

Table 75. Cumulative percentage distributions of non-caribou bones from MjVl-1, arranged by trenches and periods.

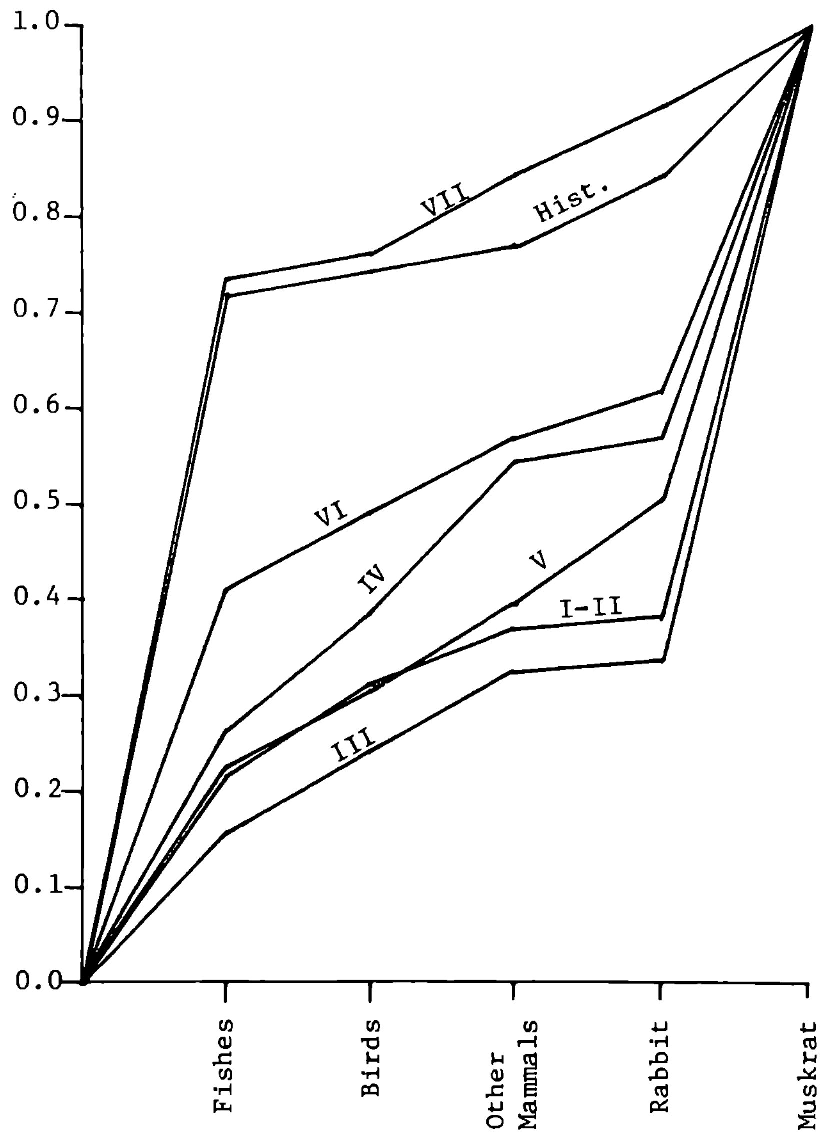

Fig. 44. Cumulative percentage distributions for non-caribou bones in MjVl-1, arranged by layer.

Most of the fishing techniques of the prehistoric period required clear water, and there is no evidence of the use of traps or weirs at Klo-kut. The Early Prehistoric period probably included the use of leisters (artifact class nos. 36-37), and the Late Prehistoric period may have brought a switch to hooks and lures (artifact class nos. 56-57); unfortunately the sample of fishing implements is much too small to be certain of this apparent change. If, however, clear water conditions were reduced by the large floods of Layers V and IV, fishing activities at the site might have been hampered. Such problems might later have been overcome by the historic introduction of nets which are highly efficient in all seasons (Balikci 1963b: 39-40).

None of the small mammal, bird, or fish resources accounts for more than 5% of the total (Fig. 43) or more than 30% of the non-caribou (Fig. 44) in Layer V and the Late Prehistoric period. Muskrat is second only to caribou in these layers and probably represents hunting and snaring at small lakes near the site. The increase of fish in the Historic period is accompanied by the highest percentage of rabbit bone and the lowest frequency of caribou. Of 334 rabbit bones in the analysis, 255 occurred in the Historic layers and may represent the beginning of snaring for the fur trade. The increase of fish could also reflect a general decline of hunting in favor of more time on the traplines.

Horizontal Distribution

The sampling problems mentioned in connection with the analysis of the horizontal distribution of artifacts obtain also for faunal remains. The analysis was confined to comparisons among the five trenches for which the identification of the bones had been completed, and cumulative percentage distributions were calculated for each period (Morlan 1971: Table 86, Figs. 71-72). Variations among the trench samples probably reflect specific differences in the pattern of resource utilization of camps in successive years, and none of them is as significant as the difference between the Historic period and the two prehistoric periods.

Individual Estimates

Ideally an analysis and interpretation of faunal remains is based almost entirely upon the number of individuals represented rather than the number of bones. There are several biases in the Klo-kut data which preclude this approach at the present time. To some extent there seems to be a tendency for the cultural and natural agencies at any given site to reduce the bones to a more or less uniform size, and any such tendency more seriously affects the remains of large mammals than those of smaller animals. The bones of muskrat, rabbit, and bird, for example, are only slightly damaged and are often intact while those of caribou and moose are broken into many unidentifiable fragments. Estimates of the minimum number of individuals represented in the Klo-kut sample are more accurate for the small mammals and birds than for large mammals. One bone can be said to represent one individual, but several hundred bones and fragments may also indicate only one individual.

The nature of the excavations poses problems for this aspect of the analysis as well. Since the excavation trenches sliced through but did not properly expose the living floors on which carcasses were butchered and distributed, there is very little basis for generalizing from the samples of bones to the population of bones in a given layer of the site. Variations in density, as shown in Tables 71-72 and Figs. 40-42, are difficult to evaluate without more extensive excavations. Furthermore each layer undoubtedly represents more than one occupation in each major area of the site, so the bones obtained from a given layer actually comprise a sample drawn from several populations. In the face of all these biases it would be quite misleading to use the individual estimates for further inferences concerning the amount of usable meat available in each layer or the number of people involved in a given occupation.

The individual caribou estimates have been tabulated for the west half of the site in Tables 76-77. Other mammals birds, and fishes appear in Tables 78-79, and the overall distribution has been graphed in Fig. 45. It is not surprising that there is little in the way of a coherent pattern in these data since they represent average values which hide the biases described above. A comparison of Figs. 43 and 45 reveals a general turnover in the positions of the various layers, and this is due to the failure of the high frequencies of caribou bones in the Late Prehistoric layers to indicate comparably high frequencies of individual caribou in those layers.

Block	Layer	Age Group	No.	Anatomical Element	Code No., Morlan 1971: Appendix B
W700	I	Adult	1	Distal right tibia	11.412
		Immature	1	Proximal right femur	9.322
		Fetal	1	Left ilium	F8.31
	II	Ad.&Imm.	11	Proximal right metatarsal	14.312
		Adult	7		
		Immature	4	Distal right radius	4.422
		Fetal	1	various	
	III	Ad.&Imm.	7	Proximal right metatarsal	14.312
		Adult	4		
		Immature	3	Distal right radius	4.422
		Fetal	1	various	
	IV	Adult	1	Distal unid. metatarsal	14.413
		Immature	1	Distal unid. metatarsal	14.423
	V	Adult	2	Right carpal cunieform	6.12
		Fetal	1	Unid. metatarsal shaft	F14.53
	VI	Ad.&Imm.	5	Proximal left metatarsal	14.311
		Adult	4		
		Immature	1	various	
		Fetal	1	various	
	VII	Adult	1	various	
		Fetal	1	Unid. epiphysis	F24.4
W600	I	Adult	1	various	
		Fetal	1	Intact right humerus	F3.11
	II	Adult	5	Distal unid. metacarpal	7.413
		Immature	4	Distal unid. metacarpal	7.423
		Fetal	1	Right ilium	F8.32
	IIIa	Ad.&Imm.	8	Proximal left metacarpal	7.311
		Adult	5		
		Immature	3	Distal left radius	4.421
		Fetal	2	Damaged left scapula	F2.21
	IIIb	Ad.&Imm.	3	various	
		Adult	1		
		Immature	2	Distal left radius	4.421
		Fetal	1	Lumbar trensverse spine	F18.34
	IV	Adult	1	various	
	V	Adult	2	Left lunate	6.21
		Fetal	1	Left radius shaft	F4.51
	VI	Adult	1	Distal left humerus	3.411
		Immature	2	Distal left humerus	3.421
		Fetal	1	Basispenoid	F1.154
	VII	Ad.&Imm.	2	Right lunate	6.22
		Adult	1		
		Immature	1	Distal right radius	4.422
		Fetal	1	various	

Table 76. Distribution of individual caribou by age group within each layer and trench, showing the anatomical basis for each estimate (see Morlan 1971: Appendix B).

Block	Layer	Age Group	No.	Anatomical Element	Code No., Morlan 1971: Appendix B
W400	I	Ad.&Imm.	3	Right tarsal cunieform	13.32
		Adult	2		
		Immature	1	Distal unid. metacarpal	7.423
		Fetal	1	Proximal rib fragment	F19.2
	II	Ad.&Imm.	9	Proximal right metatarsal	14.312
		Adult	7		
		Immature	2	Distal right radius	4.422
		Fetal	1	Distal right humerus	F3.422
	III	Ad.&Imm.	2	Left calcaneus	13.11
		Adult	1		
		Immature	1	Proximal right tibia	11.322
	IV	Adult	2	Proximal right metacarpal	7.312
		Fetal	1	Intact rib	F19.1
	V	Ad.&Imm.	2	Left talus	13.21
		Adult	1		
		Immature	1	Proximal unid. ulna	5.323
		Fetal	1	Left scapula blade	F2.31
	VI	Ad.&Imm.	4	various	
		Adult	3		
		Immature	1	Distal right humerus	3.422
		Fetal	2	Right scapula blade	F2.32
	VII	Adult	2	Damaged right scapula	2.22
		Fetal	1	Intact left radius	F4.11
W300	I	Ad.&Imm.	2	Proximal right metatarsal	14.312
		Adult	1		
		Immature	1	Distal right metatarsal	14.422
	II	Ad.&Imm.	5	Proximal right ulna	5.312
		Adult	4		
		Immature	1	various	
		Fetal	1	Intact terminal phalanx	F17.11
	III	Adult	6	Distal left tibia	11.411
		Immature	2	Proximal left humerus	3.321
		Fetal	3	Damaged right scapula	F2.22
	IV	Ad.&Imm.	2	Proximal left radius	4.311
		Adult	1		
		Immature	1	Proximal left humerus	3.321
		Fetal	1	Distal rib fragment	F19.3
	V	Adult	2	Left ilium	8.31
		Fetal	1	Unid. metatarsal shaft	F14.53
	VI	Ad.&Imm.	3	Proximal left metacarpal	7.311
		Adult	2		
		Immature	1	various	
		Fetal	1	various	
	VII	Adult	2	Damaged left scapula	2.21

Table 76 (Continued).

Block	Layer	Age Group	No.	Anatomical Element	Code No., Morlan 1971: Appendix B
W100	I	Ad.&Imm.	12	Proximal left metacarpal	7.311
		Adult	10		
		Immature	2	Distal left radius	4.421
		Fetal	3	Unid. metatarsal shaft	F14.53
	II	Ad.&Imm.	9	Proximal left metacarpal	7.311
		Adult	8		
		Immature	1	various	
		Fetal	2	Unid. metatarsal shaft	F14.53
	III	Ad.&Imm.	8	Left talus	13.2i
		Adult	6		
		Immature	2	various	
		Fetal	1	Distal left humerus	F3.421
	IV	Ad.&Imm.	5	Proximal left metatarsal	14.311
		Adult	3		
		Immature	2	Distal left metatarsal	14.421
	V	Immature	1	Distal unid. metatarsal	14.423
		Fetal	1	Intact right humerus	F3.12
	VI	Adult	2	Distal left metatarsal	14.411
		Immature	3	Distal left matatarsal	14.421
		Fetal	2	Damaged left scapula	F2.21
	VII	Ad.&Imm.	4	Damaged right scapula	2.22
		Adult	3		
		Immature	1	Distal left radius	4.421
		Fetal	3	Intact right ulna	F5.12

Table 76 (Continued).

	Hist.	Late Prehistoric I-II	Late Prehistoric III	Late Prehistoric IV	Early Prehistoric V	Early Prehistoric VI	Early Prehistoric VII	Totals	L. P.	E. P.
Adult	18	28	23	8	7	12	9	105	59	28
Immature	3	14	13	4	2	8	2	46	31	12
Fetal	5	7	8	2	5	7	6	40	17	18
Totals	26	49	44	14	14	27	17	191	107	58

		W700	W600	W400	W300	W100	Totals	%
L. P.	Adult	13	13	12	12	9	59	.551
	Immature	9	9	4	5	4	31	.290
	Fetal	3	5	3	5	1	17	.159
	Totals	25	27	19	22	14	107	1.000
E. P.	Adult	7	4	6	6	5	28	.483
	Immature	1	3	2	1	5	12	.207
	Fetal	3	3	4	2	6	18	.310
	Totals	11	10	12	9	16	58	1.000

Late Prehistoric/Early Prehistoric: $D = 0.151$; $P > 0.10$

Table 77. Distribution of caribou age groups in the layers, periods, and trenches in the west half of MjV1-1, showing the probability that the two prehistoric samples were drawn from the same population.

	I-II	III	IV	V	VI	VII	Totals	Hist.	L. P.	E. P.
Caribou	49	44	14	14	27	17	191	26	107	58
Muskrat	19	12	6	7	13	2	68	9	37	22
Rabbit	2	4	1	1	5	1	22	8	7	7
Moose	1	4		2	2		9		5	4
Beaver	1	2		3	2	1	10	1	3	6
Red Squirrel					1		1			1
Collared Lemming		1	1		1		3		2	1
Brown Lemming		1			1		2		1	1
Vole	2	1	1		1	1	8	2	4	2
Dog					1	1	2			2
Pine Marten (male)	1				1		2		1	1
Bear					1		1			1
Unidentified mammal	5	9	2	5	11	3	38	3	16	19
Totals	80	78	25	32	67	26	357	49	183	125

Table 78. Distribution of minimum numbers of individuals of identified species from the west half of MjVl-1, arranged by layers and periods.

	I-II	III	IV	V	VI	VII	Totals	Hist.	L. P.	E. P.
Loon	2	3	1	2	3		15	4	6	5
Grebe					2		2			2
Canada Goose	1	1					3	1	2	
Pintail	1	1					3	1	2	
Green-winged Teal	1						1		1	
American Widgeon		1	1				3	1	2	
Scaup	1	1		1			3		2	1
Oldsquaw	2	2	1				6	1	5	
White-winged Scoter	1	2			1		4		3	1
Red-breasted Merganser							1	1		
Hawk		1					1		1	
Ptarmigan		1					1		1	
Sandhill Crane					1		1			1
Owl		1					1		1	
Passerine				1			1			1
Unidentified Bird	10	13	3	4	7		46	9	26	11
Totals	19	27	6	8	14		92	18	52	22
Northern Pike	1						1		1	
Unidentified Fish	6	8	5	4	5	3	43	12	19	12
Grand Totals	106	113	36	44	86	29	493	79	255	159

Table 78 (Continued).

	I-II	III	IV	V	VI	VII	Totals	Hist.	L. P.	E. P.
Caribou	49	44	14	14	27	17	191	26	107	58
Muskrat	19	12	6	7	13	2	68	9	37	22
Rabbit	2	4	1	1	5	1	22	8	7	7
Other Mammals	10	18	4	10	22	6	76	6	32	38
Birds	19	27	6	8	14		92	18	52	22
Fishes	7	8	5	4	5	3	44	12	20	12
Totals	106	113	36	44	86	29	493	79	255	159
Caribou	.462	.389	.389	.318	.314	.586	.387	.329	.420	.365
Muskrat	.179	.106	.167	.159	.151	.069	.138	.114	.145	.138
Rabbit	.019	.035	.028	.023	.058	.034	.045	.101	.027	.044
Other Mammals	.094	.159	.111	.227	.256	.207	.154	.076	.125	.239
Birds	.179	.239	.167	.182	.163		.187	.228	.204	.138
Fishes	.066	.071	.139	.091	.058	.103	.089	.152	.078	.075
Caribou	.999	.999	1.001	1.000	1.000	.999	1.000	1.000	.999	.999
Muskrat	.537	.610	.612	.682	.686	.413	.613	.671	.579	.634
Rabbit	.358	.504	.445	.523	.535	.344	.475	.557	.434	.496
Other Mammals	.339	.469	.417	.500	.477	.310	.430	.456	.407	.452
Birds	.245	.310	.306	.273	.221	.103	.276	.380	.282	.213
Fishes	.066	.071	.139	.091	.058	.103	.089	.152	.078	.075

Table 79. Cumulative percentage distributions for six major categories of minimum individual estimates from the west half of MjV1-1, arranged by layers and periods.

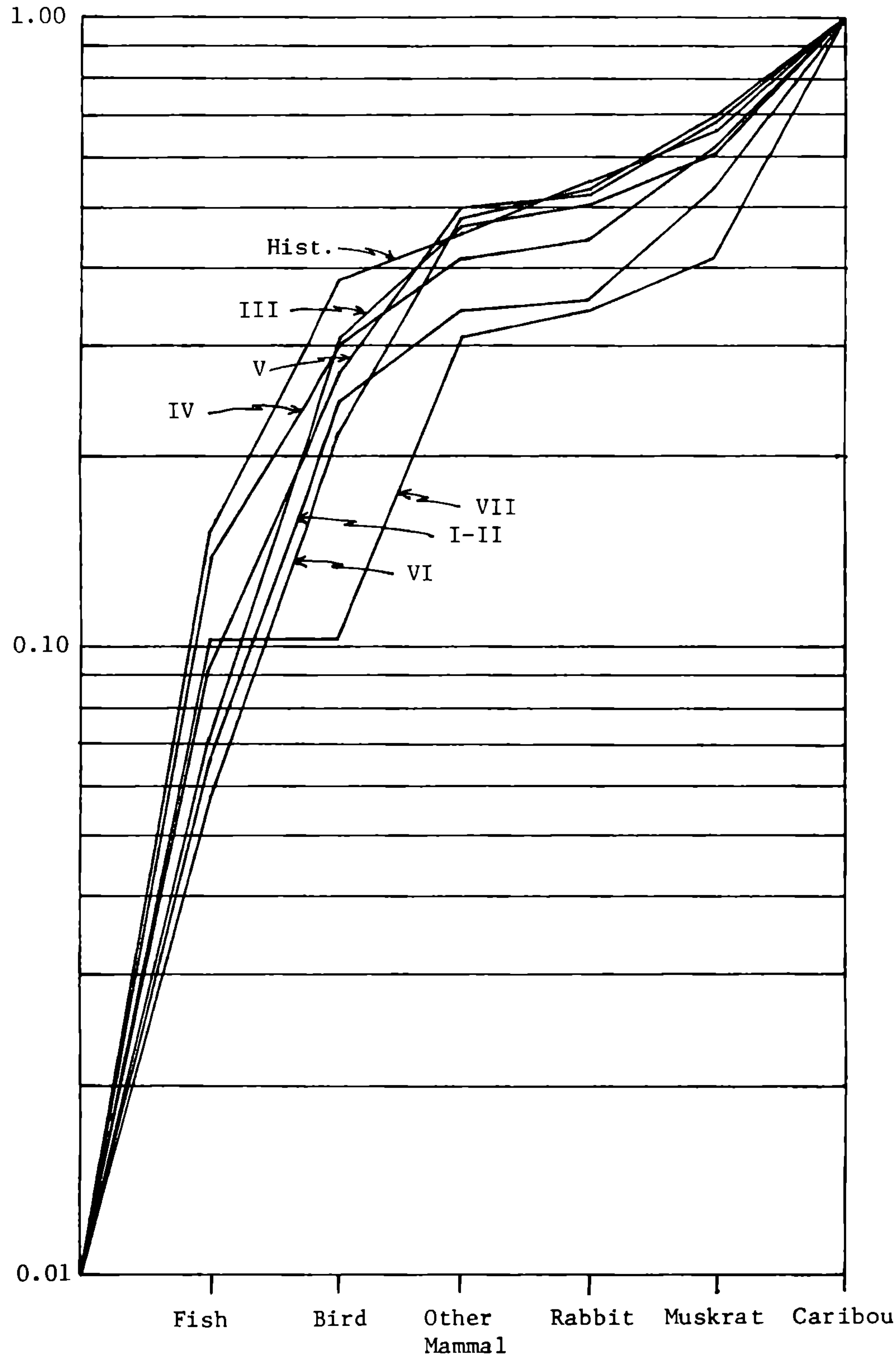

Fig. 45. Cumulative percentage distributions for six classes of individual estimates at MjVl-1, grouped by layer on a 2-cycle logarithmic scale.

The estimates given in Tables 76-79 are minimum numbers, and they are based upon inspection of the bone counts (Morlan 1971: Appendix B); the largest value for an axial element or half the largest value for a paired element provides the estimate for most species and provenience units. Care must be taken to exclude from the count all bone fragments which might represent the same animal as a fragment already counted within a given provenience lot, and the counts can be refined and increased by distinguishing between age groupings and gross or proportionate size within a given species (Bökönyi 1970). Only for caribou, however, is the sample large enough to make worthwhile an explicit subdivision by age group, and the estimates for age group are provided in Tables 76-77. Immature individuals were recognized by the lack of epiphyseal closure on the long bones; in many cases an overall value for adults and immatures was obtained from the proximal metapodial fragments with immatures being subtracted from this value on the basis of other elements. Fetal specimens are easily recognizable in the Klo-kut sample since they are not entirely ossified and therefore possess distinctive color and texture. I am not certain how many years of growth are required in order for the long bone epiphyses to close in caribou, and I have not attempted to refine the ageing of the bones by means of a detailed analysis of tooth wear. "Skull growth continues to approximately four years of age (particularly among the males)" (Banfield 1961: 16-17), and this levelling off of the growth rate may be reflected in epiphyseal closure as well. Most techniques for ageing on the basis of tooth wear (Banfield 1954, 1961) require relatively well preserved tooth rows, and the fragmentary remains from Klo-kut are not particularly suited for this technique. I intend, however, to subject the entire Klo-kut sample to analysis from the point of view of palaeodemography and the dynamics of the northern Yukon caribou herd, but such a study will require familiarity with recently developed techniques which I have not yet explored (Kelsall 1968; Reimers and Nordby 1968; Wolfe 1969). It is interesting to note that, on the basis of the very general age groupings presented here, the two prehistoric periods do not differ significantly from one another with respect to the distribution of animals by age group (Table 77, Kolmogorov-Smirnov test: $P > 0.10$).

