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PROPOSED QUANTITATIVE DEFINITIONS

of the

SUNSET CANYON and CRESCENT BAR COMPONENTS

of the

SUNSET CANYON PHASE

by

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S. O. S.

INTRODUCTION

It is my intent to present specific archaeological definitions of the concepts component and phase, as defined by Willey and Phillips (1962) with slight modification, employing, as far as possible, the conjunctive approach outlined by W. W. Taylor (1948).

The archaeological evidence which composes the definitions was excavated during two summer field-school sessions held by the University of Washington Department of Anthropology in 1960 and 1961. Both of the excavations took place in the Wanapum Reservoir located on the Middle Columbia River, in the eastern half of the State of Washington. The work was financed by a grant to Dr. Robert E. Greengo, Associate Professor in the Department of Anthropology at the University of Washington, from the Grant County Public Utilities District.

Two sites were excavated by students under the supervision of a trained staff. The sites are the remains of pre-historic communities, each composed of semi-subterranean dwellings. Areas immediately peripheral to the dwellings were also tested. However, no associated burials were excavated. The main body of the following presentation concerns the extensive collections of artifacts and features which were recovered from the two communities.

Spatially, the sites, 45-GR-68 and 45-KT-28, each represent in terms of Willey and Phillips a locality, that is a "... space that might be occupied by a single community or local group." (1962:18) The sites here under study together with several other sites briefly discussed in the following represent a region; "... a considerably larger unit of geogra-

phical space usually determined by the vagaries of archaeological history." (Willey and Phillips 1962:19). These sites are not, however, exhaustive of this region.

In terms of archaeological units each site represents a component, that is, they represent a manifestation of a given archaeological phase, the Sunset Canyon Phase. Phase as here employed is founded upon, but differs slightly from the definition presented originally by Willey and Phillips in 1958 in Method and Theory in American Archaeology. Willey and Phillips define a phase as:

> ...an archaeological unit possessing traits sufficiently characteristic to distinguish it from all other units similarly conceived, whether of the same or other cultures or civilization, spacially limited to the order of magnitude of a locality or region and chronologically limited to a relatively brief interval of time. (1962:22)

The objection to this definition lies in the phrase "...possessing traits sufficiently characteristic to distinguish it from other units similarly conceived..." (underline mine) and it is raised in respect to the goal of archaeology.

If it is the goal of archaeology to reconstruct a pre-historic culture, its relations with other cultures, and eventually concern itself with the problems in the greater field of Anthropology, then the presence and absence listing of traits in basic archaeological definitions is insufficient. A trait list does not represent a site, or a group of sites, any more than it represents a culture. To group components together under a single named phase because they all possess a certain number of traits may be very misleading and result in grouping together components representing different cultures. The possibility of this occurring can be greatly

reduced if instead of presence and absence trait lists, a quantitative contextual approach is used.

It is for these reasons that I have attempted to follow, as far as possible, the "conjunctive approach" outlined and discussed by W. W. Taylor (1948). The two tenets of this approach are "...(1) that they (comparisons) should be based upon cultural rather than empirical categories, and (2) that quantitative analysis is absolutely necessary in order that warpings and errors be eliminated as much as possible." (Taylor 1948:168)

Since it is the whole which the archaeologist seeks, then it is the whole or as much of it that he can deduce from the archaeological record which should be the foundation of his basic archaeological units such as component and phase. And for the purpose of comparisons it is

> the study of the relationships between cultural contexts as wholes. Although it may utilize comparisons of elements or cultural complexes, its major objective is to place a given synthesis in its proper temporal and cultural position with respect to the broad picture of human life in the surrounding territory. (Taylor 1948:168)

Thus in order to group components into a phase comparisons should be made of proportional distributions of the traits and in the context of the whole component, and not abstracting out certain traits the mere presence or absence of which allows for inclusion into the phase, though certain elements or cultural complexes will facilitate this process and should be used as guiding points.

I have attempted in the following presentation to base the specific definitions of both the components and the phase upon contextual criteria. However, certain kinds of information which I was unable to obtain due to a lack of time and funds should be taken into consideration

SECTION TWO

ENVIRONMENTAL SETTING

PART I. GEOLOGICAL HISTORY

Similarities of location and external appearances lead to the discovery and eventual excavation of 45-GR-68 and 45-KT-28. Both of the sites, situated on the banks of the Columbia River, are well within a salvage area under investigation by the University of Washington. The sites are located in a reservoir created by the confinement of the Columbia River behind the Wanapum Dam, two miles south of the town of Vantage in eastern Washington. A canyon was created by the river cutting down hundreds of feet through a high plateau of basalt forming a natural basin most suitable for a reservoir. The area under study by the University of Washington is limited to this basin. Though this limitation gives us a restricted view of the prehistory of the wider geographical area, it affords us the opportunity to undertake a concentrated study of prehistoric peoples in an environmentally and geographically similar area with a definite natural boundary, i.e., the Middle Columbia River Canyon.

Most of the present topographic features and soils of the Columbia Plateau have originated since the time of the Oligocene. Some time between late Oligocene and mid-Miocene, there began a series of lava flows which occurred intermittently until early Pleistocene. Welling up from fissures and a few vents, the molten lava spread out in layers of varying thicknesses before cooling. The deep valleys of the older topography became filled by successive lava extrusions and a flat basalt plateau developed occupying parts of Washing-

ton, Oregon, and Idaho to a depth of over 3,000 feet in places. The increasing weight on the older surface caused it to subside to about 656 feet above sea level in the middle of the Plateau. (Daubenmire 1942:55) (Fryxell and Cook 1964:10)

Near the beginning and again near the end of the Pliocene, the Cascade Mountains which previously had had slight relief uplifted to an average height of about 6,500 feet. Thus the western slope of the shallow lava basin was uplifted to mountainous heights while the opposite slope remained intact, sloping gently downward toward the Cascades. (Daubenmire 1942:56)

With the elevation of the Cascades in the Pliocene epoch, the climate of eastern Washington became very arid due to the interception of the moist westerly winds by the mountains. According to Daubenmire, as the forests disappeared, desert and grassland species of plants and animals began to migrate into the basin from the south and east where older arid regions existed. By early Pleistocene times the trend toward a desert climate had culminated in a long dry period during which the soil was not completely stabilized by the vegetational cover. Residual material resulting from rapidly decomposing basalt thus became essentially loessial in character (Daubenmire 1942:58) and the entire plateau became covered with loessial soil, varying in depth from a few feet to 200 feet (Bretz 1923:620). The great quantities of loesses in layers of different ages, colors and thicknesses indicate that this process occurred in several distinct periods of eolian activity. (Bryan 1927:44-45)

During this same time, the Columbia, Spokane and Snake valleys were being cut into the basalt by their respective rivers, the Spokane River draining into the Columbia in the northeast and the Snake joining the Columbia in the southeast.

The cutting by the rivers and the formation and distribution of the

loesses were greatly affected by the Pleistocene glaciation. On several occasions ice sheets pushed southward onto the Plateau through five wide north-south valleys of the Okanogan Highlands. The ice blocked the channel of the Columbia River as it flowed westward along the southern border of the highlands (Fryxell and Cook 1964:10). With the Columbia channel blocked, the melting glacial waters were forced to seek new temporary channels southwestward across the Plateau, quickly stripping off the loessal soils (Bretz 1923:621) (Bryan 1927:22).

The ice dam blocking the Columbia River was broken several times, resulting in the formation of the Channeled Scablands* over most of the areas east of the Middle Columbia River Canyon, but did not affect the plateau west of the canyon (Fryxell and Cook 1964:10). Many of the plateau areas immediately surrounding the canyon in the area of the sites were not directly affected by the flooding and thus retained the mantle of loesses (Bretz 1923: 620).

With the final retreat of the glacier, the old channel of the Columbia River became free and melt waters re-excavated it. The old channel being deeper than the temporary channels, the river resumed its old course (Daubenmire 1942: 58).

During the post-Pleistocene interval of about 30,000 years there has been relatively little soil-blowing. However, in more recent historic times, the great area of plowed land left exposed to the wind from spring until fall under the system of summer fallow for dry wheat farming, in addition to the drier climate of the western rainshadow portion of the plateau, provides a

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*"The term 'scabland' . . . is used in the Pacific Northwest to describe areas where denudation has removed or prevented the accumulation of a mantle of soil, and the underlying rock is exposed or covered largely with its own coarse, angular debris." (Bretz 1923:617)

source for a large quantity of loesses presently being deposited in the more humid area in the eastern plateau (Bryan 1927:41).

Hansen (1939) has studied the stratification of pollen fossil in peat which had accumulated since the last glaciation near Spokane (northern area of the plateau). The study indicates that immediately following the Wisconsin period of the Pleistocene the vegetation was very similar to that of today. The xerothermic period which intervened between the beginning of the post-Pleistocene and the present, dating approximately 8,500 to 3,000 B.P. (Heusser 1960:184) caused a temporary extension of the limits of the prairie and desert zones. The zones encroached upon the receding forest edge and then returned to approximately their former positions.

The sites under study date, according to radiocarbon analysis, approximately 1,000 years ago and thus fall within the climatic period which continues today. Both Daubenmire (1942) and Piper (1906) have made attempts to reconstruct the life zones by the study of virgin or near virgin flora relics, which reflect the original vegetation of the plateau, i.e., that which existed prior to extensive intervention by man.

Piper's scheme of life zones is based primarily on the distribution of plants and animals as determined by the heat factor. The subdivision of the zones or areas depends mainly on the differences due to the moisture factor. According to this scheme, the plateau of eastern Washington is included in the Austral region, upper Austral zone, and the Upper Sonoran area.

> In Washington the most conspicuous plant of this [Upper Sonoran] zone is sagebrush (Artemisia tridentata). It marks quite sharply the limits of the Upper Sonoran zone, seldom extending into the zone above as it commonly does farther southward. Other characteristic, if less abundant, shrubs are rabbitbrush (Chrysothanmus

> nauseosus and C. viscidiflorus), hopsage (Grayia spinosa), and antelope brush (Kunzia tridentata, locally known as black sage), and in alkaline situations, greasewood (Sarcobatus vermiculatus). In a few localities the sagebrush is absent, but in such cases one or more of the other characteristic shrubs is sure to be present. Excepting such species as are confined to the moist ground along perennial streams, the great majority of the Upper Sonoran plants are either shrubs or thick-rooted perennial herbs or short-lived annuals (Piper 1906:36).

Piper's classification deals with all of the State of Washington. He places not only the area of the sites, but most of the plateau of eastern Washington in the Upper Sonoran life zone. Daubenmire (1942) undertook a much more limited study confining his field work within Piper's Upper Sonoran life zone and further sub-divided it. The sites under study are within Daubenmire's Artemisia-Agropyron Zone which encompasses extensive areas to the north, south and east of the sites. He states that this area is best classified as a semi-desert which is characterized by Artemisia tridentata, a deep-rooted evergreen shrub or sagebrush and the Agropyron spicatum, a tall perennial grass.

Within the larger Artemisia-Agropyron Zone there are variations in the flora resulting from either plant-soil or plant-water associations or both. The predominant variations and associations are:

(1) Chrysothamnus Association: Chrysothamnus nauseosus and Chrysothamnus viscidiflorus (rabbitbrush) are the most characteristic plants of sandy soils. Tetradymia canescens, very similar in appearance, often accompanies the rabbitbrush.

(2) Chrysothamnus-Purshia Association: Large areas of the dark colored sand west of Neppel, Washington, are dominated by a mixture of rabbitbrush and bitterbrush or Purshia tridentata.

(3) Artemisia-Purshia Association: Certain areas of the alluvial sandy loams along the Columbia River support a mixture of sage-

brush (Artemisia tridentata) and bitterbrush.

(4) Oryzopsis Association: Open stands of bunchgrass (Oryzopsis hymenoides) occur on dune and alluvial sands.

(5) Stipa Association: Relatively pure stands of Stipa comata (a grass) indicating sandy soil, are not particularly frequent, although the species is widely distributed. In pronounced alkali basins, Distichlis stricta (a grass) dominates.

(6) Sarcobatus-Distichlis Association: Sarcobatus vermiculatus (a shrub) usually associated with Distichlis (a grass) occurs frequently on saline soils, especially in the western part of this zone. The grass is more frequently encountered east of the Columbia River than is the shrub.

(7) Grayia Association: In areas of salt concentrations hopsage or Grayia spinosa predominates in lieu of Artemisietum.

(8) Elymus Association: Elymus condensatus (rye grass) occurs most frequently in the eastern portion of this zone where there is less alkali in association with a year-around supply of soil moisture as occurs in clay bottomlands or seepage areas.

(9) Streamside forests and thickets: Species of Populus and Salix occur sporadically along the banks of permanent streams or other areas where a relatively nonsaline water table is near the surface at all times.

Juniperus scopulorum occurs in a similar situation, e.g., along the shores of the Columbia River.

Juniperus occidentalis also occurs in this zone. It occupies the southern part of the zone extending north as far as the southern end of Grant County.

(10) Artemisia Rigida Association: Artemisia rigida (a shrub) occurs on the thin soils of the scablands in the eastern part of this zone.

(11) Pinus Ponderosa Association: In the northeast extremity of this zone strips of Pinus ponderosa (pine) extend southward from the Okanogan Highlands onto the scablands.

Both of the sites are located on alluvial gravel and sand bars along the Columbia River which are covered by a sandy loam which supports a mixture of sagebrush and bitterbrush, that is, they occur with Association number three: Artemisia-Purshia Association.

Geographically the closest life-zone to that in which the sites occur is to the west in the eastern foothills of the Cascade Mountains. This area would be classified according to Piper (1906) as the Austral region, Transition zone, Arid Transition area. In eastern Washington this zone includes two subdivisions, a lower one--the bunchgrass prairies--and an upper--the yellow pine forests (Piper 1906:35).

The lower subdivision lies immediately above the zone of the sagebrush. It is marked by the extensive appearance of bunchgrass (Agropyron spicatum) and June grass (Poa sandbergii).

> The bunchgrass prairies are treeless, and excepting along streams and by springs, or on north hillsides, shrubs are rarely seen. Of the herbaceous vegetation, apart from the grasses, the most conspicuous plants are the lupines (Lupinus ornatus, L. sericeus, and L. wyethii), often very abundant; the sunflowers (Balsamorhiza sagittata and Helianthella douglasii), Gaillardia aristata, Geranium incisum, and Leptotaenis multifida. In moister places Iris missouriensis and "black sunflower" (Wyethia amplexicaulis) often occupy large areas in nearly pure growths. (Piper 1906: 48-49)

> Along the streams and by springs willows of several species, together with a thorn (Cragaegus brevispina) form thick copses. Occasionally aspens (Populus treuloides) and cottonwoods (P. trichocarpa) form groves. The commoner undershrubs are snow-

> berries (Symphoricapos racemosus), roses (Rosa nutkana and R. pisocarpa) and gooseberries (Ribes inerme and R. irriguun). Intermingled with these are other shrubs of less importance. Occasionally, however, the birch (Betula microphylla) is the most abundant shrub. (Piper 1906:49)

In the upper subdivision of the Arid Transition area,

> Yellow pine forests, where pure, are open in character, and marked by the relatively small amounts of forest litter. There is a rather scattered growth of various shrubs, consisting of ninebark (Opulaster pauciflorus), buckbrush (Ceanothus sanguineus), and rose (Rose gymnocarpa). At a somewhat higher altitude where the yellow pine is at its best, the commonest undershrub is the huckleberry (Vaccinium macrophyllum). Where such forests are more open the most abundant plant is often the pinegrass (Calamagrostis suksdorfii). (Piper 1906:50)

> In the moister situations afforded by higher altitude, shade slopes, or valleys, the yellow pine is usually mixed with red fir (Pseudotsuga mucronata) in varying proportions....Shrubs, too, become more abundant both in species and individuals, and under favorable circumstances, as in old burns, some of them especially sticky laurel (Ceanothus velutinus) and thimbleberry (Rubus parviflorus), form dense thickets. (Piper 1906: 50-51)

To the northwest of the sites there is a limited accessibility area which is classified by Piper as the Canadian Zone.

> This is the most illy defined of all the life zones in Washington, merging into the Transition below and the Hudsonian above. In the...Cascade mountains the amabilis fir (Abies amabilis) is also (in addition to the western white pine) a characteristic tree, as is its near relative, the noble fir (A. nobilis)...Apart from these truly characteristic trees, the white fir (Abies grandis) and the western hemlock (Tsuga heterophylla) both find their best development in the Canadian zone...A characteristic plant association of this zone is that of the lodge pole pine, a form of Pinus contorta...Among the more plentiful shrubs are the blue huckleberry (Vaccinium ovalifolium), Menziesia ferruginea, Pachystima myrsinites, the trailing Rubus nivalis, and the dwarf cornel (Cornus canadensis). (Piper 1906:58)

The Hudsonian zone above the Canadian zone is meagerly represented in

the area also. Thus it is possible that a current (Ribes howellii) which is characteristic of this zone (Piper 1906:60) would also be available to the inhabitants of the sites.

Thus the Upper Sonoran zone in which the sites are located and the Transition zone are the two most accessible regions to the inhabitants of the Columbia River flood plain. These two zones encompass a wide geographic area around the sites. The semi-subterranean dwellings on the flood plan (discussed later) were in the ethnographic present the winter or permanent dwellings of the Indians. During seasons in which game, berries and roots were plentiful in the Transition and Canadian zones, these natural resources were probably exploited as well as those in the immediate zone. Through further survey and excavation of this larger area, I think we will be able to identify temporary living sites which can be associated with the dwellings along the river.

The fauna available within these zones range from fairly large mammals such as deer and bison to small rodents. Among the species present in this area are: Odocoileus hemionus hemionus (mule deer), Cervus candensis (elk), Castor canadensis leucodonta (beaver), Ondatra zibethicus osoyoosensis (muskrat), Lynx rufus pallescens (bobcat), Taxidea taxus taxus (badger), Canis latrans lestes (coyote), Marmota flaviventris avara (yellow-bellied marmot, Lepus californicus deserticola (black-tailed jackrabbit), Sylvilagus nuttallii nuttallii (Nuttall cottontail), Citellus townsendii townsendii and C. washingtoni (Townsend and Washington ground squirrels), and Perognathus parvus columbianus (Great Basin pocket mouse) (Dalquest 1948). In addition to these which can be seen today mountain sheep (Ovis canadensis californiana) and bison (Bison bison) were once present in the area and persisted long enough to be observed by the first white settlers (Dalquest 1948:67) (Kingston 1932).

Large mammal bones from the interior of Housepit 2 at 45-GR-68 have been identified as bison, attesting to their presence in the area, and mountain sheep have been identified at 45-KT-17 (Holmes 1966).

Game birds which utilized the area seasonally were also available as a source of food. Among these are the many varieties of ducks of the Anatidea family, grouse of the Tetraonidae family and the Canada goose (Branta canadensis moffitti) (Jewett 1953).

Salmon (Oncorhynchus) were available in the Columbia River, and trout (Salmo) can still be obtained in the small streams in the area. Fish remains were found in all four of the housepits excavated.

PART II. CRESCENT BAR SITE: 45-GR-68

Crescent Bar, from which this site derives its name, is a crescent-shaped aggregate of wind-blown and water-laid gravels and silts. It extends approximately 2.6 miles north-south and .65 miles east-west at its widest point. The terrace lies to the east and south of a sharp east bend in the Columbia River. It is backed on the east by a steep basalt cliff (approximately 120 feet) with accompanying talus cones, and the Columbia River passes it on the west. The southern end of the terrace is terminated by the meeting of the basalt cliff and the river, and the north end is terminated by steep rolling grass covered hills.

Prior to the partial inundation of the terrace due to the reservoir, approximately thirty families were living there, most of whom made their living by growing fruit. Because of the protected position of the bar, it had become known for the quality of its early crops.

A small creek dissects the northern end of the terrace. The creek drains out of the southern end of Willow Spring Draw (also known as Lynch Creek Coulee) at the north-northeast end of the bar. In late winter and early spring the increased flow of the creek has caused the formation of a gravelly alluvial fan which extends to the Columbia River. In summer and fall, the creek slows to a trickle or completely evaporates before it reaches the river.

Willow Spring Draw is flanked on the west by a few steep rolling grass covered hills which are underlain by a large accumulation of glacial stream-deposited gravels. It is along these hills that a black-topped road was cut from the small community of Trinidad, on the plateau above the north

end of the terrace, down to the terrace. The road continues almost the full length of the bar, and where it ends a dirt track continues south to approximately 200 meters north of the site.

Within the 200 meters between the end of the dirt track and the site there is a large dune of light-colored sand. The sand deposit lies approximately twenty meters from the basalt talus cones on the east and meets the river on the west. To the northeast of the sand dune there is a large swampy depression which appears to be a catch for water seepage from the irrigation of the fruit orchards. Along the river bank to the northwest of the sand dune, there is a small grove of Locust trees.

To the southeast of the sand dune are located three ovoid depressions with raised lips, a small rock shelter a few feet up the basalt cliff by a talus cone, and an open camp site, all of which have been designated 45-GR-68 (Sec. 30-31, T. 20N, R. 23E). The drifting sand is encroaching on the site and has partly obscured the open camp site.

The northern and slightly more western depression, Housepit 3, is approximately thirteen meters north-south (magnetic) by eleven meters east-west. This housepit has not been tested. Moving south-southeast the next depression is approximately twelve meters north-south by ten meters east-west. It was designated Housepit 1 and was briefly tested in the summer of 1960 by the University of Washington. The southern depression, which is the concern of this study, was designated Housepit 2. It is approximately eleven meters north-south by eight meters east-west.

From the center of Housepit 2, it is approximately thirty-five meters south to the tip of Crescent Bar and approximately seventeen meters west to the edge of the river cut bank. Some fifteen meters to the southwest of Housepit 2 there is a fairly large windbent Locust tree. Otherwise, the

floral cover is the usual sagebrush and cheat grass complex.

The small rock shelter was tested by our field party during the summer of 1960. A limited description of the shelter and the test excavation appears in Section 2: History of the Sites.

The open camp site was identified by a concentration of freshwater mussel shells on the surface and the appearance of artifacts. It was designated as an "open camp site" because of the lack of any indications of housepits or other structural features on the surface or in the river cut bank. This part of the site was not tested. Artifacts which periodically appeared on the surface due to wind and water erosion were collected by the students and catalogued. Several artifacts were found along the western and northern borders of the easterly moving sand dune, suggesting that the major portion of this section of the site was under the sand dune. This site, like the other sites along the banks of the Columbia River, has been partially eroded by river action. It is possible that these artifacts were being eroded from a previously eroded housepit now partially covered by the sand dune. (See Fig. 2)

PART III. SUNSET CANYON SITE: 45-KT-28

Booth Bar is a crescent-shaped depositional terrace of wind and water deposited gravels and silts. The surface of the terrace is covered by a thin veneer of soil which is mainly of eolian origin. The terrace is approximately 3.2 miles north-south (magnetic) and 0.4 mile east-west at its widest point. It lies to the west of a gentle westward curve of the Columbia River. The terrace is backed on the west by a steep basalt cliff and the Columbia River passes it on the east. The bar is terminated both north and south by the meeting of the basalt cliff with the river.

The Columbia River is calm as it passes the terrace at approximately eight knots. Immediately in front of the terrace there are several large and fairly quiet back-eddies, which are presently eroding the east face of the bar. Where the northern end of the bar terminates, there is a sheer basalt cliff with an exposed vertical petrified log approximately 100 feet above the river. The log and a short series of rapids with white water below the cliff are called Lodge Pole. From this point up past 45-GR-68 to just below the Rock Island Dam, the river is fairly calm. Quilomene Rapids marks the termination of the southern end of the terrace. Below the rapids the river is also fairly calm until it reaches Island Rapids, some nine miles to the south. Calmness when applied to the Columbia River means only there are no rapids. The Columbia, because of its force and volume of water, has large swelling boils almost its full length.

There are two access routes to the terrace, in addition to the river: Quilomene Canyon at the southern end of the bar and Sunset Canyon near the northern end of the bar. Quilomene Creek is perennial and drains into the

Columbia River. The force of its flow has created an alluvial fan which dissects the southern end of the terrace. Sunset Canyon, from which 45-KT-28 derives its name, is immediately behind or to the west of the site. The creeks in Sunset Canyon and the small canyon to the south of it only flow periodically and have created smaller alluvial fans which cross the northern end of the terrace.

There are two sites located on the terrace immediately above the Columbia River. The sites seem exclusively restricted to the terrace areas even though the terrace is crossed by several alluvial fans. The more southerly site, 45-KT-27, was briefly tested in the summer of 1962 by the University of Washington. The site consists of twenty-one housepit depressions with raised lips spread over a limited geographical area in the same scattered arrangement as the housepit depressions of 45-KT-28. The housepit depressions of 45-KT-27 form a distinct group of housepits geographically separated from 45-KT-28.

Between 45-KT-27 and the site under study, 45-KT-28, there are visible remains of a ranch. The house and the barn of the Osborn Ranch were still standing when first visited by our field party. The ranch has been abandoned for a number of years. We believe it represents the only historic occupation of Booth Bar.

The northern site on Booth Bar, 45-KT-28 (Sec. 12-13, T. 19N, R. 22E), is also composed of housepit depressions. Thirty-one surface indications of semi-subterranean structures were located during the course of the excavation and mapping of the site. Not all of these depressions can be termed housepits; some of them are small in size and were probably storage pits. A table listing the size of the depressions, from lip to lip, and the distance between the eastern lip of the depression and the Columbia River is on the following page. Eight of the depressions have been partially destroyed by river erosion (Fig. 1).

TABLE 1

Man-Made Depressions at 45-KT-28

Depression	Meters Mag. N-S	Meters Mag. E-W	Dist. to R.	River cut
1	12	?	on	X
2	9	12	8	-
3	12	10	36	-
4	10	10	14	-
5	9	13	6.5	-
6	6	7	22	-
7	8	9	8	-
8	7	8	2	-
9	14.5	13.5	26	-
10	16.5	13	32	-
11	12	11	41	-
12	14	15	3	-
13	5	5.5	0.5	-
14	10	11	0.5	-
15	18	13.5	on	X
16	6	5	27	-
17	10	12	22	-
18	18	19	7	-
19	7	10	3	-
20	5	4.5	18	-
21	@14	?	on	X
22	@10	?	on	X
23	@ 8	?	on	X
24	8	8.5	4	-

TABLE 1 continued

Depression	Mag. N-S	Mag. E-W	Dist. to R.	River cut
25	15	11	29	-
26	?	?	?	-
27	9	9	6	-
28	14	12	25	-
29	?	?	?	-
30	11	12	36	-
31	?	?	on	X
32	?	?	on	X
33	9	?	on	X

SECTION THREE

HISTORY OF THE SITES

PART I. CRESCENT BAR SITE: 45-GR-68

The Crescent Bar Site, 45-GR-68, was first located and designated by J. M. Campbell in his Report of an Archaeological Survey, Priest Rapids Reservoir, submitted to Mr. D. Osborne of the University of Washington, on October 15, 1950.

When the site was first encountered by Campbell, it was reported to have consisted of a cave, an open camp, and two housepits. The area of occupation was given as "undetermined, approximately 200 x 150 yards," with the cave's location a few feet up the talus slope, 150 yards east of the housepits. The present condition of the open camp was noted as being poor (partially obscured by drifting sand), and the housepits and cave as being in fair condition with negligible damage by river erosion. No material was collected and no excavation was recommended for this site. The "occupation area" was depth tested two and one-half feet, and a notation was made that the fill was sandy and the cultural material was confined for the most part to the surface. The location of this test is unknown.

The site was revisited on March 22 and 23, 1960, by Dr. R. E. Greengo, Ralph L. Emerson, and Robert S. Kidd. They noted that the site was considerably larger than Campbell had indicated, stretching some 200 meters farther north. They also noted that about fifty meters north of a group of locust trees there was a fairly heavy concentration of shell, flakes, and artifacts near the road. They also found three, and possibly four, housepits instead

of just the two mentioned by Campbell. The cave (rock shelter) was also rechecked at this time, and a recommendation for a possible test was made.

The following summer, on July 30, 1960, a test excavation of the site was initiated by Robert S. Kidd during the formal archaeology field school session. Four students participated on this date, two of whom made notes, R. S. Kidd and Lucia Esther. A row of three stakes was set in Housepit 1 on magnetic north, with the aid of a Brunton compass. Two cuts were excavated, one meter by three meters. "No cultural stratigraphy was encountered in the housepit, but bone, shell and a flake adze were recovered." (Kidd notebook, July 30, 1960) A basalt spall tool, bifacially retouched, was found on the surface of the housepit.

Several talus pits in the lower margins of the talus cones, to the east of the housepits, were also noted on this date. One of the talus pits was opened, but it did not contain the expected burial.

A test of the rock shelter was then undertaken. The cut was located 150 cm. from the east wall of the shelter and 250 cm. from the south wall. The dimensions of the test cut were 85 by 55 cm. It was excavated to a depth of 44 cm. The following stratification was encountered: a 24 cm. level of black wet soil (D), a 10 cm. level of medium brown clay (C), a 10 cm. level of dark to light yellow soil (B), and weathered basalt at the bottom (A). Two flakes were found in the test cut, one in level (D) and one possibly in level (B). This was the only excavation undertaken in the shelter.

On August first of the same summer, R. S. Kidd and a party of three returned to the site to continue testing. The test cuts in Housepit 1 were extended 140 cm. to the north and a disturbed area (probably potted) at the south end of the cuts was cleaned up. It was here in the disturbed area that

a projectile point was found in organically discolored soil. The projectile is a basally notched calcedony point with expanding stem (convex base) and one straight edge and one convex edge: Max. L. 2.1 cm., Max. W. 1.7 cm., Max. T. 0.3 cm. ~~(Plate I, E, F)~~

Also on this date six stakes were set in Housepit 2 and another test excavation was undertaken. The stakes were set at three-meter intervals on magnetic north with the aid of a Brunton compass. Two cuts were opened, C and D, which correspond for the greater part with cuts ONOE and 3SOE. Cut C was one meter wide and cut D was 80 cm. wide. A 50 cm. balk was left between the two cuts. A "rich midden" was encountered approximately 10 - 14 cm. below the surface under a layer of light brown sand. A limited amount of artifactual material was found in this test on this date. The only previous disturbance of this housepit was a 50 cm. square pit, approximately 70 cm. in depth immediately north of stake C, probably the work of pothunters.

August 6, 1960, was the last day of testing in the summer of 1960. R. S. Kidd and a crew of two continued to work in Housepit 2. In the "dark midden" encountered in cut C a few retouched flakes were found. At 20 cm. below the top of the midden layer it was noted that the soil began to lighten, and it was here that a few more flakes and one or two fragments of shell were found. The maximum depth of this test was approximately 40 cm. below the surface.

The artifactual and non-artifactual material from the tests were saved. The artifacts were catalogued individually and the non-artifactual material was saved in 20-cm. arbitrary level bags by cut. All vertical measurements were taken below the natural surface.

After the summer of 1960, no further work was carried on in Housepit 1,

the rock shelter, or the open camp, with the exception of a small surface collection from the open camp. This concludes the history of the site up until the summer of 1961 when a full excavation of Housepit 2 was undertaken by the University of Washington Archaeological Field School.

PART II. SUNSET CANYON SITE: 45-KT-28

The Sunset Canyon site, 45-KT-28, was first recorded by J. M. Campbell in his Report of an Archaeological Survey, Priest Rapids Reservoir, submitted to Mr. D. Osborne of the University of Washington, on October 15, 1960.

When the site was first surveyed by Campbell, it was reported to be an open camp site almost wholly destroyed by high river waters. Campbell also noted that "Artifacts are scattered among large boulders on beach. Some evidence remains in bank." The area of occupation was estimated at 250 yards north-south; the condition of the site was noted as poor, and no excavation was recommended.

The site was surveyed again in 1954 by Warren T. Lee who also made a surface collection from the site. Lee published the results of his survey and collecting in the Davidson Anthropologial Journal Vol. 1, No. 2 (1955). Lee noted at this time the great number of housepit depressions on the terrace and the "tremendous quantities" of occupation debris. Lee designated the site 45-KT-3. This designation has not been employed in favor of the earlier number assigned by Campbell.

Prior to 1960 Housepits 1, 7, 10, 12, and 15 had been tested by a number of amateur archaeologists (Personal communication, C. M. Nelson). Housepit 1 was tested by Walter Barke, Housepit 12 by Ted Weld, and Housepits 7, 10 and 15 under the auspices of the Washington Archaeological Society. After 1960, but before the University of Washington excavation, Housepits 5, 7, 10, 12, 13, 15, 26, 28 and 29 were also tested by members of the Washington Archaeological Society. The extent of the excavation and the evidence obtained by the testing is presently in an unpublished manuscript: The Sunset

Creek Site by Charles M. Nelson, held by Washington State University.

During the summer of 1960 the University of Washington Archaeological Field School undertook extensive excavations of Housepits 18 and 11 and tested Housepit 32. This concludes the history of this site up until this excavation.

SECTION FOUR

STRATIFICATION AND DWELLINGS

The stratigraphic record of the excavations is detailed in sets of profiles for all excavated cuts. It is through an examination of these profiles that the stratigraphic interpretation of the sites is best understood. Copies of three of the profiles occur at the end of this section. Four semi-circular surface depressions with raised lips indicating pre-historic semi-subterranean dwellings were stratigraphically confirmed: one at 45-GR-68 and three at 45-KT-28. (See Fig. 3, 4, and 5)

PART I. EXCAVATION PROCEDURE

(CRESCENT BAR SITE: 45-GR-68)

A full excavation of 45-GR-68, Housepit 2, was undertaken during the summer of 1961 under the direction of Dr. R. E. Greengo. At the start of the excavation, the continued work at this site was considered to be an extension of the 1960 test excavations. Due to the results of the testing, however, more time and a more concentrated effort was put into the excavation of this site.

The cuts which had been excavated in Housepit 2 in the summer of 1960 had slumped considerably and had to be cleaned out and widened to obtain control over the further excavation of the housepit. A grid system of stakes oriented to magnetic north was set with the aid of a transit to include the previous testing. The stakes were set at three meter intervals north-south and east-west. The grid consisted of three north-south rows of stakes and six rows of east-west stakes. The previous cuts were widened to two meters, leaving a 50 cm. balk on either side between the rows of stakes and the edge of the cut. The two previous test cuts were joined together, and three additional adjoining cuts were excavated, two to the north and one to the south, forming a continuous north-south trench 15 meters long (OE Trench). This trench included both the north and the south surface lip indications of the housepit.

Another trench (3E Trench) was excavated one meter east of the OE Trench in the middle of the housepit depression. It consisted of two connecting cuts, two meters wide, forming a trench six meters long. The 3E Trench did not extend to the north or the south surface lip indications nor to the eastern surface lip indication.

Both trenches were excavated down to sterile sub-soil, and an extended test was made in cut 6NOE to check for the possibility of a lower occupation, which was not found.

Two days before the excavation was to have been closed, a definite break between the housepit fill and the sterile sub-soil was found extending in a north-northwest direction in the floor of the ON3E cut. The strata exposed on the walls of the cut indicated that the break occurred some 20 cm. above the cut floor where it was first located, and it coincided with the step indications in the north and east walls of the cut. This led us to believe that the break indicated the lower structure of the housepit which, if followed into the walls of the trench, would give us the original shape of the housepit and its orientation. Since the surface lip indications do not always coincide with the original shape of the housepit excavated by its occupants, it was decided that this would be the only chance to obtain the lower structural shape. Thus the excavation was extended and speeded up for five days.

