ARCHAEOLOGICAL INVESTIGATIONS AT THE ATIGUN SITE, CENTRAL BROOKS RANGE, ALASKA

by

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ABSTRACT

This thesis is an archaeological analysis of the Atigun site and is based on work conducted in 1973 and 1974 on the North Slope of the Central Brooks Range, Alaska. The excavations add significant information concerning the later prehistory and subsistence activities of the area.

The site consisted of a series of discrete occupation levels containing faunal and lithic debris scattered around a hearth. The primary concern of analysis is the cultural affiliation of the occupations, and to this end, artifacts, chipping debris and faunal remains are examined. Site activities are discussed in detail using the results of this analysis. Because the site is historically and archaeologically marginal to both Indian and Eskimo territory, ethnographic accounts of both groups are given to aid in the identification of its prehistoric inhabitants. Archaeological comparisons are made with sites in Alaska, the Yukon, the Northwest Territories and B.C. A re-evaluation of the prehistory of the Central Brooks Range is outlined, based on recent archaeological work and the results of the new data reported in this thesis.

Conclusions point to a late summer occupation of the site by Athapascans probably seeking ground squirrel hides. The site was occupied seasonally between A.D. 1400-1800, and

represents a major late-prehistoric Indian incursion throughout the Brooks Range. This period is defined as the Kavik Phase. Finally, it is suggested that boundaries between Indians and Eskimos in the Central Brooks Range have periodically shifted through time, largely due to environmental factors.

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THE CONTEXT OF RESEARCH

Introduction

In the past several years, research in archaeology has been increasingly directed to "problem oriented" field designs, to generation of testable hypotheses concerning culture, to quantitative rather than qualitative studies - in short, to scientific archaeology. This is without question a laudable trend and many would argue, a necessary one. Few areas of the globe are now unknown archaeologically and although the subtleties of most regional archaeological sequences are far from completely understood, our knowledge of some specific culture histories is generally well documented. In those areas which have an established culture sequence, it is a logical step for archaeologists to examine the problems of culture change and to try and establish cultural laws or generalizations having wide applicability. The generation and testing of hypotheses with the ultimate goal of formulating laws is one of the basic aims of science. This method of research seeks to explain phenomena and thereby to understand them. Since this is also a goal of the social sciences, hypothesis testing has become the dictum of archaeological research.

In an area where little fieldwork has been done, a decision of emphasis must be made by the researcher. Is he to attack specific questions of culture process or is he to establish a local archaeological sequence and chronology?

This seemed to be my choice when I was preparing to excavate the Atigun site, located in North-Central Alaska, in the 1974 field season. The site had seen 2 partial seasons of work but was not well reported. A chronology had been established for the area, but was based on surface sites which were not well dated. Since the Atigun site was known to contain several vertically distinct levels, it appeared to be an ideal test of the regional sequence. Charcoal and bone material was abundant and thus also offered a basis to verify absolute chronology.

Even though 1 of my primary objectives in working at the Atigun site was to establish a secure archaeological sequence, I was also interested in some specific problems including seasonality and duration of occupation, intra-site residence patterns and spatial distribution of artifacts. These specific problems in part determined my excavation strategy. However, the most important factor I had to consider ultimately was that of practicality. The 1974 fieldwork was seen as a salvage operation because it was feared the service road for the Alyeska pipeline would seriously disturb the Atigun site. My funding was minimal and my crew size small. These, combined with a sense of urgency, were all contributing factors to my research strategy.

Physiography and Climate

The Atigun site is located on the North Slope of the Central Brooks Range, Alaska overlooking the confluence of the Atigun River and Fox Creek. The Atigun River cuts east through the mountains to join the Sagavanirktok River flowing north to the Arctic Ocean (Fig. 1).

The North Slope or Arctic Slope is divided into 3 main physiographic regions: the Brooks Range; the Arctic Foothills; and the Coastal Plain (Solecki 1951:475). The study area borders on the Brooks Range and Foothills regions and consequently has some characteristics of each, though conforming more closely with the latter zone.

Britton (1966) presents a good short summary of the vegetation, climate, physiography, geology and ecology of the North Slope. The reader is referred to the above source for more detailed information than presented below.

The southern section of the Arctic Foothills is characterized by irregular buttes, knobs, east trending ridges and intervening gently undulating tundra plains (Wahrhaftig 1965:20). To the south, the rugged mountains of the Central Brooks Range rise to 7000-8000 feet.

Annual precipitation in the Atigun Valley ranges from 8-12 in (Watson 1959:19). Although annual precipitation is low, much of the ground surface is poorly drained tundra due to permafrost. The active layer is thawed for only 3-4 months of the year, causing soil to develop very slowly. Freeze-up normally begins by mid-September with breakup not being completed until well into June.

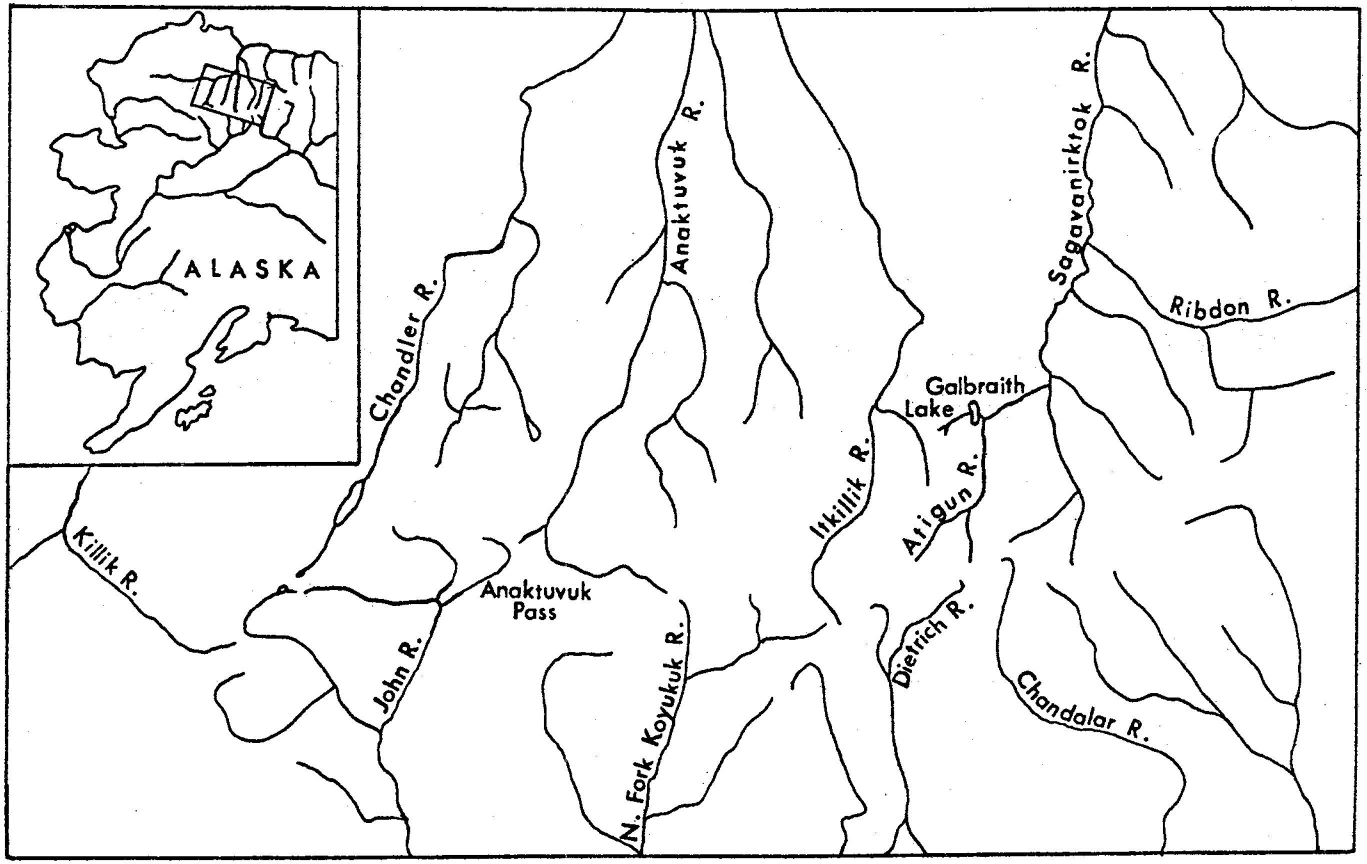


Fig. 1: Physiography of the Central Brooks Range (after Alexander 1969).

Winters are long and cold with January mean daily minimums averaging -6°F. The Arctic summer is short and cool,daily July maximum temperatures averaging only 50°F (Watson 1959:22).

Palaeoenvironment

There has been some confusion in terminology in discussing the glacial history of the Central Brooks Range. Detterman *et al* (1958) set out a glacial history which included 6 glaciations: (1) Anaktuvuk; (2) Sagavanirktok; (3) Itkillik; (4) Echooka; (5) Alapah Mountain; and (6) Fan Mountain. More recently, Hamilton and Porter (1975) have modified this sequence to include 5 major glaciations: (1) "older drifts"; (2) Anaktuvuk; (3) Sagavanirktok; (4) Itkillik; and (5) Fan Mountain. The Itkillik is subdivided into 4 advances: Itkillik I; Itkillik II; Itkillik III; and Alapah Mountain (Hamilton and Porter 1975:474). The Anaktuvuk and Sagavanirktok glaciations are pre-Wisconsin (Porter 1964b:460) and therefore have no bearing on the past 6000 years of culture history, which is the main concern of this analysis. Recent radiocarbon dates place all Itkillik advances except Alapah Mountain, before 7000 B.P. (Hamilton and Porter 1975). Following this, most researchers agree a warming trend occurred, peaking with the Hypsithermal about 7000-4000 B.P. (Porter 1964a: Farrand 1973:98). The later Alapah Mountain advance and Fan Mountain glaciation are apparently less severe and confined mainly to tributary valleys and close cirques (Keller *et al* 1961). Porter (1964b:457) received a date of 2800 B.P. from Alapah Mountain deposits, however no dates are available for Fan

Mountain deposits.

Workman (1974a:246) has noted that the period between 500-600 B.C. and A.D. 300-400 in the Southwest Yukon was characterized by cooler, moister conditions than present and has identified the time period as the sub-Atlantic. This time period could well correspond with Fan Mountain glaciation on the North Slope.

Just prior to the period A.D. 1600-1800 it was warmer and wetter in the Brooks Range than during the period indicated, and after A.D. 1800 another warming period began (Detterman et al 1958:57).

In summary, the climate in the Brooks Range has fluctuated several times in the past 10,000 years. However, it is evident that before about 7000 years ago, glacial conditions prevailed on the North Slope. Between 4000 and 7000 years ago, the region enjoyed warmer climate, which then cooled for the following 3 millenia. It seems a gradual warming trend developed again, beginning somewhere around 1000 years ago, cooling off again between A.D. 1600-1800 after which another warming trend began.

Flora and Fauna

The cold winters and cool summers prevent tree growth except for occasional stands of willow along waterways. This lack of trees typifies the true Arctic environment. The area is also characterized by mosses, lichen and tussok tundra. Spetzman (1959) and Wiggins and Thomas (1962) have described and enumerated the flora of the North Slope in some detail. Since the Atigun site is located in a sand-dune deposit, only those plants characteristic of dune areas will be specifically mentioned.

The most widespread plant community at lower elevations in the Atigun Valley is dry meadow Dryas-lichen (Spetzman 1959: 37). Such plants as Salix, Arctostaphylos, Anemone, Artemisia, Mertensia, Parrya, Silene and several genera of grasses are present in dune areas and serve to stabilize the sand deposits, preventing excessive wind erosion (Wiggins and Thomas 1962:4). Several other plants characteristic of sand dunes are Mertensia paniculate, Pedicularis lanata, Lupinus arcticus, Lloydia serotina, Chrysanthemum bipinnatum, Androsace chamaejasme, Trisetum spicatum, Arabis lyrata, Anemone parviflora and several species of Draba (Wiggins and Thomas 1962:23). Various edible berries are also found in season.

The known importance of flora to the aboriginal economy of the area is minimal. Willow was valued chiefly for fuel but was also utilized for bow and spear parts as well as for other items of material culture. Campbell (1968b:8) notes that of 256 flowering plant species, 149 are edible; and that the Nunamiut commonly ate only 12 of these 149, including several types of berries. Besides willow and berries, the most important plant for the Nunamiut was an edible root called "masu", probably a knotweed of the genus Polygonum (Smith and Mertie 1930:81). This lack of emphasis on vegetable diet was also common to Northern Athapascans. McKennan (1969a:97) notes that roots, particularly Hedysarum and berries were eaten in season by the Chandalar Kutchin.

Rostlund (1952) lists 8 species of fish available in the Central Brooks Range. These include Arctic char (Salmoni Salvelinus alpinus), lake trout (Salmoni salvelinus namaycush), grayling (Thymallus arcticus signifer), whitefish (Coregonidae), suckers (Castostomidae Castomus catostamus), pike (Esocidae Esox lucius), freshwater cod (Gedidae) and ling cod (Lota leptura). Of these species, Walters (1955:290) claims only Arctic char, lake trout and grayling could be of any economic importance because of size and abundance, although ling cod are actively sought by the Nunamiut (H. Alexander pers. comm. 1976). Campbell (1968b:9) has estimated that fish account for less than 15% of the Nunamiut diet.

There is some confusion in determining the number of species of bird present in the Central Brooks Range. Campbell (1968b:10) reports 142 species while L. Irving (1953:43) lists 121 species, of which 111 were named by Nunamiut informers. Working further east and closer to the Atigun Valley, Staender and Staender (1966) identified 74 different bird species. Seventy-three different species were recorded in the Atigun and Sagavanirktok Valleys (Sage 1974:284). While it is possible that the variety of birds present in the Atigun Valley is more restricted than in other parts of the Brooks Range, it is also possible that Anaktuvuk Valley, the area of study of Campbell and Irving, has merely been more thoroughly researched for a longer period of time. Alexander (pers. comm. 1977) notes that a severe summer snow in 1969 drastically reduced the normal bird population of the Atigun Valley, and thus affected Sage's study. The relative abundance of birds, however, would have little effect on settlement.

Specific usage for different species of birds is not indicated by their Nunamiut name. In general, birds were sought for food and for their long bones which served as drinking tubes. The gyrfalcon was sought specifically for its feathers which were used for arrows (L. Irving 1953:38). Geese, ducks and ptarmigan were the most important food birds although Irving (1958:119) points out that any sizeable bird was eaten in an emergency. However, it has been estimated that birds comprised less than 5% of the diet of inland Eskimo (Campbell 1968b:10).

Mammals represent the most important food resource to Indians and Eskimos of the north. Up to 32 species of mammal have been reported from Anaktuvuk Pass. Twenty-three species can be found in the Atigun Valley today, although many of these animals are rare in the territory. The muskox (Ovibos moschatus), once abundant in Alaska, was exterminated before the arrival of the first white explorers (Cahalane 1947:86).

There is no evidence that peoples of the north ever utilized the lemmings and voles found on the North Slope, perhaps because of their small size. The range of the snowshoe hare (Lepus americanus), artic hare (Lepus arcticus), beaver, porcupine, marten, mink and river otter is close to the Atigun Valley, but these species were probably never abundant enough to be economically significant (Gilbert 1973). Although relatively abundant, the Arctic fox (Alopex lagopus) was rarely utilized by natives of the area. The red fox (Vulpes), however, was trapped, but only in historic times (Rausch 1951:172). Another abundant animal rarely used by man is the tundra wolf (Canis lupus). Alexander (1969:11) mentions that wolf skins were occasionally utilized for trimming parkas but wolves were never eaten. Also sought for fur parka trimming was the wolverine (Gulo luscus) but like the wolf, was not eaten. A potentially valuable food resource may have been the moose (Alces americanus). Indians south of the Brooks Range relied heavily on the moose and Eskimos certainly hunted this creature when available. Although I have seen several moose in the Atigun Valley, they are not generally reported for the area. This omission may be explained by Bee and Hall's (1956:230) suggestion that moose have been expanding their range northward in recent years. This movement, they theorize, may be cyclical.

Two of the smaller mammals present on the North Slope were of intermediate importance to the economy of the aboriginal inhabitants. The fur of both the hoary marmot (Marmota caligata) and the ground squirrel (Citellus parryii) was highly valued by Indians and Eskimos for making summer parkas. In addition, both were used as food, especially in times of starvation. The Arctic grizzly (Ursus richardsoni) was also hunted by both groups for the meat as well as for specialty items such as tent door flaps.

Dall sheep (*Ovis dalli*) were quite important to Eskimo and Indian subsistence. Besides being important in manufacturing tools, including horn spoons, sheep provide a good year around source of meat. Their presence could attract hunters to an area where they were known to be abundant.

By far the most important single animal on the North Slope in terms of human survival was the caribou (*Rangifer arcticus*). The entire animal was utilized to provide food, clothing, shelter and tools. Although the caribou was found in small numbers on the tundra year round, of prime significance to the seasonal round of native groups were the annual fall and spring migrations.

History of the Area

The Brooks Range was among the last frontiers of North America to be explored by Europeans. Franklin was the first known white man to view the North Slope in 1826. A quarter of a century later, George Simpson spent several years at Point Barrow on the Arctic coast, and heard reports of Eskimos and Indians inhabiting the southern mountains. Lt. Henry Allen entered the Brooks Range from the south in 1855 along the John and Alatna Rivers and further west at about the same time, George M. Stoney was making forays up the Kobuk River. In 1885 Stoney reached Chandler Lake where he encountered Nunamiut Eskimo. Covering about the same territory 15 years later, Schrader (1901) encountered no Eskimo in the mountains. However he did report Indians to the south of the Brooks Range and

Nunamiut considerably north of the mountains. Two years earlier he had met both Indians and Eskimos south of the range. Leffingwell (1919) explored the northeastern part of the Brooks Range in the first 10 years of this century making occasional references to Eskimo families inhabiting the area. When Anderson (1913) journeyed to the same region a few years later, he found it uninhabited. Both Nunamiut and Kutchin had apparently abandoned the Brooks Range by 1920. The Nunamiut returned some 20 years later to eventually form a consolidated village at Anaktuvuk Pass. From the above, it is apparent that considerable movement and shifting of population was occurring during the past 150 years.

Ethnography

Because it is not clear from historical documentation when different areas were exploited by different groups, I will present brief accounts of the 2 ethnographically documented peoples of the general region: the Nunamiut Eskimos and the Chandalar Kutchin Indians. It is particularly unclear which group occupied the Atigun Valley. This part of the range was almost the last explored section of the mountains by Europeans as seen above, and ethnographically at least, it was a very marginal area of occupation for both Indian and Eskimo. Most researchers seem to consider everything north of the mountains to be Nunamiut territory, allowing the Kutchin the territory to the south with the mountains forming an effective physical and cultural boundary.

(1) Nunamiut

Because the Atigun site is located on the northern side of the Brooks Range in a tundra environment usually associated with Eskimo groups, I will deal first with the Nunamiut. The primary ethnographic source for the Nunamiut is Nicholas Gubser (1965), although Spencer (1959) and Ingstad (1954) have also made important contributions to Nunamiut ethnography. Burch (1972a) has discussed the concept of the term "Nunamiut" in some detail and has pointed out some serious flaws in the useage of the word. In this paper, I use the term Nunamiut to denote a unit of inland-Alaskan and primarily mountain-dwelling Eskimo.

It is apparent from early historical documents the Nunamiut range was changing at the time of contact. Therefore the map of Nunamiut range is speculative in nature with boundaries being elastic through time (Fig. 2).

The Nunamiut, like most Eskimo groups, followed a well defined seasonal round of subsistence activities. Although band size would fluctuate depending on the season and on the availability of game, Gubser (1965:167) estimates that most bands ranged in size from 50-150 people. During summer and winter months, households would disperse from the band, joining together again for the caribou migrations. Between 2 and 4 households would cluster together to hunt, fish and trap in summer and winter (Gubser 1965:166). A household might typically consist of 7 people, including 4 males and 3 females (5 adults and 2 children) (Hall 1971:64).

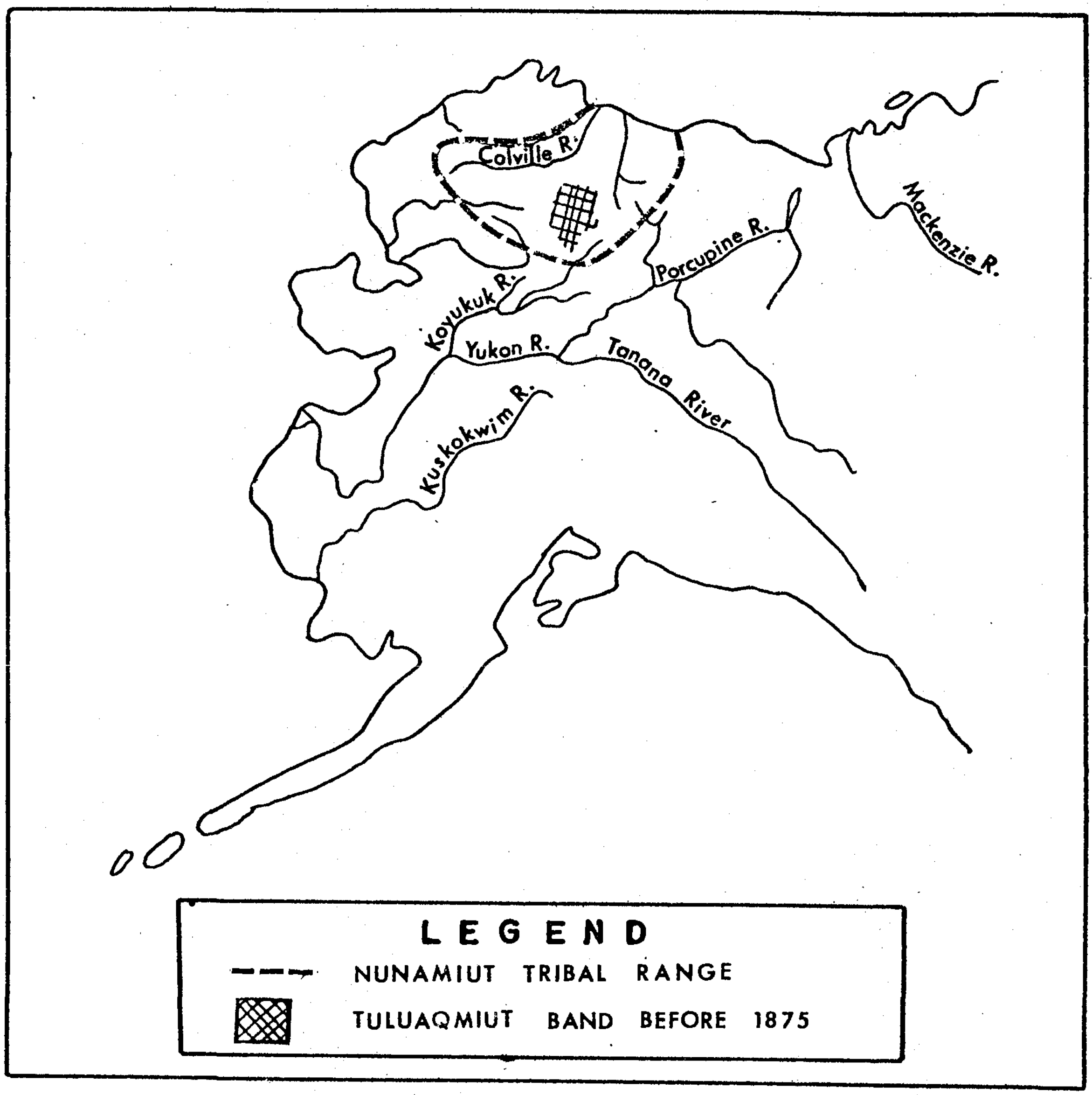


Fig. 2: Nunamiut range (after Campbell 1968b)

Fall was the season in which many caribou were killed on their southward migration. From September to November cooperative hunting was usually practiced in order to secure a large food supply for the coming winter. In winter, which lasts until about April, it was not unusual to snare isolated caribou or sheep and to net fish in the open waters of lake outlets (Gubser 1965:94).

In the short Arctic spring during May and June, households again banded together to hunt their summer supply of caribou. Ducks and geese migrate through the range in May and again in August when they often stop on the lakes to be hunted in fall and spring (Gubser 1965:246). Ground squirrels and marmots were also hunted in April and May. These animals were valued not only for their meat and fat, but also for their skin which was used for summer clothing.

After the spring caribou migration, many Nunamiut travelled to the Arctic coast to trade, while others stayed near the mountains to hunt caribou, marmot, ground squirrel, birds and fish (Gubser 1965:99). If there was opportunity, mountain sheep, moose and grizzly were also sought in the summer.

Besides summer trading expeditions to the Arctic coast, Ingstad (1954:19) reports that Nunamiut would occasionally travel to trading stations on the Kobuk or Koyukuk Rivers. Spencer (1959:198) also suggests that summer was the season of greatest dispersal and group movement for the Nunamiut. However, the mobility of families spending the summer in the mountains was decreased because of the marshy tundra, and households might spend the summer in 1 location (Gubser 1965:101).

House forms, as well as overall settlement patterns, may have varied with the seasons. Campbell (1968b) recognizes at least 6 types of Nunamiut settlements, including seasonal camps, hunting or fishing stations, and trading camps. Most authors agree that the typical inland Eskimo dwelling was a skin tent, consisting of a single caribou skin in spring through fall, and double layered for winter. Winter sod-houses are also known for the Nunamiut, such as those found at Aniganigaruk, a protohistoric Nunamiut winter village, located immediately across the Atigun River from the Atigun site. Rock-lined dwellings have been reported from the Brooks Range but have generally been accredited to Athapascan incursions. Snow houses are not known in the Brooks Range.

The construction of the Nunamiut skin tent is not well documented and while it is known that either rocks or wooden pegs held the tent down, it is less clear what held it up. One source attributes an elaborate dome shaped hut to the inland Eskimo of northern Alaska, close in style to the typical Kutchin Athapascan dwelling (Jenness 1934:412).

There are differing estimates as to the size of Nunamiut tents. Rausch (1951:159) states that tents are round to oval at the base, with a diameter of about 12 feet. On the other hand, Ingstad(1954:30) reports that tents measure 9 feet by 10 feet but were formerly smaller. Tent floors were covered with willow boughs and caribou hides.

Most of the actual cooking was done outside the "iccellik" or skin tent with heating kept to a minimum (Spencer 1959:45), particularly in summer months. Fire was kept in a small ring of stone in the center of the house (Gubser 1965:74), although this has not been archaeologically documented.

Sites that provided water, willows for firewood, and protection from the wind (primarily the north wind but secondarily the south wind) were chosen as house locations (Gubser 1965:69). Residence locations must have changed quite often even within seasonal sites. Gubser (1965:240) estimates a large household required up to 50 pounds of willow each day. Therefore, any long term occupation of 1 location, even by a small group, would deplete the limited fuel resources severely. In addition, the same camps could not be used even seasonally for many consecutive years because of the relatively unpredictable migrations of the most important resource, the caribou. The unpredictability of the caribou migrations was in part influenced by Nunamiut hunters, for too many hunters in a region alters the migration pattern (Gubser 1965:167). In this way, Nunamiut band size was limited.

The seasonal preference for different food sources has already been outlined briefly. Besides being used as food, different parts of animals were put to widely differing purposes. Tools, tents and clothes were fashioned from different animals often at season specific times. A few examples of utilization of animal resources follow.

Caribou antlers were widely used as tools, serving as projectiles, tent pegs and a variety of specialized purposes. Caribou antlers are fully formed in the fall and are shed by midwinter. Fresh antler is preferred for tool use (Alexander 1969:13). Horns of the Dall sheep were also sought for tool use, serving as spear heads, spoons and dippers (Spencer 1959: 34).

Ground squirrel and marmot were the most important of the small mammals. Skins were used as underclothing and as childrens' garments (Spencer 1959:34). Outer parkas and lighter fall and spring clothing were also made from the furs of these animals. Ground squirrel fur is most suitable for clothing in late August or early September, while fur of the marmot is valued from July through to September, although both animals are also hunted in the spring. Caribou fawns were hunted in the fall, their hides being desired for parka material (Alexander 1969:12). The wolverine and wolf were also important fur-bearing animals for the manufacture of clothing (Ingstad 1954:11). The caribou emerges as by far the most important resource both in terms of food, and in use as shelter and clothing.

The Nunamiut appeared to have definite food preferences, again largely depending on the time of year. Birds were killed and eaten without any particular preference for season, although ptarmigan was the only fowl of importance available year round. Ducks and geese were taken in May and again in August during their migration (Gubser 1965:246).

Fish of different types were obtained year round. However they seem to have been eaten with greatest frequency in the fall and to a lesser degree in the spring (Rausch 1951:161). Stefansson (1956:36) notes that in general fish bones were fed to dogs by the Eskimo.

The best season to capture mountain sheep was early fall, because at this time they are easiest to catch, good to eat and have their prime wool (Gubser 1965:287; Leffingwell 1919:64), though Ingstad (1954:67) maintains that sheep were hunted only in times of starvation. Because caribou are the preferred game in the fall, Dall sheep may have been used primarily for their horns, or as an emergency food supply if the caribou herds failed to materialize.

Caribou is eaten at any time of the year but there was some selection for age and sex in different seasons. Stefansson (1956:28) comments that both Eskimo and "northern forest Athapascans" preferred the meat of older animals. Gubser (1965: 300). In September and middle spring, bull caribou was favored, while cows were valued for their meat in late fall and throughout the winter season. In late spring, cows were hunted, primarily for the fetus (Gubser 1965:301). Much of the caribou meat was fed to dogs except in times of famine. This was apparently true also of northern Athapascans (Stefansson 1956: 88).

Dogs were ethnographically important to the Nunamiut, mainly as sled and pack animals. Giddings (1948:32) sees the first archaeological evidence of dog sleds on the Kobuk River in the first half of the sixteenth century A.D. Solecki (1950b:146) assumes there are no sleds or dog traction in the Colville drainage until at least this time. Before this, winter movements would have been hindered and summer travel confined to open waterways.

Ethnographically, there are reports of widespread trade by the Nunamiut. In the 1820's the Nunamiut were known to have camped on the coast somewhere west of the McKenzie River for trade purposes (Gubser 1965:4). Most Nunamiut traded with Barrow Eskimos at Negalik, an island in the Colville River delta although some journeyed east to Barter Island for European trade (Gubser 1965:49). Stoney (1900:39) notes that summer trading expeditions to Point Barrow by the Nunamiut were common in 1886. He also shows evidence for native trade and communication between Point Barrow and the mouth of the McKenzie River, claiming this was a round trip journey of about 2 years (Stoney 1900:76). There are reports of some copper having been traded in to Nunamiut from the Coppermine Eskimos living far to the east of the McKenzie River (Gubser 1965:233).

Eskimo from the coast also made excursions into Nunamiut territory.

> According to reports which seem to be authentic, the Malemiut natives of the Arctic coast have been known to visit the head of the Koyukuk Basin. They are supposed to have found passage through the

> mountains at the head of the Dietrich River and to have descended this stream (Schrader 1901: 456).

It appears likely that the route taken would be an ascent of the Sagavanirktok and Atigun Rivers, then crossing the divide to enter the Dietrich Valley.

The Nunamiut traded willow poles and mammoth tusk ivory to Point Barrow in exchange for rifles, cartridges, caps, lead and tobacco (Stoney 1900:72, 76). Berries were also an important trade item for the inland Eskimo who traded them to the coast (Spencer 1959:23). In addition, Rasmussen (1952: 140) claims that inland Eskimos used caribou as a trade item with coastal groups in order to secure whale blubber from the Barrow Eskimo. Although a few European trade items were available to the Nunamiut somewhat earlier, trade goods increased considerably by the early and mid nineteenth Century (Gubser 1965:51). Pre-European trade probably took place in the same patterns, although not as intensively.

Trade with the coast almost certainly occurred during the summer. Rochfort MaGuire (1854:180) mentions a group of Nunatagmiuts (western inland people) leaving the Colville around the 20th of July and returning from the coast about the 10th of September.

The Nunamiut also traded with groups other than north coast Eskimos:

> Malemiut Eskimos from south of Kotzebue Sound crossed the Brooks Range, ascending the Koyukuk and Dietrich Rivers to the divide and

> descending the Itkillik and Colville Rivers to the north coast on trading expeditions (Gubser 1965:13).

Such expeditions undoubtedly came in contact and traded with the Nunamiut.

Indians from the south also contacted the Nunamiut. In the 1820's Koyukon Indians were known to trade regularly with Kobuk Eskimos and occasionally with the Nunamiut (Gubser 1965:2). On their occasional trading expeditions to Barter Island the Nunamiut must have met Chandalar Kutchin who: "came by way of the east fork of the Chandalar River, through the Brooks Range and down the Hulahula River to Barter Island for European trade" (Gubser 1965:49). Other contacts with Indians by the Nunamiut will be discussed later in this chapter.

The history of Nunamiut occupation of the Brooks Range is well documented for the past century and a half. According to Gubser (1965:317), Nunamiut were hunting caribou in the Brooks Range by A.D. 1700. This date appears to be somewhat speculative however, since A.D. 1700 is technically prehistoric in the area. It seems fairly certain that Nunamiut were living in the Brooks Range in the early 1800's, although the Nunamiut only trace their residence in the mountains for about 100 years (L. Irving 1953:36).

By about 1880, it is estimated the Nunamiut reached their peak population of approximately 1000 individuals (Gubser 1965:52). At this time, inland Eskimos were expanding to the Kuparuk, Sagavanirktok, Ivishak and Canning Rivers to the east of the Itkillik (Gubser 1965:163). At the turn of the century, the barren ground caribou showed a tremendous decrease in population, causing Eskimos from the Colville River region to move out (Anderson 1913:6). This changing pattern of caribou migrations may have resulted from the possible high population of Nunamiut in the area, a pattern which may have had precedent in the past. The caribou became more plentiful south of the mountains, and to the east of Nunamiut occupied territory (Anderson 1913:6). There was some attempt to follow the herds, with Nunamiut gradually moving eastward and also exploiting sheep more intensively (Anderson 1913:11). Nunamiut informants claim the move eastward was to trap fox (H. Alexander pers. comm.) But by 1908 the Colville and most of the Brooks Range had became "starvation country" (Stefansson 1910:105). The reduction in game coupled with sickness (Solecki 1950b:151) resulted in the depopulation of the Brooks Range, with the Nunamiut gradually being forced to the coast (Leffingwell 1919:67). By 1913-14 only 1 family of Nunamiut was left on the Sagavanirktok and several on the Colville River (Leffingwell 1919:67), and by 1920 no settlements were left on the Arctic slope or Northern Brooks Range (Smith and Mertie 1930). The Nunamiut returned to the Brooks Range in 1938 eventually consolidating residences at Anaktuvuk Pass where they remain today.

(2) Kutchin

The Brooks Range has also been occupied by northern Athapascans, with the closest group to the Atigun site being the Chandalar Kutchin.

Northern Athapascan culture has been seen as: "a cultural continuum carried by a series of interlocking local bands whose microcultures differ in only minor details from those of their immediate neighbours" (McKennan 1969a:98). Therefore it is appropriate to discuss general northern Athapascan adaptations as well as specific Chandalar Kutchin traits.

The Na-Dene speech family is the most widespread linguistic phylum in aboriginal North America. The entire Athapascan linguistic family is subsumed under this phylum. Athapascan is then divided into 3 sub-families: northern Athapascan, Pacific Athapascan and Apachean (Van Stone 1974: 4). Kutchin is a linguistic variant of the northern Athapascan sub-family. Osgood (1936c:26) further separates northern Athapascans into a two-fold cultural division: the Pacific and Arctic drainage cultures, with the Kutchin included in the former.

The Kutchin have been divided into 8 groups which Osgood (1936c:26) has called tribes. Osgood (1936a:13) states the Kutchin are 1 of the most sharply defined groups among the Athapascans based on their linguistic development. The territories of these 8 Kutchin "tribes" are shown in Fig. 4, all groups being associated with a major river system.

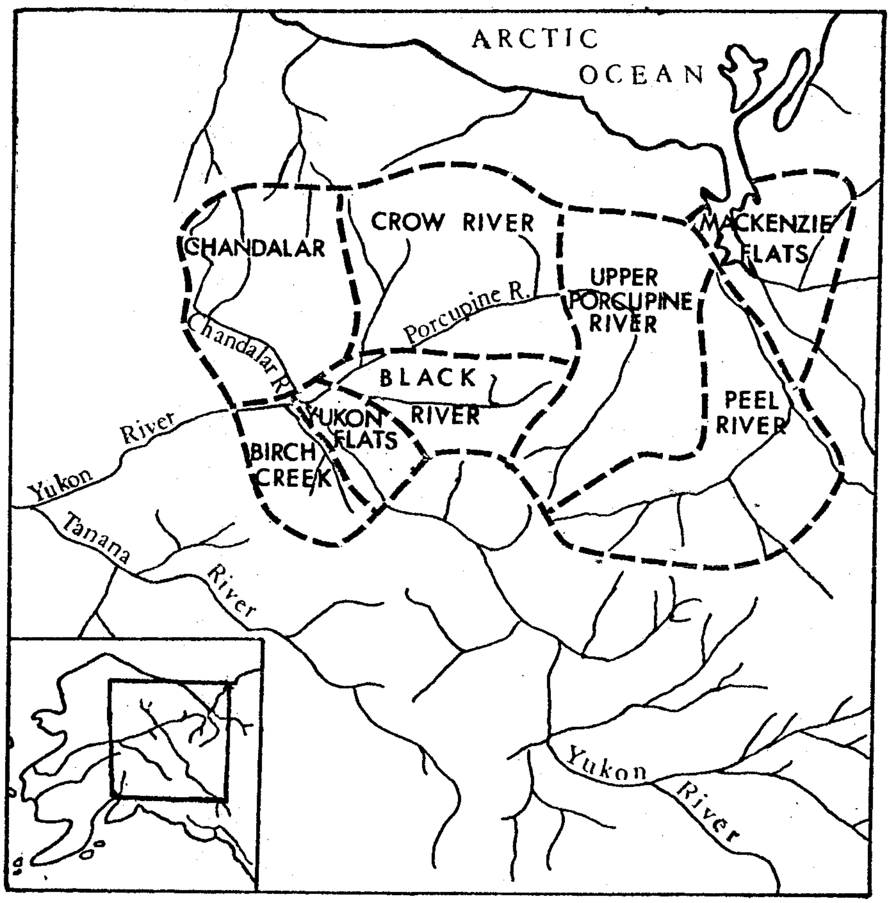


Fig. 3: Kutchin tribal territories (from Osgood 1936b).

Following is a list of the Kutchin "tribes" with their older names in parentheses: Yukon Flats Kutchin (Kutcha); Birch Creek Kutchin (Tennuth); Chandalar Kutchin (Natsit, Netsi); Black River Kutchin (Tranjik); Crow River Kutchin (Vunta); Upper Porcupine River Kutchin (Tukkuth); Peel River Kutchin (Tatlit); and MacKenzie Flats Kutchin (Nakotcho).

McKennan (1969b:34) has modified the above map, extending Kutchin territory down the Yukon and including the Indians of the lower Tanana in Koyukon territory. It might be noted Osgood (1936b:1972) later extended Chandalar Kutchin territory into the Barren grounds of the North Slope. A more important modification to this map is the addition of a ninth group to the Kutchin, the Dihai.

The presence of the Dihai Kutchin group was verified by a Chandalar informant. Dihai territory was centered around Wiseman at the Middle Fork of the Chandalar River. Their southern boundary was somewhere around the Yukon flats (coinciding with the edge of the piedmont marking the beginning of the Brooks Range), and their northern boundary would be the summit of the Brooks Range, although they were familiar with the Arctic slope (McKennan 1965:16). Netsi Kutchin territory was centered around the East Fork of the Chandalar River, including the headwaters of the Sheenjek River to the east (Dall 1870:430). The Dihai were absorbed by the Netsi Kutchin forming what is now known as the Chandalar Kutchin (West 1959:114). The confusion in names was a result of the Dihai being the westernmost of Kutchin groups, rarely going to Fort Yukon to trade and thus not being recorded in early literature. Since no ethnography exists for the Dihai, they will be subsumed together with the Netsi as the Chandalar Kutchin.

Osgood's (1936c:21) generalization that Pacific drainage Athapascans have a great dependence on salmon is untrue for the Chandalar. The Chandalar Kutchin were distinctively montane rather than riverine oriented (McKennan 1965:23) and were primarily hunters of caribou and to a lesser extent, moose (McKennan 1969b:336). Mountain sheep and bears were formerly quite important (McKennan 1969a:97). Smaller mammals important for food or fur were rabbit, ground squirrel, porcupine, fox, lynx, marten, wolverine, beaver, otter, mink, and muskrat. Birds that were utilized include ptarmigan, spruce hen, eagle, sea gull and migratory geese and ducks (McKennan 1965:17). Fish and in particular whitefish were generally a supplementary food (McKennan 1969b: 336).

The Chandalar are similar to the Nunamiut in their community pattern of "restricted wandering" which Van Stone (1974:38) defines as:

> communities that wander about within a territory that they define as theirs and defend against trespass, or on which they have exclusive rights to food resources of certain kinds. Movement within the territory may ... follow a seasonal round.

The Kutchin disperse into small groups in the winter on either side of the continental divide (Slobodin 1960:80) to fish through lake and river ice (McKennan 1965:29). During the lean winter months, mountain sheep are sought more actively than in other seasons (McKennan 1965:32).

With the coming of warmer weather and greater resources, the Kutchin band together again. Caribou are hunted in the spring, although the largest herds of caribou pass in July and August. In spring, bears were more important than in other seasons to the Kutchin (McKennan 1965:32). During summer, whitefish are usually taken in weirs built across rivers, often near lake outlets. Both in construction and operation, these weirs would involve the collective efforts of many persons (McKennan 1969b:336).