One interesting concentration of fetal caribou bones should be mentioned. The N15 trench in the W100 Block yielded an unusually large number of fetal bones in Layer VII, and they included one articulated fetus which must have been removed intact when a pregnant doe was butchered on the site (Morlan 1971: Table 155). In addition there were many other fetal bones scattered across one of the buried soils of Layer VII, and they are responsible for the proportionately high number of fetal individuals in Layer VII and the Early Prehistoric period in the W100 Block (Table 77). By all accounts fetal caribou were (and are) highly prized as a delicacy, and there is some testimony that they were often reserved for elderly people. I wondered, on this basis, whether our excavations might not have exposed the home of an elderly couple, but the number of fetal animals almost implied an old folks' home! I continued to question informants in Old Crow during the summer of 1970 and eventually was told that one should always avoid exposing a fetus to the broad daylight "where anything might see it." Rather a pregnant animal of any kind should always be dismembered within an enclosure, or the camp would be subject to very heavy rain. This implies that a shelter might have been erected for the purpose of butchering pregnant does after a successful hunt. The same informant went on to remark that "Those old people use to tell us all kinds of things we couldn't eat; it might have been true in the old days, but now they are just trying to save the good stuff for themselves."

All identified species are enumerated in Table 78 for the west half of the site along with minimum individual estimates for each layer and period. A similar list for all non-caribou bones in the entire collection is provided in Table 80 with cumulative percentages (Table 81) graphed in Fig. 46. The Kolmogorov-Smirnov tests on the distributions indicate non-significant divergences among the three periods, but the absence of good control over the fish remains probably hides the historic increase in fishes apparent in the bone counts.

	I-II	III	IV	V	VI	VII	Totals	Hist.	L. P.	E. P.
Muskrat	27	22	9	10	23	3	113	19	58	36
Rabbit	2	4	1	4	6	3	29	9	7	13
Moose	1	4		2	3		10		5	5
Beaver	1	3	1	3	3	1	14	2	5	7
Red Squirrel					1		1			1
Porcupine					1		1			1
Collared Lemming		2	2		1	1	6		4	2
Brown Lemming		1			1		2		1	1
Vole	2	2	2		1	1	11	3	6	2
Dog					1	1	2			2
Pine Marten	1			1	1		3		1	2
Bear			1		1		2		1	1
Totals	34	38	16	20	43	10	194	33	88	73
Loon	2	4	1	3	5	1	21	5	7	9
Grebe					2		2			2
Canada Goose	1	1	1		1		6	2	3	1
White-fronted Goose							1	1		
Ducks	8	10	3	2	3		32	6	21	5
Hawk	1	1					2		2	
Ptarmigan		1	1				2		2	
Sandhill Crane					1		1			1
Owl		1		1			2		1	1
Passerine				1		1	3	1		2
Totals	12	18	6	7	12	2	72	15	36	21
Northern Pike	1						1		1	
Other Fishes	6	10	7	6	7	5	59	18	23	18
Totals	7	10	7	6	7	5	60	18	24	18
Grand Totals	53	66	29	33	62	17	326	66	148	112

Table 80. Distribution of minimum numbers of individuals of all species except caribou from MjVl-1, arranged by layers and periods.

	I-II	III	IV	V	VI	VII	Totals	Hist.	L. P.	E. P.
Muskrat	27	22	9	10	23	3	113	19	58	36
Rabbit	2	4	1	4	6	3	29	9	7	13
Other Mammals	5	12	6	6	14	4	52	5	23	24
Birds	12	18	6	7	12	2	72	15	36	21
Fishes	7	10	7	6	7	5	60	18	24	18
Totals	53	66	29	33	62	17	326	66	148	112
Muskrat	.509	.333	.310	.303	.371	.176	.347	.288	.392	.321
Rabbit	.038	.061	.034	.121	.097	.176	.089	.136	.047	.116
Other Mammals	.094	.182	.207	.182	.226	.235	.160	.076	.155	.214
Birds	.226	.273	.207	.212	.194	.118	.221	.227	.243	.188
Fishes	.132	.152	.241	.182	.113	.294	.184	.273	.162	.161
Muskrat	.999	1.001	.999	1.000	1.001	.999	1.001	1.000	.999	1.000
Rabbit	.490	.668	.689	.697	.630	.823	.654	.712	.607	.679
Other Mammals	.452	.607	.655	.576	.533	.647	.565	.576	.560	.563
Birds	.358	.425	.448	.394	.307	.412	.405	.500	.405	.349
Fishes	.132	.152	.241	.182	.113	.294	.184	.273	.162	.161

Kolmogorov-Smirnov:	n1	n2	D	Probability
Historic/Late Prehistoric	66	148	0.199	0.10 > 0.05
Late Prehistoric/Early Prehistoric	148	112	0.127	> 0.10
Historic/Early Prehistoric	66	112	0.171	> 0.10

Table 81. Cumulative percentage distributions for five categories of non-caribou minimum individual estimates from MjVl-1, showing the probability for all possible pairs that two period samples were drawn from the same population.

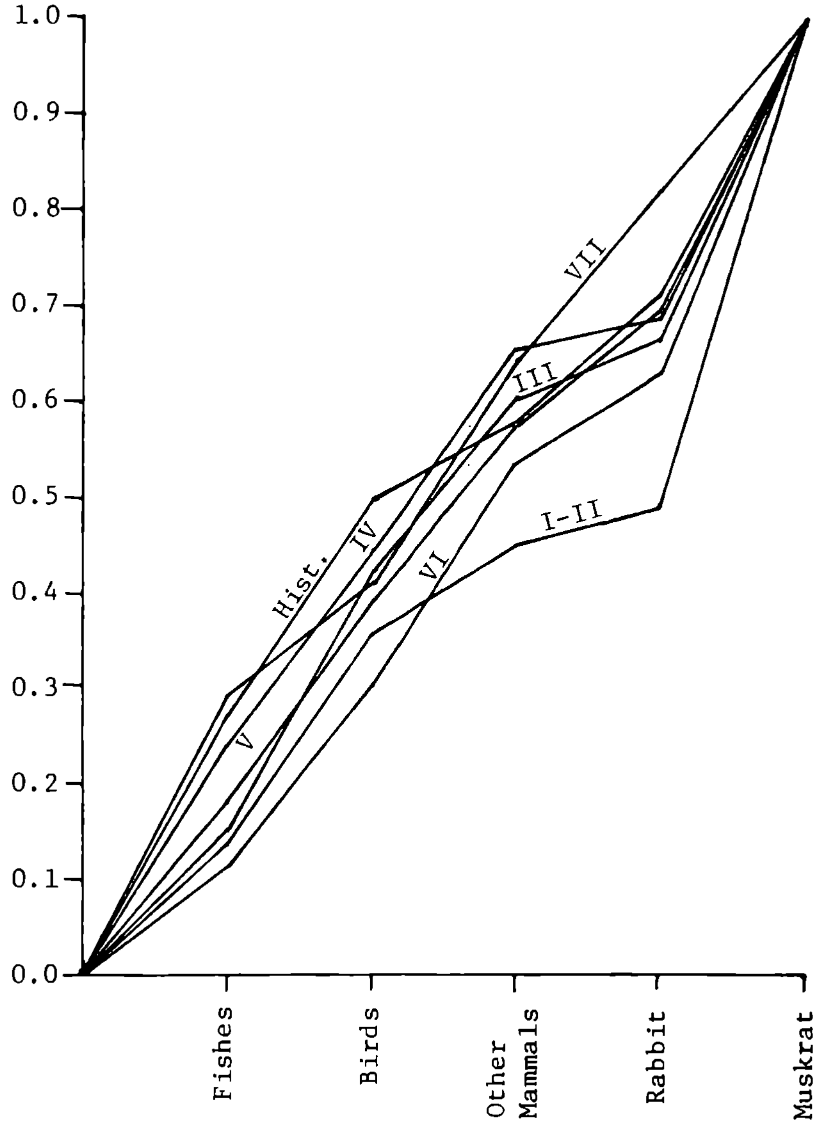

Fig. 46. Cumulative percentage distributions for five classes of non-caribou individual estimates in MjVl-1, arranged by layer.

Thirteen species of mammals and sixteen species or genera of birds have been recognized thusfar, and this list probably will not increase significantly as the analysis continues. On the other hand I have identified only one fish bone, the very distinctive mandible of a Northern Pike, and my efforts to identify other fish remains have been thwarted by a lack of comparative material; I have begun to correct this deficiency with specimens from my summer soup pots.

Some of the species in Tables 78 and 80 have no relevance to the subsistence economy and owe their presence in the site to their own activities. This includes the lemmings, the voles, the passerines, and possibly the red squirrel; the squirrel bones were stained differently than others in the vicinity suggesting that the animal may have crawled into a burrow or crack to die. The few bones of some of the other species were likely brought to the site for non-commensal purposes. The bear, for example, is represented by one unworked canine tooth which might have been collected for use as a pendant. Dogs are said to be the only animals "considered strictly taboo" as food among the Vunta Kutchin (Osgood 1936b: 34), but I am somewhat surprised that they are represented only in the Early Prehistoric period; dog carcasses may often have been thrown into the river. Many of the pitted bones (artifact class no. 69) may be our only remaining evidence of the presence of dogs in the Late Prehistoric and Historic periods at Klo-kut.

One of the hawks is represented by two bones from a wing which might have supplied feathers for decorative purposes, and the other hawk and the owls are represented by a few phalanges which could have come from talons desired for decorative or ceremonial reasons.

All the other animals in the site probably contributed to the diet, but the beginnings of significant involvement in the fur trade may be apparent in these data. The highly significant divergence of the Historic period (Table 74) is due primarily to the relative increase in the bone counts of rabbit and fish. This implies increased rabbit snaring, possibly to obtain the skins, and increased fishing, possibly to supply food to the larger teams of dogs used on the trap-lines.

Even the cumulative percentage distributions for minimum individual estimates reflect this change to some extent. The distributions shown in Tables 79 and 81 indicate no important absolute increase in rabbits and fish in the Historic period, but the relative increase is still apparent. Unfortunately the relatively small sample sizes reduce the strength of the Kolmogorov-Smirnov tests; moderate significance was achieved only with the largest samples, and yet the large Layer III sample does not diverge significantly from any other in the series. I regard this as further evidence of general continuity and gradual change throughout the Klo-kut sequence with the only major break coming between the Late Prehistoric and Historic periods when the fur trade may have already begun to transform the economy.

Seasonality

The best seasonal indicator in the Klo-kut faunal sample appears to be fetal caribou. As mentioned in Chapter III the pregnant does cross the Porcupine River in May and reach their calving grounds by early June. Fetal caribou bones have been recognized in every layer and every trench (Table 77), and this distribution suggests that Klo-kut was invariably occupied primarily for the purpose of a spring caribou hunt. Nothing else in the faunal data contradicts this interpretation. The absence of large numbers of ptarmigan implies a late spring occupation since by the end of April both willow and rock ptarmigan seek environments either latitudinally or altitudinally above treeline (L. Irving 1960: 185-190). Waterfowl arrive in Old Crow during the month of May and may settle on the ice if breakup has not yet occurred (L. Irving 1960: 157-180). Though the fish remains have not yet been identified I feel confident that there are few if any salmon bones among them and that they represent resident non-migratory species which could be taken through the ice as well as in open water.

Summary

I have little or nothing to add to the published descriptions of butchering practices, hunting techniques, sharing of meat, or observance of taboos among the Kutchin (Leechman 1954; McKennan 1959, 1965; Osgood 1936b; Balikci 1963b). Most lines of evidence bearing upon such problems could be obtained only from properly exposed living floors, and the absence of house structures at Klo-kut further complicates the delineation of commensal units. Archaeological evidence of the observance of taboos would be largely negative since ritual disposal techniques would tend to remove certain bones from the site. McKennan (1965: 84) reports that caribou and moose bones should not be thrown into a fire, but nearly every hearth in the site yielded burned caribou bone. There is also abundant evidence for the use of boiling stones, the cracking of bones for marrow, and the rendering of bone grease.

The conclusions drawn from the present faunal sample are admittedly quite limited, but one of the limitations is the almost total absence of other bodies of comparable data against which the Klo-kut sample could be contrasted. Meanwhile I think it is clear that Klo-kut was a major caribou hunting village occupied in the spring season for the purpose of intercepting the northbound caribou migration. This evidence for specifically spring season occupations at Klo-kut is in accord with ethnographic evidence concerning the annual cycle, as described in Chapter IV, and further archaeological efforts concerning the subsistence economy should contribute many important details to our understanding of the dynamic aspects of the annual cycle.

VII. KLO-KUT: COMPARISONS

Other Sites In the Middle Porcupine Drainage

In addition to Klo-kut the surveys along the Old Crow, Porcupine, and Bell Rivers have resulted in the discovery of about thirty archaeological sites. Some of these are merely single find spots and are not worth mentioning in the present discussion, but others have yielded significant information already or have the potential to do so with further work in the area. Two points should be made explicit concerning the present suite of known sites in this region:

1. No other site yet discovered in the northern Yukon is as large, as productive, or as finely stratified as Klo-kut. Thus the region has yet to produce a body of archaeological data which is entirely comparable to that from the Klo-kut excavations.

2. Evidence of very ancient human occupations in this region is accumulating rapidly and appears to be well dated at between 25,000 and 30,000 years ago (Harington and Irving 1967; W. Irving 1968, 1971; Irving and Harington 1970). On the other hand, Klo-kut and all the other sites discovered thusfar along the three rivers mentioned above appear to date within the last two millennia, and only around the northern rim of Old Crow Flats have we located

any sites which might be intermediate in age between these two extremes. This hiatus was expected in view of the meandering character of all major streams in the region, but its implications are rather discouraging; not only may much of the archaeological record have been erased for a substantial period of time but also many recent sites must have been destroyed by the sweeping flow of ice and water.

In view of these two points it is necessary to use Klo-kut as a basic framework around which the other recent sites of the region can be arranged. It should be remembered, however, that Klo-kut has itself been seriously truncated and eroded by the spring floods of the Porcupine; the size of the site and the protection afforded by First Island and the bedrock outcrop upstream are primarily responsible for its preservation. The erosional process is rapid enough that its effects can be observed from year to year, and even some of the relatively recent historic sites have been almost entirely destroyed. Indeed several houses in Old Crow have been moved or have fallen into the river since the village began to form in 1912.

The following summary of other sites in the middle Porcupine drainage will proceed more or less systematically by local area but will also proceed in general from prehistoric to historic occupations. I shall not attempt to provide a complete report for each of the sites in this discussion. Rather each of them will be described in general terms, interpreted somewhat subjectively, and fitted around the framework supplied by Klo-kut and the ethnographic data.

The Klo-kut Area

A very large area around the Klo-kut site itself is productive of small occupations which served as lookout stations along the high bluffs situated behind the modern, active bank of the river. In addition Irving has recently located a site on an old terrace 100 feet above the river which, judging from its location, must have been occupied during or prior to the Early Prehistoric period at Klo-kut (Irving, personal communication in 1970). This site, which Irving calls the Old Chief site, is characterized primarily by two semi-subterranean houses, 15' X 25' in diameter, the first we have found in the region. It has produced very few artifacts and cannot be certainly identified as yet with the Klo-kut sequence. Faunal remains from the upper levels of one house pit were dominated by caribou (10 individuals) but also included one moose, one beaver, one dog or wolf, and an unidentified duck (Stewart 1972).

Two upriver extensions of Klo-kut deserve mention. One of them (MjVk-5), ca. 500 yards upstream on the modern right bank, is marked by another large clearing. It appears to have been occupied only during the Historic period, and much of the clearing may have formed as a result of timber cutting by residents of Old Crow. The other (MjVk-6) is called the Abraham site and is located 100 yards upstream from MjVk-5. It is truly an extension of Klo-kut in every sense of the word, though the stratigraphy is somewhat distinctive and there are no historic occupations yet discovered. Test excavations there in 1970 yielded a small example of the Type Ib arrowhead (the Kavik point) and an exquisite bilaterally barbed bone projectile which probably functioned as a leister center prong (cf. Ford 1959: Fig. 73 for some very similar Birnirk examples). Other noteworthy specimens include a unilaterally barbed bone point with many small, attached barbs and a unilaterally barbed antler point with a few large detached barbs and a small bedding plane at the tip which might have been designed to fit a small stone end blade. Some of these traits are quite distinctive and did not occur in the Klo-kut collections described in Chapter VI, but they are technologically and typologically in keeping with the character of the Klo-kut bone industry and augment the general "Eskimoid" appearance of the assemblage (see below). The collections from MjVk-6 have not yet been analyzed, but stratigraphically they are expected to fit into the Late Prehistoric period around the position of Layer III at Klo-kut.

The bedrock outcrop about one half mile upstream from Klo-kut has been mentioned several times as an important deflector of the current, and on its top we have found a number of flakes and other artifacts during the past five years. The site (MjVk-2) is known to the residents of Old Crow as First Caribou Lookout; it is still used as a lookout upon occasion, and some informants have remarked that this must have been one of the locations where caribou were actually killed in the water and from which their carcasses would have been floated down the river to the village at Klo-kut. Test pits at this site have yielded a small collection of flakes, burned caribou bones, and a few distinctive artifacts. The artifacts include three biface fragments, at least one of which is the base of a projectile point with a long contracting stem and no shoulder development (unlike any of the types at Klo-kut); six boulder spalls, one of which is a well shaped primary spall; a number of nicked and blunted flakes; and two pieces of polished slate. There is nothing in this small collection to link the site directly with Klo-kut, but its proximity and the native traditions surrounding it are convincing reasons for postulating its role as a lookout station related to the Klo-kut village.

Another mile upstream, again on the right bank, at 67° 35' N X 139° 33' W, is the Second Caribou Lookout (MjVk-3). This lookout is much higher above the river and further from the water's edge than MjVk-2, and the second lookout is located atop a crumbling bedrock knoll with a well developed talus slope rather than on a lower bedrock outcrop as at MjVk-2. This lookout is still used quite frequently by hunters from Old Crow, and a bleached caribou skull with the antlers still intact has been mounted there as a marker. Surface collections and specimens troweled from the thin mixture of oxidized soil and rubble include three round-nosed end scrapers; a snub-nosed end scraper; a three-facetted microblade midsection; a number of blunted, nicked, and burinated flakes; and a series of unretouched flakes and calcined bone fragments. Like MjVk-2, this second lookout has produced nothing to provide a direct link with Klo-kut, but the scrapers are familiar forms and the flakes are made of stone types quite similar to those used at Klo-kut. The microblade fragment might suggest a distinctive technological process not present at Klo-kut, but in fact there are at least fifty flakes in the Klo-kut collections which could be called microblades if one chose to classify them that way. I have not thought it useful to emphasize them, because microblade production is not at all typical of the flake technology of the site and there are no cores in the collection which could be called microblade cores.

A lower bedrock outcrop a few hundred yards above MjVk-3 is now known as the Lazarus site (MjVk-4) since it was discovered by Lazarus Charlie while he was on a hunting and trapping excursion. Test pits at this site revealed a shallow soil profile which contained fire-cracked rocks, a few unretouched flakes, and a small quantity of burned caribou bones. This site appears to be yet another lookout locality or perhaps a place where a lunch was enjoyed after a nearby kill.

The bluffs which extend behind the Klo-kut site are dissected by a series of small gullies which break the bluffs into a number of relatively high outcrop areas nearly every one of which has been occupied briefly by a few people looking for caribou or enjoying a meal of same. One of these (MjVk-1) produced an interesting dark gray chert flake with a blunted margin truncated by a long burin facet. Others, such as MjVl-5, have produced nothing more than a few flakes, bone fragments, and fire-cracked rocks.

The Driftwood River Area

Three small sites in the vicinity of the mouth of Driftwood River have produced small collections of flakes, bones, and more distinctive artifacts. A lookout site on the left bank of the Porcupine (MjVh-1) is situated on a prominent bedrock conglomerate outcrop almost directly opposite the mouth of the Driftwood ($67^{\circ}34'$ N X 138° $29'$ W). Two to eight inches of soil and moss cap the bedrock, and the lower four inches in the deepest sections consist of sterile subsoil which is yellow in color. The upper four inches of the deepest sections contain a red zone locally which is replaced, also locally, by a brown-black zone. These two zones lie directly upon the subsoil, wherever they occur, and they are directly beneath the active humus. The brown-black zone, which I believe to be a hearth, has a circular outline, 2.5 feet in diameter, and a lenticular cross-section. Surrounding this lens are areas in which the red zone takes its place, and beyond the red zone the brown humus lies directly upon the yellow subsoil or else on bedrock. A dense mat of rootlets, both dead and alive, lies between the brown humus and the live mosses, cranberries, and dwarf birch.

Artifacts occurred most abundantly in the thin brown humus layer, though firecracked rocks usually projected above this layer into the rootlet mat. Fewer, though numerous, stone chips were found in the red zone, and chips and fire-cracked rock fragments were sparsely distributed in the brown-black hearth. The two most distinctive artifacts are a well-made bipointed stone arrowhead, willow-leaf shaped in outline and plano-convex in cross-section (Plate 23e), and a small basal fragment from a stemmed point with poorly developed shoulders (cf. MjVl-1: Type Ia; Plate 23g). One margin of the bipointed specimen has broken at a linear inclusion in the stone, and it was not made with the apparent single shoulder. Other artifacts included a wedge, 355 small to tiny unretouched flakes (many of which are biface trimming flakes), two small hematite fragments, and one fragment of charred bone. The biface trimming flakes and the two stone arrowheads, particularly the stemmed one, suggest that the site dates to the time of the Late Prehistoric period at Klo-kut.

Across the Porcupine River from MjVh-1 and about 100 feet above the mouth of Driftwood River, two test pits revealed MjVh-2 about 20 yards from the water's edge and 25 feet above moderately low water on the modern bank. Beneath the modern soil was a dark gray brown silty clay loam which capped a buried soil developed on another silty clay loam unit. Under the latter was another buried soil which yielded a small collection of fire-cracked rocks, artifacts, and burned bones. This soil was developed on a dark gray brown loam unit which led to yet another buried soil, but only the second buried soil was productive of cultural material. The collection consists of a core fragment, two unretouched flakes, four fragments of burned caribou (?) bone, and a nearly complete stemmed arrowhead with well developed shoulders and a thin biconvex cross-section (cf. MjVl-1: Type Ib; Plate 23f). Reforestation of the site is nearly complete, and erosion of the bank appears to have destroyed most of it. The arrowhead, however, permits its assignment to the time of the Late Prehistoric period at Klo-kut, and it links it directly to that site.

Behind MjVh-2 the lateralmost banks of the Porcupine and Driftwood Rivers form a bluff about 75 feet high, and, in the shallow soil on top of this bluff, test pits exposed a small collection of unretouched flakes as well as one well shaped flake, which might have been part of a round-nosed end scraper, and a blunted flake. This site (MjVh-3) probably was a lookout station since it commands an excellent view across both the Porcupine and Driftwood Rivers.