During this time a horizontal step-trench was extended out of cut ON3E to the northwest into the OE Trench, entering just north of a structural pit (Feature 7). The excavation followed the structural line at the same depth at which it had been originally encountered. The excavation of the east balk of cuts ON3E and 3S3E continued the process at the same depth.

The structural line in the east balk curved around and continued in a southwest direction across the southern end of cut 3S3E. Upon removing the west balk of cut 3S3E and the east balk of cut 3SOE, the structural line faded. It is probable that the structural line continued across the OE Trench in pit 6SOE but was missed during the excavation of this cut. Assuming that it did continue across the OE Trench, it would have coincided with

a step indication in the west wall of cut 6SOE. On the basis of this, three and one-half feet of back-dirt along the west side of the OE Trench was removed, and excavation was then undertaken to pick up the structural line again, probably extended in a southwest direction. The structural line was located at approximately the same depth but it extended to the northwest and paralleled the first structural line that had been encountered in cut ON3E.

By then, time had run out and the excavation of the site could not be continued. It would have been desirable to attempt the same operation of cutting into the west wall of the OE Trench, just north of stake ONOE, where another step indication occurred. This probably would have resulted in the connection of a line extending in a west-southwest direction to the line encountered in cut ON3E extending from the southeast to the northwest.

While this operation was going on, the balks between cuts ONOE-3NOE and ON3E-3N3E were also removed to ascertain the full dimensions of a supposed circular pit (Feature 7), half of which was identified by a soil change in cuts ONOE and 3NOE. Removal of this balk area revealed a semi-circle of large basalt rocks around the edge of the other half of the circular pit.

These various structural features were recorded on grid paper as they were uncovered. The diagrams were matched together later in the laboratory to determine the lower dimensions and orientation of the housepit and its relation to the circular pit (Fig. 7).

Because this excavation was to be a test, almost all of the vertical measurements were taken from the natural surface with the aid of a metric tape, string and line level. The stakes had been surveyed into a known point by means of the transit, but only a few depth measurements were taken from nearby stakes which acted as individual data for each pit.

Diagrams of the strata were drawn on grid paper and measured in vertically to the stakes and thus to datum.

The cuts were excavated in 20 cm. arbitrary levels. All non-artifactual material was placed in 20-cm. level bags by cuts. The identified artifacts were measured vertically below surface and placed horizontally within a quadrant of the cut or measured en situ.

In addition to the master catalogue on eight and one-half by eleven inch sheets of paper, a duplicate artifact record was kept on four by five inch cards. Student excavators were assigned the task of keeping notes of all their excavation activities in small six by nine inch spiral-backed notebooks. Feature forms and burial forms had been printed prior to entry into the field.

Because of the size of the cuts, two and sometimes three people worked in a cut. The fill was removed by shovel, with the aid of buckets, and then screened alongside the pits. Since the fill was dry and sandy, screening was not difficult, and all of the fill was screened except during the last six days of the excavation. When features occurred, they were troweled and brushed, recorded, photographed, and then removed.

Topographic features of the site and the immediate surroundings were recorded with the aid of a transit, noting angles, elevations and distances. A topographic map of the site was later reconstructed in the laboratory (See Fig. 2).

SUNSET CANYON SITE: 45-KT-28

Prior to entry into the field in the summer of 1960, it had been decided to excavate the housepit depression at 45-KT-28 partly in accordance with a system outlined in A Guide to Archaeological Field Methods, Robert F. Heizer, ed. (1958). The significant excavation technique obtained from this work was the use of the "L" trench rather than straight trench which had been previously employed. This technique was utilized in the excavation of both Housepit 18 and Housepit 11.

With the aid of a transit, a network of stakes was set across the housepits at three-meter intervals. Lines of stakes were oriented to magnetic north. Using the stakes as guide lines for control, L trenches were excavated between the stakes. Two trenches in the shape of an "L" were excavated in each housepit, the angles of the two L's meeting in the housepit center at the CLBL stake. Stakes extending north and south from this stake were designated the CL (center line) row of stakes, and the stakes extending east and west of this stake were designated the BL (base line) row of stakes. All remaining stakes were designated in terms of their direction and numerical order away from these two lines of stakes. The cuts were designated according to the name of their northwest corner stake (See Fig. 6). Two-meter square cuts were excavated with a 50 cm. balk unless the cut formed part of a trench, in which case the cut would measure two meters by three meters.

By employing this method of excavation, we hoped to obtain (1) an adequate sample of the cultural remains inside the housepit, (2) the structural features of the housepit, and (3) a sample of the cultural material peripheral to the housepit by the extension of the L trench over the lip of the housepit. This method of excavation allowed us to obtain the first and

third goals. In retrospect, however, we believe the second goal could have been better met if complete level stripping of the housepit had been carried out.

Taking all measurements from the surface line of the northwest stake of each cut, or the highest stake at the edge of each cut, allowed vertical control of the excavation. All of the stakes were measured into a single datum point. Surface measurements, as employed at 45-GR-68, were not used due to the irregularities of the housepit surface and to the depression of the housepit itself. The cuts were excavated stratigraphically within 20 cm. arbitrary levels. Both the stratum and arbitrary level of all finds were recorded.

With the exception of mapping the site, the methods of recording were identical to those utilized during the excavation of 45-GR-68. Site 45-KT-28 was mapped with the aid of a plane-table and alidade rather than a transit. Details of actual excavation procedure were also the same as those employed at 45-GR-68.

PART II. CRESCENT BAR SITE:

45-GR-68 - HOUSEPIT 2

A roughly rectangular pit was excavated by the prehistoric inhabitants into light yellow alluvial sand (Strata A) to a depth of 60 cm. The original excavation sloped down approximately 20 cm. to a distinct step which extended down another 40 cm. to the floor of the house. The step was not clear immediately north of a large pit hearth; here, instead of the step, there is a steep slope which is terminated by the pit. This was the only peripheral area of the housepit exhibiting this feature. The rectangular outline of the housepit is determined by the shape of the living floor enclosed by the step (Fig. 7). The living area was approximately eight meters northwest-southeast by six meters northeast-southwest.

A large circular pit hearth (Feature 7) was dug 60 cm. into the living floor of the housepit and surrounded by large basalt rocks averaging approximately 20 cm. in diameter. The rocks surrounding the east half of the hearth were found en situ. The hearth, measuring two and one-half meters northwest-southeast by two and one-half meters northeast-southwest, was situated in the north-northeast part of the house. Extending out from the hearth to the northeast and to part of the southeast wall of the house was a small dirt platform or elevated area (Fig. 7). The area was elevated approximately 25 cm. above the remainder of the living floor. There was a gradual sloping of the floor: 10 cm. north-south and 10-15 cm. east-west. The slope is not great when one considers that in the historic period in similar dwellings among the Sanpoil, discussed below, "The floor was covered, except near the fire, with a layer of rye-grass four or five inches [approximately 10-12 cm.] thick. This

served as a mattress on which tule mats or skins were placed." (Ray 1954: 32). Such a covering of grasses and skins could easily level this slope. No other structural features were located which could be recognized as part of the original construction of the dwelling, for example, no post molds or a possible entrance were discernable.

During the occupation of the house there was an accumulation of approximately one meter of debris in the living area (Strata B-1 and B-2) and an additional 60 cm. if one includes the depth of the hearth (Stratum B-1a). This debris contained a variety of artifacts, detritus, remains of fires, e. g., fire-cracked rocks and charcoal, and the preserved remains of animals and fish. The accumulation of debris could be explained here as well as in the other housepits in several ways: (1) it is the result of a continuous occupation of the dwelling year around by a living group such as a family; (2) it is the result of continuous occupation by at least some of the inhabitants: (3) it is the result of a seasonal abandonment of the house by all, probably leaving the super-structure intact as among the Sanpoil (Ray 1954:31) or (4) it is the result of alternate re-excavation of debris and deoris build-up within the living area. Some interpretation of this process or combination of processes resulting in the housepit fill is one of the major points in the following discussion.

There are two discontinuities of housepit fill at 45-GR-68. The upper break between strata B-1 and B-2 was continuous, that is, it was visible to a greater or lesser degree in all of the cuts excavated. The housepit fill above the break (Stratum B-2) was darker charcoal gray to brown than the fill below the break (Stratum B-1), that is, there were greater amounts of decomposed organic particles adhering to the sand grains in the upper stratum than in the lower stratum. Even though the line on the profile indicating this

break is clear and sharp, this was not the actual case. There was an approximately 10 cm. vertical area in which the two strata blend. Aside from the color difference due to the distribution of organic particles in the housepit fill, there were no other distinctive features of the contact area. There was, however, a slightly higher number of tools recovered from the lower stratum (B-1) than from the upper stratum (B-3), although the same kinds of tools appear in both strata. It is possible that the color difference could be due to natural rather than cultural processes.

The second break in the continuity of the housepit fill occurred within the stratum below the above discussed break (B-1). The discontinuity was strikingly marked by an intrusive lens of light yellow sand. The sand appeared to be the same as that which forms the sub-soil or the soil below the housepit (A) or the soil found in areas peripheral to the site. The lens (B-2) had a limited horizontal distribution occurring in cuts 3SOE, ONOE, and 3NOE and in the balk between ONOE and ON3E. The lens was not continuous; the greatest concentration occurred in cut ONOE where it obtained its maximum thickness of approximately 20 cm. The areas immediately adjacent to the lens, both horizontally and vertically, had a mottled appearance, that is, there were frequent color changes ranging from light yellow through tan to dark charcoal gray. This did not appear to be the result of rodent activity.

This irregularity in Stratum B-1 was in association with four recorded features (Features 1, 2, 3 and 4). The four features, though excavated and recorded separately, formed one continuous feature in the OE trench, and all occurred within the living area of the housepit. The features consisted of scattered basalt rocks, charcoal stains, one antler wedge (74), some chipping detritus and a few fragmentary animal bones (Fig. 7).

Feature 1 rested on and extended into the lower housepit fill (B-1) at

approximately the same level as Features 2 and 3. Features 2 and 3 were located within the irregularity (B-2). The top of one of the larger rocks in Feature 4 occurred within Feature 3 and thus it was partially within Stratum B-2, but rested on the bottom of Stratum B-1, that is, it was near the juncture of Strata B-1 and A. Feature 5 also occurred near the juncture of Strata B-1 and A, even though it was approximately 20 cm. lower than Feature 4. Feature 5 contained a scattering of basalt rocks, an antler wedge (619), some chipping detritus and charcoal stains.

The rocks in these features were basalt as were those which surrounded the east half of the hearth (Feature 7) and many were about the same size. It is very probable that the rocks in the features at one time formed a rim around the west half of the hearth. A few of the rocks in Features 4 and 5, the two features closely associated with the lower stratum (B-1), appeared to be in their original positions at the edge of the hearth.

The reason for the disturbance in the housepit cannot be deduced archaeologically. If my reconstruction is correct, it is possible that the house or the depression was abandoned after the first accumulation of fill (lower B-1) and then reoccupied. During reoccupation the rocks from the west side of the hearth which would have been partially exposed were removed, possibly to be used for the creation of another hearth and/or for cooking stones. Subsequently, the house depression was continuously occupied resulting in the accumulation of the remainder of the housepit fill (the rest of B-1 and B-3).

The total number of artifacts from the fill of Housepit 2 were distributed fairly evenly throughout the fill. They were not concentrated in the contact areas between the strata nor was there a distinct distribution of tools in the fill above or below the irregularities in the strata.

A charcoal sample (390) was obtained from the bottom of the housepit fill (B-1) in cut 3S3E. This sample was dated by radiocarbon analysis at the

University of Washington laboratory. The sample yielded a date of 1250, ± 70 years B.P. If our interpretation is correct, this dates the earliest occupation and construction of Housepit 2 at 45-GR-68.

The housepit was not excavated into completely sterile sand, for the inhabitants dug through a thin layer of river mussel shell, which we assume to have resulted from previous gathering activity. No artifacts can be assigned to this layer of shell. The shell layer was most prominent in cut 6NOE which was outside of the lip of the housepit. Cultural debris in the upper levels of this cut was either the result of activities carried on outside of the house or the result of re-excavation of the house floor for continued use or both. Once the two occupation layers had been removed (B-1 and B-2) the cut was almost sterile, that is, there were less than ten flakes of unworked stone recovered from the light yellow sand which contained the layer of shell. (See Fig. 5).

The third straum (C) indicated on the profile was a thin layer, approximately 10 - 20 cm. thick, of sterile wind-blown sand and silt which accumulated after the site had been abandoned.

PART III. SUNSET CANYON SITE:

45-KT-28 - HOUSEPIT 18

Prior to the construction and occupation of the many semi-subterranean dwellings at 45-KT-28, Booth Bar was inhabited by people who left camping debris. The occupants of Housepit 18 excavated the foundation of their house into traces of this earlier occupation. Due to the limited vertical extent of our excavation and to the horizontal confinement of the excavation to areas of housepits, little can be said of these earlier people. The later inhabitants excavated, in most areas, through the earlier occupation layer into the light yellow sterile sub-soil (A) to construct their housepit. Around the periphery of the living area, indicated by a single step, the lower portion housepit fill abuts against the earlier occupation layer. In addition to the limited excavation contact and the sparsity of cultural material, the students had difficulty identifying this layer when encountered. For these reasons the assignment of artifacts to the earlier occupation layer is almost impossible. The periphery of the living area of Housepit 32 indicated by a double step also abuts against this earlier occupation layer (Fig. 3).

A distinct single step approximately 40 to 50 cm. high enclosed the relatively square living area of Housepit 18. However, the northwest and northeast corners of the housepit were formed by weakly defined double steps approximately the same height. This may be a characteristic feature of corner construction in this dwelling for it occurs in no other area of the housepit. The living area measured approximately 11.25 meters northwest-southeast and 10.50 meters northeast-southwest. The floor of the house was relatively flat. There was no evidence of an elevated platform. A side entrance to the housepit

was identified in cut 1S1E. The floor of the entry-way was some 20 cm. higher than the floor of the housepit, and it was approximately 75 cm. wide (Fig. 6).

The fill in Housepit 18 (Stratum B), though uniform, varied in thickness from the center of the housepit to the edge of the living area. In the excavated cuts in the center of the housepit, the fill was approximately 50 cm. thick, while the fill in the cuts in which the steps were identified was approximately one meter thick. The housepit fill was an alluvial sand which appeared charcoal gray to brown in color due to the small decomposed organic particles adhering to the sand grains. The fill contained, as does the fill in the other housepits excavated, a variety of artifacts, chipping detritus, remains of fires, and the preserved remains of animals and fish. The only distinctive features in the housepit fill were hearths which consist of scatterings of rocks associated with charcoal stains.

Five hearths were identified inside the housepit. Two of the hearths (Features 4-5 and 20) were shallow basins 55-75 cm. wide excavated 10-20 cm. into the floor of the housepit. Fire-cracked rocks, predominantly basalt, were found in both the shallow basins and in the areas immediately surrounding the basins. Concentrated charcoal stains were also associated with the basins.

Basins were not identified for the other three hearths (Features 3, 6, and 19), but the features were located 20-40 cm. above the original floor of the housepit in occupation fill (B), making it difficult to identify basins if they did exist. Features 3, 6, and 19 were recorded as scatterings of broken rocks over relatively flat areas approximately 75 cm. in diameter associated with charcoal stains. Feature 19 contained a pestle-like battered stone (3226).

Another possible hearth was also identified, consisting of a large concentration of heavy stones, burned bone, and charcoal stains (Feature 14). The hearth was found above the floor in the occupation debris near and in the

entry-way of Housepit 18 in cut 1S1E. The location of this evidence does not seem unusual considering Ray's discussion (1932:32) of the side entry-way and the location of the hearth near the entry-way (discussion quoted in the conclusion of this Section).

The lower set of hearths resting on or near the bottom of the housepit fill (Features 3, 6, 19, and 14) and the upper set of hearths located within the fill (Features 4-5 and 20) fell on a northwest-southeast line in the center area of the housepit. (Fig. 6) We cannot determine, however, if the hearths within each set were contemporary.

Another hearth (Feature 15) was also recorded in cut 1S1E but below the level of occupation debris associated with Housepit 18. The feature consisted of a shallow pit approximately 20 cm. in depth immediately outside the entry-way. Within the depression were found broken rocks, tools, fish vertebra, the maxilla of a deer and other animal bones. We do not think that this feature was directly associated with the structure of Housepit 18. It will be considered as part of Stratum Association Two (A-2).

There was one additional concentration of rocks in the interior of Housepit 18 (Feature 11). Feature 11 consisted of a pile of seventeen broken river cobbles with battering on the broken edges (807-809, 811, and 957-968) and one cobble chopper (956). These tools are described in Section 6, Parts V and VI. The concentration of tools was found along the south wall of cut 1EBL in housepit fill (B) but resting on sterile sub-soil (A). There was nothing else directly associated with this feature. Someone collected hammer stones.

There was no concentration of charcoal obtained from Housepit 18 large enough to constitute a sample for radiocarbon analysis. However, large quantities of animal bones were recovered from the housepit fill. A sample

of these bones from the lowest level of occupation, that is, bones recovered from near the bottom of the housepit fill, were sent to the Geochron Laboratory Incorporated in Cambridge, Massachusetts, for dating. The laboratory extracted the collagen from the bones and dated the collagen sample by radiocarbon analysis. The sample yielded a date of 1,100±65 years B.P., dating the earliest occupation and the construction of Housepit 18.

STRATUM ASSOCIATION ONE (A-1)

Above the housepit fill (B) of Housepit 18 extending over the entire housepit depression there was a layer of sterile, white sand (C). Stratum C was approximately 10 - 15 cm. thick in the center of the housepit, e.g., cut CLBL, and thinned as it neared the lip of the housepit. Immediately above this stratum, but within its horizontal boundary, was a thin layer of orange-brown sand (D) approximately 8 - 10 cm. thick which was virtually sterile. The reason for the discoloration of this stratum cannot be determined until a soil analysis has been undertaken.

Resting on top of Stratum D in cuts CLBL and ISCL was a half-circle of very dark colored (black) sand (D-1) approximately 6 cm. thick extending out from the west wall and just touching the east wall of the cuts. It is possible that this discoloration is the result of fire, but again until the soil is analyzed this cannot be determined.

Above Strata D there was approximately 30 - 40 cm. of organically discolored sand (E). This stratum extended over the entire housepit depression and beyond its lip. It also constituted one of the upper layers of adjacent Housepit 32. There were no features associated with this layer though a number of artifacts were recovered from it. Since this stratum was above the actual housepits and yet associated with them, it will be referred to in the remainer of this study as Stratum Association One or A-1. The majority of cultural material recovered from Stratum A-1 is similar in kind and relative number to the material recovered from the housepits (See artifact distribution charts in Section 6).

The only historic artifacts recovered from the excavation were found

in Stratum A-1 within the first 20 cm. below the surface. At minus 15 cm. below the surface a small metal square nail 1.8 cm. long was recovered in cut 2EBL. At minus 20 cm. below the surface in the same cut a rifle shell was found, measuring 0.7 cm. across the base and 2.4 cm. long. There is a capital H stamped on the base of the shell, in addition to a small nick at the edge of the base of the shell. Due to the limited number of historic items and their closeness to the surface, we believe these items were intrusive and that Stratum A-1 and the rest of the cultural material recovered from Stratum A-1 was the result of prehistoric activity. (Fig. 3)

SURFACE STRATUM

The surface stratum (F) was present in all cuts excavated in the site and appears to have existed over the entire site. Stratum F consisted of recently wind- and flood-deposited sandy silts compacted by a thick layer of roots and rootlets. Only a little chipping detritus was recovered from this layer.

STRATUM ASSOCIATION TWO (A-2)

As discussed under methods of excavation, the areas around the periphery of Housepit 18 were tested by an extension of the west BL trench, the north CL trench and the south CL trench. During the extension of the east BL trench a second housepit, Housepit 32, was encountered and is discussed below. To the north, south and west of Housepit 18 occupation debris was encountered above the stratigraphic evidence of the earlier occupation. It is thought that this peripheral occupation debris and the artifacts within it are related to the inhabitants of the housepits, either as a result of activities carried on outside of the housepit or the result of the re-excavation or the cleaning out of the housepit debris or the result of both. The peripheral occupation debris will be referred to in the remainder of this study as Stratum Association Two or A-2.

The heaviest single concentration of artifacts within two cuts occurred in this peripheral debris to the south of Housepit 18 and to the southeast of the entrance to the housepit in cuts 2SCL and 3SCL. By grouping and analyzing the artifacts recovered from these peripheral areas separately and comparing them in kind and relative quantity to the artifacts from inside the housepits, I had hoped to determine whether they were similar as a group and whether or not they were contemporaneous. The artifact assemblages from both the housepits and Stratum Association Two (A-2) show greater similarities than differences (See artifact distribution charts in Section 6).

The stratification outside of the housepits was not uniform. There are areas in which the ~~stratigraphy~~ deposit had a mottled appearance with frequent color changes ranging from light yellow through tan to dark charcoal gray or brown. This was especially true in the west BL trench, making it impossible

- open to interpretation

to excavate by observable strata stratigraphically.

Two hearths were recorded in the west BL trench in occupation debris outside of the housepit (Features 9 and 13). Feature 9 consisted of a scattering of broken basalt rocks on a relatively plain surface associated with an accumulation of charcoal. The second hearth was a basin approximately 40 cm. deep and one meter in diameter containing charcoal and ash. The excavators noted that a large quantity of scattered broken rocks were recovered from the general area and level of Feature 13 (See Fig. 6).

The stratification in the north CL and the south CL trenches outside of the housepit constituted a more uniform accumulation of debris. Within the Stratum A-2 in the south CL trench were two thin layers of charcoal stains approximately 6 cm. thick, sloping downward away from the housepit. Further south in the trench, cut 3SCL, there were several more thin layers of charcoal stains sloping downward toward the housepit. The sloping layers did not appear to be connected. One feature was recorded in the trench outside of Housepit 18, Feature 17. The feature consisted of a scattering of basalt rocks. The rocks were not in association with the thin layers of charcoal stains (See Fig. 6).

In the north CL trench there was also a fairly even accumulation of occupation debris. There was one thin layer of light colored sand (approximately 4 - 6 cm. thick) which extended approximately the length of the trench at the same level as the top of the step in Housepit 18. A large concentration of ash was found in the debris at the north end of the trench near the northern end of the light colored layer. A hearth (Feature 21) was also recorded at the bottom of Stratum A-2. Feature 21 consisted of a shallow basin approximately 20 cm. deep, surrounded by broken rocks scattered over an area approximately one meter in diameter. The basin rested on and intruded

into the light yellow sub-soil (A).

The general appearance of Stratum A-2 in the two CL trenches outside of Housepit 18, in addition to the similarities in kind and relative number of artifacts recovered from the debris to those recovered from the defined housepits, would lead one to think that the occupation debris was housepit fill of two additional housepits except that there are no structural features to support this hypothesis.

PART V. SUNSET CANYON SITE:

45-KT-28 - HOUSEPIT 32

Housepit 32, adjacent and to the northeast of Housepit 18, was sampled only through the excavation of two cuts: 2EBL and 3EBL. The two cuts were an extension of the east BL trench excavated to sample the periphery of Housepit 18, but instead we encountered a partially undisturbed housepit. The housepit depression had not been recognized through surface indications prior to this time due to a pathway in the river-cut bank which cut through part of the housepit.

The two excavated cuts removed the southwest section of the southern lip and living floor of the dwelling. The horizontal shape of Housepit 32 cannot be determined due to the limited excavation. The surface lip indication of the housepit is curved, but so are all the surface lip indications of the housepits observed by our field parties, which when excavated do not exhibit the same horizontal shapes.

However, several distinctive structural and stratigraphic features of Housepit 32 were discovered by this limited testing, in addition to the recovery of a fair sample of artifacts, animal bones and chipping detritus from the interior of the housepit. Housepit 32, as the other two housepits just discussed, was excavated by its inhabitants at an angle or down a slope from the original surface to the living area which was enclosed by a distinct step. The step in Housepit 32, however, is a double step rather than a single step (See Fig. 3).

The function of the double step is unknown. It may have functioned as a buttress for the super-structure beams, or it may possibly have func-

tioned as a storage or sitting area for the inhabitants, or it could possibly be a change more closely related to style than function.

The fill of Housepit 32 (B-1) was fairly uniform. It was dark brown or charcoal gray in color, owing to organic discoloration. Within the housepit fill there were two thin light yellow strata approximately 6 cm. thick, which extended across the excavated cuts gradually dipping towards the center of the housepit depression (See Fig. 3). There are no significant differences in the artifacts which were recovered below, between, and above these two layers. The material recovered from the housepit will be dealt with as a single assemblage.

Five features were recorded within the two cuts (Features 1, 7, 8, 10 and 12). All five features were identified as hearths. What were recorded as Feature 1, along the west wall of cut 3EBL and Feature 8, along the east wall of cut 2EBL, were actually the same feature separated by a 50 cm. balk. The feature consisted of a large concentration of fire-cracked basalt rocks 20 cm. thick covering a relatively flat area approximately 130 cm. east-west by 90 cm. north-south. Charcoal, a few tools and fragmentary animal bones (e.g., two deer scapula) were associated with the feature. The concentration was located in the housepit fill approximately 82 cm. below the surface. No basin was identified in association with the rocks.

Approximately 60 cm. below Feature 1-8 in cut 3EBL also in housepit fill, Feature 7, another similar but much smaller concentration of broken basalt rocks, was recorded. The concentration covered an area 70 cm. north-south by 70 cm. east-west and was 16 cm. thick. There were a few scattered basalt rocks to the west of the concentration at the same level. Charcoal, animal bones, fish remains and a few tools were associated with the rock concentration.

Feature 10 was encountered in the east half of cut 2EBL, also within the housepit fill. It consisted of a large, round basin containing alternating thin lenses of light and dark ashes and charcoal. Various sizes of fire-cracked rocks were found throughout the bottom of the depression. When the depression was first encountered at minus 120 cm. below the surface, its diameter was approximately 140 cm. At minus 157 cm. below the surface, the diameter of the depression had decreased to 100 cm. The basin was approximately 50 cm. deep. Associated with this feature were a number of small tools, and two additional concentrations of fire-cracked rocks with a fairly large accumulation of charcoal (See Fig. 6).

The two associated rock concentrations with accompanying charcoal were recorded as Feature 12. The feature was located at minus 190 cm. below the surface near the bottom of the housepit fill. The two concentrations were approximately 30 cm. apart and covered most of the northeast quadrant of cut 2EBL. The number of small tools associated with the two rock concentration were recovered.

The charcoal obtained from Feature 12 was analyzed by the radiocarbon laboratory at the University of Washington. The sample yielded a date of 1170 200 years B.P. This dates the earliest occupation and construction of Housepit 32.

SUNSET CANYON SITE: 45-KT-28 - HOUSEPIT 11

The stratification of Housepit 11 was unique because of its position near the mouth and on the edge of the alluvial fan of Sunset Canyon. The proximity of the house to the periodic flood drainage area had resulted in a variegated accumulation of soils in the housepit. The lower stratum (A) below two-thirds of the housepit was composed of alluvial gravels and boulders while Stratum A under the north one-third of the housepit was composed of caliche. Stratum B immediately below the occupation fill of the housepit (C) and above the gravels (A) was a coarser sand than was encountered in any of the other excavations. In several cuts, however, Stratum C was resting on the gravels (A) just above large boulders and Stratum B was absent.

Stratum B and parts of Stratum C were inter-bedded with thin lenses of volcanic ash. The ash was apparently washed from a primary ash deposit located half-way up and on the south side of Sunset Canyon.

One possible artifact KT28/2077 was recovered from Stratum A in the gravels and as would be expected, it has a rolled appearance. The piece is an amorphous flake tool with a single convex, unifacially retouched edge with a 45 to 60 degree angle.

The surface depression of Housepit 11 was the deepest depression of the four housepits excavated. From the present natural surface, the center of the housepit was minus 110 cm. The majority of material recovered from the excavation of this depression was found either in dark brown or charcoal gray occupation fill or in dark tan, slightly sandier, soil just below this layer. Both of these layers constitute Stratum C and are considered to have resulted from the occupation of the housepit. The fill of Housepit 11 varied in thickness from the center of the housepit to the surface lip indication of the housepit.

In the excavated cuts in the center of the housepit, the fill was approximately 20-30 cm. thick, while in the cuts which contain surface lip indication of the housepit, the fill was at maximum 60 cm. thick. The horizontal shape of the housepit was approximately round or, better, a rounded square, approximately seven meters in diameter. No step indications were identified, thus the housepit is being referred to as saucer-shaped. There was a relatively flat area (floor) in the center of the housepit and a steep slope near its periphery up to the lip of the housepit (See Fig. 4).

A bone concentration associated with a milling stone (2048) was recorded as Feature 40. The concentration occurred at the contact surface between the two layers which make up Stratum C. Feature 40 was located in the northeast corner of cut 1S1E and covered an area approximately 149 cm. north-south by 56 cm. east-west. The concentration consisted of 20 articulated fish vertebrae and miscellaneous fragments in addition to fragmentary deer bones. Many of the fish vertebrae and deer bones in the center of the concentration appear charred. The milling stone rested outside and along the southeast edge of the concentration.

Two hearths were identified (Features 43 and 44) and one fairly extensive area of charcoal stains (Feature 41). Feature 43 consisted of a concentration of five large basalt rocks 20-30 cm. in diameter, a few small basalt rocks, one small post mold 10 cm. in diameter and a scattering of charcoal and ash. No basin was associated with the concentration. The hearth was located in the housepit fill, that is, it was in the upper layer of Stratum C, but resting on the lower layer of Stratum C. The feature was located at the north edge of the floor of the housepit just south of the steep rise to the lip of the housepit.

Feature 44 was located in relatively the same horizontal and vertical

position as Feature 43, except that it was located near the west edge of the housepit floor. The feature consisted of a large concentration of charcoal over an area 90 cm. east-west by 100 cm. north-south. The main concentration of charcoal appeared to be the remains of a log 75 cm. long and 8 cm. wide. There were only a few small rocks associated with the charcoal concentration. Bits of animal bones, chipping detritus and a few small tools were also found in association with the charcoal.

The charcoal stains constituting Feature 41 also occurred at the contact surface between the two layers which make up Stratum C. The stains extended into the west wall of cut 2NCL. The exposed outline of the stain was a semi-circle measuring 100 cm. north-south by 60 cm. east-west. There were a few bits of bone in association with the feature.

Seventy-five cm. east and on the same level as Feature 41 was a cache of 100 medium-sized (2 - 4 cm.) flakes of various kinds of stone and many hundreds of smaller flakes or chips of various kinds of stone. The cache was found approximately minus 72 cm. below the surface. The soil around the cache was loosely packed and contained a quantity of small grass roots. Two of the larger flakes exhibit indications of retouching. They would be termed "variable." The majority of the flakes, those under 2 - 4 cm. in size, are unsuitable for tools. It is possible that this accumulation could have been made by man, but it could also have been the result of rodent activity.

Another cache thought to be the result of human activity also was recovered from the site. The cache contained approximately 43 large flakes (above 2 cm.) and approximately 50 smaller flakes or chips, all of the same kind of stone and possibly from the same core. Of the 43 larger flakes, 18 are classifiable tools (amorphous). The cache was found at the contact surface between the two layers which make up Stratum C. Horizontally the

cache was located in the wall at the north end of the main north-south trench. This places the cache just under the surface lip indication of Housepit 11 and outside of what is considered to be the living area of the housepit. The concentration of flakes could have been a cache in the dirt wall of the housepit.

No entrance for Housepit 11 was identified during the course of the excavation, nor were any post molds resulting from the construction of the super-structure recorded.

There is a very thin humus layer (D) resting on top of the housepit fill. In several of the center cuts the humus was difficult to identify from the housepit fill, except for a few roots and rootlets.

PART VI

INTERPRETATION AND CONCLUSION

Each of the four housepits just described represent a slight variation in style of dwelling within the general range of semi-subterranean dwellings on the Plateau. According to Ray, in Cultural Relations in the Plateau of Northwestern America (1939:135), in the ethnographic present:

> In the western half of the American Plateau (Sanpoil, Southern Okanogan, Wenatchi, Columbia, Kittitas, Yakima, Klikitat, Tenino, Wishram, Klamath) the circular pit with a conical roof of radiating poles is universal. The central posts vary in number (Sanpoil: one; Tenino, Klamath: four) or may be absent entirely (Sanpoil), as in the Lakes house...An essentially distinct type of earth lodge may be represented by the square pit of the Kittitas, Wenatchi, and Southern Okanogan. In all cases this lodge is supplementary to that built with a round pit...The opening at the side or edge is another new feature encountered in the square earth lodge; an entry at top center is never used. But the side entrance is not limited to the square lodge; it is utilized with the round pit by the Sanpoil, Wenatchi, Kittitas, Klikitat, Tenino, and Nez Perce. Only among the Wenatchi and Kittitas is this the exclusive type; others use the center hatchway for circular pit dwellings as well...

The construction of this characteristic earth lodge or housepit is further elaborated upon by Ray in The Sanpoil and Nespelem: Salishan Peoples of Northeastern Washington (1932:31):

> The semi-subterranean earth lodge consisted of a circular pit with a flat or conical roof. The depth of the pit varied from four to six feet; a deep pit was necessary for the flat roof type. The diameter ranged from ten to sixteen feet. The hole was dug with a sharp edged paddle-like tool of wood. In the conical roofed structure a single large log served as a center post, from the top of which radiated poles extending slightly beyond the margin of the hole. At the periphery the distance between the poles was about two feet. The angle of slope was ap-

> proximately 22 degrees. The method used to secure the radiating poles to the center post is not clear; they were tied in some manner with willow rope. Cedar planks, split from driftwood, were laid as a first covering on the roof when such wood was available. In lieu of planks willow mats were used. A layer of grass and brush was then added to a thickness of about six inches. On top of this a thick layer of dirt was placed, usually a part of that which had been excavated. However if clay were easily available the covering would be made of this, since it turned water much better than ordinary soil. A single hole in the top near the center post permitted entrance and egress and allowed the smoke to excape. The ladder consisted of two vertical poles set a small distance apart upon which cross sticks were tied with thongs of willow bark. The ladder projected a foot or two out of the opening. The notched log type of ladder was not known. Only one fire was used, placed near the center of the room. (Ray, 1932: 31)

At contact the Sanpoil lived along the Okanogan River and bordered the Columbia, living in the area of the sites, on the northeast. The Sanpoil also had a style of single room semi-subterranean dwelling with a flat top.

> The entire room of the flat top earth lodge was below the ground level. Poles of proper length were simply laid across the top of the pit in a parallel series. The distance between poles was two feet or less. Subsequent coverings of planks, brush and earth were added as in the former type. With the flat top house the opening leading outside was placed at the edge instead of the center, necessitating a corresponding change in the location of the fireplace. Although easier to build than the conical roofed lodge, this type was less efficient in the manner of drainage and consequently less used.
>
> During stormy weather and at times when no fire was burning the smokehole was closed by means of a tule mat. Care was taken not to allow snow to collect on top of the lodge in order to avoid the possibility of collapse under the stress of the extra weight. (Ray 1932:32)

As indicated by the above descriptions, several styles of dwellings co-existed on the plateau in the area of the sites in the ethnographic present. Therefore, it seems reasonable that variations in style of dwelling might also have co-existed in the pre-historic past.