Late summer and early fall was probably the time of greatest population concentration in Kutchin territory. Caribou were intensively hunted during this season, often by means of caribou fences and surrounds (McKennan 1969a:100, Osgood 1936a:36). The caribou fences, like the fish weirs, demand cooperative behavior, probably involving several bands. A typical band consists of about 16 people in 4 households (McKennan 1969a:106). When groups gathered together for the caribou migrations or fish runs, they have been termed a "regional band" or a "macrocosmic group" (Helm and Leacock 1971:365).

Garments were usually made in the fall, predominantly from caribou skins. Ground squirrel, rabbit and other small animals were used as clothing material as well as for their meat (McKennan 1965:44). Murray (1910:89) notes that caribou were also procured in the spring for clothing.

Several types of dwelling are recorded for the Chandalar Kutchin. McKennan (1965:43) gives a comprehensive list of these. Generally, the Chandalar winter dwelling was a dome shaped tent, covered with caribou skins, while summer dwellings were conical skin covered "tipis" with a three-pole foundation (McKennan 1965:43). The latter were also used as temporary shelters in any season. The winter lodge contained a single central hearth, while no fire was used inside the summer lodge (McKennan 1965:43). Aboriginal dwellings were "normally of the 2 family type" (McKennan 1965:51).

European contact did not occur with western Kutchin groups (including the Chandalar) until 1844 (Osgood 1936c:14). Richardson (1851:398) was the first European to come in contact with the Kutchin, mentioning the "gens du fou", probably the Upper Porcupine or the Peel River Kutchin. Alexander Murray set up the first European settlement in the area - a trading post which came to be known as Fort Yukon. He mentions the Chandalar specifically ("gens du large") and estimates their population as "about forty men" (Murray 1910:36). This appears to be a reasonable figure since McKennan (1969a:106) estimates the Chandalar Kutchin population remained at the "reasonably steady figure of about 150 during the 19th Century".

In pre-contact times, trade was carried on between the Chandalar and Indians to the south. Dentalia and copper were prized imports, with the Tanaina and lower Tanana Indians acting as middlemen (McKennan 1965:25). It might be noted that the Dene had the most advanced metallurgy of northern interior peoples, notably in the use of copper, and especially during late prehistoric times (Witthoff and Eyman 1969: 22). Later iron axes and beads followed the same route until the establishment of Fort Yukon. The first European trade goods probably arrived in Chandalar territory around the 1830's. There are strong possibilities that the Chandalar Kutchin were periodically engaged in trade at Barter Island and the mouth of the MacKenzie. Osgood (1936b:172) mentions that the Chandalar are "distinguished by their trade with the Kangmaligmiut" (coastal) Eskimo, and McKennan (1965:25) also reports trade with Eskimo (Nunamiut?) in the territory of either group.

(3) Nunamiut-Athapascan Relationships:

Ingstad (1954:23) mentions that the Nunamiut and the Koyukuk Indians had a friendly relationship. It is known that trade was well established between Koyukuk Indians and the Kobuk and Nunamiut Eskimos at the time of Russian contact with the former in 1838 (Clark 1970a:20). However, in 1901, Shrader (1904:21) met a group of natives on the John River who had come up from the Koyukuk, and stated that these Indians "never go beyond the timber line and seldom do natives of the north ... come as far south". Therefore it appears likely that the Koyukuk and Nunamiut had only occasional meetings.

The first accounts from Nunamiut informants concerning the Kutchin refer to a village of 100 persons or more between the heads of the Noatak and Kobuk Rivers around Walker Lake. These are not assumed to be Koyukon Indians (Gubser 1965:44). These Indians fought with the Kobuk Eskimo and between 1800-1820 they probably moved to the area around Howard Pass, being forced eastward along the Brooks Range, at times settling in the Killik, Okokmilaga, Chandler and Itkillik Valleys, "living much like Eskimos" (Gubser 1965:45). Ingstad (1954:23) corroborates this story of the Nunamiut, specifically naming the Chandalar as the Indians involved. This could be the time period a Nunamiut informant at Anaktuvuk Pass had in mind when he said that at one time the Brooks Range to the east was "a dark wilderness covered by Indians" (Alexander 1967:20).

Sometime before 1850, a large battle near Tulugak Lake saw the Nunamiut kill 20 Indians (Gubser 1965:47). The fight occurred after several years of peaceful coexistence between Eskimo and Indian and apparently arose because of jealousies over women (Hall 1969:321). After this fight the Indians gathered in the Killik Valley and soon after travelled further east across the North Slope and passed through the Brooks Range by way of the Itkillik or some other nearby valley to the country around Chandalar Lake, "joining other Indians like themselves" (Gubser 1965:48). This might suggest the Dihai Kutchin were the Indians involved in hostilities with the Nunamiut, joining with the Chandalar after their defeat at the hands of the Nunamiut. It should be noted that all the above information is based on Nunamiut legend. However, the validity of the legends should not be dismissed out of hand:

> The Nunamiut distinguish between myths, which recount events in the remote past, and legends, which describe events of a finite number of generations ago and in their minds constitute reliable oral history. At Anaktuvuk Pass and on the Kobuk River several legends record the former presence of Kutchin Athapascans in Eskimo territory far to the west and north of the recent Kutchin range (Irving 1969:35).

The Chandalar also have legends about conflict with the Nunamiut. They say Indians living on the North Slope fought with the Eskimo who drove the Indians southward. The legend also states Indians were living south of the Range before this battle occurred (McKennan 1965:69), lending added support to the hypothesis that Dihai Kutchin were forced from the North Slope to band together with the Netsi Kutchin, becoming the Chandalar.

Both the Kobuk and Nunamiut Eskimos tell of increasingly hostile contacts with Indians in the Brooks Range after A.D. 1800 (Clark 1970a:18). Slobodin (1960:92) has suggested that the hostilities between Indians and Eskimos are recent and attributable to European arrival and the desire for trade. This appears plausible since the history of hostilities dates to the period when European trade items were becoming more important in northern economy. Hostilities could also be attributable to increased competition for food resources resulting from the arrival of greater numbers of people in the mountains due to a warming trend in climate. This latter proposition will be more fully discussed in Chapter 8 in connection with palaeo-environment.

The history of Indian-Eskimo relations was not always one of hostility. Seltzer (1933:47) concluded that: "the physical features of the Nunamiut clearly betray the presence of considerable Indian blood that must have entered the group in comparatively recent times." However, it is not certain whether the physical type of the Nunamiut differed from coastal Eskimos because of admixture with Indians or because the Nunamiut were originally different from the Eskimos of the coast (Larsen and Rainey 1948:36). Some interbreeding between Indian and Eskimo seems plausible at some time in the past.

Material traits in Nunamiut culture have been attributed to borrowing from Athapascan Indians "on the other side of the Brooks Range" (Solecki 1951:489). An example of this diffusion is the similarly styled dome-shaped skin tent of the Chandalar and the Nunamiut. Irving (1969:35) claims even wider diffusion, stating "artifacts from the central and western Brooks Range compare closely with the Vunta Kutchin of Old Crow and other far northern Athapascans."

Certainly, after the retreat of Indians from the North Slope, relations were not always unfriendly. Nunamiut continued to come in contact with the Chandalar, "often going over to the Chandalar drainage from the Hulahula River" (Leffingwell 1919:68) and Indians also continued to visit the

North Slope (Rasmussen 1952:140).

The history of Indian-Eskimo relations is probably one of sporadic hostilities, which increased with the arrival of the white man and with his desirable but limited trade goods. There were undoubtedly times of cultural exchange carried on largely by means of trade, and possibly intermarriage. The length of the contact is undetermined but possibly long-standing.

Summary of Archaeological Investigations

The Central Brooks Range of Alaska has a short history of archaeological research. However, in the past decade work has been intensified in the region and archaeological sequences have now been postulated, although a completely clear picture of this part of Alaska has not yet emerged.

Solecki (1950b;1951) published the first archaeological reports concerning the Central Brooks Range. Solecki's work was concentrated in the northwestern part of the range but he did obtain some information from the Anaktuvuk Pass region. Shortly after Solecki's fieldwork, William Irving (1951;1953) surveyed the northern part of Anaktuvuk Pass, and later worked in the Howard and Survey Pass region of the western Brooks Range (1962). The first detailed archaeological sequence for the region was put forth by John Campbell, based on several seasons work in the Anaktuvuk-Chandler Valley area (1962a;1962c). Campbell's work also included 2 weeks in the Itkillik Valley.

The Atigun Valley was surveyed by Alexander in 1966 and the Atigun site was partially excavated by him the following year (1967;1968a;1968b). This led Alexander (1969) to modify Campbell's archaeological sequence.

The construction of the trans-Alaska pipeline caused a tremendous increase in archaeological efforts throughout central Alaska. Of particular interest to this paper are the surveys and excavations along the pipeline corridor through the Atigun Valley, extending north along the Sagavanirktok River into the coastal plain. Archaeological work has also been done south of the Brooks Range in conjunction with the pipeline project, and new information continues to emerge as a result of explorations along the pipeline right-of-way.

Hall and McKennan surveyed around Old John Lake and Arctic Village to the south of the Brooks Range in 1973. This survey was conducted in the traditional center of Chandalar Kutchin territory but a "total lack of material relating to the past 1500 years" was recovered (Hall and McKennan 1973: 26). The authors conclude either the East Fork of the Chandalar River was not within prehistoric Kutchin territory, or else sites from this time period were simply not found or recognized (1973:26).

My introduction to this region of the Arctic was in the capacity of an archaeological field assistant to H. L. Alexander in 1973. During this season we excavated the Putu site, a PalaeoIndian occupation near the Sagavanirktok River. At the end of the field season, we spent a further 3 weeks test excavating and mapping the Atigun site. In 1974, I returned to the Atigun site to carry on excavations with financial support from Sigma Xi and the Arctic Institute of North America.

The Archaeological Sequence

Based on his survey and limited test excavations, Solecki assigned sites to 3 complexes: British Mountain; Denbigh Flint; and "unspecified Eskimo affiliations (Solecki, Salwen and Jacobson 1973:77). MacNeish identified the British Mountain complex as an early culture in the northern Yukon, while many researchers feel that Denbigh Flint is the first archaeological evidence of Eskimo culture in the north. Solecki specifically names inland Thule manifestations among his Eskimo affiliated sites (Solecki, Salwen and Jacobson 1973:81).

Irving (1951:53) did not assign any cultural affiliations to the large bifaces he recovered from the Killik River sand dunes. His work in Howard and Survey Passes yielded materials which have been compared to the Arctic Small Tool Tradition, Tuktu and late prehistoric-early historic remains. The latter appeared similar to Ipiutak (Irving 1962). Irving (1953:75) has also collected artifacts from Anaktuvuk Pass which he feels resemble types found associated with the Ekseavik phase of the Kobuk River sequence. In addition, Irving (1953:77) found 2 stone houses and a number of rock-lined shelters at Anaktuvuk Pass which the Eskimo linked to Indians formerly inhabiting the region. Irving (1953:77) also identifies a relatively recent Indian occupation on the North

Slope on the basis of an antler projectile point which he compares to material "from the interior of Alaska."

Based on fieldwork at Anaktuvuk Pass, Campbell (1962a; 1962b) has postulated the following sequence for the Central Brooks Range.

Nunamiut culture	recent
Kavik complex	<200 B.P.
Anaktuvuk Ipiutak	1500-2000 B.P.
Toyuk complex	>2000 B.P.
Tuktu complex	3000-4000 B.P.
Nakvakruak complex	4000-6000 B.P.
Kayuk complex	5000-7000 B.P.
Naiyuk complex	8000-10,000 B.P.
Kogruk complex	>10,000 B.P.

Without going into detail beyond the scope of this paper, it has been shown that this sequence should be modified. Alexander (1969:66) has reorganized Campbell's data and has utilized his own material in formulating the following sequence. He has divided the sequence into Indian and Eskimo occupations.

Eskimo	Indian	Time
Nunamiut		<100 B.P.
	Kutchin	75 B.P.
Proto-Nunamiut		"several hundred years"
	Kavik	200-500 B.P.
Sand Hill		>500 B.P.
Kayuk		1500 B.P.
Itivlik (ASTT)		4100 B.P.
	Tuktu	5600 B.P.

Alexander is justifiably less sure of dating in his proposed sequence. By way of further explanation, Itivlik is part of the Arctic Small Tool Tradition, closely related to Denbigh Flint; and Kayuk is synonymous with Anaktuvuk Ipiutak.

In the light of research subsequent to Alexander's proposed archaeological sequence, the above scheme can be further modified. Work at the Gallagher Flint Station on the upper Sagavanirktok River has yielded a radiocarbon date of 10,500 B.P. (Dixon 1975:68). Alexander (1973:25) has excavated at the Putu site in the Sagavanirktok Valley which he feels is related to the Clovis horizon and appears to be at least 8500 years old. Recently, a radiocarbon date of 11,470 ± 50 years has been received for the Putu site (Alexander pers. comm. 1976).

However, the larger archaeological picture is not of immediate concern in this paper. Primarily I will involve myself with the past 6000 years of prehistory in the central Brooks Range and the way in which the resources have been exploited.

With the exception of the Kayuk phase which has been identified from only 1 site so far, located in Anaktuvuk Valley, a great gap apparently exists in the archaeological record between about 500 and 4000 years ago. This gap may be more apparent than real as future pipeline research may reveal. But in the past millenium at least, the history of the Brooks Range does not seem to be one of continuous, uninterrupted occupation by one group. This problem of discontinuous occupations by both Eskimo and Indian groups is the primary research problem of this paper. The question of whether or not late-prehistoric cultural deposits are a result of *in situ* development or movements into and out of the Brooks Range is a second major issue to be discussed.

Chapter 2

THE SITE

Location

The Atigun River flows north from the mountains about 32 km to Fox Creek, an outlet stream from Galbraith Lake located at 149°29'E, 68°28'N. The river then bends almost due east, flowing for about 14 km through the Atigun Canyon until it joins with the Sagavanirktok River. The Atigun site overlooks the confluence of Fox Creek and the Atigun River (Fig. 4).

The Brooks Range is a formidable barrier to north-south movement of both people and animals. There are however, 3 well-defined passes in the middle of the Brooks Range - Howard, Survey and Anaktuvuk. These passes serve as major north-south routes for caribou movement, and presumably for men as well. Atigun or Dietrich Pass is of secondary importance compared to the above but is still a viable route for movement of men and herds.

The cardinal advantage of mountain valleys on the North Slope in general, and the Atigun Valley in particular, is the ease of big game hunting. Because the area is treeless and generally flat but surrounded by good vantage points, all game passing through can be easily detected. The valleys also restrict movement of the herds between the spruce forest and the tundra. William Irving (1953:58) notes:

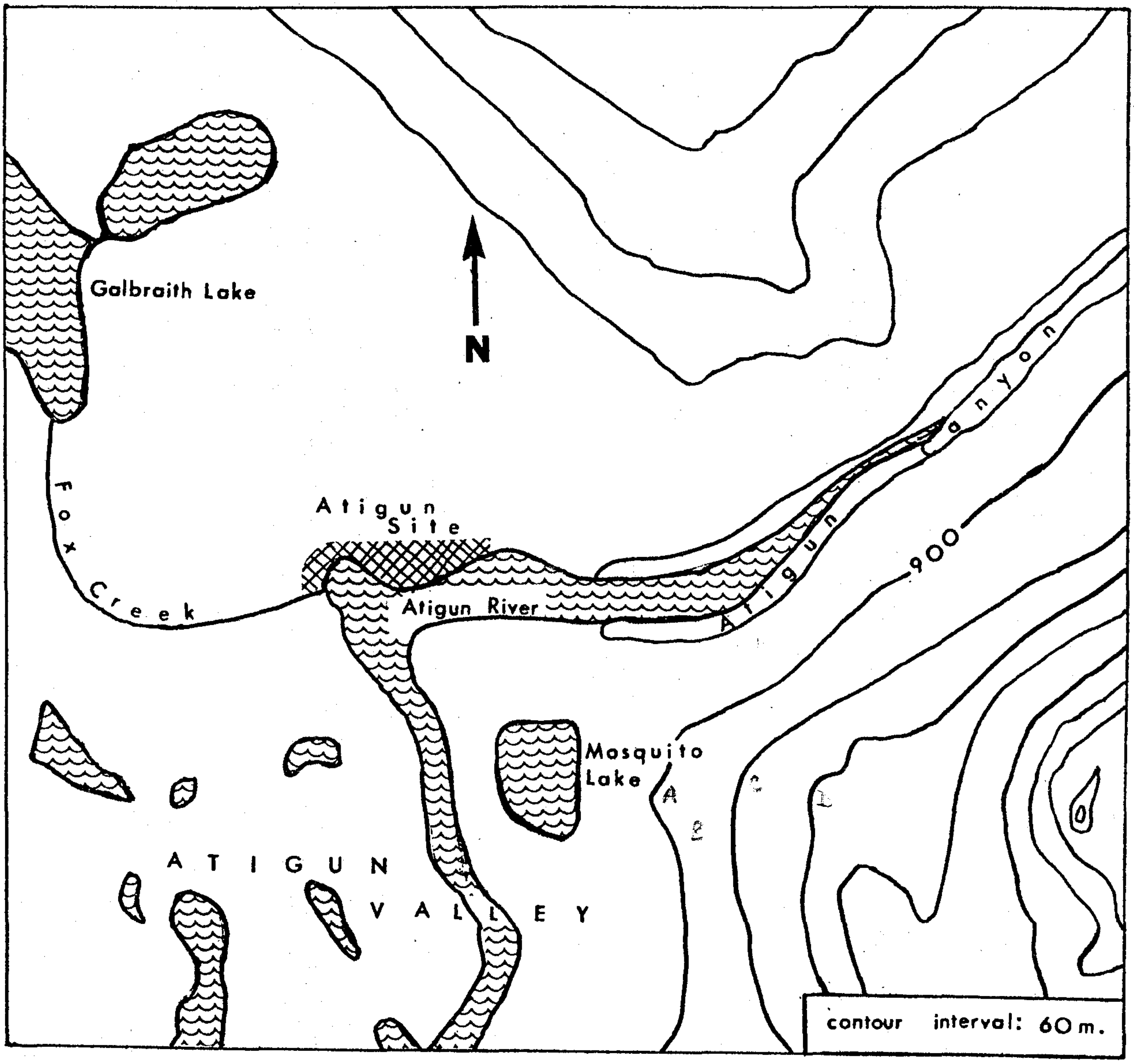


Fig. 4: Location of the Atigun site.

> the population density of game animals averages much higher in the mountain valleys than on the wet tundra and that animals are more easily hunted here than in the spruce forest or in the open rolling country to the north.

The Atigun Valley has other advantages for human settlement. The river and lakes offer a plentiful supply of fish. There are many isolated outgrowths of willow suitable for fuel located in the valley. Small mammals such as ground squirrel are numerous, particularly in sand dunes. The many scattered lakes present good resting places for migratory birds. And, finally, mountain sheep are particularly abundant in and around Atigun Pass (Brooks *et al* 1971:7).

Description

The north bank of the Atigun River is characterized by a series of wind-deflated trenches, exposing cultural material in aeolian sand deposits. The boundaries of the Atigun site have not been determined due to overburden, but the site probably extends along the river bank for 1.5 km and for at least 50 m to the north of the river (Fig. 5).

The site itself affords a good view of the valley and is close to the mountains where mountain sheep are plentiful. The confluence of Fox Creek and the Atigun River is a natural caribou crossing and also a source of fish. Although willows are not present on the site today, they may have been in the past.

The natural site matrix is composed entirely of aeolian

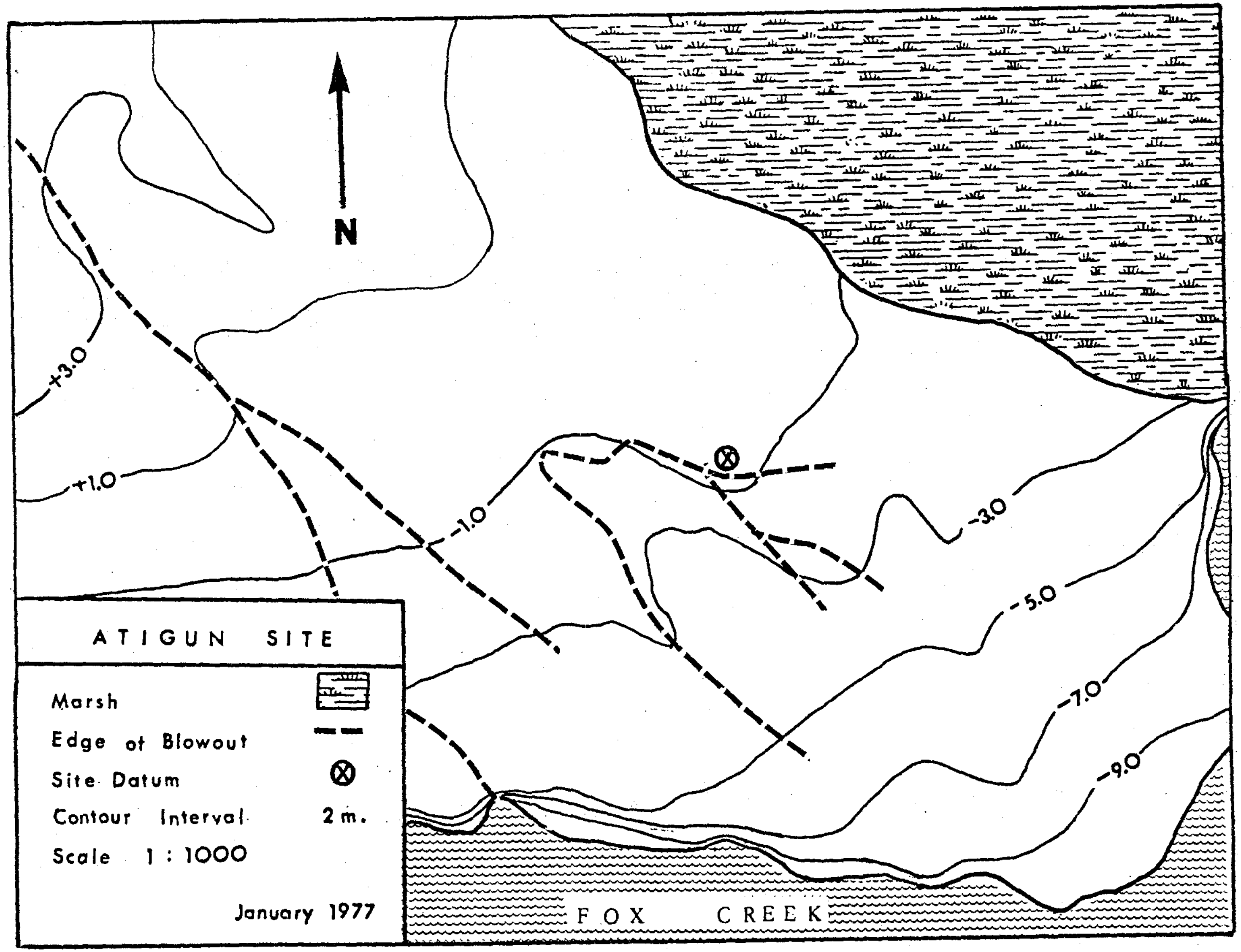


Fig. 5: Atigun site topography.

sand. All river pebbles and rocks had to be carried in by man. Because of previous work done at the site, it was known that sterile sand vertically separated some occupation levels. It was also known that occupation zones were not continuous across the site, but were horizontally discreet. Past excavations had shown these occupations to be dense but areally limited concentrations of animal bones and chipping detritus, closely associated with hearths.

Previous Archaeological Research

The Atigun site saw limited test excavations in the summer of 1966, conducted by H. L. Alexander. Originally, the site was thought to contain a component of the Arctic Small Tool Tradition, but a variety of more recent phase affiliations was later proposed (Alexander 1969:2). More extensive testing was carried on at the site in the summer of 1967 by H. L. Alexander who then made comparisons with Kavik and Ekseavik artifacts (Alexander 1968b:37). Some historic artifacts were recovered from near the surface and a multibarbed antler arrowhead was compared to those used by the Chandalar Kutchin (Alexander 1968a:4). Lower levels yielded material thought to have considerable time depth (Alexander 1968b:37).

In 1973, Alexander returned to the Atigun site. The objectives of the summer's work were to draw a topographic map of the site; to determine the site's boundaries; to horizontally connect previously excavated cultural areas; and to collect datable charcoal for these layers. This latter objective was necessary since previous radiocarbon dates were assumed to be in error, with some falling in the future. To achieve these ends, several test pits and trenches were excavated. The reader is referred to Wilson (n.d.) for a fuller description of excavation strategies of this 1973 fieldwork.

Research Aims

It was known from previous years' work that many areas of the Atigun site contained superimposed levels of cultural material. An undisturbed, stratified site is, of course, ideal for determining an archaeological sequence. Therefore, originally, a primary goal of research was to establish a secure archaeological sequence for the Central Brooks Range. However, in 3 previous field seasons, few tools, let alone diagnostic artifacts, had been recovered. It was decided artifacts alone would probably not be sufficient to accurately assess cultural similarities among all occupations at the Atigun site and other archaeologically known cultures, especially if the sampling methods of other years were not changed. Comparisons among occupations at the Atigun site could only be made with additional information about lithic manufacturing techniques and butchering procedures. The emphasis of research then shifted from the establishment of a regional sequence to a more specific analysis of activities occurring at the site.

Sampling and Excavation Procedure

Because each occupation was limited in extent, it was decided to excavate each hearth area as a discrete unit. The procedure of recovery was as follows.

First, 2 x 2 m test pits from the 1973 field season were expanded in all directions, radiating from the original excavation. All cultural deposits were kept in situ until it was apparent that the extent of the deposit had been uncovered. A general rule of thumb used in the field was that a 50 cm band of sterile sand surrounding the cultural concentration was sufficient (and minimum) grounds for ceasing horizontal excavation. When 1 horizontal level had been collected, vertical testing was continued in alternate squares until another level was hit. The same technique of horizontal exposure was then utilized for these subsequent buried levels. Vertical testing was continued as far as possible into the permafrost, with time allowed for thawing of the frozen ground.

Areal sampling of the site was not as rigidly controlled. First priority was given to the expansion of 1973 pits. Then, further test pits were judgementally dug around the nucleus of the excavations. When any sign of past human activity was found (usually a hearth), horizontal exposure followed. No attempt was made to determine either statistically or absolutely how many hearth areas were buried on the Atigun site. It was felt this was impossible to determine with the limited personnel available.

Once cultural material had been located either by probe or by test pit, overburden could be quickly and easily removed by shovel, and deposits were then fully exposed by trowel. It was felt that little was missed using this procedure since even the smallest flakes were readily seen in the otherwise sterile sand. Because of the ease of recovery, screens were not deemed necessary. The failure to screen, however, was later judged to be the major procedural flaw.

No obvious disturbance was seen in any of the buried layers at the Atigun site. Hearths were readily identifiable with bone and lithics strewn closely around deposits of ash and fire-cracked rock.

Recording of Cultural Material

The dense concentrations of lithics and bone made precise recording in 3 dimensions impractical. Instead, the following procedure was followed.

First, fire-cracked rock was mapped in precisely and drawn to scale. Then, in each 2 m unit, a smaller 50 cm grid was laid out. In every 2 m square, the smaller units were numbered consecutively from the northwest to the southeast corner from 1 to 16. Material was collected using the coordinates of the 2 m square followed by the appropriate number of the 50 cm square unit. Depth below surface and depth below datum was taken in the center of each 50 cm square. From each 50 cm unit, all bones and lithics were collected and placed in separate containers. Any identifiable tools were measured in precisely. As material was collected from each small square, the sand was trowelled to ensure that debris not exposed was collected, assuring complete recovery. The only material collected immediately upon exposure was charcoal. Where possible, at least 2 different samples were collected from each hearth area, and in almost all areas, sufficient charcoal was collected for radiocarbon dating. No soil samples were collected in 1974 as soil had been obtained and analyzed the previous summer. Those samples were felt to adequately reflect soil conditions of the site.

The above method of collection proved to be efficient and well suited to the desired analyses. Locational information was adequate for distributional studies. Admittedly, however, more precise measurement would have made for more accurate illustrations and more readily manipulable statistical studies. Because this is a shortcoming of the collection method, more precise measurements were taken for obvious concentrations of flakes, sharpening flakes and unusually dense bone concentrations. Any articulated bones were labelled as such and kept together. The collection method was thus made elastic enough to allow greatest analytical manipulation for the least time and effort in the field.

Chapter 3

EXCAVATION

Location of Excavation Units

Four excavation units, areas A,B,H and I, were dug in 1974 (Fig. 6). Land to the east of the central excavation area has been heavily eroded and disturbed by wind action and was not well-suited to the plan of total excavation. Northeast of the central area, test pits were dug in the marshy tundra with negative results. Further testing to the west was prevented by time limitations.

Stratigraphy

The straightforward nature of the deposits at the Atigun site made profiles an unnecessary exercise. In all cases, buried deposits were clearly distinct from surrounding sterile sands. Most cultural layers ranged from 2 to 5 cm in thickness, with thicker deposits closer to hearths. The one notable exception was in area A in the first level which contained an unusually thick and closely packed layer of faunal remains up to 15 cm deep.

In areas where multiple layers were found, the most recent level was labelled as "1", the next "2" and so on. Thus, A1 refers to the upper level in excavation unit A. This system will be used as shorthand designation henceforth. All completely excavated areas contained multiple levels.

Two buried levels were found in area A. A1 was located about 20 cm below surface and A2 at 65 cm below surface. The 2 levels in area

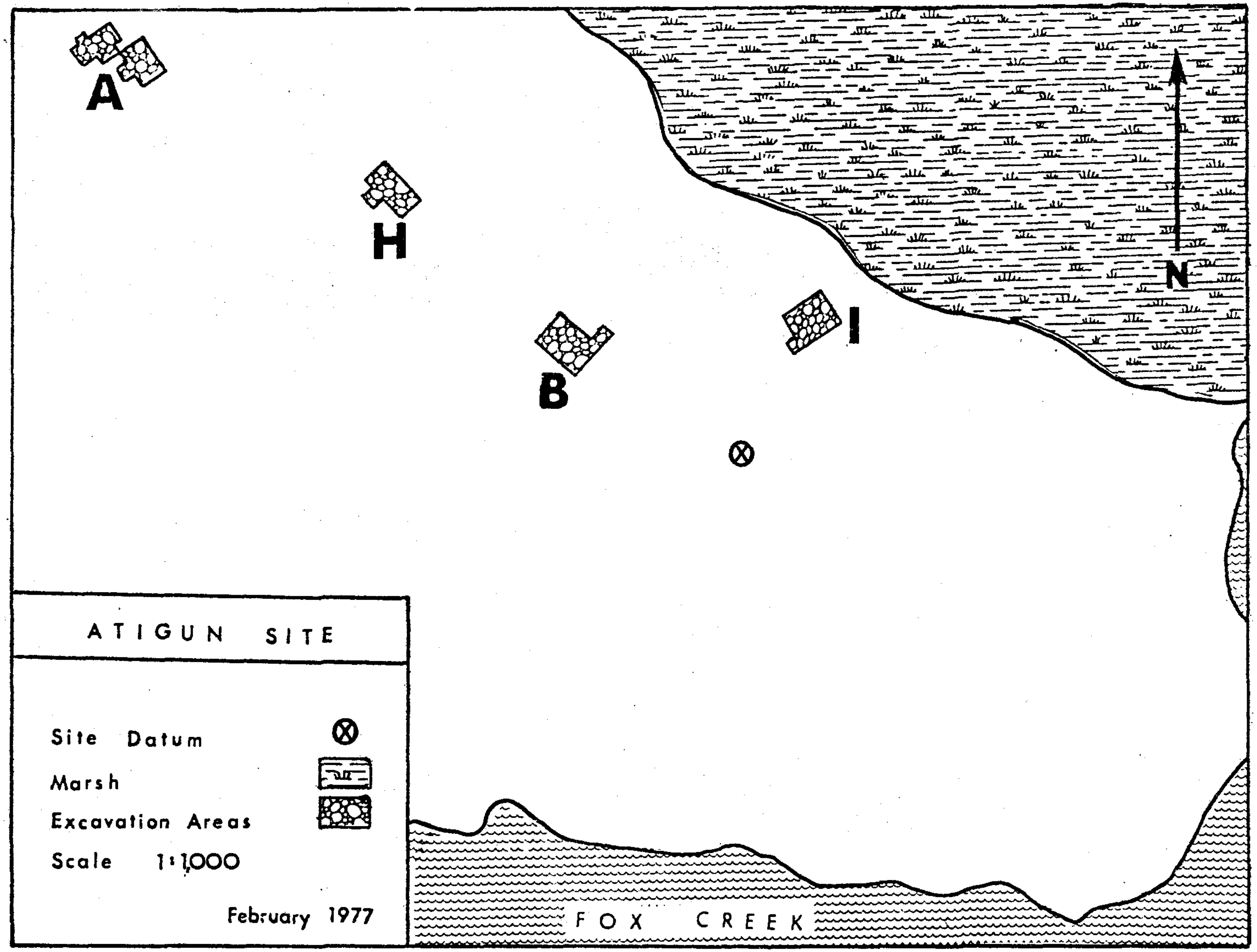


Fig. 6 : Location of 1974 excavation units at the Atigun site.

H were also found at 20 and 65 cm below surface. Again 2 levels were found in area I, these being located 25 and 40 cm below surface. Finally, 3 cultural levels were excavated in area B; 10, 25 and 45 cm below surface. Because levels were separated by substantial depths of sterile sand, any possibility of mixing of levels is eliminated.

Soils

In 1973, soil samples were taken from the pit walls of 3 different areas; A,B and NCT (Table I). The north connecting trench (NCT) is located about 20 m northeast of area B and is 20 m closer to the river bank.

(1) Physical Tests

Each soil sample was mechanically sorted and graphed on logarithm graph paper, yielding cumulative curves (not included here) and weight curves (Fig. 7). Skewness and kurtosis for each sample were calculated, as were the mean and the sorting coefficient. The results are summarized in Table II.

Roundness of the sample particles was measured by comparing the shape of particles illustrated in Powers (1953:118) with Atigun samples viewed under a microscope. The average roundness for each sample was then determined by multiplying the number of particles in each class by the geometric mean of that class and dividing the sum of the products by the total number of particles counted (Powers 1953:118). The geometric means obtained for the samples tested, calculations of spherical standard deviation and description of the mean roundness of the soil particles is shown in Table III.

An additional physical test was classification of the colour of

Table I: Location of soil samples.

sample	DBS (cm)	comments
Area A:		
1	6	sterile
2	25	component 1, ca 250 bones/m^2
3	50	sterile
4	65	component 2, no bones
Area B:		
1	6	sterile
2	20	component 1, ca 100 bones/m^2
3	20	component 1, hearth sample (excluding charcoal)
4	45	component 2, ca 10 bones/m^2
5	75	component 3, ca 10 bones/m^2
Area NCT:		
1	10	sterile
2	35	component 1, ca 10 bones/m^2
3	50	sterile
4	60	component 2, ca 10 bones/m^2

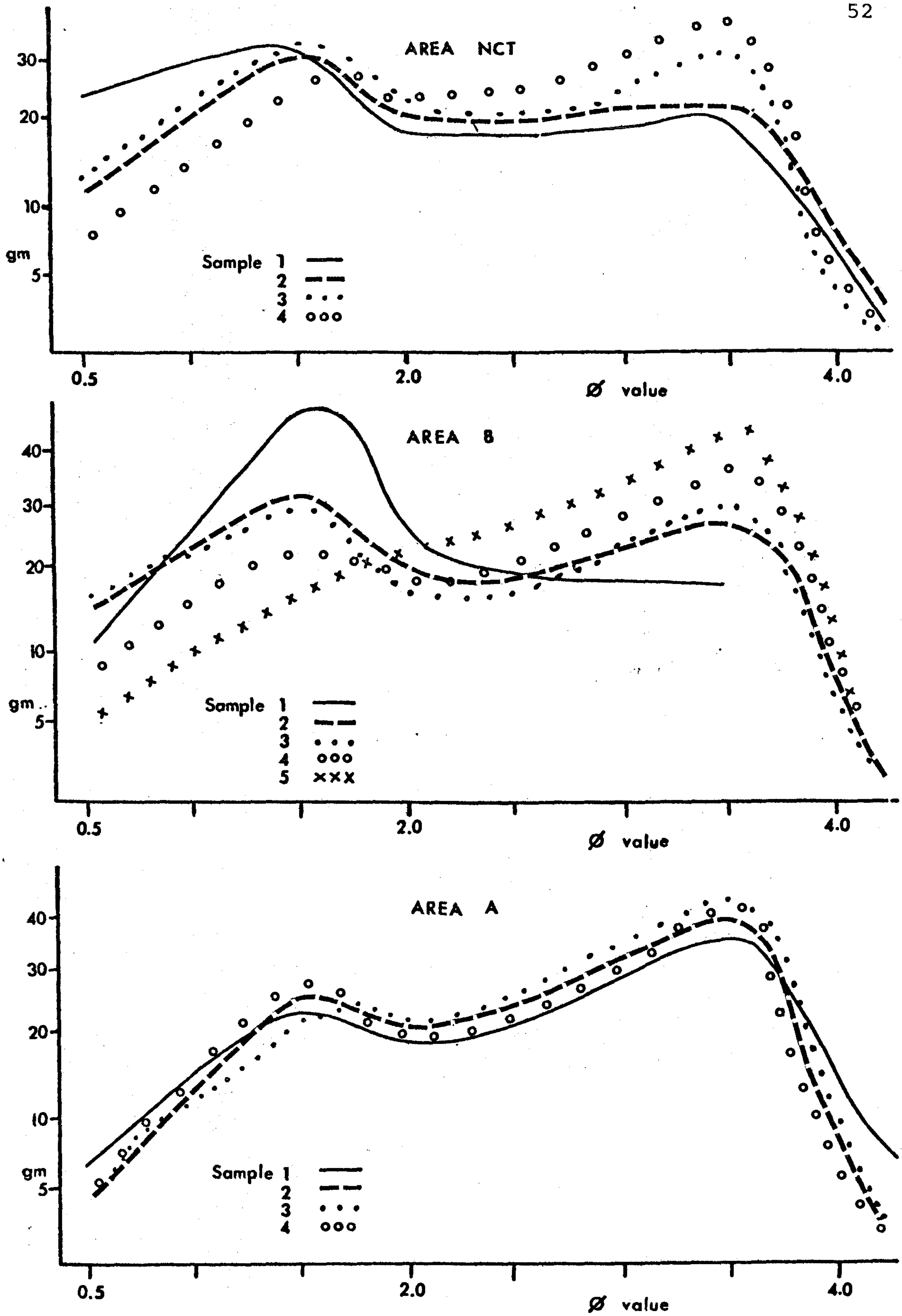


Fig. 7 : Particle size curves of soil samples from 3 areas: NCT; B; and A.

Table II: Mean, sorting co-efficient, skewness and kurtosis of soil samples.

Area	Sample	Mean	Sorting Coefficient	Skewness	Kurtosis
A	1	2.23	1.25	0.05	0.96
	2	2.00	1.01	0.04	0.99
	3	2.03	1.08	0.00	1.09
	4	2.03	0.92	0.06	0.90
B	1	1.37	0.83	0.20	0.85
	2	1.70	1.117	0.17	0.96
	4	2.10	1.24	0.07	1.01
	5	2.20	1.06	0.04	1.08
NCT	1	1.33	1.21	0.08	0.91
	2	1.97	1.32	0.22	0.98
	3	1.70	1.06	0.03	1.08
	4	1.90	1.08	0.00	1.11

Table III: Soil samples: sphericity measures.

Area	Sample	Geometric Mean	description	Spherical standard deviation
A	1	.55	rounded	1.988
	2	.55	rounded	1.988
	3	.55	rounded	1.988
	4	.55	rounded	1.988
B	1	.55	rounded	1.988
	2	.55	rounded	1.988
	4	.45	sub-rounded	1.016
	5	.59	rounded	3.133
C	1	.55	rounded	1.988
	2	.55	rounded	1.988
	3	.55	rounded	1.988
	4	.55	rounded	1.988

the samples by Munsell Colour Charts. Wall profiles in the field showed no visible colour changes or stratigraphy. However, when dried samples were tested, they yielded the results shown in Table IV. Ped structure was not noted in the field (and was almost surely non-existent). The sample showed no plasticity or stickiness.

The results, in general, confirmed certain hypotheses made concerning the site. It was assumed in the field that the site consisted mainly of aeolian deposits which separated undisturbed cultural layers. The river has probably not affected the recent surface of the site because of the height of the bank.

It is not certain how long it took for the deposits to accumulate. At the base of the bank, about 4 m below surface, deposits change from sand to gravel. It was not determined whether the deeper deposits were glacial or fluvial. Because deposition may not have been constant, it is impossible to estimate age of components by their depth.

The cumulative particle size curves indicate all samples are aeolian because of the skewness toward finer particle size. The graphs compare favorably with those representing dune sands presented in Visher (1969). The lines tend to be straight line functions which indicate a steady environmental state within and between tested areas. An exception is the surface sample from area B, which totally lacks very fine particles. This probably indicates that winnowing is ongoing which may eventually result in a blowout trench. The number of wind cut trenches is greatest in the southwest portion of the site, indicating greater wind activity in that area, at least recently. The southwest portion of the site appears also to have been occupied more frequently than other areas, perhaps due to wind activity. An advantage of a windy

Table IV: Soil colour.