The Rat Indian Creek Area

MjVg-1 is located on the right bank of the Porcupine River, ca. 75-100 yards above the mouth of Rat Indian Creek, at 67°35' N X 138°20' W. The site appears to be about 100 yards long and is eroding out in the cut bank along its entire known length. The main site area is marked by a grassy clearing which is surrounded by patches of birch, poplar, alder, spruce, and willow. To the west is a lower area, apparently an old channel of Rat Indian Creek, which is covered with alder. A birch grove extends east along the river bank, and open, wetter ground extends northward to the spruce-covered banks of Rat Indian Creek.

A rectangular depression, ca. 7 X 3 feet and 1½ feet deep, occurs near the north edge of the clearing. Just southwest of this is a smaller, ca. 3 X 3 feet, square pit about 2½ feet deep. At least three drainage ditches run north and south across the site and are similar to those seen in Old Crow today. One of these, however, may be a path running from the river, northwest to the creek. At least two, and possibly four, hearths were found in the cut bank, and they contain bones and fire-cracked rocks. On the beach in front of the site were found a grooved adze, quite similar to those from Klo-kut, a core with a well defined platform, an unshaped boulder spall, and one fragment of cut bone. Test pits revealed the presence of several buried soils which yielded a few unretouched flakes as well as quantities of bone; the modern soil yielded a glass bead, indicating a final historic occupation.

Just east of the clearing is a small open spot with saw-cut stumps, tent poles, and hearth stones on the surface. Several metal axe-cut stumps occur in and around the clearing, and one stump may have been cut with a stone adze.

The faunal remains collected from the beach and the test pits represent caribou of several ages, including fetal individuals; this is a good indication that the site was occupied in the spring season and may represent the same activities documented for Klo-kut.

About three miles upstream from MjVg-1 another lookout station (MjVg-2) is located on the western end of a conglomerate cliff which forms the right bank of the Porcupine River. The site is situated about 50 feet above the water and commands an excellent view to the south and west. The occupation layer formed a band 2-3 inches thick between the moss and the subsoil which capped the bedrock. Hearths occurred just below the moss and produced a small collection of artifacts. The artifacts include about fifteen cores and core fragments, over 150 retouched and unretouched flakes (some of which are biface trimming flakes), nearly 100 fragments of burned caribou bone, and a series of six bifaces. Among the bifaces are the stem of a projectile point (Plate 23d), a projectile point tip (Plate 23c), two broken knives (Plate 23 h-i), a wedge (Plate 23b), and an exhausted core (Plate 23a). Many of the flakes and core fragments can be rejoined, and one of the knives (Plate 23i) has been reconstructed from four small fragments. This degree of integrity suggests that only one occupation may be represented, but various points along the cliff top could have been occupied intermittently over a long period of time. The bifaces, however, suggest that this locality dates to the Late Prehistoric period in the Klo-kut sequence, and it is interesting to note that this lookout site may bear a relationship to the MjVg-1 village site analogous to that between MjVl-1 and its nearby lookouts.

Old Crow Flats

When one ventures into most areas of Crow Flats he has the feeling that he is literally "out in the middle of nowhere." Indeed I am uncertain that I could relocate some of the archaeological sites we have found there, and they are even difficult to plot on a map. The Raspberry Point site (MlVm-1) is a good example of this problem. Located in the southwestern area of the Flats, ca. 67°57' N X 140°18' W, on a small tributary of Schaeffer Creek, the site is almost completely surrounded by various kinds of water bodies, most of which are shallow lakes with very irregular shapes. The Raspberry Point site was reported to Irving and me as the location of a fish trap on a small stream connecting two lakes near Schaeffer Creek. We found a site in the area, but I have never been certain that it was the one we were looking for as there was no evidence of a fish trap remaining in the stream. The site is marked by a small grassy clearing, and our test pits yielded artifacts which may indicate that the site was occupied in both the Late Prehistoric and Historic periods. The artifacts include two unretouched flakes, two pieces of worked bone, several fragments of fire-cracked rock, and a well-shaped tabular *tci-de-tho* as possible Late Prehistoric specimens; a wood chip cut by a metal axe, a blue glass bead, and a 1½" wire nail represent the Historic period. The faunal remains include a moose long bone fragment; a caribou radioulna; the ulna, humerus, and coracoid of a duck; and two small fish bones. Such diversity is typical of sites in Old Crow Flats.

This sample is too small to supply much information about activities or age, but according to informants' statements it is probably a summer fishing camp which was associated with a fish trap that has since been destroyed by ice.

A larger sample of artifacts was obtained from an Historic site called Tsdu-ho-ko (NbVk-1) in the north-eastern region of Old Crow Flats, on the right bank of a small stream near the head of a tributary of Black Fox Creek (ca. $68^{o}12'$ N X $139^{o}31'$ W). We learned of the site from informants in Old Crow who were familiar with a nearby locality as a good place to gather birds' eggs (Tsdu-ho-kai, place where the ducks lay eggs). The informants were also aware of the site and knew that a fish trap had formerly been operated there. The site is marked by a grassy clearing surrounded by willows and alders on three sides and by the stream on the fourth side. Cultural material was found (1) on the surface, with no cover of vegetation; (2) partly on the surface, with a partial cover of moss and grass; and (3) completely buried and scattered throughout the modern soil.

A pile of sharpened sticks and two larger logs were found along the south edge of the clearing on the right bank of the stream. The sticks had originally been pushed into the bank, and they were oriented at right angles to the edge of the water. A large number of poles were found lying flat on the bottom of the stream, and Jacques Cinq-Mars, in a heroic performance in the cold water, restored them to a vertical position. This revealed two V-shaped patterns, one of which was aligned with the piles of sticks on the bank. Apparently each of these clusters of poles represented a fish weir, and the pile of poles on the bank must have been the remains of cross-pieces which would have been interwoven among the uprights. A basket trap probably was placed in the center of the weir, though we found no evidence of such a trap.

This collection of historic debris has been described in detail elsewhere (Morlan 1972b), and I think it more relevant in this discussion to confine our attention to the statements given by informants in Old Crow since these form the real basis for my interpretation of the site. The artifacts provide detailed confirmation of their statements. John Tizya, a former chief in Old Crow Flats, organized the construction of a fish trap at Tsdu-ho-ko in the late 1800's, and in 1899 a large group of people stayed at the site to run the trap. Thereafter only one family occupied the site pretty regularly until 1929 when Tizya operated the trap for the last time. A white man named Peterson, who was married to Tizya's daughter, camped on the site in the spring of 1935 for the purpose of hunting muskrat, and the site has been abandoned ever since.

Judging from the artifacts, we failed to find the large occupation of 1899 or any earlier period. The artifacts recovered from a tent excavation include 22-cal. cartridges, indicating a post-1911 date, and both Copenhagen snuff and Edgeworth tobacco cans, indicating a post-1925-30 date in this area. Thus the tent could have been occupied by Tizya in 1929 or by Peterson and his wife in 1935, and I favor the former interpretation. Peterson's muskrat hunting activities are represented by muskrat stretchers and a rat canoe found on the surface, and it was probably he who build the caches on the site. The latter inference is based partially upon the location of his cabin on nearby Black Fox Creek whereas Tizya lived more frequently in the village of Old Crow; indeed Tizya was the first man to build a permanent cabin at the present site of Old Crow (in 1906).

The faunal remains from the tent area indicate once again the diversity of resources available in Old Crow Flats, and they also show the importance of waterfowl in these summer season occupations. The remains represent at least one caribou, one moose, four muskrat, four snowshoe hares, one red fox, two white-winged scoters, three oldsquaw, three scaup, four American widgeons, three pintails, three geese, and an undetermined number of fish.

The only other site in or around Old Crow Flats on which I am prepared to comment at the present time is the Thomas Creek caribou surround which was described as fully as possible in Chapter IV (pp. 70-72). We have located a number of small lookout sites and camps in the Thomas Creek area, but I cannot date them, determine their seasonality, or link them with the rest of the sites discussed thusfar. Irving's most recent season of field work produced several sites in the Sam Lake area, at the headwaters of Black Fox Creek, and one very interesting stone house on the northern end of Mt. Schaeffer. At least one of the sites near Sam Lake may represent an earlier occupation of this area, but in view of its location it could be expected to fit into the Eskimo continuum as easily as the Indian one.

Cadzow Lake

A number of people in Old Crow have described to me the natural cyclic fluctuations which characterize the muskrat population of the Flats. Apparently the population increases until the Flats is "swarming with rats" and fights break out among the crowded animals which are competing for food and in territorial defense. Then the population undergoes a sudden decline, and the Old Crow trappers are well aware of their role in curbing muskrat population growth so as to prevent this cycle from depleting their supply of furs. They have become aware of this role through experience, and 1933 is well remembered as a year when the muskrat failed and many people were forced to abandon the Flats for other pursuits along the Porcupine River. Some of those who had travelled to the Little Flats area, in the southeastern corner of Old Crow Flats, crossed the divide to Porcupine River and camped at the base of a small gully across from Cadzow Lake. I was guided to this camp (MjVi-2) in the summer of 1970 and found a small clearing on a 30° slope which contained evidence of very recent hunting camps on the surface. Test pits revealed two historic components in a stratigraphic profile which is somewhat disturbed by soil movements on the slope, and the upper component probably dates to 1933.

Across the river and a half mile upstream is the mouth of the outlet from Cadzow Lake, and in a small clearing surrounded by alders at the mouth of the outlet is a multicomponent site (MjVi-1). The outlet is clearly the stream called Fishing River by McConnell (1891: 126D, Sheet 8), and the lake was noted by Murray (1910: 34) as a place "in which the Indians say there are plenty of excellent white fish."

Excavations at MjVi-1 revealed a rich historic component in the modern soil, and this was identified by my informants as Joe Kay's 1933 camp from which he left for Fort MacPherson in the fall; Joe Kay was a powerful chief for many years in the Old Crow area (see remarks in Chapter III, p. 50). On the first buried soil at MjVi-1 we found the remains of an earlier historic occupation attributed to William Chitze (an ancestor of the Abel family of Old Crow). While camped at MjVi-1 Chitze's father is said to have gone down to Klo-kut to arrange Chitze's marriage; this implies a date between 1850 and 1880 for the occupation by Chitze.

The evidence of firearms and the forms of nails from MjVi-1 lend confirmation to this interpretation. The 1933 layer yielded large numbers of 22-cal. and 30-cal. cartridges, whereas the earlier layer produced no cartridges but one percussion cap and a heavily used gunflint. The upper layer produced round wire nails and tacks of several lengths, and the lower layer yielded only unannealed nails with square cross-sections.

A somewhat earlier historic occupation was found on a second buried soil, and no nails or remains of firearms were recovered from it. The only weapon is a unilaterally barbed point fragment, and trade goods consist only of a brass button and a number of large glass beads.

Progressive erosion by the river was clearly evident at MjVi-1. The early historic occupation on the second buried soil was badly truncated, and that on the first buried soil was also exposed in the cut bank; by contrast, the 1933 occupation in the modern soil was nearly intact and could be found in the cut bank profile only in a few local areas. The faunal remains and artifacts from this site have not yet been analyzed, but the statements by informants that the occupations there must have been in the spring have not been contradicted by the faunal remains. A detailed report has appeared elsewhere (Morlan 1972c).

The Ramparts

We have recorded four sites in the Ramparts area, between the mouth of Bluefish River and the Alaskan border. All of them are historic, and at least three of them appear to have been occupied by white men. Nonetheless they are informative concerning the dating of Euro-Canadian influences and trade goods and thus shed some light on the recent history of the native peoples of the area. One of the sites is a multi-component historic site at the mouth of Caribou Bar Creek (MiVn-2), ca. 67°23' N X 140°36' W. Test pits yielded a few caribou bones, some fragments of metal, and several pieces of rubberized material which might have been a floor mat.

At the mouth of Sunaghun Creek, almost precisely on the Alaskan border, a low bench along the right bank of the Porcupine forms a small terrace about 25 feet lower than the level of most of New Rampart House. In 1967 we found a stone adze in mint condition on the slope below this bench (Plate 24a), and the eroded face of the bench revealed several hearths from which we obtained some historic artifacts, including a fragment of a horse bridle. I returned to excavate the site (MiVo-1) in 1968, thinking that the adze and one of the deeper hearths must represent a prehistoric occupation which we had not fully sampled the previous year.

Unfortunately whatever prehistoric component may once have been there had eroded away entirely, and our excavations revealed only historic debris on the top of the bench which I now believe represents the quarters of a geologist named Turner who spent the winter there around 1888 and was the first man to bring horses to the region (International Boundary Commission 1918).

In New Rampart House itself (MiVo-2) we recovered an excellent end of the bone scraper (Plate 24b) and a ledger from Cadzow's store (see Chapter II). The latter will be very useful in ethnohistorical studies of the early fur trading period in the area.

A small clearing (MiVn-1) on the left bank of the Porcupine River, just above the head of the Ramparts produced some fire-cracked rock and several large flakes in the crest of the cut bank, but my excavations in 1968 failed to recover any further evidence of a prehistoric occupation. Instead we found the remains of an historic occupation which I am inclined to attribute to a man from Edmonton, named Campbell Young, who had come through the area seeking a northern route to the Klondike gold fields and had settled down to trap along the Porcupine by 1904 when Camsell (1954) found him there. The remains of his (?) occupation were partially covered by the wind-blown spoil from some cache pits dug near the back of the clearing by Jack Frost around 1925;

Frost was an ex-R.C.M.P. officer and the father of the Frost brothers who live in Old Crow today. The family still maintains a cabin just across a small gully from the site.

The Old Crow Area

The present site of Old Crow has yielded only a few artifacts which suggest that any prehistoric occupation may formerly have existed there. Nor have we managed to find any evidence of a reportedly large village "around Crow Point," the area around the mouth of Old Crow River. This large village is supposed to have been associated with a fish trap which spanned the Old Crow and which was operated under the direction of a great chief named Zzhe Gitlit. The village was abandoned around the beginning of the 20th century, but all remains of it must have been washed away. Several modern fish camps are easily recognizable below Old Crow and are interesting for their combinations of European and native techniques and artifacts, but we need not dwell upon them here.

La Pierre House

Excavations at the Hudson's Bay post of La Pierre House (MiVd-1) produced a substantial collection of Euro-Canadian trade goods but very little in the way of aboriginal artifacts. The collection has not yet been analyzed but may eventually prove useful in charting the flow of certain specific articles into the area (Morlan n.d.). Test pits in a nearby moss house which was abandoned in 1936 produced a profile containing four buried soils, every one of which yielded historic materials. Indeed I was unable to find any trace of a prehistoric occupation in the lower half of the Bell River valley, and I am inclined to suspect that the steep cut banks of the Bell and its tributaries may have discouraged all but winter travel in prehistoric times. This possibility cannot be evaluated until further work is completed on the overall annual cycle of the Tukkuth Kutchin of the upper Porcupine.

Summary

This completes a survey of the meagre archaeological evidence which can presently be appended to the information supplied by the Klo-kut site. I am sure that some useful information can be gleaned from the collections of historic artifacts mentioned here, but I have not yet begun to analyze them since my emphasis has been on the prehistoric period. Unfortunately there are few important prehistoric components yet found in the middle Porcupine region, and I think we should anticipate a very slow recovery of information from our surveys. Much of the record may already be destroyed, and the natural agencies of erosion are rapidly being supplemented by human modification of the landscape.

In late February 1970 I received word from a friend in Old Crow that "tractors are churning up the area where you were digging." An investigation soon revealed that a winter road had been cut through to Old Crow and had surmounted the right bank of the Porcupine River exactly in the middle of the clearing at Klo-kut. I visited the site several times during the summer of 1970 to determine the extent of the damage and to make a photographic record of the road bed. Most of the site's archaeological potential is still intact, but the modern ecology of the area has been drastically altered and cannot possibly recover with the same vegetation communities it had only a year before. I have since succeeded in having the road moved for any further operation in the area; but my plans concerning an integrated study of palaeo- and modern ecology have been scrapped, and our tentative thoughts concerning a reconstruction of the Klo-kut village have been seriously impaired. We have some assurance that other sites will not be similarly destroyed through ignorance of their locations, and a very worthwhile review of site protection and antiquities legislation resulted in part from the damage done at Klo-kut (Morlan 1972d). Unfortunately the fact remains that the most recent occupation of Klo-kut caused serious disturbance to the earlier ones as well as to our efforts to reconstruct them.

Other Regions of Northwestern North America

For a number of reasons I think it premature to embark upon an intensive comparison of the Klo-kut collections with others in northwestern North America. In the first place, in spite of nearly forty years of archaeological work in the North, the interior is still very poorly known and has received intensive examination only during the last fifteen years. Secondly, much of the large scale excavation has been carried out only in the last five years and is still unpublished and only superficially discussed; this applies to most of the work of Cook and McKennan at Healy Lake, Workman and Cook in southwest Yukon, Irving and Morlan in northern Yukon, Clark in northcentral Alaska, and Anderson at Onion Portage. Thirdly, while each of these efforts as well as many others has the potential to produce an excellent understanding of a particular region of Alaska and the Yukon, they are so far apart and separated by so many intervening physiographic and environmental changes that any attempt to link them at the present time involves a sort of connect-the-dots approach to culture history which could scarcely be expected to stand the test of time. Furthermore this approach has already been applied to most of the material available as of 1960 (e.g. MacNeish 1964), and many researchers are now finding that serious problems stand in the way of re-sorting the resulting formulation of culture history; that such formulations have subsequently been used uncritically (e.g. Willey 1966: Chap. 7) only complicates the task even further. One might say that we have reached a sort of "cocktail party" understanding of the prehistory of interior northwestern North America. The field work of the past five years has added new dimensions and insights, and we think we are asking some of the right questions; but there have not yet been time or resources to support the kind of intensive collaborative effort required to bring together the new information in an overall view of Alaska-Yukon prehistory.

For these reasons I shall summarize a few relevant comparisons which point the way toward further research requirements, but I shall not presume to synthesize the later prehistory of northwestern North America. This summary will focus upon the following major areas: Southwest Yukon, Central Alaska, Southwestern Alaska, Western Alaska, the Brooks Range, and other more distant areas.

Southwest Yukon

A number of ubiquitous artifact types widely identified with Athabaskan Indians were reported by Johnson and Raup (1964: 165-169) from the Lake Creek cabins fifty miles northwest of Burwash Landing. These cabins contained historic trade goods, such as glass beads and two iron skin scrapers (cf. MjVl-1: 143), as well as *tci-de-tho* fragments (cf. MjVl-1, class no. 25) and a bone beamer (cf. MjVl-1, class no. 40). Beamers and chi-thos are also reported for a number of other localities in the area (Johnson and Raup 1964: Fig. 48). It is quite interesting, however, that none of the ethnological specimens illustrated by Johnson and

Raup (1964) in Fig. 54 bears close resemblance to a Klo-kut type; the barbed bone points are made quite differently from those at Klo-kut, and only the beamers collected by Johnson and Raup (1964: Fig. 48) resemble closely their northern Yukon counterparts.

MacNeish's work in Southwest Yukon resulted in a definition of two synthetic units (1964) which should be compared with Klo-kut. One of these, the Bennett Lake phase, appears to be an amalgamation of every site or find which produced historic trade goods, so the integrity of the phase should be questioned until a substantial excavated sample can be used to test it. The other, the Aishihik complex, was so poorly represented in MacNeish's collections that he declined to call it a "phase." This complex will be further clarified by the analysis of the Chimi site, currently being undertaken by W.B. Workman (1968, 1969). A number of artifacts comparable to the Klo-kut types can be found in the various components of Bennett Lake and Aishihik. The most noteworthy is the Stott point type, some examples of which resemble some of the points from Klo-kut. Unfortunately, from my point of view, MacNeish (1964: 406) elected to describe the Stott type as "corner-notched" and, perhaps as a result, included both stemmed (MacNeish 1964: Fig. 88, nos. 1, 6) and notched (MacNeish 1964: Fig. 88, nos. 12, 13) points in this type. The stemmed examples are quite similar to Klo-kut type 1b as well as to some of the points from the Kavik site in Anaktuvuk Pass (cf. Campbell 1968).

The Stott specimens which I would call notched are unlike any of the points from Klo-kut. The Morhiss type, as defined by MacNeish (1964: 400), is also quite variable and apparently is regarded as somewhat earlier than the Aishihik complex; one illustrated example, however, resembles Klo-kut Type la (v. MacNeish 1964: Fig. 88, no. 7). A number of MacNeish's (1964: 428-438, Table 17, Fig. 90) scraper types are similar to Klo-kut examples, but most of them are nearly ubiquitous in his series of phases and traditions and cannot be used at the moment as diagnostic artifacts. The same problem obtains with the "chi-tho" (MacNeish 1964: Table 17, Fig. 91) and most of the other forms of heavy artifacts, but the three-quarter grooved adze characterizes both Bennett Lake and Aishihik as well as Taye Lake (a single specimen; MacNeish 1964: 456-458, Table 23, Fig. 95). The single illustrated specimen, however, is thicker than wide and therefore might be called a splitting adze as opposed to the broad, flat planing type of adze present at Klo-kut; the Southwest Yukon examples also include double-grooved forms which have not been found at Klo-kut.

Bone preservation in the Southwest Yukon is nowhere as excellent as at Klo-kut, so comparisons of bone technology are hampered. A variety of awls in MacNeish's (1964: 424-425, Table 16, Fig. 89) collections characterize most of his phases, but the one recognizable type, called a "fibula awl" though it is made on a splint bone, represents the much earlier Champagne and Taye Lake phases in MacNeish's work whereas at Klo-kut it is found exclusively in the Late Prehistoric and Historic periods (MjVl-1, Type 1, cat. nos. 514, 1521, 1800). In general the Bennett Lake and Aishihik materials appear to bear a number of important resemblances to the Klo-kut collection, but we must await further excavations before firm conclusions can be drawn. Even the recent work at Chimi may not provide the sort of comparative material we need for Klo-kut since the post-ash horizon yielded very few artifacts not all of which were diagnostic (Workman 1969).

Central Alaska

One of the first archaeological inroads into Central Alaska was made by Rainey in the 1930's (Rainey 1939, 1940) when the Dixthada site was first reported. Of all the sites yet discovered in Alaska and the Yukon, Dixthada comes closest to providing an over all assemblage comparable to Klo-kut. I have not had an opportunity to examine the collection, but some of the scanty illustrations are quite convincing, and the list of artifact types is encouraging. The stone points are described as stemmed (Rainey 1939: 371, Fig. 5, nos. 1-4; 1940: 301, Fig. 14, no. 9), though some of them are somewhat broader than the Klo-kut Type 1b counterparts. The bone points appear to have been made in a manner similar to those at Klo-kut, and both the points and scrapers of copper at Dixthada could be regarded as typological counterparts to bone examples from Klo-kut (MjVl-1A: 96, 262, 261). The bone knife illustrated by Rainey (1940) as Fig. 14, no. 1, might have been described as a creaser in my Klo-kut sample. A "bone day tally" (Rainey 1939: Fig. 3, no. 6) might correspond to the Klo-kut gaming piece. The usual "tci-tho," stone scrapers, bone awls, cut bark, and burned stones are present at Dixthada, and the major point of difference is the presence of the controversial "polyhedral cores and small prismatic flakes struck from these cores" (Rainey 1940: 301). Furthermore the copper artifact described as an ear ornament (Rainey 1940: Fig. 14, no. 5), is probably in fact a knife handle such as those pictured by Murray (1910: 86, 91) in specifically "Kootcha-Kootchin" settings. Dixthada is probably an early historic Tanana or Nabesna encampment which might be expected to yield an assemblage similar to that from a Kutchin settlement of comparable age. Recent excavations at Dixthada have clarified its prehistoric record and indicate even more compelling similarities with Klo-kut (McKennan and Cook 1972).