The four styles of dwellings identified at 45-GR-68 and 45-KT-28 which are elaborated above, can be briefly described as follows:

45-GR-68, HP 2 was an approximately rectangular housepit with a single step. The northeast side of the dwelling consisted of a large round pit hearth and an elevated platform. The hearth was situated in the northeast corner of the dwelling. The platform extended southward from the hearth. No entry way was identified.

45-KT-28, HP 18 was an approximately square housepit with a single step and double step construction in the corners. A side or edge entry way was identified in the southeast corner of the dwelling. Six hearth were located along a northwest-southeast line in the center area of the housepit. It is not known if the hearths were contemporaneous.

45-KT-28, HP 32 was a double stepped housepit of undeterminable shape due to the limited horizontal excavation. The southwest portion of the housepit was horizontally curved. Four hearths were found near the southwest periphery of the dwelling. One of the hearths was in the shape of a deep pit. No entry way was identified.

45-KT-28, HP 11 was an approximately round (?) saucer-shaped housepit. There was only a very slight stepping which indicated the edge of the living area. Two hearths were identified: one near the north periphery and one near the west periphery of the living area. No entry way was identified.

It is possible that the housepits in which the entrances were not identified had entry ways through the roofs. Since the dwellings were not entirely

excavated this cannot be stated with any assurance.

The variations in style of housepit and placement of the hearths within the housepits can also be seen in other sites in this area. Some of the sites in the immediate area will be briefly described and discussed in the following pages.

In the American Antiquity, April 1952, R. D. Daugherty reported on the excavation of two sites in the O'Sullivan Reservoir. The sites are located along the shores of Moses Lake, some twenty-eight miles to the east of the Sunset Canyon and Crescent Bar sites. Both of the sites fall within the area assigned by Ray (1936) and Teit (1928) to the Columbia Indians, as do the sites here under study. The two sites, 45-GR-27 and 45-GR-30, both contained semi-subterranean dwellings.

Site 45-GR-27 consisted of thirty-three housepits occurring in groups varying in number from two to eleven. Three housepits were tested. A summary of the information obtained on the structure of the housepits is presented in the table below.

TABLE 2

HP	Shape	Wall Configuration	Entry	Hearths
1	Circle (@ 22 ft.)	Steep slope 70° (flat floor)	-	Charcoal stains, south center
2	Circle (@ 21 ft.)	Steep slope 70° (flat floor)	-	Charcoal stains, south center and paralleling SW wall
3	Circle (surface 35 ft.)	Steep slope 70° (sloping floor)	-	------

Site 45-GR-30 contained twenty-one housepit depressions scattered in groups. Three depressions were tested. A summary of the structural infor-

mation is presented below.

TABLE 3

HP	Shape	Wall Configuration	Entry	Hearths
A	Oval (40 x 27 ft.)	Steep slope 70° (flat floor)	-	Charcoal stains, S end of house
B	Circular (@ 30 ft.)	Steep slope 70° (sloping floor)	-	------
C	Elongate (30 x 11 ft.)	Shallow depression, Mat lodge	-	------

Even though the housepits from the two sites are similar, three forms can be discerned: HP 1 and 2 at 45-GR-27, circular dwellings with flat floors; HP 3, 45-GR-27 and HP B, 45-GR-30, circular dwellings with sloping floors; and HP A, 45-GR-30, oval dwelling with a flat floor. The general similarities of the housepits, in addition to the similarities of the artifacts recovered from the two sites leads to the combining of the sites into the same archaeological phase, even though as stated by Daugherty "...there are some typological and quantitative variations which imply slight temporal differences." (Daugherty, 1952:383) Depression C at 45-GR-30, identified as a mat lodge by Daugherty, is the most strikingly different form of dwelling at the two sites but "...the artifacts recovered here exhibit no significant differences from those obtained in the excavation of the semi-subterranean houses." (Daugherty 1952:383)

No historical artifacts were recovered during the excavation; however "...the similarity of the artifacts found here to those found at other sites in the region in association with contact material, suggests the occupancy of these sites not long before the earliest white contact." (Daugherty, 1952: 383)

In the summers following the excavation of the Sunset Canyon and

Crescent Bar sites, the University of Washington undertook the excavation of two other large housepit sites. One of the sites, 45-KT-17, was described and analyzed by B. G. Holmes in a Master's thesis in the Department of Anthropology at the University of Washington. The site is located in the Wanapum Reservoir on the west bank of the Columbia River approximately ten river miles south of 45-KT-28. This site also falls within the area assigned by Ray (1936) to the Columbia Indians.

The upper occupation stratum of the site consisted of twenty-three housepit depressions, six of which were extensively trenched and a seventh, Housepit 22, level stripped. A summary of the information obtained on the structure of the housepits is presented in the table below.

Table 4

HP	Shape	Wall Configuration	Entry	Hearths
15	Rectangular	E - double step W - single step S - gradual slope	-	------
16	Circular	N - double step S - double step	-	Oval stone hearth - center slightly E
18	Circular	N - single step S - gradual slope	-	Stone hearth - center slightly N and small hearth S periphery
19	----	S - gradual slope	-	------
20	----	E - double step W - gradual slope	-	------
21	----	E - slump area W - gradual slope	-	Fire broken rock, oxidized soil near N periphery
22	Circular	E - double step W - steep slope S - double step	-	Three superimposed oval stone hearths with charcoal stains - center slightly S

All of the floors in the above housepits were described as being "dish-shaped". The wall configurations of the housepits show greater variety than any of the sites previously discussed. This is especially true of Housepit 15 in which the living area was enclosed by a double step, a single step, and a gradual slope.

The artifact yield of the housepits was also higher than the sites previously discussed with the exception of Housepit 18 at the Sunset Canyon Site. Historic artifacts were recovered from two of the housepits: 16 and 18. No historic material was found in the other five housepits.

Holmes, studying the same site as E. H. Swanson, could find no evidence to support the latter's chronological sequence of changes in housepit styles presented in an article in American Antiquity, 1958. (See Holmes, 1966) Though acknowledging the differences in the construction of the original housepits, Holmes feels that there are "...no differences within the artifact assemblage which indicate chronological differences". (Holmes 1966: 110) The artifact assemblage from the housepits (Schaake V.) was not subdivided and "if the radiocarbon date from Housepit 22 of A.D. 480 is taken to be the beginning of the housepit occupation...the terminal date of the site's occupation could be anywhere between 1800 and 1855" A.D. (Holmes 1966:110)

The information on the structure of the five housepits excavated by Swanson in 1954 at 45-KT-17 is presented in the table below.

Table 5

HP	Shape	Wall Configuration	Entry	Hearths
14	Square w/ rounded corners	E - gentle slope N - gentle slope S - possible ramp entry	-	Earth oven N and slightly W of center Hearth-center
24	Circular (24 feet)	Saucer shaped w/ gradual slope	-	Ash concentration center of floor

Table 5 (cont'd)

HP	Shape	Wall Configuration	Entry	Hearths
12	Circular (17 feet)	Shallow	-	Ash and charcoal 2-3 feet from rim SE of center
4a	Circular (40 feet)	(Gradual slope on profile) Possible antichamber	-	Possible hearth to one side
4b	Circular (22-23 ft.)	(Gradual slope on profile)	-	Possible hearth to one side

A limited number of artifacts were recovered during the course of this excavation. Historic material was found in Housepit 14.

The excavation of four sites in the Rocky Reach Reservoir was reported by A. Gunkel in Thesis in Anthropology, 1961. One of the sites, 45-GR-62, is located in the area assigned by Ray (1936) to both the Wenatchi and the Chelan Indians, that is in a limited area in which the two groups mixed freely. The site is located along the banks of the Columbia and Entiat Rivers approximately 45.5 river miles north of the sites here under study. In Test Pit 3, Area B of the Entiat Site (45-GR-62) an occupation stratum was identified as a possible housepit.

Gunkel described the housepit as being a circular saucer shaped depression approximately 17.5 feet in diameter. Three fire pits consisting of charcoal stains and rocks were identified in the southeastern part of the dwelling. Only the southern part of the housepit was excavated. It was noted by Gunkel that no artifacts or other living debris except for charcoal stains were found outside of the tentatively identified housepit. Gunkel included this site in his Orondo Subphase I which he dated by the comparative method at approximately 1000 B.P.

A number of other sites containing semi-subterranean dwellings have also been excavated on the Columbia Plateau. The sites are located at greater geographic distances from the sites here under study. It is very possible, however, that some of these sites should also be placed within the phase presently being defined. These sites include those containing housepits excavated in the McNary Reservoir and analyzed by J. L. Shiner, D. Osborn, M. T. Newman, A. Woodward, W. J. Krool, and B. H. McLeod; sites in the Chief Joseph Reservoir excavated by D. Osborn, R. Crabtree, and A. Bryan; and the Wenas Creek Site excavated and analyzed by C. N. Warren. It is beyond the scope of this study, however, to conduct a detailed study of all of these sites, and in addition there is a lack of pertinent information in some of the publications on these sites. The publications on the excavations are included in the bibliography for reference.

The variation in the housepits indicates that innovations in the construction of the semi-subterranean structures occurred on the Plateau probably at varying times. An innovation, however, does not necessarily indicate a termination of an existing method of construction. Thus it is up to the archaeologist to document the innovations and determine their effects on the persistence of previous innovations or methods of construction. He must then evaluate the significance of the innovations and possible co-existing variations in the development of the concepts of component and phase and in the reconstruction of the pre-historic culture. All three of the above problems have proved to be difficult in the present context.

The ethnographic evidence cited above indicates three things. First, there were different styles of semi-subterranean dwellings co-existing among the Kittitas, Wenatchi, and Southern Okanogan. Secondly, not all of the communities appear to exhibit variation in style of dwelling. And thirdly, ac-

cording to informants (Ray 1939:136), the mat lodge is a more recent innovation, and "...Gradually, over a long period...the earth lodge (housepit) was supplanted by the mat covered dwelling, so the latter was in virtually exclusive use in the late nineteenth century..." (Ray 1939:136)

The present archaeological evidence from the immediate area indicates that at some sites such as 45-KT-28 and 45-KT-17 there is greater variation in style of structures than at other sites such as 45-GR-27. The assemblages obtained from the interior of the different styles of structures indicates that they were all used for a similar purpose, that is, they functioned as living or dwelling areas. The assemblages consisted of milling stones, scrapers, knives, projectile points, hammer stones, choppers, etc., in association with hearths and food refuse such as animal bones and fish remains. Also the occurrence of the mat lodge at 45-GR-30, the most strikingly different style of dwelling at the site, contained the same kind of archaeological assemblage as that obtained from the semi-subterranean dwellings. This latter point indicating that this innovation in the construction of a dwelling did not represent a major change in the other aspects of the living pattern as far as can be determined archaeologically at present.

There has been a tendency among the archaeologists cited above to lump the archaeological evidence from the strata containing these dwellings together on comparative typological grounds in spite of the style variation, though recognizing the late date for the mat lodge. The documentation of the other innovations in construction has proved at present to be impossible due to inadequate dating techniques. Although dates obtained by radiocarbon analysis are available, they are not sensitive enough to be useful in solving this problem.

A series of three stratified housepits has been excavated. (Personal

communication, C. M. Nelson) A double-stepped, a single-step and a saucer-shaped housepit were found stratified one above the other at 45-KT-28. The convenient re-occupation of the depression may account for some of this change. But whether it does or not, this one series does not negate the possibility of the contemporaneity of the different styles of dwellings at this site.

Thus we are left with typological comparisons to indicate differences between the dwellings other than the style of the dwellings themselves. In previous studies as well as in this study, the analysis of the archaeological evidence points to greater similarities among the peoples living in these dwellings than differences. There are some differences, however. For example, the inhabitants of Housepit 11 at 45-KT-28 preferred to use large flakes of basalt to fashion heavy stone tools such as choppers rather than river cobbles which were used for the same purpose by the inhabitants of the other two housepits excavated at this site and by those who occupied Housepit 2 at 45-GR-68. Also there appears to be a slightly greater preference for Plateau Pentagonal projectile points among the occupants of Housepit 2 at 45-GR-68 than by the occupants of the three dwellings excavated at 45-KT-28. This form of projectile point is also present in the assemblages from 45-KT-28, but in lesser quantity. This preference does not seem as significant, however, if you look at the total percent distribution of all of the projectile point forms presented in Table 17 and Chart 1 .

For the purpose of definition of a phase, then, we are left with three main points. For inclusion criteria there is the presence of the semi-subterranean dwellings described above, and secondly, the kind and quantity of associated archaeological material (the latter discussed in the conclusion of Section 6). And thirdly, there is the greater or lesser degree of variation

in the styles of dwellings, probably resulting from innovations occuring at different times. This variation, however, does not appear to represent different uses of the structures or changes in the general living pattern of the people as far as can be determined archaeologically.

The placement of the dwellings in the communities appears somewhat random, except that they are close to the present course of and parallel the river. The size of the dwellings vary presumedly in part to accommodate different numbers of occupants. Housepit 18 at 45-KT-28 is the largest structure at this site. (See Fig. 1) Due to its large size and the possibility that the three hearths in each set of hearths located along a center line in the structure were contemporaneous, it is possible that the occupancy of the housepit may have been multiple. Another possibility is that this housepit functioned as some kind of community structure.

Housepit 18 is one of the richest housepits in terms of quantity of artifacts recovered from a single structure in this area. However, the artifacts are not significantly different in either kind or proportional quantity than those recovered from the other housepits which are smaller in size. It should also be taken into consideration that the fill of Housepit 18 was deep, indicating occupancy possibly over an extended period of time. This would account for, in part, the large quantity of artifacts. However, the fill of Housepit 2 at 45-GR-68 was also deep, but the artifact yield was much smaller. Housepit 2 at 45-GR-68 is approximately six by eight meters in size and Housepit 18 at 45-KT-28 is ten and a half by twelve and a half meters in size. The artifact yield from Housepit 11 at 45-KT-28 is still smaller, as is the size of the housepit, seven meters in diameter, and the fill in the housepit is shallow. Thus both the depth of fill and the size

of the housepit should be taken into account when considering the artifact yield. But taking both into consideration, the yield of Housepit 18 at 45-KT-28 still seems more closely related to size than to depth of fill. The above factors seem to indicate that the first explanation, that the occupancy of Housepit 18 may have been multiple, is correct.

SECTION FIVE

DATES AND DATING

Three radiocarbon dates have been obtained from organic remains recovered from the sites under study. Two of the dates are from the Sunset Canyon Sites, 45-KT-28, and the third date is from the Crescent Bar Site, 45-GR-68:

45-GR-68, HP 2 1,250 ± 70 years B.P., U of W Laboratory
45-KT-28, HP 18 1,100 ± 65 years B.P., Geochron Lab. Inc.
45-KT-28, HP 32 1,170 ± 200 years B.P., U of W Laboratory

As previously mentioned, the samples from Housepit 2 at 45-GR-68 and Housepit 32 at 45-KT-28 were burned wood remains. And the sample from Housepit 18 at 45-KT-28 was collagen extracted from animal bones.

These calculations date the earliest occupation and construction of each respective semi-subterranean dwelling. They also fall within the range of dates proposed for the Sunset Canyon Phase of the Middle Columbia River.

Directly across the Columbia River from 45-KT-28, the University of Washington conducted an excavation of another housepit site: 45-GR-73. The site consisted of fifteen surface depressions with raised lips indicating semi-subterranean dwellings situated near the edge of a depositional terrace. Four depressions were excavated during the summer of 1961, each one represented a separate dwelling. The artifact assemblage obtained from the site is very similar to that obtained from 45-KT-28 and 45-GR-68. An organic sample of partially burned wood from the lower occupation debris of a single-step

housepit was collected and dated by radiocarbon analysis. The sample yielded a date of 1,170 ± 120 years B.P., University of Washington Laboratory. This dates the earliest occupation and the construction of Housepit 11. The date closely coincides with the three above dates.

As previously mentioned in Section Four, a radiocarbon date was obtained from an organic sample from a hearth in Housepit 22 at 45-KT-17. The sample yielded a date of 1,520 ± 110 years B.P., University of Washington Laboratory (Holmes 1966: 139). This dates the beginning of the Schaake V assemblage which was recovered from seven semi-subterranean dwellings. The date is approximately three hundred years earlier than the above dates, and falls near the beginning of the range of dates purposed for the Sunset Canyon Phase.

The above dates, however, are not the earliest dates we have obtained by radiocarbon analysis of organic remains from semi-subterranean dwelling in the Middle Columbia River. In the summer of 1960, a test trench was excavated by the University of Washington in a site directly north of 45-GR-73 on the same deposition terrace: 45-GR-77. The site consisted of thirty one surface depressions with raised lips. Limited tests were undertaken in three of the depressions. In Housepit 3, a steep sided semi-subterranean dwelling, partially burned wood was recovered 160 cm. below the surface. The sample yielded a date of 1,715 ± 60 years B.P., University of Washington Laboratory (Dorn, Fairhall, Schell, and Takashima, 1962: 7). This date is approximately 250 years earlier than the above dates. This date, if accepted, dates the earliest occupation of the dwelling, in addition to being the earliest dated housepit in the area. It also marks the proposed approximate beginning of the Sunset Canyon Phase of the Middle Columbia River.

Initial white contact in the Middle Columbia River, which marks the

beginning of the Proto-Historic Phase, was made during a river trip on the Columbia by David Thompson in the summer of 1811 (Elliott 1914). The second recorded contact was made later the same year during a river trip made by Alexander Ross and his party (Ross 1904). Thus the terminal date of the Sunset Canyon Phase could be anywhere between 1811 and 1855 which marks the eventual settlement of most of the Plateau Indians on reservations.

PART I

PROJECTILE POINTS

Three-hundred and forty-six stratified classifiable projectile points were recovered from the two sites under study. These are complete or nearly complete points. An additional three-hundred and seven unclassifiable (in terms of the method of analysis employed here) projectile fragments were also found. Of the latter, one hundred and seventy-five are projectile point tips and the remaining one hundred and thirty-two are miscellaneous fragments. The total recovered complete and fragmentary stratified projectiles is six hundred and fifty-three.

Table 6

238	projectiles from 45-KT-28, Housepit 18
87	projectiles from 45-KT-28, Stratum Assoc. One
154	projectiles from 45-KT-28, Stratum Assoc. Two
46	projectiles from 45-KT-28, Housepit 32
30	projectiles from 45-KT-28, Housepit 11
98	projectiles from 45-GR-68, Housepit 2

The distribution of the unclassifiable projectile point fragments is presented in Table 7 . Other than this, they will not be dealt with in this study.

The system of analysis employed in the study of the projectile points is based upon a study by R. E. Greengo, Department of Anthropology, University of Washington (unpublished). Greengo undertook the analysis of all stratified

TABLE 7

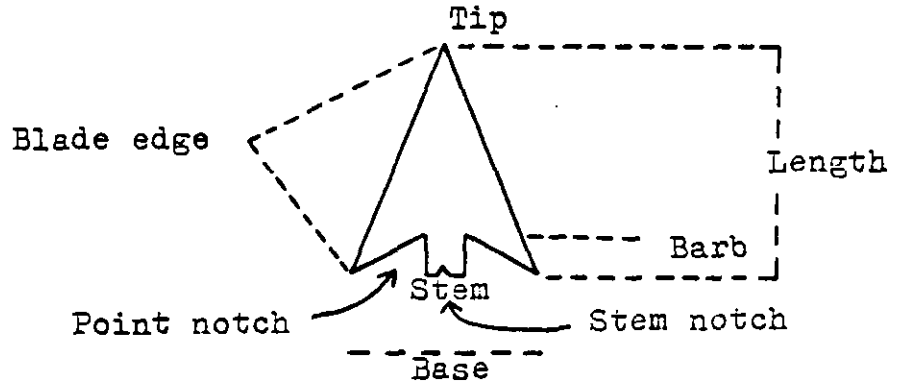
DISTRIBUTION of PROJECTILE POINT FRAGMENTS

PROJECTILE POINT FRAGMENTS	45-KT-28 Housepit 18	Stratum A-1	Stratum A-2	Housepit 32	Housepit 11	Total 45-KT-28	Housepit 2 (GR-68)	TOTAL 45-KT-28 45-GR-68
Tips	55	26	50	14	4	149	26	175
Miscellaneous sections	57	18	21	3	11	110	22	132
Totals in Housepits & Strata	112	44	71	17	15	~~295~~ 259	48	307

and unstratified projectiles found by the University of Washington field parties during seven seasons of field work in the Middle Columbia River Valley. Not all of the groupings identified by Greengo are represented in this collection and other groupings are only represented by a few specimens. However, we feel that it will be more meaningful in the total pre-historic picture of this area to use these categories as much as possible even though they may include only one or two specimens.

The terms used during the discussion of the projectile points are illustrated in the following figure.

Figure 8



Projectile Point

The primary categories called "groups" are based upon the placement of notches if present, and the geometric outlines of the projectile points. Nine groups have been identified in the collection under study: Group I, Corner Notched; Group II, Basal Notched; Group III, Side Notched; Group IV, Triangular; Group V, Asymmetrical Notched; Group VI, Pentagonal; Group VII, Leaf; Group VIII, Bi-point; and Group IX, Large Points.

The division of the notched projectiles is based on the position of the notches relative to the blade edges and the base of the point. If the notches occur at the base of the projectile, it is called a Basal Notched point. If the notches occur on the blade edges of the point, it is called a Side Notched point. If the notches occur at the projected intersection of the blade edges and the base, it is called a Corner Notched point.

The outline of the Triangular projectile points, as the name indicates, approximates the shape of a triangle. The Asymmetrical Notched points are triangular in outline with one notch which may be either a corner or a basal notch.

Projectiles referred to as Pentagonal have five sides, resulting from a slight indentation of the blade edges. Points which are termed Leaf are roughly triangular in outline, with a marked excurvate base. Projectiles designated Bi-point are pointed at both the tip and the base.

The last group of projectile points are excluded from the above groups due to their large size. The two points within this group measure nine or more centimeters in length.

Group I; Corner Notched

The criterion which unites this group of projectile points is the placement of the notches (two) at the projected intersection of the blade edges and the base. Slight variation in the placement of the notches has resulted in different shaped stems and barbs. The barbs on these projectiles are small relative to the barbs on the Basal Notched points. Four of the points have small lateral barbs, that is, the barb is perpendicular to the length of the projectile.

The first subdivision of the Corner Notched points is based upon the

configuration of the stem. Two terms are employed to describe this variation: tapering and straight to expanding.

TAPERING: A stem is said to be tapering when its width is greatest near the body of the projectile point and tapers toward the base of the stem.

STRAIGHT-EXPANDING: A stem is considered straight-expanding when its width near the body of the point is equal to or less than the width at the base of the stem.

Five of the projectile points in Group I have expanding stems with strikingly excurvate bases, resulting in the stem appearing round. These are: one projectile in A1b from HP 18, one projectile in B1c from HP 18, one projectile in B2c from A-2, one projectile in B3c from HP 18, and one projectile in B5b from A-1. All five of these points have excurvate blade edges.

One specimen in B2c has a diamond shaped stem, that is, the stem expands half of its length and then it contracts. This is the only point of the collection which has this characteristic. It was found in Stratum Association Two (A-2).

Six of the Corner Notched points have an additional notch in the base of the stem. These are: one specimen in B2a from HP 18, one specimen in B2c from HP 18, one specimen in B2e from HP 32, one specimen in B2e from A-2, one specimen in B3d from HP 18, and one specimen in B3e also from HP 18.

One projectile point in Group I has serrated blade edges. This point is in subdivision C3 and was found inside Housepit 18.

The terms employed to describe the linear character of the blade edges are the same as those presented below under Group II, Basal Notched points.

The lengths of the projectile points presented in the following tables

are the maximum lengths of the points from tip to base. The measurements are taken directly from the projectiles with the aid of a caliper. For ease of presentation the point lengths have been grouped into one centimeter intervals. (See Table 8) (Plate 1,I)

Group II: Basal Notched

As mentioned above, the criterion which unites this group of projectile points is the placement of the notches (two) at the base of the point. The notches are not parallel to the length of the projectile; instead they slant inward from the corners toward the body of the point. The result of this is that the great majority of the projectiles within this group have expanding stems. A few of the projectiles have straight-expanding stems, and one specimen in subdivision A1 has a tapering stem with a stem notch.

Forty-seven of the Basal Notched projectiles have one additional notch in the base of the stem. The distribution of this attribute is presented in Table 9 .

The Basal Notched points are subdivided on the basis of the width of the notch, the width of the stem and blade, the linear character of the blade edge, and the length of the projectile.

Three projectiles in this group have wide notches relative to the width of their bases, subdivision G. The notches are wide concavities in the base of the point which have a cord greater than three millimeters. The majority of the projectiles within Group II have narrow notches relative to the width of the base.

The seven projectile points of Group II, F have a broad stem and broad blade relative to the length of the stem and the total projectile. The majority of the points within this group do not exhibit this characteristic.

The greatest variation within this group is in the linear character of the blade edges. Five terms are used to describe this variation.

STRAIGHT: A straight blade edge is an edge whose linear representation is a straight or relatively straight line, so that the majority of the points along the linear blade edge are contiguous to a straight line of reference.

INCURVATE: An incurvate blade edge is an edge which curves inward toward the body of the projectile point.

EXCURVATE: An excurvate blade edge is an edge which curves outward away from the body of the projectile point.

RECURVE: A recurve blade edge is an edge which is both incurvate and excurvate, resulting in a roughly S shaped edge.

ASYMMETRICALLY CURVATE: A projectile point is said to have asymmetrically curvate blade edges when each of the blade edges exhibits one of the above linear characteristics but not the same linear characteristic, resulting in the projectile appearing asymmetrical.

Two of the projectiles in subdivision B3 have serrated blade edges. One of the points was recovered from Housepit 32. The other point, found in Stratum Association Two (A-2), also has a stem notch. (See Table 9) (Plate 1,II)

Group III: Side Notched

The projectile points within Group III have notches in the blade edges. The notches occur opposite each other on the lower one-third of the projectile. The Side Notched points are subdivided on the basis of size, linear character of the blade edge above the notch and the linear character of the base. (See Table 10) (Plate 2,III)

Group IV: Triangular

The projectile points within Group IV are approximately triangular in outline. The subdivisions within this group are based upon the linear character of the two blade edges and the base of the projectile point. The size criterion is also used. (See Table 11) (Plate 2,IV)

Group V: Asymmetrical Notched

Asymmetrical Notched projectile points are approximately triangular in outline and have one notch asymmetrically placed at either the corner or the base of the point. The linear character of the blade edges and the base, in addition to the size of the points, is given in Table 12. (Plate 2,V)

Group VI: Pentagonal

Group VI, Pentagonal points, have five sides resulting from a slight indentation of the blade edges. The linear character of the blade edges above the indentation and the linear character of the base are used as the subdivisions within this group. The size is also given in Table 13. (Plate 2,VI)

Group VII: Leaf

The projectile points within Group VII are roughly triangular in outline with a marked excurvate base. The group is subdivided on the basis of the linear character of the blade edges and the size of the projectile. (See Table 14) (Plate 3,VIII)

Group VIII: Bi-point

Group VIII consists of only one projectile point which is pointed at

both the tip and the base. The point has four blade edges which approximate a diamond-shaped outline. It is 4.6 cm. long. (See Table 15) (**Plate 3,VIII**)

Group IX: Large Point

There are two Large Points in the collection, both measure over 9 cm. in length and are bi-pointed. One of the points has two excurvate blade edges. The other point has four edges: two straight edges which form the upper portion of the point and two excurvate edges which form the base. (See Table 16) (**Plate 3, IX**)

Table 8

Projectile Points Group I

CORNER NOTCH	45-KT-28 Housepit 18	Stratum A-1	Stratum A-2	Housepit 32	Housepit 11	Total 45-KT-28	Housepit 2 (GR-68)	TOTAL 45-KT-28 45-GR-68
A. Tapering stem								
1. <2 cm.								
a. Incurvate bld. ed.	1	-	-	-	-	1	-	1
b. Excurvate bld. ed.	1	-	-	-	-	1	-	1
2. 2-3 cm.								
Asymmetrical bld. ed.	1	-	-	-	-	1	-	1
3. 3-4 cm.								
Excurvate bld. ed.	-	-	1	1	-	2	1	3
4. 4-5 cm.								
Incurvate bld. ed.	-	-	1	-	-	1	-	1
B. Straight to expanding stem								
1. <2 cm.								
a. Straight bld. ed.	-	-	-	-	1	1	-	1
b. Incurvate bld. ed.	1	-	-	-	-	1	-	1
c. Excurvate bld. ed.	1	-	-	-	-	1	-	1
d. Asymmetrical bld. ed.	-	-	-	-	-	-	1	1
2. 2-3 cm.								
a. Straight bld. ed.	-	-	4	-	-	4	-	4
b. Incurvate bld. ed.	2	-	-	-	-	2	-	2
c. Excurvate bld. ed.	1	-	4	-	-	5	-	5
d. Recurve bld. ed.	-	-	-	1	-	1	-	1
e. Asymmetrical bld.ed.	3	-	2	1	-	6	1	7
3. 3-4 cm.								
a. Straight bld. ed.	-	-	-	-	-	-	1	1
b. Incurvate bld ed.	1	-	1	-	-	2	-	2
c. Excurvate bld. ed.	1	-	1	1	-	3	-	3
d. Recurve bld. ed.	1	-	-	-	-	1	1	2
e. Asymmetrical bld.ed.	2	-	-	-	-	2	-	2
4. 4-5 cm.								
Straight bld. ed.	1	-	-	-	-	1	-	1
5. 5-6 cm.								
a. Straight bld. ed.	-	-	2	-	-	2	-	2
b. Excurvate bld.ed.	-	1	-	1	-	2	-	2
C. Tapering stem with lateral barbs 4-5 cm.								
1. Incurvate bld. ed.	-	-	1	-	-	1	-	1
2. Excurvate bld. ed.	-	-	1	-	-	1	-	1
3. Asymmetrical bld. ed.	1	-	1	-	-	2	-	2
Totals in Housepits & Strata	18	1	19	5	1	44	5	49

Table 9

Projectile Points Group II

BASAL NOTCH	45-KT-28 Housepit 18	Stratum A-1	Stratum A-2	Housepit 32	Housepit 11	Total 45-KT-28	Housepit 2 (GR-68)	TOTAL 45-KT-28 45-GR-68
A. Straight blade edges								
1. <2 cm. Stem notch	-	-	1	-	-	1	-	1
No stem notch	-	-	2	-	-	2	-	2
2. 2-3 cm. Stem notch	2	-	2	2	-	6	1	7
No stem notch	9	10	6	1	1	27	10	37
3. 3-4 cm. Stem notch	1	-	-	-	-	1	-	1
No stem notch	2	-	1	-	-	3	-	3
B. Incurvate blade edges								
1. < 2 cm. Stem notch	-	-	1	-	-	1	-	1
No stem notch	1	-	1	-	-	2	-	2
2. 2-3 cm. Stem notch	4	2	3	3	1	13	-	13
No stem notch	16	4	4	3	1	28	5	33
3. 3-4 cm. Stem notch	3	1	4	1	-	9	-	9
No stem notch	6	3	2	2	1	14	2	16
C. Excurvate blade edges								
1. <2 cm. Stem notch	-	-	-	-	-	-	-	-
No stem notch	1	1	-	-	-	2	-	2
2. 2-3 cm. Stem notch	-	-	-	-	-	-	-	-
No stem notch	5	2	3	-	2	12	3	15
3. 3-4 cm. Stem notch	-	-	3	-	-	3	-	3
No stem notch	2	-	-	-	-	2	-	2
D. Recurve blade edges								
1. 2-3 cm. Stem notch	1	-	1	-	-	2	-	2
No stem notch	1	1	-	1	-	3	1	4
2. 3-4 cm. Stem notch	-	-	-	-	-	-	-	-
No stem notch	1	-	-	-	-	1	-	1
E. Asymmetrical blade edges								
1. <2 cm. Stem notch	-	-	-	-	-	-	-	-
No stem notch	1	-	-	-	-	1	-	1
2. 2-3 cm. Stem notch	3	1	-	-	-	4	-	4
No stem notch	6	1	-	1	-	8	4	12
3. 3-4 cm. Stem notch	-	1	-	-	-	1	-	1
No stem notch	-	-	-	3	-	3	-	3
4. 4-5 cm. Stem notch	1	-	-	-	-	1	-	1
No stem notch	-	-	-	-	-	-	-	-

Table 9 cont.