Area	Sample	Munsell Colour code	Description
A	1	10 YR 3/2	very dark grayish brown
	2	10 YR 4/2	dark grayish brown
	3	10 YR 4/2	dark grayish brown
	4	10 YR 4/2	dark grayish brown
B	1	10 YR 4/1	dark gray
	2	10 YR 3/2	very dark grayish brown
	3	10 YR 3/1	very dark gray
	4	10 YR 4/2	dark grayish brown
	5	10 YR 4/2	dark grayish brown
NCT	1	10 YR 3/2	very dark grayish brown
	2	10 YR 4/2	dark grayish brown
	3	10 YR 4/2	dark grayish brown
	4	10 YR 4/2	dark grayish brown

camp ground would be partial alleviation of the nuisance of mosquitoes.

The deposits are poorly sorted. Coefficient of sorting in aeolian deposits is usually below 1.25 (Kukal 1971:123) and site samples all fall within this range except for NCT sample 2.

All samples tested for skewness show a positive sign, as noted for aeolian dune deposits (Duane 1964:873). Kukal (1971:123) notes the upper skewness level for aeolian deposits is 0.30, which lends support to the conclusion that Atigun sands are wind blown. Mason and Folk (1958:218) make a distinction between dune and aeolian flat deposits on the basis of skewness and kurtosis. The skewness ranges for the Atigun deposits place them in the dune type of deposit, but the kurtosis measurement is closer to aeolian flat deposits (Mason and Folk 1958:219). However Friedman (1961:517) notes that skewness is environmentally sensitive, whereas kurtosis is not, in this type of situation.

Quartz grains were all rounded except those in area B sample 4 which were sub-rounded. This difference is probably not significant and was possibly due to sampling error when quartering sample 4 of area B. Quartz crystals are not much abraded by streams, but lose much by chipping in aeolian transport (Kuenen 1960:448). This observation combined with the spherical standard deviation plotted on a ϕ scale reinforces the contention that Atigun sands were wind transported (Dott and Batten 1971:166).

In comparing the mean size of particles for each sample to the Wentworth scale, all area A samples as well as components 2 and 3 in area B, are classified as fine sand. The rest of the samples are classified as medium sand. The NCT area is somewhat more coarse than area B which in turn is coarser than area A, perhaps due to wind direction. The wind cut trenches generally run north-south, paralleling wind direction. Since particle size decreases from south to north, the following interpretation is offered concerning the recent depositional history of the site. The ground is frozen from October until June, with deposition, erosion, and weathering confined to summer months. During the summer, the river fluctuates in depth and, in periods of low water, channel bar deposits are quite extensive. With prevailing southerly winds, sand would be picked up from the river banks and channel bars and be deposited on the site. Heavier particles would separate first, causing the southernmost part of the site to consist of coarser materials. Accurate wind and weather recordings are needed to adequately test this hypothesis.

(2) Chemical Tests

Soil pH tests were done on all samples using both phenol red and bromthymal blue indicators (Table V). Using the La Motte soil testing system, tests were made for available phosphorous, nitrate nitrogen, potassium, calcium, ammonia nitrogen, magnesium, manganese, aluminum, sulphate and humus content. No readings were obtained for sulphate, aluminum, manganese, ammonia nitrogen or potassium. Magnesium readings were "low" at or near the surface for all areas, and "medium" for every other level in each area. Due to a lack of chemicals, only incomplete results were obtained for humus screening and nitrate nitrogen (Table VI).

It should be noted that the Atigun site has little or no soil development, consisting instead of wind blown sand. There are no sources for the chemical makeup of these type of deposits and no extra-site soil testing was done to determine the chemical constituents of the parent

Table V: Soil pH.

Area	Sample	DBS (cm)	Phenol red	bromthymal blue
A	1	6	7.0	7.0
	2	25	7.2	7.0
	3	50	7.0	7.0
	4	65	7.0	6.8
B	1	6	7.0	7.0
	2	20	7.4	7.2
	3*	20	7.6	7.6
	4	45	7.0	7.0
	5	75	6.8	7.0
NCT	1	10	6.6	6.8
	2	35	6.8	6.6
	3	50	6.6	6.6
	4	60	6.6	6.6

* sample from hearth.

Table VI: Soil chemical test results.

Area	Sample	humus screening	nitrate nitrogen	calcium	phosphorus
A	1		60 lb/acre	350 ppm	150 lb/acre
	2		30 lb/acre	350 ppm	50 lb/acre
	3		10 lb/acre	350 ppm	75 lb/acre
	4	2	10 lb/acre	700 ppm	125 lb/acre
B	1	<1		350 ppm	75 lb/acre
	2	4		350 ppm	200+lb/acre
	3	2		350 ppm	200+lb/acre
	4	3		700 ppm	75 lb/acre
	5	2		700 ppm	50 lb/acre
NCT	1		<10 lb/acre	350 ppm	100 lb/acre
	2		30 lb/acre	350 ppm	75 lb/acre
	3		10 lb/acre	350 ppm	75 lb/acre
	4		40 lb/acre	700 ppm	100 lb/acre

material. Secondly, the soil testing kits were inadequate for doing precise quantitative analysis.

Results obtained from chemical testing are somewhat difficult to explain. One observation in the pH readings is that area NCT is slightly more acidic than other areas. A possible explanation for higher acidity in area NCT may be poorer drainage. The higher pH reading, indicative of more basic soil, for sample 3, area B is predictable since the sample was drawn from the hearth area.

The overall neutral pH readings support the observed excellent bone preservation. The fact that pH readings are neutral at all levels may indicate the faunal material present in each part of the site is an accurate record of bone deposition in each occupation. In other words, differential preservation is probably not a factor in explaining different amounts of faunal material present in different parts of the site. Although Arctic soils are typically acidic (Strahler 1965:169), the homogeneity of pH readings from Atigun samples suggest this is not the case at the Atigun site. A possible source of error has been mentioned by Buckman and Brady (1969:388) who state that drying of soil, especially above field temperatures, will often cause a noticeable increase in acidity. This source of error could be corrected by taking pH readings in the field.

Results of humus screening tests are difficult to explain. There seems to be no pattern to the results, perhaps due to experimental error. The test for nitrate nitrogen produced interesting results in the NCT area. Nitrogen content increases in occupation zones as could be expected, but only moderately. This does not occur, however, in area A where nitrogen simply decreases with depth of deposit. This could point to greater leaching in this area.

Calcium readings seem to indicate some leaching may have occurred but not at a significant rate. No calcium layer was noted above the permafrost and since permafrost is generally impermeable, it is not likely that leaching of calcium is significant.

It was hoped that phosphorous would be a useful indication of human activity at the site. A maximum of phosphate is available with a pH of 6-7 (Buckman and Brady 1969:485). Readings from surface samples indicate natural phosphorous readings are low at the site. Given the soil pH, phosphorous readings below that level should be constant (Thompson _et al_ 1953:195) or somewhat lower (Heizer and Cook 1965:16). Thus the readings from A, sample 4; B, samples 2 and 3; and NCT, sample 4 indicate human activity. There is however no constant correlation between phosphorous content and amount of faunal material. Greater amounts of faunal material suggest more intensive or longer human occupations. The very high phosphorous content in area B, component 1 was to be expected, but component 1 in area A had a puzzlingly low phosphorous content. Area A component 2 had almost no bone and yet a relatively high phosphorous reading. Solecki (1940a: 255) does note high phosphorous content indicates the presence of decayed bone. This does not seem to answer the problem at the Atigun site however, since the bones that were present even in small amounts were excellently preserved.

The difference in soil colour noted in the Munsell charts could represent incipient soil development of an A horizon. Hill and Tedrow (1961:99) suggest stronger browns in upper layers of well-drained Arctic environments could be due to oxidation. The site supports a tundra vegetation whose soil is characterized by Brown and Tedrow (1964:192) as consisting of a discontinuous A horizon, resulting in reduced leaching, free carbonates and a solum lacking strong colour differentiation.

Lutz (1951) notes vegetation over sites in Alaska are richer in colour and content than surrounding areas. No attention was given to this type of observation which may have proved valuable in locating buried cultural features.

Features

(1) Frost Cracks

A frost crack in area H marked the only natural feature of note in the excavations at Atigun. The frost crack extended through both cultural levels in area H but did not affect the deposits in any significant way.

(2) Hearths

Hearths are the only man made feature present at the Atigun site. It must be remembered that the aeolian matrix means any rocks found on the site were transported in by man. Hearth areas were so named because rocks, unsuited for tool manufacture, were surrounded by layers of ash and charcoal. Rocks in all levels showed signs of thermal fracture as a result of winter cold, fire, or both. All cultural levels contained hearths, except 12.

There seemed to be no difference in size of a typical hearth rock from level to level in different areas of the site, with the exception of Bl. For example, large but typical hearth stones have a diameter of around 15 cm in all levels but Bl, where larger rocks have diameters of only up to 10 cm.

The configuration, size and number of hearths in each level is a moot point. The fire-cracked rock of 3 levels is illustrated to demonstrate what was considered to be a single hearth, a double hearth and the only possible triple hearth (Fig. 8-10). It should be noted these are the clearest examples rather than the most typical. The presence of multiple hearths indicates either many people at one campsite, or several days occupation, or both.

The definition of 1 discreet hearth was difficult to judge, but hearths generally conformed to each other in measurements taken. The impression that hearths tended to be oval was borne out by these measurements. Typically, a single hearth at the Atigun site measures about 125 cm along its long axis and approximately 75 cm across the perpendicular. These dimensions seem rather too large for an indoor hearth (Gubser 1965: McKennan 1965) and would indicate that the site was not occupied in winter months.

The salient feature about the hearths is their unusual composition. Rather than an encircling ring of stone, each hearth appears to be paved with stone. This pattern was common to all hearths uncovered at the Atigun site. A purpose or advantage of this type of hearth has not been determined. The overall similarity of the hearths, in rock size, general shape, overall size and in type (that is, paved rather than encircled), points to related occupations. The large size of the hearths would suggest a more abundant supply of willow at the Atigun site than today, but this was not tested. Finally, the abundance and distribution of stones suggests many rocks may have been used to smash bones rather than serving as hearth stones.

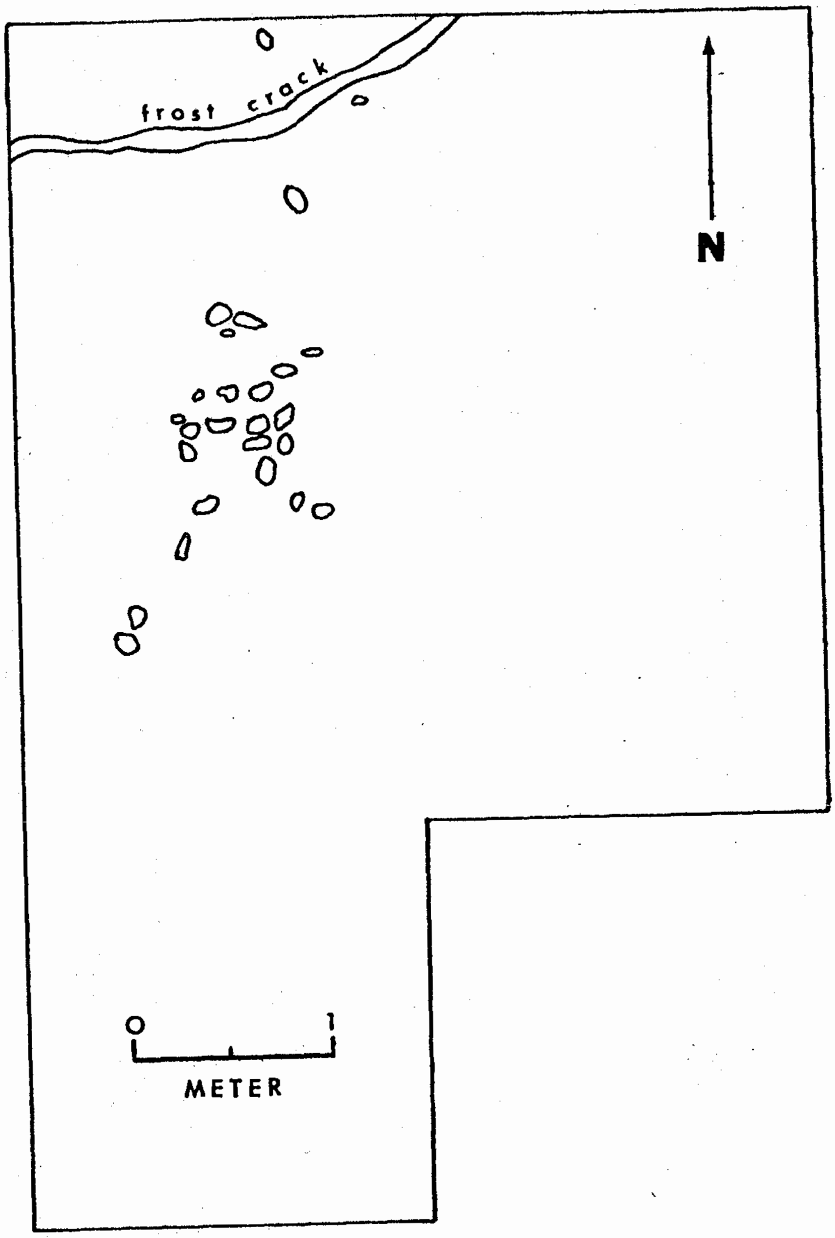


Fig. 8 : Area H2, single hearth.

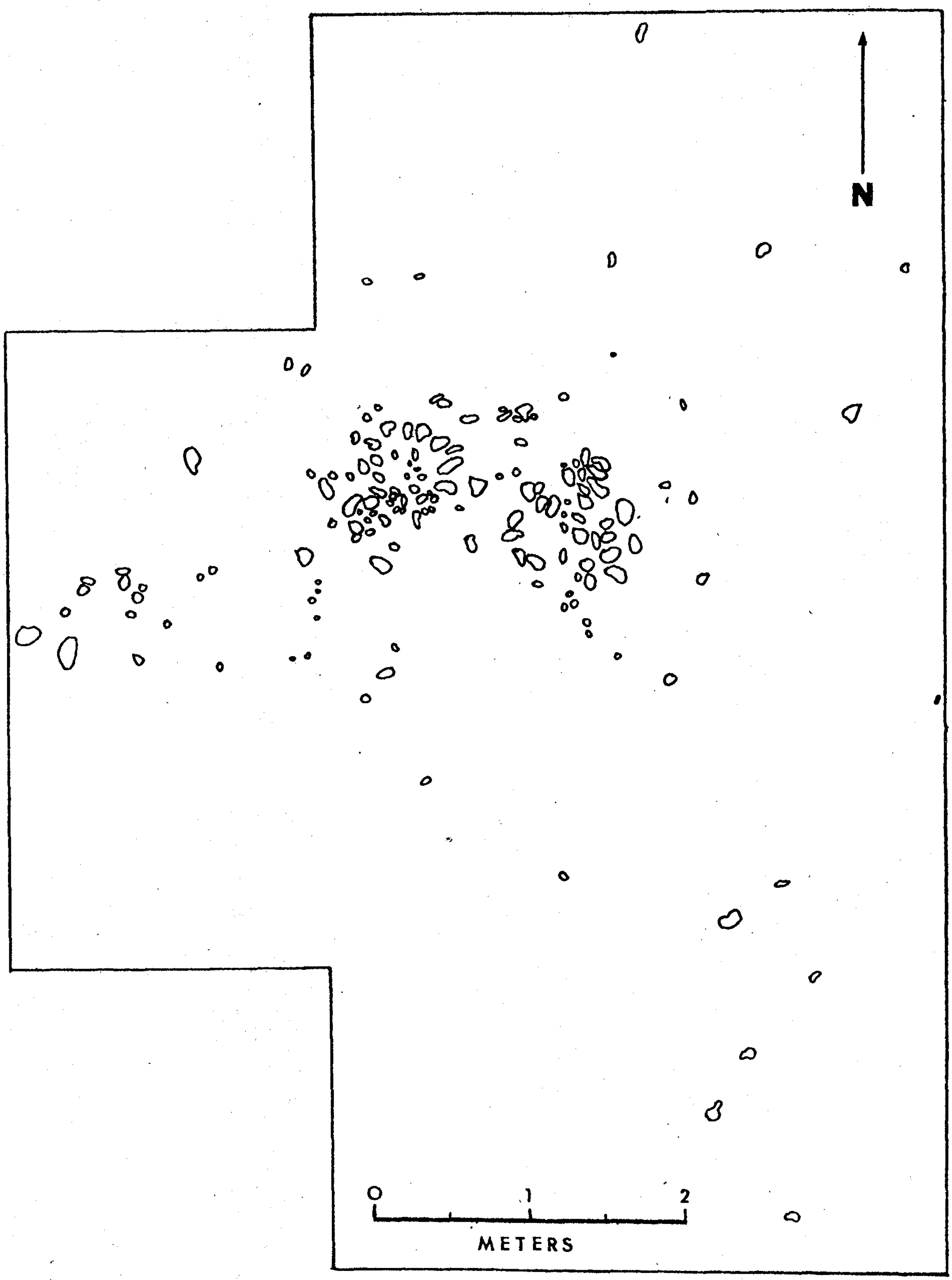


Fig. 9: Area B3, double hearth.

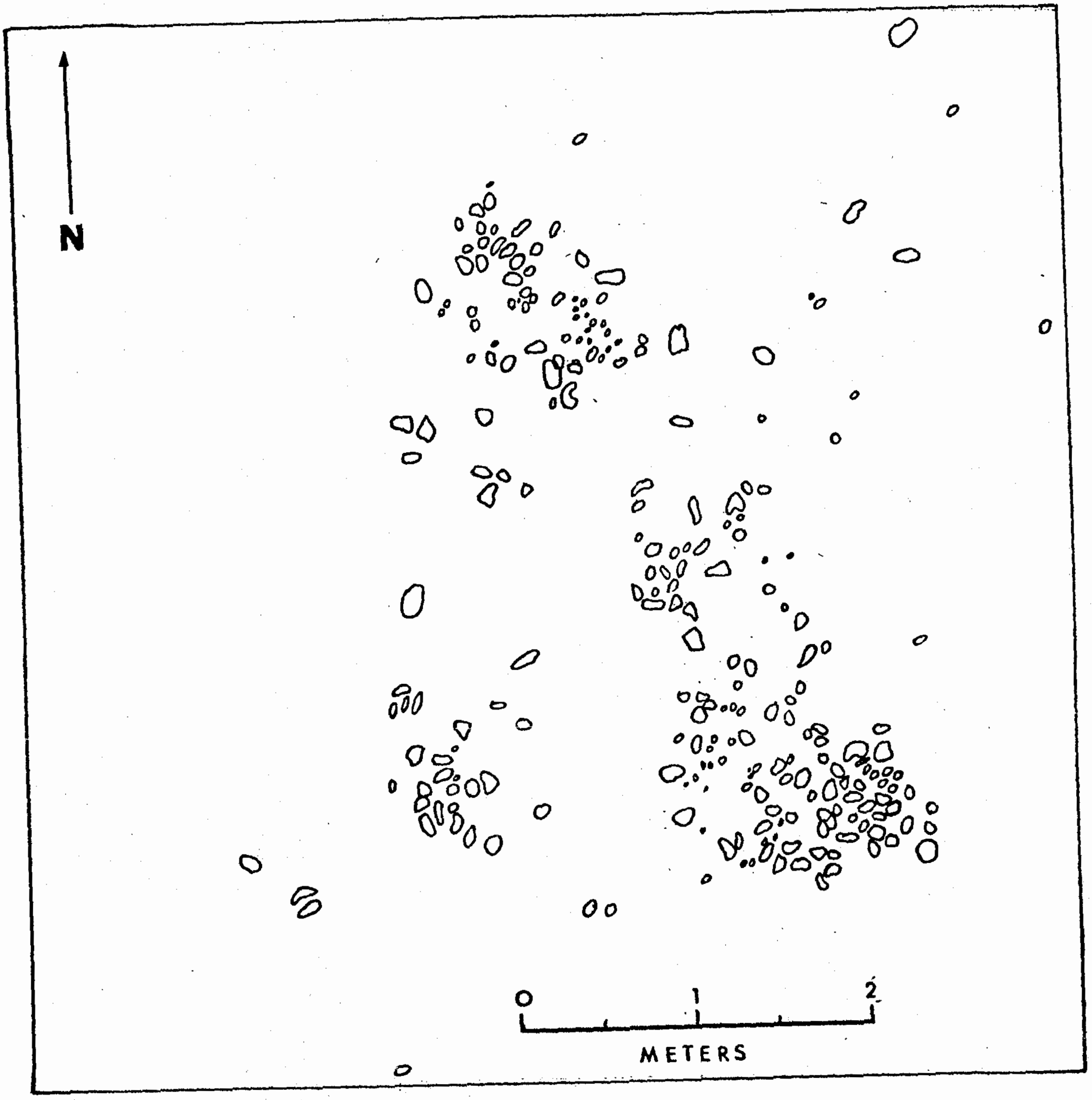


Fig. 10: Area I1, triple hearth.

Chapter 4

FAUNAL REMAINS

Techniques of Recovery and Analysis

(1) Recovery

Faunal experts hold differing opinions concerning the size of bone samples to be brought home from the field. Representing one extreme, Olsen (1961:540) suggests discarding non-identifiable bone fragments, broken vertebrae and ribs in the field. But as early as 1939, Brainerd (1939:324) maintained all bone fragments be saved. Chaplin (1971:24) is more emphatic: "Every scrap of bone must be kept for examination. There is no room for argument on this point." Therefore, all bones recovered from the Atigun site were kept for analysis.

As previously noted, cultural deposits are easily isolated in the otherwise sterile sand of the Atigun site. When excavating, the first material encountered was always fire-cracked rock which projected above all other cultural material. As soon as fire-cracked rock was reached, excavation slowed down and the occupation level was totally exposed. Material was then collected by 50 cm horizontal units. First, the large bones were removed, then smaller bones and fragments were recovered by trowelling the 50 cm, square and placing the collected bones and surrounding soil matrix with the larger bones. The collected sample was passed through a tea sieve with a mesh of <5mm in the lab during final sorting.

Multiple mesh screens were not used in the field for a variety of reasons - most importantly a lack of manpower, and secondly the absence of wood for construction. Unfortunately, this oversight in collection has biased the faunal sample. Although I am confident my collection method yielded a close approximation of bone content, I have no proof of this assumption. This problem will be returned to in the section dealing with number of individuals.

(2) The Sample

A major problem in dealing with faunal remains is that of distinquishing natural from culturally deposited bone. According to Thomas (1969:400), there is no accurate method for making this distinction, although he has proposed a model to this end (1971:367). At the Atigun site culturally deposited bones were isolated as follows.

Concentrations of bones scattered about a hearth were considered to be food remains. Evidence of burned bone is difficult to dispute as cultural, as is smashed and cut bone. Bones farther from the hearth were sometimes less clearly food remains, but were considered as such unless evidence to the contrary was apparent. Several samples of crumbled bones of small mammals found together were identified as wolf or dog feces, for example. A rack of caribou antler from H2 was not considered in analysis because it had not been modified and lay at the perimeter of the cultural deposit, not clearly within the cultural stratum.

(3) Techniques of Analysis

The final preparatory problem concerns the method of sorting, identifying and quantifying the material. Sources are legion on these topics but 3 of the most general and helpful are Gilmore (1949), Cornwall (1956), and Chaplin (1971). Methods of analysis and presentation of data are so diverse, it has prompted one author to call for a standardized approach to the manipulation of faunal data (Grayson 1973). To this end, methods used for Atigun material will be explicitly detailed.

Twelve categories of information were sought for each bone. Because of the quantity of bone, it was decided to computerize these data. This was done on a standard Fortran coding sheet, one line per bone with 27 columns needed for the different categories. The first category was site area, including the vertical occupation, (for example, H2). The next 2 categories were the specific bone and species identification. Because species identification is difficult and often impossible, especially when working with bone fragments, categories were set up indicating doubtful identifications. For example, one choice in species determination was non-identifiable large land mammal. And in bone identification, choices like non-identifiable long bone and general sesamoid were included. Also one overall category labelled "identification" was included to indicate the degree of confidence in identification. On the coding sheets, species were identified only as "caribou", "sheep" etc., and notes were kept narrowing these down to *Rangifer arcticus*, *Ovis dalli*, etc. Only 9 choices were necessary for species and 74 for specific bone. The coding sheets were set up so species or bones could be added to the choices as needed. Another category on the coding sheet was artifact number. From this, horizontal provenience and depth below datum could be filled in by referring to the artifact catalogue. Horizontal provenience was given by listing the co-ordinates of the 2 x 2m pit followed by the 50 cm collecting unit number. A sixth category was the side of specific paired bones. Choices included left, right, and "not known." Portion of the bone was also included with choices of proximal, distal, medial, complete, and fragment. Choices for age were sub-adult, young adult, adult, old adult, fetal, and "not known." The first 4 choices used in this study correspond to Bokonyi's (1970) 4 age groups. Bones were aged on the basis of presence or absence of epiphyseal union. Thus, depending on the age of union for a specific bone, the femur might be classed as sub-adult, the humerus as young adult and the radius as adult, even if all bones may have come from the same animal. The final 2 categories were labelled "condition" and "manufacture." Condition referred to whether the bone had been burned, whereas manufacture indicated if the bone had been worked. Worked bone was considered exclusive from broken bone and needed saw or cut marks to be included in that category.

In all categories, hand-written notes and comments were kept for unusual bones if it was felt that the computer categories might be ambiguous. This was also necessary in describing butchering patterns. In retrospect, the computer coding of bone was far from satisfactory if a highly detailed faunal analysis were to be obtained. However, given the size of the sample, and time restrictions, computerization of data was necessary.

(4) Aims of Analysis

Faunal analysis was undertaken with several specific objectives in mind. These objectives included determination of seasonality, length of occupation, identification of activity areas, and, perhaps, the identity of the cultural group that left the remains. Different methods of characterizing the data were employed. These techniques included minimum number of individuals, aging and sexing of animals, and analysis of butchering patterns. In addition, the spatial distribution of the bones was examined.

The most basic of these techniques is the determination of the minimum number of individuals of each species present in each occupation. By determining the abundance of different species in different occupations, inferences can be drawn concerning activities occurring at the site. Techniques of aging and sexing animals can be used to determine the season of occupation and may suggest cultural preferences - for example, old male caribou may have been highly desired prey if they are numerically predominant. Analysis of butchering patterns can yield information concerning the utilization of species and may help determine the cultural identity of the site's inhabitants. Plotting of bone distribution may add information concerning butchering patterns and hearthside activity areas. Finally, the length of occupation and/or population size can be roughly approximated, using minumum number of individuals.

Estimates of minimum number of individuals are presented first in the following section, to give a broad perspective on the kinds and relative abundance of species at the site; this is followed by a section on seasonality. Using these 2 categories of information, an estimate of length of occupation will be offered, followed by an analysis of bone distribution and a discussion of butchering patterns.

Number of Individuals

In order to get some idea of the length of occupation and types of activities occurring at the Atigun site, it was first necessary to identify and quantify the animal species present. Various methods can be used to calculate the minimum number of individuals in a faunal collection. The simplest is to take the most abundant paired element, for example femurs, and divide by 2, giving the minimum number of individuals for a particular species (White 1953b: 396). This method will usually underestimate the true number of individuals, especially if the kill was divided between groups at the site (White 1953b: 397).

Two methods of calculating minimum numbers of individuals were used in this paper. The first is based on White (1953a:160), who uses the most abundant bone element, separates the left from the right, and uses the greater number as the unit of calculation. I modified White's approach by dividing bones into different age classes. Minimum numbers of individuals were calculated for each age class and were then totalled, yielding a final estimate of the minimum number of individuals. The number used was the highest estimate obtained from paired bone elements. For example, if ground squirrel femurs suggested a minumum number of 20 and mandibles suggested a minimum number of 25, the latter estimate was used. In the case of single unpaired elements such as sacra, minimum numbers equalled the number of sacra recovered. In the case of multiple unpaired elements such as lumbar vertebrae, minimum number of individuals was arrived at by dividing the recovered number of bones by the number of similar bone elements present in a single living animal of the species. In all cases, paired elements yielded a greater minimum number of individuals.

To illustrate this first method, a total of 48 bones were identified as ground squirrel ulnae in area A1. Of these, 33 were complete, including 1 adult left, 5 young adult left, 8 sub-adult left, 6 young adult right and 6 sub-adult right. The rest of the ulnae were all proximal portions - 7 left sub-adults, 6 right sub-adults and 9 right ulnae fused on the proximal portion. To include all specimens, age classes were reduced to 2 - ulnae with unfused proximal ends and those with fused proximal ends. Left ulnae with unfused proximal ends totalled 15, right proximal unfused ulnae totalled 12, left proximal fused ulnae totalled 6, and right proximal fused ulnae equalled 15. The minimum number was taken to be 30 by adding the greatest number found in each age class.

The second method was based on pairing right and left bones from the same individual. Here the minimum number of animals is the number of pairs of a given bone plus the unpaired lefts and unpaired rights of the same bone (Chaplin 1971:75). Perkins (1972:1009) has suggested Chaplin's "grand minimum total" is statistically invalid, however he fails to substantiate this. White (1953b: 397) has suggested that matching left and right bones of individuals involves the expenditure of "a great deal of time with small return." However, one of the few researchers to attempt the matching of paired elements showed that different results were obtained by this method (Flannery 1967:157). In this study, matching paired elements yielded a higher total of minimum number of individuals.

Using the same data employed to illustrate the first method, but matching left and right ulnae, a different figure was reached. Thirty-two bones formed 16 pairs of ulnae. Bones which could not be matched included 1 complete left, 4 proximal sub-adult left, 1 complete sub-adult right, 2 complete young adult right, 3 proximal sub-adult right and 5 proximal young or adult right ulnae. Adding unmatched bones to the number of pairs yielded a result of 32 as a minimum number of individuals.

In order to illustrate different figures arrived at by examining different bone elements, a summary table of results based on different ground squirrel bones in area A1 is given below (Table VII). Two estimates are given for each bone element, based on the modification of White's method and Chaplin's method.

Table VII: A comparison of minimum number of individuals estimates based on ground squirrel remains in area A

	Minimum number of individuals	
bone	White's method	Chaplin's method
mandible	38	41
ulna	30	32
humerus	34	39
tibia	26	32
femur	31	35

The same techniques were applied to faunal remains of all mammalian species in all areas and for paired elements in recovered fish bones. However, most fish remains were vertebral centra. Although Casteel (1974a: 240) outlines a method for determining minimum number of individuals of fish by considering frequencies of occurrence of vertebral types, his method could not be followed due to lack of comparative material.

Species identification of bird and fish remains was not accomplished due to lack of comparative skeletal material. Ryder (1969:38o) has suggested measuring the diameter of each fish vertebra and reporting relative frequencies of each diameter in order to statistically identify species, but Olsen (1971:6) believes this is valid only on a family level of taxonomy. Casteel (1974a:238) has shown this method to be an invalid approach to the identification of fish remains on any level. With one exception, B1, the bird remains are those of a ptarmigan-sized bird. One of the 3 birds present in B1 is from a larger fowl, identified as a species of goose.

Rather than list complete tables of all faunal material recovered in each area, a summary table is presented, listing by species the number of identified specimens and the minimum number of individuals (Table VIII). Two estimates of minimum number of individuals are presented, based on the methods described above. The larger result was taken to be the closer approximation of the actual number of animals deposited at the site.

Because of the failure to screen cultural deposits in the field, the numbers of both identified specimens and minimum individuals must be viewed with caution. The obtained numbers are certainly underestimates of the true deposition of fauna, particularly in the cases of small mammals, birds and fish. The significance of this underestimation is impossible to judge. Therefore, all following discussion in the chapter is necessarily partially speculative in nature.

Although no 2 areas show striking similarities in numbers and species of animals represented, one overall similarity is the presence of ground squirrel in all occupations but I2, also the only area that lacks a hearth. This might suggest I2 is the site of an isolated caribou kill, with the one bird bone present representing either a chance kill or an intrusive element. The high frequency of ground squirrel remains compared to other fauna in all other occupations suggests the site may have been primarily occupied for the purpose of capturing ground squirrels. Since fine screening should have resulted in the collection of even more material from such small animals, this conclusion is reinforced. The presence of fish in several occupations shows at least some fishing was done.

Table VIII: Distribution of bone, frequencies and minimum number of individuals based on two methods.

	Caribou (Rangifer arcticus)			dall sheep (Ovis dalli)			hoary marmot (Marmota caligata)			ground squirrel (Citellus parryii)			Bird			Fish		Total		
	NISP	MNIa	MNIb	NISP	MNIa	MNIb	NISP	MNIa	MNIb	NLSP	MNIa	MNIb	NISP	MNIa	MNIb	NISP	MNIa	NISP	MNIa	MNIb
A1	1675	6	9	0	0	0	8	1	1	1231	38	41	2	1	1	51	1	2967	47	53
A2	0	0	0	0	0	0	0	0	0	9	2	2	0	0	0	0	0	9	2	2
B1	0	0	0	240	1	1	0	0	0	1315	97	105	37	3	3	115	2	1707	103	110
B2	210	1	1	0	0	0	33	1	1	263	13	14	4	1	1	1	1	544	17	18
B3	69	1	1	0	0	0	8	1	1	440	28	30	3	1	1	0	0	523	31	33
H1	360	2	2	0	0	0	1	1	1	2504	146	158	1	1	1	14	1	2883	149	163
H2	18	1	1	0	0	0	0	0	0	49	12	13	0	0	0	0	0	67	13	14
I1	136	1	1	0	0	0	0	0	0	25	6	6	0	0	0	0	0	161	7	7
I2	149	1	1	0	0	0	0	0	0	0	0	0	1	1	1	0	0	150	2	2
Ttl.	2617	13	16	240	1	1	50	4	4	5836	342	369	48	8	8	181	5	9011	371	401

NISP - Number of identified specimens
MNIa - Minimum number of individuals (White's method)
MNIb - Minimum number of individuals (Chaplin's method)

Seasonality

Seasonality is best determined by obtaining the exact ages of the animals represented in the faunal remains. Klevezal and Kleinenberg (1967) show methods of aging animal skeletons by analyzing annual layers in both teeth and selected bones. Unfortunately these methods were beyond my capabilities in terms of time and equipment. Casteel (1972) shows how it is possible to establish seasonality using specific fish bones or scales, again a method precluded by the nature of the sample.

Another approach to determining seasonality is to sex the animals killed. Since different sexes were ethnographically desired prey in different seasons (Gubser 1965), it should be possible, by isolating the most common sex of animals, to provide additional evidence for seasonality. Both Bergerud (1964) and Chaplin (1971) have been successful in sexing faunal remains using different bone indeces. But since their methods were inappropriate due to the fragmentary nature of the Atigun sample, sexing of Atigun specimens was not attempted.

The criteria finally used in determining seasonality at the Atigun site were aging Atigun fauna by means of tooth eruption and epiphyseal union. Cultural data were used for supportive evidence where possible. Seasonality was determined independently for ground squirrel remains, for caribou and for other fauna.

Almost nothing has been written concerning developmental patterns in ground squirrel. One source established the fact that distal femoral epiphyses close in ground squirrels between 2 and 3 years (Tomich 1962: 218), a time range too broad to be used to judge seasonality. This detail does permit, however, the generalization, based on observations made when determining minimum number of individuals, that over 95% of ground squirrels captured at the Atigun site were under 3 years of age. A selection for young animals is thus possible, although no data are available concerning the population structure of ground squirrels. It must be remembered that ground squirrels hibernate from September to early May, thus narrowing the seasonality at the Atigun site. No fetal ground squirrels were recovered from any occupation and since the young are born in June (Mayer and Roche 1954:57), the time of year might reasonably be pinpointed to late June, July or August.

Caribou provide some supporting evidence of this seasonality. Complex studies such as those by Banfield (1960) and McEwan (1963) involving microscopic analysis were not attempted. No studies were found which discussed epiphyseal union in caribou, so Lewel and Cowan's (1963) data on mule deer were examined for comparative purposes. Only 4 areas, A1, B2, H1, and I2 had material on which any age estimates could be made. In other areas where caribou were present only very general statements can be made. H2 contained only antler and non-identifiable long bones, making precise age estimates impossible. All that can be said of the caribou in B3 is that the animal was 14 months or older. The single caribou in I1 had an unfused innominate, but since Lewel and Cowan (1963) omit any reference to innominate closure, all that can be said is the animal was young. Age estimates in the other 4 areas are disappointingly broad in range. A femur, in area I2 came from a caribou 30-40 months old. In B2, the single caribou humerus was 10-14 months old. In areas A1 and H1, phalanges indicated 12-14 month old caribou in both areas, and there was additional evidence of younger animals. There was no evidence from any occupation that old (>60 months) animals were captured , indicating a preference for young animals and calves.

Knowing how old a caribou was when captured can help determine seasonality, by calculating the month when the animal was most likely born. In one study, Kelsall reported June as the month of caribou calving (1953:6). Howver, in a later study, the same researcher reports calving throughout June, with peak calving occurring during the middle of July (Kelsall 1960:7). In this report, July 1 was taken to be the average date of birth. Thus, in A1 and H1 the caribou were taken between July and September. In B2 the time of capture was from May to September, while in I2 only November and December were eliminated as possible times of capture.

Another technique of aging caribou bones was tried to find supportive evidence for the above and to further narrow seasonality. Using information from Banfield (1954) and Skoog (1968), tooth eruption in caribou specimens was studied, although only areas A1 and H1 contained suitable specimens. Four different mandibles were aged in A1 and one in H1, with results as follows: in H1, 11-13 months; in A1, 22-25 month, 11-13 months, 22-24 months, and 11-12 months. It thus seems very probable that these 2 levels were occupied in either July or August.

Ethnographic information was invoked to further examine seasonality. The greatest dispersal of Alaskan caribou occurs during August (Kelsall 1960:18) and it is at this time that calves would be most easily taken. The preponderance of young caribou at the Atigun site may be a result of this dispersal. However, the maximum concentration of animals in each herd occurs in late June and early July during spring movement, and more regularly during fall migration (Burch 1972b:345). In the Atigun region, however, caribou are now rare until August (H. Alexander pers. comm. 1976). Furthermore, caribou skins best suited for clothing are taken during August (Burch 1972b:343).

Some inferences can be made about seasonality from other faunal remains. For example mountain sheep, found in B1, were preferred in the fall, or at least from August on. Ground squirrel fur is most suitable for clothing in August or early September. Marmot, found in several occupations, was also most highly desired during August - September. The 1 goose found at Atigun was likely killed in August on its southward migration.

The "time of capture" and "season of occupation" are probably synonymous at the Atigun site since all occupation levels exhibit almost identical ranges of fauna. The presence of ground squirrel in all levels but I2 could well indicate a season specific activity common to most occupations at the site. Almost certainly, ground squirrels were not cached for future use, but were utilized when they were captured. Distributional evidence cited later in the chapter suggests bones from all species present were deposited at the time in each discrete occupation level. Therefore, all evidence, both empirical and inferential, points to an August occupation in all areas at the Atigun site with the possible exception of I2.

Length of Occupation

Hall (1971:60) has presented the formula $L = \frac{T}{CI}$ to calculate length of occupation. In this formula L is the length of occupation in days, T the total caloric value represented by faunal remains, C the necessary caloric intake per individual per day, and I the number of individuals. In order to calculate the caloric value of the faunal remains, it is necessary to first estimate the live weight of the captured animals. Perkins and Daly (1968:96) suggest measuring the astragalus or load-bearing bone to determine live weight. However, astragali were not well enough represented to make this a worthwhile venture. Noddle (1971) also used other bone measurements to estimate live weight, but with rather limited success.

It has been suggested that the most valid means of deriving meat-to-bone ratios for each species is based on the total weight of bone per species (Reed 1964:215). Because ratios of dry bone to fresh weight vary between 5% (Cook and Treganza 1950:245) and 7.7% (Reed 1964:215), this method should be viewed with caution. Also, bone loss by various means could seriously skew the data. It was decided that weight estimates based on minimum number of individuals per species would be relatively accurate, especially since age of animals and their season of capture, both important factors in weight estimation, were known. It was first necessary to determine the average live weight of different species present at the Atigun site. Then, an estimate of the proportion of useable meat to live weight was made. This figure was multiplied by the minimum number of individuals to arrive at an estimate of the amount of available useable meat per species. Faunal sources provided all the calories consumed at the site, as berries were probably not yet in season. The cautionary notes of Watson (1955:288) concerning possible additional protein sources can be ignored in an Arctic occupation.

Estimates of male caribou live weight range from 222 pounds (Banfield 1954:1) to 370 pounds (Rand 1945:79). August live weight is probably closer to 250 pounds, averaging male and female (White 1953b:397). At this season young adults weigh about 160 pounds and juveniles or calves about 75 pounds (Hall 1971:62). Using information from White (1953b) and Hall (1971) an estimate of pounds of useable meat per species and total available calories was made for each area (Table IX). Although Casteel (1974b:96) does use statistics to estimate total live weight of all fishes, this technique was not used because of the paucity of fish remains. A very general estimate of one pound of useable meat per fish was used instead.

Lehmer (1954:170) estimated meat requirement to be one half pound per person per day. However, in cold climates, caloric needs are increased to keep the body warm and allow for extra energy expenditures (Mitchell and Edman 1951:20). Body temperature is also regulated in cold climates by an increase in fat intake (Newman 1962:23). For an adult relying on meat alone for both protein and calories, it is necessary to consume at least 4 to 5 pounds of meat each day, even in a temperate climate (Uerpmann 1973:320). One estimate would have Eskimo hunters eating up to 10 lb of meat per day (Solecki et al 1973:8). These figures suggest that Hall's (1971:65) estimate of 3000 calories per day is somewhat conservative. A more accurate figure may be around 4000 calories per day for an adult male hunter and my calculations are based on this latter estimate.

The number of individuals per household is a more difficult figure to arrive at. If hides were sought at the site, females would accompany the hunters to prepare skins and children would follow their parents. Six individuals might be a reasonable estimate for a single household, the most likely unit to have occupied each area at the Atigun site (Hall, 1971). Based on these data, length-of-occupation estimates are given in Table X.