Recent work around Healy Lake has produced several sites which appear to span a long time period and which are thought by their excavators to represent a long sequence of cultural development leading to historic Athabaskan-speakers (Cook and McKennan 1968, 1970a, 1970b; McKennan and Cook 1968). Unfortunately there is no overall resemblance of complex between the Healy Lake sites and Klo-kut, for there are many artifact types not shared at all between Klo-kut and the Healy Lake sites, but the stemmed point forms of the uppermost horizons of the Village site drew the attention of Cook and McKennan (1968: 10) to a possible relationship with Klo-kut and Kavik. More recently they have remarked that "The Kavik, Klo-kut and Little Arm sites would seem to represent a relatively widespread Athapaskan horizon, late prehistoric in time, which would fill the gap in the Healy Lake sequence from about A.D. 1200 to the historic period" (Cook and McKennan 1970b: 4).

A work long hailed as a major pioneer effort in interior Alaska is the Yukon River survey conducted in 1935 by de Laguna (1947). A large series of small sites as well as several major ones were located and tested on this survey, and many of them on the lower Yukon were identified as Eskimo whereas further upriver the occupations were attributed to Athabaskan Indians. Three major problems characterize the 1947 monograph as viewed from our perspective today: (1) the character of early historic and prehistoric Indian culture was viewed primarily vis-a-vis the much better understood Eskimo manifestations already known in Alaska; (2) the conclusions were oriented toward a definition of cultural origins with a theoretical point of view derived entirely from Birket-Smith's concept of cultural stratification (de Laguna 1947: 268); and (3) all but a few of the sites were either too small or too slightly tested to yield a coherent picture of the technological tradition(s) represented in the Yukon valley. In my opinion this work will gradually become more significant as intensive survey and excavation begin to provide a framework in which the many important but isolated finds can be placed in perspective. Thus, while I do not wish to belittle or to misuse de Laguna's scholarly Yukon monograph, I shall decline detailed analysis of the trait lists and site distributions. None of her sites has produced a complex with compelling overall similarity to Klo-kut. Suffice it to say that many of the types found in her "Tena" sites are represented at Klo-Kut: stemmed stone arrowheads, a variety of stone scrapers, "ulo-shaped scrapers" (*tci-de-tho*), whetstones, adzes, hammerstones, unbarbed bone arrowheads, barbed bone arrowheads, blunt arrowheads, bone awls, bone fish hook barbs and shanks, cut bark, mineral pigments, and many others. Not a few of these, of course, also occurred in the Eskimo sites, and the technological differences are often a matter of slight degree rather than of kind; it is my impression that this is particularly true of the bone industry, a point to which I shall return below.

Southwestern Alaska

Throughout southwestern Alaska the slender barbed points (Clark 1968; de Laguna 1934, 1956; Heizer 1956) bear many specific resemblances to the unilaterally barbed bone points from Klo-kut, but a detailed attribute analysis would be required before any conclusions could be drawn. In addition there are a number of other nearly ubiquitous artifact types which may be interrelated over a broad geographical area but which have been kept apart because of our semantic classifications; these require further study. Two more specific types deserve special mention: stemmed arrowheads and unbarbed socketed points. Throughout most of southwestern Alaska the stone technology either is predominantly based upon grinding and polishing techniques or lacks any sort of stemmed point which might be comparable to those from Klo-kut. There are, however, in a number of sites a few isolated stemmed points which bear close resemblance to the Klo-kut examples and which stand out in assemblages characterized primarily by ground stone. Examples include the Rolling Bay site on Kodiak Island (Clark 1968: 200, Plate 17K), the Lower levels of the Uyak site, also on Kodiak Island (Heizer 1956: 48, Plate 36), and the Yukon Island II material from Kachemak Bay (de Laguna 1934: 69, Plate 30). The Rolling Bay specimen was unique, the five examples from Uyak were so unusual that they were regarded as possibly having been "introduced into the site by accident through recovery from the bodies of dead sea mammals in whose flesh they were imbedded" (Heizer 1956: 48), and the Yukon Island specimens were interpreted as counterparts of the polished slate points (de Laguna 1934: 69). Though they seem somewhat out of place in some of the contexts in which they have occurred in southwestern Alaska, these chipped stone points bear striking similarities to some of the Klo-kut examples. Even more striking, however, is the range of variation in the stemmed points from several phases on the Alaskan Peninsula (Cressman and Dumond 1962: Plates I and II; Dumond 1971); in each phase of Dumond's Norton Tradition the range of point forms overlaps the range of Klo-kut examples in every discernible respect. Elsewhere I have described one possible interpretation of these similarities (Morlan 1972a) while Derry (1972) has offered an alternative based in part on Workman's (1972) interesting discussion of the White River ash fall.

The unbarbed socketed points are even more compelling because of the detailed similarities between those from Uyak (Heizer 1956: 64, Fig. 42, Plate 59) and the unbarbed bedded points from Klo-kut (MjVl-1, class no. 36). Another possible example occurred in the Rolling Bay site but lacked a sharp point (Clark 1968: 484, Plate 20CC). I have not encountered such identical bedded or socketed, collared, sharp bone points anywhere else in Alaska or the Yukon, and, while I would not conclude that there is any functional similarity between the northern Yukon and Kodiak examples, the technological similarities between these two distant manifestations must eventually be explained.

Western Alaska

Many sites in Western Alaska have yielded a wide range of artifacts which resemble Klo-kut materials quite closely, but most of the comparisons are with sites attributed to late prehistoric and historic Eskimo occupations. This is partially due to the relative scarcity of substantial Indian sites excavated to date, but the recent work at the Onion Portage site indicates that this seeming paradox may persist in spite of further research in the interior. Anderson (1970) now classifies the Band 1 material from Onion Portage as Western Thule Eskimo, and the upper zone of Band 2 is thought to represent a Northern Indian occupation. I have examined some of this material on several occasions and on that basis, as well as on the basis of unpublished illustrations, I regard the Western Thule series as much more similar to Klo-kut than the Band 2 collections. The similarities with Western Thule are found primarily in the bone industry and include specific techniques of barb formation on the points, the mode of using groove and splinter techniques on bone and antler, and even more specialized traits such as an elaborate fish lure with inlaid ivory eyes which is nearly indistinguishable from the specimen illustrated in Plate 20 from Klo-kut. Certain characteristics separate even the comparable artifacts: the shoulders are more abrupt on the barbed points, the beamers are more often made by splitting in the coronal rather than the sagittal plane, and there are more bilaterally barbed points than in Klo-kut (which has produced only one). In general, however, the character of the Klo-kut bone industry could be matched in detail with collections from many late prehistoric Eskimo components, including most of the phases of the Arctic Woodland culture sequence on the Kobuk, particularly Ekseavik (Giddings 1952), the Nukleet collections from Iyatayet (Giddings (1964), and even portions of the assemblages from Birnirk and Nunagiak (Ford 1959) and the Nunamiut sites around Anaktuvuk Pass (Campbell 1962). The major differences in comparable types are stylistic; the basic technological procedures and results are very similar. On the other hand, Klo-kut obviously lacks an enormous range of artifact types quite prevalent on Eskimo sites such as the equipment associated with sea mammal hunting and with certain forms of fishing, as well as most of the gadgetry that characterizes many Eskimo assemblages. Thus I would regard the historical relationship between

Klo-kut and the Eskimo continuum as a matter of sharing certain basic technological procedures, and in Chapter VIII we shall examine a few hypotheses concerning the manner in which this sharing came about.

It is particularly interesting to contrast the bone industry similarities with the dissimilarities found in the lithic inventories. Late prehistoric Eskimo sites have yielded enormous numbers of stemmed points, but many of them are flaked differently from the Klo-kut points, the blades are relatively much longer, the stems are not thinned and do not contract, and many of them were designed for insertion in a bone point or foreshaft. Similarly the scrapers approach the Klo-kut forms in a few instances but more often have a standardized hafting element and peculiar flaring outline which is absent at Klo-kut. The most important difference, however, is the polished slate debitage which forms the dominant feature of most Eskimo stone assemblages. As mentioned earlier the polishing is unlike that at Klo-kut in being designed to produce a sharp cutting edge rather than a flat abrading surface; when one travels north of the Barn and Buckland mountains, north of Old Crow Flats, it is immediately apparent that the sites are late prehistoric Eskimo by the quantity of polished slate never matched or even approached to the south.

The Brooks Range

Similarities between portions of the Nunamiut Eskimo bone industry and that at Klo-kut were already mentioned, but one site in Anaktuvuk Pass requires special mention for several reasons. The Kavik site (Campbell 1962: 48-49; 1968) is the only locality yet discovered in Alaska or the Yukon in which nearly every artifact has a close counterpart at Klo-kut. A series of eight contracting stemmed stone points so completely overlaps the series from Klo-kut with respect to form, flaking techniques, and size that the specimens from Klo-kut (class no. 20) described above as Type 1b can fairly be called Kavik type points (Plate 6f-n). In addition there are two unilaterally barbed antler points, which Campbell (1968: 37, Plate II, no. 7) calls leister prongs, which share with some of the Klo-kut points (class no. 32) their size, cross-section, slightly shouldered conical tangs, method of barb formation, and presence of barb lines; no other site has yielded points so similar to the Klo-kut specimens, particularly to those which characterize the Late Prehistoric period. Other similarities include the methods of grooving and splintering antler, a ladder-like decorative element seen at Kavik on an antler comb (Campbell 1968: Plate II, no. 4) and at Klo-kut on two ornamented bone beamers (Plate 14a-b), a long unbarbed antler point (compare Plate 12f and Campbell 1968: Plate II, no. 8) and a series of rectangular antler objects which I have called gaming pieces (class no. 58, Plate 19c). On the basis of these similarities Campbell (1968) now regards Kavik as a possible representative of a pre-Nunamiut, Athabaskan occupation of Anaktuvuk Pass, but it is interesting to note that his conclusions concerning Kavik/Ekseavik similarities (Campbell 1962: 49; 1968: 34, 41) and my awareness of Klo-kut/Ekseavik similarities were arrived at independently; he too seems impressed by the generally Eskimo character of the bone and antler industry.

Further east in the Brooks Range a locality in the Atigun valley has recently yielded a unilaterally barbed point "almost identical to the Kavik type" in association with bifaces similar to some of those from Kavik and antler rectangles "of apparently exactly the same type as Kavik specimens" (Campbell 1968: 41; Alexander 1968, personal communication in 1968).

Kavik type points have recently been found at several sites along the Alyeska pipeline alignment (University of Alaska 1970: 72, 91, 127) and in one of Clark's Batza Tena sites near the Koyukuk River (RlIg-33, D. Clark, personal communication in 1972).

Continued research in the Brooks Range between Anaktuvuk and Old Crow should being to light a wealth of interrelated material of this kind.

More Distant Areas

A collection of 15 artifacts catalogued NbTu-1 is in the National Museum collections and attributed to MacNeish's 1954 field work, but the location of the site is unknown. Judging from its Borden designation the site must be in the Mackenzie delta vicinity, and the presence of a thick sherd of grit-tempered pottery and two pieces of edge ground slate suggests that it represents an Eskimo occupation. Other artifacts, however, include two unilaterally barbed points which appear to be leister side prongs and a well made bifacial stone arrowhead (NbTu-1: 9) with a slightly contracting stem nearly identical to the Klo-kut example in Plate 6n. Elsewhere in the same general region McGhee (personal communication in 1970) has recently obtained from the Kittigazuit midden several points resembling part of the Klo-kut series.

Recent work in interior British Columbia has produced a few stemmed arrowheads which resemble the Klo-kut points quite closely. Some of these represent early historic Athabaskan occupations, such as the Chilcotin occupation of the Potlatch site (FcSi-201) at Anahim Lake (Wilmeth 1969b, 1969c, 1970) and the Ulkatcho Carrier occupation of the nearby Algatcho site (FfSk-1; Donahue 1970). Somewhat less similar but possibly still within the range of variation are some of the points attributed to the Carrier occupation of Natalkuz Lake (Borden 1952).

In view of the similarities between the Klo-kut points and those from southwest Yukon attributed to the Stott type by MacNeish (1964), it might be expected that some resemblance would be found between the Klo-kut points and those from the Stott site in Manitoba which was the type site for the Stott type. Instead I wish to call into question MacNeish's (1964) extension of the type to the Yukon, because most of his Yukon specimens bear only a vague resemblance to his Manitoba examples and do not fit his original definition of the type (MacNeish 1954: 40). Indeed the Yukon "Stott" point most similar to the Klo-kut points is described as "aberrant" (MacNeish 1964: Fig. 88, no. 1), and only a few of the others should be compared with examples from Manitoba.

Conclusions

A number of other specific trait similarities could be traced across large areas and through many millennia, but it does not seem particularly useful to do so at the present time. Such artifact types as beamers, end of the bone scrapers, certain forms of stone end scrapers, peculiar types of awls, boulder spall scrapers, grooved adzes, and tabular tci-thos are so widespread as to defy any simple explanation for all their occurrences. I would rather not add to the growing list of ubiquitous "traditions" since most of them will have to be subdivided anyway if they are to contribute significantly to our understanding of culture history. I think it preferable to restrict our comparative comments to particular distributions which appear to represent a specific problem requiring definition and solution. Then our research should proceed from known to unknown, preferably by systematic survey from one drainage basin to another, so that the archaeological map ceases to resemble a dart board and beings to take on the characteristics of a mosaic.

One such problem which is emerging from recent work concerns the distribution of the stemmed point forms found at Klo-kut and Kavik. These forms appear to be distributed throughout most of the Brooks Range, and they extend south through the Yukon and possibly as far south as the west-central interior plateau of British Columbia. This distribution is quite sketchy at the moment, but it suggests a montane association linked with caribou hunting and possibly representing at least a part of the late prehistoric Athabaskan developments throughout much of northwestern North America. It would not be surprising if the Kavik point eventually proves to be a diagnostic Athabaskan type, but it will not, apparently, be present in all Athabaskan contexts, even in all those of the Pacific drainage.

This suggestion should be developed into a testable hypothesis before any rash statements are made concerning the significance of the point type. But even the suggestion poses certain problems which can be mentioned in rather vague terms but which cannot yet be clearly defined. For example it becomes even more difficult to explain the sudden appearance of the Kavik type in the Late Prehistoric period at Klo-kut; what does the Early Prehistoric period represent in view of the general continuity of technology, typology, and style? If the bone and antler industry of Klo-kut can be regarded as Eskimo-like in any meaningful way, how did the distinctively Indian (?) Kavik stone arrowhead become associated with the industry and what does the association mean with respect to the origins and development of prehistoric Athabaskan cultures? Some of these problems will be further discussed in the following chapter.

VIII. SUMMARY, CONCLUSIONS, AND PROBLEMS

On the basis of the descriptions and discussions in the foregoing chapters it is now possible to address ourselves to several important questions of rather broad scope, but the reader should be forewarned that I am more inclined to define problems than to formulate answers when faced with incomplete and sketchy evidence. Among the questions to be considered are the following: (1) the ethnohistorical evidence bearing upon the identity of the occupants of Klo-kut and other sites in the middle Porcupine region; (2) a comparison of the Klo-kut inventory with the material items documented ethnographically for the Vunta Kutchin; (3) an overview of subsistence economy and settlement patterns and their development through time; and (4) the origin and larger relationships of the technology represented at Klo-kut and elsewhere in the region. Each of these questions will be considered in turn in an effort to fit the later prehistory of the middle Porcupine region into the context of the recent culture history in northwestern North America.

Ethnohistory and the Direct Historical Approach

Klo-kut has been widely regarded as a "Kutchin site" or even a "Vunta Kutchin site" for several years now (Campbell 1968, Hall 1969, Irving 1967), and I believe this interpretation was justified even if based in some cases upon scant information. As I noted in Chapter VI the ethnographic evidence upon which one can base analogic arguments is slim and uneven; for certain kinds of bone implements it is possible to trace types in use today back through time as far as our record takes us, but we know almost nothing about the early historic manufacture and use of most kinds of stone tools.

Another important kind of evidence, however, consists of the stories told today in Old Crow about Klo-kut and other localities bearing archaeological material. There are stories centering primarily upon Klo-kut, and there are others which refer to Klo-kut in connection with events which took place elsewhere. Perhaps the most noteworthy of these stories is that which describes the final demise of a culture-hero named Kaihenjik. Several people at Old Crow have told me of reports they heard from their fathers and grandfathers that Klo-kut was a major Kutchin village over a hundred years ago. The locality must have been known to people scattered over a very large area, for "four nations" of Kutchin gathered there to defend themselves from a giant man called Kaihenjik. Young men were trained to negotiate a high log bridge which spanned the gully between the village and First Island, and these young men would camp on the island as lookouts who could hurry back across the log and warn the village if Kaihenjik approached (this particular detail may indicate the extent to which erosion has advanced since the time of the story, because such a bridge would now exceed in length any tree known to grow in northern Yukon Territory!). At last one day Kaihenjik arrived and in the ensuing battle killed nearly all the Kutchin camped at Klo-kut. He was so large and tough that he laughed as the piercing arrows tickled his flesh, and, after the battle, he pulled the arrows from his body and built a fire with their shafts (I have frequently been asked why no "man bones" have appeared in the Klokut excavations, and it is widely assumed that I have not yet dug deep enough). Kaihenjik then left the area and journeyed to a cliff above Fishing Branch on the upper Porcupine where he met his two brothers who had been hunting. All three were eventually tracked down by the few surviving Kutchin, and two brave warriors managed to vanquish the lot at the cost of their own lives.

In Chapter VII I mentioned the journey by William Chitze's father who arranged a marriage for Chitze with a girl at Klo-kut. Another story tells of a desperate trek across Schaeffer Mountain by part of a starving hunting band seeking aid from people at Klo-kut. These stories indicate clearly that the occupants of Klo-kut during the Historic period and, probably, the Late Prehistoric period were the ancestors of the Vunta Kutchin of the present village of Old Crow. The fragments of material continuity -- bone beamers, end-of-the bone scrapers, tabular *tci-de-tho*, bark vessels, the use of hematite as red paint, certain forms of bone awls, stories concerning the use of stone adzes, and the presence of adze-cut stumps -- lend confirmation to this ethnohistorical evidence, and they are inadmissible as conclusive evidence only because each of these traits is widespread and cannot be regarded as diagnostic of Kutchin material culture.

To extend the argument somewhat further, I can simply reiterate that there is both general and specific continuity throughout the Klo-kut sequence: general continuity in the manner of working bone, bark, and certain forms of stone; specific continuity in the distributions of specific types of stone scrapers, bone beamers, bone awls, bone projectile points, and other artifact forms. This continuity is in contrast only to the apparently sudden appearance of bifacial stone working techniques in the Late Prehistoric period. Statistically the absence of stone bifaces in the Early Prehistoric period is highly significant; if we phrase the distribution in terms of a prediction based upon the Late Prehistoric period, at least twelve stone arrowheads would be expected in an Early Prehistoric period sample of the size now available from Klo-kut. It seems highly unlikely that even a generous margin of chance could accomodate a dozen missing stone arrowheads, and the absence of trimming flakes among the Early Prehistoric unretouched flakes makes it clear that bifacial stone working techniques were not in use at Klo-kut until the Late Prehistoric period.

The only other major change in the technology at that point in time is the sudden decline in the frequency, both absolute and relative, of cut bark. Presumably this change could be brought about by the progressive elimination of birch from the immediate area of Klo-kut. Overcutting of birch in this area could lead to a concentration of bark working in other areas of the middle Porcupine drainage, but I would still expect a representative sample of bark artifacts to be deposited at Klo-kut. The nearest large stands of birch are now two to three miles upriver, near the Second Caribou Lookout, and none of the tress is especially large.

There may, however, have been climatic variables which played a role in reducing the abundance of birch bark in the Late Prehistoric period. A southward displacement of treeline in central Canada, beginning around 900 years ago (Bryson *et al.*1965), cessation of peat growth about 600 years ago at Ennadai Lake, in southern Keewatin (Nichols 1967a, 1967b), oxygen isotope measurements from the Camp Century ice core in Greenland (Dansgaard *et al.*1969), and indications of lowered temperatures and increased moisture at Melville Sound and Bathurst Inlet (Terasmae 1968: 16) all point toward a southward displacement of the front of the Arctic air mass. This displacement, with other meteorological variables, culminated in the Neo-Boreal climatic episode of 1550-1850 A.D. in the temperate zones (Bryson 1966;

Bryson and Wendland 1967: 296) and the so-called Little Ice Age in the North (Terasmae 1968: 18). Paradoxically the evidence for some of these changes includes a peak in the birch pollen diagrams (Terasmae 1968: 16, Fig. 3), but this birch pollen probably represents dwarf birch (*Betula nana*) rather than the paper birch (*Betula papyrifera*) from which the Klo-kut birch bark was obtained; the taxonomic complexities of the genera *Betula* (birch) and *Salix* (willow) pose difficult problems for palaeoecological studies of Alaska and the Yukon (Terasmae 1967: 8). Obviously such suggestions as these should be based at least in part on local evidence of changes in the pollen rain and fluctuations through time in macrofossils obtained from Klo-kut and other sites, but this aspect of our work in northern Yukon has just begun. On the other hand the evidence of flooding in Klo-kut Zone B may in itself be an important indicator of lowered temperatures and increased moisture since both of these variations would tend to increase the likelihood of high water at breakup associated with temporary ice dams. The major spring floods of the last forty years have invariably been associated with ice dams downstream from the flooded area.

Returning for a moment to the appearance of bifacial technology in the Late Prehistoric period, it is significant that several widespread population movements appear to have taken place in the western Brooks Range as a cooling trend began sometime during the last millennium. W.N. Irving (1964: 323), for example, assigns his Late Prehistoric Eskimo material at Itivlik Lake to the "latter half of the present millennium" and remarks that "If the climatic history of the Brooks Range followed the pattern of warm and cool periods noted in other parts of the world, the Late Prehistoric Eskimos moved there from the coast at about the time the climate there changed from relatively warm to relatively cool." Likewise Campbell (1962: 52) has noted that the Nunamiut of Anaktuvuk Pass have not lived there "for more than a few generations." The significance of these observations will become apparent below.

In view of the overall continuity which characterizes the Klo-kut sequence, and in view of the probable existence of climatic parameters which can help to explain the major changes in the sequence, I am inclined to regard the entire archaeological record from Klo-kut as representative of the ancestors of some of the Kutchin Athabaskans. Obviously this is the most parsimonious interpretation, and I do not think there is any evidence of a population replacement which would seem to me to be a necessary condition for a linguistic replacement of such a recent age as the Klo-kut Late Prehistoric period. On the other hand we do not yet know how refined can be our archaeological identifications of historically documented cultural groups. Though I think it prudent to identify the occupants of Klo-kut as Kutchin, I do not feel confidence in their identification as Vunta Kutchin; I suspect that any such high resolution of the prehistoric record will come from reconstructions of subsistence and annual cycle rather than from technology and typology. Future work in the Chandalar, upper Porcupine, and Peel River regions should provide a basis for assessing our ability to distinguish the several Kutchin groups on the basis of archaeological remains.