Basal Notch	45-KT-28 Housepit 18	Stratum A-1	Stratum A-2	Housepit 32	Housepit 11	Total 45-KT-28	Housepit 2 (GR-68)	TOTAL 45-KT-28 45-GR-68
F. Broad stem and blade								
1. Incurvate blade edges								
4 cm. Stem notch	-	-	-	-	-	-	-	-
No stem notch	-	-	1	-	-	1	-	1
2. Excurvate blade edges								
a. 2-3 cm. Stem notch	-	-	1	-	-	1	-	1
No stem notch	-	-	-	-	-	-	1	1
b. 3-4 cm. Stem notch	-	-	-	-	-	-	-	-
No stem notch	1	-	-	-	-	1	-	1
3. Asymmetrical blade edges								
a. 2-3 cm. Stem notch	-	-	-	-	-	-	-	-
No stem notch	-	-	1	-	-	1	-	1
b. 3-4 cm. Stem notch	1	-	-	-	-	1	-	1
No stem notch	-	-	-	1	-	1	-	1
G. Wide notches								
1. Straight blade edges								
2-3 cm.	1	-	-	-	-	1	-	1
2. Recurve blade edges								
2-3 cm.	1	-	-	-	-	1	-	1
3. Asymmetrical blade edges								
2-3 cm.	-	-	-	-	1	1	-	1
H. Broken projectile points								
2-3 cm. Stem notch	1	1	-	-	-	2	-	2
No stem notch	3	1	2	-	-	6	-	6
Totals in Housepits & Strata	74	29	39	18	7	167	27	194

Table 10

Projectile Points Group III

SIDE NOTCH	45-KT-28 Housepit 18	Stratum A-1	Stratum A-2	Housepit 32	Housepit 11	Total 45-KT-28	Housepit 2 (GR-68)	TOTAL 45-KT-28 45-GR-68
A. Small side notch								
2-3 cm.								
Straight-excurvate bld ed.								
1. Straight base	1	-	-	-	-	1	-	1
2. Excurvate base	1	-	-	-	-	1	-	1
3. Broken base	-	-	-	-	-	-	1	1
B. Large side notch								
1. 3-4 cm.								
Straight-excurvate bld. ed.								
a. Straight base	-	-	1	-	-	1	-	1
b. Excurvate base	1	-	-	-	-	1	-	1
2. > 4 cm.								
Excurvate blade edges								
Excurvate base								
Broken	-	-	-	-	1	1	-	1
Totals in Housepits & Strata	3	-	1	-	1	5	1	6

Table 11

Projectile Points Group IV

TRIANGULAR	45-KT-28 Housepit 18	Stratum A-1	Stratum A-2	Housepit 32	Housepit 11	Total 45-KT-28	Housepit 2 (GR-68)	TOTAL 45-KT-28 45-GR-68
A. Straight-excurvate bld. ed.								
1. 2-3 cm.								
a. Straight base	2	2	-	-	-	4	3	7
b. Excurvate base	9	4	2	-	2	17	3	20
2. 3-4 cm.								
a. Straight base	3	-	2	1	-	6	-	6
b. Excurvate base	4	2	2	2	-	10	2	12
3. 4-5 cm.								
a. Straight base	-	-	1	-	-	1	-	1
b. Excurvate base	1	-	-	-	-	1	-	1
4. 5-6 cm.								
Excurvate base	1	-	-	-	1	2	-	2
5. 8-9 cm.								
Excurvate base	-	-	1	-	-	1	-	1
6. Broken								
a. Straight base	1	-	-	-	-	1	1	2
b. Excurvate base	-	1	-	-	-	1	-	1
B. Incurvate blade edges								
1. 2-3 cm.								
Excurvate base	2	1	-	-	-	3	-	3
2. 3-4 cm.								
a. Straight base	-	-	1	-	-	1	-	1
b. Incurvate base	-	-	1	-	-	1	-	1
c. Excurvate base	1	-	1	-	-	2	-	2
3. 4-5 cm.								
Excurvate base	-	-	1	1	-	2	-	2
4. Broken								
Excurvate base	1	-	-	1	-	2	1	3
Totals in Housepits & Strata	25	10	12	5	3	55	10	65

Table 12

Projectile Points Group V

ASYMMETRICAL NOTCH	45-KT-28 Housepit 18	Stratum A-1	Stratum A-2	Housepit 32	Housepit 11	Total 45-KT-28	Housepit 2 (GR-68)	TOTAL 45-KT-28 45-GR-68
A. Asymmetrical corner notch								
1. Straight blade edges 3-4 cm. Straight base	-	-	1	-	-	1	-	1
2. Incurvate blade edges 2-3 cm. Straight base	-	-	1	-	-	1	-	1
3. Asymetrical blade edges (straight and incurvate) 3-4 cm. Straight base	-	-	1	-	-	1	-	1
B. Asymmetrical basal notch								
1. Straight-excurvate bld. ed. 2-3 cm. Straight base	-	-	1	-	1	2	-	2
2. Incurvate blade edges								
a. 2-3 cm. Straight base	1	-	-	-	-	1	-	1
b. 3-4 cm. Excurvate base	-	1	-	-	-	1	-	1
C. Asymmetrical notch broken								
Straight blade edges								
1. 1-2 cm. Excurvate base	-	-	-	-	-	-	1	1
2. 2-3 cm.								
a. Straight base	-	-	1	-	-	1	-	1
b. Excurvate base	1	-	-	-	-	1	-	1
Totals in Housepit & Strata	2	1	5	-	1	9	1	10

Table 13

Projectile Points Group VI

PENTAGONAL	45-KT-28 Housepit 18	Stratum A-1	Stratum A-2	Housepit 32	Housepit 11	Total 45-KT-28	Housepit 2 (CR-68)	TOTAL 45-KT-28 45-CR-68
A. 2-3 cm.								
Asymmetrical blade edges								
Straight-excurvate base	1	1	-	-	-	2	2	4
B. 3-4								
1. Excurvate blade edges								
Incurvate base	-	-	-	-	1	1	-	1
2. Straight-excurvate bld. ed.								
Excurvate base	1	-	-	-	-	1	-	1
C. 4-5 cm.								
Asymmetrical blade edges								
Excurvate base	-	-	1	-	-	1	1	2
D. 5-6 cm.								
1. Straight blade edges								
Excurvate base	-	-	-	-	-	-	1	1
2. Incurvate blade edges								
Excurvate base	-	-	1	-	-	1	-	1
3. Excurvate blade edges								
Excurvate base	-	1	1	-	-	2	-	2
E. 6-7 cm.								
Excurvate blade edges								
Excurvate base	-	-	-	-	-	-	1	1
F. Broken								
Straight-excurvate bld. ed.	-	-	-	-	-	-	1	1
Totals in Housepits & Strata	2	2	3	-	1	8	6	14

Table 14

Projectile Points Group VII

LEAF	45-KT-28 Housepit 18	Stratum A-1	Stratum A-2	Housepit 32	Housepit 11	Total 45-KT-28	Housepit 2 (GR-68)	TOTAL 45-KT-28 45-GR-68
A. Straight-excurvate bld. ed. 4-5 cm.	-	-	1	-	-	1	-	1
B. Excurvate blade edges								
1. 3-4 cm.	1	-	-	-	-	1	-	1
2. 4-5 cm.	-	-	1	-	-	1	-	1
3. 5-6 cm.	1	-	1	-	-	2	-	2
Totals in Housepits & Strata	2	-	3	-	-	5	-	5

Table 15

Projectile Points Group VIII

BI-POINT								
Four blade edges 4.6 cm.	-	-	-	-	1	1	-	1

Table 16

Projectile Points Group IX

LARGE POINTS								
A. 9 cm. Bi-pointed Two edges Excurvate blade edges	-	-	-	1	-	1	-	1
B. 9.5 cm. Bi-pointed Four edges Two straight blade edges Two excurvate blade edges	-	-	1	-	-	1	-	1

Summary

Among the three hundred and forty-six classifiable projectile points there are six recurring groups: Corner notched, Basal Notched, Side Notched, Triangular, Asymmetrical Notched, and Pentagonal. These six groups were identified in both sites. Five Leaf projectile points and one Bi-point projectile point, Groups VII and VIII, were recovered from 45-KT-28, but none were found at 45-GR-68. The distribution of all of the groups of projectile points is presented in Table 17. The percentage of each group of projectiles relative to the total number of points found within the housepits and strata is also presented in the same table. If one compares the percent distribution of seven of the groups (Groups VIII and IX containing a total of three points, being omitted) among the four housepits, the marked similarity of the distribution is easily visible as evidenced by Chart 1.

Projectile points, though considered a diagnostic trait showing change through time and space, here point not to diversity but to a general consistency over a limited geographical area and during a relatively short period of time. Thus, if one could compare diversities and similarities within different cultural traits with each other, it could be said that though these people lived in different styles of houses they produced similar kinds and relative quantities of arrowheads.

By subdividing the groups of projectile points on the criteria presented above there appears to be greater diversity between the different housepits. However, only a few projectile points fall within each subdivision and thus it is difficult to determine the significance of the variation based upon these secondary attributes.

TABLE 17

PROJECTILE POINTS	45-KT-28 Housepit 18		Stratum A-1		Stratum A-2		Housepit 32		Housepit 11		Total 45-KT-28		45-GR-68 Housepit 2		TOTAL 45-KT-28 45-GR-68	
Group I Corner Notched	18	14.3	1	2.3	19	22.9	5	17.2	1	6.6	44	14.9	5	10.0	49	14.1
Group II Basal Notched	74	58.7	29	67.4	39	47.0	18	62.0	7	46.6	167	56.4	27	54.0	194	56.1
Group III Side Notched	3	2.4	--	----	1	1.2	--	----	1	6.6	5	1.7	1	2.0	6	1.7
Group IV Triangular	25	19.8	10	23.2	12	14.5	5	17.2	3	20.0	55	18.6	10	20.0	65	18.8
Group V Asymmetrical Notched	2	1.6	1	2.3	5	6.0	--	----	1	6.6	9	3.0	1	2.0	10	2.9
Group VI Pentagonal	2	1.6	2	4.6	3	3.6	--	----	1	6.6	8	2.7	6	12.0	14	4.0
Group VII Leaf	2	1.6	--	----	3	3.6	--	----	--	----	5	1.7	--	----	5	1.4
Group VIII Bi-point	--	----	--	----	--	----	--	----	1	6.6	1	0.3	--	----	1	0.3
Group IX Large Point	--	----	--	----	1	1.2	1	3.4	--	----	2	0.7	--	----	2	0.6
Totals in Housepits and strata	126		43		83		29		15		296		50		346	
Percent of total points in Housepits and strata	36.4		12.4		24.0		8.4		4.3		85.5		14.5		100.0	

PROJECTILE POINTS

GROUP I

CORNER NOTCHED

GROUP II

BASAL NOTCHED

GROUP III

SIDE NOTCHED

GROUP IV

TRIANGULAR

GROUP V

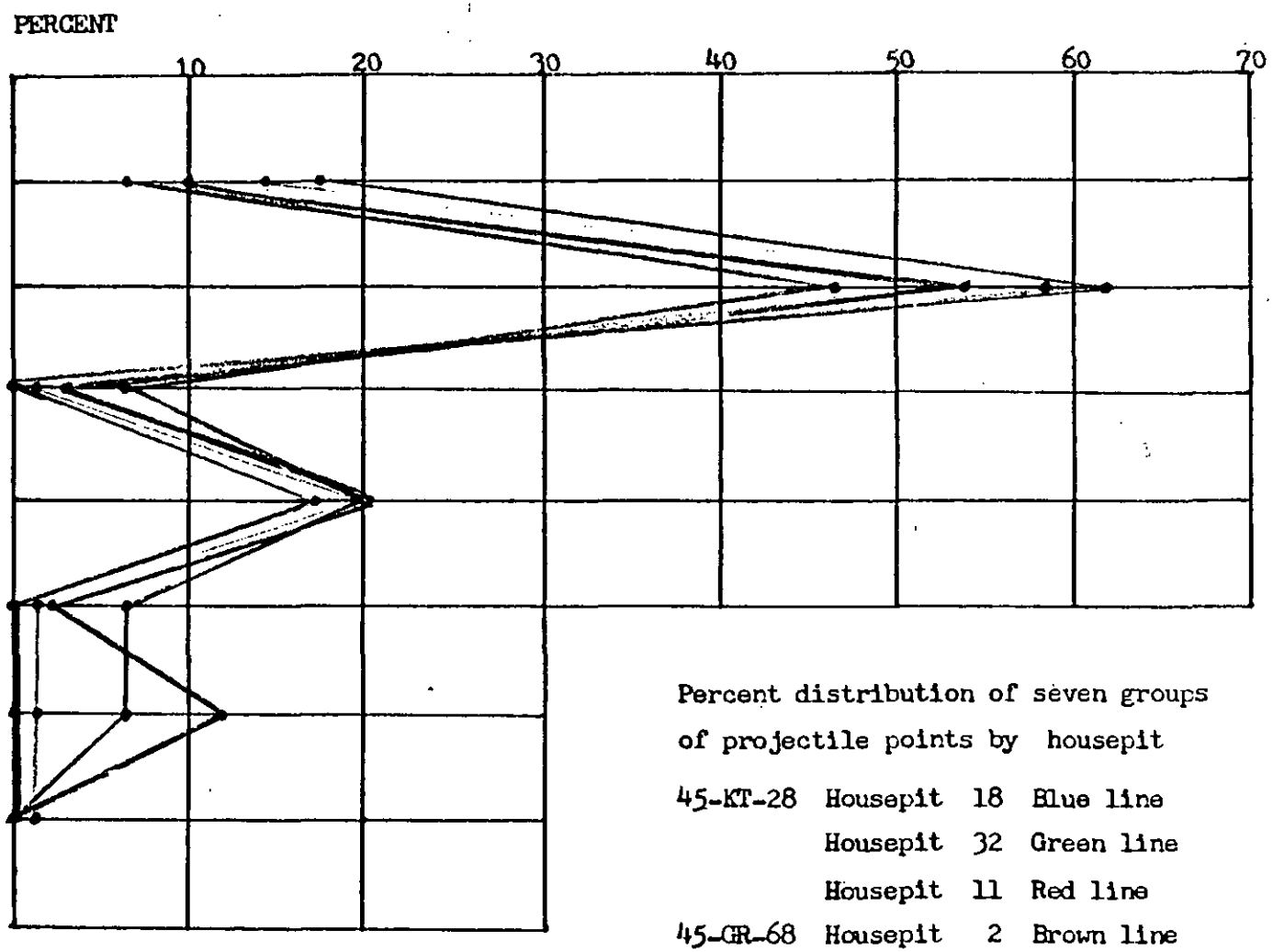
ASYMMETRICAL NOTCHED

GROUP VI

PENTAGONAL

GROUP VII

LEAF



Percent distribution of seven groups of projectile points by housepit

45-KT-28 Housepit 18 Blue line
Housepit 32 Green line
Housepit 11 Red line
45-GR-68 Housepit 2 Brown line

CHART 1

STONE TOOLS

PART II:

DESCRIPTIVE ANALYSIS OF UNIFACIAL AND BIFACIALLY RETOUCHED STONE TOOLS

The majority of tools from the Sunset Canyon and Crescent Bar Sites are unifacially and bifacially retouched flakes and cores, frequently referred to as scrapers and knives or by such terms as irregularly retouched flakes. Rather than make a basic division of these tools into well formed tools, for example "thumbnail scraper," which are well described and then lump the remainder as "irregularly retouched flakes," all of these tools will be described in detail and by a common system of descriptive analysis.

It is hoped, by employing a detailed descriptive analysis, that: (1) these kinds of tools may prove to have certain diagnostic qualities which will aid in the definition of both the archaeological component and phase, i.e., there will be evidence of both time and space variability in these tools; or (2) in lieu of number (1) that within the universe in which this study is being made there are no significant or important changes in these tools, but the frequency of occurrence and not just the presence of the different classes of tools can be used in defining the phase which I am here postulating or (3) in lieu of (1) and (2) that this kind of tool, either as a result of the general functional nature of the tools themselves or the descriptive system being employed, show no significant or important diagnostic qualities.

A goodly portion of the descriptive analysis employed here is founded on Francois Bordes' work, Typologie Du Paleolithique (1961). This system was altered and additions were made to accommodate our collections by Diane Gordon. Through the employment of the revised system, I have further altered it, making it, I believe, more applicable to the study at hand and other comparable collections, i.e., unifacially and bifacially retouched stone tools. Even with two alterations both making additions and changes, the descriptive system still shows a marked resemblance to Bordes' original work.

There are several assumptions underlying this descriptive system as it is employed here, and they should be stated and discussed prior to the presentation of the system itself.

(1) No explicit assumption is being made concerning whether or not the stone tools were hafted or used in hand without a haft. The collections of tools presently under study were obtained from sites in which bone and antler were well preserved. If these tools were hafted in bone or antler, there would be, I think, ample evidence. The other possibilities are that the tools were hafted in wood or used in the hand. None of the specimens have indications of pitch or other hafting substances on them, but neither do the projectile points which are found unhafted in these sites. There is no clear evidence one way or the other as to whether these tools were hafted, except the probability that the majority were not hafted in bone or antler hafts. There is, in the collection from 45-KT-28, HP 18, however, one antler haft which would be suitable as a haft for some of these

tools, but these tools far outnumber this one haft.

(2) All of the tools classed are dealt with as if they were complete, i.e., finished tools. This assumption has been made to reduce the usage of subjective criteria by eliminating conjecture concerning (a) whether the tool is actually a fragment, (b) the finished appearance of the tool if it is determined to be a fragment, and (c) if the tool is unfinished. Thus the analysis is made on essentially observable and directly measurable traits of all retouched flakes and cores. It is also possible that the tools which appear to have been broken could have been utilized in their present condition and often show signs of reworking or subsequent use. But there is another even more valid justification in terms of the system itself for the use of the possible fragments in the analysis. If the attributes on which any descriptive system is founded are present, even though the tool may be a fragment, the tool can justifiably be included and accommodated by the descriptive system. For example, if a descriptive system dealing with projectiles is founded on the attributes of the bases of the projectiles, e.g., corner notched, and one has only the base of a projectile, it can be justifiably dealt with within the system. As discussed in the following assumptions, this system is based on distinguishing edges and basic form. If a distinguishing edge can be ascertained even though the tool appears to be broken, it can be included within this analysis. If the distinguishing edge is not present, it is very possible that the flake would have been placed in a level bag and called detritus. By using all the stratified retouched flakes and cores available in the collection regardless of their appearance as possible fragments, we may be able to gain some insight into and meaning out of these great amounts of tools which are so commonly found in sites.

(3) An often unwritten assumption made by archaeologists when

working with stone tools will be employed as one of the basic assumptions of the present descriptive analysis: a distinguishing edge or edges can be ascertained and that the distinguishing edges are one of the traits most indicative of function, thus the raison d'etre of the tool. The artifact class will be determined by the distinguishing edge.

(4) The other basic assumption concerns a set of criteria which cross-cuts the distinguishing edge criterion. This second set of criteria concerns the different techniques of manufacturing resulting in what will here be called different "basic forms." There will be distinguished five basic forms: unifacial, semi-biface I, II, III, and bifacial. It is assumed that through the maker's selection of the flake, the particular edges and faces of the flake for additional working, and the additional workmanship itself, these five basic forms represent tools having distinguishing (or functional) edges exhibiting the same configuration of traits. The result of this assumption is the establishment of analogous classes based on distinguishing edges containing artifacts resulting from slightly different techniques of manufacture. Throughout the analysis the basic forms will be distinguished, but it should be understood that a given class of tools may contain all five of these basic forms, as the basic forms may include a variety of distinguishing edges. As there may be variation in time and space of the distinguishing edges, so may there also be analogous variation in the basic form. It is also possible that the basic form may merely be a result of the kind of material used and/or the form of the flake which was struck off the core, thus if either of these vary, so will the basic form in order to produce the desired working edge.

The descriptive system has been designed to deal with those flakes of stone which show evidence of additional modification either by per-

cussion and/or pressure retouch after they have been removed from their parent core. Thus flakes exhibiting flake scars resulting only from the removal of flakes from the parent core prior to the removal of the flake are not taken into consideration in this analysis. However, these scars will be considered if there is evidence of additional modification of the flake after its removal from the parent core. One obvious difficulty may arise when using this inclusion criteria if the collection of tools under study contains "blades," i.e., in the sense employed by Old World archeologists to designate thin, narrow prismatic flakes with essentially parallel sides which were struck from specially prepared cores. The all over dimensions of the blade have been intentionally created or planned for by the maker, but prior to the removal of the flake from the core, and additional modification may or may not be undertaken after the blades are detached. If there were blades in this collection, for clarity of presentation they would not be included within this descriptive system but handled separately.

The system has also been designed to accommodate stone cores which have indications of additional pressure or percussion retouch other than those scars resulting from the production of flakes for other potential tools, i.e., a core-tool in contrast to a flake-tool. The core and the flake scars on the core will only be taken into consideration if the additional modification is present.

The descriptive system has a broad two-fold division. The criteria for one part of the system is founded on the total configuration of the stone tool, i.e., the appearance of both faces and all edges of the implement. The second part of the system is based only upon the distinguishing edges of the implement. Both parts are employed at the same time and work in a complementary relationship to one another.

TOTAL CONFIGURATION OF THE IMPLEMENT

Two sets of attributes have been devised in order to deal with the total configuration of the tool. The first set of attributes describes the degree of conformation of the tool. If the overall dimensions of the tool have been purposely created, that is, they are the result of intentional modification, the tool is referred to as Uniform. For example, all the major edges of a given uniform artifact are worked; it has relatively the same thickness over its total length, and the total outline or form appears to be the result of intentional shaping. Ideally, projectiles, drills and drill-gravers would also be included in the "uniform" classification; however, for the purpose of clarity in presentation these three kinds of tools will be described separately. If the tool has one or more distinguishing edges but not all the major edges are considered distinguishing edges, e.g., unworked edges, and the overall dimensions of the tool have not been intentionally shaped by the maker after the flakes removal from the parent core, the tool is referred to as Amorphous (lacking definite allover form). If the tool is retouched randomly along its edges or on its faces so that no distinguishing edges are assessable, the tool is referred to as Variable, i.e., unclassifiable artifacts.

The second set of attributes dealing with total configuration primarily concerns the method of manufacture used to produce the finished tool. The criteria is based on the area and/or the relative degree of both pressure and percussion retouching. Five divisions have been devised to handle this classification: Unifacial, Semi-bifacial I, II, III and Bifacial.

UNIFACIAL: All pressure and percussion retouching is largely confined to one face of the tool. The other face of the tool is formed by one or two

large flake scars. Alternate face retouching along a single edge is included under this classification if the alteration does not occur after the removal of each small flake. For example, a given edge may be retouched for one-half its length on one face and then retouched on the alternate face the remainder of its length, i.e., the retouching does not occur on both faces of the same portion of the same edge. Also included under this classification are tools retouched on two or more edges on both faces as long as the retouching is not opposite, that is, at the same place on the same edge.

SEMI-BIFACE I: All pressure and percussion retouching is largely confined to the edges of the tool. The faces of the tool are formed by one or two large flake scars, but a given edge(s) of the tool is retouched on both faces of the same portion of the same edge. There is no attempt to form or thin down the tool by retouching the faces. The only distinguishing modification is that done to form the working edge of the tool. This does not exclude the possibility that there may also be a unifacial edge on the tool, but due to the bifaciality of the one edge the tool is termed semi-biface. The unifacial edge will be noted when dealing with distinguishing edges.

SEMI-BIFACE II: Flake scars are evident over the majority of only one face, but a given edge is retouched on both faces. In addition to the formation of the edges by retouching, one face of the tool has been thinned down. Thinning in this context does not necessarily mean thin or thinness. This method of workmanship can, in addition to producing a bifacial edge, produce a unifacial edge. This will be noted when dealing with distinguishing edges, but the tool will still be classified as a semi-biface due to the total configuration of the workmanship.

SEMI-BIFACE III: Flake scars are evident over the majority of both faces, but one face shows a greater concentration of flake scars, i.e., more intersecting flake scars (both faces do not exhibit the same quantity and quality of workmanship). Thus, in addition to the possible retouching of the edges of the tool, there is evidence of bifacial thinning. The edge retouching does not necessarily have to be on both faces of the artifact, thus a unifacial edge could exist on a semi-biface III artifact, but so far few such tools have been discerned.

BIFACIAL: Both faces of the tool are retouched in essentially the same manner and to the same degree forming a true bifacial tool. There are flake scars over the majority of both faces and along major edges of the tool. Complete bifacial thinning is evident. (See Chart 2, p. 108)

DISTINGUISHING EDGE(S)

The distinguishing edge or edges of a tool are determined by the degree of retouch exhibited on the edges of the tool relative to the other edges of the same tool. For example, a tool may exhibit one convex edge finely retouched by pressure flaking, while the remaining edges are unretouched or retouched sporadically (variable). The distinguishing edge of the tool is then the convex edge, and the tool will be classed according to this edge. In each case the distinguishing edge is determined relative to the other edges of the same tool and not according to other tools which may be placed in the same classification, thus no absolute degree of retouch is designated for any given category. It is reasoned, for example, that a finely retouched convex edge with accompanying attributes can function in the same manner as another tool not as well made but exhibiting a convex edge with the same configuration of accompanying attributes. Regardless of the quality of workmanship,

tools with the same configuration of distinguishing edge attributes are comparable and can be placed in the same category.

Four sets of attributes have been employed to deal with those traits of the distinguishing edge which are felt to be the most diagnostic. There are (1) linear character of edge, (2) uniface or biface edge, (3) degree of angle of edge, and (4) orientation of tool (distinguishing edge) to flake.

LINEAR CHARACTER OF THE DISTINGUISHING EDGE

Three descriptive terms will be employed singly and in combination to describe the linear character of the distinguishing edge. These are: convex, concave and straight.

CONVEX: A single convex edge is an edge which curves outwardly away from the main body of the tool. This edge typically forms a minor arc, that is, an arc which is less than a semi-circle. If the arc forms a major arc, or a semi-circle, it is no longer considered a single edge; rather the curvature is considered as two convergent edges (See criteria of converging).

CONCAVE: A single concave edge is an edge which curves inwardly toward the main body of the tool. The edge can form a curvature ranging from a minor to a major arc. Differentiation has been made and noted between a small concavity with a cord less than one centimeter and a large concavity with a cord more than one centimeter. The smaller concavity is often referred to as a "spoke shave."

STRAIGHT: A single straight edge is an edge whose linear representation is a straight or relatively straight line, so that the majority of the points along the linear edge are contiguous to a straight line of reference.

According to the ascertained linear character of all the distinguishing edges of a tool, the tool can be viewed as simple, that is, all the distinguishing edges have the same linear character, e.g., bi-concave; or composite, that is, the distinguishing edge(s) are a combination of two or more different linear characteristics, e.g., bi-concave-convex.

To describe the relationships of two or more distinguishing edges of a tool, a descriptive term and two prefixes are employed: Converging, Bi-, and Tri-.

CONVERGING: A tool is said to have convergent edges if two distinguishing edges meet at a point to form a major arc or an angle ranging in size from an obtuse to an acute angle. In the case of a major arc the point of convergence is undetectable, thus the point of convergence has been designated as falling on an axis of the tool which would divide the continuous edge into equivalent sections. The angle of convergence of the uniform tool has been noted, but this attribute has not been employed when dealing with the amorphous tools with convergent edges.

BI- : A tool is said to have "bi-" edges if two distinguishing edges are noncontiguous or nonadjacent.

TRI- : A tool is said to have "Tri-" edges if there are three edges which can be said to be distinguishing edges. These edges may be in combination, for example, a converging-convex and a single concave edge or they can be three separate edges, for example tri-concave. The tri-edge tools are recorded in the same manner as the uniform tools (See description of uniform tools). In this way reoccurring combination of edges can be more readily seen and comparisons made.

Due to the complexity of the linear character of the uniform tools,

a slightly different method of notation has been employed to describe tools so defined. The terms employed for the description are identical: convex, concave, and straight, so that comparisons can easily be made between the uniform and the amorphous tools. For example, comparisons can be readily made to determine if there are similarities in the kinds and ways of combining the linear character of the distinguishing edges. A set of symbols will be employed to describe both the linear character and the points of convergence of the uniform tools.

To maintain a consistency in the order in which edges are to be described a starting point must be identified. In order to do this two additional descriptive terms will have to be defined. These are dorsal and ventral.

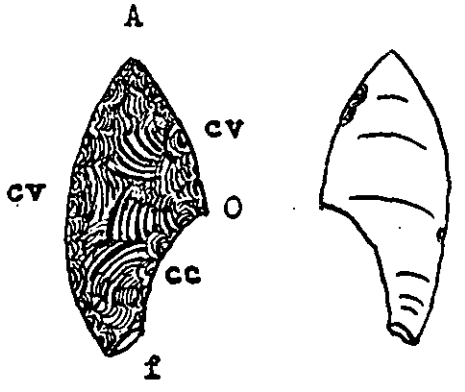
VENTRAL: The ventral face of a tool with little modification after the flake was detached from the core is easily determined. A face is said to be the ventral face if it exhibits the bulb of percussion, i.e., it can be determined that this face was created when the flake was struck off. If the bulb of percussion is not present, the longitudinal axis of the face having the greater concavity, i.e., the appearance of the depression or concavity which occurs just below (further from the point of impact) the bulb of percussion, will be called the ventral face. If the tool is extensively retouched and the above attributes are not visible, the ventral face is said to be the face of the tool showing the least number of intersecting flake scars (with the general exception of bifacial artifacts) and/or the face that is relatively less convex, that is, it is more plane or concave than the opposite face.

DORSAL: A face of the tool is referred to as dorsal when its attributes are opposite those used to define the ventral face of the tool, or simply the face of the tool which is opposite the ventral face. It is the face

which does not show the bulb of percussion, thus was on the surface of the core before the flake was struck off. The longitudinal axis of the face is more convex than the opposite face. If the tool is extensively retouched, the ventral face is the face with the most intersecting flake scars and/or it is more convex than the opposite face. The designations dorsal and ventral will not always be applicable.

The lineal character of the edges of uniform tools will be described when viewing the tool with the ventral face down or underneath and the dorsal face up. With the tool in this position and the bulb of percussion at the bottom, the description will start with the left longitudinal side or edge of the tool and move in a clockwise direction. (See diagrams below.) The symbols which are employed are as follows:

Linear character		Points of convergence	
Convex	- cv	Arc	- K
Concave	- cc	Obtuse angle	- O
Straight	- st	Right angle	- R
Concave-convex single edge	- cc-cv	Acute angle	- A
Fracture plane	- f		



Ventral Dorsal

cv A cv O cc f

Figure 9

UNIFACIAL AND BIFACIAL EDGES

As discussed previously, even though a tool may be classed according to its total configuration as a semi-biface, it may have a unifacial edge. Because of this it will be noted when describing the edge of the tool whether it is unifacial or bifacial. It is reasoned that if the unifacial and bifacial edges do function differently, they should be dealt with individually as well as in combination. Neither edge will be considered dominant over the other edge, and the linear character of each will be described separately.

UNIFACE EDGE: The edge of a tool will be considered unifacial if the retouching occurs on only one face of that edge. Alternate face retouching along a single edge will be included as long as the alternation does not occur after the removal of each small flake, i.e., any given portion of the edge is retouched on only one face.

BIFACE EDGE: The edge of a tool will be considered bifacial if the retouching occurs on both faces of the same portion of the same edge.

ANGLE OF RETOUCH OF THE DISTINGUISHING EDGE

The angle of retouch of the distinguishing edge of a stone tool is here accepted as a valid trait. It is granted that there is a relatively high correlation between the angle of retouch and the thickness of the edge of the flake prior to retouching, but it is noted that this is not a one to one correlation. This is not the only reason for including this trait in the analysis. Though the angle of retouch is largely a function of the thickness of the edge of the flake, there is still the factor of

selection involved. If the maker of the tool desires a tool with a low angle of retouch in lieu of a medium or a high angle of retouch, it is reasoned that he would have selected an appropriately thin edge suitable to his needs and retouch it. As evidenced by both the detritus and the tools themselves, the makers of these tools were quite capable of producing flakes with a variety of edge thicknesses. To say that the angle of retouch is merely a function of the thickness of the flake without taking into account the selection factor is divorcing him from one of his most interesting traits: choice. For this and the above reason this trait will be included within the analysis.

The angle of retouch exhibited on these tools varies from less than twenty degrees to approximately ninety degrees and nearly forms a continuum though there is some clustering. Because of this, the continuum has been broken up in more or less convenient intervals for the purpose of description. The intervals are as follows:

a. 30° angle or less - low angle of retouch

b. 45° to 60° angle - medium angle of retouch

c. greater than 60° angle - high angle of retouch

Assignment of a tool to a specific group is based on the typical angle of the distinguished edge along the majority of its length. This angle is ascertained by direct measurement. Not all of the tools fall easily within the defined categories, thus arbitrary rules of assignment have been employed. The undefined distance between 30° and 45° has been left as an arbitrary distance since finer distinctions have not appeared to be any more significant. Tools which measure slightly greater than 30° but less than 45° have arbitrarily been assigned to the smaller (30°) angle group. Such assignments were made by comparing the questionable tools with the

defined specimens in both groups since variables, such as blunting through use often confounded the identifications. Distinguishing between 45° to 60° and over 60° has been accomplished by using 45° as the standard for the former group; and 60° as the standard for the latter group. A tool with an angle of 60° or greater was placed in the over 60° group and a tool whose edge measured between 45° and 60° was placed in the 45° to 60° group.

ORIENTATION OF THE TOOL TO THE FLAKE

Orientation as it is here employed refers to the relationship of the axis of the tool to the axis of the flake. The axis of the flake will be considered constant and two terms will be employed to describe the relationship of the tool to this axis.

The axis of the flake is an imaginary line extending from the point of impact and separates the cone of percussion and the coincidal fractures into two more or less equal parts.

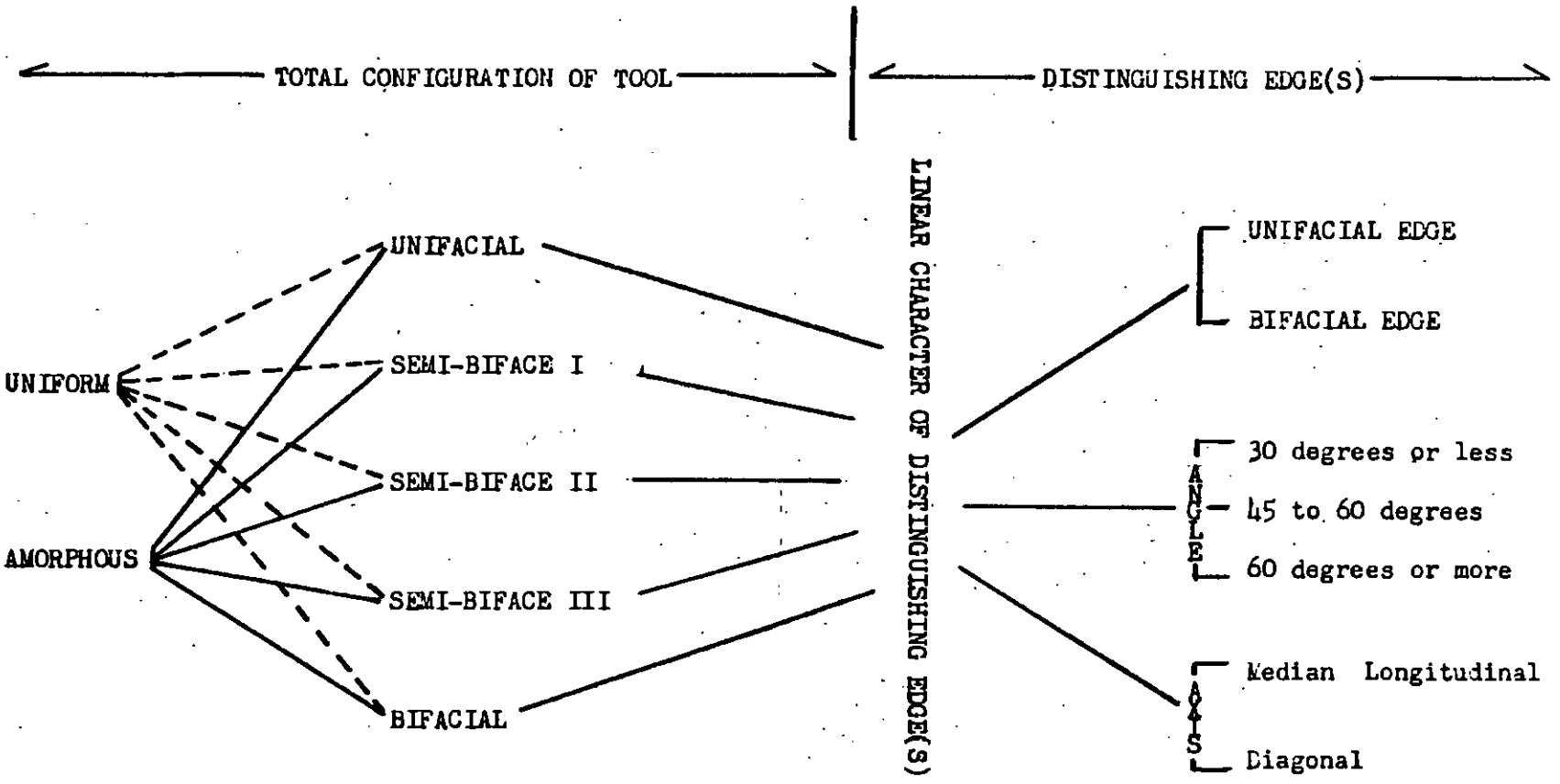
The axis of the tool is described as either MEDIAL LONGITUDINAL to the axis of the flake, that is, the majority of the distinguishing edge(s) are parallel to the axis of the flake. Or the axis of the tool is referred to as DIAGONAL, that is, the distinguishing edge(s) are nonparallel or diagonal to the axis of the flake.