Table IX: Edible weight and available calories of the Atigun faunal material. Calorie estimates based on White (1953b) and Hall (1971).

	caribou		sheep		marmot		ground squirrel		bird		fish		total
	lb.	calories	lb.	calories	lb.	calories	lb.	calories	lb.	calories	lb.	calories	calories
A1	720	276150	0	0	5.5	1700	41	12300	2	8000	1	414	298,665
B1	0	0	70	31780	0	0	105	31500	10	4000	2	1030	68,310
B2	104	43148	0	0	5.5	1700	14	4200	2	800	1	515	50,363
B3	156	64722	0	0	5.5	1700	30	9000	2	800	0	0	76,222
H1	153	63414	0	0	5.5	1700	158	47400	2	800	1	515	113,829
H2	?	?	0	0	0	0	13	3900	0	0	0	0	3,900?
I1	104	43148	0	0	0	0	6	1800	0	0	0	0	44,948
I2	104	43148	0	0	0	0	0	0	2	800	0	0	43,948

Table X: Length of Occupation (based on 6 individuals in each area).

	Area								
	A1	A2	B1	B2	B3	H1	H2	I1	I2
occupation in days	16	1?	3-4	3	3-4	3-4	1?	2-3	1?

The above estimates of length-of-occupation must be regarded with considerable caution. Weight estimates for caribou were based on averages and may be very inaccurate. In addition, weights are based on minimum numbers of individuals and because the low frequency of identified caribou bones in some occupations gives rise to the suspicion that meat was divided between households, calorie estimates may be too high. No allowances are made in the calculations for the feeding of dogs, possibly a large source of error. Although no direct evidence for the presence of dog was found, something identified as either wolf or dog feces was recovered from 2 occupations.

Another potential source of error are ground squirrel remains since it is by no means sure that all or even most ground squirrels represented by the faunal remains were eaten. The estimate of 6 individuals per household can be questioned. One final source of error may be the incompleteness of recovery of small animals, particularly fish.

Because of the above cautionary notes, a conservative guess suggests that all occupations at the Atigun site lasted less than 3 weeks.

Bone Distributions

The plotting of bone distributions should yield information about butchering patterns and hearthside activity areas. Computerized data would ease an otherwise tedious job, but because of the imprecise locational coordinates, direct printouts of distributions were not obtained. If each individual bone were plotted the chart would be too crowded and patterns, if any existed, would be difficult, if not impossible, to detect. Bones were divided into 9 classes to simplify the picture. These were: (1) "head"; (2) "backbone"; (3) "forelimb"; (4) "hindlimb"; (5) "thorax"; (6) "innominate"; (7) "distal limb" (including phalanges); (8) "non-identifiable long-bones"; and (9) "antler".

Based on these bone classes, several figures were drawn. In each area and for each species, a diagram of percentage counts was done. For example, if the entire occupation contained 100 ground squirrel forelimbs, and 5 of these were found in one 50 cm square, the figure 5, representing 5%, was plotted in the appropriate square with a shorthand designation for forelimb. This results in a rather bulky illustration, difficult to interpret. Because of this, only 2 sample charts showing results of this method are illustrated (Fig. 11,12) with only those values above 5% shown. The 2 illustrations were chosen arbitrarily since all figures tended to be very similar.

In Figure 11, representing ground squirrel from area B1, it is difficult to see an overall pattern. Backbone and thorax seem to have their greatest concentration somewhat to the south of other bones. It is only logical that backbone and thorax should be associated.

In Figure 12, caribou remains from B2 are illustrated. In this example, only one animal is involved yet the depositional pattern is still unclear. All that can be said is that butchering was quite localized.

In retrospect, it may have been more profitable to sub-divide the bones into Uerpmann's (1973:316) tripartate division based on quantity

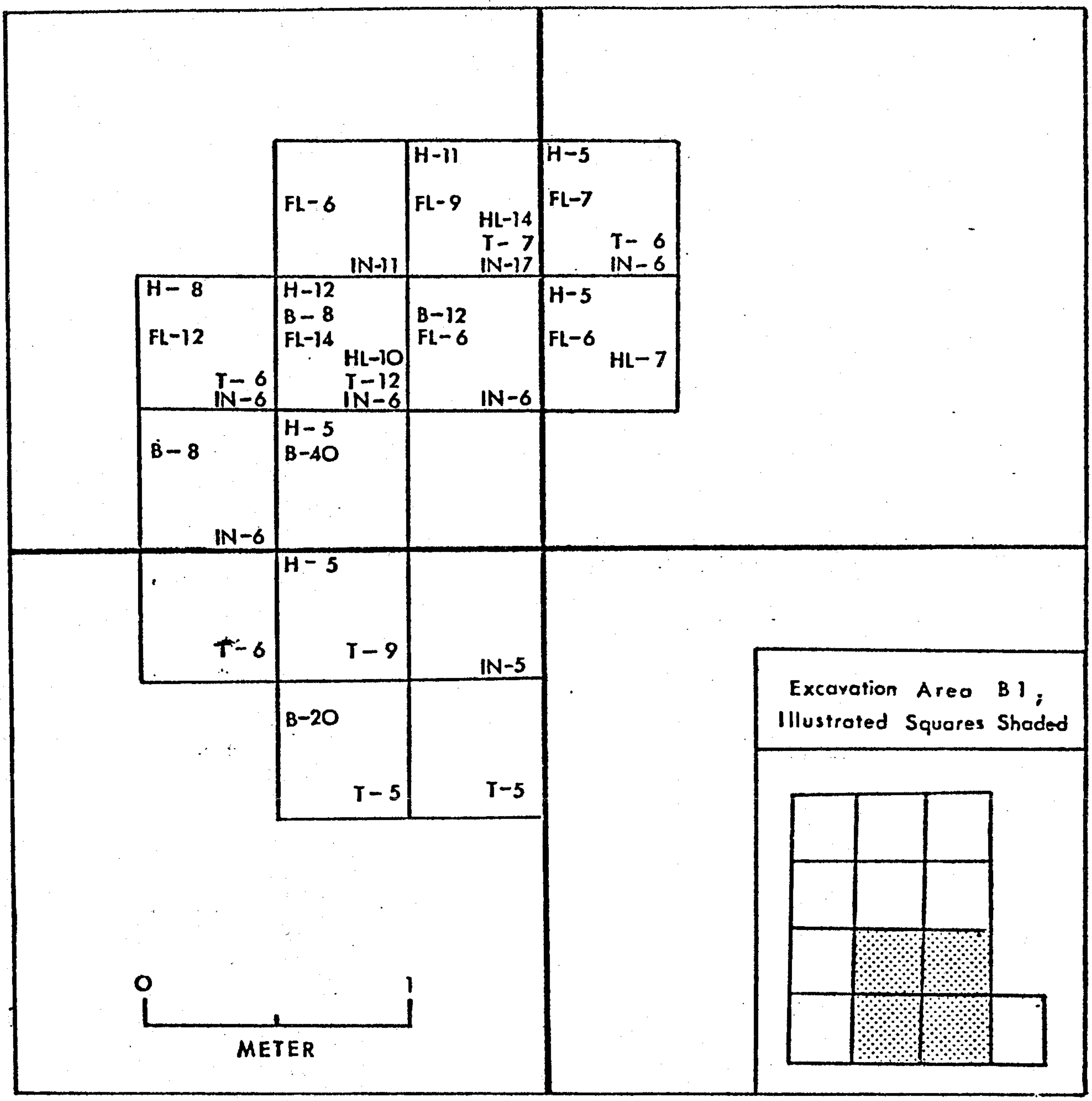


Fig. 11: Distribution of ground squirrel bones in area B1. Bones are subdivided into head (H), back (B), forelimb (FL), hindlimb (HL), thorax (T) and innominate (IN). Numbers represent percentages of the total in each category. Total number of bones in each category are H(514), B(24), FL(366), HL(168), T(137) and IN(64).

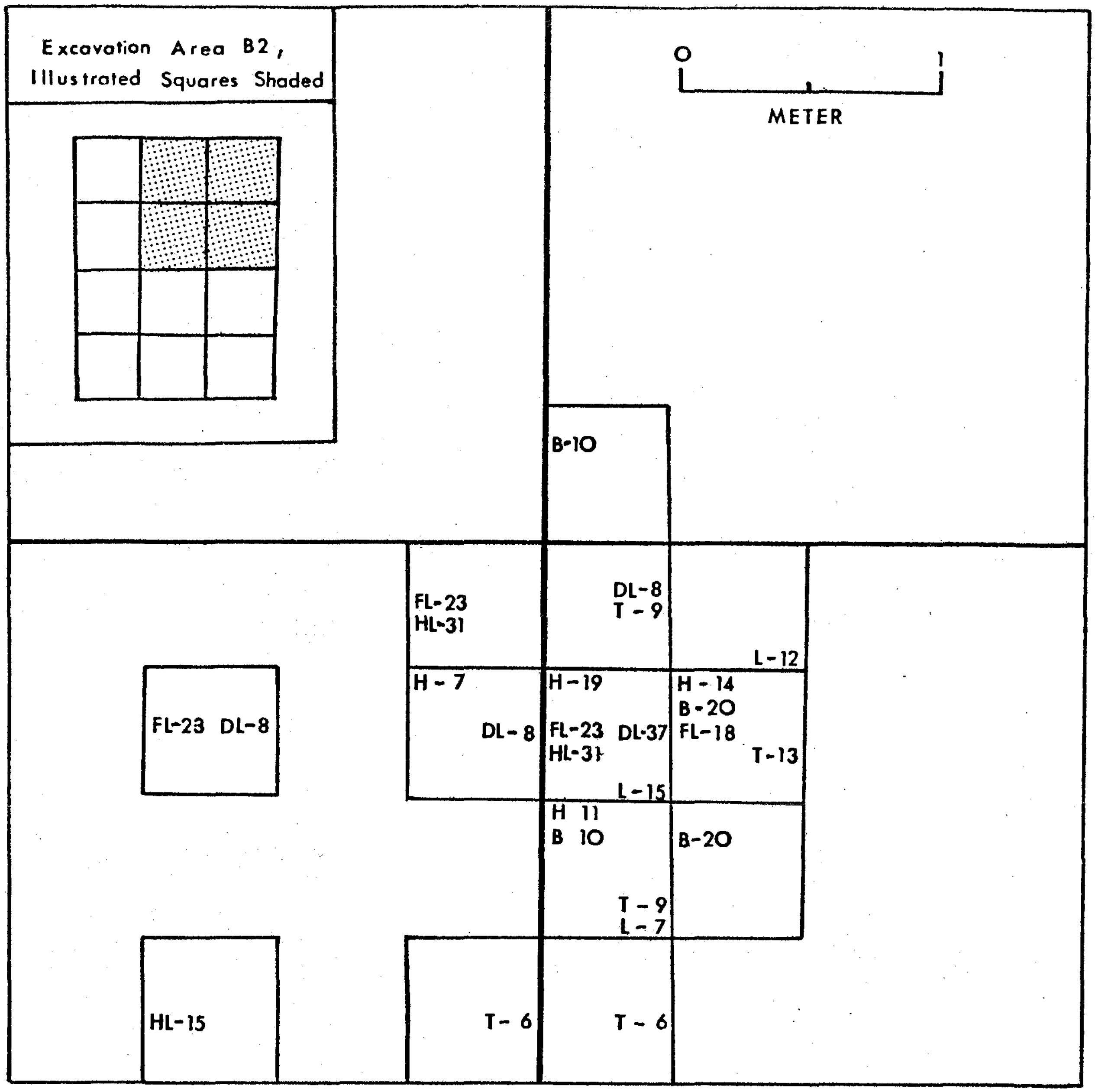


Fig. 12: Distribtuion of caribou bones in area B2. Bones are subdivided into head (H), back (B), forelimb (FL), hindlimb (HL), distal limb (DL), thorax (T), innominate (IN) and longbone (L). Numbers represent percentages of the total in each category. Total number of bones in each category are H(27), B(20), FL(17), HL(13), T(22), DL(48) and L(59).

of meat the bones carry, since it is possible that bones carrying more or less desired cuts of meat may have been differentially deposited.

Further charts were then done to examine the proposition that different animals may have been deposited in different positions around the hearth. To examine this, a separate chart was drawn for each species in each area. The total of all caribou bones in A1, for example, was calculated. Then for each 50 cm square, the number of bones recovered in that square was expressed as a percentage of the total. Surprisingly, in no single area was there a marked difference in bone distributions between species. One area, B2, is illustrated (Fig. 13).

A final series of charts was drawn, considering all bones of all species in each area. Total number of bones was calculated, and bone count in each 50 cm square was expressed as a percentage of the total. This was done to accurately locate activity areas around the hearth. The term "concentration" implies a judgementally significant grouping.

Five areas showed striking similarities in bone distributions. The 5 all had one strong concentration of bone, centered in 3 or 4 adjacent 50 cm squares. The location of the concentrations varied in compass orientation to the hearths, but all were contiguous with rocks bordering main hearth areas. One example of this type of concentration is shown, without inclusion of fire-cracked rock, in Fig. 14.

Areas showing a strong concentration of bone included A1, B1, B2, B3 and H2. B3, illustrated in Figure 13, containes 44% of all bones in $1m^2$. This concentration is just north of the double hearth, with the greatest concentration exactly in between the 2 hearths. Thirty-two percent of all bones in B1 were found in .75 m^2 immediately northwest of the hearth. In B2, northeast of the hearth rocks, a concentration con-

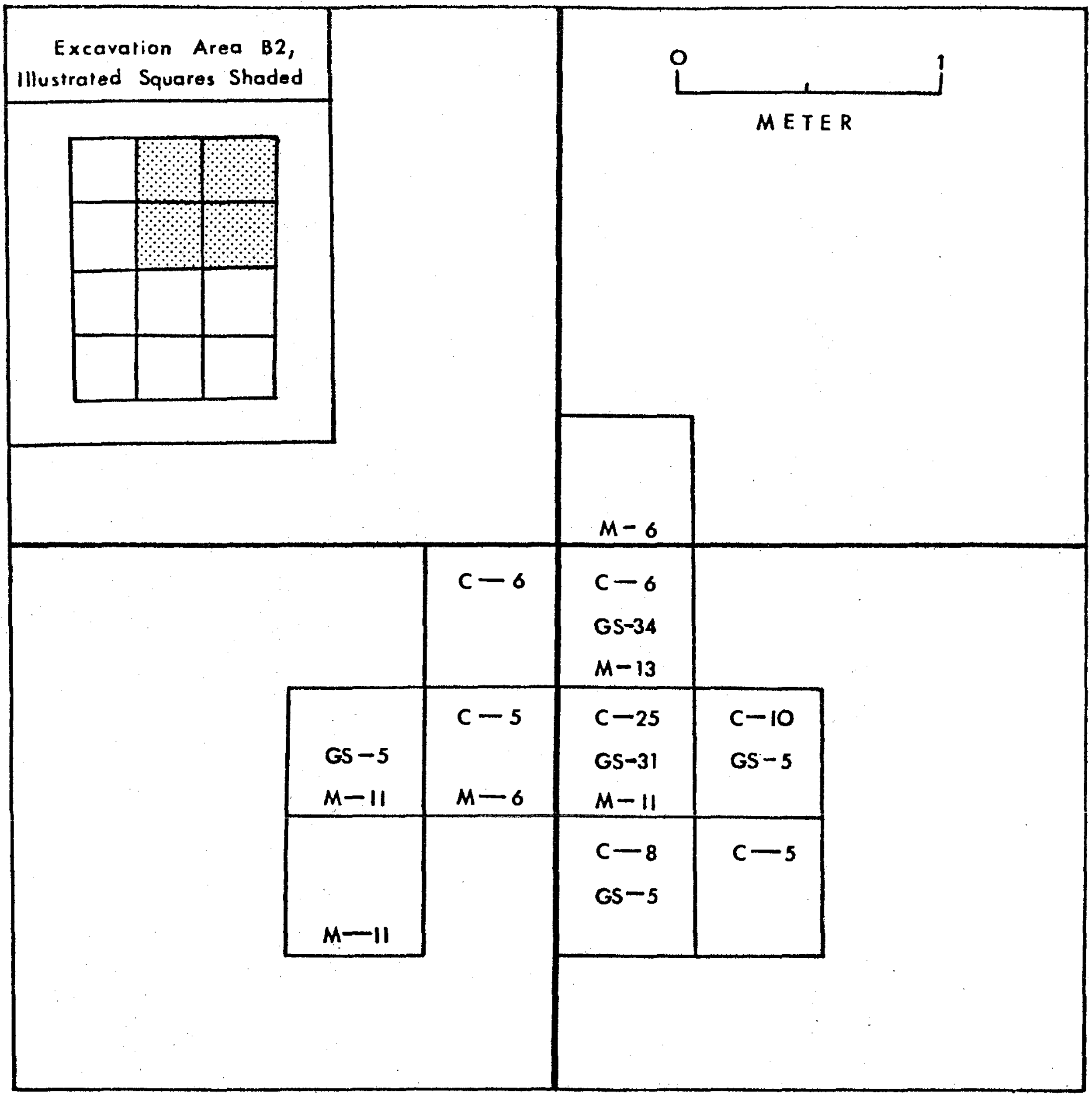


Fig. 13 : Distribution of bones by species in area B2. Species include caribou (C), ground squirrel (GS) and marmot (M). Number represent percentages of the total number of bones recovered for each species.

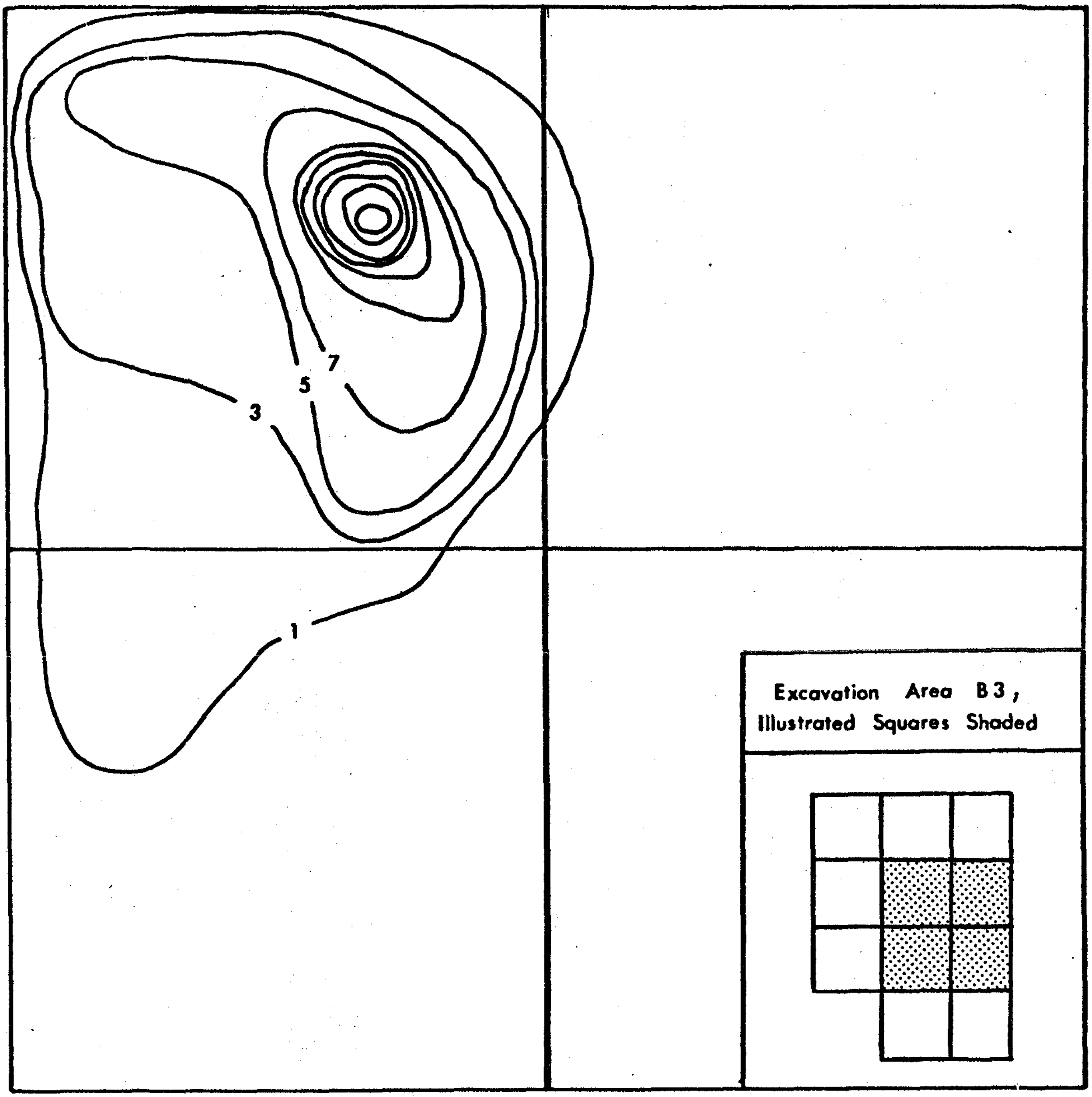


Fig. 14: Distribution of bones of all recovered species in area B3, expressed as percentages. The contour intervals represent 2 percentage units. The number of recovered bones in area B3 totalled 520.

sists of 52% of all bones in that level. Immediately south of the hearth in H2, .75 m^2 contains 46% of all bone, and A1, $1m^2$ has 51% of all bones in the northeast section of the hearth.

All 3 occupations in area B show 1 strong concentration, all lying generally north of the hearth area. A1 shows this same pattern and orientation. The concentration in area H2 is to the south of the hearth.

In area H1, 2 concentrations of bone are apparent. Immediately south of the hearth, 22% of all bones are found in $1m^2$. One hundred forty centimeters to the south of this concentration, but to the north of a group of smaller rocks than those of the hearth, a concentration of 17% of the total bones was found in $1m^2$. No charcoal was found with the latter group of rocks. This may represent an area where animals were butchered, with the more northerly concentration representing the remains of a meal. The area contained many ground squirrel remains, possibly too many to have been eaten in a short stay, especially since other food sources were present. The concentration to the south of the true hearth is consistent in orientation with the remains in H2.

Area I1 shows more scattered bone than other areas. However, there is a concentration immediately north of 1 of the 3 possible hearths in the occupation level. Seventeen percent of all bones occur in $1m^2$. No other comparable area of this occupation level contains more than 5% of the total bones.

The evidence from bone distribution would suggest a common pattern for all areas, including H1 and I1. It is likely that areas outlying the hearth were used for butchering and skinning, with one central locality used for cooking. This would explain the abundance of rocks in each occupation, with outlying, scattered rocks used for smashing bone. The single concentrations of bone, even with more than 1 hearth, would suggest either a communal meal or a single family's activity.

The association of bones with hearths reinforces some earlier hypotheses. As previously noted, prevailing winds which are strongest in August are from the north and secondarily from the south. At the Atigun site strong winds are indicated by the constancy of bone accumulations to the north or south of the hearth areas, indicating northerly or southerly winds, since it is assumed inhabitants would avoid smoke from the fire or if mosquitoes were bad, would actually seek out the smoke. Again, bone concentrations point to overall functional similarities among all occupations at the Atigun site.

A final factor examined was the distribution of burned bone. Burned bone showed no concentration in any occupation, but did appear close to the hearth rather than far away, not a surprising result. Most bone tended to be charred indicating exposure to low heat, although some bones were calcinated, a result of longer exposure to low temperature or short exposure to high temperature (Stewart 1974:16).

Butchering Patterns

The study of butchering patterns at the Atigun site was done with 3 primary objectives in mind: (1) to establish similarities or differences among the occupations at the site; (2) to determine the ways different species were used; and (3) to identify the site's inhabitants as either Eskimo or Indian.

To examine similarities among occupations, a pair of tables was compiled showing the number of bones found for each species in each occupation and the percentage of bones for each general part of the skeleton (Tables XI, XII). Only caribou, Dall sheep and ground squirrel bones were found in sufficient quantity to be included. Each general skeletal part or bone class will not contain equal numbers of elements, so comparisons between different skeletal zones are not meaningful. For example, it cannot be said that proportionately more head parts were found than were innominates, simply because the former includes more bones. What must be examined are like skeletal parts among different occupations. Thus, a comparison of percentages of caribou forelimbs among occupations would be meaningful.

Results were disappointing. No statement can be made concerning caribou or Dall sheep (Table XI) other than that long-bones were smashed in all occupations, as evidenced by high percentages of non-identifiable long-bone fragments. Ground squirrel showed more similarity among occupations (Table XII), but similarities were still far from striking.

Brothwell and Brothwell (1969:28) suggest using frequency distributions, comparing bones of different species, to test similarities in methods of preparing carcasses. The method involved taking the most commonly represented bone as 100%, then calculating percentages of other bones from this figure. This was done with Atigun faunal remains with the additional hope that comparisons could be made for the same species in different occupations. Results were again disappointing. A different frequency pattern was noted between species in the same area, which might be taken to suggest different methods of butchering different animals. This conclusion is suspect however, since differing frequencies were also obtained for the same species across different occupations.

When these methods were shown to be inadequate to produce good information on butchering patterns, it became necessary to turn to more

Table XI: Butchering patterns: caribou.

	A1	B1*	B2	B3	H1	H2	I1	I2
minimum individuals	9	1	1	1	2	1	1	1
number of bones	1675	238	210	69	346	18	136	149
% head	10	20	13	6	9	-	15	6
% back	17	7	9.5	8	13	-	1.5	4
% forelimb	11.5	3	8	18	5	-	4.5	8.5
% hindlimb	9.5	6	6	11	5.5	-	4	3.5
% thorax	17	24	10	22	16	-	15	8.5
% innominate	2	3	2	7	2	-	3	1
% distal limb	11	11	22.5	10	8.5	-	8	9
% non-identifiable long bone	22	26	28	28	41	100	49	58

* Dall sheep.

Table XII: Butchering patterns: ground squirrel.

	A1	A2	B1	B2	B3	H1	H2	I1
minimum individuals	41	2	105	14	30	158	13	6
number of bones	1231	9	1315	263	440	2509	49	25
% head	20	33	39	25	32	26	67	66
% back	25	0	2	16	9	7	3	0
% forelimb	13	22	28	12	13	18	6	18
% hindlimb	11	22	12	2	6	13	9	10
% thorax	24	22	14	41	38	30	12	0
% innominate	6	0	5	4	2	6	3	4

subjective approaches. If right and left elements of a particular species show numerical discrepancies, the kill may have been divided among different households (White 1956:401). This is the only means of judging whether or not at least 2 groups occupied the site at any 1 time. Only large animals were considered, since it is doubtful whether an individual ground squirrel would have been shared among households. No discrepancies were noted for large animals in any area.

Area A1 contained the only articulated bones of a large mammal, indicating that they were discarded with connective tissue or flesh still in place. Five of the 7 groups of articulated bones in A1 were distal parts of fore and hindlimbs. The bones in the forelimb included metacarpal 3+4, ulnar, intermediate and radial carpals, 2+3 fused carpal, carpal 4 and phalanges. Hindlimb parts included the calcaneous, astragalus, 2+3 tarsal, central +4 tarsal, and tarsal 1. It would seem feet were being cut off above the "ankle" and discarded. Two other groups of articulated bones included 2 sets of 5 vertebral bodies, each set from different individuals.

Areas were examined for any unbroken long-bones. Daly (1969: 147) states an unbroken long-bone would not come from an eaten animal because of the highly desired marrow content. All large land-mammal long-bones at the Atigun site were smashed. Complete innominates and scapulae were found in 4 areas, A1, B1, H1 and I1. The marrow content of the scapula and innominate is very low, making their unbroken presence not surprising (White 1954:255).

Shotwell (1955:331) outlines a method for determining the relative completeness of bone preservation. The method involves dividing the number of identified specimens by the minimum number of indiviuals, resulting in a ratio that can be compared between species. However, the number of skeletal elements may differ between species. Shotwell (1955:331) suggests the "data should be corrected so that the corrected number of specimens represents the number which would be expected if all genera contributed the same number of recognizeable elements." Shotwell's (1955:331) correction method was applied to material from the Atigun site except to fish or bird remains because the species were unknown. It would seem that Shotwell's ratio might also suggest cultural differences in that a different species ratio might indicate different butchering patterns or different uses for different species and the ratio might also be compared among occupations to test for similarities. This ratio was calculated and shown in Table XIII and some general speculative statements can be inferred from the data.

The comparatively low figure obtained in area H2 does not represent a butchering pattern. The remains in this occupation were composed entirely of antler and non-identifiable long bones. It is quite possible these elements do not represent food remains, as is the case in all other areas, but rather are evidence of tool manufacture alone. The animal represented by the bones was butchered and eaten somewhere else, as only 2 long-bone fragments were recovered.

Rank order of frequencies of large mammal and ground squirrel showed a high correlation. If the frequency was high for caribou, it tended to be similarly high for ground squirrel. This would suggest similar preservation for different species in the same area.

Differences in frequencies between large and small mammals show that larger species were more fragmented. This may only suggest marrow was sought from caribou and sheep and not from ground squirrel and marmot.

Table XIII: Bone specimens per individual.

Area	caribou	sheep	marmot	ground squirrel	bird*	fish*
			Species			
A1	184		11	42	2	51
A2				8		
B1		240		17	11	57
B2	210		42	26	4	1
B3	69		11	20	3	
H1	180		1	21	1	14
H2	18			6		
I1	136			6		
I2	149				1	

* not corrected.

Bones were checked for butchering marks and breakage patterns. starting with the vertebral column. In Al, 1 atlas was found with the proximal part removed; 3 axes were found with ventral portions removed and a total of 6 cervical vertebrae were similarly butchered. Five of these were chopped in half along the long axis and 1 missed the anterior portion. Four thoracic vertebrae were missing the ventral portion. A total of 8 lumbar vertebrae were chopped in half along the long axis, as was 1 sacrum. This would suggest heads were removed by cutting between the atlas the the axis, but without particular care. The fact that ventral parts of vertebrae were missing and that no proximal rib fragments were found, indicates that the ribs were chopped from the vertebral column without great care (White 1954:255). It seems the animal was cut in half along the backbone anteriorly and posteriorly and then had the ribs separated from the vertebral column in the thoracic region.

In Hl, 1 caribou atlas was split longitudinally, perhaps indicating the skull was split open for the brain while still attached to the body. One axis and 4 cervical vertebrae had been cut along the ventral face. Seven lumbar vertebrae and 1 sacrum were split longitudinally. Again, it would appear the head was removed by cutting between the axis and the atlas. The distal end of the backbone was cut in a way similar to the remains in Al. However, several proximal rib parts were found in Hl, suggesting that here ribs were not chopped from the vertebral column. Hl was the only occupation to have any number of proximal rib fragments and no other area contained either first or second cervical vertebrae. In fact, butchering marks were seldom noted in areas other than Al and Hl.

In Al, 2 proximal humeri had been severed at the greater tubercle and only 1 proximal humerus was found complete. Both the cut bones and the complete humerus head were sub-adult. This would indicate that the humerus was smashed while being separated from the scapula. The recovery of only sub-adult proximal humeri suggests that it was easier to remove the humeri of younger animals, and smash that part in adults. Humeri were cut or smashed close to the scapula, effectively removing the complete forelimb. This pattern is common to all areas. The small number of proximal humeri may mean that this bone was pulverized for bone grease (White 1953a:162).

Distal ends of humeri were well represented in A1, but 50% had been split lengthwise or transversly, probably in an attempt to obtain marrow. Most of the split bones were from adult animals, reflecting the greater amount of available marrow. Distal humeri were commonly well represented in all occupations across the site. It is evident that the humerus was separated from the lower limb at the joint, probably by cutting.

Only 1 ulnar fragment showed signs of being cut - a proximal end recovered from A1 with a section missing. This reinforces the idea that the forelimb was cut in half at the joint. No distal ulnar fragments were found in any occupation, indicating they were smashed, probably when removing the distal portion of the forelimb.

Five proximal and 5 distal radii from area A1 were cut longitudinally. Each radius was probably broken in half and then each portion split lengthwise for marrow extraction. As the radii were not badly smashed, it would seem marrow was not highly desired from this bone.

One proximal femur in A1 was cut through the greater trochanter. Since femur heads were frequently occuring elements in this occupation, it would seem that the hindlimb was fairly carefully cut or wrenched from the innominate. Distal femurs were also well represented showing that the hindlimb was not smashed, but more probably carefully cut at the knee joint. Distal femur fragments had been cut longitudinally in 3 cases in Al. In no other area on the Atigun site were proximal or distal femurs present in any abundance.

Tibia fragments, both proximal and distal, were also fairly well-represented in Al. Three proximal fragments had the anterior tuberosity cut off and 1 proximal specimen had both the medial and lateral sides removed. One distal fragment had been cut across the distal portion. Four distal tibiae had lateral, medial or both sides removed. The longitudinal cuts indicate that the tibia had been separated from the femur, while the example of the distal cut indicates that the tibia was removed from the distal limbs by a cross cut rather than by smashing. The same pattern is found in Hl, while in all other areas, tibiae are not well represented.

Several metacarpals and metatarsals were split longitudinally in Al and Hl, again probably for marrow content.

A final calculation was made using bones of large mammals in an attempt to determine the relative frequency of each bone element in terms of what would be expected from the minimum numbers of individuals. The percentage of recovered to expected elements for selected bones is shown in Table XIV. These figures must be viewed with caution since it must be remembered that only 1 individual is represented in most occupations.

In all occupations, the horizontal ramus of the mandible is better represented than the ascending ramus. Only Al shows the presence

Table XIV: Percentage recovered/expected bone elements for large mammals.

	A1		B1		B2		B3		H1		I1	
	proximal	distal	proximal	distal	proximal	distal	proximal	distal	proximal	distal	proximal	distal
femur	50	100	0	0	0	0	0	50	50	0	0	0
tibia	77	92	0	0	0	50	0	0	50	50	0	50
humerus	67	88	50	0	0	50	0	50	0	0	0	0
radius	88	76	50	0	50	0	50	0	75	0	50	0
ulna	100	0	0	0	0	0	0	0	25	0	0	0
metapodial	65	43	75	75	25	75	75	75	25	50	0	75
mandible	67	89	0	50	0	50	0	0	0	50	0	100
atlas	11		0		0		0		50		0	
axis	0		0		0		0		50		0	
scapula	33		50		50		0		75		25	
innominate	25		100		50		50		50		100	
rib	1		3		33		10		15		15	

of relatively complete ascending rami. With the exception of Al it would appear that the ascending ramus was smashed to get at the tongue (White 1953a:162). The absence of hyoids in all occupations reinforces this idea (Olsen 1971:27). It is quite possible to get the tongue without smashing the mandible, perhaps pointing to a different method of obtaining the tongue in Al. It is also possible that all the meat was not utilized in Al, since so many individuals were captured.

Since many skull fragments were found in each area it is known that the head was removed at the site, or at least returned with the carcass. Although low numbers of first and second cervical vertebrae were recovered, comparatively large numbers of other vertebrae were found, showing preservation not to be a factor. The head was probably removed by chopping between the axis and atlas, but was done in such a crude manner as to destroy both bones.

Both the scapula and innominate are well represented in all occupations. It is assumed the meat from the shoulders and flanks was not highly desired, since these bones were not smashed or cut.

The presence of ribs varies from occupation to occupation. Actual percentages are difficult to calculate as complete ribs are found only in area B2. In other areas, percentages are based on distal ends of ribs. Generally, these bones seem to have been highly fractured.

Metapodials are well represented in all occupations. They appear to have been broken for marrow, but were not highly desired. They were removed from the rest of the limb at the proximal end and were smashed in the middle.

Distal ends of both the radius and ulna were smashed except in Al. Apparently the forelimb was separated at the joint since proximal ulnae are absent. Proximal radii are relatively well represented. Because the radius and ulna have similar marrow content, it is not likely the ulnae were smashed for marrow, but were absent because of butchering. This would mean that the forelimb was smashed from a medial direction.

The butchering of the humerus does not show a consistent pattern between occupations, but is represented by a proximal or distal portion in all areas but H1 and I1.

Distal tibia are more frequent than proximal, probably indicating that the hindlimb was separated at the joint. Femurs are represented only in A1, B3 and H1, with no apparent pattern.

Occipital bones were all smashed, showing that the brain was removed in all occupation levels. Few skull bones were found intact but maxilla were identified more frequently than other cranial parts. This might indicate that the muzzle was chopped free from the skull and sought for the lip and nasal cartilages (White 1953a:162) or for a broth (White 1954:255). This pattern is common to northern Athapascans.

Many phalanges, as well as carpals and tarsals were cut down the middle longitudinally. This is most common in B1 with the Dall sheep remains.

The making of bone grease is an activity common to both Eskimo and Indian groups of the north. The grease would be used in a similar way as our culture would use butter. Bone grease was produced by drying the bones, placing them in a caribou skin from which the hair has been removed and smashing them into tiny fragments. The bones are then simmered and the grease skimmed from the top (Leechman 1951:355). Fish guts were used in the same fashion to make fish grease. Since the femur, tibia and humerus have higher marrow content than either the radius and ulna, there should be a lower number of the former bones present if bone grease was manufactured (White 1955:178). This is not the case at the Atigun site.

No butchering marks were found on ground squirrel bones. But,

> it is quite possible to butcher an animal of any size without leaving a single mark on any bone. The more hurried or careless the process the greater the probability that bone will be scored (Guilday et al 1962:64).

The lack of butchering and the relative completeness of skeletal elements of ground squirrel may indicate these animals were carefully skinned for their hide. It may also indicate the the entire carcass was thrown in a pot, similar to the Chandalar Kutchin practice in dealing with squirrels (McKennan 1965:29). The above 2 practices are not mutually exclusive.

Heizer (1960:134) notes bird femurs are seldom found intact because of their marrow content. He also notes that the ends of humeri are usually charred, indicating the roasting of wings. No such patterns are apparent at the Atigun site where several complete femurs were found and no burned bird humeri were recovered. However, bird bones are so poorly represented little can be said of how the bird was utilized.

Conclusions

It has been determined that the season of occupation for all areas except I2 was July or August, more probably the latter. The season of occupation for I2 is in doubt, since it appears to be an isolated caribou kill.

Bone distribution showed that wind direction may have played a part in placement of activity areas around the hearth. Bones were possibly smashed a short distance from the hearth and were discarded immediately adjacent to the hearth in a very concentrated area. All species within each occupation showed a co-occurrent distribution near the hearth, suggesting most individual animals were used as food. The one heavy concentration suggests a single family occupation of short duration, probably less than a fortnight, if length-of-occupation estimates are accurate.

Determining the purpose of occupation must be based on relative abundance of each species and differential bone loss is a factor which must be considered at this point. Some bones may have been removed from the site by carnivores or rodents (Krantz 1968: 286). If present, domesticated dogs probably destroy a considerable proportion of the bone from smaller animals, particularly fish (Lyon 1970:214), although Casteel (1971:467) points out this destruction is far from total. In addition, ritual disposal of animals is a common practice throughout the Arctic, particularly among Athapascans. The most commonly disposed creature is the fish (Clark 1970b:86; de Laguna 1970:22).

Bearing this in mind, it is possible that the Atigun site served at least partially as a fishing camp, since the site is close to good fishing and was occupied at a time of year when fish were readily obtainable. Fish bones were recovered in small numbers in most occupations. At an ethnographically known fishing camp where a fish trap was present, Morlan (1972a:30) noted the absence of fishing equipment and the paucity of fish bones.

Several researchers have shown that remains of small animals are less likely to be recovered in the field than those of large animals. It has been suggested that the recovery of identifiable bones from a single large mammal is 15 times more likely than a single small animal (Ziegler 1965:54). Thomas (1969:396) statistically shows this ratio not to be universal, but rather site specific, and offers a method of correcting the data by excavating and screening test pits. Even assuming the ratio to be of an order of 10:1, it can be seen that this would significantly increase relative numbers of small mammals, particularly ground squirrel. The increase would show ground squirrel to be more frequent than large mammals in absolute numbers, and in all areas but Al, even in available meat. Even without the correction factor, ground squirrel are more numerous than any other species. The Atigun site was therefore almost unquestionably occupied for the purpose of trapping ground squirrels in great numbers, probably for manufacture of clothing. Al is a possible exception, but it should be noted that ground squirrel remains are as numerous here as in other occupations. It would seem that this level was visited earlier in the summer perhaps taking advantage of good caribou resources that particular year. Burch (1972b:362) estimates 50 caribou per-person per-year were required for humans alone. He also assumes that major caribou kill sites contain 80% or more <u>tarandus</u> remains (Burch 1972b:363). It is clear that the remains in Al do not represent a significant portion of yearly caribou requirements, nor do they represent a major caribou kill site.

Similar resource utilization throughout the site points to occupation by related groups. Butchering patterns do not strongly reinforce this hypothesis but neither do they negate the suggestion since there is no evidence of radically different butchering patterns in different levels.

What remains to be determined is the identity of the occupants of the Atigun site. This is difficult to accomplish with any degree of certainty since no similar sites have been reported in the Arctic.

Discussing the butchering of caribou, Ingstad (1954:81) claims Athapascans around Great Slave Lake first removed the head then cut the inside of the forelegs, whereas the Nunamiut cut the outside of the forelegs, then removed the hide whole. The Nunamiut also removed the head before skinning. Evidence points to the former technique at the Atigun site.

Bonnichsen (1973:10) reports northern Indians heat long bones after stripping the meat. This is done without burning the bone and for the purpose of removing the periosteal sheath to make the bones easier to break. This sheath is scraped off by Eskimo (Bonnichsen 1973:10). Bones butchered by Eskimo should therefore show many scraping marks. No evidence of scraped bone was found at the Atigun site.