What is missing at Klo-kut?

Having identified the occupants of Klo-kut as prehistoric Kutchin Athabaskans, it seems worthwhile to consider briefly what aspects of their ethnographically documented material culture are missing in the site. Irving (1967) posed this question following the 1966 excavations, and it is noteworthy that two of the items in his list -- blunt arrowheads and weapons for killing caribou -- appeared in the following two seasons of work. The long, unbarbed lance heads (e.g. MjVl-1: 245, 787) were probably used for killing caribou according to statements by informants in Old Crow and by Leechman (1954) that caribou were stabbed repeatedly with lances wielded by men in bark canoes. I would also be inclined to identify many of the barbed bone points and the stone points as arrowheads used for killing caribou which reached the river bank and left the water; the forms of the tangs on these projectiles suggest that they may have been hafted in such a way that the shaft could fall free and leave the point in place.

Most of the items which are still missing from the collection were likely made of wood and thus were not preserved. These include boat parts, drying racks, house frames and many portable artifacts. Furthermore the bone artifacts in the collection include many diverse forms which must represent a wide variety of functions, but I have not felt that it is justified to classify them in functional categories without evidence obtained from local ethnography. On the other hand, a re-examination of these specimens, with somewhat relaxed restrictions on my methodology, would not produce very many more functional categories than I have named already. Some of these discrepancies can be corrected through inferences based upon experimentation with bone cutting and use. Others, such as the form and size of structures, can be remedied by excavations of broader scale designed to expose large living areas in which the distributions of bones and artifacts will reveal activity areas. It is not out of the question that a water-logged deposit can be found somewhere in the middle Porcupine area, but I would be surprised to discover a productive deposit of this kind at Klo-kut.

Subsistence and Settlement Patterns

I have little to add to the descriptions of the annual cycle provided in Chapter IV (pp. 83 ff.), but it may be useful to reiterate its salient characteristics, to make more explicit the sources of our information for its components, and to define certain problems which may stand in the way of further elucidation of the cycle. Obviously the season best represented in our archaeological samples is the spring. Both archaeological and ethnographic evidence converge to indicate spring season occupations of fairly large villages along the Porcupine River where the north-bound caribou migration could be intercepted. Klo-kut repeatedly comprised such a village for over a millennium, and the Rat Indian Creek village (MjVg-1) may represent the same kind of settlement. One statement in the literature (Leechman 1954: 6) attributes this hunting pattern to "August or early September when the skins are best," but other evidence suggests that the fall hunt took place around the northern rim of Old Crow Flats where the caribou surrounds are located. It is possible that both these statements are correct but refer to different time periods or to alternatives which were selected from year to year. As I indicated in Chapter IV we have no clear evidence that surrounds were utilized in prehistoric times, because all three examples examined thusfar were made primarily with poles cut with metal axes. An older surround might not be preserved, but we have at the moment no basis for determining the time depth of this technique. The ethnographic evidence is quite uneven with respect to communal hunting techniques, because different authors have emphasized different techniques for the Vunta Kutchin. Leechman (1954: 6-10) concentrates exclusively on caribou hunting along the river and makes no mention of surrounds; Balikci (1963b: 15-19) describes surrounds in detail and makes only brief mention of communal hunting along the river; and Osgood (1936b: 33-34) describes only individualistic hunting techniques specifically for the Vunta (Crow River) Kutchin, and his cross-reference to his Peel River data describes surrounds but not communal hunts at river crossings. Furthermore I take strong exception to Osgood's (1936b: 31) statement that "The cycle of the seasons is almost identical with that of the Peel River tribe"; this is physiographically impossible as well as historically inaccurate.

I would like to offer one fragmentary hypothesis which might help to clear these muddied waters. Obviously if a communal hunt is to be successful it is necessary to intercept a caribou migration when the herd is fairly compact. This condition is probably best met in the spring as the herds approach the Porcupine River, for they tend to follow certain ridges and tributary valleys which lead north to the Porcupine. In the fall they likewise follow streams on the Arctic slope which lead to low passes in the mountains flanking the Flats, and they enter the northern rim of the Flats in relatively compact herds. Then in either season they are faced with alternative routes of travel: they can strike out across the broad expanse of the Flats itself or they can follow the hills which surround the Flats. In fact what little evidence I have on this point suggests that they do both, i.e., that the herds begin to fragment with some animals going one way and others going another. The Flats appear to act as a sort of spreading ground which disperses the herds somewhat and causes them to subdivide into smaller groups; the caribou forage over a very broad area as they cross the Flats, but during the past two years they have badly overgrazed a swath about 20 miles wide centered on the bed of a winter road which was cut across the Flats in the winter of 1969. The noticeable effects of their overgrazing along the road which now channels their movements are among the clearest indications that they previously dispersed as they crossed that broad flat expanse. On this basis I suggest that the pattern of hunting along the river in spring and along the northern rim of the Flats in fall may have considerable time depth and represents an adjustment to the fluctuating density of the migratory caribou herds. This hypothesis should be testable with comparative faunal analysis from village sites in both areas. Unfortunately we have not yet found a major village site along the northern rim or one which is thought, regardless of location, to have been occupied primarily in the fall.

Our archaeological sample provides a dim glimpse of summer activities and their role in the annual cycle. The two fish trap sites in Old Crow Flats should, on the basis of ethnographic data, typify the season, but the Cadzow Lake sites (MjVi-1, MjVi-2) may offer an example of a viable alternative to failure in late spring and early summer resources. Thusfar we have not sampled the winter season, and the unlikelihood of burying a winter occupation in frozen country may forever limit our understanding of prehistoric winters. Informants in Old Crow have described Potato and Surprise Creeks, in the southern rim of Old Crow Flats, as important wintering grounds, and Balikci (1963b: 16) has mentioned the area south of Porcupine River, in the direction of Lone Mountain, as an important place to find the caribou herd in the winter. Neither of these areas has yet been surveyed on the ground; I have flown over the Potato-Surprise Creek area and regard it as forbidding country for summer travel, but a survey might be made by helicopter if the necessary funds were available.

Presumably the summer and winter camps were somewhat smaller than those of spring and fall, if only because the large-scale communal effort required to operate a surround or effectively intercept a herd at a river crossing would require more people than the operation of a fish trap or the exploitation of scanty winter resources and stored provisions. The Vunta Kutchin may have been dispersed into smaller bands during summer and winter, and several such bands might have recombined to form a larger community in spring and fall. It must always be remembered, however, that membership in such bands was notoriously fluid, and their size probably fluctuated as well. On the other hand, informants in Old Crow have repeatedly remarked to W.N. Irving (personal communication in 1970) that the people did not split up into little groups or families during the winter but stayed together to help one another and to take advantage of the guidance of a strong leader; Irving has noted that this pattern is in marked contrast to the extreme fragmentation of Nunamiut Eskimo communities during the winter months.

These basic subsistence and settlement patterns, or something like them, must have characterized both the Early and Late Prehistoric periods since there is no evidence suggesting a major change from one period to the other. The Historic period, however, brought significant changes which culminated in the nucleated settlement patterns of the present day. I agree with Welsh

(1970) that the existence and stability of Old Crow as a community was brought about and maintained by the presence and influence of Euro-Canadian institutions such as the store, the school, the church, and the nursing station. I would add that Old Crow more or less sprang into existence from the shattered remains of New Rampart House which was devastated by a smallpox epidemic in 1912 (see Chapter II), but for many years it was not the only community of its kind on the Porcupine River in the Yukon. Johnson village, Whitestone village, and even, possibly, a reoccupation of La Pierre House in the late 1930's might have offered competition for the distinction of being the only lasting community in northern Yukon Territory. That there could be only one should have been obvious from the start: with a population of only 200 native people the white taxpayer was not likely to provide Euro-Canadian goods and services to more than one locality on the river.

What is more important in the present discussion is whether the tendency toward nucleated settlement had begun by the time of the Historic period at Klo-kut and whether the subsistence economy had been markedly altered by that time. I am inclined to interpret the Historic period at Klo-kut as a continuation, with very little modification, of the prehistoric patterns apparent earlier in the profile. As shown in Chapter VI there is a significant increase in the absolute and relative frequencies of fish and rabbit bones in the Historic period and a corresponding decrease in the reliance on caribou. The occupation(s), however, appears to be season-specific for the spring, and most of the aboriginal technology is still in evidence though it is accompanied by a small number of Euro-Canadian trade items.

If the influence of contact is interpreted as slight, it becomes worthwhile to assess the date of the Historic occupation(s) as precisely as possible in order to link it (them) with the history of trading posts in the region (see Chapter II). I have not isolated in the description or in the analysis more than one historic occupation, but I think a larger sample would support a subdivision into at least two major occupations in the Historic period; these would correspond respectively, with Layers I and II of the 1968 excavations in the W100 and E100 blocks. The artifact affording the most recent maximum age appears to be the single cartridge case from Irving's Layer 1 in the E100 block.

> Between 1870 and 1875, 215,704 revolvers as well as ammunition for the same were manufactured, fulfilling a contract with the Russian government. Machine made, and thus fairly common, it was chambered by Smith & Wesson initially, for use in this .44 Smith & Wesson Russian model 3 Single Action revolver. However,... the Smith & Wesson model .44 calibre hand ejector - 2nd model, was also chambered for this cartridge in North America (Stephens 1972: 4-5).

Informants in Old Crow have said that the first 44-cal. firearms to reach the middle Porcupine area were obtained from whalers wintering over at Herschel Island around 1894, the year after Hudson's Bay Company abandoned New Rampart House. The final aboriginal occupation of Klo-kut must, therefore, date from 1894 or later, but I would guess it was not much later. Another specimen for which I have established a maximum age is the square-cut nail. This nail appears to have been of a form called common cut, size 9d, and was machine-made indicating a post-1830 date; such nails were almost completely replaced by wire nails made of Bessemer steel by 1890 (Fontana 1965; VanStone and Townsend 1970: 98). Dating of the other historic artifacts also indicates an occupation in the latter half of the 19th century.

On the basis of these dates it seems safe to suggest that the introduction of historic trade goods to Klo-kut did not begin before Murray's 1847 construction of Fort Yukon. Certainly Murray (1910) seems to have found everyone in the area very little touched by Euro-Canadian practices and artifacts, and I doubt that the people of the middle Porcupine had the rifles which Murray found in use at the mouth of the stream. The marginal nature of these early historic influences must have been due simply to the long distances which separated Klo-kut from any of the new trading centers. Informants in Old Crow have often spoken of the long journeys made by a prominent hunter or chief for the purpose of retrieving Euro-Canadian trade goods which he could distribute upon his return, and such patterns are also described by Murray (1910) himself. Thus I think it likely that (1) the beginning of the Historic period at Klo-kut dates to between 1850 and 1880 A.D.; (2) there may have been a shift in settlement to New Rampart House after it was established on the Alaskan border, ca. 1880; (3) a second historic occupation of Klo-kut may have occurred around 1894, following the abandonment of New Rampart House by the Hudson's Bay Company; (4) the bulk of the population may have returned to New Rampart after Cadzow opened his store there in 1904; and (5) the village of Old Crow owes its beginnings around 1912 to the smallpox epidemic which struck New Rampart. This sequence of events leaves out the reported large village near the mouth of Old Crow River, but such a village might have been occupied in the summer season after the caribou hunt at Klo-kut and thus would not have affected the basic pattern as I have outlined it. In any case the shift from seasonal camps to a more stable, nucleated pattern of settlement must have been spread out over a period of at least half a century; even so the entire change may have occurred within the lifetime of many individuals and for them it must have been a rather disruptive process.

Some of these suggestions will be examined in more detail as the historic sites of the region are fully analyzed, but I would rather defer that aspect of the Kutchin story for a later discussion. It will be quite worthwhile eventually to link the archaeological record with the ethnographic data being assembled by Welsh (1970), for an overall view of culture change should emerge from such an effort.

Origins and Larger Relationships

Discussions of "Athabaskan origins" have become quite popular in the last few years, and they seem to have taken place on at least two levels of analysis. On a very broad level are the efforts to trace the rubric of "Athabaskan prehistory" through its development from some older "tradition." MacNeish (1964) is usually credited with having postulated continuity from his Northwest Microblade Tradition to his Denetasiro Tradition, though in fact that is not quite what he said: "It would appear that the Denetasiro Tradition was in some way well adapted to the northwest boreal forest and that *somehow it gradually replaced* the Northwest Microblade Tradition which had previously occupied that region" (MacNeish 1964: 386, italics mine). This certainly implies continuity and development, but MacNeish does not specify the evidence for it except to list a few traits shared by the two traditions (MacNeish 1964: 383).

Cook and McKennan (1970b) have been more explicit. They have recovered two "complexes" at Healy Lake --

Denali and Tuktu -- which MacNeish would assign to the Northwest Microblade Tradition. Cook and McKennan (1970b) see a developmental sequence from Tuktu to Denali which in turn is ancestral to a

> wider ranging sphere of Athapaskan influence some several centuries after the beginning of the Christian era and possibly coinciding with the expansion to the south. It is marked by the spread of Stott or Kavik points to such places as Anaktuvuk Pass, Klokut on the Porcupine River, and various other sites in the Yukon Territory. Although this phase is not present in the two sites we have excavated to date it is quite possible that it may yet appear at other sites around Healy Lake.

Tuktu, Denali, and this "wider ranging sphere of Athapaskan influence" together form the "Athapaskan Tradition" which accordingly has much greater time depth than hitherto attributed to any identifiable Athabaskan material. This hypothesis places both microlithic technology and the distinctive Tuktu variety of notched point in the ancestry of late prehistoric Athabaskans.

Two earlier arguments, based upon somewhat different evidence, together led to a similar conclusion. Borden (1968) defined an "Early Boreal culture," the salient characteristic of which -- microblades -- could be used as a hallmark of Nadene movements into the New World in "terminal Pleistocene or early Holocene time." Dumond (1969) appended to this argument a northward diffusion of notched projectile points which together with the southward movement of microlithic technology, led to the formation of an area of Na-Dene speech [which has been] maintained as a relatively stable geographic unit, with movements...only back and forth within that area -- movements related at least in part to the maintenance of the noncoastal Na-Dene within the boreal forests (Dumond 1969: 862).

I do not wish to enter into an extended discussion of these hypotheses, since I am not yet able to replace them with anything better and since they are somewhat beyond the scope of the present topic; but a few cautionary remarks seem to be in order. Most of the samples on which MacNeish based his definitions of traditions are very small, as he himself has noted; I also have serious reservations about much of his typological scheme, particularly when it is used in comparisons with other areas. Even using his own typology, however, I have found several ways in which the integrity of his Northwest Microblade phases could be improved by resorting the sites and components. Furthermore we still know precious little about either the Aishihik complex or the Bennett Lake phase, and the evidence in MacNeish's sites for continuity from Northwest Microblade to Denetasiro is tenuous at best.

My main source of concern over Cook's and McKennan's definition of the Athabaskan Tradition is their postulation of continuity among its three phases. Cook (1968; Cook and McKennan 1970b) is well aware of the differences between the microlithic industries and distributions of Denali and Tuktu, but I would hesitate to link them in a single tradition until these differences are better understood. I think I understand the differences between Denali and the microlithic industries of Eskimo prehistory (Morlan 1970c) but I cannot find a place for the Tuktu cores in my scheme; their association with side-notched points makes them even more distinctive. A more specific problem in the present context is the presence in Denali, as well as in Tuktu, of a significant bifacial stone working industry which, of course, carries on into the final phase of the Athabaskan Tradition as documented at Dixthada. This makes the absence of bifaces in the Early Prehistoric period at Klo-kut all the more enigmatic or else suggests that the Athabaskan Tradition represented at Healy Lake applies to only some of the Athabaskans of northwestern North America. The latter suggestion is quite conceivable, I think, and it is a possibility that should be reckoned with more explicitly.

These same reservations apply to the reconstructions by Borden and Dumond, but a further note must be added in each case. Borden (1968) traces microlithic technology way to the south, onto the interior plateau of British Columbia, and along the way there are some major changes which may prove to indicate more than one origin for microlithic technology in the region. Sanger (1968: 114) has remarked that the "'northern influences' so often associated with microblades in the Pacific

Northwest, appear at present to be limited to microblades," and I have noted several serious problems with any attempt to link the cores of that region with those of northwestern North America (Morlan 1970c).

A major problem with Dumond's reconstruction is that enormous mass of "Canadian" Na-Dene (Dumond 1969: Fig. 1-2). The argument leads to much too simple a solution, though Dumond (1969: 862) regards it as "distressingly unparsimonious." It is my hope both that the complexities can be revealed and that specific regional reconstructions of lasting value can result from distinguishing the various "tribes" or "nations" of Athabaskan speakers as we attempt to reconstruct their prehistory. Certainly I would not lump with the other Athabaskans of the Yukon the very distinctive Kutchin whose linguistic divergence sets them apart from all their neighbors except the Han (Krauss n.d.). As I have implied in previous discussions the main axis of cultural historical relationship for the later prehistory of the northern Yukon points westward along the Brooks Range rather than south through Yukon Territory. This point must now be discussed at greater length.

The other level of analysis which has characterized discussions of "Athabaskan origins" is that which focusses upon a particular group of Athabaskans and attempts to trace their origins back as far as possible. Such a line of argument has implicitly characterized the work of MacNeish (1964) and Cook and McKennan (1970b), but some writers have settled upon this approach without extending their discussions to a larger scope (e.g., Wilmeth 1970; Townsend 1970; VanStone and Townsend 1970). I would like to attempt to place the prehistoric record of the middle Porcupine region in that kind of context, but it cannot be done without certain reservations. As I argued above, the Kutchin appear to have occupied the middle Porcupine drainage for at least a millennium or a little more, but I have not made any suggestions regarding their earlier prehistory. Either they were present in the region at earlier times which we cannot now identify and date or they were newcomers to the area at the time we first recognize them at Klo-kut. In either case it is difficult to determine the degree to which they had diverged from their Athabaskan relatives by that time; were they Kutchin in the sense we mean today, or is it useful or necessary to distinguish some sort of "proto-Kutchin"? This question cannot yet be answered, but several lines of evidence point westward along the Brooks Range for their nearest relatives of a millennium ago.

Hall (1969) has published a detailed account of a Nunamiut Eskimo story of contact with the Dihai Kutchin, and W.N. Irving (1969) has also collected such legends as well as very similar ones from the Kutchin point of view (W.N. Irving, personal communication in

1969). These stories indicate that the Dihai Kutchin were, only a few centuries ago, more or less isolated from the main block of Kutchin speakers to the east. As recently as A.D. 1800 the headwaters of the Kobuk River may have been their home, and they must have moved east along the south slopes of the Brooks Range, briefly penetrating Anaktuvuk Pass, prior to the arrival there of the Nunamiut, to arrive in the Chandalar River region by about 1870. By then they had been decimated by conflict with their Eskimo neighbors and soon were absorbed by the Natsit (Chandalar) Kutchin. The several convergent lines of evidence suggest that this story is substantially factual, though I would leave the dating of these events open to question. Hall (1969: 327) offers three possible reasons for the former separation of the Dihai:

(1) they could have moved there from the present-day Kutchin territory during an earlier period;
(2) they could have somehow ended up there during the very earliest migrations or population expansions of the proto-Kutchin peoples; or
(3) they could represent a remnant of an early Kutchin occupation of the entire Brooks Range.

Hall (1969: 327-328) thinks the third alternative is the most likely, though he regards it as speculative; I agree with him on both counts.

As I noted in Chapter VI the general character of the bone industry at Klo-kut as well as many specific characteristics of the bone artifacts are strongly reminiscent of Eskimo bone working techniques and types. In addition there are many other aspects of the technology which resemble Eskimo counterparts as closely as or even more closely than corresponding Indian traits in other areas. An explanation for these observations comes to mind if one thinks of the Brooks Range as continuous Kutchin territory during most of the last millennium or a little more. Such a widespread distribution for the prehistoric Kutchin, particularly since there is reason to believe that it would reach to Walker Lake on the headwaters of the Kobuk, would put them into direct contact with developing Eskimo cultures on the middle Kobuk by A.D. 1000. Previously the middle Kobuk had been occupied in turn by the American Paleo-Arctic Tradition, the Northern Archaic Tradition, and the Arctic Small Tool Tradition, followed briefly by a possible Indian culture (Anderson 1968, 1970), with which I can find very few similarities to Klo-kut. Close resemblances to Klo-kut first appear with the Western Thule occupation of Onion Portage, beginning about 1000 years ago, and they continue through all the phases of the Arctic Woodland culture (Giddings 1952). In particular, however, there appear to be close similarities between the Late Prehistoric period at Klo-kut and the Ekseavik village of about 600 years ago. These similarities consist of more than a few artifacts; indeed, if one subtracts from the Eskimo site the equipment associated with the exploitation of the sea, the remaining complex of Kobuk traits conforms closely with the Klo-kut assemblages.

With these facts in mind, I would like to propose the following hypotheses:

1. By 1000 years ago the entire south flank of the Brooks Range was occupied by groups of people engaged, at least seasonally, in the exploitation of the northern reaches of the boreal forest in Alaska and the Yukon. This kind of forest is characterized by fairly rugged terrain, intermittently dotted with large, lake-studded flats, many open areas resulting from both edaphic and altitudinal factors, and it is rich in large game, particularly caribou, and fish. The principal technological hallmarks of human adaptation to these conditions include a well developed bone industry on which much of the land hunting weaponry and fishing technology are based, extensive utilization of spruce wood and birch bark, and the use of both cryptocrystalline and microcrystalline types of stone for different kinds of artifacts. Technologically it is feasible in such a context to find local industries which lack techniques of bifacial stone knapping, because the major implement category for which such techniques are used can consist of bone and antler examples. The presence of bifacial stone projectiles in the Western Thule Band 1 occupations

of Onion Portage and in the Ahteut village of ca. 1200-1250 A.D. resulted from a long history of bifacial stone knapping reaching all the way back to the Denbigh Flint Complex. On the other hand, at the other end of the Brooks Range the Early Prehistoric period lacked such techniques, possibly because no culture ancestral to it had possessed them.

2. This broadly shared technological complex characterized both prehistoric Eskimo cultures (on the Kobuk) and prehistoric Kutchin cultures (east of the Kobuk as far as the middle Porcupine). This fact led to considerable confusion concerning the identity of the bearers of the Arctic Woodland Culture when that concept was first defined.

3. For some reason, which I cannot yet specify, the particular forms of bifacial stone points which developed in Ekseavik spread eastward as far as the middle Porcupine around 600 years ago. Indeed many of the traits shared across this broad zone became even more specifically similar from one end of it to the other. (Eventually I will attempt to quantify this statement, but it will require a detailed examination of the Kobuk collections). The introduction to the middle Porcupine of bifacial stone working techniques was associated with very few other changes. The major one was a reduction in the use of birch bark, and if climatic variables are partially responsible for the bark decline

they might also be invoked as partial explanations of the diffusion of bifacial techniques during the Ekseavik time period.