One of the factors leading to the inclusion of this attribute is that the tool-makers appeared to have used the natural curvature of the ventral side of the flake as a functional element of scrapers (unifacially retouched tools) and drill-gravers. The distinguishing edges or points are oriented diagonally to the axis of the flake resulting in the tool being "beaked."

PRESENTATION

For the purpose of brevity in the presentation of the classification, a set of symbols is also employed when describing the amorphous tools. Each class of tools has two letter symbols and one number symbol. The first letter is a reminder; it refers to whether the tool is Uniform (U) or Amorphous (A). The second letter refers to the unifacial or bifacial characteristic of the distinguishing edge, (u) or (b). The number, which follows the second letter, refers to the lineal character of the distinguishing edge or edges. Eighteen different numbers are employed. For convenience and in order to present the descriptive system as a whole, these symbols will be presented in tabular form.(See charts 2 and 3).

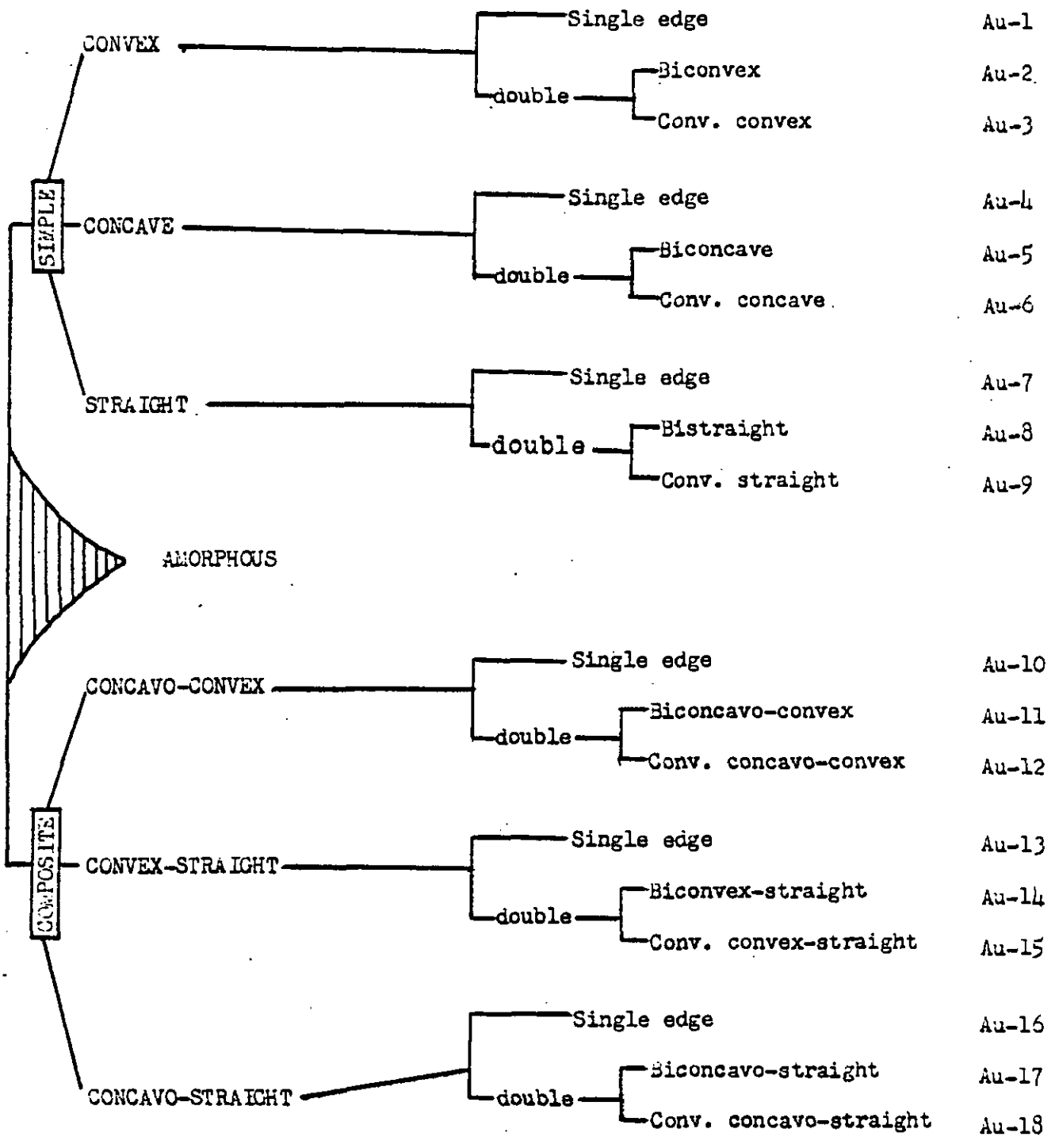
CHART 2



Summary of Descriptive Analysis of Unifacially and Bifacially Retouched Flakes and Cores

CHART 3

The following chart represents AMORPHOUS tools in any of the four basic forms which have a unifacial distinguishing edge(s). A similar chart could be constructed for amorphous tools which have a bifacial distinguish edge(s) by substituting Ab for Au.



PART I. UNIFORM TOOLS WITH DOMINANT BIFACE EDGE(S)

Forty-one uniform tools with dominant bifacial edge(s) can be discussed as a single group of tools. The traits which unify this group of tools are (1) the uniformity of the tools, (2) the dominant slightly convex to straight bifacial edge(s), and (3) the semi-bifaciality with a striking lack of fine secondary retouching which results in the tools having a roughed-out appearance. Three basic forms are represented among the different classes of tools: SB I, SB II, and SB III. The tools are roughly lenticular in transverse cross-section and range in size from L. 3.1 to 6.2 cm. and W. 2.5 to 4.0 cm. The thickness of the tools vary from 0.4 to 1.8 cm. In all-over linear character these tools range from triangular to oval to roughly round. Seven classes of uniform biface edge tools have been identified according to their linear character. (See Table 18, page 111). (Plate 5)

Classes I through V are approximately triangular in outline. Class VI is approximately oval in outline, and the outline of the tools in Class VII is approximately round. The angle of the edges of these tools is 45 to 60 degrees. None of the tools have an edge with an angle less than 45 degrees, but a few have edges with angles greater than 60 degrees. The s indications on the chart below are probably remnants of the striking platforms and the dominant edges of these tools run diagonal to this orientation.

There are two one-of-a-kind uniform tools with dominant biface edges.

TABLE 18

CLASS	Linear Character						Basic form	Dominant U & B edge(s)
	Side		Tip		Side		Base	
I.a	*s cv	A	s cv	A	st	A	SB III	All biface
I.b	s cv	A	s cv	A	st	A	SB II	B except 1 U
II	cv	A	cv	0	cv	0	SB 2,3	B and U
III	cv	A	st s	0	cv	0	SB 2,3	Biface
IV	cv	A	cc	0	cv	0	SB 2,3	Biface
V	cv	0	cv	0	s cv	0	SB III	Biface
VI	cv	0	cv	-	0	-	SB III	Biface
VII	continuous cv (roughly round)						SB III	Uniface

* s small flat area of the original surface, which could function as a bearing surface to apply pressure to the working edge of the tool.

Table 19

Distribution of Uniform Stone Tools w/
Dominant Biface Edges

Uniform Stone Tools w/ Dominant Biface Edges	45-KT-28 Housepit 18	Stratum A-1	Stratum A-2	Housepit 32	Housepit 11	Total 45-KT-28	Housepit 2 (GR-68)	TOTAL 45-KT-28 45-GR-68
Class I a	8	1	2	2	-	13	-	13
b	4	-	1	1	-	6	-	6
Class II	3	1	-	1	-	5	-	5
Class III	6	-	2	-	-	8	-	8
Class IV	-	-	3	-	-	3	-	3
Class V	1	-	1	-	-	2	-	2
Class VI	-	-	1	-	1	2	-	2
Class VII	2	-	-	-	-	2	-	2
Totals in Housepits & Strata	24	2	10	4	1	41	-	41

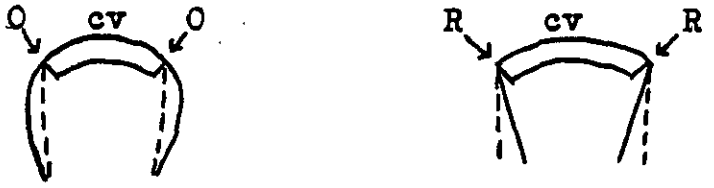
One of the tools, from the interior of Housepit 18 (Stratum B), could simply be described as a thick bipoint with a bifacial basic form and bifacial edges. Or, in terms of the descriptive system here employed, it would be described as: cv s A cc-cv A. The second tool was found outside and to the south of Housepit 18 in Stratum A-2. It has a bifacial basic form with bifacial edges. The tool is roughly rectangular in outline and would be described as follows: st R st R st R cv. Both of the tools are lenticular in cross-section, medial longitudinal in orientation, and have edges with a 45 to 60 degree angle.

Four of the uniform tools with bifacial basic forms appear to be broken projectile tips which have been re-worked into tools with small concave unifacial edges. The edge has over a 60 degree angle, and it is diagonal to the flake and to the main body of the tool. The concavity has less than one centimeter cord and could be referred to as a "spoke shave." The four tools were found outside of Housepit 18; three were recovered from Stratum A-1, and one was recovered from Stratum A-2. A tool which looks like the shaft or "blade" of a large knife or dagger, made on a tabular piece of petrified wood is unique. The tool (-/57) was recovered from occupation debris just outside of Housepit 2 at 45-GR-68. The basic form of the tool is SB II, and it has two bifacially retouched distinguishing edges. The distinguishing edges, one slightly convex and the other slightly concave, converge to form an acute angle. The maximum length of the tool is 14.2 cm. and the maximum width is 2.3 cm. The tabular piece of stone from which the tool was made is 0.9 cm. thick (measurement taken on the base of the tool). (Plate 4,A).

PART II. UNIFORM TOOLS WITH PROMINENT UNIFACE EDGES

Three form classes of uniform uniface edge tools have been identified according to the linear character of their distinguishing edges. Three "basic forms" are represented in these classes: Uniface, SB I and SB II. The two largest classes of tools have a dominant steeply retouched (45-60 plus degrees) convex uniface edge in common. Thirty-eight of the total forty-four uniform uniface edge tools belong to these two classes (86.3 percent). The distinction between the two classes is based on the lineal angle formed on either side of the dominant edge. The angle is either a right angle forming a sharp break in the linear character of the tool (15 of the 38 tools or 39.5 percent), or it is an obtuse angle forming a fairly smooth continuous line (23 of the 38 tools or 60.5 percent). On the majority of these tools, the longitudinal sides, formed by a convex or straight retouched edge, converge towards the base of the tool. The longitudinal sides of one tool in each class do not converge, that is, the sides are parallel. (Plate 3,I and II)

FIGURE 10



Class I Class II

TABLE 20

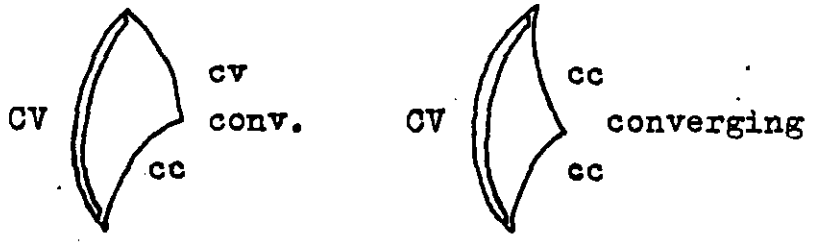
	Class I		Class II		Combined	
Basic Form						
Uniface	20	87.0%	10	66.6%	29	76.3%
SB I	0	—	4	26.6%	4	19.5%
SB II	3	13.0%	1	6.7%	4	10.5%
SB III	0	—	0	—	0	—

TABLE 20 (cont'd)

	Class I		Class II		Combined	
Prominent edge						
Uniface	23	100.00%	15	100.0%	38	100.0%
Convex	23	100.0%	15	100.0%	38	100.0%
45-60	9	39.1%	0	---	9	23.7%
60 plus	14	60.9%	15	100.0%	29	76.3%
Ware	9	39.1%	5	33.3%	14	36.9%
Longitudinal sides						
Contracting	22	95.7%	14	93.3%	36	94.7%
Straight	1	4.3%	1	6.7%	2	5.3%
Orientation						
ML	19	82.6%	12	80.0%	31	81.6%
Dia	3	13.0%	1	7.6%	4	10.5%
?	1	4.3%	2	13.3%	3	7.9%
Longitudinal X-sec.						
Plano-convex	4	17.4%	5	33.3%	9	23.7%
Concave-cv	19	82.6%	10	66.6%	29	76.3%

The third class of tools includes only five, or 11.3 percent of the uniform uniface tools. The class is distinguished by a single steeply retouched (45-60 plus degrees) convex edge which is accompanied by a converging cc-cc or cc-cv steeply retouched edges. (Plate 4,III)

FIGURE 11



The same lineal configuration occurs among the tri-edge amorphous tools. Eight such amorphous tools occur in the collection. According to our method of classification, these tools are referred to as a counterpart in the amorphous classification of the Class III uniform uniface tools.

There is one uniform uniface tool which cannot be included within the above three classes: a unifacial bi-convex tool (cc A cc A) with

a median longitudinal orientation and 60 plus degree angle of edge. In brief, it is a uniface bi-point, which was recovered from Housepit 2 at 45-GR-68. (Plate 3,A)

The above attributes are not entirely independent of one another. There is an expected correlation between the high percent of uniface basic forms and the prominent uniface edges. There is also a relationship between the medial longitudinal orientation and the high percentage of concave-convex longitudinal cross-section due to the fact that the orientation of the tool to the flake is primarily based on the relationship of the retouching to the bulb of percussion. Upon detaching the flake, the maker of the tool utilized the lower portion of the positive bulb of percussion in order to have a concavity on the under side of the tool. To achieve this, the maker had to orient the tool medial longitudinally to the flake. This technique of orientation was also employed in the manufacture of drill-gravers to obtain the beaked effect. In both cases the functional edge or point of the tool is at a right angle to the axis of the tool, that is, it is diagonal.

Also, as noted, the prominent edges of all the tools classed are unifacial, thus the semi-bifacial trait occurs only on the contracting or converging sides of the tools. In most cases, however, the convergence was obtained by unifacial workmanship. Only in cases where the base of the tool is thick relative to the rest of the tool was the tool worked on both faces, which supports the forth assumption stated in the presentation of this system at the beginning of Part II.

Table 21

Distribution of Uniform Uniface Stone Tools

Uniform Uniface Stone Tools	45-KT-28 Housepit 18	Stratum A-1	Stratum A-2	Housepit 32	Housepit 11	Total 45-KT-28	Housepit 2 (CR-68)	TOTAL 45-KT-28 45-CR-68
Class I	6	3	5	2	1	17	6	23
Class II	4	4	2	1	2	13	2	15
Class III	3	-	-	1	-	4	1	5
One-of-a-kind	-	-	-	-	-	-	1	1
Totals in Housepits & Strata	13	7	7	4	3	34	10	44

The analysis of the amorphous stone tools from 45-KT-28 and 45-GR-68 involved the study of sixteen-hundred and seventeen specimens exhibiting twenty-three-hundred and fifty-three distinguishing edges. In order to facilitate the presentation of this data, a series of tables and charts follow. The tables present in addition to the data itself, its numerical and proportional distribution by housepit and the two strata associations at 45-KT-28. The charts graphically illustrate the proportional distributions between the housepits.

The analysis of this body of tools indicates that within this Universe, these tools have some diagnostic value. The distributions of the tools and attributes studied exhibit similar tendencies among the four housepits and to a slightly lesser extent among the two strata associations. As would be expected, however, not all of the attributes studied show the same degree of or the same similarities of distribution. The analysis has been useful in defining the components and allowing comparisons to be made between the components for the purpose of inclusion into one phase. But even so, it is difficult to determine from this study whether this kind of analysis of these tools both in kind and quantity will be of diagnostic value in distinguishing the components of this phase from the components of other phases, because of its limited (internal) application.

The largest overall classification is that of basic form or method of manufacture, that is, all tools classified were placed in one of the four categories: uniface, semi-biface I, II, III. The distribution of the evidence for these four methods of manufacture among the housepits is very similar as evidenced from Table 22 and Chart 4. The inhabitants as a result of the function of the finished tools and/or the material with

which they were working, chose to utilize to the same degree the four methods of manufacture. Granted there may have been only a limited technolithic knowledge, and thus the presence and absence of these techniques may not be significant; however, the very close similarities in the proportion of use of the different techniques seems significant.

The distribution of the different unifacial and bifacial classes of tools is also very similar (See Tables 23, 24, 25, 26, and 27), indicating the inhabitants also chose to manufacture similar kinds and quantities of tools exhibiting the different linear characteristics. Presumably the different classes of tools functioned in different fashions, and thus it could be suggested that the functions or the uses to which these tools were put were also proportionately similar. However, this point could be argued.

By far the numerically largest class of tools is the Au-1 or the amorphous unifacial tool with a unifacial convex distinguishing edge. As a class in relation to other classes of tools, this class is the most prominent and its distribution among the housepits is very similar (See Table 23). However, by combining all unifacial convex distinguishing edges regardless of their possible relation with other distinguishing edges, such as bi-concavo-convex or the basic form (some unifacial convex distinguishing edges were identified on semi-bifacial tools), there is an approximately fifteen percent difference between the occurence of this particular edge in Housepit 2 at 45-GR-68 and the three housepits studied at 45-KT-28 (See Table 31 and Chart 5). In relation to this, there is an increase of the unifacial concave and straight distinguishing edges in Housepit 2 at 45-GR-68 as compared to the three housepits at 45-KT-28. Notwithstanding

this difference in proportion, however, there is still a similar tendency in the distribution, that is, in each housepit the most prominent edge among the unifacial edges is the convex edge, then the concave edge and then the straight edge.

Upon combining all of the bifacial distinguishing edges according to their linear characteristics regardless of their possible relation to other distinguishing edges, there is also a proportional difference between the housepits (See Table 32 and Chart 6). However, there is a similar tendency in the distribution of the linear characteristics of the bifacial edges among the three housepits at 45-KT-28. The most prominent bifacial edge is the convex edge, then the straight edge, and then the concave edge. This tendency does not hold for Housepit 2 at 45-GR-68. The most prominent bifacial edge in this housepit is also the convex edge; however, the next most prominent bifacial edge is the concave edge and not the straight edge and the least prominent bifacial edge is the straight edge. Thus at 45-GR-68, the tendency in the distribution of the linear characteristics of the bifacial edges is the same as the tendency exhibited by the unifacial edges. Whereas two different tendencies are exhibited between the unifacial and bifacial edges in relation to the linear character of the distinguishing edges at 45-KT-28. I have not been able to account for this difference.

The angle of retouch of the distinguishing edges, as mentioned above, has been divided into three groups: (1) low angle of retouch, 30 degrees or less; (2) medium angle of retouch, 45 to 60 degrees, and (3) high angle of retouch, 60 degrees or more. The unifacial and bifacial edges exhibit angles of retouch which fall into all three groups, but not in the same

proportions.

Table 33 A

Distinguishing Edge	Angle of Retouch Low	Medium	High
Unifacial	10.14%	65.41%	24.46%
Bifacial	15.00%	80.68%	4.32%

In Table 33 the relation of the angle of retouch to the linear character of the distinguishing edge is given by housepit and the two strata associations. The proportion of the three groups to one another in relation to the linear character of the distinguishing edge is similar in the different housepits and the two strata associations.

Table 34 presents the orientation of the tool (medial longitudinal, diagonal and undeterminable) to the flake or core. On completion of the first computer run of this attribute in relation to both the class and basic form, excluding the tri-edge tools and the semi-biface tools with unifacial edges, this attribute was temporarily abandoned. Some indication of the proportion of the two orientations among the unifacial tools was obtained. However, the difficulties in determining the orientation of the semi-biface resulted in the majority of these tools being placed in the undeterminable category. The breakdown of this attribute in relation to the classes is available but it is not presented in this study because of this difficulty.

TABLE 22

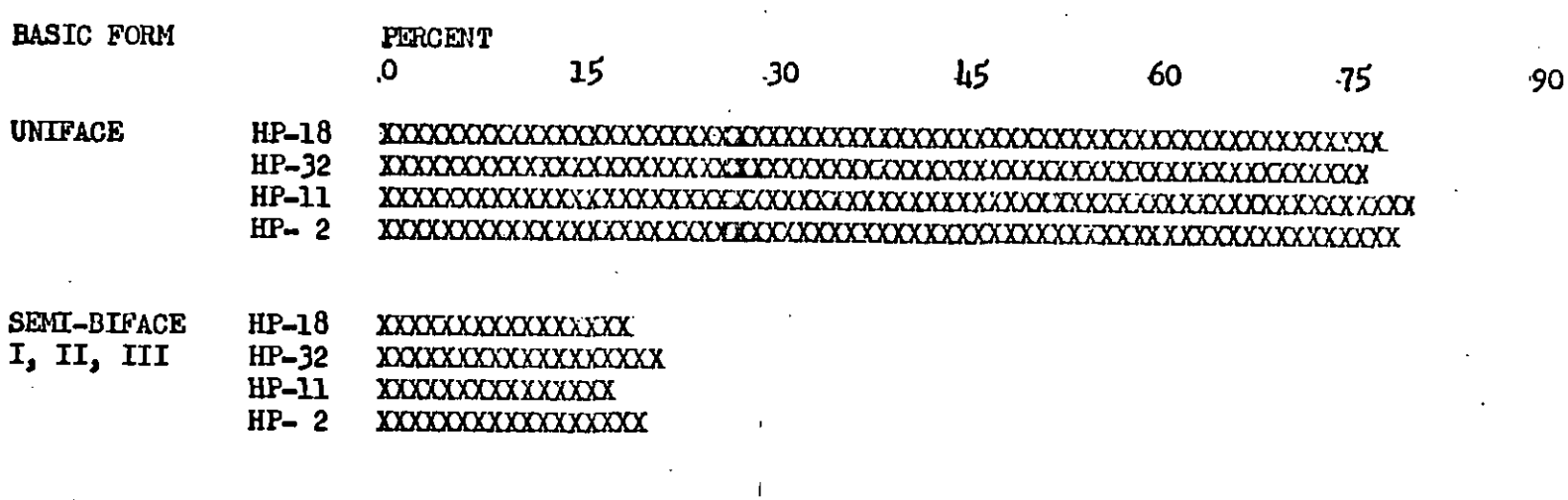
DISTRIBUTION of BASIC forms (Method of Manufacture) of AMORPHOUS TOOLS *

BASIC FORM	45-KT-28 Housepit 18	Stratum A-1	Stratum A-2	Housepit 32	Housepit 11	Total 45-KT-28	Housepit 2 (GR-68)	TOTAL 45-KT-28 45-GR-68
Uniface	492	253	219	111	76	1151	149	1300
	78.0	86.1	79.3	77.1	81.7	80.5	79.3	80.4
Semi-biface I, II, III	139	41	57	33	17	278	39	317
	22.0	14.0	20.7	22.9	18.3	19.5	20.7	19.6
Semi-biface								
I	50	18	19	9	5	101	14	115
	7.9	6.1	6.9	6.3	5.4	7.1	7.4	7.1
II	34	12	17	10	3	76	14	90
	5.4	4.1	6.2	6.9	3.2	5.3	7.4	5.6
III	46	11	21	14	9	101	11	112
	7.3	3.7	7.6	9.7	9.7	7.1	5.9	6.9
Totals in Housepits & Strata	631	294	276	144	93	1429	188	1617
	39.0	18.2	17.1	8.9	5.8	88.4	11.6	100 %

* All amorphous tools including Tri-edge tools

CHART 4

PERCENT DISTRIBUTION of BASIC FORMS (Method of Manufacture) of AMORPHOUS TOOLS by HOUSEPIT



45-KT-28 Housepit 18
Housepit 32
Housepit 11

45-GR-68 Housepit 2

TABLE 23

AMORPHOUS UNIFACIAL TOOLS with UNIFACIAL DISTINGUISHING EDGES

CLASS DISTRIBUTION

CLASS	45-KT-28 Housepit 18	Stratum A-1	Stratum A-2	Housepit 32	Housepit 11	Total 45-KT-28	Housepit 2 (GR-68)	TOTAL 45-KT-28 45-GR-68
Au - 1	180 38.5	99 41.6	79 38.5	46 43.0	31 41.3	435 38.8	52 36.9	487 39.5
Au - 2	49 10.5	19 8.0	22 10.7	9 8.5	9 12.0	108 9.9	6 4.3	114 9.2
Au - 3	26 5.6	8 3.4	13 6.3	8 7.5	2 2.7	57 5.2	5 3.6	62 5.0
Au - 4	57 12.2	53 22.3	20 9.8	9 8.4	9 12.0	148 13.6	24 17.0	172 13.9
Au - 5	17 3.6	5 2.1	7 3.4	4 3.7	3 4.0	36 3.3	4 2.8	40 3.2
Au - 6	6 1.3	3 1.3	10 4.9	2 1.9	— —	21 1.9	4 2.8	25 2.0
Au - 7	41 8.8	18 7.6	15 7.3	6 5.6	8 10.7	88 8.1	17 12.1	105 8.5
Au - 8	2 0.4	— —	3 1.5	1 0.9	— —	6 0.5	3 2.1	9 0.7
Au - 9	5 1.1	2 0.8	2 1.0	1 0.9	2 2.7	12 1.1	1 0.7	13 1.1
Au - 10	7 1.5	3 1.3	5 2.4	4 3.7	2 2.7	21 1.9	3 2.1	24 1.9
Au - 11	25 5.5	7 2.9	11 5.4	6 5.6	3 4.0	52 4.8	4 2.8	56 4.5
Au - 12	18 3.9	7 2.9	4 2.0	3 2.8	2 2.7	34 3.1	3 2.1	37 3.0

Table 23 (cont.)

CLASS	45-KT-28 Housepit 18	Stratum A-1	Stratum A-2	Housepit 32	Housepit 11	Total 45-KT-28	Housepit 2 (GR-68)	TOTAL 45-KT-28 45-GR-68
Au - 13	1 0.2	—	1 0.5	—	1 1.3	3 0.3	—	3 0.2
Au - 14	7 1.5	6 2.5	3 1.5	—	2 2.7	18 1.6	2 1.4	20 1.6
Au - 15	8 1.7	1 0.4	4 2.0	4 3.7	—	17 1.6	4 2.8	21 1.7
Au - 16	— —	— —	— —	— —	— —	— —	1 0.7	1 0.1
Au - 17	9 1.9	3 1.3	3 1.5	— —	— —	15 1.4	7 5.0	22 1.8
Au - 18	3 0.6	— —	1 0.5	2 1.9	— —	6 0.5	1 0.7	7 0.6
Au-1/Au-10 *	4 0.9	1 0.4	— —	1 0.9	— —	6 0.5	— —	6 0.5
Au-1#Au-10 *	— —	1 0.4	— —	— —	— —	1 0.1	— —	1 0.1
Au-4/Au-10	1 0.2	— —	— —	1 0.9	1 1.3	3 0.3	— —	3 0.2
Au-7/Au-10	— —	— —	1 0.5	— —	— —	1 0.1	— —	1 0.1
Au-7#Au-10	1 0.2	— —	— —	— —	— —	1 0.1	— —	1 0.1
Au-10/Au-10	1 0.2	2 0.8	— —	— —	— —	3 0.3	— —	3 0.2
Totals in Housepits & Strata	467 37.9	238 19.3	205 16.6	107 8.7	75 6.1	1092 88.6	141 11.4	1233 100%

* /means Bi-, # means converging.

TABLE 24

AMORPHOUS SEMI-BIFACIAL TOOLS with UNIFACIAL and BIFACIAL DISTINGUISHING EDGES - CLASS DISTRIBUTION

CLASS	45-KT-28 Housepit 18	Stratum A-1	Stratum A-2	Housepit 32	Housepit 11	Total 45-KT-28	Housepit 2 (GR-58)	TOTAL 45-KT-28 45-GR-58
Ab - 1	42 34.7	10 25.0	18 34.6	10 31.3	5 31.3	85 32.6	10 31.3	95 32.4
Ab - 2	3 2.5	1 2.5	2 3.8	3 9.4	— —	9 3.4	2 6.3	11 3.8
Ab - 3	20 16.5	5 12.5	5 9.6	4 12.5	1 6.3	35 13.4	5 15.6	40 13.7
Ab - 4	2 1.7	— —	2 3.8	— —	1 6.3	5 1.9	2 6.3	7 2.4
Ab - 5	— —	— —	— —	— —	— —	— —	— —	— —
Ab - 6	1 0.8	— —	— —	— —	— —	1 0.4	1 3.1	2 0.7
Ab - 7	7 5.8	3 7.5	2 3.8	— —	1 6.3	13 5.0	1 3.1	14 4.8
Ab - 8	3 2.5	— —	— —	2 6.3	1 6.3	6 2.3	1 3.1	7 2.4
Ab - 9	2 1.7	2 5.0	1 1.9	— —	— —	5 1.9	— —	5 1.7
Ab - 10	— —	— —	— —	— —	— —	— —	— —	— —
Ab - 11	— —	— —	— —	— —	— —	— —	1 3.1	1 0.3
Ab - 12	7 5.8	3 7.5	3 5.8	3 9.4	1 6.3	17 6.5	1 3.1	18 6.1

Table 24(cont.)

CLASS	45-KT-28 Hpusepit 18	Stratum A-1	Stratum A-2	Housepit 32	Housepit 11	Total 45-KT-28	Housepit 2 (GR-68)	TOTAL 45-KT-28 45-GR-68
Ab - 13	— —	1 2.5	— —	— —	— —	1 0.4	— —	1 0.3
Ab - 14	2 1.7	1 2.5	— —	— —	— —	3 1.1	— —	3 1.0
Ab - 15	9 7.4	1 2.5	4 7.7	— —	1 6.3	15 5.7	— —	15 5.1
Ab - 16	— —	— —	— —	— —	— —	— —	— —	— —
Ab - 17	— —	— —	— —	— —	— —	— —	— —	— —
Ab - 18	— —	— —	— —	— —	— —	— —	— —	— —
Au - 1	3 2.5	— —	2 3.8	— —	1 6.3	6 2.3	— —	6 2.0
Au - 2	— —	2 5.0	— —	— —	— —	2 0.8	— —	2 0.7
Au - 4	— —	— —	2 3.8	— —	— —	2 0.8	— —	2 0.7
Au - 12	— —	— —	1 1.9	— —	— —	1 0.4	— —	1 0.3
Au - 15	1 0.8	— —	— —	— —	— —	1 0.4	— —	1 0.3
Au - 18	— —	1 2.5	— —	1 3.1	— —	2 0.8	— —	2 0.7
Au - 7	1 0.8	— —	— —	— —	— —	1 0.4	— —	1 0.3

Table 24 (cont.)

CLASS	45-KT-28 Housepit 18	Stratum A-1	Stratum A-2	Housepit 32	Housepit 11	Total 45-KT-28	Housepit 2 (GR-68)	TOTAL 45-KT-28 45-GR-68
Au-1/Ab-1	2 1.7	3 7.5	4 7.6	1 3.1	— —	10 3.8	— —	10 3.4
Au-1#Ab-1	3 2.5	3 7.5	4 7.6	2 6.2	2 12.5	14 5.4	1 3.1	15 5.1
Au-1/Ab-4	— —	— —	— —	— —	— —	— —	1 3.1	1 0.3
Au-1#Ab-4	1 0.8	— —	— —	— —	— —	1 0.4	— —	1 0.3
Au-1/Ab-7	3 2.5	— —	1 1.9	— —	— —	4 1.5	1 3.1	5 1.7
Au-4/Ab-1	1 0.8	— —	1 1.9	3 9.4	— —	5 1.9	4 12.5	9 3.1
Au-4#Ab-1	— —	— —	— —	1 3.1	— —	1 0.4	— —	1 0.3
Au-4/Ab-4	1 0.8	— —	— —	— —	— —	1 0.4	— —	1 0.3
Au-4/Ab-7	1 0.8	1 2.5	— —	1 3.1	— —	3 1.1	— —	3 1.0
Au-7/Ab-1	2 1.7	1 2.5	— —	1 3.1	1 6.1	5 1.9	— —	5 1.7
Au-7#Ab-1	1 0.8	— —	— —	— —	— —	1 0.4	1 3.1	2 0.7
Au-7/Ab-4	1 0.8	1 2.5	— —	— —	— —	2 0.8	— —	2 0.7
Au-7#Ab-4 $\frac{1}{2}$	1 0.8	— —	— —	— —	— —	1 0.4	— —	1 0.3
Au-7/Ab-7	1 0.8	1 2.5	— —	— —	— —	2 0.8	— —	2 0.7
Au-7#Ab-7	— —	— —	— —	— —	1 6.3	1 0.4	— —	1 0.3

Table 24(cont.)

CLASS	45-KT-28 Housepit 18	Stratum A-1	Stratum A-2	Housepit 32	Housepit 11	Total 45-KT-28	Housepit 2 (GR-68)	TOTAL 45-KT-28 45-GR-68
Totals in Housepits & Strata	121 41.3	40 13.7	52 17.7	32 10.9	16 5.5	261 89.1	32 10.9	293 100 %

TABLE 25

AMORPHOUS SEMI-BIFACIAL I TOOLS - DISTINGUISHING EDGES

CLASS DISTRIBUTION

CLASS	45-KT-28 Housepit 18	Stratum A-1	Stratum A-2	Housepit 32	Housepit 11	Total 45-KT-28	Housepit 2 (GR-68)	TOTAL 45-KT-28 45-GR-68
Ab - 1	17	3	10	5	2	37	5	42
Ab - 2	1	-	-	-	-	1	1	2
Ab - 3	4	2	1	-	-	7	1	8
Ab - 4	2	-	-	-	-	2	-	2
Ab - 7	6	3	1	-	1	11	-	11
Ab - 9	2	2	-	-	-	4	-	4
Ab - 12	-	1	1	1	1	4	-	4
Ab - 13	-	1	-	-	-	1	-	1
Ab - 14	1	-	-	-	-	1	-	1
Ab - 15	2	1	2	-	-	5	-	5
Au - 1	1	-	-	-	-	1	-	1

Table 25 (cont.)