The Chandalar Kutchin have a taboo forbidding bones of caribou and moose from being thrown into a fire (McKennan 1965:84). Less than 5% of caribou bone at the Atigun site was burned, perhaps indicating at least a reluctance to burn bone. Friedman's work (1934a, 1934b, 1935, 1937, 1941) would suggest a greater frequency of bird bones in Eskimo sites, although his work was confined to coastal Alaska.

Different attitudes to killing carnivores exist between the Chandalar Kutchin and the Nunamiut Eskimo; the latter will kill and eat any animal, whereas the Kutchin avoid killing carnivores (H. Alexander pers. comm. 1976). No carnivore bones were recovered from the Atigun site.

The evidence is certainly far too weak to justify any definite statements of cultural identity. However, what evidence is present points more to Athapascan than Eskimo occupation.

Chapter 5

CHIPPING DEBRIS

The most numerous cultural remains at the Atigun site were chipping debris, presumably the result of on-site tool manufacture. To organize these data, a classification scheme was utilized.

There are 2 basic kinds of typology: functional and morphological (Cahen and Van Noten 1971:211). A functional typology can be achieved by either an analysis of wear patterns or by ethnographic analogy. The former method was rejected because of the nature of the material (that is, most of the debitage was not used, making analysis of wear patterns meaningless), while the latter was impossible due to a lack of good ethnographic data. Moreover, the use of ethnographic analogy in establishing a functional typology is often of questionable validity. Therefore, a morphological typology was imposed on Atigun material. Categories or types of debitage were broadly adapted from Morlan's (1973a) "technological approach" devised for the Yukon Territory. Morphological "types" were defined primarily on the basis of manufacturing process evidenced by presence or absence of such traits as a striking platform or a bulb of percussion. It is realized that this procedure results only in broad, descriptive classes of chipping debris, but a more detailed typology of debitage was totally beyond the scope of this paper.

The classification was constructed with 2 major objectives in mind. It was felt that the morphological types would order the large volume of detritus - over 28,000 individual specimens - in a simple and fairly standard fashion. A few selected quantitative attributes such as weight, length and width could then be used to examine similarities or differences among occupations for each type. The selected measurements were thought to reflect more than just raw material size but were reflective to some degree of technological qualities. The chert outcropping most likely used as a source of most of the Atigun lithic material contained nodules of widely differing size and shape (von Krogh pers. comm. 1974). Therefore, even if size measurements used in this study were controlled _only_ by raw-material constraints, because chert of differing size is equally available, then measurements will reflect the size of raw material nodules that were preferred in initial selection. If measurements are similar among occupations, then some technological, functional or stylistic similarities must be inferred. The second objective was to isolate activity areas by plotting the distribution of debitage.

Types

Using Morlan's approach, debitage is first separated on the basis of raw material and then described and ennumerated on morphological grounds. Three of Morlan's types or classes were used to describe unformed lithics: (1) "core fragments", which includes not only fragments of cores but also any complete core lacking a discrete, identifiable platform (Morlan 1973a:9) since without the platform, a core cannot be oriented consistently for measurement; (2) "cores" with discrete identifiable platforms can be oriented consistently and hence form a separate category (Morlan 1973a:9); and (3) "flakes" which are stones exhibiting "a positive bulb of percussion associated with one margin of a relatively plain, flat face" (Morlan 1973a:13).

Two additional types were defined. Flakes that were abruptly truncated were labelled "snapped flakes". These may be the result of intentional breakage or simple hinge fracture. Very small flakes, weighing less than 0.2 gm were isolated and intuitively classed as "sharpening flakes". Most had bulbs of force, indicating they were a by-product of lithic manufacture rather than accidental breakage. Bulbs of force can be accidentally produced by men, animals and even by nature (Crabtree 1972:19), but because sharpening flakes were normally found in dense concentrations among other lithic debris, their identification as manufacturing waste is reinforced.

All types of detritus were divided on the basis of the presence or absence of secondary modification. No attempt was made to differentiate use-wear from deliberate retouch. Some specimens exhibited obvious retouch, whereas most showed what could have been heavy utilization. Faint, almost microscopic utilization was noted on some lithic pieces.

On the basis of the above criteria, 9 types of lithic debitage were isolated in the Atigun assemblage. These types are listed below.

1. unmodified core fragments
2. modified core fragments
3. unmodified cores
4. modified cores
5. unmodified flakes
6. modified flakes
7. unmodified snapped flakes
8. modified snapped flakes
9. sharpening flakes

Methodology

In order to examine intra-site similarities, mean measurements of size and shape were compared for each type. The sizes of lithic material selected for utilization were also compared among occupations.

All lithic material was weighed. Length was taken from the striking platform, measuring in the direction the blow was struck. Width was taken as the maximum dimension perpendicular to length and thickness was measured at the thickest point below the bulb of force. These measurements were taken for all flakes (Fig. 15) and cores (excluding sharpening flakes), but only for utilized core fragments. Unmodified core fragments were not measured because of the problem, mentioned previously, that they could not be oriented consistently. For utilized core fragments, length

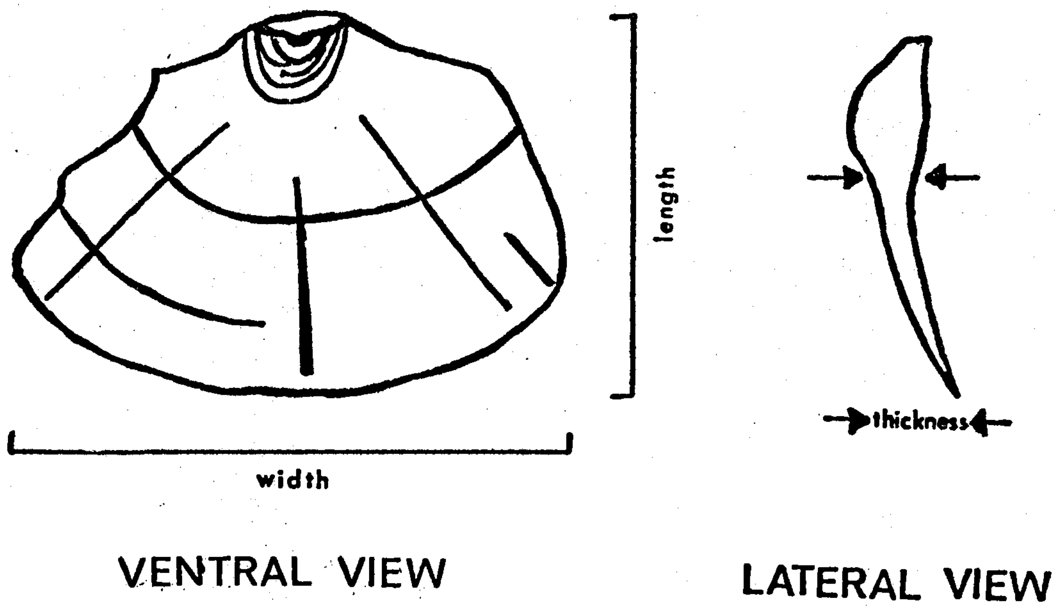


Fig. 15: Schematic representation of flake dimensions.

was taken as the longest dimension.

In addition to these measurements, length-width ratios were calculated as a rough measure of shape. All measurements taken were examined for normal distribution by plotting them on a series of cumulative graphs.

Results and Discussion

(1) Raw Material

The overwhelming majority of lithic remains are of chert, undoubtedly obtained from a nearby quarry located on the north bank of the Atigun Canyon, about an hour's walk east of the Atigun site (von Krogh n.d.). The chert varies in colour from brown, blue and green to almost black. No particular significance was attached to colour, as varying hues were found in each occupation. The only other common variety of raw material is quartz crystal, found in limited amounts in several occupation-levels. In fact, only 39 quartz crystal specimens were recovered from the site. The source of quartz crystal is unknown. However, the fact that the same chert quarry was used for raw material in all occupations points to overall similarities in resource exploitation through time.

The amount of raw material carried back to the site (Table XV) could have been transported by 1 person in 1 trip in all occupations but H1. Raw material in that occupation might require 2 trips or 2 people making 1 trip. The volume of lithics supports the estimates made in the preceding chapter, of relatively short occupations.

Table XV: Weight of lithic material recovered from each site area.

	Area								
	A1	A2	B1	B2	B3	H1	H2	I1	I2
Kilograms	0.15	.40	1.40	.20	.225	14.00	1.575	1.90	.095

Two areas (A1 and I2) stand out in the small amount of chert present. Because I2 probably represents an isolated caribou kill, the scarcity of lithic remains is not surprising. However, A1 probably represents the longest occupation at the Atigun site (chapter 4) and the scant lithic remains would indicate butchering and tool manufacture were carried on in a location other than the hearth area.

(2) Unmodified Debitage

Measures of weight, length, width and thickness are first summarized for unmodified lithic debitage, since it was felt that unmodified lithics reflect the primary manufacturing patterns. Table XVI does not point to similarities in weight of unmodified core fragments among areas. It should be noted areas with relatively high mean weight values have correspondingly very high standard deviation scores. The amount of raw material may account for this difference in mean weights. For instance in an area (or component) with much chert present, an unwieldy or otherwise unsuitable core fragment is likely to be discarded, whereas in an area with little raw material, each piece is likely to be further reduced until a suitable product is attained. In fact, the numbers of core fragments are directly proportional to the weight of recovered raw material (Table XV) and the mean weight is approximately directly proportional to the number of core fragments recovered, reinforcing this conclusion.

Table XVI: Number, mean weight and standard deviation of unmodified core fragments compared among occupations at the Atigun site.

	Area								
	A1	A2	B1	B2	B3	H1	H2	I1	I2
N	2	57	125	32	32	1180	135	240	6
$\bar{x}$ weight (gm)	3.1	2.34	5.96	2.89	3.08	9.45	4.57	5.11	3.55
S	-	4.22	10.55	3.56	3.76	67.46	7.75	9.67	2.82

S - standard deviation

All measured dimensions of unmodified flakes (Table XVII) show similarities among areas. Areas B3 and H1 are exceptions to this generalization, although the small sample in B3 might account for its apparent differences. Although H1 is anomalous, modal scores and frequencies, discussed later, do point to overall similarities.

Unmodified snapped flakes (Table XVIII) were not recovered in all areas. In areas where snapped flakes were recorded, dimensions were very similar.

Although too few cores were recovered to allow valid generalizations, where cores were present they conformed in size and shape among occupations (Table XIX).

Table XVII: Number, mean weight, length, width and thickness of unmodified flakes compared among occupations at the Atigun site.

	Area								
	A1	A2	B1	B2	B3	H1	H2	I1	I2
N	1	61	96	50	10	423	188	118	0
$\bar{x}$ weight (gm)	0.5	1.26	1.78	1.28	2.18	2.61	1.32	1.45	-
S	-	1.08	1.50	0.81	1.02	2.70	0.85	0.97	
$\bar{x}$ length (mm)	17	22.8	23.8	20.9	26.1	26.1	22.1	23.3	-
S	-	4.9	6.7	6.0	5.4	7.6	6.1	5.7	
$\bar{x}$ width (mm)	17	17.3	17.9	17.5	20.2	20.3	16.7	18.3	-
S	-	5.7	5.3	4.6	6.6	6.9	3.9	4.4	
$\bar{x}$ thickness (mm)	2	2.8	3.8	3.6	4.4	4.0	3.3	3.3	-
S	-	1.2	1.6	1.5	1.8	2.7	1.2	1.1	

S - standard deviation

Table XVIII: Number, mean weight, length, width and thickness of unmodified snapped flakes compared among occupations at the Atigun site.

	Area								
	A1	A2	B1	B2	B3	H1	H2	I1	I2
N	0	9	13	7	0	56	62	14	0
$\bar{x}$ weight (gm)	-	1.81	1.91	1.82	-	1.84	2.01	1.71	-
S		1.94	1.55	1.72		1.31	1.62	0.94	
$\bar{x}$ length (mm)	-	19.0	18.9	19.1	-	19.2	19.9	18.3	-
S		5.6	6.2	5.2		5.3	6.1	4.7	
$\bar{x}$ width (mm)	-	20.4	21.8	21.1	-	23.3	20.2	19.8	-
S		6.0	6.8	5.8		6.4	5.3	5.7	
$\bar{x}$ thickness (mm)	-	3.7	3.5	3.6	-	3.8	3.9	3.1	-
S		2.1	1.9	1.8		1.90	2.5	1.7	

S - standard deviation

Table XIX: Number, mean weight, length, width and thickness of unmodified cores compared among occupations of the Atigun site.

	Area								
	A1	A2	B1	B2	B3	H1	H2	I1	I2
	0	0	10	0	2	12	0	5	0
$\bar{x}$ weight (gm)	-	-	15.38	-	15.25	23.12	-	50.36	-
S			10.94		-	15.61		18.72	
$\bar{x}$ length (mm)	-	-	44.3	-	40.5	43.6	-	51.2	-
S			13.6		-	13.9		13.9	
$\bar{x}$ width (mm)	-	-	28.2	-	27.5	36.1	-	35.6	-
S			10.0			10.6		9.7	
$\bar{x}$ thickness (mm)	-	-	11.4	-	11.0	14.0	-	23.6	-
S			4.2		-	3.8		6.8	

S - standard deviation

To further compare areas, each measured attribute of each type of chipping detritus was plotted on a cumulative graph. This was done for every occupation to investigate the frequency of occurrence of each size measurement. For example, in analyzing the weight of core fragments in B1, let the y-axis represent weight in grams and the x-axis the number of cases. When all measurements were recorded, the data were transformed to percentage figures. Using a hypothetical example, if B1 contained 100 core fragments, and 5 core fragments each had a measured weight of 3 gm, then 5% of the core fragments in B1 weighed 3 gm. All the graphs were then changed so that the x-axis represented percentage of the total number of the debitage type being analyzed, to ease the task of comparison.

In all cases, curves showed one strong peak, possibly indicating a preferred size. However, this peak, or mode, does not necessarily reflect cultural preferences, but could be a result of diverse factors such as manufacturing technique, physical characteristics of the raw material, or amount of available raw material. For illustrative purposes flake weight in 3 areas, B1, B2 and H1 is shown, to point out similarities through time and space. Fig. 16 shows great similarity among these areas both in modal scores and in the relative frequency of different sized flakes. These frequency charts point to close similarity in flake-weights among occupations. Frequency charts of all other measured attributes for each class of debitage (not illustrated) likewise showed close similarities among occupations.

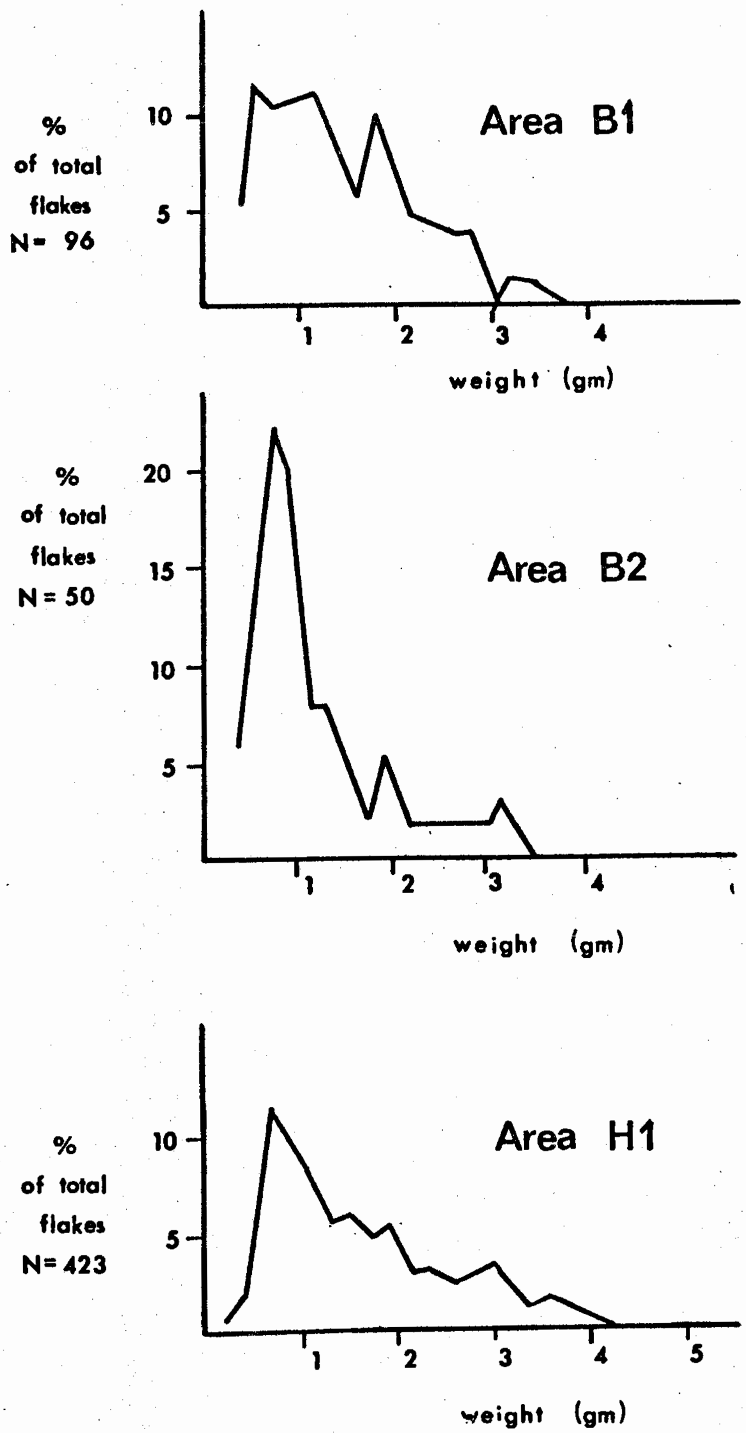


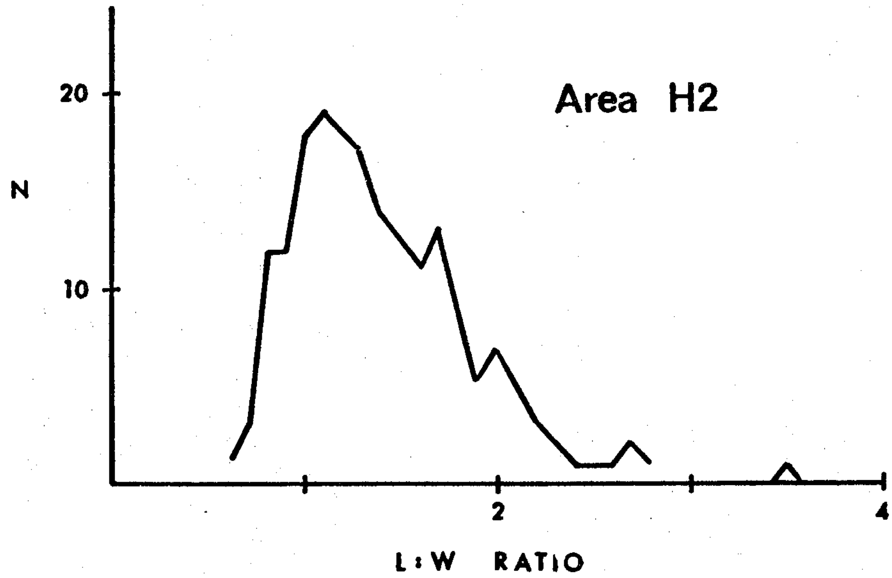
Fig. 16: Mean weight of unmodified flakes in 3 areas: B1, B2 and H1. Recorded weights are plotted on the y-axis in grams, and the frequency of flake occurrence in each weight unit is plotted on the x-axis as a percentage of all flakes recovered in the occupation.

Length-width ratios were calculated for all measured lithics and were plotted on a bar graph. It was felt that length-width ratios provide a crude description of shape since length was not calculated as the longest dimension. The curves obtained were similar in all areas, 2 of which are illustrated (Fig. 17). Flakes were somewhat longer than they were wide with a typical length to width ratio of 1.2:1. In all areas where flakes were abundant, several examples of blade-like flakes were found. However, because no blade-cores or other evidence of blade technology were found, these flakes might be more properly described as lamellar to avoid connotations of a blade industry. Lamellar flakes made up about 5% of the total flakes in each area.

Other comparisons of manufacturing techniques were also attempted. Little of the platform was left on any complete core, making description of shape impossible. Cores and core-fragments from all occupations showed flakes struck from 2 or more directions. Cores and core-fragments tended to be small, indicating they were used to exhaustion. Cortical surfaces were absent from cores or fragments and all were completely flaked or facetted. No flakes showed platform preparation, and it is likely natural surfaces of cores were utilized for platforms, necessitating repeated rotation of the cores.

(3) Modified Debitage

Modified lithic debitage was also examined. Numbers



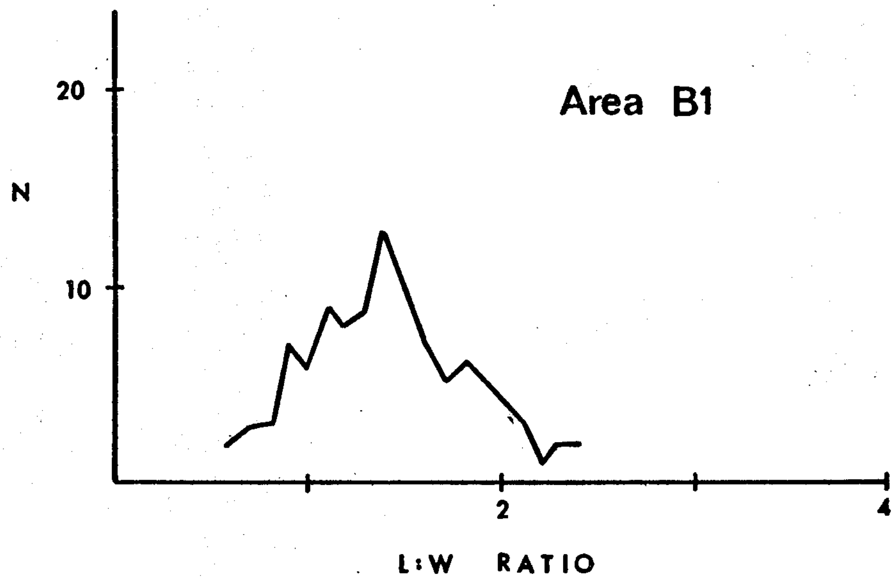


Fig. 17: Graphs of length: width ratios of non-retouched flakes from areas H2 and B1.

and mean measurements are summarized for modified core fragments in Table XX, for modified flakes in Table XXI, for modified snapped flakes in Table XXII, and for modified cores in Table XXIII. Similarities in size are not apparent among occupations in any debitage type.

Table XX: Number, mean weight, length, width and thickness of modified core fragments compared among occupations at the Atigun site.

	Area								
	A1	A2	B1	B2	B3	H1	H2	I1	I2
N	0	18	12	2	3	53	13	13	1
$\bar{x}$ weight (gm)	-	3.11	10.61	3.70	9.43	8.02	19.38	6.76	16.5
S		2.90	12.60	1.27	13.59	9.48	14.02	4.91	
$\bar{x}$ length (mm)	-	24.9	31.9	27.5	30.0	31.0	45.8	32.8	42.0
S		4.14	10.6	3.5	8.7	10.4	12.0	7.6	
$\bar{x}$ width (mm)	-	18.3	21.3	28.0	17.3	25.5	31.6	22.5	29.0
S		8.7	7.5	12.7	11.2	11.6	12.5	7.1	
$\bar{x}$ thickness (mm)	-	6.0	9.4	5.0	8.7	8.0	11.1	7.5	12
S		2.3	6.9	1.4	6.4	3.9	4.7	5.9	

S - standard deviation

Table XXI: Number, mean weight, length, width and thickess of modified flakes compared among occupations at the Atigun site.

	Area								
	A1	A2	B1	B2	B3	H1	H2	I1	I2
N	1	40	31	16	10	91	61	29	2
x̄ weight (gm)	4.1	1.70	3.50	1.94	4.38	3.79	3.29	1.86	28.05
S		1.38	8.0	0.8	3.18	3.40	4.49	0.9	
x̄ length (mm)	22.0	22.5	26.1	27.3	35.2	30.9	26.6	22.8	33.5
S		6.1	13.0	6.6	5.5	10.3	9.6	6.3	
x̄ width (mm)	21.0	18.1	16.7	16.8	22.6	22.3	18.1	19.6	48.0
S			8.7	2.9	3.9	7.4	6.0	6.7	
x̄ thickness (mm)	8	3.7	4.6	4.5	5.6	5.2	4.7	4.0	8.0
S		1.9	2.3	1.5	3.0	2.2	2.5	1.6	

S - standard deviation

Table XXII: Number, mean weight, length, width and thickness of modified snapped flakes compared among occupations at the Atigun site.

	Area								
	A1	A2	B1	B2	B3	H1	H2	I1	I2
N	0	5	3	0	0	21	7	8	0
x̄ weight (gm)	-	3.54	4.27	-	-	3.23	5.83	1.6	-
S		1.49	2.01			2.04	2.34	0.40	
x̄ length (mm)	-	18.2	20.7	-	-	24.6	26.9	18.9	-
S		3.6	4.0			5.6	5.2	4.1	
x̄ width (mm)	-	28.8	27.7	-	-	24.2	24.7	20.1	-
S		5.5	5.4			5.8	5.8	5.6	
x̄ thickness (mm)	-	6.2	6.1	-	-	5.3	6.3	3.1	-
S		1.8	1.9			2.1	1.9	0.6	

S - standard deviation

Table XXIII: Number, mean weight, length, width and thickness of modified cores compared among occupations at the Atigun site.

	Area								
	A1	A2	B1	B2	B3	H1	H2	H1	H2
N	0	0	2	0	0	13	0	1	0
$\bar{x}$ weight (gm) S	-	-	45.8	-	-	34.94 20.78	-	25.9	-
$\bar{x}$ length (mm) S	-	-	68.0	-	-	54.6 16.8	-	51.0	-
$\bar{x}$ width (mm) S	-	-	36.0	-	-	38.5 8.6	-	31.0	-
$\bar{x}$ thickness (mm) S			14.0			16.2 5.8	-	15.0	-

S - standard deviation

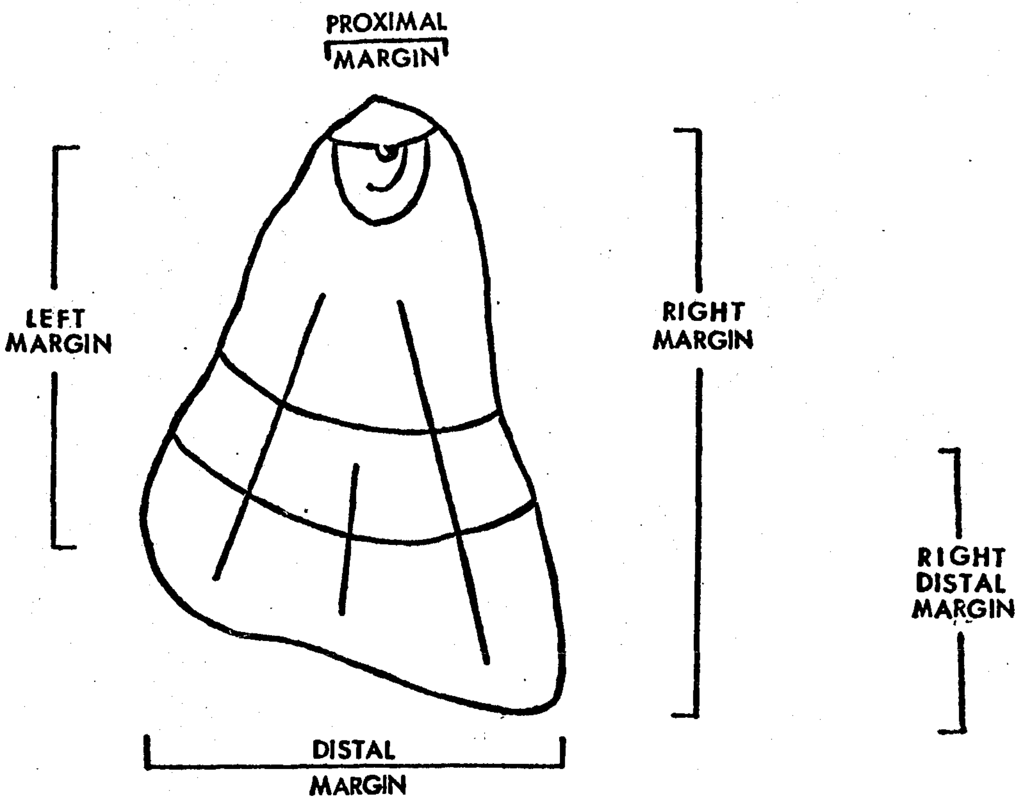
Modified debitage was compared with unmodified debitage by examining mean scores of measured attributes. It is apparent that larger lithic specimens were generally preferred for tool use in all areas, as evidenced by larger mean weight scores for utilized pieces in all debitage categories. Width does not seem to be an important factor, while greater lengths are preferred. The most important criterion for selection for use, true of all categories in all areas, is thickness.

The frequency of utilization of each type of detritus was compared between components. Table XXIV lists percentages of utilized pieces in each lithic category. When comparing these percentages, absolute numbers within each category (Tables XVI-XXIII) must be kept in mind. No strong similarities can be seen in terms of percentages, however, in all areas flakes were selected over core fragments for tool-use. Complete cores were frequently selected for tool use where they were present. Generally, the less chert or quartz crystal present, the higher the frequency of utilization as evidenced by total frequencies of use.

Table XXIV: Debitage types compared among occupations to examine the frequency of utilization. The number of modified lithics in each debitage type is expressed as a percentage of the total number of lithics in each type.

	Area									
	A1	A2	B1	B2	B3	H1	H2	I1	I2	Total
modified cores	0	0	16.7	0	0	52.6	0	16.7	0	35.5
modified core fragments	0	24	8.7	5.9	8.6	4.3	8.7	5.2	14.3	6
modified flakes	50	40	24.5	24.3	50	17.7	24.5	20	100	22.9
modified snapped flakes	0	35.7	0	0	0	27.3	10.2	36.4	0	22.7
TOTAL	25	31	29	18	23	95	17	12	33	13.2

Location areas (Fig. 18) of modification were also examined. For each utilized (or retouched) piece of detritus, notes were kept showing location of the modification. Table XXV summarizes the location of areas of utilization on flakes. Right and left margins are identified by placing the flake with the platform away from the viewer with the ventral side exhibiting the bulb of force facing the viewer. These margins are constant so that if the ventral side is placed face down, the "right" margin will appear on the viewer's left.



VENTRAL VIEW

Fig. 18: Schematic representation of the position of named flake margins.

Table XXV: Position of utilization on flakes. The number of modified flakes in each defined position is noted.

	Area									
	A1	A2	B1	B2	B3	H1	H2	I1	I2	Total
right margin			5	2	2	14	5	2		30
left margin	1	6	3	3	1	10	3	3		30
proximal		1	2			1				4
distal		26	18		2	40	49	22	1	158
right distal		3		2		5		1		11
right proximal		1	1			3				5
left distal		2	1		1	8	1			13
left proximal						3				3
right, left + distal		1		4		3	4	1		13
right and left			1	7	3	5				16

There is a strong tendency for flakes to be most frequently used on the distal end. In areas where few utilized flakes were found, excluding A1 and I2, there was a tendency to use several margins of the flake.

Distributions

The distribution of lithic materials was calculated in a similar manner to that of the faunal remains (see Chapter 7). Each category of lithics was plotted in each area by taking the number found in each 50 cm square and expressing that number as a percentage of the total in that particular occupation. No difference in relative positions of flakes, cores or core fragments, utilized or non-utilized, was noted in any area. All categories were lumped together (excluding sharpening flakes) and the same procedure was followed. No overall shared patterns of lithic distributions were noted. In some occupations, flakes were randomly scattered over the entire excavation area. In others, 1, 2 or more concentrations were apparent. In all areas where concentrations were found, the concentrations were in close proximity to the hearth, but usually removed from faunal concentrations in the same area. In H1 the lithic scatter lay immediately between the 2 concentrations of faunal remains, and was the only dense concentration of lithics in any area. Distributional data do not suggest localized activity areas for preliminary processes of lithic manufacture.

Summary

A very general classification was imposed on chipping debris from the Atigun site. Lithics were divided into flakes, cores, core fragments, and snapped flakes, either modified or unmodified. Sharpening flakes comprised a ninth type of chipping debris.

Examination of chipping debris supported the hypothesis of related occupations at the Atigun site. Size measurements conformed closely among areas, raw material was gathered from the same source in each occupation and manufacturing technique appeared to be similar. In general, cores were not prepared in any special way and were rotated, using natural surfaces for flake detachment. Cores were normally reduced to such a small size that further flake removal was impossible.

Larger chert fragments were selected for utilization with thickness being the key factor. Flakes were preferred for utilization, probably serving either as scraping or cutting tools, or perhaps both.

Two areas, A1 and I2, showed differences from other occupations. The hypothesis, expressed earlier, that I2 represented an isolated caribou kill, was reinforced by the paucity of lithic remains. A1, rich in faunal remains, showed an almost total lack of lithics, indicating butchering and hide preparation were conducted away from the main hearth area. Although distributional studies did not reveal any localized activity areas (with the exception of H1), the presence of very small flakes in all areas showed on-site tool finishing and sharpening.

Chapter 6

TOOLS AND MISCELLANEOUS ITEMS

The aim of this chapter is to describe the tools from the Atigun site as fully as possible, and also to determine similarities or differences among occupations based on tool-frequencies. A total of 75 formed tools or tool-fragments was recovered from 9 occupations in 2 seasons work at the site. In addition, several artifacts difficult to classify as tools were found. Because many tools were only represented by fragments, the small sample size limits attempts at a formal typology of Atigun artifacts, thus necessitating discussion of individual specimens in some cases. Rather than describe the tools by occupation, artifacts were treated as a unit for the sake of descriptive clarity. Also, the presence or absence of specific artifact "types" could then be compared among occupations. Use-wear was not examined systematically and therefore functional terminology has been avoided whenever possible. Tools were placed in several descriptive categories, based mainly on raw material and shape. Artifacts were first broadly categorized by material including: (1) lithic; and (2) bone.

Lithic Tools N=34

All were made of chert, with the exception of 1 obsidian tool.

A. Formed unifaces N=4 Fig. 19a-d

Unifacially retouched lithics do not include retouched or utilized flakes, discussed in the preceding chapter, as this section deals only with the 4 artifacts whose shape has been significantly modified by retouch. Three of these, although radically different in shape, show similar techniques of manufacture, while the fourth is an anomaly in both shape and manufacture. All can be subsumed under Morlan's (1973a: 20) classification of "bevelled unifaces". His class consists of specimens:

> which have been shaped along one or more margins by means of force applied transverse to the plane of the margin being modified. In most cases the retouch occurs on only one face of each modified margin, but alternate retouching on opposite faces of different margin segments may also occur; likewise two or more margins may be retouched on one face or the other, but bifacial retouch at one locus is excluded (Morlan 1973a:20).

In the Atigun collection, 3 of the unifaces were steeply retouched on 1 margin (Fig. 19a-c), whereas the fourth was retouched on 2 opposing margins on alternate faces (Fig. 19d). The angle of retouch was much greater on the single-edged unifaces. Modified margins varied in shape from straight to convex. There were no similarities in size of unifaces and the length of retouch on all tools was also variable. The metric attributes of all 4 unifaces are summarized in Table XXVI.

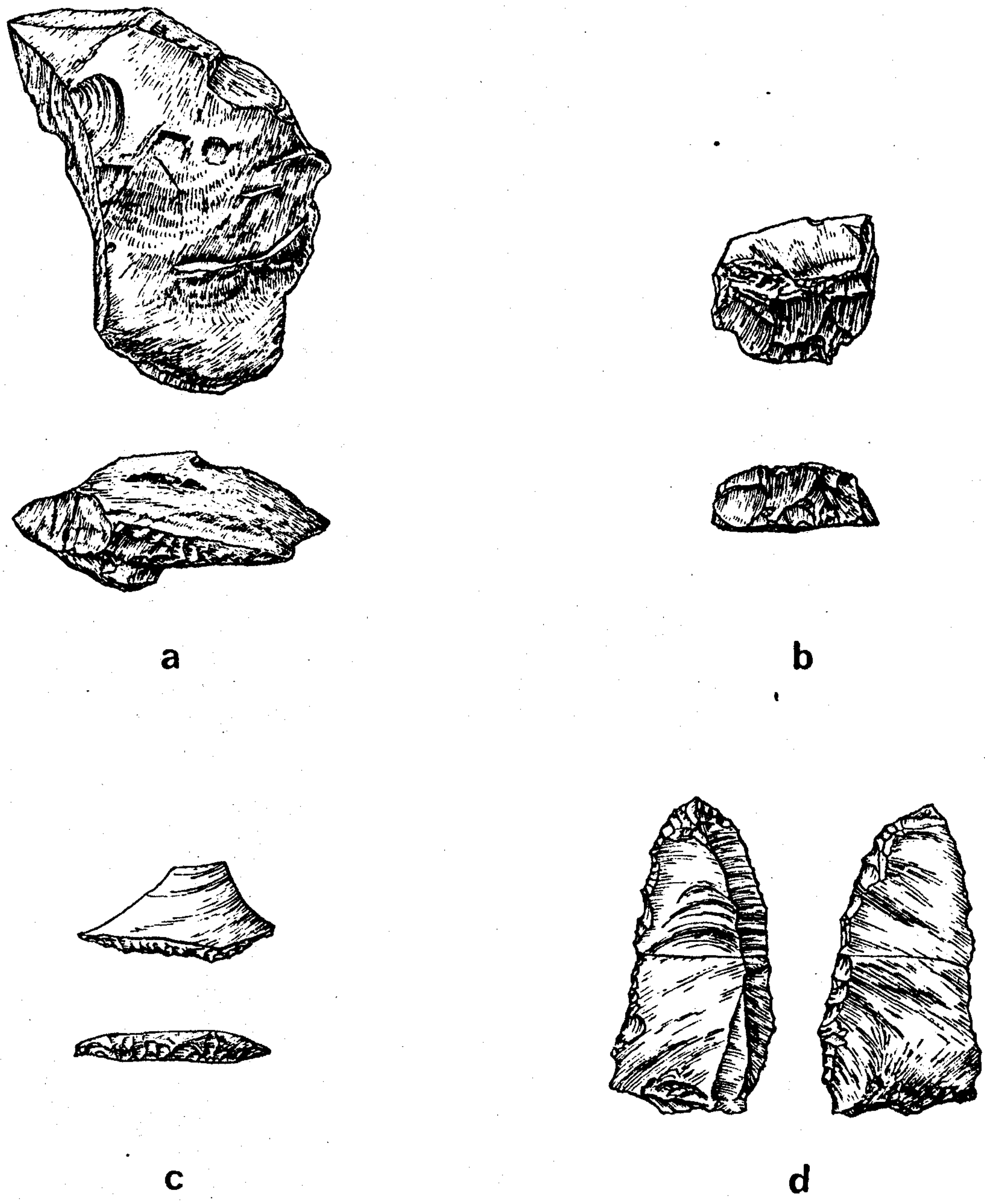


Fig. 19: Formed unifaces. a-c, single margin retouch; d, alternate retouch. Natural size.

Table XXVI: Bevelled Unifaces : location, linear measurements (mm) and position and angle of retouch.

Description	Single margin retouch	Single margin retouch	Single margin retouch	Multiple margin retouch
length	55	22	28	43
width	38	20	13	21
thickness	14	8.5	4	3.5
location of retouch	distal	left?	left?	right ventral left dorsal
length of retouch	25	18	28	36,38
angle of retouch (^{o})	82^{o}	71^{o}	76^{o}	50^{o}
Area	H1	A1	H1	H1
Figure	19a	19b	19c	19d

B. Bifaces N=30

A total of 30 bifacially retouched artifacts were recovered from the Atigun site. These fall into 3 broad categories, described below:

1. Rough Bifaces N=8 Fig. 20a-h

Eight examples of "rough bifaces" (Morlan 1973a:27) were recovered. They are defined by their relatively thick cross-section, irregular or incomplete flaking and incomplete or absent marginal retouch. All examples are large compared to other bifaces from the site. In addition, all are made from core fragments rather than flakes. Some of these pieces may represent unfinished specimens or preforms. This is most apparent in the biface illustrated in Fig. 20c which retains some cortical surface. No attempt was made to further subdivide the rough bifaces. Measurements are listed in Table XXVII.

Table XXVII: Rough bifaces: location and linear measurements (mm).