4. Sometime during the last 500 years the historic Brooks Range distribution of Kutchin, Koyukon, and Eskimo took shape. It is not clear how this may have happened, for a northward intrusion of Koyukon appears, on linguistic, ethnographic and slim archaeological grounds, to be unlikely (A. McF. Clark, personal communication in 1970). Perhaps the differentiation of Koyukon and Kutchin took place *in situ* in their respective areas just south of the Brooks Range, but such a process makes it difficult to explain how the Dihai Kutchin would have remained at Walker Lake until A.D. 1800.

In the ethnographic record there are many cross-ties between the Koyukon and Kobuk Eskimos (McFadyen 1964), and somewhat fewer cross-ties of this kind link Kutchin with the Kobuk. Linguistic evidence indicates a marked divergence between Koyukon and Kutchin, and Dihai Kutchin apparently diverged to become a very distinctive dialect of Kutchin. Regardless of this recent phase of prehistory, however, I think it likely that the southern Brooks Range should be regarded as an ecological and technological unit throughout much of the period since A.D. 500, and this unity is responsible for the similarities between prehistoric Kutchin technology, as revealed at Klo-kut, and that of the late prehistoric Eskimo of the Kobuk River. Abundant evidence indicates that the historic distributions of Indians and Eskimos in the Brooks Range are no older than a century or two (Campbell 1962; Hall 1969; Irving 1964; McFadyen 1964).

This reconstruction is not in conflict with evidence elsewhere in Alaska or in the Yukon. The so-called Stott points of MacNeish's (1964) Denetasiro tradition are found only in the Bennett Lake phase, which is universally associated with historic trade goods, and similar specimens on the interior plateau of British Columbia are also found only in post-contact sites (Wilmeth 1969c, 1970). The prehistoric collection from the Chimi site lacks these stemmed points, and their major occurrence in central Alaska -- Dixthada -- has recently been dated to A.D. 1600 (Cook, personal communication in 1972) and might well be within the range of the influences spreading eastward across the Brooks Range. Indeed, if the stemmed points spread from the Brooks Range to southwest Yukon I would expect them to follow the Yukon-Tanana upland rather than some route across the Ogilvie Mountains in Yukon Territory. Their major function probably was in the killing of caribou, and they represent an important part of the adaptation of their makers to mountain conditions. Murie (1935) has noted that the woodland caribou is primarily a mountain animal and, viewed in that light, we should expect human hunters of caribou to be oriented toward the passes and open, treeless areas of the hilly country of interior Alaska and the Yukon.

I believe this emphasis upon caribou hunting and the exploitation of rugged terrain may be a fair characterization of much of the late prehistory of most Athabaskan groups in northwestern North America. At least some of the largest villages of such groups would have centered around communal caribou hunting localities, and only in certain circumstances would such localities be found along major river valleys. I regard Osgood's (1936b: 31) emphasis upon the "salmon area" and the singular importance of fishing to be an exaggeration in the case of the Vunta Kutchin, and I suspect he over-emphasized this activity for many Athabaskan groups in Alaska and the Yukon. Perhaps partially because of this emphasis, as well as because of the logistic difficulties of travelling away from the rivers in the area, we have spent too much time searching major stream banks and not enough time walking ridge tops and small stream valleys leading to drainage divides. We must anticipate poor preservation and, possibly, small samplés in sites in rugged country, but I think the sites will better represent the major focus of prehistoric Athabaskan cultures. Admittedly Klo-kut is located on a major stream bank, but it is in one of those important situations in which the communal hunting of caribou can be carried out along a river valley. Admittedly it is a season-specific and activity-specific site, but I doubt that we will find another prehistoric village locality with so representative a cross-section of prehistoric Kutchin material culture.

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Plate 1. Historic and Late Prehistoric periods:

a. core with platform, 343.

b. core with platform, 792.

c. exhausted core, 152.

d. core with platform, 1787.

e. Type II wedge, 1A 161.

f. Type III wedge, 234.

g. Type III wedge, 1A 278.

h. Type III wedge, 1A 255.

National Museums of Canada Neg. No. J-20748-5.

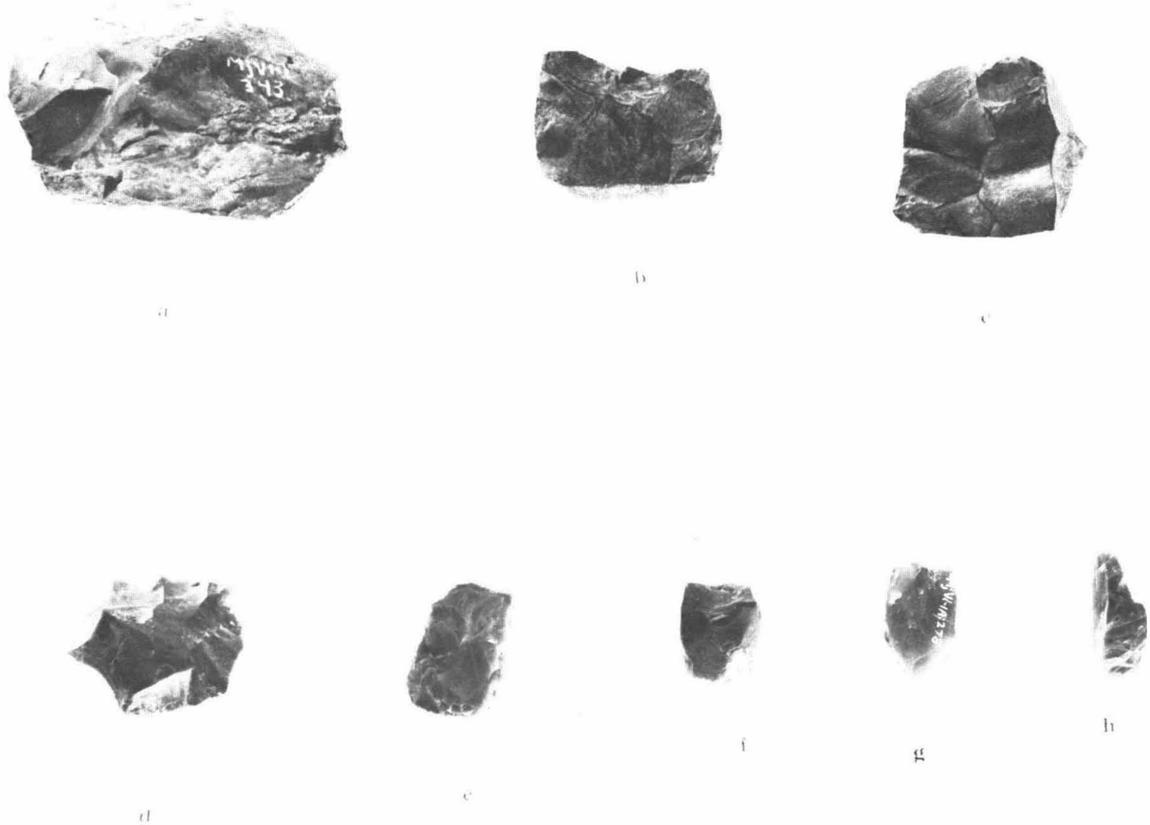
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Plate 2. Early Prehistoric period:

a. core with platform, 1A 205.

b. core with platform, 1021.

c. core with platform, 1330.

d. Type III wedge, 1542.

e. Type III wedge, 1A 71.

f. Type III wedge, 1A 330.

National Museums of Canada Neg. No. J-20748-13.


MjVI-1A
205
0
5 cm
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Plate 3. Late Prehistoric period:

a. Type I scraper, 168.
b. Type IIIb scraper, 89.
c. Type IIIa scraper, 756.
d. Type IIIa scraper, 111.
e. Type V scraper, 68.
f. Type VI scraper, 785.
g. Type IV scraper, 253.
h. Type IV scraper, 1793.
i. Type IX scraper, 23.
j. Type VIII scraper, 104.
k. Type II scraper, 25.

National Museums of Canada Neg. No. J-20748-23.

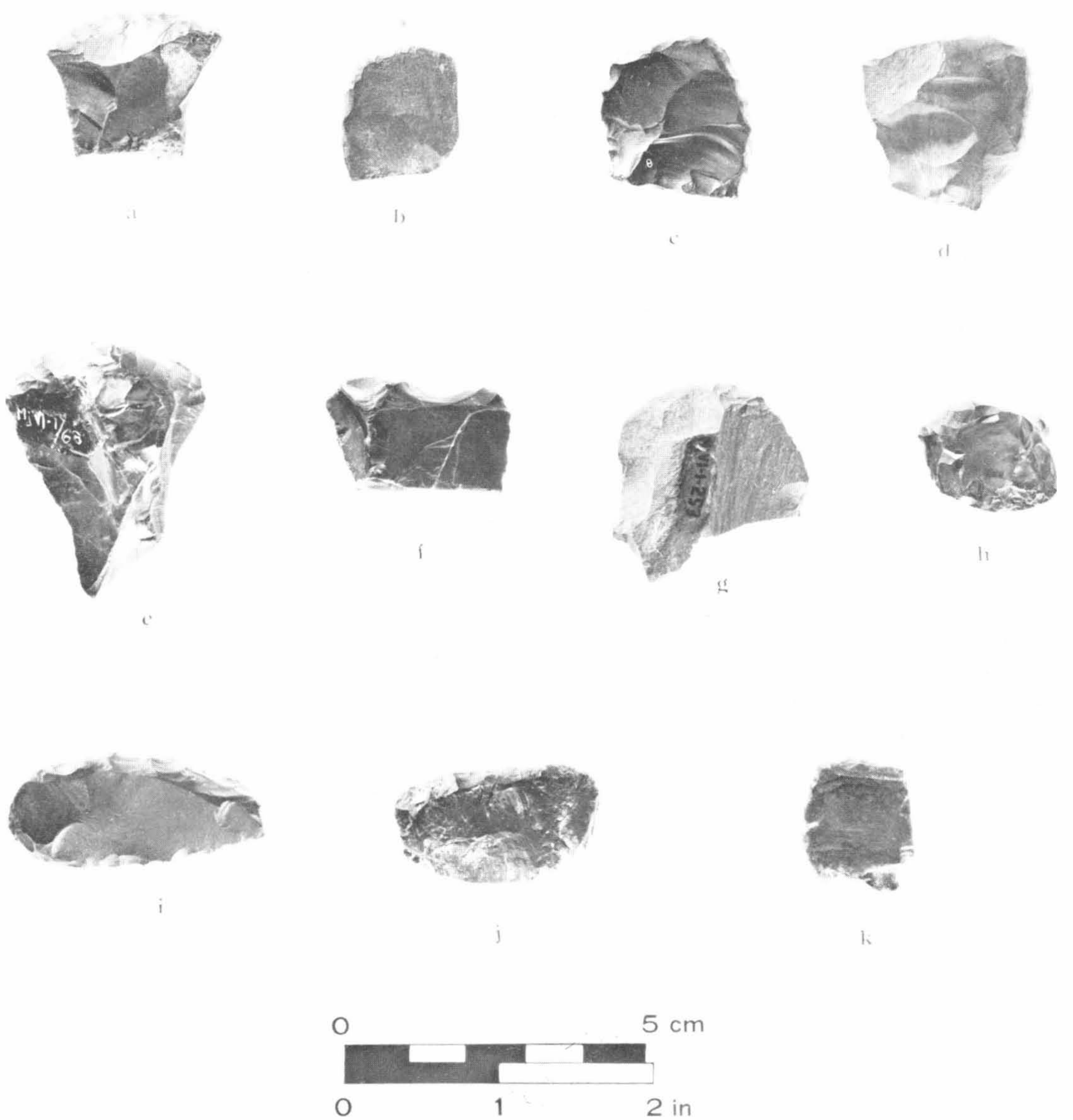
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Plate 4. Early Prehistoric period:

a. Type IV scraper, 1A 216.
b. Type IV scraper, 1A 170.
c. Type IIIb scraper, 1A 93.
d. Type IV scraper, 1A 59.
e. Type II scraper, 1A 237.
f. Type V scraper, 1A 189.
g. Type IIIa scraper, 1A 267.
h. Type II scraper, 1A 189.
i. Type II scraper, 1A 126.
j. Type IV scraper, 1A 461.
k. Type IV scraper, 1A 130.
l. Type VII scraper, 1A 300.
m. Type VII scraper, 1A 86.
n. Type VIII scraper, 1A 127.
o. Type IX scraper, 1A 267.

National Museums of Canada Neg. No. J-20748-3.

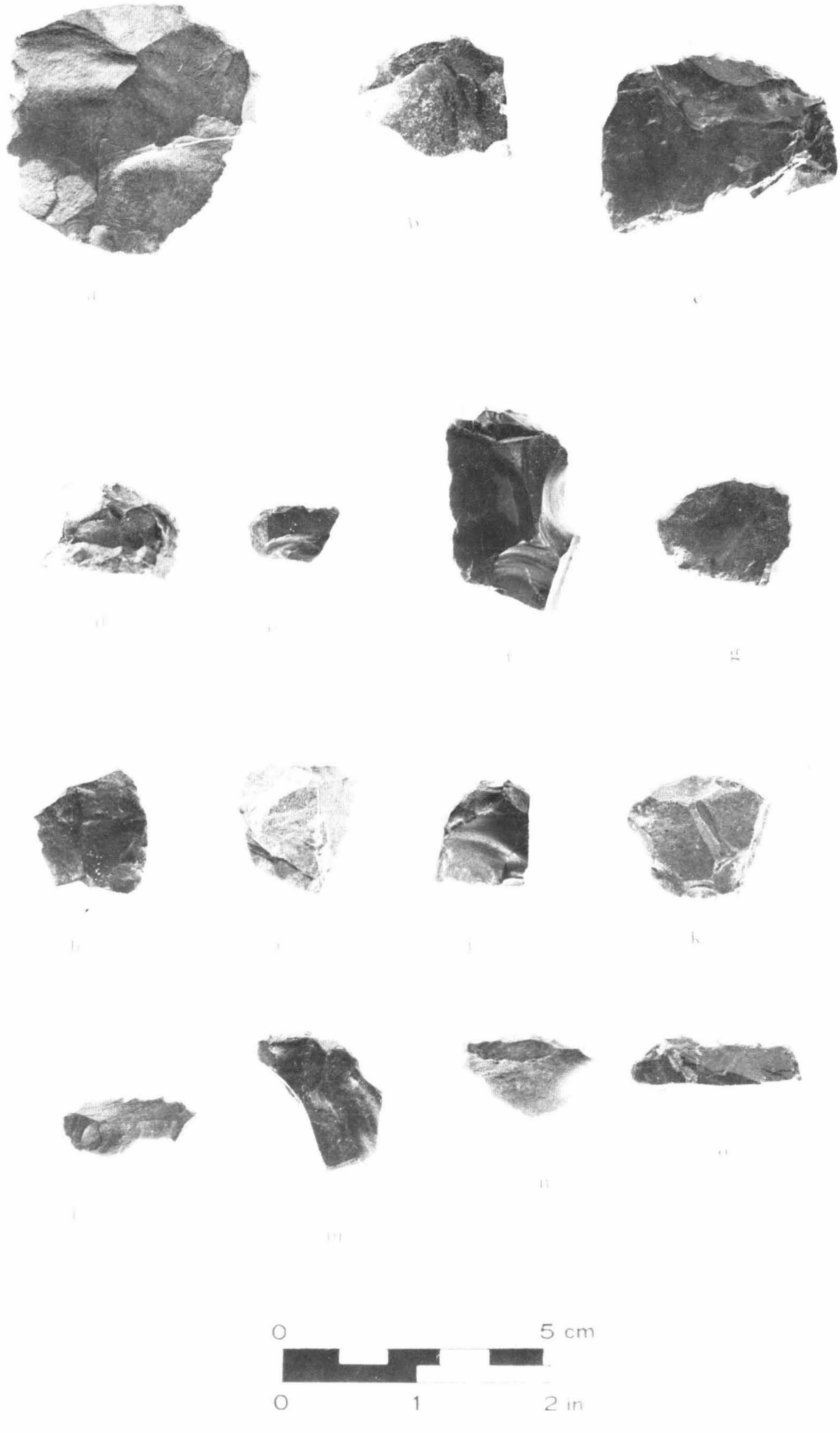
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Plate 5. Historic and Late Prehistoric periods:

a. bifacial knife (?), 781.

b. bifacial knife (?), 136.

c. bifacial drill (?), 877.

d. rough biface, 290.

e. rough biface, 17.

National Museums of Canada Neg. No. J-20748-17.

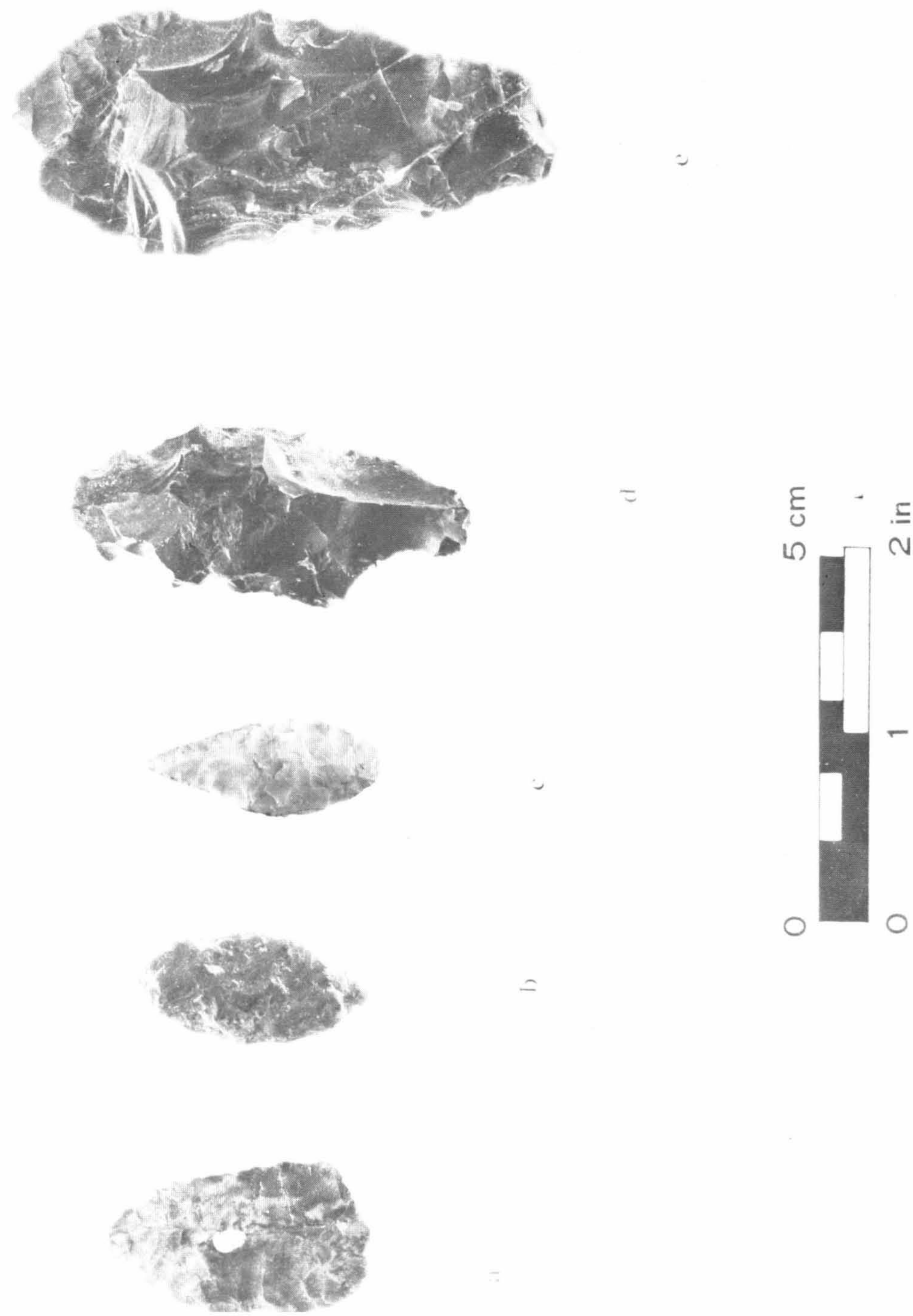
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Plate 6. Historic and Late Prehistoric periods:

a. Type III arrowhead, 1A 412.
b. Type III arrowhead, 1A 411.
c. Type Ia arrowhead, 137.
d. Type Ia arrowhead, 1A 348.
e. Type Ib arrowhead, 762.
f. Type Ib arrowhead, 1A 422 + 429.
g. Type Ia arrowhead, 1773.
h. Type Ia arrowhead, 47.
i. Type Ib arrowhead, 139.
j. Type Ib arrowhead, 1A 34.
k. Type Ib arrowhead, 69.
l. Type Ib arrowhead, 1256.
m. Type Ib arrowhead, 70.
n. Type Ib arrowhead, 153.
o. Type IV arrowhead, 266.
p. Type Ib arrowhead, 777.
q. Type II arrowhead, 103.
r. Type Ia arrowhead, 270.