CLASS	45-KT-28 Housepit 18	Stratum A-1	Stratum A-2	Housepit 32	Housepit 11	Total 45-KT-28	Housepit 2 (GR-68)	TOTAL 45-KT-28 45-GR-68
Au - 18	-	1	-	-	-	1	-	1
Au-1/Ab-1	1	-	2	-	-	3	1	4
Au-1#Ab-1	-	1	-	-	1	2	-	2
Au-1/Ab-4	-	-	-	-	-	-	1	1
Au-1#Ab-4	1	-	-	-	-	1	-	1
Au-1/Ab-7	3	-	1	-	-	4	1	5
Au-4/Ab-1	-	-	1	1	-	2	2	4
Au-4/Ab-4	1	-	-	-	-	1	-	1
Au-4/Ab-7	-	1	-	1	-	2	-	2
Au-7/Ab-1	2	1	-	1	-	4	-	4
Au-7/Ab-4	1	-	-	-	-	1	-	1
Au-7#Ab-4	1	-	-	-	-	1	-	1
Totals in Housepits & Strata	46	17	19	9	5	96	12	108

TABLE 26

AMORPHOUS SEMI-BIFACIAL II TOOLS - DISTINGUISHING EDGES

CLASS DISTRIBUTION

CLASS	45-KT-28 Housepit 18	Stratum A-1	Stratum A-2	Housepit 32	Housepit 11	Total 45-KT-28	Housepit 2 (GR-68)	TOTAL 45-KT-28 45-GR-68
Ab - 1	12	5	3	3	-	23	3	26
Ab - 2	-	-	2	1	-	3	-	3
Ab - 3	5	-	1	1	1	8	1	9
Ab - 4	-	-	-	-	-	-	2	2
Ab - 6	1	-	-	-	-	1	-	1
Ab - 7	1	-	1	-	-	2	-	2
Ab - 8	-	-	-	-	1	1	1	2
Ab - 11	-	-	-	-	-	-	1	1
Ab - 12	3	1	1	1	-	6	-	6
Ab - 15	4	-	1	-	-	5	-	5
Au - 1	2	-	-	-	-	2	-	2
Au - 2	-	1	-	-	-	1	-	1
Au - 4	-	-	2	-	-	2	-	2
Au - 7	1	-	-	-	-	1	-	1
Au - 18	-	-	-	1	-	1	-	1
Au-1/Ab-1	1	1	2	-	-	4	-	4
Au-1#Ab-1	1	2	3	2	-	8	-	8
Au-4/Ab-1	-	-	-	1	-	1	2	3

Table 26 (cont.)

CLASS	45-KT-28 Housepit 18	Stratum A-1	Stratum A-2	Housepit 32	Housepit 11	Total 45-KT-28	Housepit 2 (GR-68)	TOTAL 45-KT-28 45-GR-68
Au-4/Ab-7	1	-	-	-	-	1	-	1
Au-7/Ab-4	-	1	-	-	-	1	-	1
Au-7/Ab-7	1	1	-	-	-	2	-	2
Au-7#Ab-7	-	-	-	-	1	1	-	1
Totals in Housepits & Strata	33	12	16	10	3	74	10	84

TABLE 27

AMORPHOUS SEMI-BIFACIAL III TOOLS - DISTINGUISHING EDGES

CLASS DISTRIBUTION

	45-KT-28 Housepit 18	Stratum A-1	Stratum A-2	Housepit 32	Housepit 11	Total 45-KT-28	Housepit 2 (GR-68)	TOTAL 45-KT-28 45-GR-68
Ab - 1	13	2	5	2	3	25	2	27
Ab - 2	2	1	-	2	-	5	1	6
Ab - 3	11	3	3	3	-	20	3	23
Ab - 4	-	-	2	-	1	3	-	3
Ab - 6	-	-	-	-	-	-	1	1
Ab - 7	-	-	-	-	-	-	1	1
Ab - 8	3	-	-	2	-	5	-	5

Table 27 (cont.)

CLASS	45-KT-28 Housepit 18	Stratum A-1	Stratum A-2	Housepit 32	Housepit 11	Total 45-KT-28	Housepit 2 (GR-68)	TOTAL 45-KT-28 45-GR-68
Ab - 9	-	-	1	-	-	1	-	1
Ab - 12	4	1	1	1	-	7	1	8
Ab - 14	1	1	-	-	-	2	-	2
Ab - 15	3	-	1	-	1	5	-	5
Au - 1	-	-	2	-	1	3	-	3
Au - 2	-	1	-	-	-	1	-	1
Au - 12	-	-	1	-	-	1	-	1
Au - 15	1	-	-	-	-	1	-	1
Au-1/Ab-1	-	2	-	1	-	3	-	3
Au-1#Ab-1	2	-	1	-	1	4	-	4
Au-4/Ab-1	1	-	-	1	-	2	-	2
Au-4#Ab-1	-	-	-	1	-	1	-	1
Au-7/Ab-1	-	-	-	-	1	1	-	1
Au-7#Ab-1	1	-	-	-	-	1	1	2
Totals in Housepits & Strata	42	11	17	13	8	91	10	101

TABLE 28

DISTRIBUTION of BASIC FORMS (Method of Manufacture) of

TRI-EDGE AMORPHOUS TOOLS

BASIC FORM	45-KT-28 Housepit 18	Stratum A-1	Stratum A-2	Housepit 32	Housepit 11	Total 45-KT-28	Housepit 2 (GR-68)	TOTAL 45-KT-28 45-GR-68
Uniface	25	15	14	4	1	59	8	67
Semi-biface I, II, III	9	1	5	1	1	17	7	24
Semi-biface								
I	4	1	-	-	-	5	2	7
II	1	-	1	-	-	2	4	6
III	4	-	4	1	1	10	1	11
Totals in Housepits & Strata	34	16	19	5	2	76	15	91
Percent of Tools in Housepits & Strata which are TRI-EDGE	5.4	5.4	6.9	3.5	2.2	5.3	8.0	5.6

TABLE 29

AMORPHOUS UNIFACIAL TRI-EDGE TOOLS with UNIFACIAL DISTINGUISHING EDGES - CLASS DISTRIBUTION *

CLASS	45-KT-28 Housepit 18	Stratum A-1	Stratum A-2	Housepit 32	Housepit 11	Total 45-KT-28	Housepit 2 (GR-68)	TOTAL 45-KT-28 45-GR-68
Au - 1	20	8	7	-	1	36	4	40
Au - 3	4	2	-	-	-	6	-	6
Au - 4	8	11	5	6	-	30	7	37
Au - 6	4	1	2	1	-	8	3	11
Au - 7	2	1	2	-	-	5	2	7
Au - 9	1	-	1	-	-	2	-	2
Au - 10	3	2	5	-	-	10	-	10
Au - 12	9	5	4	1	1	20	2	22
Au - 13	-	-	1	-	-	1	-	1
Au - 15	2	1	3	-	-	6	-	6
Au - 18	-	1	1	-	-	2	1	3
Au-1#Au-12	1	1	-	-	-	2	-	2
Au-4#Au-12	1	1	2	-	-	4	-	4
Au-12#Au-12	-	-	-	1	-	1	-	1
Totals in Housepits & Strata	55	34	33	9	2	133	19	152

* Tri-edge combinations are not shown; this table represents a composite of the classes which appear in tri-edge combinations.

TABLE 30

AMORPHOUS SEMI-BIFACIAL TRI-EDGE TOOLS with BIFACIAL and UNIFACIAL DISTINGUISHING EDGES - CLASS DISTRIBUTION *

CLASS	45-KT-28 Housepit 18	Stratum A-1	Stratum A-2	Housepit 32	Housepit 11	Total 45-KT-28	Housepit 2 (GR-68)	TOTAL 45-KT-28 45-GR-68
Ab - 1	7	-	2	2	1	12	5	17
Ab - 3	2	-	1	-	-	3	-	3
Ab - 4	-	-	3	-	-	3	1	4
Ab - 6	-	-	-	-	-	-	1	1
Ab - 7	3	-	2	-	-	5	2	7
Ab - 9	1	-	-	-	1	2	-	2
Ab - 12	1	-	1	-	-	2	2	4
Ab - 15	-	-	1	-	-	1	-	1
Au - 1	5	-	-	1	-	6	4	10
Au - 4	3	-	2	-	-	5	2	7
Au - 7	4	-	-	-	-	4	2	6
Totals in Housepits & Strata	26	-	12	3	2	43	19	62

* Tri-edge combinations are not shown; this table represents a composite of the classes which appear in tri-edge combination.

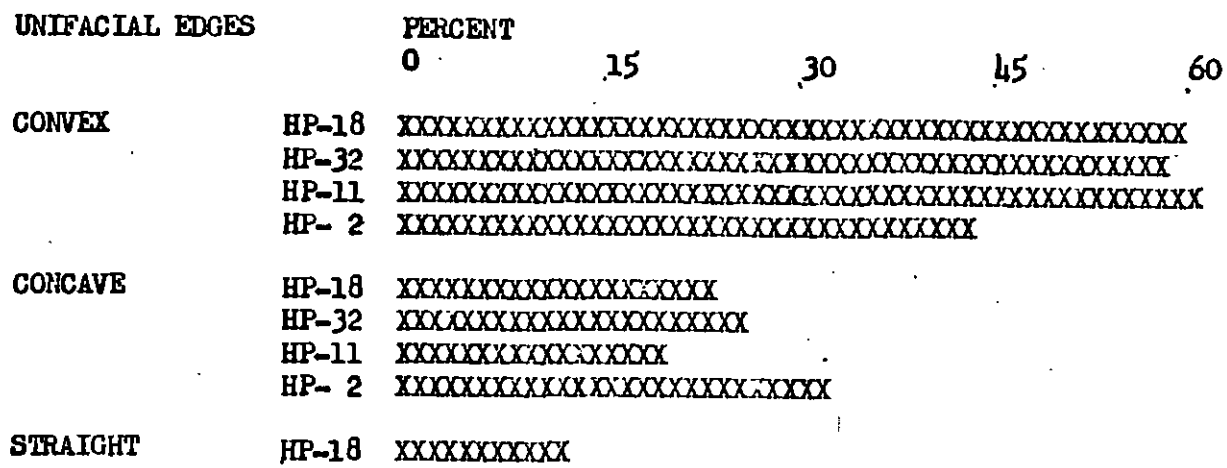
TABLE 31

DISTRIBUTION of the LINEAR CHARACTERISTIC of UNIFACIAL DISTINGUISHING EDGES of AMORPHOUS TOOLS

LINEAR CHARACTERISTIC	45-KT-28 Housepit 18	Stratum A-1	Stratum A-2	Housepit 32	Housepit 11	Total 45-KT-28	Housepit 2-(GR-68)	TOTAL 45-KT-28 45-GR-68
Convex	445 60.1	206 57.4	192 56.5	104 58.8	66 62.3	1013 58.8	96 44.2	1109 57.2
Concave	178 24.1	103 28.7	88 25.9	47 26.6	21 19.8	437 25.4	73 33.6	510 26.3
Straight	97 13.1	39 10.9	46 13.5	18 10.2	15 14.2	215 12.5	43 19.8	258 13.3
Concavo-convex	19 2.6	10 2.8	13 3.8	8 4.5	4 3.8	55 3.2	3 1.4	58 3.0
Convex-straight	1 0.1	— —	1 0.3	— —	— —	2 0.1	1 0.5	3 0.2
Concavo-straight	— —	— —	— —	— —	— —	— —	1 0.5	1 0.1
Totals in Housepits & Strata	740 38.2	359 18.5	340 17.5	177 9.1	106 5.5	1722 88.8	217 11.2	1939 100 %

CHART 5

PERCENT DISTRIBUTION of the LINEAR CHARACTERISTIC of DISTINGUISHING EDGES of AMORPHOUS TOOLS by HOUSEPIT



45-KT-28	Housepit	18
	Housepit	32
	Housepit	11
45-GR-68	Housepit	2

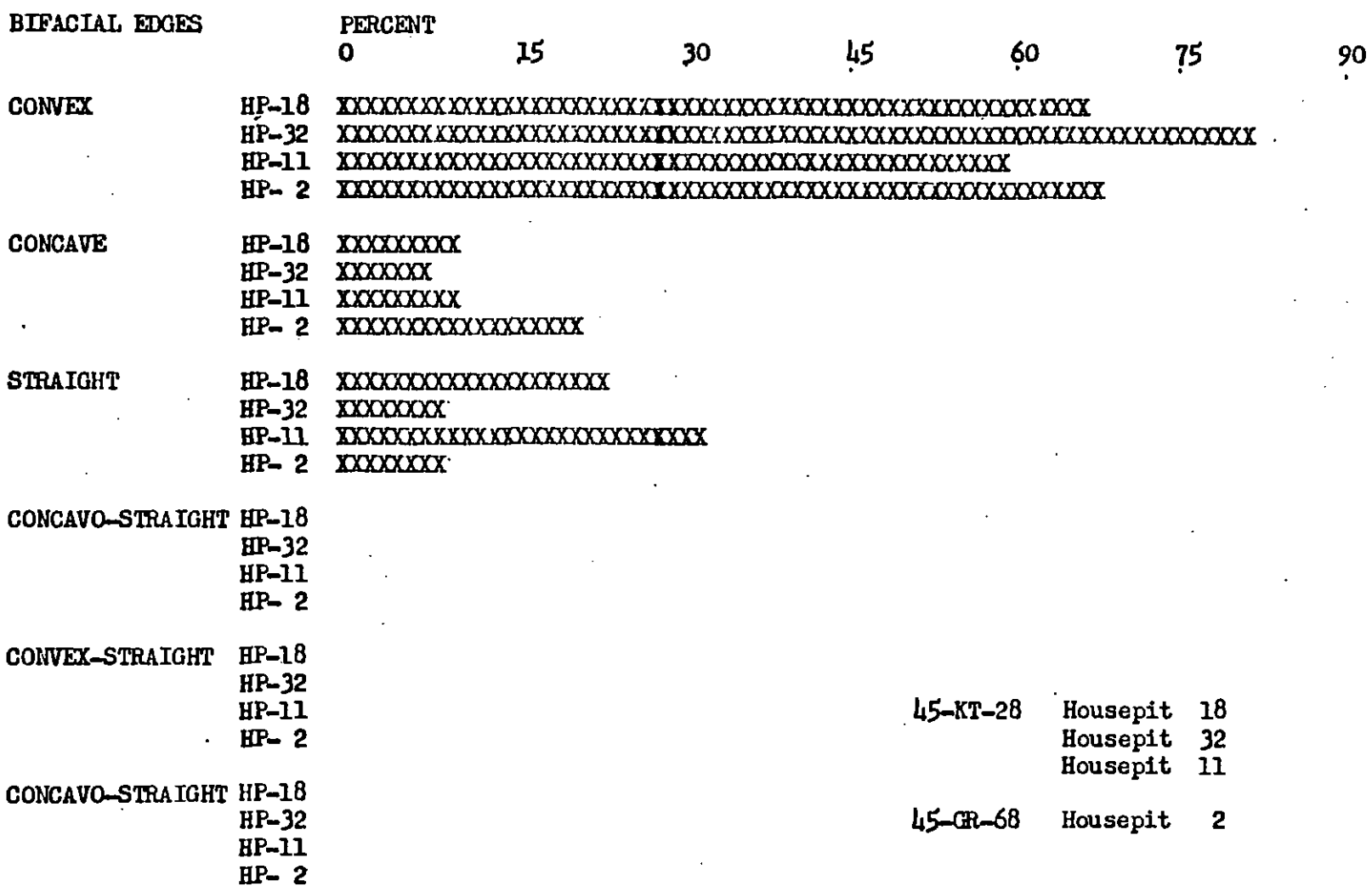
TABLE 32

DISTRIBUTION of the LINEAR CHARACTERISTIC of BIFACIAL DISTINGUISHING EDGES of AMORPHOUS TOOLS

LINEAR CHARACTERISTIC	45-KT-28 Housepit 18	Stratum A-1	Stratum A-2	Housepit 32	Housepit 11	Total 45-KT-28	Housepit 2 (GR-68)	TOTAL 45-KT-28 45-GR-68
Convex	106 66.3	37 68.5	54 70.1	37 82.2	13 59.1	247 69.0	38 67.9	285 68.8
Concave	16 10.0	4 7.4	10 13.0	3 6.7	2 9.1	35 9.8	12 21.4	47 11.4
Straight	38 23.8	12 22.2	1 3 16.9	5 11.1	7 31.8	75 20.9	6 10.7	81 19.6
Concavo-convex	— —	— —	— —	— —	— —	— —	— —	— —
Convex-straight	— —	1 1.9	— —	— —	— —	1 0.3	— —	1 0.2
Concavo-straight	— —	— —	— —	— —	— —	— —	— —	— —
Totals in Housepits & Strata	160 38.6	54 13.0	77 18.6	45 10.9	22 5.3	358 86.5	56 13.5	414 100 %

CHART 6

PERCENT DISTRIBUTION of the LINEAR CHARACTERISTIC of DISTINGUISHING EDGES of AMORPHOUS TOOLS by HOUSEPIT



45-KT-28	Housepit	18
	Housepit	32
	Housepit	11
45-GR-68	Housepit	2

Table 33

Distribution of Angle of Edge to

Unifacial and Bifacial Edges *

	45-KT-28 Housepit 18	Stratum A-1	Stratum A-2	Housepit 32	Housepit 11	Total 45-KT-28	Housepit 2 (GR-68)	TOTAL 45-KT-28 45-GR-68
UNIFACIAL EDGES								
Concave, 30° or less	20	8	7	8	4	47	24	71
	11.2	7.4	6.5	16.7	18.2	10.1	32.0	13.2
45° to 60°	120	65	72	28	13	298	45	343
	67.0	60.2	66.7	50.3	59.1	64.1	60.0	63.5
60° or more	39	35	29	12	5	120	6	126
	21.8	32.4	26.9	25.0	22.7	25.8	8.0	23.3
Total edges	179	108	108	48	22	465	75	540
Convex, 30° or less	40	14	17	6	6	83	16	99
	9.8	7.0	7.0	6.1	9.1	8.2	15.8	8.9
45° to 60°	253	131	182	71	39	676	70	746
	61.9	65.5	75.2	71.7	59.1	66.5	69.3	66.8
60° or more	116	55	43	22	21	257	15	272
	28.4	27.5	17.8	22.2	31.8	25.3	14.9	24.4
Total edges	409	200	242	99	66	1016	101	1117
Straight, 30° or less	7	3	5	1	1	17	13	30
	7.5	7.3	9.6	5.6	6.7	7.7	29.6	11.4
45° to 60°	64	27	34	14	13	152	25	177
	68.1	65.9	65.4	77.8	86.7	69.1	56.8	67.1
60° or more	23	11	13	3	1	51	6	57
	24.5	26.8	25.0	16.7	6.7	23.2	13.6	21.6
Total edges	94	41	52	18	15	220	44	264

* The lower figures represent the percent distribution of the attributes.

Table 33, cont.

	45-KT-28 Housepit 18	Stratum A-1	Stratum A-2	Housepit 32	Housepit 11	Total 45-KT-28	Housepit 2 (GR-68)	TOTAL 45-KT-28 45-GR-68
Concavo-convex								
30° or less	-	1	-	-	-	1	-	1
	—	7.7	—	—	—	1.7	—	1.6
45° to 60°	9	4	7	4	2	26	3	29
	45.0	30.8	53.9	50.0	50.0	44.8	100	47.5
60° or more	11	8	6	4	2	31	-	31
	55.0	61.5	46.2	50.0	50.0	53.5	—	50.8
Total edges	20	13	13	8	4	58	3	61
Convex-straight								
45° to 60°	1	-	-	-	-	1	-	1
Concavo-straight								
45° to 60°	-	-	-	-	-	-	1	1
BIFACIAL EDGES								
Concave, 30° or less	4	2	5	1	-	12	1	13
	28.6	40.0	45.5	33.3	—	34.3	8.3	27.7
45° to 60°	10	1	6	2	2	21	6	27
	71.4	20.0	54.6	66.6	100	60.0	50.0	57.5
60° or more	-	2	-	-	-	2	5	7
	—	40.0	—	—	—	5.7	41.7	14.9
Total edges	14	5	11	3	2	35	12	47

Table 33, cont.

	45-KT-28 Housepit 18	Stratum A-1	Stratum A-2	Housepit 32	Housepit 11	Total 45-KT-28	Housepit 2 (GR-68)	TOTAL 45-KT-28 45-GR-68
Convex, 30° or less	13 10.3	5 13.2	4 7.0	3 8.1	1 7.1	26 9.6	8 19.5	34 10.9
45° to 60°	110 87.3	32 84.2	53 93.0	33 89.2	13 92.9	241 88.6	27 65.9	268 85.6
60° or more	3 2.4	1 2.6	- --	1 2.7	- --	5 1.8	6 14.6	11 3.5
Total edges	126	38	57	37	14	272	41	313
Straight, 30° or less	4 11.1	6 50.0	1 7.1	5 100	1 14.3	17 23.3	2 33.3	19 24.5
45° to 60°	30 83.3	6 50.0	13 92.9	- --	6 85.7	55 75.3	4 66.6	59 74.7
60° or more	1 2.8	- --	- --	- --	- --	1 1.4	- --	1 1.3
Total edges	36	12	14	5	7	73	6	79
Concavo-convex —	-	-	-	-	-	-	-	-
Convex-straight								
45° to 60°	-	1	-	-	-	1	-	1
Concavo-straight —	-	-	-	-	-	-	-	-

Table 34

Distribution of Orientation of the Tool to Flake to the Basic Forms of Amorphous Stone Tools *

Basic Forms	45-KT-28 Housepit 18	Stratum A-1	Stratum A-2	Housepit 32	Housepit 11	Total 45-KT-28	Housepit 2 (CR-68)
Unifacial							
A. Diagonal	41.4	49.1	40.1	47.6	54.1	44.2	22.9
B. Median Longitudinal	42.8	36.4	43.3	37.1	37.0	39.9	50.7
C. Undeterminable	15.6	14.5	16.6	15.2	18.9	15.9	26.4
Semi-biface I							
A. Diagonal	9.1	13.3	22.2	---	25.0	13.2	14.3
B. Median Longitudinal	27.3	20.0	16.7	16.7	---	21.1	28.6
C. Undeterminable	63.6	66.7	61.1	83.3	75.0	65.8	57.1
Semi-biface II							
A. Diagonal	11.1	---	10.0	---	---	7.5	12.5
B. Median Longitudinal	14.8	---	40.0	33.3	66.7	22.6	25.0
C. Undeterminable	74.1	100	50.0	66.7	33.3	69.8	62.5

* The distribution by housepits and strata is presented in percents. The breakdown of this attribute in relation to classes is available but is not presented because of the difficulty of determined this attribute for many of the artifacts.

Table 34, cont.

Semi-biface III	45-KT-28 Housepit 18	Stratum A-1	Stratum A-2	Housepit 32	Housepit 11	Total 45-KT-28	Housepit 2 (GR-68)
A. Diagonal	---	---	---	---	---	---	---
B. Median Longitudinal	36.1	12.5	28.6	50.0	20.0	32.9	66.7
C. Undeterminable	63.9	87.5	71.4	50.0	80.0	67.1	33.3

Table 34 A

Distribution of Unifacial Concave Edges

w/ a Cord Less than One Centimeter *

	45-KT-28 Housepit 18	Stratum A-1	Stratum A-2	Housepit 32	Housepit 11	Total 45-KT-28	Housepit 2 (CR-68)	TOTAL 45-KT-28 45-CR-68
Unifacial Concave Edges w/ a Cord Less than One Centimeter	10	5	1	3	1	20	3	23

* As mentioned on page 100, this small concavity, unifacially retouched is often referred to as a "spoke shave".

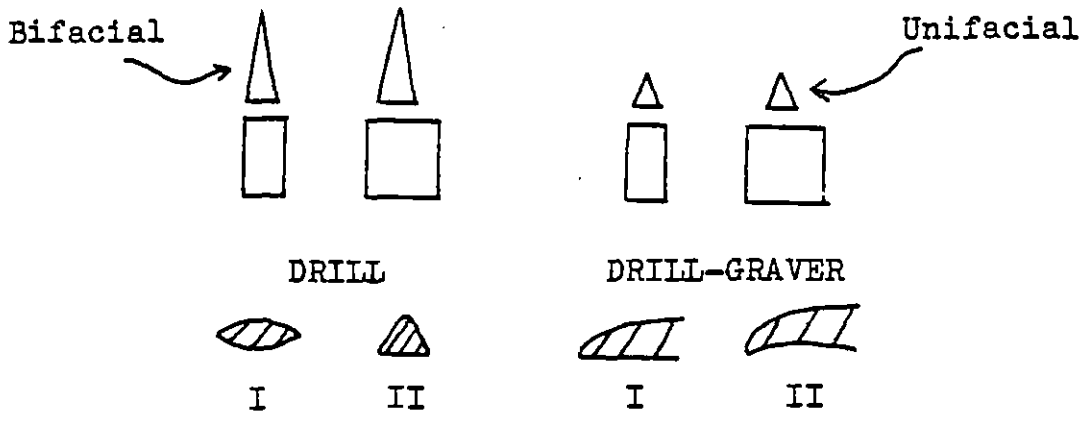
PART III. DRILLS AND DRILL-GRAVERS

According to the following definitions, twenty-eight retouched stone tools from 45-KT-28 and 45-GR-68 have been grouped under the headings drill or drill-graver. Drill-gravers were found at both sites, while drills were found only at 45-KT-28. (Plate 3)

The drill differs from the drill-graver in that the pile extends out further from the body of the tool, forming a longer, generally slimmer, bit. The bit of the drill is bifacially retouched. This classification has been divided into two sub-groups: those drills whose bits are lenticular in transverse cross-section and those drills whose bits are triangular in transverse cross-section. (See figure below.)

The bit of the drill-graver is a short drill-like projection which does not extend out as far from the body of the tool as the drill bit, nor is it as slender as the drill bit. The bit of the drill-graver is unifacially retouched. This classification has been divided into two sub-groups: those drill-gravers which are beaked in longitudinal cross-section and those drill-gravers which are plano-convex in longitudinal cross-section or not beaked.

FIGURE 12



A similar curvature, as that of the beaked drill-graver, was also obtained on twenty-nine of the uniform unifacial tools through the utilization of the positive bulb of percussion, i.e., a median longitudinal orientation of the tool to the flake (See Orientation, under the descriptive analysis of unifacial and bifacially retouched tools). This same technique of manufacture was employed to obtain the beaked appearance of six of the drill-gravers.

Table 35

Distribution of Drills and Drill-gravers

Drills and Drill-gravers		45-KT-28 Housepit 18	Stratum A-1	Stratum A-2	Housepit 32	Housepit 11	Total 45-KT-28	Housepit 2 (GR-68)	TOTAL 45-KT-28 45-GR-68
Drill	I	2	-	1	-	-	3	-	3
	II	7	2	2	-	-	11	-	11
Drill-gravers	I	1	3	1	1	-	6	4	10
	II	2	-	2	-	-	4	-	4
Totals in Housepits & Strata		12	5	6	1	-	24	4	28

PART IV. LARGE SPALL TOOLS

There is, in the collections from 45-KT-28 and 45-GR-68, a distinct category of tools made of large, relatively flat spalls of basalt, schist and granite. The tools are bifacially retouched on one or more convex edges. The majority of the basalt tools have distinctly smoothed areas on the retouched edges resulting from use.

I. Five basalt spall tools are bifacially retouched around the entire periphery. Two of the five are roughly disc shaped, and three are roughly ovoid in outline.

TABLE 36

Specimen	Outline	Wear	Centimeters Max. L.	Max. W.	Max. T.
GR68/153	Oval	X *	8.7	5.7	1.0
-/208	Oval	?	10.3	6.9	1.1
-/493	Disc	X	7.1	6.2	1.6
KT28/2163	Disc	X	7.9	7.3	1.4
-/3470	Oval	X	8.0	5.9	1.4

II. There is only one basalt spall tool which has three convex bifacially retouched edges. The convex edges converge to form a continuous arc. Specimen: GR 68/571: wear unknown; Max. L. 8.7; Max. W. 7.7; Max. T. 0.9; L. of W.E. (worked edge) 15.3.

III. Three of the large basalt spall tools have two convex bifacially retouched edges (See Table 37).

* X = presence of wear

TABLE 37

Specimen	Edge	Wear	Centimeters Max. L.	Max. W.	Max. T.	L. of W.E.
GR68/63	Bi-convex, opposite	XX	10.4	6.9	1.8	2.5/4.0
KT28/2080	Converging-convex	X	7.5	5.8	1.3	6.5/5.5
-/2268	Bi-convex, opposite	XX	9.7	6.0	1.2	6.5/6.0

IV. Nine large spalls of basalt and one of granite have a single bifacially retouched edge. Six of these tools have a clean flat break opposite the convex retouched edge suitable as a rest to apply pressure to the working edge. This edge on the other four tools is formed by an irregular break.

TABLE 38

Specimen	Opposite E.	Wear	Centimeters Max. L.	Max. W.	Max. T.	L. of W.E.
GR68/455 (granite)	Flat	X	9.2	6.5	1.5	4.7
KT28/2026	"	X	8.2	7.4	1.2	10.5
-/2038	"	X	12.2	6.2	1.5	17.0
-/2079	"	?	8.7	4.9	1.3	6.0
-/2083	"	?	12.0	6.3	1.8	—
-/2120	"	?	7.0	5.3	1.5	3.3
-/2082	Irregular	X	11.3	7.3	1.4	10.5
-/2086	"	X	6.1	3.9	0.9	5.7
-/2268	"	X	6.1	6.0	0.7	4.5
-/3625	"	X	9.5	7.0	1.1	14.5
-/2081	" (frag.)	X	5.4	4.5	0.8	6.0

V. There is one basalt tool in the collection which has bi-straight unifacially retouched edges. The unifacially retouched edges occur on two natural

beveled edges which result in a parallelogram cross-section. There is a slight indication of battering on one of the retouched edges.

Max. L. 8.0; Max. W. 6.3; Max. W. 1.4; Specimen: KT28/2087

There are three large spall tools made of schists. Because of the material it is difficult to determine with any assurance which edges are actually retouched and which are only used. Each of these possible tools has what appears to be a bifacially retouched convex edge or edges. In addition, one of the tools has a relatively straight, wide (0.7 to 1.0 cm.) edge which appears to have been abraded forming a smooth surface.

TABLE 39

Specimen	Outline	Edges	Wear	Centimeters Max. L.	Max. W.	Max. T.
GR68/492	Oval	Periphery completely retouch	-	8.0	5.7	1.5
-/481 -/617	Irreg. (broken)	Bi-convex retouch	-	7.4	6.9	0.6
-/616 -/615	Ovoid (broken)	Bi-convex-ret. 1 straight-worn	- X	10.2	6.6	1.4

Table 40

Distribution of Large Spall Tools

Large Spall Tools	45-KT-28 Housepit 18	Stratum A-1	Stratum A-2	Housepit 32	Housepit 11	Total 45-KT-28	Housepit 2 (GR-68)	TOTAL 45-KT-28 45-GR-68
Form I	-	-	1	-	1	2	3	5
Form II	-	-	-	-	-	-	1	1
Form III	-	-	-	-	2	2	-	3
Form IV	1	-	-	-	9	10	1	11
Form V	1	-	-	-	-	1	-	1
Form VI	-	-	-	-	-	-	3	3
Totals in Housepits & Strata	2	-	1	-	12	15	9	24

PART V. CHOPPERS

Of the twenty-five stratified choppers recovered from 45-KT-28 and 45-GR-68, two general categories of tools can be distinguished: choppers made of water-worn stones (cobbles) and choppers made of large flakes or spalls of basalt which have no indication of having been water-worn; cobble choppers and flake choppers respectively. There are six cobble choppers, and nineteen flake choppers. Within this division, the choppers will be divided according to whether the flakes were removed unifacially or bifacially and then according to the linear character of the working edge. Indications of battering on the working edge of the tool will also be noted. There are no indications of battering on the working edge of the flake choppers.

TABLE 41

Form I : Flake Choppers

Specimen	Edge	Character of Edge	Centimeters L.	W.	T.
GR68/108	Uniface	2 converging convex-straight	18.0	12.5	3.3
-/61	Biface	1 convex	6.1	5.4	2.7
-/171	Biface	2 converging convex-straight	20.0	8.5	2.2
KT28/1813	Uniface	1 convex	12.0	9.5	5.6
-/2078	Uniface	1 convex	24.0	13.0	3.0
-/2086	Uniface Biface	1 concave 1 convex	10.0	8.5	1.7
-/573	Biface	1 convex	11.3	8.0	3.1
-/2084	Biface	1 convex	14.0	10.0	1.9
-/2091	Biface	1 convex	12.0	8.5	3.0
-/2040	Biface	2 converging convex *	12.5	9.2	2.7

* The two edges form a continuous convex edge or arc.

Flake Choppers (cont'd)

Specimen	Edge	Character of Edge	Centimeters L.	W.	T.
KT28/3300	Biface	2 converging convex	12.5	10.5	4.6
-/2085	Biface	2 converging convex-straight	14.0	9.5	1.5
-/2112	Biface	2 converging convex-straight	10.0	8.0	1.6
-/432	Biface	3 converging convex* (nodule-like)	8.0	8.0	4.2
-/2025	Biface	3 converging convex*	11.5	9.0	2.0
-/2074	Biface	3 converging convex*	14.5	10.0	2.3
-/2179	Biface	3 converging convex*	12.0	9.7	2.1

TABLE 42

Form II : Cobble Choppers

Specimen	Edge	Character of Edge	Centimeters L.	W.	T.
KT28/617	Biface	1 convex (battered)	16.4	11.0	6.7
-/797	Biface	1 convex (battered)	12.5	11.5	5.7
-/813	Biface	1 convex (no battering)	18.4	11.5	6.7
-/956	Biface	1 convex (no battering)	7.6	7.1	5.5

TABLE 43

Form III : Flake Off of a Cobble

Specimen	Edge	Character of Edge	Centimeters L.	W.	T.
GR68/132	Biface	2 bi-convex (no battering)	15.5	12.7	4.0

* The three edges form a continuous convex arc or edge.

The term "stone celt" has been employed by Caldwell (1965: 113-114) to designate oblong stone tools which are bifacially retouched on one end to form a convex working edge. Though this same tool occurs in this collection, an alternate term will be used to eliminate confusion with the polished stone axe which is generally referred to as a celt. The overall appearance of these tools has lead to their inclusion under the general heading of chopper, but under a separate descriptive heading. For lack of a better term, I suggest "oblong chopper" as an alternate to Caldwell's term of celt.

There are three oblong choppers in the collection of tools recovered from 45-KT-28. None were found at 45-GR-68. Two of the tools are made from basalt and are angular in cross-section. The third specimen is made from an oblong river worn cobble and is oval in cross-section. The only modification of the stones is that which creates the convex working edge; the slight natural tapering towards the base of the stone may have been the reason for its selection.

TABLE 44

Form IV: Oblong Choppers from 45-KT-28

Specimen	Material	W. of End	W. of Base	Max. L.
-/928	Basalt	7.7 cm.	5.0 cm.	21.0 cm.
-/2157	Basalt	6.4 cm.	@5.1 cm.	18.0 cm.
-/3507	Granite	6.7 cm.	@3.1 cm.	13.2 cm.

Table 45

Distribution of Choppers

Choppers	45-KT-28 Housepit 18	Stratum A-1	Stratum A-2	Housepit 32	Housepit 11	Total 45-KT-28	Housepit 2 (GR-68)	TOTAL 45-KT-28 45-GR-68
I. Flake Choppers	3	1	-	-	10	14	3	17
II. Cobble Choppers	4	-	-	-	-	4	-	4
III. Flake off of a Cobble	-	-	-	-	-	-	1	1
IV. Oblong Choppers	1	-	1	-	1	3	-	3
Totals in Housepits & Strata	8	1	1	-	11	21	4	25

PART VI. BATTERED AND PECKED STONE TOOLS

Fifty-nine stone artifacts from 45-KT-28 and 45-GR-68 show indications of having been battered, the appearance resulting from blows by this tool directed upon another object. Whether or not this battering is the result of pecking or pounding, a functional-descriptive distinction made by Woodbury (1954) when dealing with similar stone tools, is a distinction I cannot make with any assurance. The term pecked will be used to describe additional modification of the tools by the removal of small bits of stone resulting in a pock-marked surface and not to describe a function of the battered end of the tool. There are no indications, such as small striations, that this group of tools was primarily used for grinding, though, in fact, some of them may have been used in this manner. The tools are divided into four categories, based on additional modification by pecking and the kind of surface upon which the battering occurs. In addition to the length and width measurements of these tools, the weight is also given. To whatever use these tools were put, the weight of the tool would seem as important as the force exerted by the arm(s) when driving the blow to produce the desired results. Weight may, in fact, be more important than actual size in the selection of this kind of tool.