Figure	Area	Length	Width	Thickness
20a	I1	42	37	15
20b	I1	51	30	12
20c	H2	50	33	12.5
20d	B1	47	29	10
20e	H2	38	28	9
20f	H1	30	25	9
20g	H2	48	20	8.5
20h	B3	42	17	9

2. Biface Fragments N=12

Nearly half of the formed lithic tools fall into the cate-

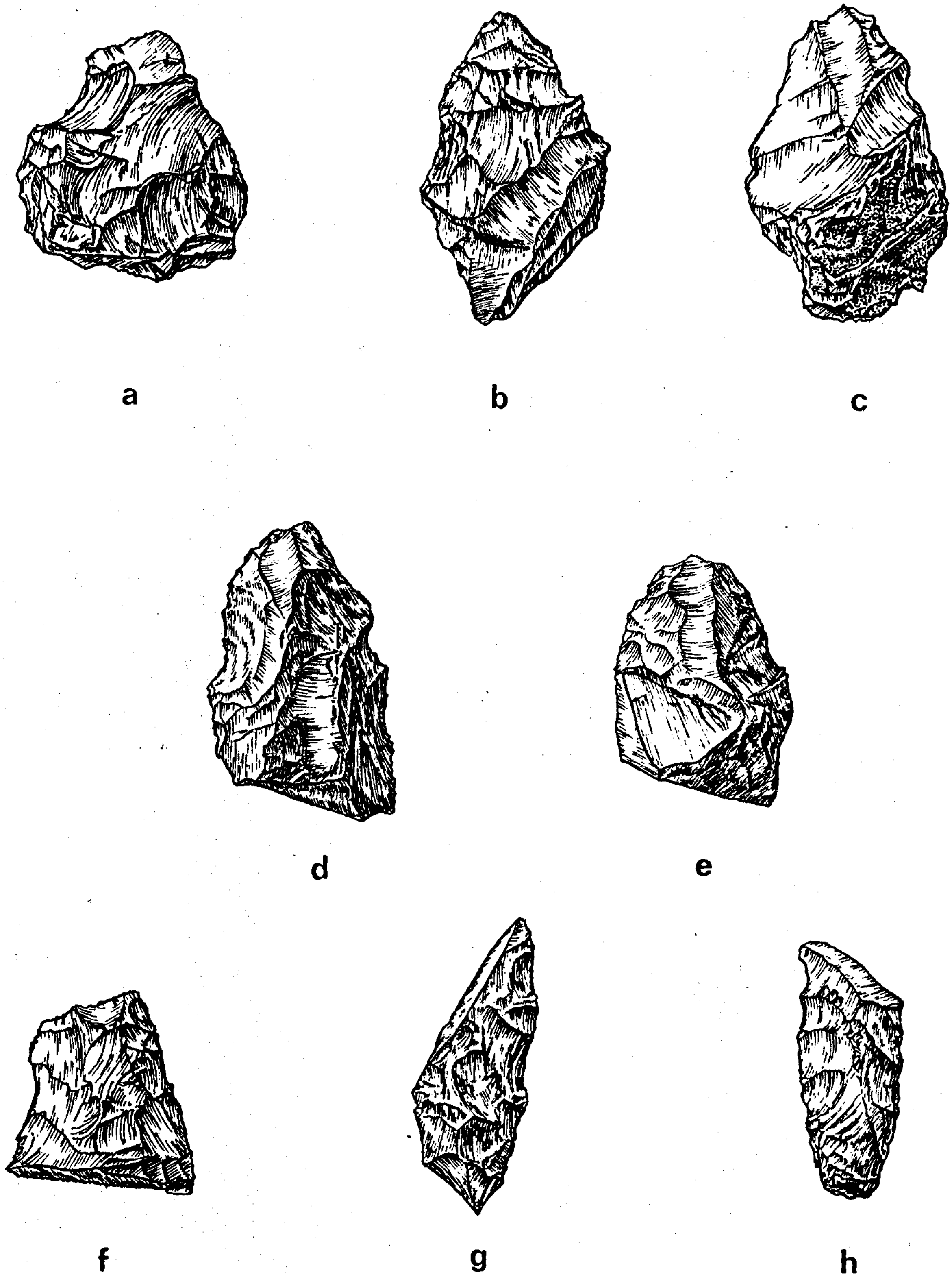


Fig. 20 : Rough bifaces. Natural size.

gory of biface fragments. These can be separated into 2 categories based on the position of the fragment, size and flaking technique.

a. biface end fragments with wide flake scars N=2
Fig. 21 a,b

Flaking extends across both faces of each biface (Fig. 21 a,b) with relatively wide flake scars. Each fragment could be either a proximal or distal portion of a comparitively large thin biface. Table XXVIII shows measurements and locations of the 2 fragments.

Table XXVIII : Biface end fragments with wide flake scars: loaction and linear measurements (mm).

Figure	Area	Length	Width	Thickness
21a	A1	25	20	5
21b	B3	16	19	4

b. biface end fragments with narrow flake scars N=9
Fig. 21 c-e

Eight bifacially worked end-fragments and 1 larger fragment were recovered which showed a similar flaking pattern. Flake scars cover both faces and are relatively narrow. Edges are all retouched and the completed tools were probably smaller than those of the preceding category. All fragments are pointed, perhaps indicating that they are biface tips, although it is also possible some of these fragments are basal portions of contracting stemmed bifaces. It

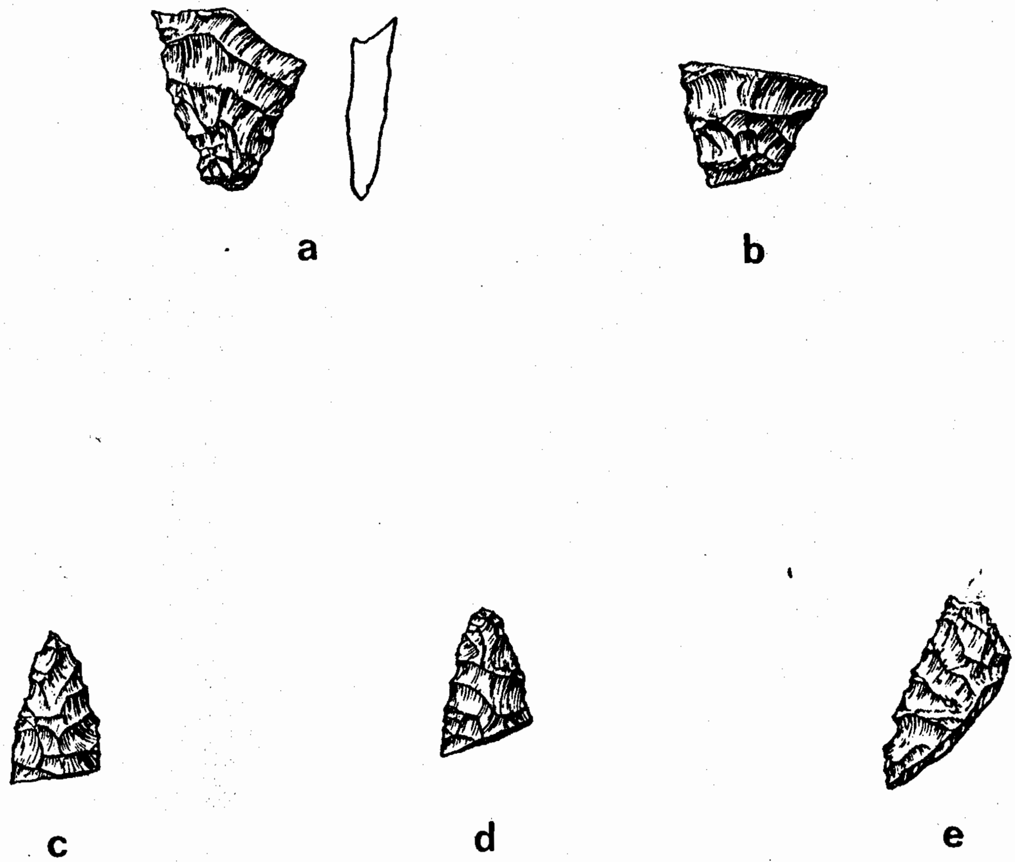


Fig. 21 : Biface end fragments. a, b, wide flake scars; c-e, narrow flake scars. Natural size.

cannot be assumed that these fragments are representative of a single type of biface as they are too small to reconstruct the complete tools (Fig. 21c, d). The larger fragment can be better described (Fig. 21e). Most of the base is missing from this fragment which is snapped diagonally from 1 side of the proximal portion to over half way up the opposing edge. No wear was evident on the newly exposed surfaces, indicating the biface was not deliberately snapped to produce a specialized tool. The tip is somewhat rounded and the sides are straight. Table XXIX shows measurements and locations of biface fragments in this category.

Table XXIX : Biface end fragments with narrow flake scars: location and linear measurements (mm).

Figure	Area	Length	Width	Thickness
21c	B2	19	12	2.5
	B2	9	7	1.5
	B3	15	8	3
	B3	13	7	3
21d	H1	19	13	3
	H1	10	12	3
	H2	13	12	3
	I1	19	12	3.5
21e	B2	22	12	4

3. Finished Bifaces N=10

A total of 10 formed lithic tools can be classed as complete, finished bifaces. This class differs from rough bifaces in that the cross-sections are thin, flaking is regular, with well defined marginal retouch and no major fracture surfaces. These can be further subdivided on the basis of shape:

a. ovate bifaces N=2 Fig. 22a,b.

Two bifaces can be described as ovate in shape. The distal tips of both examples are broken, perhaps as a result of usage. The tip of 1 was recovered, indicating that it was pointed. The sides are convex with slightly rounded, thinned bases. Their overall size is very similar but the flaking differs. The example shown in Fig. 22a is flaked over both faces, whereas the biface (or projectile point) illustrated in Fig. 22b is retouched only on the margins. The flake scars on both bifaces are narrow. Measurements and locations of the 2 bifaces are shown in Table XXX.

Table XXX : Ovate bifaces : location and linear measurements (mm)..

Figure	Area	Length	Width	Thickness
22a	B3	36	19	4
22b	H1	35	19	4

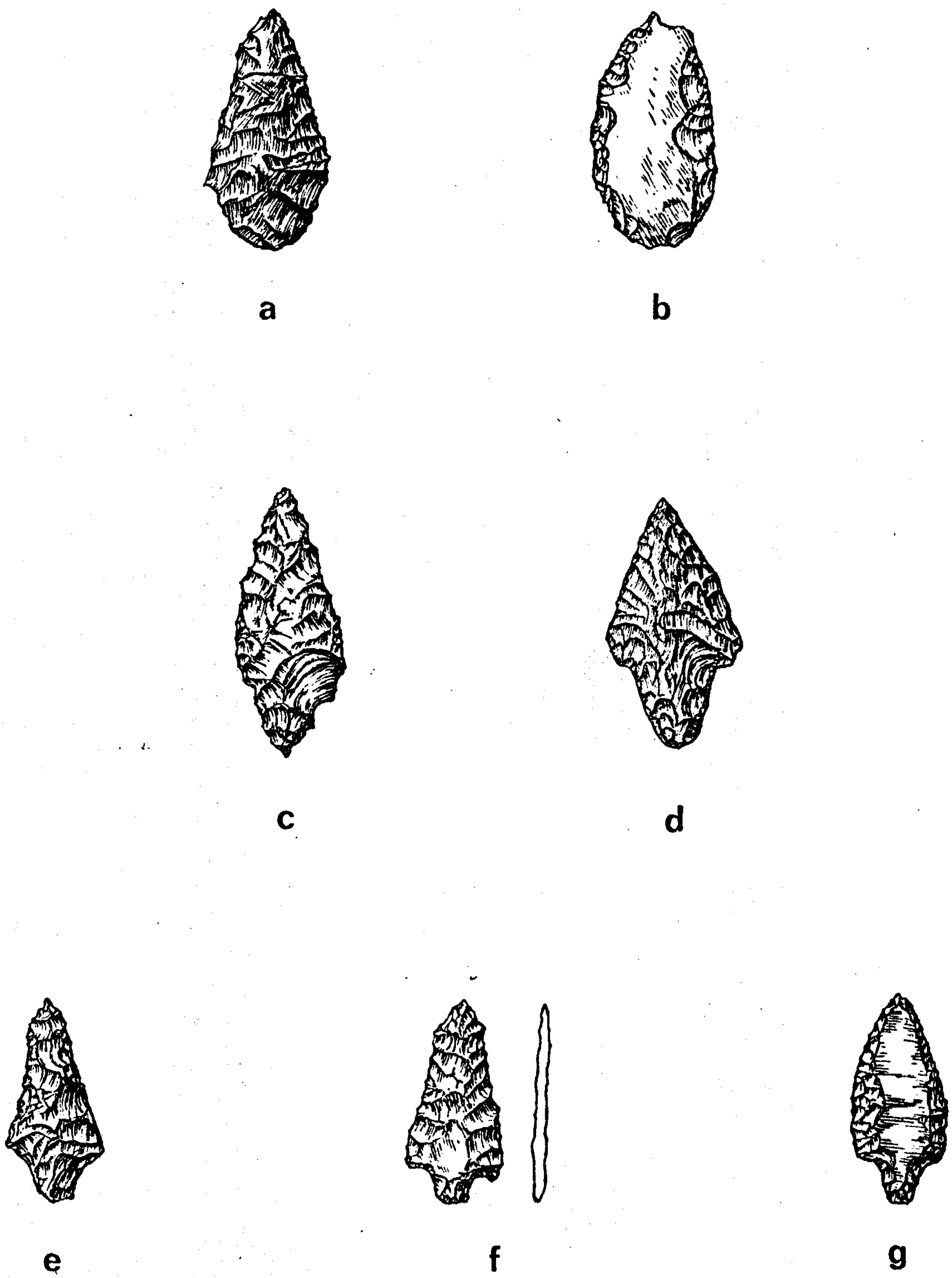


Fig. 22 : Finished bifaces. a-b, ovate, c-d, contracting stems; e-g, straight stems. Natural size.

b. bifaces with contracting stems N=2 Fig.22c,d.

One of these bifaces (or projectile points) (Fig.22c) is made of chert while the other is made of obsidian (Fig. 22d). The latter represents the only obsidian piece, including debitage, recovered from the Atigun site. It also differs from the chert tool in having a rounded base and well defined shoulders. The chert biface has a pointed base and poorly defined shoulders. These differences may be attributable to differences in raw material. Both share straight sides and asymmetrical shoulders. That is, if a line perpendicular to the long axis of the biface was drawn through the top of the stem on one side, the line would not pass through the top of the stem on the opposite side. Both show the same familiar pattern of thin flake scars covering both faces and both conform closely in size. Measurements are summarized in Table XXXI.

Table XXXI : Bifaces with contracting stems: location and linear measurements (mm).

Figure	Area	Total Length	Maximum stem length	Total width	Maximum stem width	Thickness
22c	B2	40	10	17	8	5
22d	I2	38	12	20	9	5.5

c. shouldered bifaces with straight stems N=3 Fig. 22 e-g.

These bifaces (or projectile points) exhibit well-defined shoulders, thin cross-sections, relatively straight stems and straight bases, and share the same slight asymmetry as the preceding class. The body segments have relatively straight sides. Two show flaking patterns similar to the bifaces in the previous category while a third (Fig. 22g), is not completely facetted. It is like 1 biface described in category 3b, with flaking only around the margins. It should be noted that both these incompletely flaked bifaces are from the same occupation, H1. A completely facetted biface of this same shape was also recovered in H1. Measurements for the 3 bifaces in this category are given in Table XXXII.

Table XXXII : Shouldered bifaces with straight stems: location and linear measurements (mm).

Figure	Area	Total Length	Maximum Stem Length	Total Width	Maximum Stem Width	Thickness
22e	B1	31	6	14	6	3.5
22f	H1	30	5	14.5	5	3.5
22g	H1	32.5	6	14	5	2

d. miscellaneous bifaces N=3 Fig. 23 a-c

Three tools were recovered that could not easily be placed in any of the above categories. Two appear to be preforms for stemmed bifaces similar to the previous category.

One of these is broken diagonally, and the distal portion possesses thin flake scars extending across both faces (Fig. 23a). The proximal portion is completely facetted on 2 faces but only on 1 margin, extending to the midpoint of the biface. It was apparently broken during the preparation of a corner-notch on the proximal half. The total length of the biface is 40 mm, the width 22 mm, and the thickness 3.5mm.

The second biface is broken at about the midpoint (Fig. 23b). The proximal portion, like the first specimen, is bifacially flaked on only 1 side. Some flaking appears on the basal part of the tool, but it appears that the biface was broken before being finished. The length of the tool is 40mm, the width is 19mm, and the thickness is 3mm.

The third "miscellaneous biface" is also broken and 1 side is shaped by bifacial retouch. A spur on the proximal end shows extensive use wear (Fig. 23c). It would seem this tool served a dual function; the proximal spur was probably used as a graving tool, the only such example at the site, while the bifacial margin possibly served as a cutting edge. The total length is 41mm, width 24mm, and thickness 3.5mm.

All the above tools were found in area H1.

<u>Bone Tools</u> N=31

Subsumed under this category are artifacts of bone, antler and tooth. In the Atigun collection, bone tools were classified mainly on the basis of shape. Unless otherwise noted, function should not be implied, regardless of the

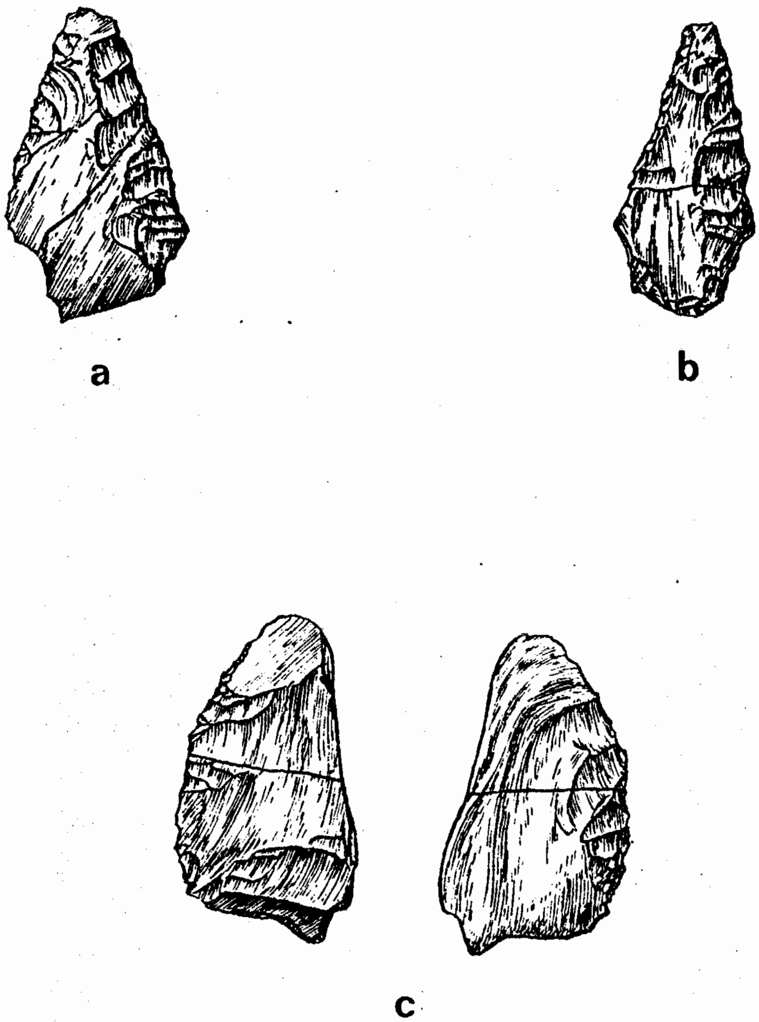


Fig. 23 : Miscellaneous bifaces. Natural size.

terminology used to describe the tool.

No particular effort was made to identify the anatomical element from which the tool was fashioned, but where obvious, this is noted. Linear measurements are included in all descriptions and the technique of modification is also given for all tools. All bone tools but 1 were manufactured from the remains of large mammals, probably caribou. In area B1, it is possible that bone tools were made from Dall sheep remains.

The description of manufacturing techniques used in this paper has been taken from Morlan (1973b:274-276), who describes 6 techniques of bone modification, including scraping, whittling, polishing, incising, grooving, and splintering. Grooving and splintering are generally used in initial phases of manufacture. The bone is first cut or gouged in the grooving process and then broken, or splintered, along the groove. Grooving subsumes other descriptive terminology used in the literature such as cutting or sawing. It might be noted that splintering is not always associated with grooving, since it is possible to cut completely through bone without breaking. The groove-and-splinter technique can result in a long straight cut. Scraping serves to reduce the size and change the shape of the bone. Scraping produces logitudinal facets, characterized by small transverse ridges. Whittling is done for the same purpose as scraping, but the resulting facets are more variable in width than those produced by scraping and may have undulating surfaces. Transverse ridges on facets are absent. Finally, polishing is done to produce a smooth surface as well as to alter the size and angularity of a bone. Incising is usually simply a method of decorating the surface of a bone.

Twenty-one formed bone tools or tool fragments and several pieces of worked bone were divided into 2 major divisions. For lack of better terminology, these are labelled "piercing implements" and "miscellaneous implements".

A. Piercing Implements N=17

These tools were subdivided into 3 categories: points, awls and needles. All points are unbarbed.

1. Unbarbed Points N=14

This category includes only 5 complete tools, which with 9 distinctive fragments, have been tenuously placed into 4 sub-types.

a. long, thin points with triangular cross-sections N=2 Fig. 24a,b.

These specimens from B1 have a roughly triangular cross-section with straight sides tapering to a distal point. Edges are bevelled, more sharply in the tool shown in Fig. 24b, which also has a more prominent medial ridge. The bases of both points are broken, but appear to have been asymmetrically tanged. Both points were probably whittled and/or scraped, but since all surfaces are polished, evidence of these techniques is obliterated. These tools were formed from a long bone of a large land-mammal.

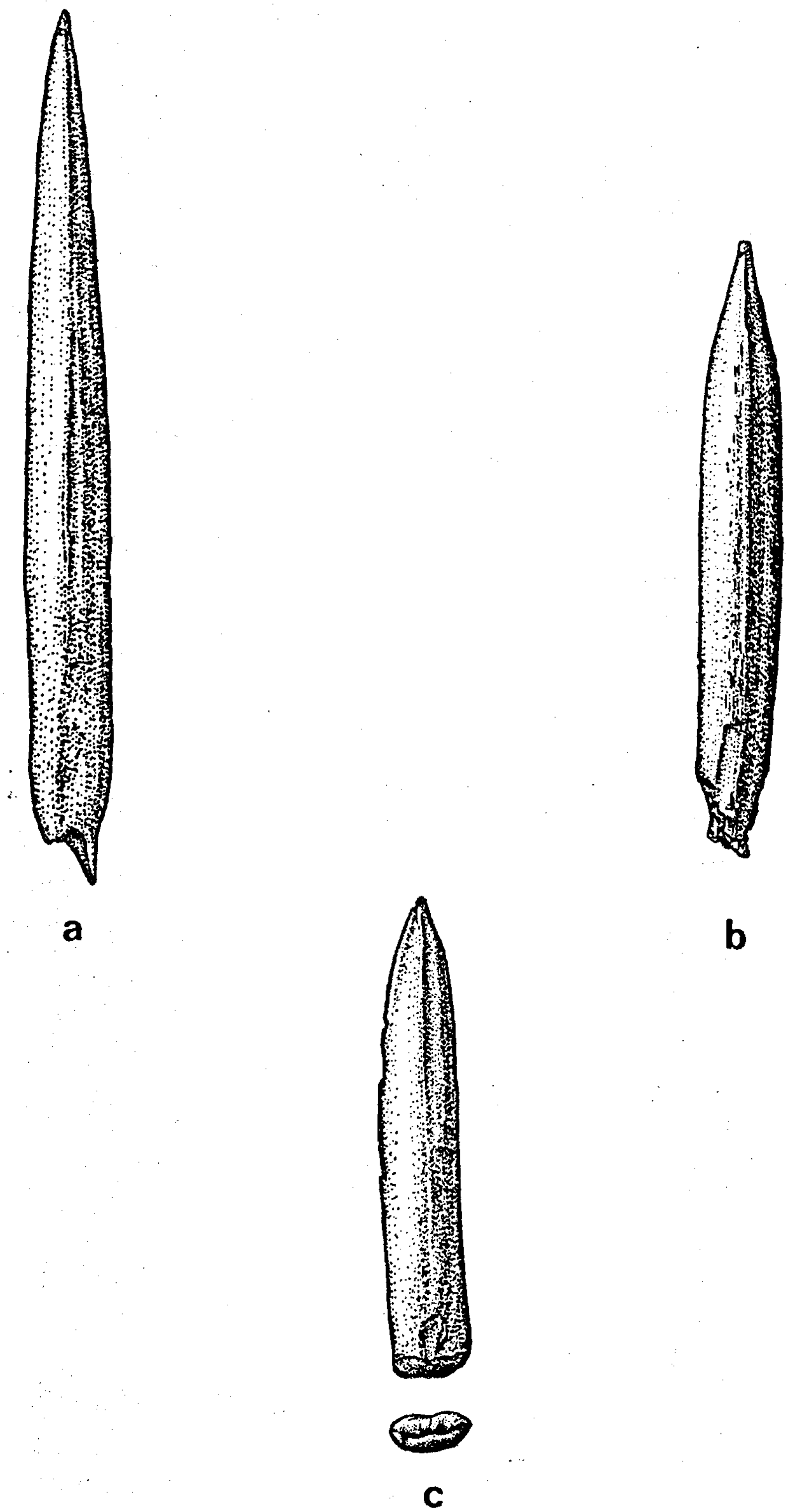


Fig. 24 : Unbarbed bone points. a-b, long thin points with triangular cross-section; c, short points with flat cross-section. Natural size.

Some differences exist between the 2 points. One (Fig. 24a) has a shallow groove 20mm in length, located on the mid-point of the tool. The groove begins 51mm from the distal end of the point and might represent a blood groove. The shallow indentation is lacking in the other specimen, but the more steeply bevelled edges may have served the same function. The latter point also shows a series of 12 striations along 1 flattened edge of the proximal portion. The striations extend along the edge for 6mm perpendicular to the longitudinal axis. The cuts do not appear to be decorative incisions, but may represent marks left from hafting. The tip of this point is slightly crushed. Measurements are given in Table XXXIII.

Table XXXIII : Long, thin bone points with triangular cross-sections: location and linear measurements (mm).

Figure	Area	Length	Width	Thickness
24a	B1	114	10	5
24b	B1	81	11	5

b. short points with flat cross-sections N=2
Fig. 24c

One complete point (Fig. 24c), and 1 fragment missing only the distal third were included in this category. The complete point is more highly polished than the fragment, and both show signs of being whittled. The faces of both are flat, although the complete specimen shows evidence of a very faint medial ridge on one face, on the distal quarter of the tool. On both tools 1 edge is flat and perpendicular to the face while the opposite edge is steeply bevelled from the ventral face. The base of both tools is straight to slightly convex. On the complete point, both faces are steeply bevelled to the base. The total length of the bevelled section is only 3mm. Although the fragment is also somewhat basally thinned, the workmanship is not as complete. Both tools are made of antler, presumably caribou. Measurements of the 2 artifacts are given in Table XXXIV.

Table XXXIV : Short, flat antler points : location and linear measurements (mm).

Figure	Area	Length	Width	Thickness
24c	A1	64	10	6
-	B3	52	8	5

c. points with blunt tips N=5 Fig. 25a,b.

One complete antler point (Fig. 25a) and 4 fragments are included in this category. The complete point (perhaps a blunt bird point) has straight sides and a tip whittled from all planes to form a blunt point, beginning 4mm from the distal end. The proximal third of the point is also distinctly bevelled, possibly for hafting. On 1 edge, a channel about 1mm deep extends for 35mm. This groove is too wide and shallow to be used effectively for insertion of arming pieces.

The 4 fragments are all proximal sections, apparently broken at the end of the bevelled part of the points. All are more polished than the complete point. Evidence of both scraping and whittling appears on the tools, and 2 of the fragments have been incised on both faces. A series of shallow and fine parallel incisions varying from 1-2mm. apart appear on fragments recovered from B3 and I1. These incisions are likely decorative rather than functional. One incised fragment is illustrated (Fig. 25b). Measurements are given in Table XXXV.

Table XXXV: Bone points with blunt tips : location and linear measurements (mm).

Fig.	Area	Total Length	Length of Bevelled part	Total Width	Max. Width of bevelled part	Total Thickness	Max. thickness of bevelled part
25a	A1	81	28	12	8	7	4
25b	B3		32		9		4
-	B3		32		9		4
-	B3		23		7		4
-	I1		29		9		3.5

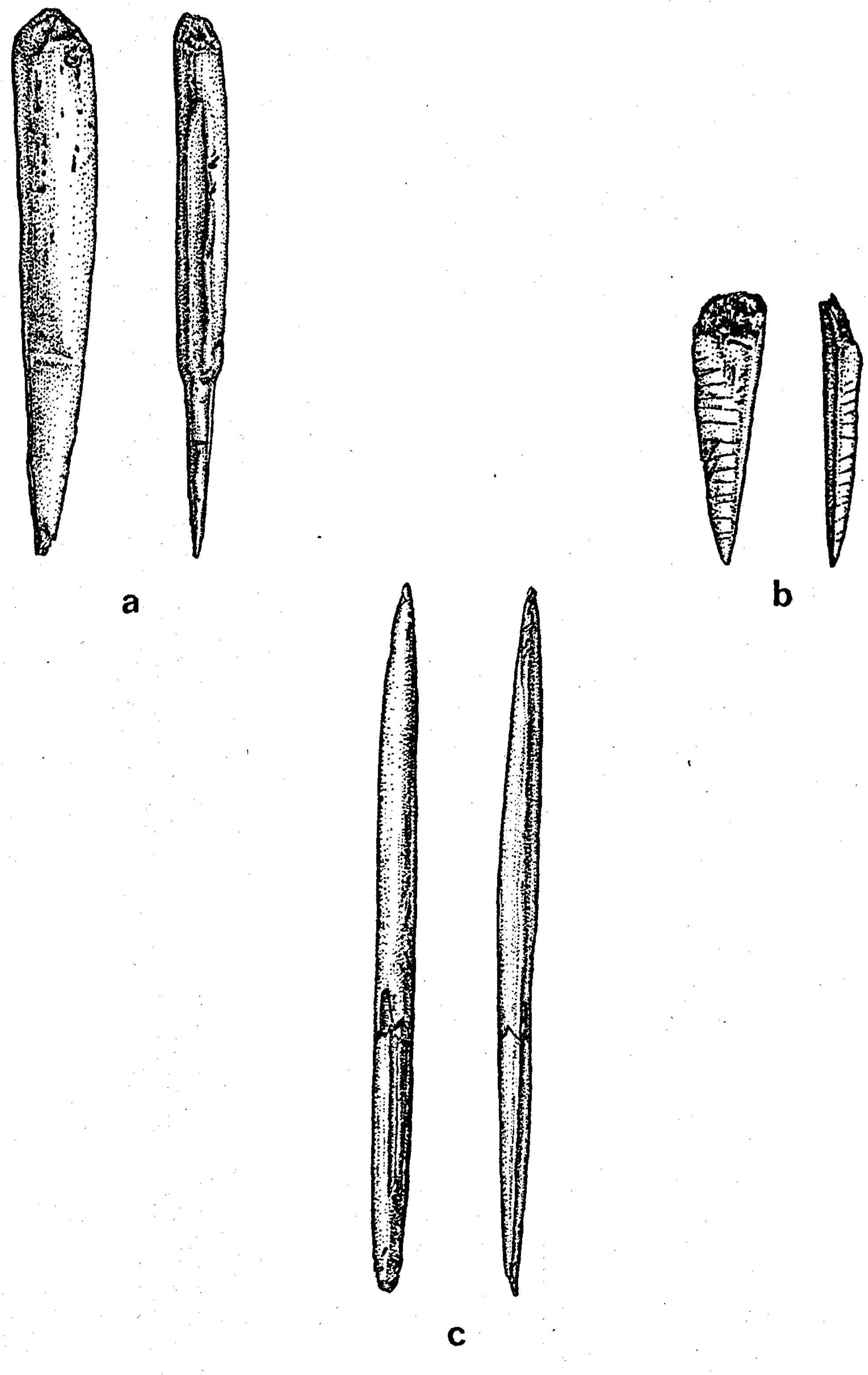


Fig. 25 : Unbarbed bone points. a-b, blunt tips; c, long, thin, narrow. Natural size.

d. long, thin and narrow points N=5 Fig. 25c

One complete point and 4 distal fragments are included. The complete tool was broken across the face at 1/3 the distance from the base to the tip. A shallow, possible blood groove extends 22mm from this break. The body of the artifact is trapezoidal in cross-section having relatively flat edges, and the distal end is cone shaped. The conical section is approximately 20mm in length, corresponding closely with the length of the 4 fragments. The proximal section is flattened on 2 opposing faces, starting at the point of breakage and gently sloping toward the base. The flattening appears on the face where the groove is present. The complete tool is polished all over, as are the 4 distal fragments. All artifacts show evidence of scraping and whittling. Total length of the tool is 106mm, width 6mm, and thickness 6mm. The 4 fragments are all between 20-22mm in length, with diameters of 5-6mm. The complete point was found in A1 as was 1 fragment; 2 fragments were found in B3 and 1 in B2.

2. Awls N=2 Fig. 26 a, b

The term "awl" is used (Morlan 1973b:312) to describe pieces of bone which have been sharpened to a point, but otherwise show no modification other than the initial process of forming a blank. It is quite possible that the 2 specimens recovered from the Atigun site are simply unfinished points, but both are somewhat blunted, indicating use. Each will be described separately.

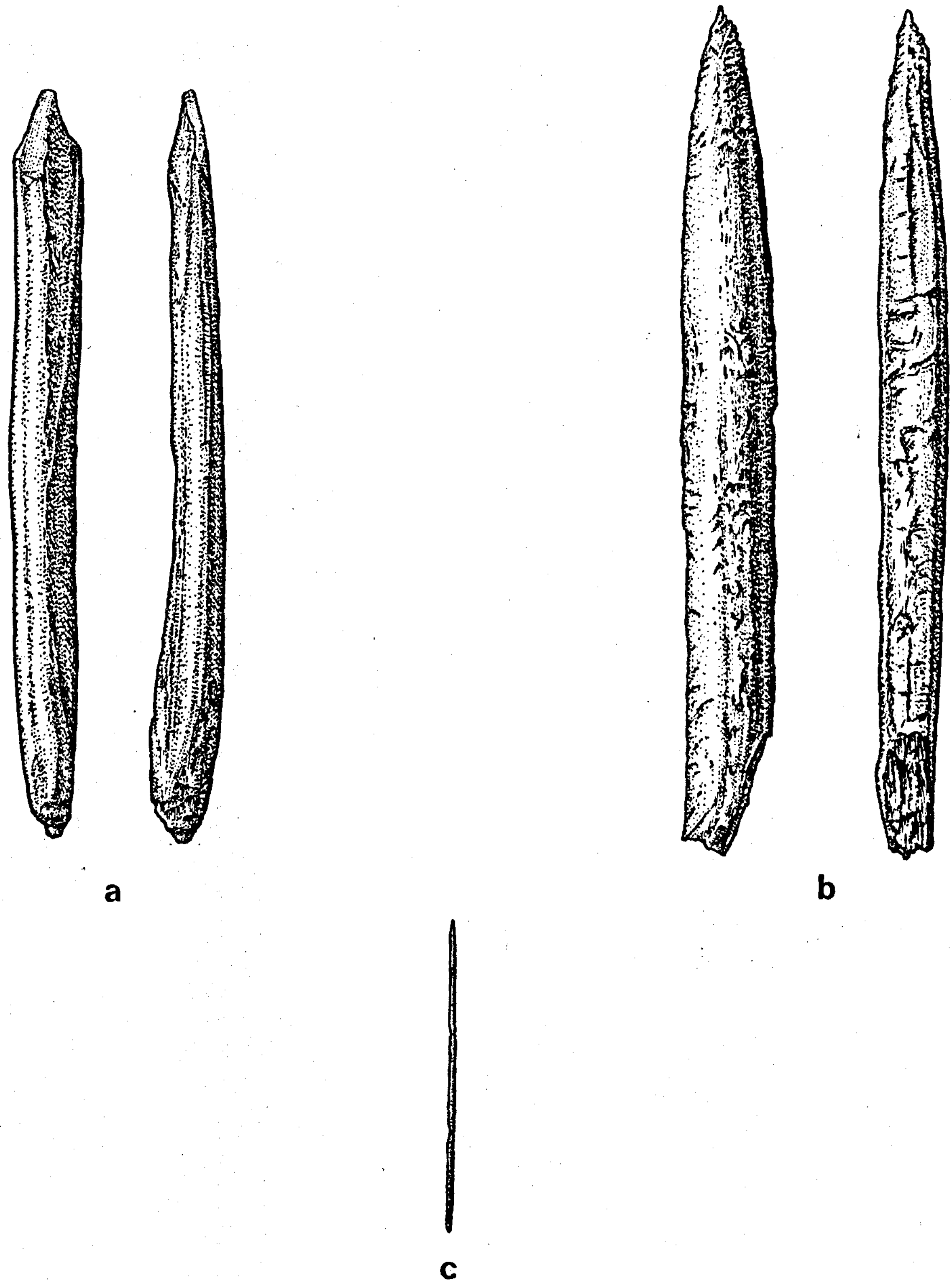


Fig. 26 : Bone awls and bone needle. a-b, awls, c, needle.
Natural size.

The first example, recovered from H1, is a caribou rib fragment grooved and split longitudinally and roughly hacked at the proximal end (Fig. 26a). The point has been formed by whittling and shows only 3 distinct cuts, 2 on 1 lateral edge and 1 on the opposite edge. No polishing is evident on the artifact, which measures 117mm in length, 9mm in width and 8mm in thickness.

The second is made of caribou antler that has been grooved and split (Fig. 26b). The point has been whittled on 2 edges and 1 face and shows evidence of several cutting strokes. The tip does not appear to be polished but is heavily pitted or weathered, obscuring the manufacturing process. The point was recovered from A1 and is 132mm long, 14 mm wide and 10mm thick.

3. Needle N=1 Fig. 26c

This specimen from B2 is polished on all surfaces and is sharply pointed on the distal end; the proximal end is slightly flattened. Overall length is 48mm, while width and thickness are 0.9 and 0.5mm respectively. The needle has no eye but is indented on 2 opposing sides, possibly for attachment of threading material. Because the needle is so fine, very intricate work such as bead threading or quill work is suggested. Another possibility is that the tool may have served as a gorge hook rather than as a needle.

B. Miscellaneous Bone Implements N=14

1. Antler Rectangles N=10

Several rectangular pieces were recovered from A1, A2, B3 and H1. They are fairly uniform in size, ranging within 15-25mm in length and 12-15mm in width. Most shows signs of polishing, but none are incised or decorated. They could represent gaming pieces or, in the case of unpolished rectangles, may simply be by-products of tool manufacture.

2. Other N=4 Fig. 27a-d

The first of these "other" artifacts is tentatively identified as a "fish-jigger", or lure-handle (Fig. 27a), although several other uses can be hypothesized. The piece might represent the handle of an unidentified tool with the working piece hafted to the flattened face. Another possible use is that of a flesher, with the hole in the proximal end serving to lash the tool to the user's wrist. This tool is made of caribou antler split in half longitudinally leaving 1 broad flat face. The sides have been rounded by whittling and all surfaces are highly polished. A groove has been cut completely through the distal portion by cutting from both faces. The cuts are U-shaped, indicating they were done with a stone tool (Guilday et al 1962:63). The proximal end of the tool is blunted and appears to have been battered. Overall length is 124mm, maximum width 25mm, and maximum thickness 12mm. The tool was recovered from area B3.

The second specimen is also made of caribou antler and was recovered from H1 (Fig. 27b). It is a crudely worked piece, flattened on 1 face with several cut marks on various

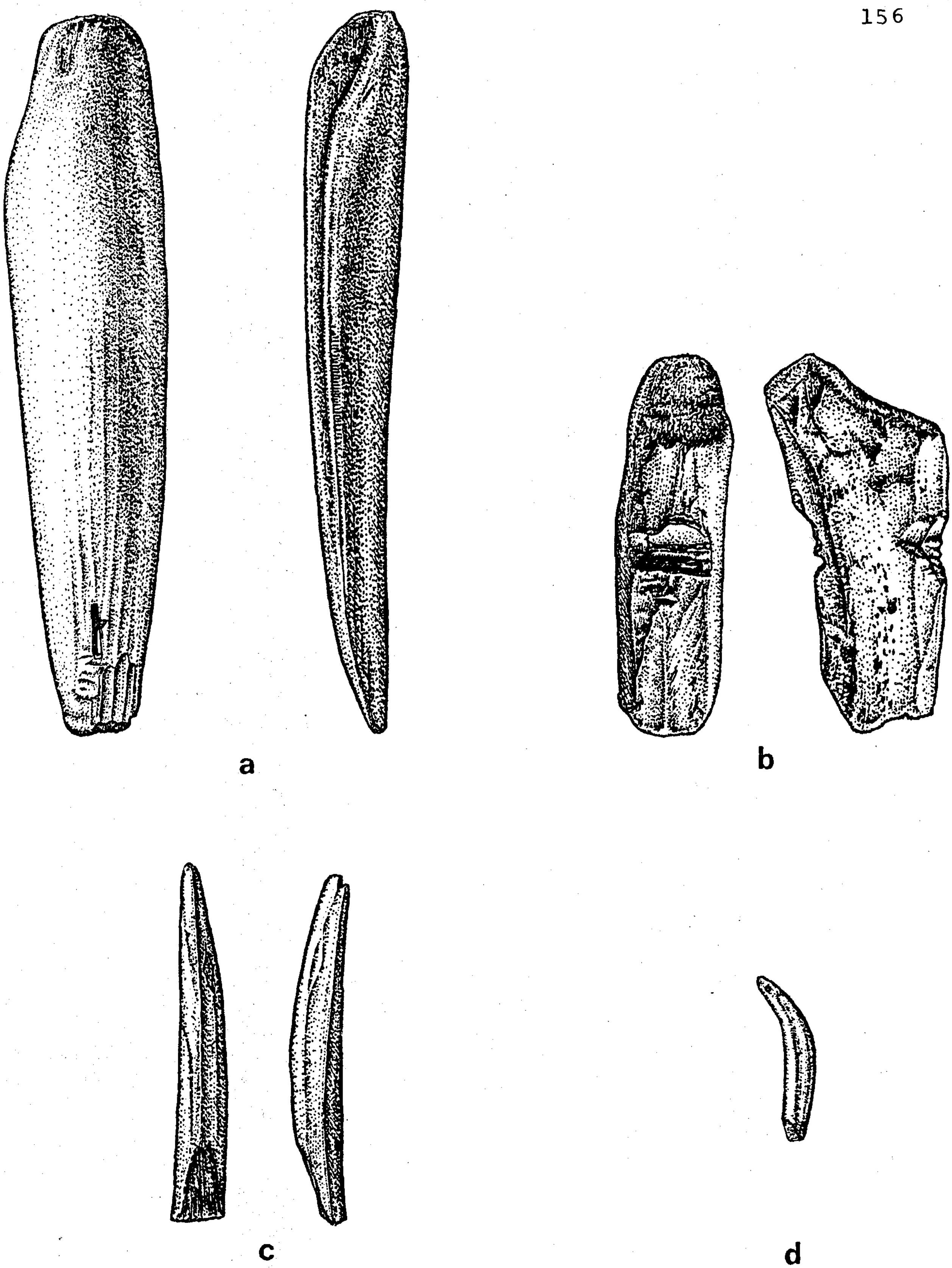


Fig. 27 : Miscellaneous bone tools. a, "fish-jigger"; b, handle?; c, "creaser"?; d, caribou tooth pendant?. Natural size.

surfaces, probably done to smooth the outline. The most noticeable features are hacked grooves located on either edge of the tool at about the midpoint. It is possible that twine or cordage was wrapped around these indentations. This tool would then serve as a handle or a device for keeping line straight.