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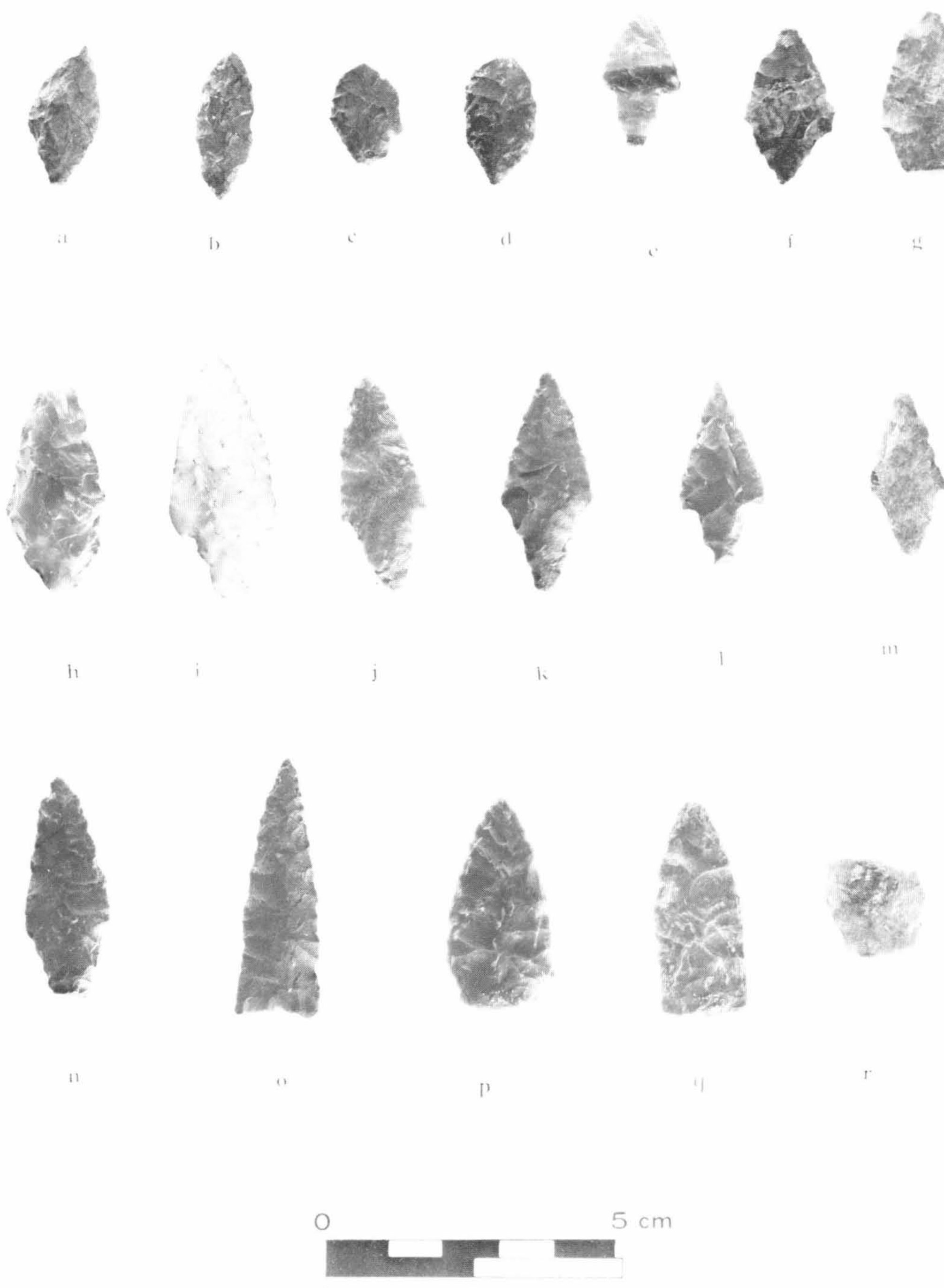
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Plate 7. Historic and Late Prehistoric periods:

a. Type I unshaped boulder spall, 442.

b. anvil chopper, 338.

c. grooved adze, 1A 423.

d. grooved hammerstone, 1A 307.

National Museums of Canada Neg. No. J-20748-20.


b
0
5 cm

Plate 8. Early Prehistoric period:

a. shaped *tci-de-tho*, 1A 326.

b. shaped *tci-de-tho*, 1A 313.

c. shaped *tci-de-tho*, 1A 465.

d. shaped *tci-de-tho*, 1A 211.

e. shaped boulder spall, 1533.

f. Type I unshaped boulder spall, 1A 28.

National Museums of Canada Neg. No. J-20748-19.

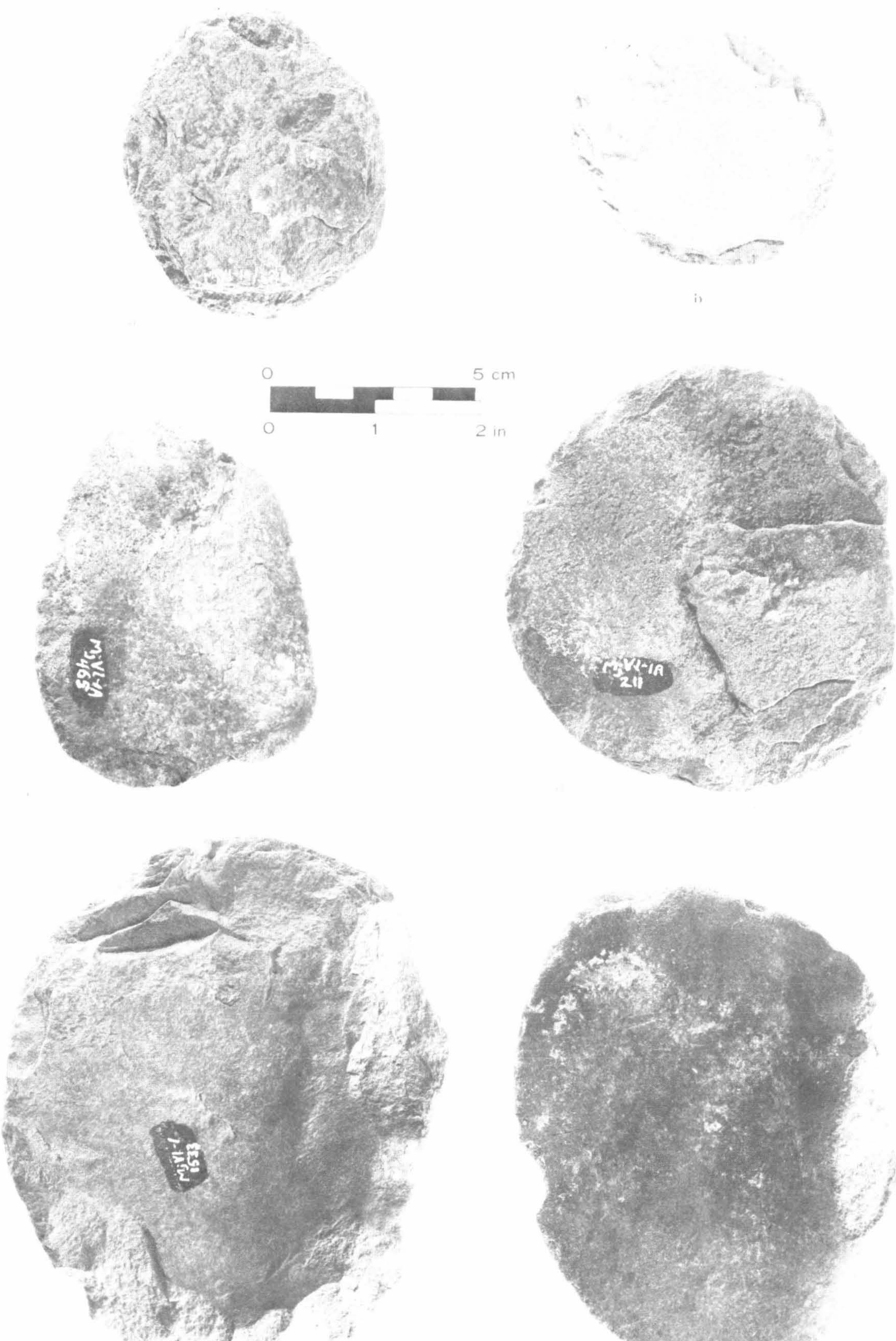
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Plate 9. Early Prehistoric period:

a. grooved adze, 398.

b. grooved adze, 1A 314.

National Museums of Canada Neg. No. J-20748-10.

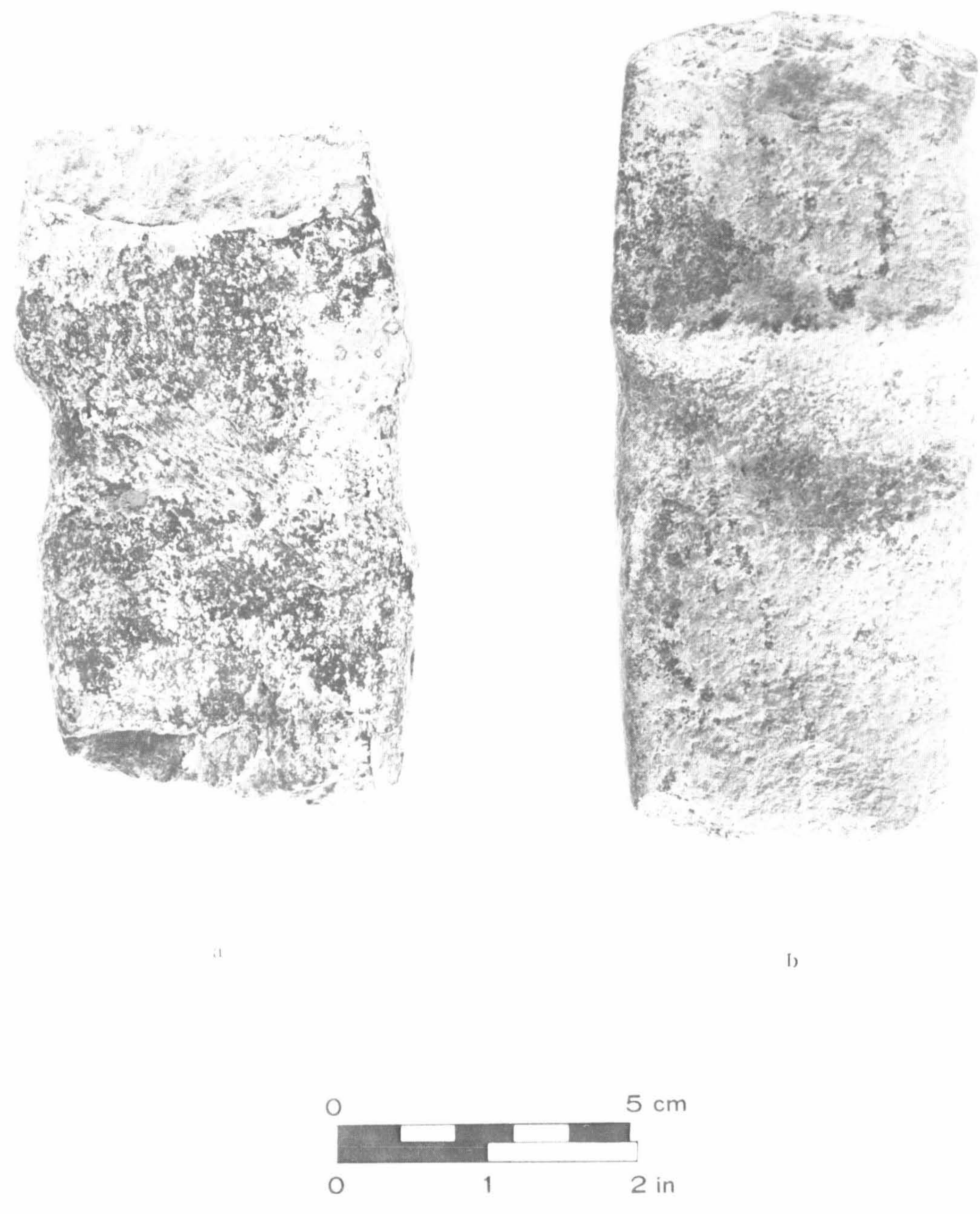
a
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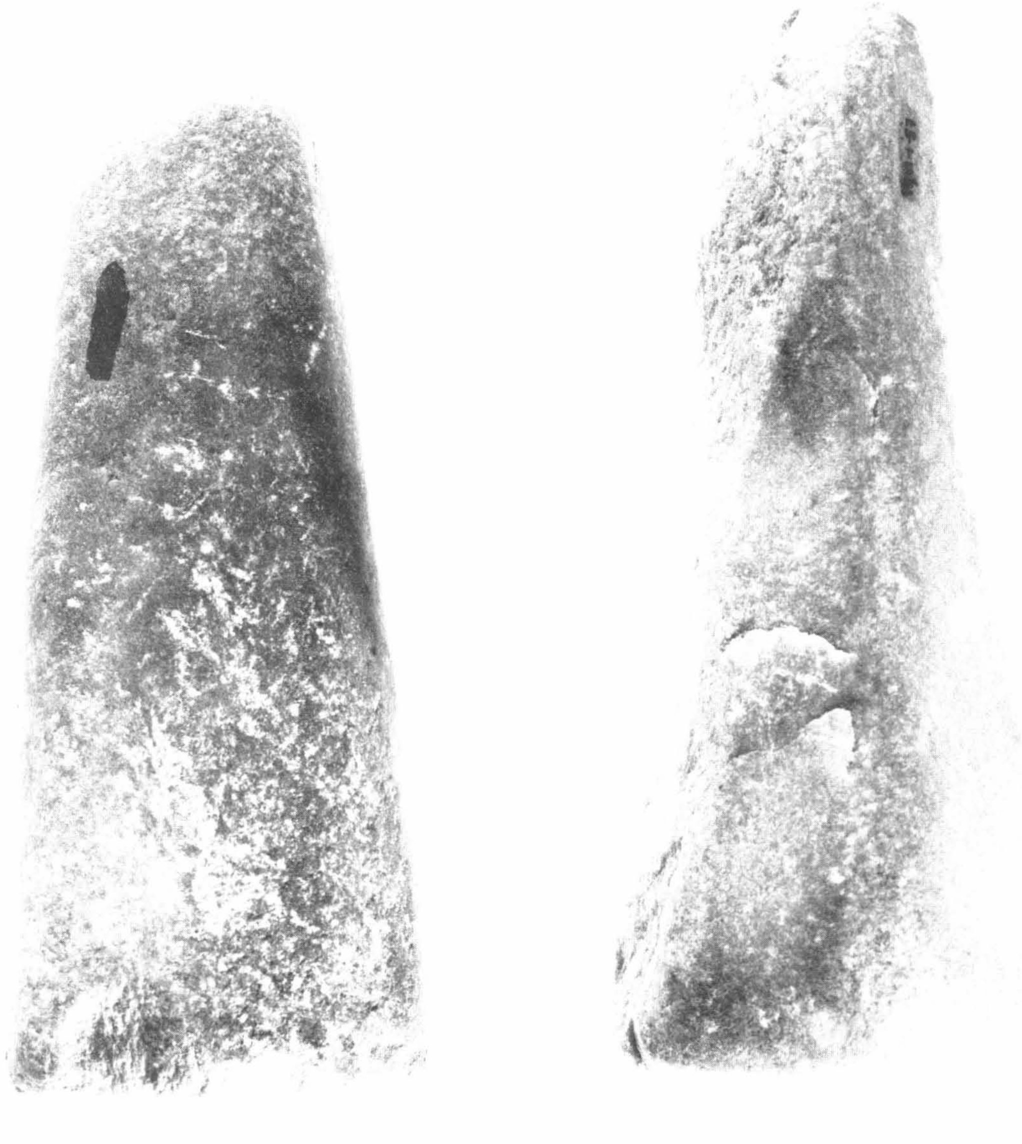
Plate 10. Early Prehistoric period:

a. pestle, 56.

b. pestle, 57.

National Museums of Canada Neg. No. J-20748-14.



b

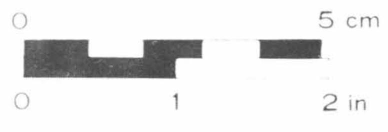


Plate 11. Historic and Late Prehistoric periods:

a. bilaterally barbed point, 277.
b. unilaterally barbed point, 161.
c. unilaterally barbed point, 267.
d. unilaterally barbed point, 279.
e. unilaterally barbed point, 1278.
f. unilaterally barbed point, 1250.
g. Type III awl, 1A 203.
h. Type I awl, 1800.
i. Type I awl, 1521.
j. Type II creaser, 415.
k. Type III awl, 10.
l. Type III awl, 135.
m. Type IV awl, 1500.

National Museums of Canada Neg. No. J-20748-15.

Plate 12. Early Prehistoric period.

a. unilaterally barbed point, 1A 350 + 352 + 353.
b. unilaterally barbed point, 1A 183.
c. unilaterally barbed point, 1323.
d. unilaterally barbed point, 1A 444.
e. unbarbed point, 787.
f. unbarbed point, 245.
g. blunt arrowhead, 1027.
h. unilaterally barbed point, 42.
i. unbarbed point, 1A 136.
j. unilaterally barbed point, 1032.

National Museums of Canada Neg. No. J-20748-16.


a
b
c
d
e
f
g
h
i
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0
5 cm
0
1
2 in

Plate 13. Early Prehistoric period:

a. leister barb, 1A 65.

b. unbarbed bedded point, 1A 64.

c. unbarbed bedded point, 1A 63.

d. unilaterally barbed point tip, 1A 123.

e. unilaterally barbed point tip, 1A 219.

f. unilaterally barbed point tip, 1A 290.

g. unilaterally barbed point tip, 512.

h. point with knobbed stem, 1087 (Late Prehistoric).

i. point with knobbed stem, 1A 208.

j. unbarbed point, 1038.

k. point with knobbed stem, 1A 262.

l. point with knobbed stem, 1A 96.

m. unbarbed point, 1A 315.

National Museums of Canada Neg. No. J-20748-8.


a
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c
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e
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k
l
m
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5 cm
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1
2 in

Plate 14. Late Prehistoric and Early Prehistoric periods:

a. ornamented beamer, 786.

b. ornamented beamer, 1A 464.

c. ornamented beamer, 1531.

National Museums of Canada Neg. No. J-20748-18.

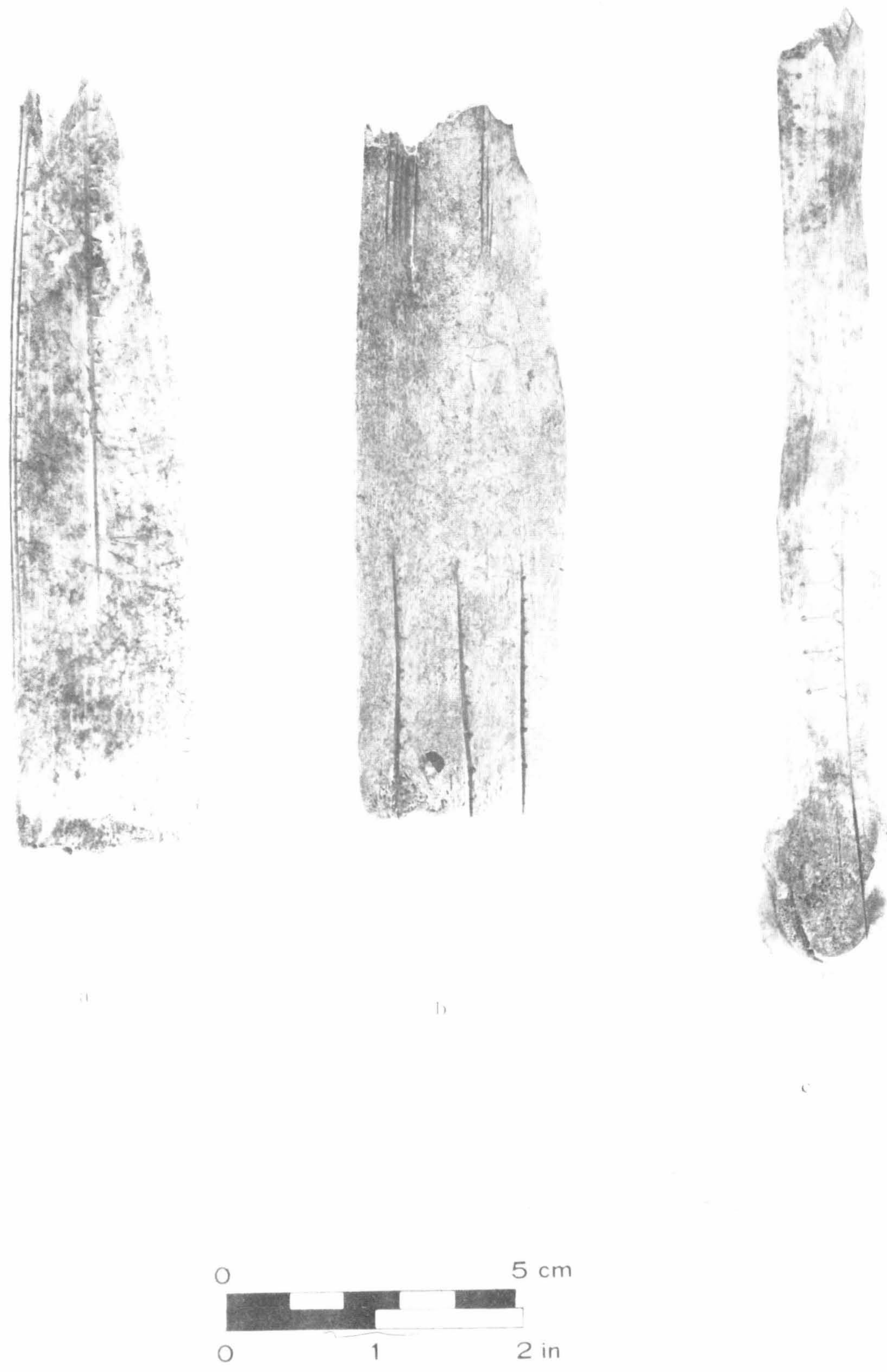
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Plate 15. Historic and Late Prehistoric periods:

a. beamer, 1552.

b. beamer, 110.

c. beamer, 503.

d. beamer, 1A 303.

National Museums of Canada Neg. No. J-20748-11.

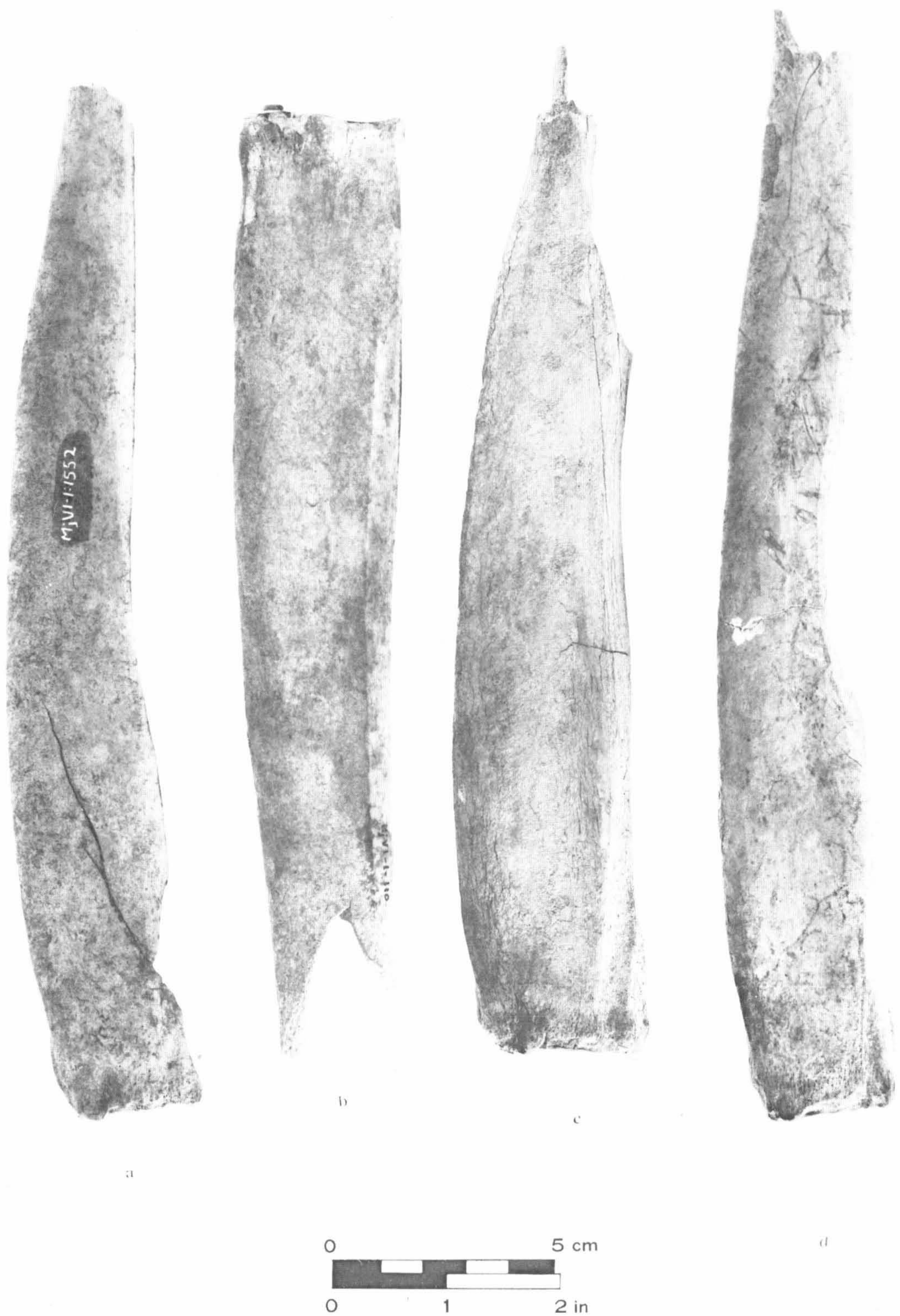
MJVI-1:1552
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Plate 16. Historic and Late Prehistoric periods:

a. coronally split metapodial, 178 + 1085.

b. coronally split metapodial, 1A 72.

c. coronally split metapodial, 4.

d. quartered metapodial, 67.

e. quartered metapodial, 1560.