I. PESTLES: In addition to the battering which occurs on a slight convex to straight end of the tool, the longitudinal sides of the tool have been modified by pecking. The pecking has reduced the angularity of the sides, producing a nearly round cross-section. Specimen KT28/3001 has additional pecking near the end of the tool, resulting in a constriction which reduces the size of the battering surface. Three other specimens: KT28/542, KT28/1021, and KT28/4529 also show a reduction of the battered surface, but it is caused

by the removal, purposely or through use, of several flakes peripheral to the battering surface.

TABLE 46

Pestles

Specimen	Ends	L. (cm.)	W.	Wt. (grams)
KT28/542	One battered	13.5	7.0	734
-/551	One battered	7.0	4.5	191
-/1021	One battered, other broken	14.0	7.0	808
-/1484	None, center section only	4.0	6.0	295
-/3001	One battered, other broken	13.0	6.5	1029
-/4529	One battered, other broken and battered	8.5	6.0	513

II. PESTLE-LIKE BATTERED STONES: The natural form of these tools is similar to that of formed pestles, but they do not have the additional longitudinal modifications. There are indications of battering on the slight convex to straight end of the tools and a reduction of the battered surface through the removal, purposely or through use, of several large peripheral flakes. The specimens have similar battering on both ends.

TABLE 47

Pestle-Like Battered Stones

Specimens	Ends	L. (cm.)	W.	Wt. (grams)
KT28/2136	Both battered	12.5	6.5	671
-/3266	Both battered	14.5	9.0	2286

III. BATTERED COBBLES OR PEBBLES: Indications of battering on these tools occurs on convex water-worn surfaces, on what could generally be called the ends of the stones. According to the natural shape of the stones these tools

can be divided into two categories: (1) oblong tools and (2) roughly spherical tools.

TABLE 48

Battered Cobbles and Pebbles

Specimen	Shape	Battered Ends	L. (cm.)	W. (cm.)	Wt. (grams)
GR68/454	Oblong	1	6.5	2.0	40
KT28/447	"	2	9.0	3.0	94
-/789	"	2	5.5	3.0	45
-/1305	"	2	10.0	8.5	550
-/1632	"	2	12.0	8.0	508
-/3096	"	2	11.0	8.0	519
-/46	"	1	9.5	4.5	123
-/832	"	1	16.5	9.0	461
-/979	"	1	11.5	5.0	273
-/1683	"	1	9.0	6.5	284
-/3128	"	1 (?)	14.0	6.5	463
-/547	"	1 (broken)	12.0	7.5	252
-/571	"	1 (broken)	9.0	11.0	538
-/3325	"	1 (broken)	18.5	10.0	2329
-/3401	"	1 (broken)	12.0	8.5	1312
GR68/253	Spherical	1	8.5	6.5	442
KT28/545	"	1	6.5	5.0	162
-/835	"	1	9.5	7.5	651
-/2236	"	1	8.0	6.0	215

IV. BATTERED BROKEN COBBLES: Indications of battering on the tools occurs on the angular broken edges of the stones. The only shaping of these tools

is the initial breaking of a large cobble, possibly to obtain a more convenient size and the angular edge. Due to the battering on the edges small chips of rock spalled off. I do not think that the edges were purposely retouched prior to use. There are in the collection, however, tools which were probably retouched or formed prior to battering, i.e., battered cobble choppers. The difference between these two groups of tools is the size of the stones, the size of the flakes' scars and the general configuration of the battered edge.

TABLE 49

Battered Broken Cobbles

Specimen	No. of Edges	Edges Battered	Battered Water-Worn Areas	L. (cm.)	W. (cm.)	Wt. (grams)
GR68/120	4	2	-	8.0	5.5	78
-/185	4	1	-	5.5	4.5	42
-/264	4	4	-	11.0	6.5	465
-/312	4	2	-	11.0	9.0	314
KT28/552	4	1	1	13.0	8.0	896
-/807 *	7	3	-	7.5	5.5	164
-/808 *	4	4	-	8.5	7.5	276
-/809 *	5	4	-	8.5	7.0	307
-/811 *	9	4	-	6.5	5.0	125
-/957 *	2	2	-	10.5	6.0	312
-/957A *	1	1	-	11.0	10.0	443
-/958 *	3	2	-	10.0	5.5	246
-/959 *	5	3	1 trace	10.0	9.0	700
-/960 *	6	2	-	12.0	8.5	457
-/961 *	5	3	1	7.5	7.0	345
-/962 *	4	2	-	15.5	12.0	1242

Battered Broken Cobbles (cont'd.)

Specimen	No. of Edges	Edges Battered	Battered Water-Worn Areas	L. (cm.)	W. (cm.)	Wt. (grams)
KT28/963 *	8	4	-	6.5	5.0	139
-/964 *	3	2	-	9.0	6.5	369
-/965 *	9	7	-	6.5	6.0	135
-/966 *	10	3	-	5.5	5.0	139
-/967 *	4	1	-	6.0	5.7	143
-/968 *	11	4	-	6.0	3.5	154
-/1020	4	4	-	8.0	5.0	146
-/1351	4	2	-	7.5	5.0	352
-/1403	5	1	-	8.0	3.5	125
-/1633	6	2	-	8.5	6.0	242
-/2050	9	4	-	12.5	9.5	1154
-/2075	4	2	-	5.0	6.0	109
-/3239	6	1	-	6.0	5.0	128
-/4730	6	4	-	8.5	5.5	404

* Indicate tools recovered from the 130-140 cm. level of cut BL1E, Housepit 18, 45-KT-28. These tools are either a part of or in close association with Feature No. 11. (See description of strata and housepits, Sec. 4)

V. There is only one pecked and battered stone in the collection which appears to have been modified beyond that which could be considered functional, i.e., decorated: KT28/816. It is probably the head section of a pestle. The head is roughly triangular in cross-section and consists of three pecked grooves. On two of the faces, the grooves are very distinct; the third face is almost smooth. Each face is approximately 5 cm. across; the diameter of the shaft just below the head is 5.0 cm., and at the break, the diameter of the shaft is 5.8 cm.

There are a few battering marks on the base indicating that it had been used after it had been broken. The tool is made of granite; Max. L. 9.0 cm.; found in Housepit 18 (See Fig. 13).

Table 50

Distribution of Battered and Pecked Stone Tools

Battered and Pecked Stone Tools	45-KT-28 Housepit 18	Stratum A-1	Stratum A-2	Housepit 32	Housepit 11	Total 45-KT-28	Housepit 2 (GR-68)	TOTAL 45-KT-28 45-GR-68
I. Pestled	1	1	3	1	-	6	-	6
II. Pestle-like tools	1	-	-	-	1	2	-	2
III. Battered Cobbles	9	3	1	3	1	17	2	19
IV. Cobbles with broken battered edges	21	3	-	-	2	26	4	30
Totals in Housepits & Strata	32	7	4	4	4	51	6	57

PART VII. MILLING STONES

Four stratified milling stones were recovered from 45-KT-28. None were found at 45-GR-68. Two of the milling stones (2048 and 2119) were found during excavation of HP 11 and two (1483 and 3003) were recovered outside of HP 18 to the southeast of the entrance, Stratum Association Two (A-2).

Relatively large, round, flat, river-worn boulders were selected for use. No shaping of the stones was undertaken. The only indications of use on the stones are shallow depressions which are slightly smoother and vary in color from the surrounding stone due to the removal of the cortex through use. Three of the milling stones were used on one face only while the forth milling stone was used on both faces. The areas of use are oval in outline.

TABLE 51

Milling Stones from 45-KT-28

Specimen	L. (Cm.)	W. (Cm.)	T. (Cm.)	Faces	Area of Use	Stone	Depth of Depression
1483	37	33	13	1	14 X 16	Granite (hard)	.65 cm.
3003	26	23	7	1	14 X 11	Basalt	.54 cm.
2048	30	29	6	2	19 X 16 14 X 12	Basalt	.74 cm. .40 cm.
2119	31	28	10	1	16 X 14	Basalt	.75 cm.

PART VIII. ABRADING STONES

Only one possible abrading stone was recovered during the course of the excavation: KT 28/1465. It is a small, tabular, fine-grained stone measuring 4.5 cm. by 3.7 cm. and 2.7 cm. thick. One of the flat surfaces of the stone is worn very smooth, indicating its possible use as an abrasive. The stone was uncovered to the south of Housepit 18 in Stratum Association One (A-1).

Considering the number of ground bone and antler tools recovered from the sites, this apparent lack of abrasives or abrasive stones is surprising, though they could have used otherwise unmodified river boulders.

PART IX. NET SINKERS

Four net sinkers made of small, flat, river-worn pebbles were found stratified at 45-KT-28. Three of the net sinkers have two notches opposite each other across the length of the pebble. The fourth has four notches: two opposite each other across the length of the pebble and two opposite each other across the width of the pebble. The notches were produced by the removal of one or two flakes on each side of the end of the pebble. The inner curve of the notches on the two-notched net sinkers has been smoothed down either by battering (two specimens) or by grinding (one specimen). Two of the notches of the four-notched net sinker were also battered. I believe this smoothing was purposely done to dull the sharp edge which was created by the removal of the flakes to produce the notch. The smoothing down would decrease the abrasive ability of the stone on the binding. Of the fourteen two-notched net sinkers found on the beach by 45-KT-28, six had both notches battered; three had one notch battered; two had one notch with indications of possible battering, and three had no indications of having been smoothed down.

TABLE 52

45-KT-28

Specimen	Notches	Smoothing	Length (Cm.)	Width	Thickness	Distribution
392	2	Both slightly ground	5.7	3.8	1.3	HP-18
3000	2	Both battered	6.4	5.2	1.7	A-2
3025	4	Two of the four battered	6.2	5.2	1.2	A-2
3413	2	Both battered	4.9	4.2	1.3	A-2

POSSIBLE NET SINKER

A large, round granite river cobble, grooved three-fourths of the way around its circumference was found in the interior of Housepit 11 at 45-KT-28. The groove is 1.3 cm. wide. There are no indications of battering on the stone. The groove on the cobble was probably used to secure a binding or rope to the stone so that it could be employed as a weight to hold down fish nets or fish traps. Specimen: KT28/2018; cobble measurements: 15 cm. by 12 cm. by 6.4 cm.

PART X ADZE

One broken ground nephrite adze was recovered from 45-KT-28 near the bottom of the occupation debris in Housepit 18. The adze is approximately lenticular in cross-section due to a slight sloping of the two faces from a longitudinal center line to the sides of the tool. One end of the tool is formed by a single beveled edge, maximum width of the bevel 0.9 cm., and there is a slight bevel on the same edge on the opposite face. The other end of the tool is formed by a fracture plane. The broken (?) length of the adze is 5.6 cm. It is 5.9 cm. wide and 1.1 cm. thick. (See Fig. 15).

According to Jim Kemp (Personal communication) who is presently studying wood-working tools of the Pacific Northwest Coast, a single beveled adze can only be effectively used with a straight or elbow-shaped haft. The function of these two kinds of tools is the production of deep scars (depressions) in wood used to rough-out forms. The D-shaped haft has a bi-bevel adze which produces shallow scars and is generally used as a finishing tool.

MODIFIED BONE AND ANTLER

INTRODUCTION

The following descriptive analysis of bone implements is partially founded on Kidder's (1932) classification of 3142 Pueblo bone implements. His classification is based primarily on the function of the implements, secondly on the bone from which the implement is made and thirdly upon the degree of modification of the bone to form the implement. In lieu of Kidder's first, or primary, category according to function, I prefer to use descriptive terminology and employ functional terminology only when there is ethnographic evidence in the immediate or surrounding area as to the function of the implement. The second category will be used when possible as set forth by Kidder. The third category will be modified to accommodate this collection by the addition of additional sub-divisions.

The following classification will be based on complete tools as much as possible, but fragments exhibiting the characteristics of the class will be included within that class. It is very possible that the fragments included in one class could be the basal or tip ends of implements which if complete would be placed in another class, but rather than conjecture about their complete appearance, they will be dealt with as fragments and placed in classes according to their present appearance.

The most common form of bone implement in the collection is the awl, a gradually tapering sharply pointed tool. Its point is formed on a split bone

through the reduction of one end by grinding, probably through the use of an abrading stone. The cross-section of the point itself is round. The polished appearance of the points of many of these tools is probably due to use rather than being purposely polished. Use may also account for the slight blunting of some of the tool points.

The second most prevalent form of bone implement is that with a flat rounded end. This tool gains part of its characteristic appearance from the shape of split bone which was selected for additional fashioning, a straight longitudinal split bone or a longitudinal split bone at a slight angle forming a tapering wedge-shaped end. The split bone was reduced to a working end by either unifacially or bifacially grinding, probably through use of an abrading stone. Signs of polish, in addition to blunting and chipping, probably result from use. Because of their tapering wedge-shaped ends, these tools could be classed separately as wedges, but not all of them indicate battering on the base.

The third category is an angular ended tool, formed on split bones ground to form a relatively straight end. This kind of implement has been referred to by others as "spatulate" bone tools, function unknown.

The fourth category covers bone points: short, blunt-pointed implements which are round or oval in cross-section, with bases either relatively flat or slightly tapered to a blunt point.

The fifth category of bone implements indicates pieces of split bone, the ends of which have been used without additional modification; analogous to utilized flakes, these are utilized bones. Implement ends show a slight abrading and polish produced through use rather than purposeful modification.

There are several one-of-a-kind bone implements in the collection which will be described individually.

PART I. BONE AWLS

I. Epiphysis partly modified

A. The epiphysis is unmodified except by original splitting. The angles of the base formed by the epiphysis are slightly worn down through use. The shaft is relatively flat, tapering to a cylindrical sharp point. Specimen KT 28/1013 is made from the distal end of a tibia, probably from a deer. Total 2. Specimen /1013: L. 7.9 cm., W. of base 1.1 x 1.8 cm. Specimen /2024: L. 5.8 cm., W. of base 1.7 x 1.0 cm. (Plate 6)

B. L-shaped awl: The shaft, round in cross-section, is the spine of a scapula and the base is cut from the vertebral border. Cellular structure is exposed along the shaft. From the vertebral border or base of the implement, there is a continuous tapering to a cylindrical sharp point. Total 1. Specimen GR68/249: L. 16.7 cm., W. at base 1.5 cm., W. of shaft at base .8 cm. (Plate 6)

C. The epiphysis is partly ground down so that the bone cannot be identified. The base is flat. There is either a slight depression near the base, or the cellular structure is exposed. The shaft tapers to a cylindrical point. Total 5. Specimens: KT28/802 (frag.), -/847, -/2159, -/3202, -/3203: Max. L. 12.6 cm., Min. L. 6.3 cm., Max. W. .9 cm., Min. W. .5 cm. (Plate 6)

II. Epiphysis entirely modified

The epiphysis or base is completely ground down and tapers to a flat base. The remainder of the shaft tapers to the other end, forming a cylindrical point. Total 1. Specimen: GR68/437: L. 11.2

cm., W. at base .5 cm. round. (Plate 6, II)

III. Fragments, base missing

A. Fragment of a rib, triangular in cross-section, is ground to a tapering cylindrical point. The cellular structure of the rib is exposed in the center section of the shaft. Specimen KT28/1406 has a series of eleven small notches near the base on one of the corners formed by the triangular cross-section. Total 2. Specimens: KT28/1406: L. 11.5 cm., W. at base 1.0 cm.; GR68/386: L. 8.8 cm., W. at base 1.0 cm.

B. Fragment of a rib, lenticular in cross-section, is ground to a tapering cylindrical point. The implement is made from relatively flat section of rib which is split lengthwise. One side of the shaft is slightly curved, and the other side is flat with the smooth cellular structure exposed. Specimen KT28/3703 has a constriction near the tip resulting in a fine sharp point. Total 5. Specimens: KT28/3070, -/3084, -/3703, -/3726, -/4315: Max. L. 6.2 cm., Min. L. 3.1 cm., Max. W. 1.1 cm., Min. W. .9 cm. (Spec. 3703, Plate 6,III,a)

C. Fragment of unidentifiable bone with oval cross-section is ground to tapering cylindrical point. Specimen KT28/1410 has a round cross-section. Specimens KT28/50 and -/1410 both have incised designs on the shaft. Specimen -/50 has a series of half triangles, enclosing small lines perpendicular to the shaft and parallel to the exposed cellular structure of the tool. Along the opposite edge of the tool is a series of short parallel lines which are also perpendicular to the length of the tool. The incising terminates approximately 2.5 cm. from the tip of the point. Specimen -/1410 has three lines of incising, composed of grouped dashes which are perpendicular to the

length of the tool. The number of dashes in the groups, moving from the broken base to the point, are as follows: (1) -3-3-4- ; (2) -3-4- ; (3) -2-2-3- . The groupings terminate approximately 3.7 cm. from the tip of the point. (Fig. 16) Specimen KT28/3286 has a polished appearance on the broken end or base indicating use after the tool had been broken. Total 5. Specimens: KT28/50, -/1005, -/1058, -/1410, -/3286: Max. L. 10.6 cm., Min. L. 4.4 cm., Max. W. 1.1 cm., Min. W. .5 cm.

IV. Splinter awls

The tool is made from a splinter of unidentifiable bone. The only modification of the bone is the reduction of the bone at one end to form a cylindrical tapering point. Most of the angles on the shaft of the natural splinter have not been smoothed down. The tip of specimen KT28/3101 appears to have been heated accidentally, or purposely by fire which could have been done to temper the point. Total 5. Specimens: KT28/684, -/3101, -/3204, -/3860, -/3861: Max. L. 7.3 cm., Min. L. 4.7 cm., Max. W. 1.3 cm., Min. W. 0.2 cm. (Plate 6, III - 2, 3 and 4)

PART II. BONE TOOLS WITH FLAT ROUND ENDS

I. The epiphysis or base is unworked except by original splitting. The edges on the shaft, created by the splitting, have been ground smooth. The shaft is wedge-shaped and tapers to a bifacially ground round flat end. There are indications of battering on the base or epiphysis, indicating that the implement may have been used as a wedge. The tool is made from the distal end of a deer tibia. Total 1. Specimen: GR68/139: Max. L. 16.1 cm., Max. W. at base 1.7 x 1.1 cm.

II. The epiphysis is entirely modified. It is completely ground down to a base which is blunt, rounded, oval in cross-section. The shaft is ground smooth and tapers to an almost pointed flat end. There are long deep scratches on one side of the shaft, and the cellular structure is ground smooth on the opposite side. Total 1. Specimen: KT28/182: Max. L. 8.6 cm., Max. W. at the base 1.1 cm. (Plate 6,A,2)

III. The base is broken. The shaft, oval in cross-section, is ground smooth and tapers to a round blunt end. It is a long, narrow, well-made implement. Total 1. Specimen: GR68/283: Max. L. 8.5 cm., Max. W. .6 cm. (Plate 6,A,1)

IV. There are several splinters of bone which also taper to a round flat end. The shaft of specimen GR68/40 is slightly ground, while the remainder of the specimens have unground shafts. All of the specimens, with the exception of GR68/202, are made from long bones of mammal. There is evidence of battering on the bases of four of the specimens, GR68/40, -/202, -/377 and KT28/2154, again indicating they may have been used as wedges. Total 6. Specimens: GR68/40, -/202, -/377, and KT28/2154, -/2258, -/3224: Max. L. 14.5 cm., Min. L. 6.1 cm., Max. W. 3.4 cm., Min. W. .8 cm. (Plate 6,A, 3 and 4).

PART III. BONE TOOLS WITH ANGULAR ENDS

There are only four bone tools with angular ends in the collection; all are fragmentary. Three of the specimens, GR68/321, -/172 and KT28/3654 are flat. Specimen KT28/3653 is made from a bird bone, resulting in a longitudinal curved shaft and end. The angular end of this tool is diagonal to its length. Specimens GR68/321 (made from a mammal rib) and KT28/3654 have angular ends perpendicular to their length. The angular end of specimen GR68/172 is diagonal to its length. The width near the base of this last specimen is contracted and the base broken. Total 4. Specimens: GR68/321, -/172, and KT28/3653, -/3654: Max. L. 7.3 cm., Min. L. 2.5 cm., Max. W. 1.1 cm., Min. W. 0.7 cm. (Plate 6,B).

PART IV. BONE POINTS

There are six bone points in the collection, two possible points, and one implement better described as a bone peg.

I. The six bone points are small implements having one tapering blunt point. None of the points is a true bi-point although they all taper toward the base. The points are oval in cross-section, with one exception: Specimen KT28/4152 is approximately rectangular except for the point, which has a round cross-section. This specimen is also completely whittled, not ground, and has a pronounced blunted point. It was recovered from outside of Housepit 18, to the southwest of the entrance, that is, Stratum Association Two (A-2). (Fig.17) Specimen KT28/4170 has a whittled, constricted base; the remainder of the tool is ground. This tool was located outside of Housepit 18 in Stratum Association One (A-1). The four remaining points are completely ground. (Plate 6,C).

Four of the six point shafts have a groove; -/4152 has two grooves, and the sixth point has no grooves. The grooves, when present, appear on the wide sides of the oval cross-section; when not grooved, the wide sides are relatively flat. The grooves, in most cases, appear to be natural indentation. The bones may have been selected for this characteristic. The grooves of specimen -/4152 are definitely man-made. (See Table 53) (Spec. 4152, Plate 6,C,1)

II. The possible bone points are longer, relative to their width, than the above points, round in cross-section, and taper toward a broken base. Specimen KT28/485 has a gradually tapering point, and specimen KT28/788 has an abrupt tapering point. Specimen -/485 was recovered from the interior of Housepit 32 and -/788 from the interior of Housepit 18. (Plate 6,D,1)

III. The bone peg (?) was found in two sections but within the same stratum in Housepit 32 at 45-KT-28. There is a slight tapering to a blunt end and the base is rounded off. It is almost round in cross-section. KT28/$\frac{1224}{4236}$ (Table 53), (Plate 6,D,2)

TABLE 53

Bone Points

Specimen	Technique	Base	Grooves	Centimeters L.	W.	T.
KT28/496	Ground	Flat, PB	0	4.4	1.0	.7
-/742	Ground	Taper, B	1	5.2	1.0	.5
-/827	Ground	Flat	1	4.2	1.0	.5
-/1470	Ground and Whittled	Constricted	1	3.7	.9	.7
-/3725	Ground	Flat, PB	1	5.1	.7	.5
-/4152	Whittled	Flat	2	4.8	1.5*	.8*

Possible Bone Points

Specimen	Technique	Base	Grooves	L.	W.	T.
KT28/485	Ground	B	0	5.8	.8	.7
-/788	Ground	B	0	6.4	.6	.6

Bone Peg

Specimen	Technique	Base	Grooves	L.	W.	T.
KT28/1224-4236	Ground	Rounded	0	4.9	.7	.6

PB partly broken
B broken
* at base

PART V. USED SPLINTERS OF BONE

Fourteen splinters of bone show indications of having been used as tools. It is possible to classify these tools according to the areas where use-polish appears, thus they will be classified according to the working end and not the appearance of the unworked shaft. Using this method of classification, four groupings are easily discernable:

I. Blunt pointed ends. Total 6. Specimens: GR68/580 and KT28/265, -/2033, -/3464, -/3649, -/4270: Max. L. 11.3 cm., Min. L. 6.2 cm., Max. W. 1.6 cm., Min. W. 1.0 cm. (Plate 6,F,1,2, and 4)

II. Narrow (.3-.4 cm.) rounded ends. Total 5. Specimens: GR68/122 and KT28/3690A, -/3690B, -/4352, -/3879: Max. L. 9.5 cm., Min. L. 5.6 cm., Max. W. 1.6 cm., Min. W. .9 cm. (Plate 6,F,3)

III. Wide (1.0 cm.) rounded ends. Total 1. Specimens: KT28/4293: L. 10.1 cm., W. 2.4 cm.

IV. Angular ends. Total 2. Specimens: GR68/45: L. 5.7 cm., W. 1.8 cm., and KT28/3881: L. 6.6 cm., W. .8 cm.

PART VI. WORKED BONE FRAGMENTS

Seventeen worked bone fragments were recovered. Of these, six are ends of tools: four flat, narrow rounded ends, approximately 3 cm. long and .7 cm. wide and two tapering blunt points, also approximately 3 cm. long and .7 cm. wide. Little more can be said of these except that they were formed by grinding.

(1) Flat rounded ends. Specimens: GR68/521 and KT28/3862, -/4728, -/4729

(2) Blunt pointed ends. Specimens: KT28/319, -/1652

The remainder of the fragments are parts of shafts formed by grinding. Specimen GR68/520 has indications of battering on one end and is possibly the base of a wedge. The only other specimen which should be described in more detail is KT28/1343. It is a small rectangular section of bone, probably mammal rib, which has small incised notches perpendicular to its length on each of the four corners formed by the rectangular cross-section. Cellular structure is exposed on two opposite longitudinal faces and the other two faces are ground, one of which has longitudinal scratches. L. 1.6 cm., W. 1.1 x 1.0 cm. (See Fig. 18)

Shaft fragments. Total 10. Specimens: GR68/121, -/300, -/520, -/613, and KT28/518, -/1343, -/1256, -/2190, -/3141, -/3243 and -/944.

Table 54

Distribution of Bone Tools

Bone Tools	45-KT-28 Housepit 18	Stratum A-1	Stratum A-2	Housepit 32	Housepit 11	Total 45-KT-28	Housepit 2 (GR-68)	TOTAL 45-KT-28 45-GR-68
Awls I	4	-	-	1	2	7	1	8
II	-	-	-	-	-	-	1	1
III Awl tips	6	1	1	3	-	11	1	12
IV Splinter awls	5	-	-	-	-	5	-	5
Tools w/ flat rounded ends I, II, and III	-	-	-	1	-	1	2	3
IV Fragments	1	-	-	-	2	3	3	6
Tools w/ angular ends	-	2	-	-	-	2	2	4
Bone Points	3	3	1	2	-	9	-	9
Used bone splinters	1	2	5	2	1	11	3	14
Bone tool fragments	9	1	-	1	1	12	5	17
Totals in Housepits & Strata	29	9	7	10	6	61	18	79

PART VII. ONE-OF-A-KIND BONE IMPLEMENTS

One of the bone implements tapers from the center, which is ovoid in cross-section, towards both ends, both of which are broken. There is a slight constriction near one of the broken ends, which leads to the possibility that this object was bound and suspended in the form of a bangle often worn on clothing in the ethnographic present. It was recovered from the interior of Housepit 18. Specimen: KT28/3227: L. 7.9 cm., W. 1.2 x 1.2 cm. (Plate 6,E)

Another one-of-a-kind bone implement was made from a longitudinal split deer tibia. The splitting left a small ridge the length of the bone which is chipped, probably through use. After the bone was split, the area in back of the ridge was ground or worn to a smooth flat surface. The split epiphysis were left unmodified. The implement was possibly used for scraping. It was recovered from the interior of Housepit 11. Specimen: KT28/2186: L. 23.3 cm., W. center of shaft 1.2 cm. (Fig. 23).

A modified skull cap of a dog or wolf was recovered: KT28/3057. The skull cap was horizontally removed from the upper portion of the skull, probably by cutting. The majority of the edge formed by the removal of the cap was smoothed down by grinding, leaving only a few cut marks visible near the edge. The part of the cap formed by the occipital bone is broken. The temporal bones are partially visible on the sides of the cap. A small hole--approximately 0.15 cm. in diameter--was drilled in the parietal bone or the upper center area of the cap. The inside of the skull cap has many small striations possibly produced during the cleaning of the skull. The cap was recovered from Stratum Association Two (A-2), that is, outside of Housepit 18 and to the southwest of the entrance in cut 2SCL. L. 8.9 cm., W. 6.8 cm., Height of fragment 1.7 cm. (See Plate —). (See Fig. 20)

PART VIII. BONE BEADS AND/OR RINGS

There are four bone rings or beads in the collection from 45-KT-28. They all appear to have been made from bird or rabbit bones. Each of the specimens will be described separately.

Specimen KT28/4150 was probably cut from the center section of a long bone. The edges were ground smooth prior to the incising of designs on the outer and inner surfaces of the ring. The design on the outer surface is a series of triangles, the long axis of which is opposite the curve of the ring. The triangles have been almost completely filled with lines running in the same direction as the curve of the ring, that is, perpendicular to the long axis of the triangles. There is a series of small dashes on the slightly beveled edges on the inside of the ring. Between the two rows of dashed lines on the inner surface of the bead are small scratches running in the same direction as the curve of the ring, indicating that in addition to beveling the edges, the center section was also worked down to a smooth surface. This working would not be difficult if the diameter of the ring were as large as indicated by the arch of the perimeter of this fragment. The diameter of the bead, as determined by this arch, assuming that it was relatively symmetrical, is 2.3 cm. The width of the ring is .8 cm., and the length of the fragment is 1.3 cm. (See Fig.19)

Specimen KT28/4233 was probably cut from the center section of a long bone. The edges created by the cutting have been ground smooth. There are a few scratches on the outer surface of the ring, indicating additional smoothing of the bone. There is no incising on either the outer or inner surfaces of the ring. The projected diameter of the ring is 1.4 cm.; the width of the ring is 1.3 cm., and the length of the fragment is 2.1 cm.

Specimen KT28/4254 was probably also cut from the center section of a long bone. The edges were ground smooth, and there are a few sporadic incised dashes on the edges of the outer surface of the bead. There are no indications of further workmanship. The projected diameter is 1.0 x 0.8 cm. The fragment is large enough to indicate that the perimeter of the bead is not symmetrical. The width of the ring or bead is 1.1 cm.; the length cannot be determined due to the curvature of the fragment.

Specimen KT28/4496 is almost complete. It was also probably cut from the center section of a long bone. The cut marks are still visible as the edges were not ground smooth. Scratches appear on the outer surface, running opposite the curvature of the bead, indicating additional smoothing. The cut marks at the bead edges dissect the scratch marks on the outer surface, indicating that the bone had been smoothed down prior to cutting the bone to form the bead segment. The diameter of the bead is 0.6 x 0.5 cm. (asymmetrical), and its width is 1.8 cm.

All four of the beads or rings were recovered from Stratum Association Two (A-2) at 45-KT-28. Three of the beads were found to the southwest of the entrance of Housepit 18, and KT28/4233 was recovered from the western side of the housepit in cut 1N4W.

PART IX. GAMING STICKS

Two gaming stick fragments were recovered from 45-KT-28: Specimens 3456 and 3500. The two sticks fit together and originally formed one section of bone. The two sections were found 20 cm. apart vertically, but within the same stratum, Stratum Association Two (A-2), that is, they were found outside of Housepit 18 and to the southwest of the entrance. The sticks are rectangular in outline, oval in cross-section and taper slightly towards one end. The opposite end is formed by the break. The break was accomplished by cutting a bifacial groove and then snapping the bone in half. Section -/3456 is slightly longer (4.0 cm.) than section -/3500 (3.5 cm.). The long section has three sets of incised lines, each composed of four lines, while the short section has two sets of incised lines, each composed of four lines. The sets of lines on the short section are evenly spaced, but those on the long section have been unevenly placed, probably due to miscalculation when the lines were incised. (See Fig. 19). The width of the sections at the break is 1.0 cm.; the opposite end of -/3456 is 0.8 cm. wide, and the opposite end of -/3500 is 0.8 cm. wide. The thickness of the bone at the break is 0.5 cm.; the opposite end of -/3456 is 0.4 cm. thick, and the opposite end of -/3500 is 0.3 cm. thick.

PART X. ANTLER TOOLS

There are eleven antler implements in the collections from 45-KT-28 and 45-GR-68: five possible wedges or wedge fragments, two possible flakers, one haft, and two unidentifiable implements.

I. The worked antler implements, which are being referred to as wedges, show either a wedge-shaped tapering to a fairly flat, rounded end or indications of battering on one end or both.

TABLE 55

Antler Wedges

Specimen	Technique	Base	End	Centimeters L.	W.
GR-68/74	Ground	Broken	Biface, tapered,	16.5	6.5 base 4.3 end
-/619	?	Battered	Broken	12.5	4.5 base
KT28/806	Ground	Battered	Broken, tapered	18.3	4.3 max.
-/2161	Ground	Broken	Biface, tapered rounded	9.0	2.3 max.
-/3354	Cut, longitudinally	Broken	Broken, tapered	15.8	3.5 max.
-/4253	Ground	Broken	Tapered, round	(fragments)	

TABLE 56

Distribution of Antler Wedges

GR68/74	Housepit 2, recorded in Feature 1
-/619	Housepit 2, recorded in Feature 5
KT28/806	Housepit 18
-/2161	Housepit 11
-/3354	Stratum Association Two (A-2) recovered on the northern side of Housepit 18
-/4253	Stratum Association Two (A-2) recovered outside Housepit 18 to the southwest of the entrance

II. There is one probable flaker and another antler tine which may also have been used in this manner. The probable flaker, KT28/663, is an antler tine 15.7 cm. long and 2.6 cm. wide at the base. The tip of the tine has been blunted and roughened, probably through use. There are chopping marks on one side of the base, probably resulting from detachment.

The other possible flaker, KT28/1654, is smaller, 8.6 cm. The tip is blunted. The base exhibits a recent clean break, and part of the burr still remains. Specimen -/663 was recovered from the interior of Housepit 18 and -/1654 was recovered from Stratum Association One (A-1).

III. There is one identifiable haft in the collection: KT28/1014. The perimeter at the base of the tine was grooved, and the tine was snapped off. The cellular structure in the base of the tine was removed to a depth of one centimeter. A rectangular slot 0.6 cm. wide continues down into the core of the tine approximately 1-2 cm. (Fig.21) There is a shallow indentation on the side of the tine at the base which extends up the shaft 2.5 cm. The tip of the tine is ground flat and tapers. The end of the tip is broken. The haft was recovered from the interior of Housepit 18. Max. L. 10 cm., Max. W. 1.7 cm.

IV. One of the unidentified antler implements, KT28/806A, is a modified antler beam with two tines. Both of the tines have grooves near their tips. The groove on the long tine (20 cm.) extends completely around its perimeter while the groove on the short tine (9 cm.) extends only half-way around its perimeter. The grooves are not an even distance from either the antler beam or the broken tips of the tines. The groove on the long tine is 16.5 cm. from the beam and 3.5 cm. from the tip. The groove of the short tine is 7 cm. from the beam and 2 cm. from the tip. There are chopping marks on the base of the beam, probably resulting from detachment. (See Fig. 22)

This rough surface has been slightly smoothed by grinding. The beam is 13 cm. long and 2.2 cm. wide. The implement was recovered from the interior of Housepit 18.

The other unidentified implement is the butt end of an antler: KT28/3142. The antler section base shows indication of battering. The opposite end was grooved and the remainder of the beam was snapped off. There are no indications of it having been used as a haft. It could easily be the refuse resulting from the manufacture of another antler implement. The antler section was recovered from the inside of Housepit 18. Max. L. 7.1 cm., Max. W. at butt end 4.6 cm., Max. W. of opposite end 3.5 cm.