A third antler tool of unknown function was found in occupation B3 (Fig. 27c). In cross-section it is plano-convex. The flat face has been whittled while the other 3 have been scraped and polished. The tool comes to a blunt point on 1 end and might be described, using Morlan's (1973b:318) terminology, as a "creaser". The artifact is 61mm long,8mm wide and 5mm thick.

The fourth artifact, found in B3, is a caribou incisor that has been drilled through near the apical end (Fig. 27d). The tooth is otherwise unmodified and probably served as a belt ornament or part of a pendant necklace. The hole seems to have been drilled unidirectionally since it has a constant diameter of 1mm.

In addition to formed bone artifacts, the Atigun site yielded several examples of unfinished worked bone which reflected manufacturing technology. In all areas but H2 and I2, examples of longitudinally grooved and split antler were recovered. One large, longitudinally split antler found in I1 also showed rough chopping marks on the freshly split face.

Techniques for cutting bone and antler across the grain were more variable. In some instances, bone was circumscribed then snapped. Other antler were after pieces sawed completely through. Both techniques seem to differ from the common Nunamiut pattern of partial sawing and breaking of antler (Alexander 1969:59).

Miscellaneous Items

Only 3 items were found that could not be included in the categories of lithic or bone tools. One of these, a feather, was recovered from B3. It was not associated with bird bone, and the species is not known. The feather's length is 25mm and its colour is mottled grey.

One small copper fragment was found in H2. It appears to be a small, beaten and rolled fragment of native copper, about 6mm in diameter, and amorphous in shape. The copper was sent to Ann Shinkwin of the University of Alaska to try to determine the source of the material by trace element analysis. Results have not been received.

The third miscellaneous item is a piece of wood, 9mm in length, recovered from area Al. It is incised with many parallel lines of variable length and spacing.

Distribution of Tools

No obvious concentrations of tools were discovered within each occupation. This is not surprising, considering the overall paucity of formed tools, and, on the basis of tools alone, no specific activity areas could be defined in any occupation.

Although cultural affinities and comparative tool types will be discussed in the following chapter, some inferences about intrasite similarities can be made on the basis of tools. Only a few examples of similar tools were found between occupations, and only a few of these were specific enough to allow valid comparisons. I have chosen to compare the distribution of 6 tool types because of their possible diagnostic value and multiple occurrence. These are: (1) ovate bifaces; (2) bifaces with contracting stems; (3) bifaces with straight stems; (4) bone points with blunt tips; (5) long, thin, narrow bone points and, (6) the rectangular cut antler. Presence of any of these tool types is noted for each occupation in Table XXXVI.

Two occupations, B3 and A1, shared 3 tool types and 2 occupations, B3 and H1, shared 2 similar types. The remaining occupations, with the exception of H2, share 1 tool type with at least 1 of the above mentioned components. The degree of similarity among occupations based on the artifact assemblage is not immediately evident, but the presence of some rather strikingly similar artifacts in different components suggests cultural affinity between occupations. This, combined with the similar flaking patterns exhibited on artifacts suggests all occupations are related. The exception to this rule is H2, where only 3 rough bifaces, a copper fragment and 1 distal tip of a finished biface were found. These tools are not sufficient, however, to suggest the

Table XXXVI: Presence of selected tool types in different occupations at the Atigun site.

	Stone tools			Bone tools		
	ovate bifaces	contracting stem bifaces	straight stem bifaces	points with blunt tips	long, thin, narrow points	polished rectangular antler
A1				X	X	X
A2						X
B1			X			
B2		X			X	
B3	X			X	X	X
H1	X		X			X
H2						
I1				X		
I2		X				

presence of a different archaeological culture from that in other occupations. The identity of the archaeological culture is discussed in the following chapter.

Some further speculative comments can be made concerning tools found at the Atigun site, if the supposition that all occupations reflect the same archaeological culture is valid. If, in fact, all artifacts described were present in any single tool kit, the variation in shape and size must be explained.

Several artifacts, both stone and bone, appear to be piercing tools, possibly serving different functions. For example, some of these piercing tools were probably used for cutting and others for killing. It is even conceivable that some tools were reserved for utilization on a particular species of animal. For example, a chert biface (projectile point) with a tapering stem was found in I2, which has been demonstrated to be a caribou kill. With the exception of 1 bird bone, caribou bones are the only faunal remains present in this occupation. Therefore, at least 1 use for this particular biface was to kill or butcher caribou. This is the only example of a tool to which a definite function can be implied without benefit of functional analysis.

The above reasoning may explain the different shape of otherwise apparently similar tools, for example among the small finished bifaces and also among the unbarbed bone points. Another explanation for the difference in shape of possibly similarity utilized tools is that of clan or even band level differences. It is conceivable that different clans (or different bands) within a larger cultural unit identify their affiliation by means of differently shaped artifacts. This argument is weakened, however by the presence in the same occupation of differently shaped artifacts with inferred similar functions. For example, 2 dissimilar types of unbarbed bone points were found together in 2 separate occupations, A1 and B3.

Another topic for conjecture is the differences in manufacture of morphologically similar tools. Two examples come to mind: finished bifaces with straight stems; and also bone points with blunt tips.

Two bifaces were found in area H1 with similar sizes and shapes. Both were small, thin, shouldered bifaces with straight stems. However, flaking patterns were different, in that 1 point was completely flaked, while the other was worked only around the margins. Differences on the clan or band level can be discounted since it seems unlikely that 2 different clans or bands would share 1 hearth. Differences might be attributed to individual ownership. It may be possible that completely flaked bifaces were made and owned by 1 man, and the marginally flaked biface by another. It would not be uncommon for 2 adult males to share the same hearth, especially it they belonged to the same family.

It was noted that 1 proximal end of a blunt tip bone point showed parallel incisions, while others did not. These incisions could easily represent ownership marks. Ownership marks are associated with Nunamiut Eskimos (H.Alexander pers. comm. 1976) but have not been documented for the Chandalar Kutchin.

Chapter 7

DISCUSSION

Nature of the Site

The opinion has been expressed in preceding chapters that occupations at the Atigun locality are culturally and functionally related. However, some obvious dissimilarities have been mentioned. Attention will now be focussed on these apparent contradictions.

The presence of hearths in all cultural levels but I2 clearly indicates that the Atigun locality was primarily a habitation site. I2 must be defined as either a kill site or butchering station on the basis of faunal remains and the absence of a hearth. Whether I2 is unique at the Atigun locality is unknown because of incomplete excavation of the site. The unique nature of I2 does force some re-evaluation of the site.

(1) Type of site

Perhaps the most basic question is whether defining the entire area as a single site is justified. Willey and Phillips (1958:18) demand of a site that it be "fairly continuously covered by remains of former occupation, and the general idea is that these pertain to a single unit of settlement ...". They use the term "locality" to indicate a somewhat larger spatial unit. The locality must be small enough to allow the "assumption of complete cultural homogeneity at any given time" (Willey and Phillips 1958:18). Using these definitions, the Atigun "site" can be seen as a locality, made up of many discrete sites, or what I have termed occupations.

What must now be examined is whether each occupation represents a single unit of settlement, or an activity area of a larger unit. In most occupations, the answer seems clear: occupations containing a hearth, abundant faunal remains and abundant lithic material probably represent the full range of archaeologically visible activities of a small group. Using these criteria, all excavated occupations but A1, A2, H2 and I2 represent discrete habitation sites within the Atigun locality. What, then, do the exceptions represent?

I2 has been defined as a butchering or kill site. The fact that only 1 caribou was killed suggests this is not an activity area since the pattern in other Atigun occupations is for bones of caribou (usually representing 1 animal) to be intermingled with bones of other animals. So, although I2 cannot be defined either as a habitation site or an activity area of a habitation site, it does represent a single unit of settlement. I2 is therefore functionally different from other occupations, but not demonstrably different in cultural affiliation.

Both A2 and H2 contain hearths and abundant quantities of lithics, but few faunal remains. If they are to be considered activity areas, some specific activity must be posited. One hypothesis is that these deposits represent lithic workshop areas. However, lithics are no greater in quantity in these 2 cases than in the other discrete habitation sites at the Atigun locality. The fact that ground squirrels are represented in both occupations suggests 2 possibilities: (1) Bone preservation may be a factor as was discussed in regard to A2. Faunal remains may have been originally present in abundance but due to differences in soil conditions or age of deposits, were not well preserved; and, (2) When A2 and H2 were occupied, ground squirrel and other resources were poor. It is a well-documented fact that abundance of Arctic resources is highly cyclical. Thus, A2 and H2 may be habitation sites rather than activity specific areas.

A1 is atypical in 2 ways. First, large land-mammal bones are far more abundant here than in any other occupation. Second, very few lithic artifacts were recovered. The tools used to butcher the animals were left in a location removed from the A1 hearth but it is likely that the animals were butchered at the Atigun locality or at least nearby. Cuts of meat, and probably entire carcasses, judging from the faunal remains, were transported to the hearth where they were ultimately deposited. A1 must be considered a habitation site, since faunal remains are abundantly present, there is evidence of a hearth, and at least some butchering and tool making was carried on, as suggested by the presence of some debitage and complete and unfinished tools. Therefore, A1 cannot be considered an activity-specific occupation for the above reasons and also since several different species of fauna are present. The apparent difference of A1 can be attributed to an exceptional (at the Atigun locality) abundance of caribou in 1 particular period of occupation.

Therefore, it can be stated in summary that the Atigun locality is composed of several discrete occupations which generally represent habitation sites.

(2) Dating the Atigun locality

The contemporaneity of the occupations at the Atigun locality is another factor which must be discussed before conclusions can be made concerning both the overall nature of the locality and similarities among occupations at the locality.

Because some occupations are separated vertically, it is certain that the locality was occupied at several different times. It seems probable only 1 or 2 family sized units occupied the locality at any one time, since any larger number of inhabitants could not have been supported for any length of time by the relatively meagre resources. For example, it would not be advantageous for a large group to trap ground squirrel, as too few of these animals are present to supply food or clothing material in any quantity. A large group would soon virtually wipe out the ground squirrel resource.

A fairly typical grouping for both the Nunamiut (Gubser 1965) and northern Athapascans (Vanstone 1974) could be called a "task-group" consisting of 1-3 nuclear families. Normally, the activities of a task group would include general subsistence and trapping (Vanstone 1974:46). It seems likely that a limited quantity resource would also be most effectively utilized by a small task group.

If it can be assumed that the locality was occupied by low numbers of people at any time, the next step toward demonstrating similarity among occupations is determining the time-depth of the various habitations. If the occupations were close together in time, it would lend more credibility to the proposition that they are similar and related. It is only logical that sites occupied at the same locality during a short period of time would be culturally similar. To examine time depth, a series of radiocarbon dates were obtained.

Although several researchers have expressed the fear that radiocarbon dates from the Arctic may be inaccurate because of radioactive fallout, Campbell (1965:181) discounts adverse effects on datable remains. Therefore, dates from the Arctic, like anywhere else, can be judged on their individual merits.

Charcoal samples were analyzed from B1, B2, B3 and H1. Dates obtained were as follows: B1, 115±140 radiocarbon years: A.D. 1835 (APSC-18); B2, "less than 200 radiocarbon years" (ASPC-20); B3, 360±100 radiocarbon years: A.D. 1590 (APSC-21); and H1, 310±140 radiocarbon years: A.D. 1640 (ASPC

-19). Therefore, the Atigun locality was utilized over a period of at least 2 to 3 centuries from A.D. 1500 to 1800. Since it is uncertain how many times the locality was occupied, the frequency of utilization is impossible to judge. Based on the incomplete excavation of the locality and taking into consideration previous field seasons' observations, the locality was utilized at the very least once a decade and possibly even yearly. These conclusions assume that the C-14 dates are representative of the chronology of the occupations at the locality. Dating does seem consistent with previous results. Alexander (1968a:4) cites a radiocarbon date of 168±34 radiocarbon years: A.D. 1782 (P-1236) for 1 occupation at the Atigun locality. Another occupation resulted in a date of 310±61 radiocarbon years: A.D.1640 (P-1237) (Alexander 1969:54). Other dates have yielded the following estimates: "A.D. 1931±45; A.D. 1671±46; A.D. 757±53; A.D.1957 ±53; and 1.4% in excess of modern" (Alexander 1968a:4).

The relatively short range of time during which the Atigun locality was used provides a basis for assuming that the occupations are culturally related. Specific similarities among occupations have been noted but bear reiteration.

(3) Similarities Among Occupations

We have already seen that the Atigun locality was occupied many times by similar sized groups, over a relatively brief span of time. Some other similarities are listed and discussed below.

There is a complete absence of tent ring stones among occupations at the Atigun locality. This fact is made noteworthy when it is remembered that the Atigun locality is composed mainly of habitation sites. The lack of tent ring stones at a site in the Atigun Valley region was a key factor in its inclusion as a member of Alexander's (1969:53) "sand hill group". The absence of tent ring stones is then taken to show similarities among occupations at the Atigun locality.

In occupations where hearths are present - the majority of Atigun levels - similarities are apparent among occupations. Hearth stones are similar in size. Hearths conform in general shape (ovate), size (125 x 75 cm), and type (paved rather than encircled).

Chipping detritus was analyzed and similarities among occupations were reinforced. Raw material was obtained from the same quarry in all occupations. Core reduction was similar among areas and size measurement of different debitage types generally conformed among occupations. Flakes were preferred over core fragments for use as tools and thickness seemed to be the key factor in their selection. This pattern was common to all occupations.

All occupations but H2 shared at least 1 specific tool type between each pair of occupations. When the total tool count and paucity of diagnostic artifacts at the Atigun locality is considered, it is surprising to find even this degree of similarity among occupations. Presence of similar type artifacts among occupations therefore strongly reinforces cultural similarities within the Atigun locality.

Faunal analysis determined the season of occupation to be July or August for all occupations within the Atigun locality. Butchering patterns are at least generally similar among occupations. All habitation sites in the Atigun locality were apparently occupied primarily to obtain ground squirrels, presumably for the manufacture of clothing. The possession of ground squirrel clothing is a mark of high status among ethnographic inhabitants (H. Alexander pers. comm. 1976), perhaps providing the motivation for groups to return regularly to the Atigun locality.

In order to provide a full picture of the content and distribution of material found in each site, summary illustrations of all habitation sites are provided (Fig. 28-34). Included in these illustrations are hearths, lithic debitage, and faunal material. Methods of characterizing lithics and bones have been previously discussed in Chapters 4 and 5 and will not be repeated. Lithic debitage includes all types with the exception of sharpening flakes. Faunal remains include all bones from all species. Categories were totalled, and the number found within each 50 cm square was expressed as a percentage of the total for that component. Only squares with over 5% were noted in illustrations. It can be seen that distributions, though not identical, are roughly similar. That is, concentrations of lithic debitage, bones and sharpening flakes lay immediately adjacent to hearths,

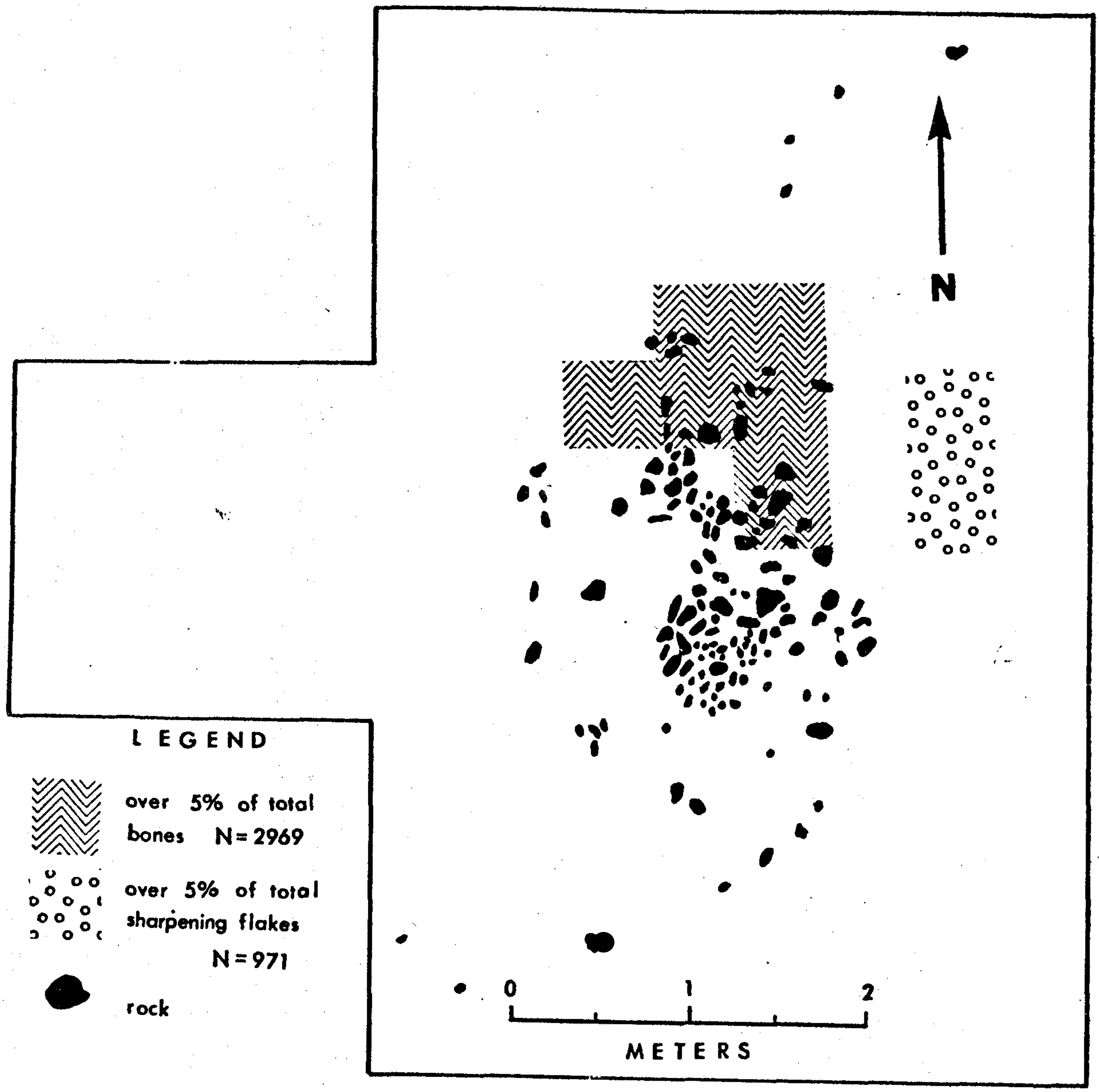


Fig. 28 : Summary illustration, area A1.

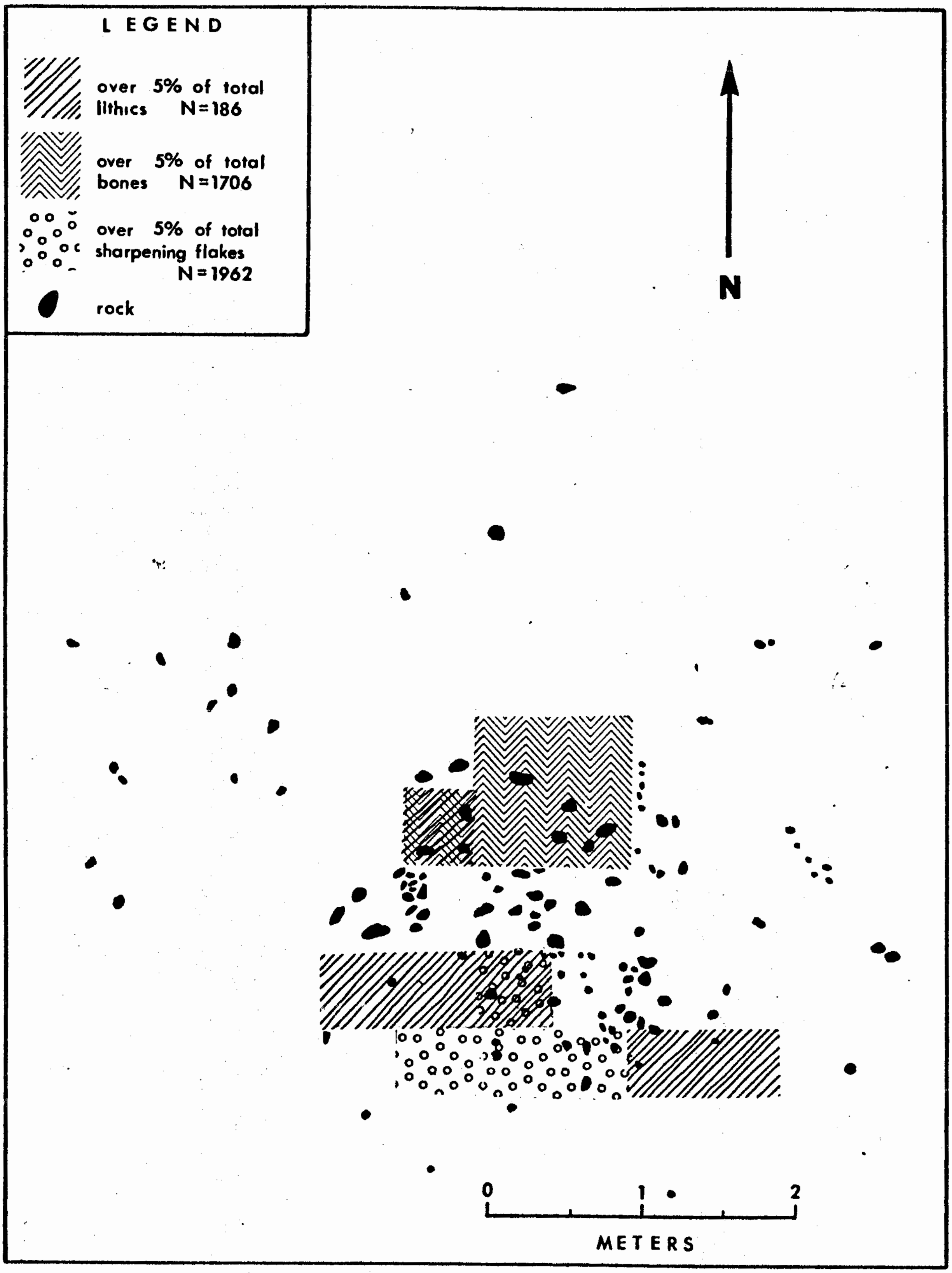


Fig. 29 : Summary illustration, area B1.

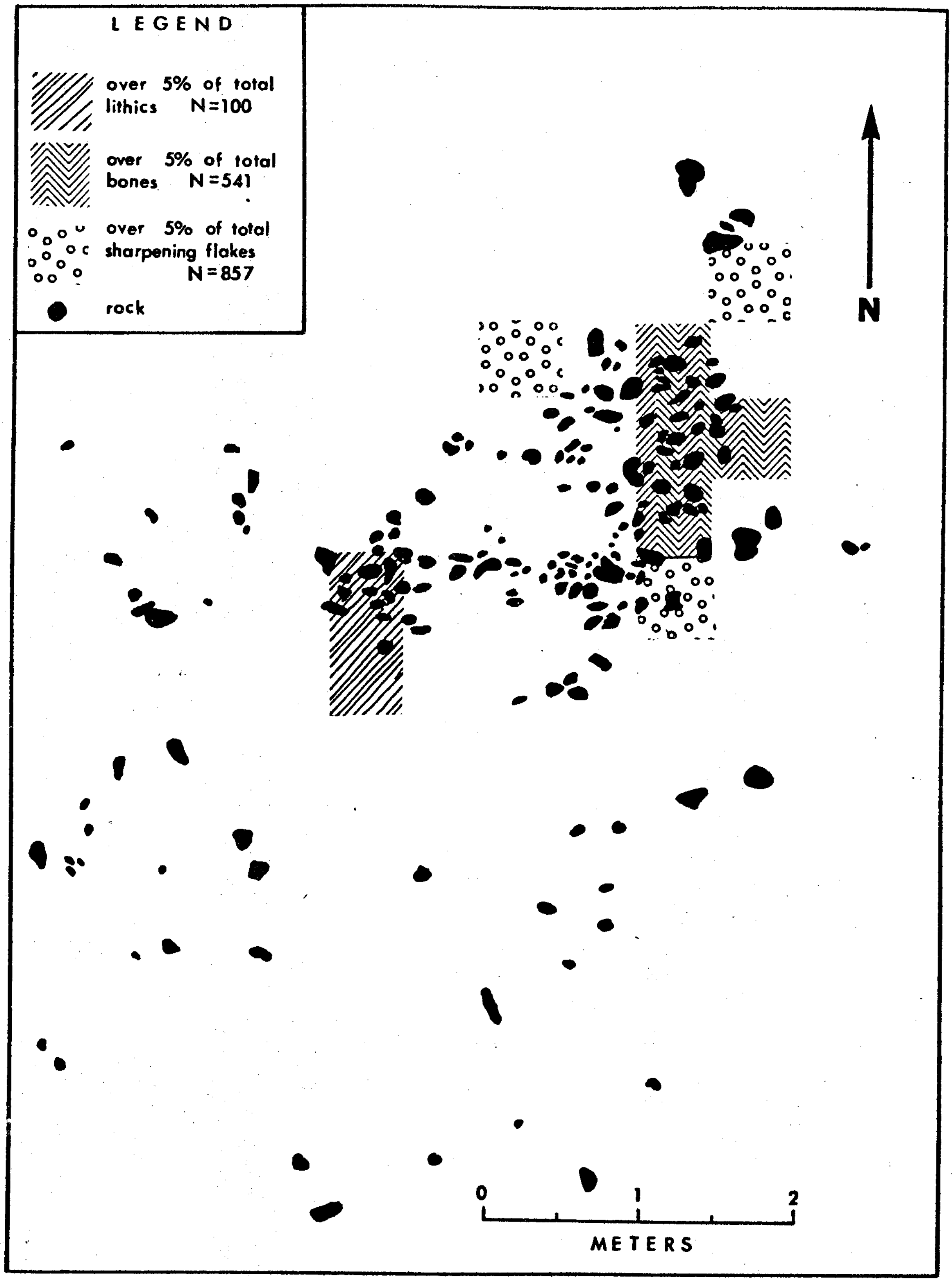


Fig. 30: Summary illustration, area B2.

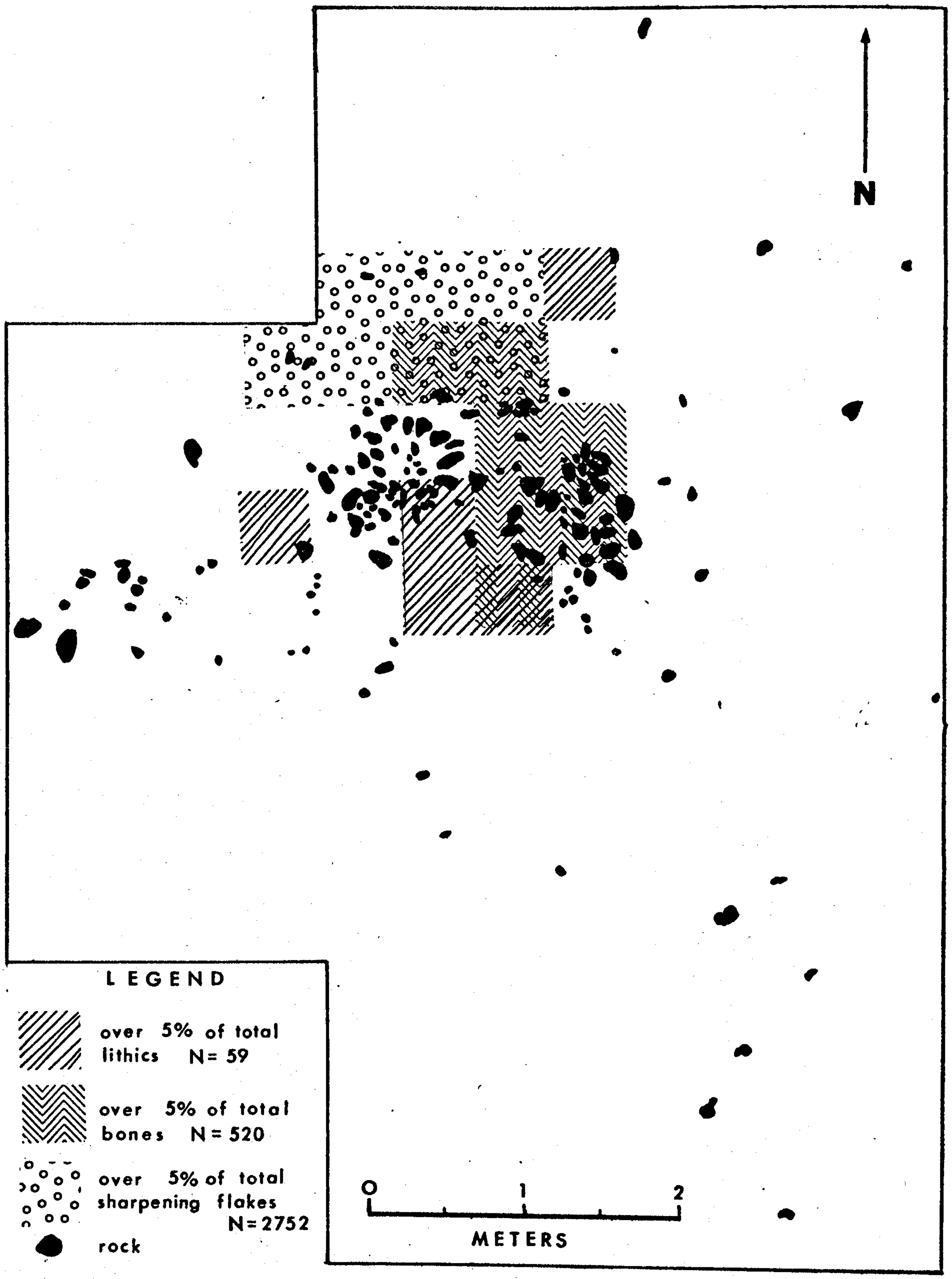


Fig. 31 : Summary illustration, area B3.

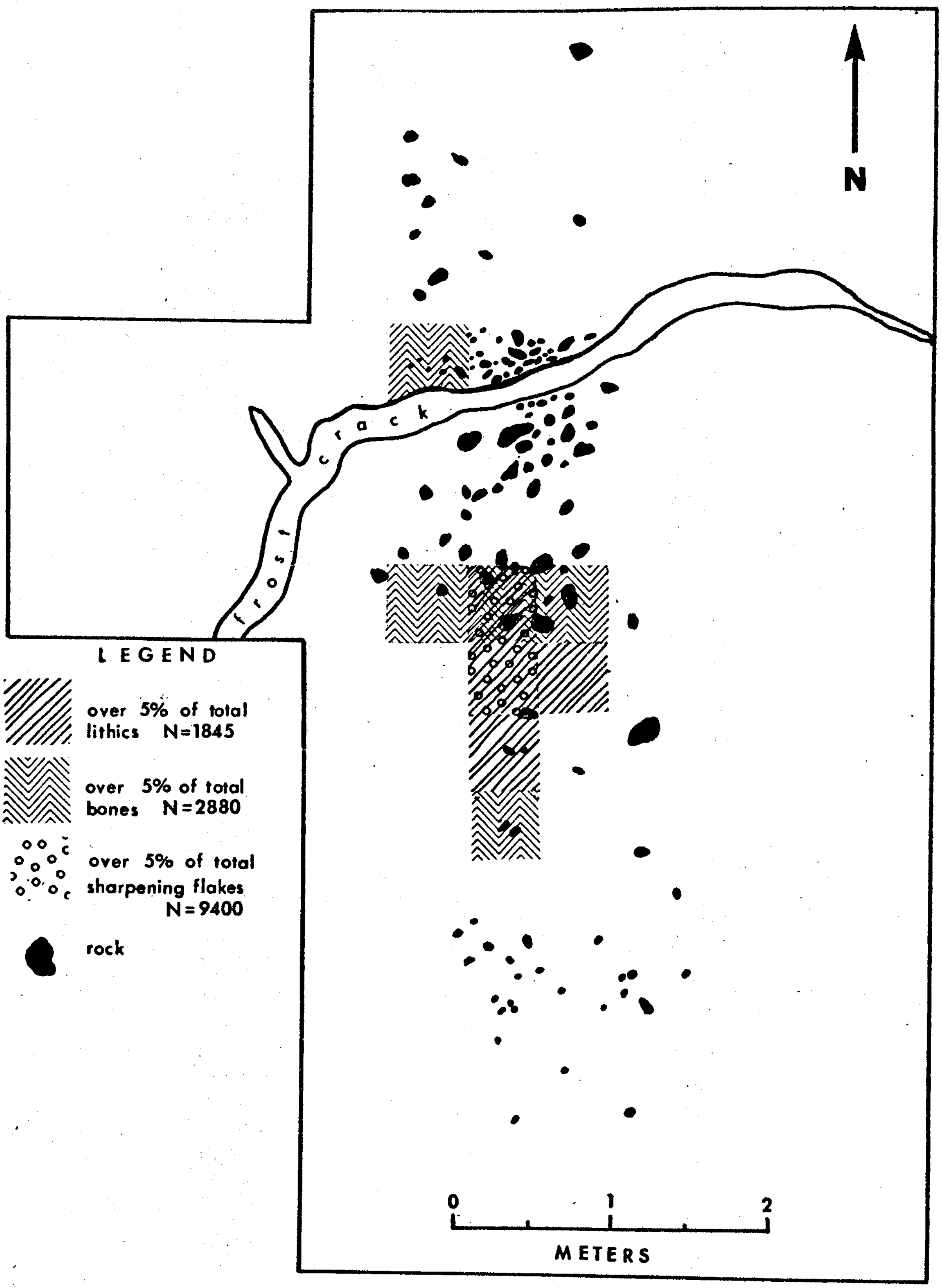


Fig. 32: Summary illustration, area H1.

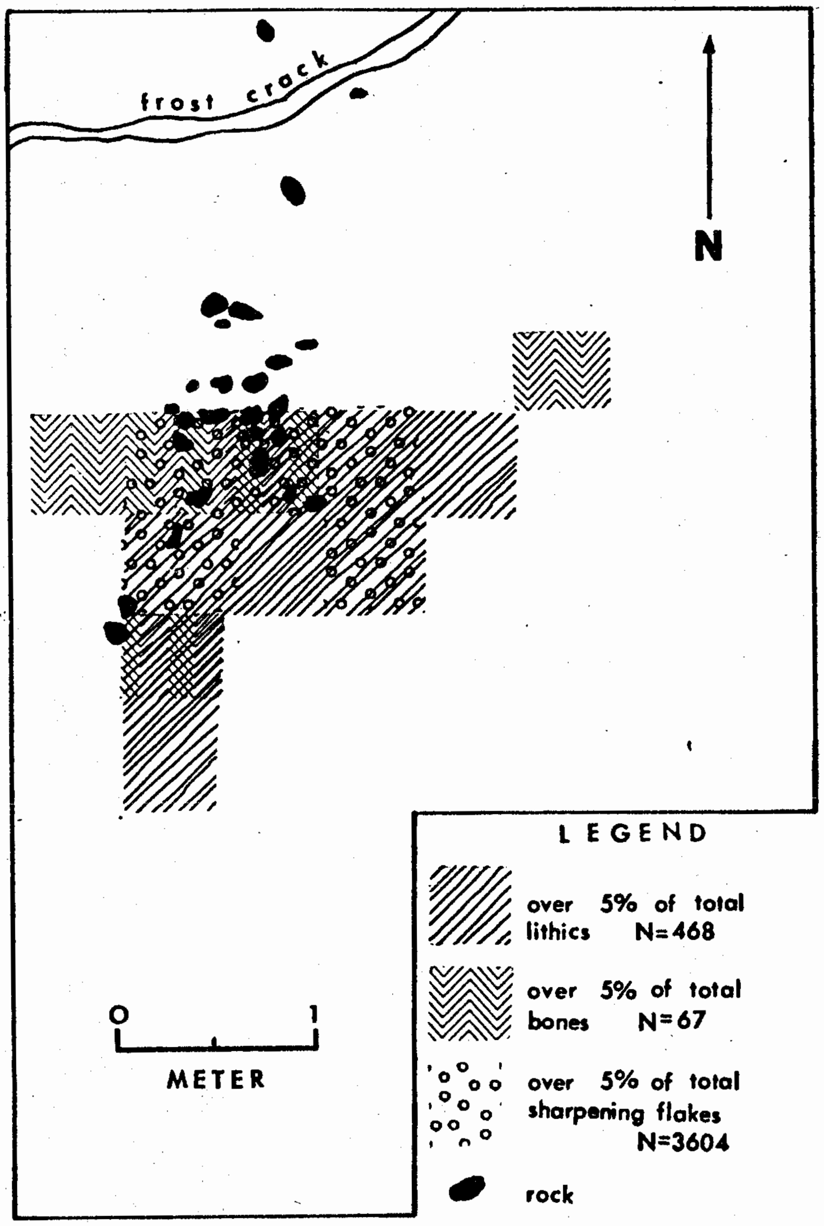


Fig. 33: Summary illustration, area H2.

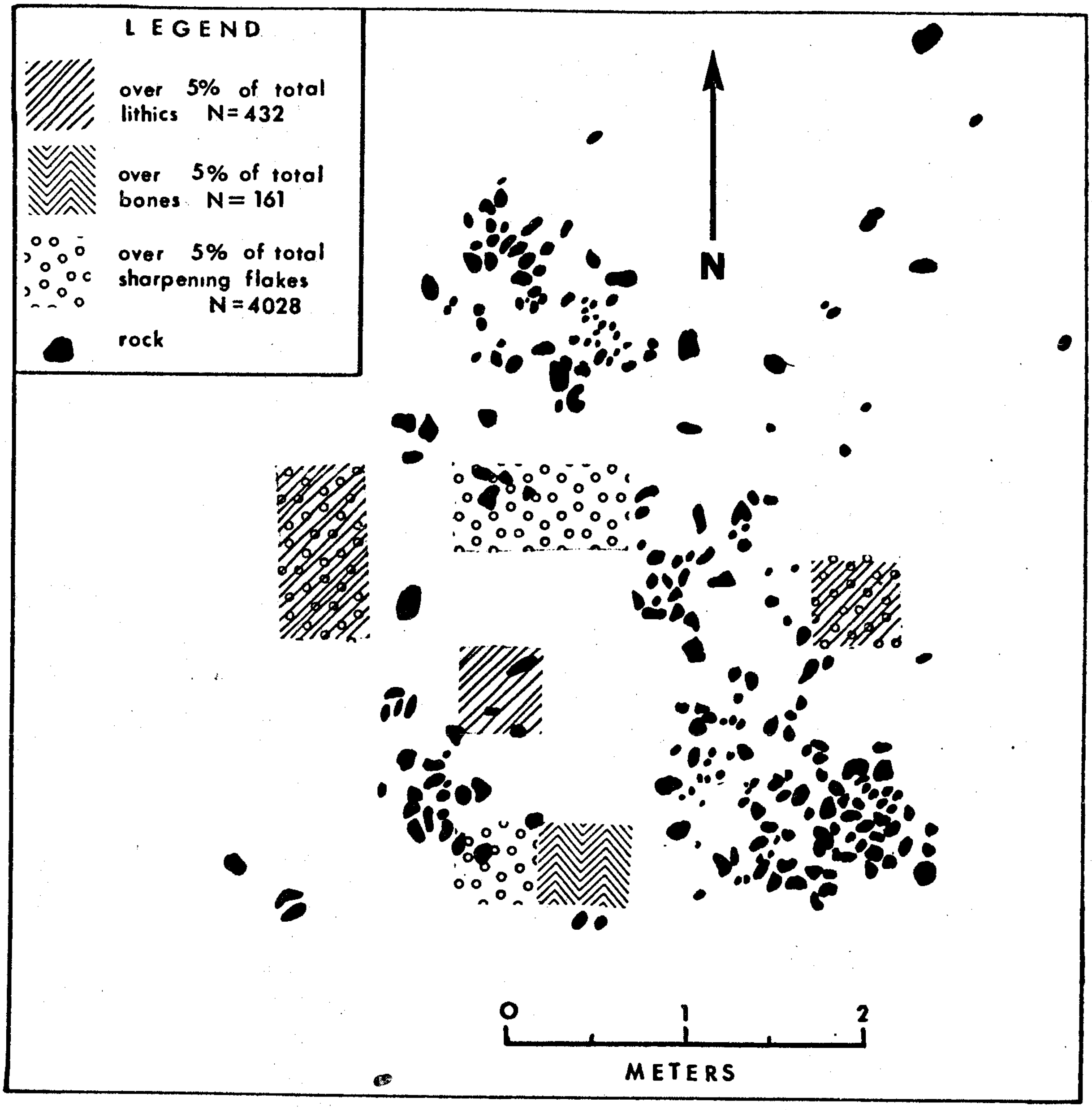


Fig. 34 : Summary illustration, area I1.

with surprisingly little overlap of concentrations considering the limited area in which they were found.