National Museums of Canada Neg. No. J-20748-9.

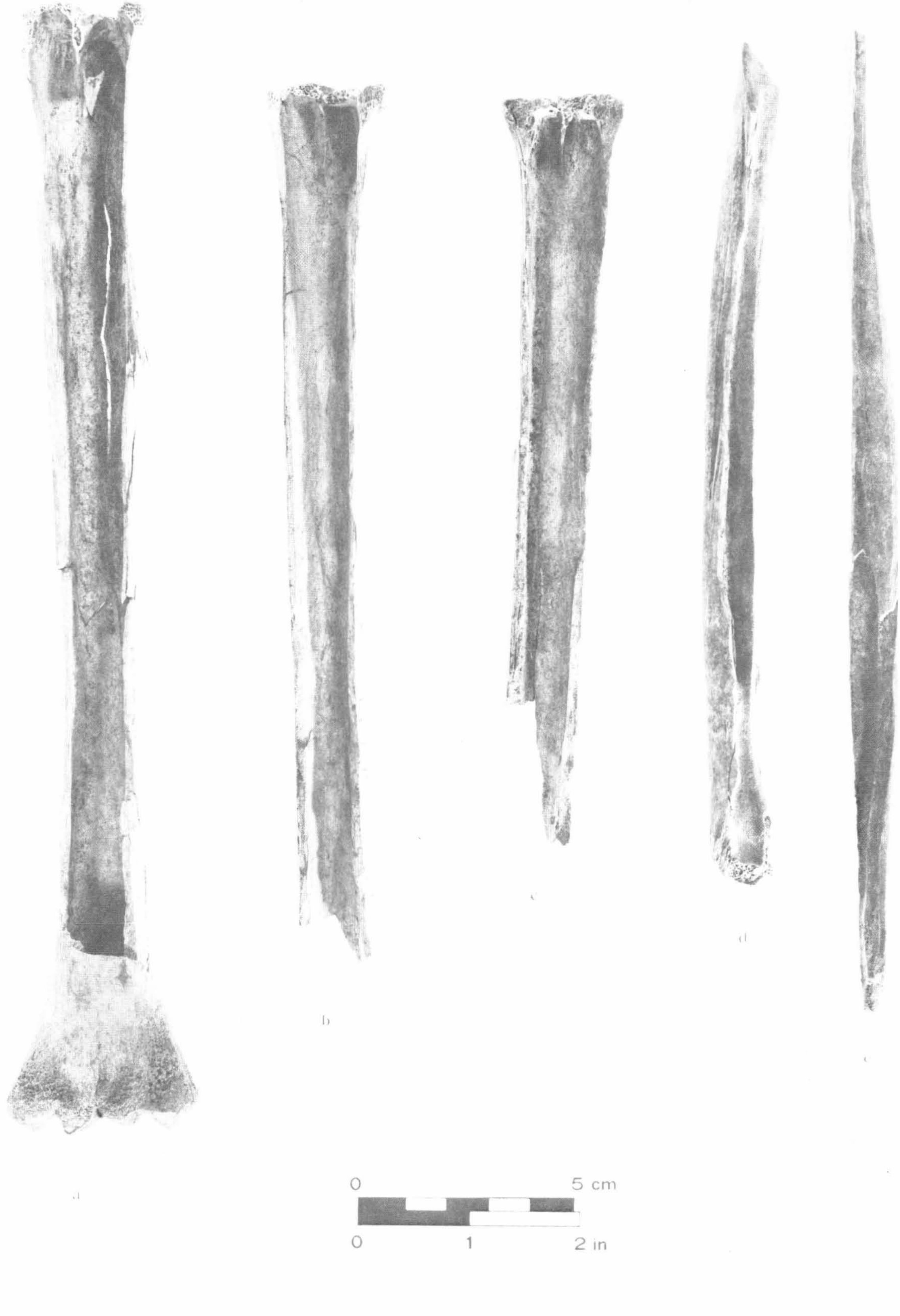
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Plate 17. Early Prehistoric period:

a. coronally split metapodial, 1A 284.

b. coronally split metapodial, 1A 141.

c (top). coronally split metapodial, 1A 124.

c (bottom). coronally split metapodial, 927.

d. quartered metapodial, 1A 466.

e. quartered metapodial, 1592.

National Museums of Canada Neg. No. J-20748-21.

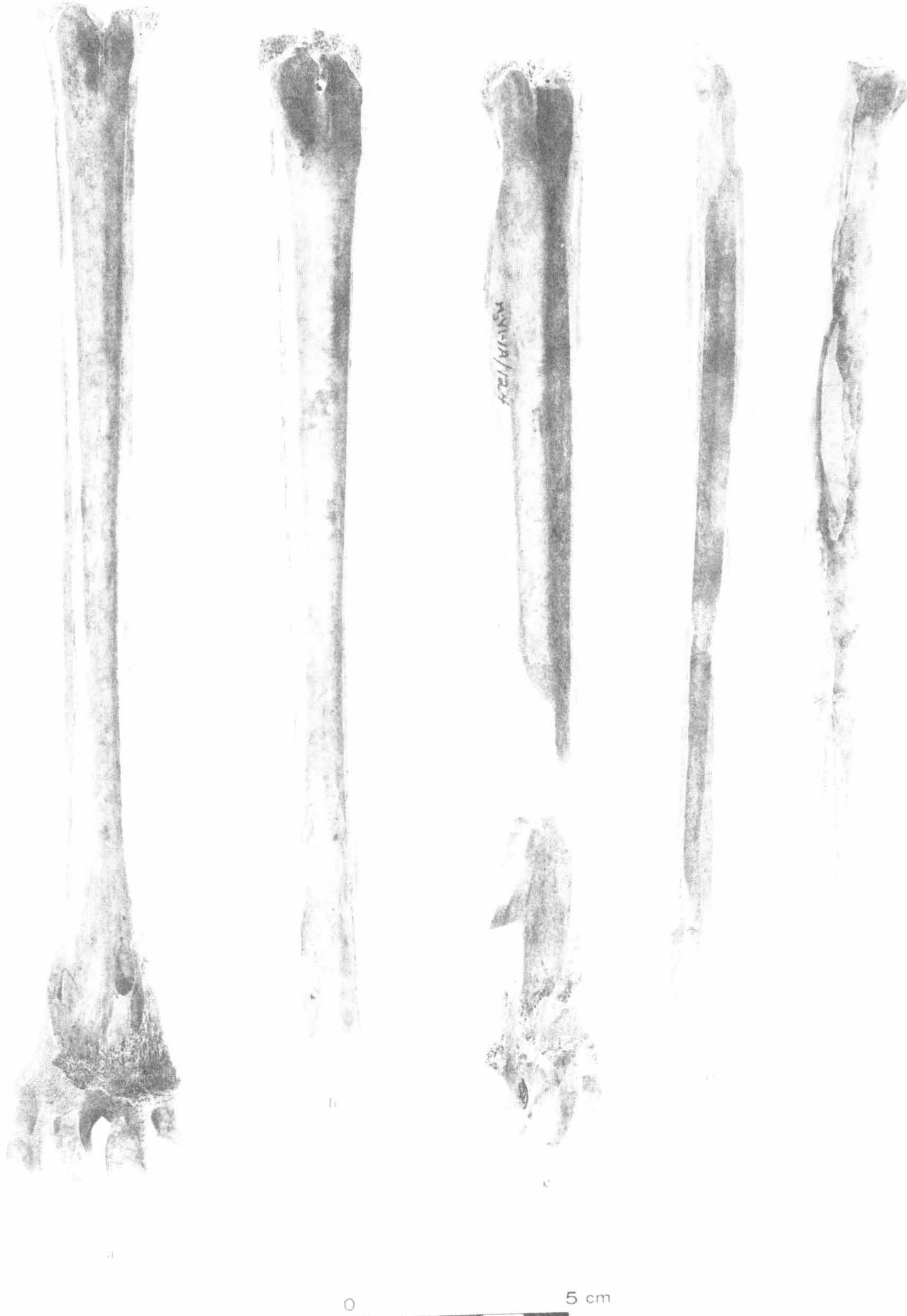
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Plate 18. Early Prehistoric period:

a. end of the bone scraper, 1A 261.
b. Type II awl, 1373.
c. Type II awl, 1547.
d. Type II awl, 1A 135.
e. Type III awl, 1A 81.
f. Type I awl, 1A 435.
g. Type I awl, 1A 210.
h. Type I creaser, 1A 187.
i. Type I creaser, 1A 41.
j. Type II creaser, 172.
k. Type III awl, 1A 286.
l. Type V awl, 1A 263.
m. Type V awl, 1A 391.

National Museums of Canada Neg. No. J-20748-2.


0
5 cm
0
1
2 in

Plate 19. Early Prehistoric period:

a. worked beaver incisor, 1A 67.

b. worked beaver incisor, 1A 67.

c. gaming pieces, 1A 98 (top). 1A 90 (bottom).

d. Type IV awl, 426.

e. Type IV awl, 1159.

f. Type IV awl, 11 (Historic).

g. Type V awl, 1A 14.

National Museums of Canada Neg. No. J-20748-12.

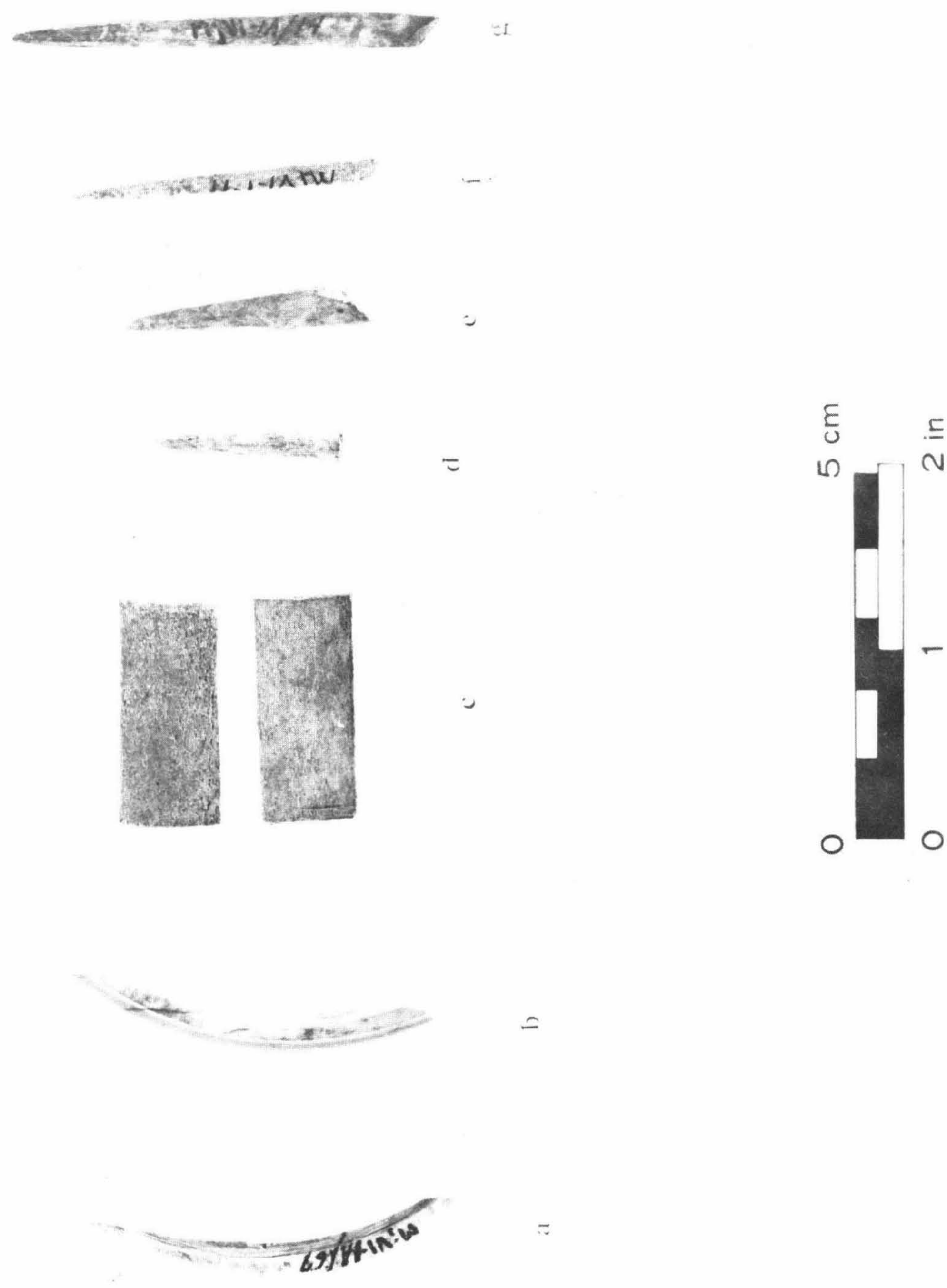

Plate 20. Late Prehistoric period fish lure, 66.

National Museums of Canada Neg. No. J-20748-6.

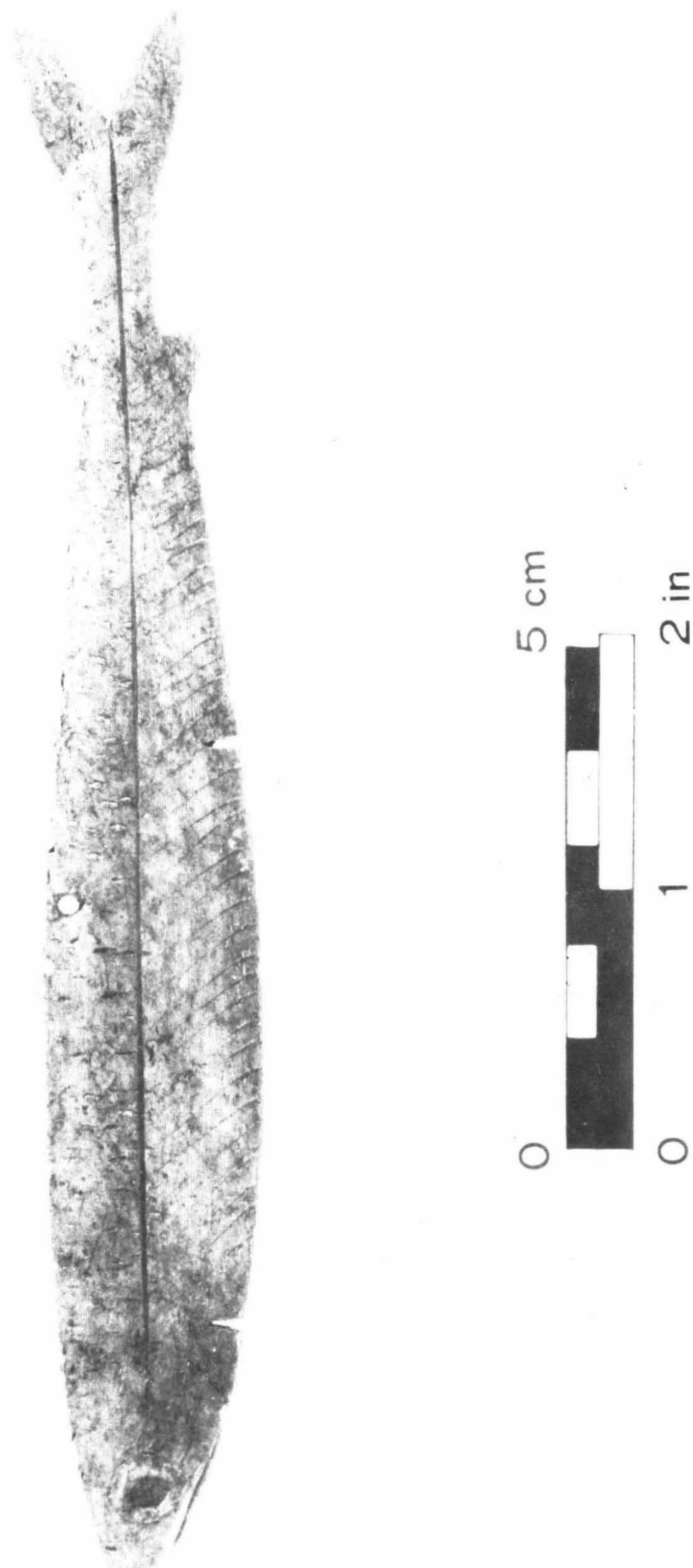
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Plate 21. Historic and Late Prehistoric periods:

a. compound fish hook, 14.

b. compound fish hook, 1A 250.

c. gaming piece, 163.

d. long bone splinter with two grooved margins, 1A 251.

e. grooved, split, and sawn antler fragment with collar at base (handle?), 518.

f. fish lure, 167.

g. fish lure, 167.

National Museums of Canada Neg. No. J-20748-4.


0 5 cm
0 1 2 in

Plate 22. Historic period:

a. painted pottery sherd, 200.
b. semilunar iron scraper, 143.
c. scissor tip, 220.
d. iron nail, 262.
e. bottle rim sherd, 420.
f. bone button, 305.
g. pocket knife, 287.
h. harmonica fragment, 261.
i. cartridge case, 16.
j. spent bullet, 331.
k. pocket knife blade, 289.
l. pocket knife, 6.

National Museums of Canada Neg. No. J-20748-1.


0 5 cm
0 1 2 in

Plate 23. Bifaces from three sites near Driftwood River and Rat Indian Creek.

a-d, h-i. MjVg-2.

e, g. MjVh-1.

f. MjVh-2.

National Museums of Canada Neg. No. J-20748-7.

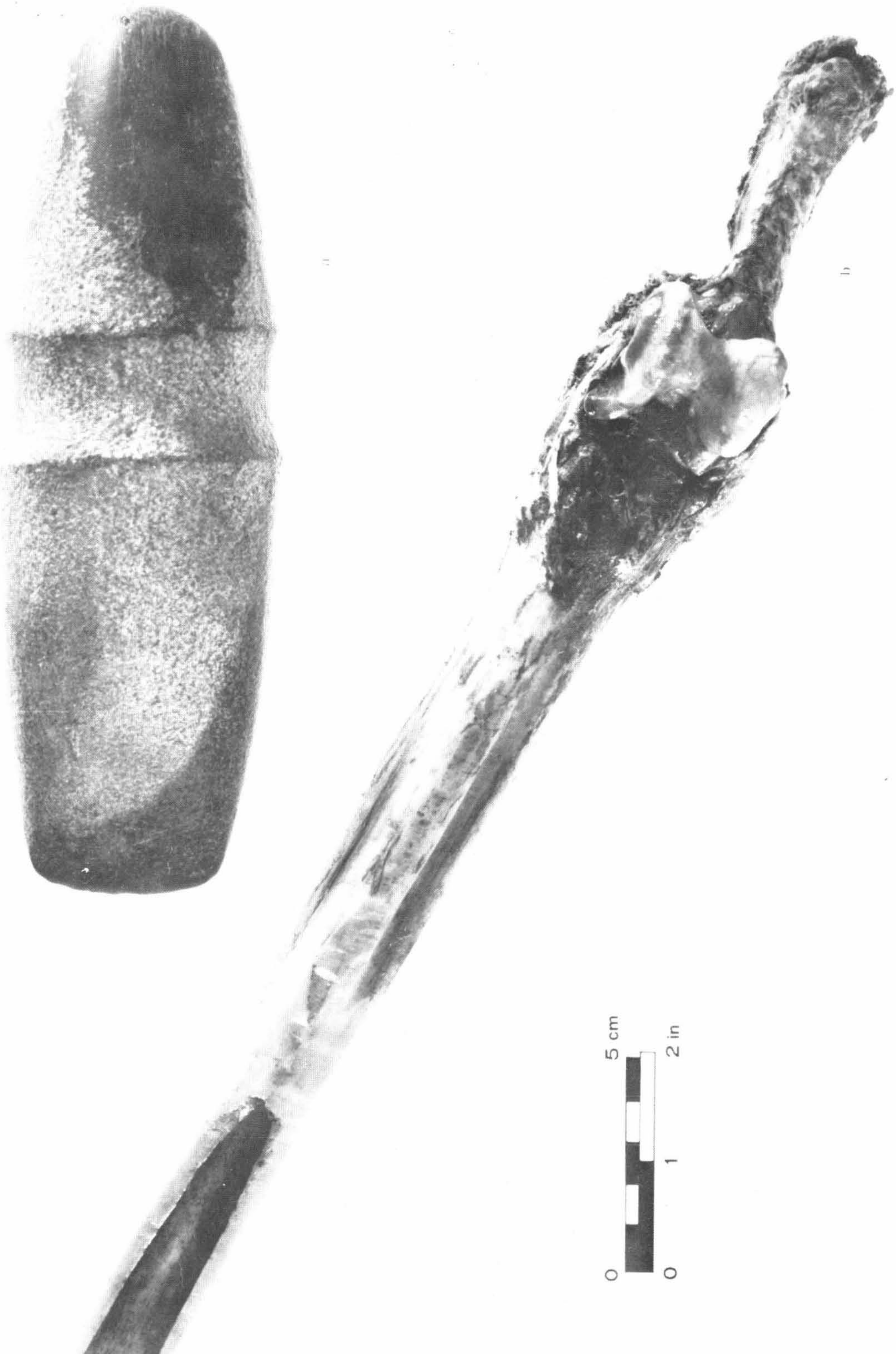

5 cm
2 in
1
0
0

Plate 24. Artifacts from New Rampart House.

a. grooved adze, MiVo-1: 1.

b. bone scraper, MiVo-2: 1.

National Museums of Canada Neg. No. J-20748-24.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