Therefore, all lines of evidence seem to indicate that all occupations at the Atigun locality are culturally related.

Archaeological Comparisons

Only the artifacts could be compared with other northern sites since little work has been done elsewhere in describing faunal remains or lithic manufacturing techniques. Comparisons will be made with sites in Alaska, the Yukon, the Northwest Territories and British Columbia.

(1) Alaska

Atigun artifacts bear close resemblance to those reported from the Kavik site at Anaktuvuk Pass (Campbell 1962a, 1972b, 1968). Small contracting-stemmed stone points have been cited as diagnostic tools of this complex (Campbell 1962a:49). Corresponding points were found at the Atigun locality, and therefore at least some occupations can be positively identified as Kavik. It is felt that all occupations are therefore related to Kavik.

The Kavik point, as described by Campbell (1968:37), has high shoulders and a pointed base. However, 4 of the 7 Kavik points shown have either contracting or relatively straight stems, and pointed, rounded, or almost straight bases (Campbell 1968:32). It is clear that the Kavik point at the type site has a considerable range of variability, a fact not usually recognized in the literature. It should be noted that all Atigun types of shouldered bifaces with straight stems and bifaces with contracting stems, described in Chapter 6, are within the range of variation of Kavik points, both in shape and size.

There is another point of similarity between the Kavik site and the Atigun locality. Campbell (1962a:49) reports 6 small rectangular antler artifacts which he identifies as gaming pieces (1968:39). Although no illustrations or metric data on these pieces are published, they seem to be the same as the polished antler rectangles recovered from the Atigun locality.

Campbell (1968:41) also reports an unilaterally barbed antler leister-prong which is "almost identical" to 1 found by Alexander at the Atigun locality. Alexander (1968b: 37) notes similarities both among antler fish-spears and also rectangular gaming pieces found at the Atigun and Kavik sites.

Campbell (1968) reports the presence of several other artifacts, including an antler comb, a bone flaker, leister prongs, "2 well worked pieces", stone scrapers and knives but they are either incompletely described or have no analogue with material from the Atigun locality.

Several other North Slope sites have yielded Kavik points, or other material which can be compared with Atigun artifacts. A few kilometers north of the Atigun locality, near Murphy Lake, a "small, tapered stem, high shouldered, slightly assymetrical point" identified as a Kavik point was found in association with a hearth (Bacon 1971:220). Dimensions of this point conform closely with those recovered from the Atigun locality.

The occurrence of a Kavik point at the Sagwon Bluffs #1 site about 100 km north of the Atigun locality, has been reported by Dave Derry (Kunz 1971:309). A single associated C-14 sample yielded a date of 890±35 radiocarbon years: A.D. 1060 (Kunz 1976:10).

The Mosquito Lake site lies less than 1 km to the south of the Atigun locality, just across the Atigun River. Kunz (1971:307) states that its primary cultural affiliations are with Denbigh Flint, but isolates a different cultural occupation on the basis of surface finds. One surface collected biface is illustrated (Kunz 1971: Plate D-8, B), and it conforms in size and shape with Kavik points recovered from the nearby Atigun locality. Another Kavik point was recovered from a hearth at the Mosquito Lake site in 1974. This biface also closely resembles Atigun counterparts (Kunz pers. comm. 1974). The hearth from which this point was recovered yielded a surprising C-14 date of 1975±140 radiocarbon years: 25 B.C. (Kunz 1976:9).

Several sites in southern interior Alaska have provided material comparable with Atigun artifacts. The Dixthada site is commonly cited as bearing resemblances to Kavik-related material (Morlan 1973b:471; Powers 1971). The Dixthada collection includes native copper points, awls or needles, scrapers, tci-thos, barbed or notched bone-points and small stemmed stone points (Rainey 1940:301). Two stone bifaces illustrated by Rainey (1939:370) fall within the size variation of Kavik points, but similarities in shape are rather general. Stemmed points at Dixthada date to A.D. 1600 (Morlan 1973b:515).

Notched and stemmed points are reported from a recent horizon at the Village site at Healy Lake (Cook and McKennan 1970b:2) and have been compared to Kavik points (Morlan 1973b: 473). However, these points are not illustrated or described in the literature, so comparisons are difficult.

Cook and McKennan (1970a:4) linked upper levels at Healy Lake with Dixthada on the basis of microblades, burins, stemmed points and the presence of "similar obsidian". Burins and microblades are absent at the Atigun and Kavik sites. Therefore it seems that the Village site and Atigun locality are not demonstrably alike. Dating of the Village site confirms this conclusion. Two dates were reported: 900±90 radiocarbon years: A.D. 1050 (GaK 1886); and 1360±80 radiocarbon years: A.D. 710 (GaK 1887) (Cook and McKennan 1970a:2), clearly predating the Atigun occupations.

Borass (1971:412) recovered a Kavik point from the surface of a site about 100 km north of Fairbanks. It appears identical to straight stemmed Kavik points from the Atigun locality, both in size and shape. Only a few waste flakes were found with it.

In northwest interior Alaska on the Koyukuk River, Clark (1974a:38) reports a Kavik point associated with "later prehistoric material", but it is not illustrated or discussed in site context.

With the exception of Borass' biface, sites in Alaska, south of the Brooks Range, show only general similarities with Kavik material. The problem may lie with poor description. Conversely, several sites on the Alaskan North Slope do show rather striking similarities with material from the Atigun locality.

(2) Yukon Territory

Each artifact of the Kavik site apparently has a close counterpart at the site of Klo-Kut in the Yukon Territory (Morlan 1973b:480). Morlan's (1973b:249) type Ib projectile point is defined as a stemmed point with a triangular blade and well defined contracting stem. His illustrations and metric data (Morlan 1973b:250) conform closely with similar specimens from the Atigun locality. It might be noted type Ib stems range from contracting to parallel, and bases vary from pointed, rounded to almost straight. Type Ib, as well as 4 other types of point not represented in the Atigun collection, are confined to the late prehistoric and historic periods, with a time span of about 600 years (Morlan 1973b:403). Klo-Kut hearth diameters for late prehistoric zones match those at Atigun (Morlan 1973b:151). Also found in the late prehistoric context are "small ovate bifaces, tear-drop in shape with little or no stem development" (Morlan 1970:26). These may be similar to small

Atigun ovate bifaces. An unilaterally barbed bone point was recovered from the Atigun locality in 1967 and was compared to those at the Kavik site earlier in this paper. This point is also similar to several Klo-Kut specimens (Morlan 1973b: 280). Morlan (1973b:331) also reports 4 "rectangular gaming pieces" which are close in size to Atigun polished rectangles. Native copper is noted at Klo-Kut (Morlan 1973b:370). Also, Morlan (1973b:448) notes 50 flakes in the Klo-Kut collection which could be called microblades, but which were "de-emphasized" because of the absence of microblade cores.

Many discrepancies between the artifacts at Atigun and Klo-Kut can be explained by the small Atigun sample, differences in environment (Klo-Kut lies within the tree zone) and season of occupation. The most obvious dissimilarity is the absence of unbarbed bone points in late prehistoric levels at Klo-Kut (Morlan 1973b:295).

At the Cadzow Lake site, in the middle Porcupine drainage, a Klo-Kut type Ib stone point was found (Morlan 1972b:25), closely resembling Atigun Kavik points. Two unbarbed bone points and 1 "awl" were also recovered from this site (Morlan 1972b:26). Illustrations of these bone artifacts bear resemblance to Atigun awls and the long, thin unbarbed bone points described in Chapter 6. Morlan (1972b: 73) dates the Cadzow Lake site between A.D. 1850-1890.

Some similarities have been shown between Kavik points and "Stott" points of MacNeish's (1962:24) Bennett Lake Phase (Morlan 1970:29). Besides "Stott" points, MacNeish (1964:

296) also includes in the Bennett Lake Phase, "Prairie", "Fresno" and "Catan" points, copper points and awls, as well as a variety of antler points, both unbarbed and unilaterally barbed. Some of the illustrated Fresno points fit into the range of Kavik points, and the Catan points are similar in size and shape to the small ovate bifaces found at the Atigun locality (MacNeish 1964: Figure 88). The Bennett Lake Phase is now dated between A.D. 1800 - 1900 (Workman 1974b:2).

Directly ancestral to the Bennett Lake Phase is the Aishihik complex. MacNeish (1962:25) suggested that Bennett Lake and Aishihik make up the Denetasiro tradition, representing material remains of Northeast boreal forest Athapascans. The Aishihik complex is poorly defined, although Workman (1974) has attempted to sort out some of the confusion with MacNeish's description. All of Workman's (1974b:4) characteristic artifacts of the Aishihik Phase are subsumed by MacNeish's (1964:295) definition of the Bennett Lake Phase. Until this is sorted out it might be justified to think of the Bennett Lake Phase as simply the Aishihik Phase with the addition of historic items. The Aishihik Phase is dated between A.D. 400-1800 (Workman 1974b:4).

MacNeish (1962:24) identified the Taye Lake complex as a terminal phase of the Northwest Microblade Tradition. The complex is ill-defined but does underly White River volcanic ash (Workman 1974a:240), dated between A.D. 475-575. Similarities are apparently strong enough between Taye Lake and the later Aishihik and Bennett Lake phases, to permit

Workman (1974b:12) to include all 3 as variants of the Northern Archaic Tradition.

Included in Taye Lake phases and the (presumably) related Gladstone "culture complex" are "Morhiss" points (MacNeish 1960:6, 1964:401) which are similar in shape to Kavik points. Unfortunately, MacNeish (1960, 1964) gives 2 different sets of measurements for Morhiss points, 1 set falling well within the Kavik range of variation (1960:12) and another considerably larger than Kavik (1964:401).

Despite this confusion, there is no doubt that Kavik points, as well as several other Kavik-related artifacts, are present in Southwest Yukon assemblages. The presence of Kavik material in Taye Lake deposits is, for the time being, discounted because of conflicting information. Kavik is related to Aishihik and Bennett Lake phases, but does not necessarily begin with their earliest manifestations. Definitions of all above-mentioned phases need to be refined and all material from the Southwest Yukon must be reclassified. Present "types" are almost useless because of extreme internal variation and overlap.

3. Northwest Territories

A small contracting stemmed point <u>may</u> belong to the Whitefish Lake complex which is roughly dated between A.D. 1000-1830 (MacNeish 1951:33). The complex is poorly defined and resemblances to Kavik and Atigun are tenuous. At least for the present, the Northwest Territories can be discounted as having cultural connections with Kavik.

4. British Columbia

Donahue (1970:19) sees similarities in stemmed points from Algatcho and Klo-Kut. However, resemblances are not convincing. Comparisons with Klo-Kut and Kavik have also been made from material recovered in Bes Yaz House and Tłokut house near Anahim Lake (Wilmeth 1969:9). Again, ties are not strongly suggested. Several other sites from the North-Central Interior of British Columbia have been related to the "northern sub-Arctic culture sphere" (Helmer 1976:19) but comparisons are very general in nature. It is quite possible north-central B.C. late prehistoric cultures are in some way related to more northern cultures, but specific ties with Kavik are not apparent.

5. Summary

The Atigun locality thus shows closest archaeological similarities to the Kavik site at Anakuvuk Pass; several small sites on the North Slope east of Anakuvuk; the site of Klo-Kut in the Yukon; and the Cadzow Lake site, like Klo-Kut, located in the Middle Porcupine drainage of Yukon Territory. Sites in the Southwest Yukon Territory and central interior Alaska show closer similarities to each other than to Atigun, but a relationship should not be dismissed. Late prehistoric sites in the Northwest Territories and British Columbia are not seen to be similar to Atigun.

Definition of Kavik

There is a degree of confusion in the literature concerning the term "Kavik". At times, Kavik is used to refer only to specific projectile point types, other times to artifact assemblages, and sometimes to a loosely defined "Kavik complex". Finally, the term Kavik, used by itself, implies the concept of a Kavik "culture". It is therefore necessary to define Kavik from several perspectives. I have chosen to define Kavik in terms of artifacts, activities, dating and cultural affiliations. Unless otherwise explicitly stated, "Kavik" will be used in its broadest sense.

(1) Artifacts

Kavik points have been suggested as a possible diagnostic late northern Athapascan trait, extending from British Columbia to Northwest Alaska (Clark 1974b:46). However, such a general application serves to diminish the diagnostic utility of the Kavik point type. Part of the problem lies with the fact that researchers have been more than willing to identify any small, stemmed biface found in the Western sub-Arctic (or Arctic) as a Kavik point. It is important to remember that small, stemmed and/or notched points are common throughout the north and west in late prehistoric times and are not necessarily related to Kavik points. Researchers must look for specific traits when searching for cultural identity and of course, a range of artifacts is necessary when discussing cultural similarities. To clarify the problem of Kavik, it is necessary to compile a range of Kavik-related artifacts and activities.

It is important to remember that Kavik was first defined at the type site at Anaktuvuk Pass. Because the Kavik points reported from Anaktuvuk Pass have an internal range of variability in stem and base shape, it is not easy to accurately define specific attributes of a Kavik point. Any comparisons should be made with the reported bifaces from the Kavik site and it is suggested that points not conforming closely with these specimens both in size and shape should be rejected as Kavik points, since the range of variability is already great. Since Atigun bifaces can be favourably compared with Kavik points, it is further suggested that Atigun tools expand the inventory of Kavik-related artifacts. Klo-Kut type Ib points are clearly Kavik, but Morlan (1973b) reports several bifaces with no counterparts at either the Kavik site or Atigun. It is suggested that the points found in a late prehistoric context at Klo-Kut (with the exception of type Ib) might have different origins and may not lie within the Kavik continuum.

Besides Kavik points, the only other stone artifacts clearly belonging to the "Kavik complex" are the tear-drop shaped pointed found at Kavik, Atigun and Klo-Kut. Related Atigun points were described as ovate. Other artifacts associated with Kavik points are small antler rectangles or gaming pieces and unilaterally barbed antler leisters. The unbarbed bone points described in the Atigun collection may prove to be diagnostic of Kavik. It is also likely that copper working is associated with Kavik.

(2) Activities

At the present stage of northern archaeology, it is impossible to describe the full range of activities and seasonal rounds of Kavik-related culture, due to the inadequate description of faunal remains. However, some sketchy comments and inferences can be made.

Based on Atigun data, it seems that late summer ground squirrel hunting may have been an important seasonal activity. Ground squirrel remains were also found at the Kavik site (Campbell 1968c:37).

Campbell (1962b:429) typifies the Kavik site as a caribou hunting base camp, occupied during either the spring or fall. Later, he refined his statement and concluded Kavik was a fall encampment (Campbell 1968:39). Although Campbell (1968:37) "guesses" 97% of his faunal remains were caribou, he also reports several bird species, including goose, as well as ground squirrel and marmot. Because screens were not used and because faunal analysis was not carried out, it is impossible to determine subsistence activities or seasonality at the Kavik site. All that can be said is that caribou were hunted, possibly intensively.

Klo-Kut has been identified as a spring and early summer occupation, based on the presence of fetal caribou (Morlan 1970:25). Morlan (1973b: 416) sees Klo-Kut as a caribou hunting camp, identifying up to 95% of faunal remains as caribou in the late prehistoric period. Fish, birds and small mammal were also present. Morlan's presentation makes it unclear whether estimates are based on NISP or MNI. It is also apparent that multiple mesh screens were not used at Klo-Kut, making inferences difficult to evaluate. All that can be said is that caribou, birds and small mammals were hunted in the spring and that fishing was also practiced at that time.

We are therefore left with very little idea of seasonal activities of Kavik-related occupations. No winter settlements have been identified as Kavik. It is not known what role fishing played in the economy, and it can only be guessed that caribou were important, perhaps in spring and fall. It is painfully clear that more detailed work must be done to clarify the seasonal round of Kavik activities. Certainly, much more has to be done in terms of interpreting the subsistence economy: "Neither the food habits, demography, nor the technology of their creators can be adequately understood by studying (1 site) in isolation" (Salwen 1970:4), a fact most relevant when applied to migratory hunters.

(3) Dating

Dating of Kavik is almost as unclear as the nature of its seasonal activities. The earliest date of 1975 B.P. is from the Mosquito Lake site, directly across the river from the Atigun locality (Kunz 1976:9). Although Kunz does not believe the date is in error, he fails to explain the occurrence of Kavik at Mosquito Lake a millenium before it appears elsewhere. Since Kavik points occur in the historic period in the Middle Porcupine drainage (Morlan 1962b), the acceptance of 1 early date necessitates the belief that Kavik points were manufactured, at least occasionally, for 2000 years. This would totally destroy any diagnostic value of the Kavik concept. It is much easier and more logical to reject the single radiocarbon date which can be discarded on 2 grounds: First, the Mosquito Lake site is composed of "15 separate localities 1 of which is Kavik" (Kunz 1976:9). The remaining 14 are presumably Denbigh Flint (Kunz 1976:8). The actual location of the 15 separate localities is not given, but the site does lie on and below a slope where it is probable that considerable soil creep and solifluction have occurred. Therefore, there could be mixing of materials. Second, a series of 5 charcoal samples from the 14 presumably Denbigh localities were submitted for dating. The dates range from 3515±160 to 2135±160 radiocarbon years (Kunz 1976:8), a range of 1400 years at the same site for the same archaeological culture. To further complicate matters, Kunz (1976:10) accepts a date of 305±130 radiocarbon years for another locality at the Mosquito Lake site which he identifies as Ipiutak. It seems possible that the site is mixed.

The next earliest date from a Kavik site is the 890±35 B.P. determination from Sagwon Bluffs #1 (Knuz 1971). The base date of the late prehistoric level at Klo-Kut, containing Kavik tools, is 600 B.P. (Morlan 1973b:403). Atigun dates range from about 100-400 B.P. and the Kavik site at

Anaktuvuk Pass has not been dated. Kavik tools extend into the historic period at Cadzow Lake in the Yukon Territory, possibly as late as A.D. 1890 (Morlan 1972b).

The origins of Kavik are not clear, but can be assumed to date back 600-900 years, with a persistence of up to 800 years if the earliest and latest dates are accepted. If the Sagwon Bluffs site is rejected as Kavik - no illustrations are presented, and identification is made on the basis of a single biface - then Kavik spans the period 100-600 B.P., based on Klo-Kut material. It is not clear whether early stages of the late prehistoric period at Klo-Kut contain type Ib, or Kavik, points. If not, the time range of Kavik may be as brief as about 100-400 B.P. based on Atigun dates.

(4) Cultural affiliations

It is widely assumed that Kavik points are a "hallmark of late Athapascan sites" (Morlan 1970:29). This assumption is based on their discovery in historic Athapascan territory, in a time period when it is certain that Eskimo were not present.

Evidence from butchering patterns at the Atigun locality points to an Indian rather than Eskimo occupation. Except for this, the Atigun locality has few clues as to the identity of its inhabitants, except the following inferential data: The early historic Nunamiut Eskimo site of Aniganigaruk located a few hundred meters across the Atigun

River, contained hearths of a totally different size and configuration to Atigun site hearths (Corbin 1976). Tent rings were absent at Atigun, but are commonly associated with Eskimo sites in the valley (Alexander 1969). Copper and obsidian at the Atigun locality were examined in an attempt to trace the raw material source of finished artifacts. The results of the copper analysis were never forwarded, nevertheless some statements can be made. The use of copper is not well documented for the Nunamiut. Ingstad (1954:136) does mention the Nunamiut imported beaten copper from the east. Copper is seldom associated with inland Eskimo archaeological sites, whereas copper-working is widely associated with northern Athapascans (Witthoff and Eyman 1969:22).

The obsidian artifact recovered from Atigun was quarried from the Batza Tena deposits on the Koyukuk River, south of the Arctic circle (Earle Nelson pers. comm. 1975). Batza Tena is the raw material source for all obsidian artifacts found in northwestern Alaskan sites (Griffin et al 1969:155; Patton and Miller 1970:761). Nunamiut informants have suggested there is an obsidian source west of Killik River, but geologists are highly doubtful of the possibility (Gubser 1965:232). It is probable that Batza Tena is the closest major obsidian source to the Atigun locality.

Batza Tena does lie about 300 miles south of Atigun, well within the tree zone and also well within ethnographic Athapascan territory. It is highly doubtful Nunamiut would have ventured so far south into Indian territory. Therefore, it can only be assumed that if inhabitants at the Atigun locality were Eskimo, they were trading with Indians. Or, it can be assumed Atigun locality occupants were Indian. There is no evidence of late prehistoric sites at Batza Tena (Clark 1972:18), indicating perhaps that no middlemen monopolized the obsidian source. It is likely the source was utilized by groups wanting obsidian for their own use, rather than trade. The fact that there was no debitage associated with the Atigun obsidian tool suggests it was manufactured at the quarry site and therefore, probably by Indians. All evidence points to an Indian occupation of the Atigun locality and an Indian identity of Kavik.

(5) Conclusions

"Kavik" can now be discussed in terms of its overall place in northern prehistory. One hypothesis derives Kavik points ultimately from stemmed Eskimo points (Clark 1974b:46). They then diffused eastward along the south flanks of the Brooks Range, accompanied by shared elements of Eskimo-Indian bone technology. The idea of an eastward diffusion is suggested by both Campbell (1962a:49) who sees a "genetic relationship" between Kavik and the Kobuk River sequence, and Morlan (1973b:481) who sees a resemblance between Klo-Kut and Ekseavik and late prehistoric Eskimo - "particularly in the bone and antler industry". Morlan (1973b:513) goes on to state no bifacial stonework was present at Klo-Kut "until Ekseavik spread eastward".

However, I believe a good deal of unnecessary confusion has been added to the literature. First, Irving (1967) points out differences between Klo-Kut points and those of the North Alaskan Eskimo. Differences are distinct and would require a fertile imagination to link the 2 stone industries. Ekseavik stone tools are 2 to 3 times larger than Kavik points and are far from consistantly similar in shape (Giddings 1952: Plate 28). Tree ring chronology dates Ekseavik between A.D. 1380-1430 (Giddings 1952:107), contemporaneous with early late-prehistoric levels at Klo-Kut. Attributing Kavik, Atigun or Klo-Kut stoneworking to Ekseavik influence is totally out of the question because: (1) there are no demonstrated similarities in stone tools; (2) Ekseavik and Klo-Kut levels are contemporaneous and geographically far-removed; (3) there is no archaeological evidence of Ekseavik cultures between the Kobuk River and Klo-Kut; and (4) there is no evidence of expansion of Ekseavik or a break in the Kobuk River sequence.

Similarly, relating the Kavik and Klo-Kut bone and antler industry to Ekseavik seems a fanciful exercise. Morlan(1973b:511) offers no specific comparisons between Ekseavik and Klo-Kut but states bone working at Klo-Kut "looks Eskimo". Specific comparisons are necessary in order to establish credibility for further speculation. Morlan does not adequately establish similarity between Klo-Kut and Ekseavik bone working. Illustrated artifacts of the 2 sites show no striking resemblances in form. In fact, the salient feature is that Ekseavik exhibits a far broader range of bone tools than does Klo-Kut. Ekseavik bone and antler working also appears more elaborate, and finished tools of Ekseavik are more detailed.

Kavik can then be re-examined. Only 3 major Kavik sites have been excavated: the Kavik site at Anaktuvuk Pass; Klo-Kut in the Middle Porcupine drainage; and Atigun in the Atigun Valley. Small sites have been identified as Kavik with varying degrees of certainty. Most of the smaller Kavik sites are a few miles north of the Brooks Range on the treeless North Slope, although there is some evidence for Kavik occupations south of the Range in Alaska. Lack of evidence for Kavik is undoubtedly due in part at least to lack of archaeological work. However, based on our present knowledge, it seems clear that Kavik has a montane association, and more specifically a Brooks Range association. It is also clear that Kavik represents a late prehistoric Athapascan development in that area. Doubts remain about Kavik origins and conclusions.

Dumond (1969:861) has suggested that small stemmed points associated with Athapascans could be descended from "earlier broadly notched implements". Tuktu seems a likely early ancestor. No more recent archaeological cultures in the Brooks Range show continuity from Tuktu or toward Kavik. Tuktu is followed at the stratified site of Onion Portage by the Portage complex (Anderson 1968) which lacks stemmed points. The Athapascan Itkillik complex at Onion Portage also has few stemmed points (Anderson 1970:7). Neither of these complexes appear to be derived from Tuktu. Continuity from Tuktu must be found elsewhere.

Cook and McKennan (1970a:2) define an "Athapascan Tradition" composed of Tuktu and Denali complex materials. Denali includes Campus-type artifacts including notched and stemmed points (Cook and McKennan 1970b:2). Cook (1969) argues Kavik fills out later or post-Denali culture history of the Athapascan Tradition. I do not wish to broach the subject of the reality or archaeological visibility of Denali, nor do I wish to debate the theoretical acceptability of the "Athapascan Tradition". However, there does seem to be some evidence for continuity of a Tuktu-related archaeological sequence in central Alaska.

In the Southwest Yukon, Workman (1974b) also sees continuity through Taye Lake, Aishihik and Bennett Lake Phases, spanning the past 3000 years. All phases contain notched points and show connections to the Alaskan interior (Workman 1974b:11).

I would suggest that Kavik has cultural antecedents in central Alaska and the Southwest Yukon Territory and seems to lead directly to ethnographically known Athapascan cultures. Kavik points were found in association with an historic period Vunta Kutchin campsite (Morlan 1972b) and "arrowheads like those used by the Chandalar Kutchin" have been found at the Atigun site (Alexander 1968a:4). From ethnographic records summarized in Chapter 1, it should be noted that western Dihai Kutchin joined with eastern Netsi Kutchin to form the Chandalar. Obviously, bonds existed between different "tribes" of Kutchin. From archaeolgical records (that is, the distribution of Kavik), it is apparent that interaction occured between Kutchin "tribes" for at least 4 centuries.

Based on linguistics, the Na-Dene or Athapascan stock consisted of a single closely related group with a homeland centered in east-central Alaska and part of the Yukon as recently as 2500 B.P. (Krauss 1965:185). Pacific Athapascan divergence from Northern Athapascans began about 1000 years ago (Hoijer 1956:231), and diversification among Northern Athapascans was occurringbetween 1000 to 500 years ago (Vanstone 1974:5). This latter time range may also mark the appearance of the Kavik point.

Morlan (1973b:508) notes:

> 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 the Yukon Territory.

Evidence points to an occupation of the entire Brooks Range by Athapascans and specifically Kutchin Athapascans for at least the last 500 years. Similarities of Kavik, Atigun and Klo-Kut to sites in the Southwest Yukon and Central Alaska can be explained in part by the hypothesis of a common shared Athapascan "ancestor" for all these groups. Differences in material culture thus result from the varied technological and ecological adaptations necessary in different areas.

Because the environment at Klo-Kut is more similar to that of the southwest Yukon and central Alaska than is the environment at Anaktuvuk Pass and the Atigun Valley, it is only reasonable that Klo-Kut more closely resembles the former assemblages than do Brooks Range sites. However, strongest ties are still seen between Atigun, Kavik and Klo-Kut.

Therefore Kavik can be defined as a Brooks Range adapted, late prehistoric Athapascan occupation. The time range of Kavik is from about 100-500 years ago and may represent Kutchin speakers. Kavik as described here, fits the definition of an archaeological phase; that is, a group of similar components restricted in time and space. Far more work needs to be done in defining and refining the Kavik Phase, in terms of material culture, subsistence activities, and economic adaptations. Origins and cultural relationships need to be further explained, and the time dimension must be re-evaluated before a final statement can be made.

Chapter 8

CONCLUSIONS

The Archaeological Sequence Re-examined

The broad research aims outlined in Chapter 1 can now be re-examined. First, the archaeological sequence can be refined, based on the work presented in this paper and new data resulting from Alyeska pipeline research. Generally, Alexander's (1969) sequence, presented earlier, is re-affirmed with minor changes. Only the past 6000 years of Brooks Range prehistory will be discussed here, both because older sites are as yet controversial in terms of cultural affiliation, and also 6000 B.P. still seems to be the best base date for cultural regionalization and differentation between Indians and Eskimos (Cook 1975).

Tuktu remains the earliest archaeological culture which can be assigned Indian and probably Athapascan status. No early dates for Tuktu have been reported from sites in the Brooks Range, but radiocarbon dates from Onion Portage indicate a base date of about 5600 B.P. for this culture (Alexander 1969:49). It is unclear how long Tuktu persisted, but it would seem unlikely the culture endured for more than 2000 years.

The earliest archaeological culture in the Brooks Range which can be assigned Eskimo status is Denbigh, part of the Arctic Small Tool Tradition (ASTT). The ASTT has also been called Itivlik in the Brooks Range (Irving 1953). Recently, a series of radiocarbon dates from several ASTT sites in the Brooks Range yielded dates of from about 2200-3900 B.P. (Kunz 1976:8).

The presence of Norton - an Eskimo-related archaeological culture - has been recently noted in the Brooks Range, and has been dated between 2300-1800 B.P. (Kunz 1976:9). Several Eskimo-related sites have been reported in the Brooks Range which apparently follow Norton in time. A site in the Atigun Valley identified as Eskimo, yielded a carbon date of about 2000 B.P. (Wilson, Kunz and Slaughter 1974). The suggestion of Eskimo origins for this site was reinforced by the presence of whalebone. Kunz (1976:9) reports several Ipiutak-like sites which post-date 2000 B.P. Ipiutak has also been reported at Desperation Lake in the Arctic Foothills, associated with a radiocarbon date of 1850 B.P. (Lowden, Wilmeth and Blake 1970:484). Ipiutak seems no more recent than 500 years, based on radiocarbon dates from Alyeska pipeline research (Kunz 1976).

There is little archaeological evidence for Eskimo occupation of the Brooks Range between 100-500 years ago. However, Kavik dates fall precisely within these bounds, suggesting that the Brooks Range was the province of Athapascans for 4 centuries. For the past 100-150 years

Nunamiut Eskimo have dominated the Brooks Range. A chart of the prehistory of the Brooks Range over the last 6000 years is given in Figure 35.

Central Brooks Range prehistory is seen as consisting of 5 quite distinct periods: (1) Palaeo-Arctic; (2) Palaeo-Athapascan; (3) Palaeo-Eskimo; (4) Athapascan; and (5) Eskimo. I have used the term "period" rather than "tradition" becouse our level of knowledge of Brooks Range culture history does not yet warrent its use. The term "period"as used here, implies only a span of time when an archaeological culture of series of related cultures were present in the Brooks Range. Prior to 6000 B.P., the Range was occupied by a variety of named archaeological cultures, including Clovis. The period before 6000 B.P. could be described as "Palaeo-Arctic". This does not, however, imply that all Arctic cultures prior to 6000 B.P. were culturally undifferentiated, but simply indicates our inability to assign specific cultural or "ethnic" status to this early time period. Tuktu is the next period in the Brooks Range and probably represents the earliest evidence for northern Indian ("Palaeo-Athapascan") adaptation in the area. Following Tuktu, and perhaps to some extent overlapping in time, is the "Palaeo-Eskimo" period, represented by the ASTT (labelled Itivlik or Denbigh), Norton and Ipiutak which can be seen as a related Eskimo tradition. Ipiutak, as yet poorly defined in the Brooks Range, is followed by Kavik, representative of the "Athapascan" period. The final stage is represented by

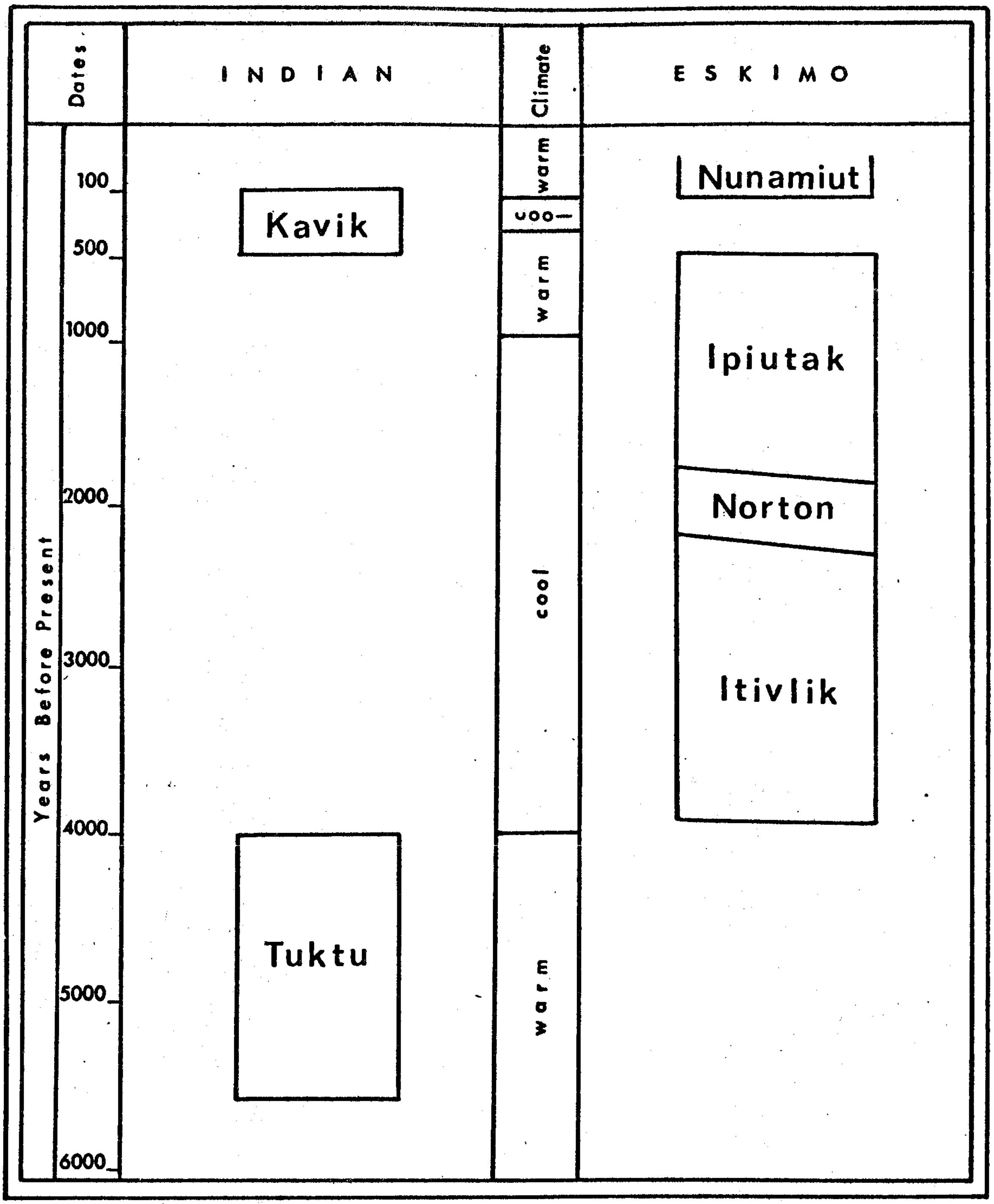


Fig. 35 : The last 6000 years of Brooks Range prehistory.

the ethnographically known Nunamiut and might reasonably be called the "Eskimo" period.

It is apparent the Brooks Range has been at least intermittantly utilized for the past 6000 years. Since remains from some of the above periods are rare, it is possible that the intensity of utilization of the Brooks Range may have fluctuated widely at different times. Differing intensity of utilization has been well documented for the past century as briefly outlined in Chapter 1. It is suggested that the intensity of use in this marginal area was directly proportional to environmental factors like climate and changing faunal resources. More work in the area could certainly help clarify the relationship of intensity of utilization and environment.

It is also apparent that, although the Brooks Range has been utilized for the past 6 millenia and much longer, it has not been utilized by any 1 cultural tradition. This is reflected by Campbell's (1962a:54) statement that "the primary mechanism characterizing Brooks Range culture change has been successive intrusive cultural replacement rather than... in situ development". Campbell's statement, however, suggests a series of migrations, with each named archaeological culture representing a new wave of immigrants. In the view of Brooks Range prehistory presented here, migration is not seen as the main mechanism of culture change. Rather, it is argued that cultures show a logical progression through time. However, because of changing cultural boundaries between

Indian and Eskimo, the archaeological sequence has been disturbed several times. The reasons for this changing cultural boundary will next be examined in closer detail.

Environmental Effects on Culture

The climatological and glacial record (see Chapter 1) shows remarkable chronological synchroneity with the archaeological sequence put forward in this paper (Fig. 35). Indian occupations of the North Slope seem to correlate closely with the onset of warming trends and retreat with the advent of cooler periods. Northern Indians are primarily adapted to the forested interior, while Eskimos are adapted to the coast and the open tundra. It is possible a warming trend would allow the forest to spread northward with a consequent spread of Indian culture. A warming trend might also have the effect of improving sea ice conditions and possibly making life on the coast more attractive to the Eskimo. A reverse effect could be seen with a deterioration of climate. However, the minor climatic variations were unlikely to effect these gross changes, but probably acted on more subtle levels. For example, even minor temperature changes might have had important consequences for migratory patterns of animals.

The above explanation assumes a dual nature of Eskimo economy. The author agrees with Taylor's (1966:118) statement that Eskimo economy is neither inland nor coastal adapted but rather is Arctic adapted. It must be remembered at this point that cultures cannot be seen as static and unchanging but as dynamic and constantly shifting. Eskimo hunters whose primary residence was coastal undoubtedly explored, hunted and lived some days, months, seasons or years inland, depending on any number of factors, the most important of which would probably be resource availability. In a similar fashion, Burch (1972a) has proposed a "regional unit" model of Nunamiut population, hypothesizing the existance of several inland Eskimo "societies" possessing different territories, dialects and adaptive strategies.

All researchers consider the Nunamiut a coastal people recently moved inland and all ethnographic evidence strongly supports this conclusion. More recently, Hall (1970:7) has divided the Nunamiut into 2 groups, which he calls the Eastern and Western Nunamiut. The main criterion for division is the use of surface dwellings in the east, as opposed to semi-subterranean dwellings in the west. Hall believes the 2 groups have different derivations: the Western Nunamiut from the Kobuk-Noatak Eskimo, and the Eastern Nunamiut from the Point Barrow Tareumiut (Campbell 1968a:276). However, Hall (1970:7) also points out that there is no archaeological evidence that groups recognizable either as Western or Eastern Nunamiut occupied their territory prior to white contact. It is thus quite possible that the "permanent" move inland was quite recent and was to some extent influenced by European factors such as whaling.

The late prehistoric and early historic period, apparently the time of greatest conflict between Indian and

Eskimo in the Brooks Range, was also a time of fluctuating climate and concomitant shifting resources. Conflict could well be a result of shifting and depleting resources as well as the likelihood that both Indian and Eskimo would be more liable to come into greater contact at this time. Both groups might find themselves in the mountains because of recent shifts in climate. Another factor might be the greater strain on coastal resources by European whalers and traders, forcing Eskimo inland. The rapid shifts in caribou resources, outlined in Chapter 1, might be associated with fluctuating climate. It is only logical that uncertain resources could lead to hostility between groups competing for the same resource. Eskimo-Indian conflict might then be viewed as a forseeable outcome of climatic change and resource fluctuation. That the culture boundary is closely tied to the resource base and therefore to minor shifts in climate is reinforced by the distribution of Nunamiut and caribou. Gubser (1965) indicates that Murphy Lake approximates the eastern boundary of the Nunamiut. This boundary is closely correlated with the eastern margin of the "center of habitation" of the Western Arctic caribou herd (Skoog 1968:206; Burch 1972a:356). However, evidence of historic Eskimo sites in the Elusive Lake region, located about 75km east of Murphy Lake, documented by Alexander (1969), and ethnographic accounts of Nunamiut <u>centered</u> in the Atigun Valley near Murphy Lake (Alexander pers. comm. 1977), extends Nunamiut boundaries considerably to the east. The more easterly boundary of Nunamiut occupation in the past may reflect a shift in caribou distribution.

To recapitulate briefly, it has been suggested that the archaeological sequence in the Central Brooks Range has been closely tied to climatological shifts for the past 6000 years and probably longer. During warmer periods, presumably when forests expanded northwards, the region was the domain of northern Indians, while during colder periods Eskimos utilized the area. It was suggested that the nature of Eskimo economy was dual, utilizing both coast and tundra, with perhaps more emphasis on coastal life during periods of warmer weather. It is probable that Indian and Eskimo have a long history of occasional contact. It is assumed that contacts were more hostile and frequent during periods of changing climate and uncertain resources.

Problems for Future Research

Some difficulties encountered in this analysis have already been mentioned. The most serious problems were those involving sampling at the site level. First, insufficient horizontal sampling was done to totally satisfy doubts as to the cultural homogeneity and range of activities carried on at the Atigun locality. Systematic horizontal sampling could be undertaken to solve this difficulty. Inferences from faunal analysis are in some doubt because of the failure to employ multiple-mesh screens. Use of appropriate recovery techniques in future testing of the large area of the Atigun locality would again easily remedy this shortcomings. It is strongly recommended that other northern archaeologists heed the above advice, especially if the main sphere of interest continues to lie in understanding aboriginal economy.

Perhaps the ideas presented in this paper will stimulate future research in an area where much remains to be done. Even now the culture history is merely being roughed out. Much more remains to be done in defining and redefining archaeological cultures. Much can be accomplished in subdividing periods of prehistory into workable and meaningful units. Certainly the period described as Ipiutak in this paper merits more attention.

The importance of environment in terms of both climate and resources should also be examined in relation to culture change. Because our knowledge of palaeoenvironment in the Arctic is painfully inadequate, this field of study can be nothing but productive in understanding past human use of the Arctic.

The prehistory of northern Athapascans is still but little understood. Hopefully, this paper has added in some small way to our thinking on this matter. Certainly more work awaits the archaeologist in this field.

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