There is one other small antler fragment: GR68/491. It is the butt end of a single tine antler, with the tip of the tine broken. There are no indications of the tine having been modified or used. It was recovered from the area of Features 1 and 2 inside Housepit 2 at 45-GR-68.

MODIFIED SHELL

Four modified shell fragments were recovered from 45-KT-28; a pendant, a bead, and two fragments of dentalia. (See Fig. 24)

The shell from which the pendant was made is unidentifiable. The roughly rectangular shape of the pendant was created first by cutting and then by grinding. Natural striations of the outer surface of the shell are visible on the tan colored face of the pendant. The other face is light colored and naturally smooth and glossy. A small hole, approximately 0.3 cm. in diameter, near the top of the pendant appears to have been drilled from both sides. Series of small lines were incised around the edge of the smooth face. The pendant (-/753) measures 2.6 cm. long, 1.5 cm. wide at the top, 1.8 cm. wide at the base, and 0.3 cm. thick. It was found in the interior of Housepit 18.

The bead (-/62) is made from a white mollusc shell. Its outer diameter is 1.1 cm. and it is 0.7 cm. thick. The hole in the bead appears to have been drilled from both sides, for its diameter is 0.45 cm. on one side and 0.6 cm. on the opposite side, but narrower in the center of the hole. The bead is roughly round in cross-section and appears to have been manufactured by cutting and grinding. It was also found in the interior of Housepit 18.

Two dentalia fragments were recovered from Housepit 11, (-/2089, -/2270). These shells were frequently used in the ethnographic present for clothing decoration. The larger of the two fragments (-/2089) is 1.4 cm. long. One end of the fragment is ground and the other end appears broken. The smaller fragment is 0.6 cm. long and appears to be broken at both ends. While both fragments were found in the housepit, they were recovered from two different cuts: 1NCL and 2WBL.

PIGMENTS

Seven specimens which could have functioned as coloring agents were recovered during the excavations. Four of the specimens were small lumps of red ochre, hematite, which have at least one worn or abraded surface. A lump of green pigment (fossil fragments located around glauconitic shale) has one broken edge, and the other edge is worn smooth with small striations possibly resulting from use. The sixth specimen is a small lump of lacustrine clay which could have also functioned as a pigment. The last possibility is a small lump of white chalk. All of the specimens are one gram or less in weight.

The three colors: red, yellow and white, all appear in the geometric and zoomorphic pictographs found in this area, (Cain, 1950:4) which only indicates that pigments in these colors were used by the Indians. Cain makes no mention of the use of green pigments. However, during a survey of the Logy Creek area on the Yakima Indian Reservation by the University of Washington, we located a cave with many pictographs, one of which was green.

Two stones which were possibly used for the grinding or powdering of pigments were also recovered. Both of the stones have what appears to be red ochre stains. One of the stones (KT28/3491) is a fragment of a small saucer-shaped bowl. It has a diameter of 6.6 cm. and it is made of basalt. The stains only occur on the interior of the bowl which is smooth, indicating that it was possibly used for grinding.

The second possibility is a flat basalt rock (KT28/592). One face of the rock is completely covered by red ochre stains. This face is somewhat

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The identification of the pigments was made by Dr. V. S. Mallory, Department of Geology, University of Washington.

rough. The stone is 15.5 cm. long and 9.5 cm. wide.

The stone bowl was found outside and to the south of Housepit 18 in occupation debris, that is, in Stratum Association Two (A-2). The flat stone was found in the interior of Housepit 18 in association with a small hearth, Feature 6.

TABLE 57

Specimen	Pigment	Worn Surface	Weight Grams	Location
GR68/592	White	-	2/10	HP 2 (B-3)
KT28/769	Yellow	-	1	Stratum A-1
-/975	Red	X	7/10	HP 18
-/2055	Green	X	1	HP 11
-/4358	Red	X	3/10	Stratum A-2
-/4439	Red	X	9/10	Stratum A-2
-/4475	Red	X	8/10	Stratum A-1

GENERAL SUMMARY

The discussions which conclude the analysis of the strata and housepits, the analysis of the projectile points and the analysis of the retouched stone tools, clarify the definitions of the Sunset Canyon Component and the Crescent Bar Component, and the evidence for their inclusion into the Sunset Canyon Phase. Prior to this study, it had been suggested by Swanson (1958) and others that the different styles of dwellings were important criteria for defining the archaeological units. Partly because of this view, and to clarify the definitions of the components, I have dealt with the housepits and the two stratum associations, as if each represented a separate component. This was done in order that the evidence from each could be examined separately and in total.

It could not be expected that each of these units would be identical; however, the question as to the range of variation which can exist between these units and still allow for their inclusion into a large unit, in this case a phase, still remains somewhat open. It is my opinion, in looking over the evidence presented, that the similarities in the archaeological record between the units are significantly greater than the total of the differences. And the variation which occurs is no greater than one would expect to find in a hunting, fishing and gathering society over this period of time.

I have made no attempt to mask the differences which occur. These differences, in fact, in some respects are more interesting and may be

more important than the similarities. The explanation of the similarities in the archaeological record can be dealt with in terms of other similarities, that is, proximity of time and space allowing for contact, similarities of environment and level of technology to exploit the environment and so on. However, faced with these similarities, the question of "why" the differences becomes more interesting. The differences may, when viewed in a much larger comparative picture, be of more value in gaining insights into this particular culture and its relations with other cultures. I do not think that all of these differences can simply be written off to individualism or individual variation. It is hoped that this study will be used along with previous and future studies to examine more closely these variations in a larger context and gain more insight into the differences.

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APPENDIX I

1960 Personnel

Principal Investigator: Dr. Robert E. Greengo

Field Director: Dr. Robert E. Greengo

Field Assistants: Mr. Ralph L. Emerson
Mr. Robert S. Kidd
Miss Sonja O. Sollano
Mrs. Margaret L. Susia

Student Assistants: Mrs. Louise S. Deane
Mr. Burard W. Eddy
Mr. Dave Edwards
Miss Lucia E. Esther
Miss Roberta R. Hilton
Mr. Lawrence S. Jacobson
Mr. Perry A. Kenneay
Miss Lizabeth S. Lapovsky
Miss Patricia E. Ostrander
Miss Joyce M. Provost
Mr. Lee D. Roys
Miss Nancy A. Stenholm
Mr. William A. Wienke

APPENDIX II

1961 Personnel

Principal Investigator: Dr. Robert E. Greengo

Field Director: Dr. Robert E. Greengo

Field Assistants: Mr. Robert S. Kidd
Miss Sonja O. Solland
Miss Nancy A. Stenholm

Student Assistants: Mrs. Patricia E. Ali
Mr. Robert W. Byington
Miss Lucia E. Esther
Mr. William R. Filter
Mr. Jared Fitzgerald
Miss Suzanne J. Gilmore
Miss Susan G. Goodhope
Mr. Stephen P. Grant
Mrs. Anona J. Hales
Mr. Brian G. Holmes
Mr. Duan F. Hopp
Mr. Kent R. Weeks
Mr. Dennis J. Wicklund

FIGURE 5

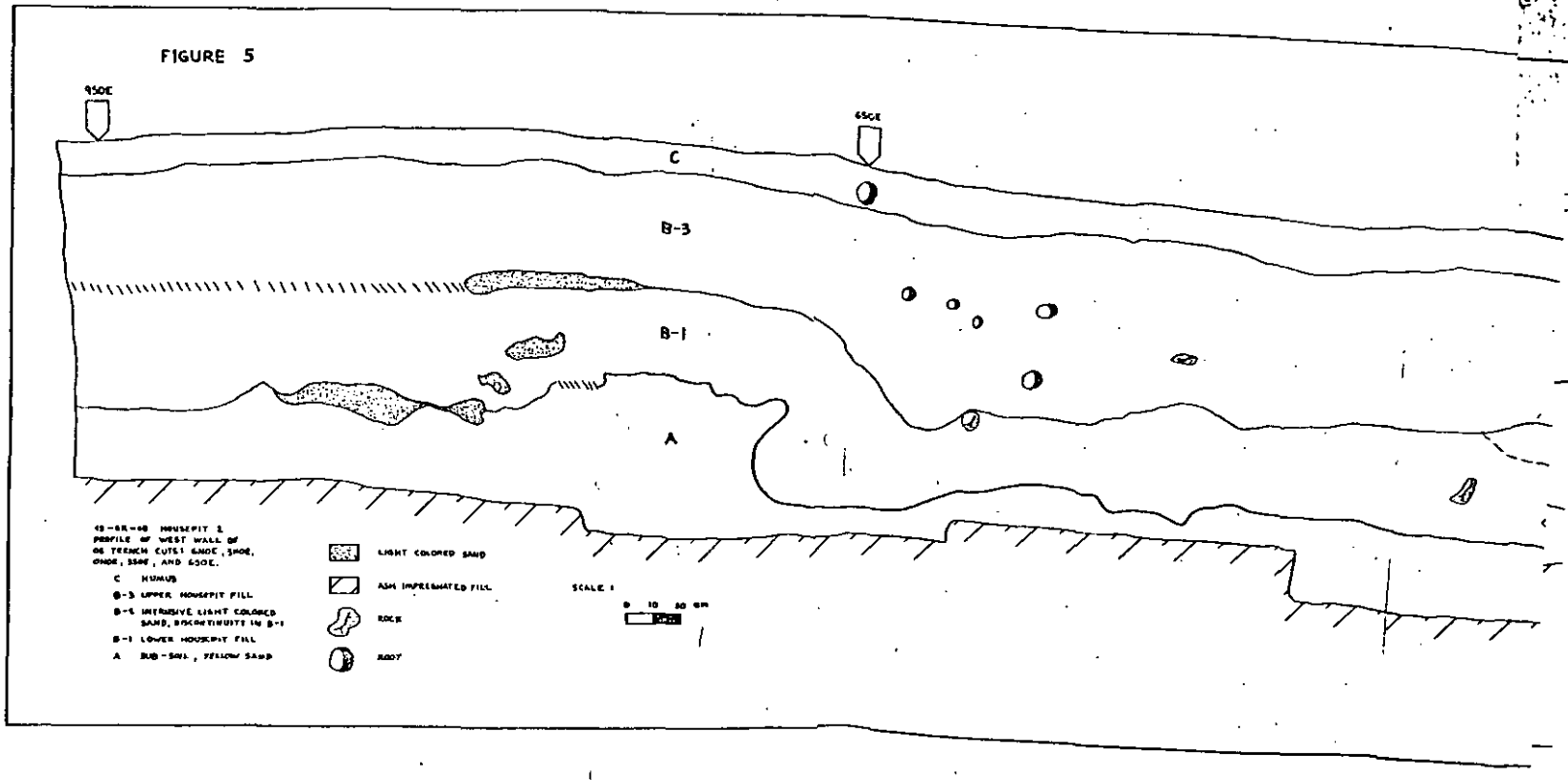
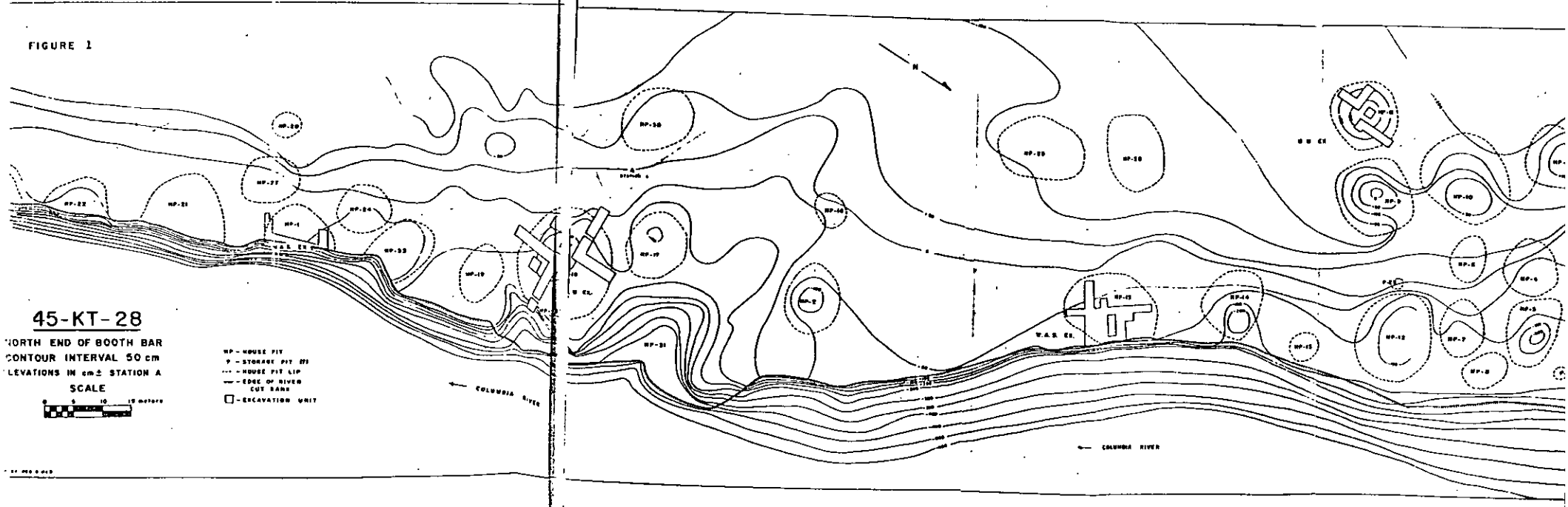

950E
650E
C
B-3
B-1
A
LIGHT COLORED SAND
ASH IMPREGNATED FILL
ROCK
ROOT
SCALE 1
0 10 20 cm

FIGURE 1


45-KT-28
NORTH END OF BOOTH BAR
CONTOUR INTERVAL 50 cm
ELEVATIONS IN cm± STATION A
SCALE
WP - HOUSE PIT
P - STORAGE PIT (?)
--- - HOUSE PIT LIP
— - EDGE OF RIVER CUT BANK
□ - EXCAVATION UNIT
COLUMBIA RIVER
N
W.A.S. EX.
COLUMBIA RIVER

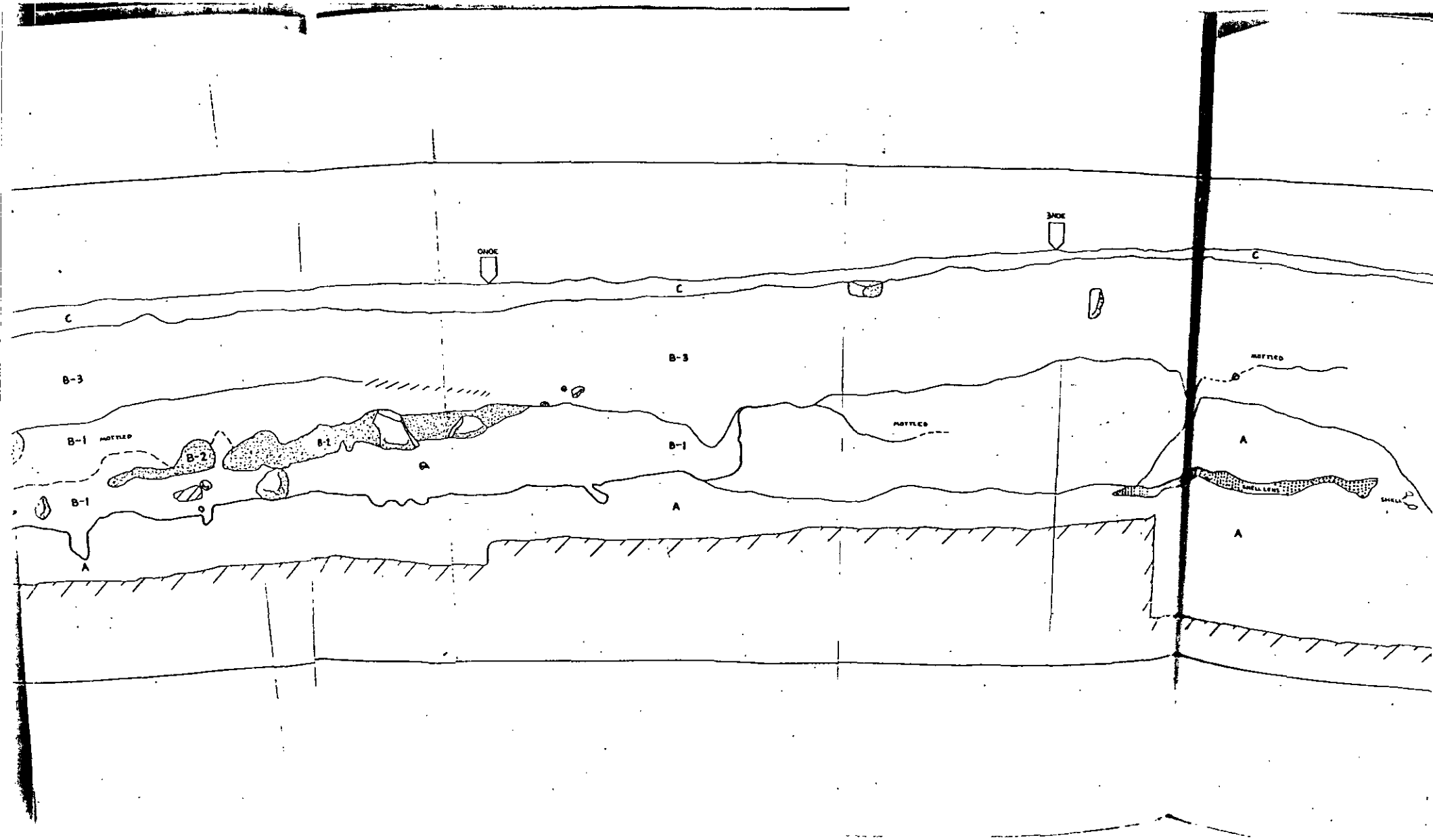
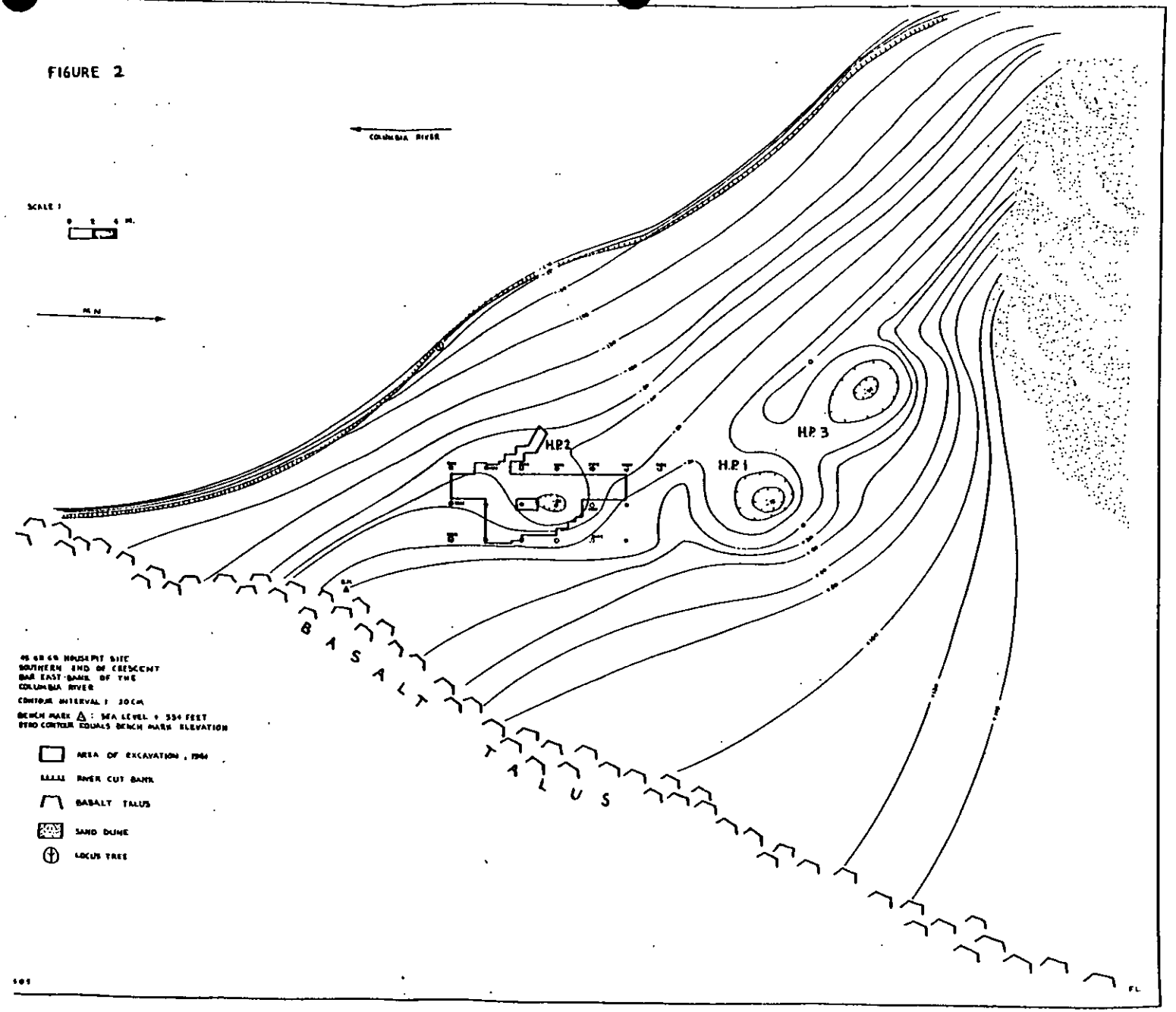

ONOE
3NOE
C
C
C
B-3
B-3
B-1 MOTTLED
B-2
B-1
B-1
MOTTLED
B-1
A
A
A
MOTTLED
A
SHELL LENS
SHELL

FIGURE 2


COLUMBIA RIVER
SCALE 1
0 3 6 M.
M N
H.P.2
H.P.1
H.P. 3
B A S A L T
A L U S
95 48 49 HOUSEPIT SITE
SOUTHERN END OF CRESCENT
BAR EAST BANK OF THE
COLUMBIA RIVER
CONTOUR INTERVAL 1 30cm
BENCH MARK △ : SEA LEVEL + 334 FEET
ZERO CONTOUR EQUALS BENCH MARK ELEVATION
AREA OF EXCAVATION , 1966
RIVER CUT BANK
BASALT TALUS
SAND DUNE
LOCUS TREE

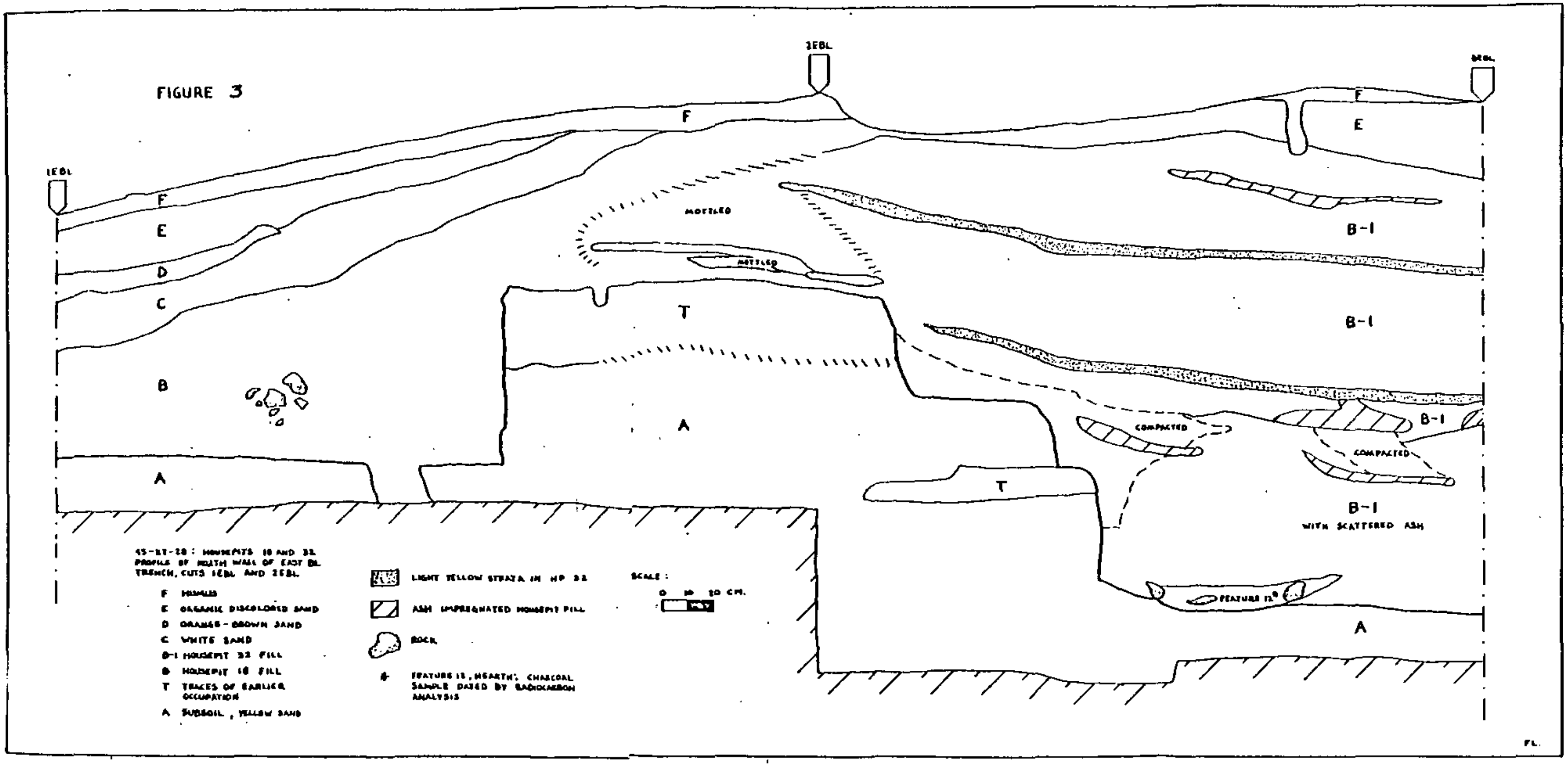

1EBL
2EBL
3EBL
F
E
D
C
B
A
MOTTLED
MOTTLED
T
A
B-1
B-1
B-1
COMPACTED
COMPACTED
B-1
WITH SCATTERED ASH
FEATURE 12*
T
A
45-KT-28 : HOUSEPITS 18 AND 32
PROFILE OF NORTH WALL OF EAST BL
TRENCH, CUTS 1EBL AND 2EBL
F HUMUS
E ORGANIC DISCOLORED SAND
D ORANGE-BROWN SAND
C WHITE SAND
B-1 HOUSEPIT 32 FILL
B HOUSEPIT 18 FILL
T TRACES OF EARLIER OCCUPATION
A SUBSOIL, YELLOW SAND
LIGHT YELLOW STRATA IN HP 32
ASH IMPREGNATED HOUSEPIT FILL
ROCK
* FEATURE 12, HEARTH; CHARCOAL SAMPLE DATED BY RADIOCARBON ANALYSIS
SCALE :
0 10 20 CM.
FL.

FIGURE 3

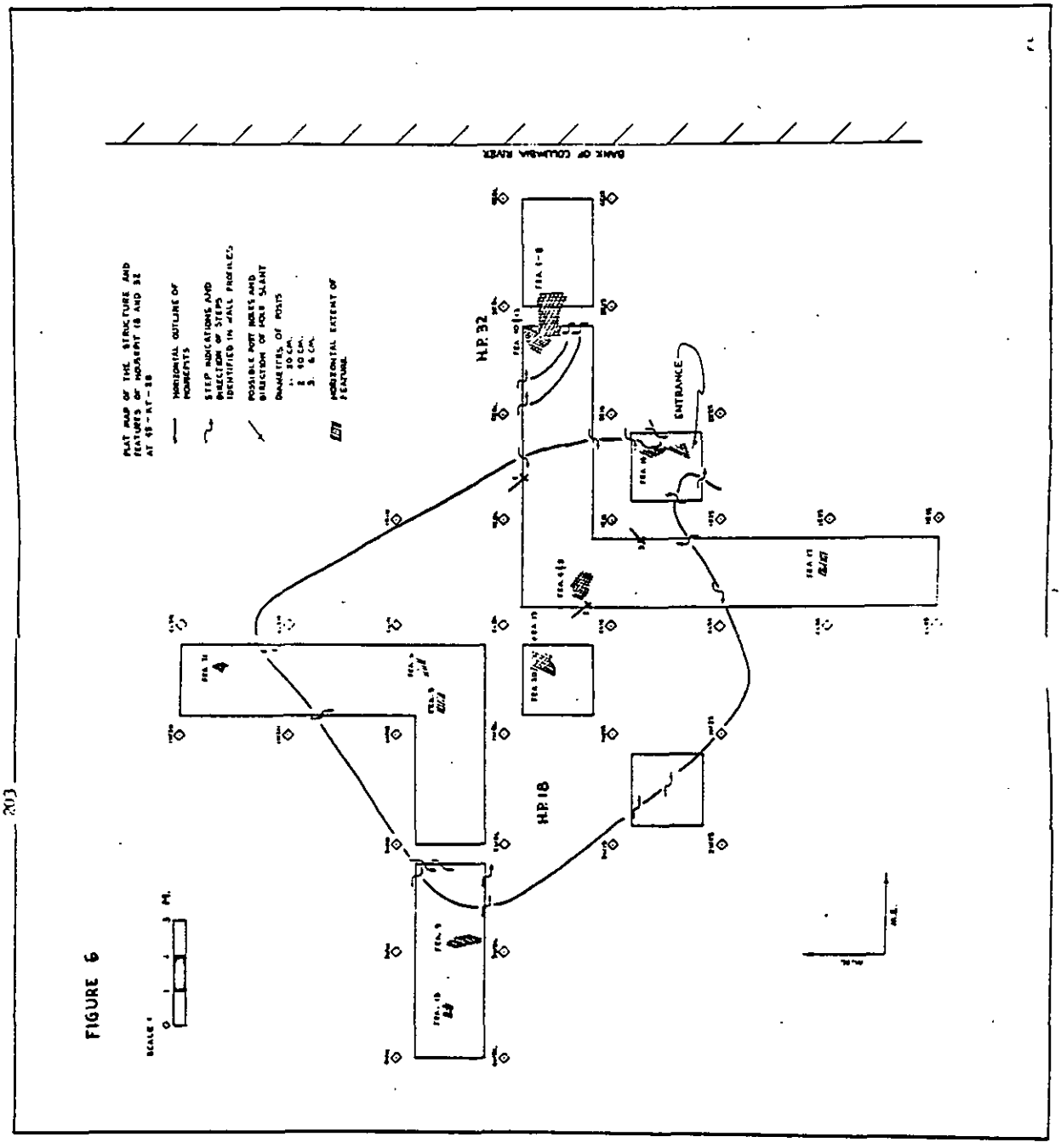
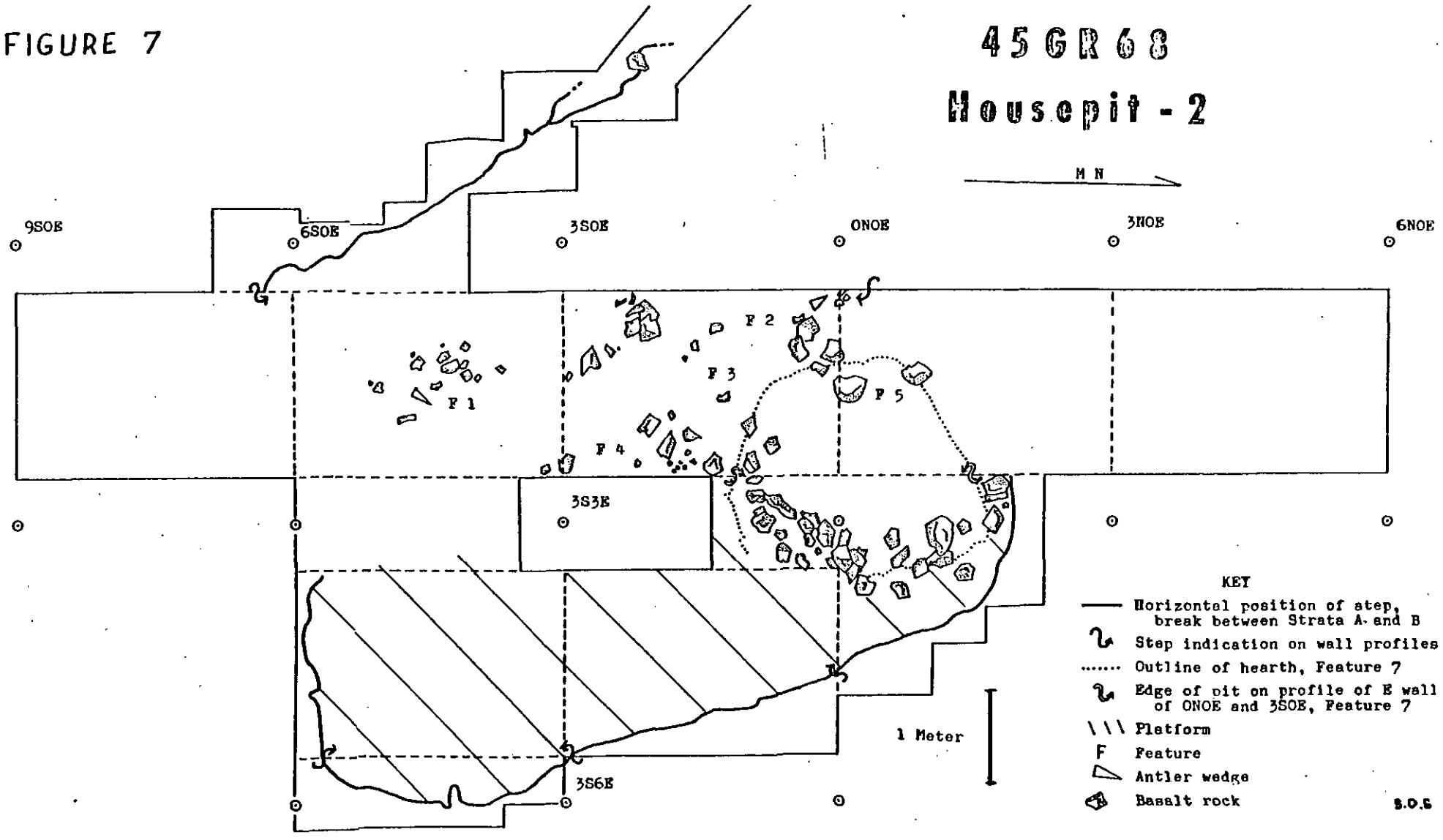

BANK OF COLUMBIA RIVER
PLAT MAP OF THE STRUCTURE AND FEATURES OF NO-45-PIT 18 AND 32 AT 45-47-28
HORIZONTAL OUTLINE OF POWERFITS
STEP INDICATIONS AND DIRECTION OF STEPS IDENTIFIED IN WALL PROFILES
POSSIBLE POST HOLES AND DIRECTION OF HOLE SLANT
DIAMETERS OF POSTS
1. 20 CM.
2. 10 CM.
3. 6 CM.
HORIZONTAL EXTENT OF FEATURE
H.P. 32
H.P. 18
ENTRANCE
SCALE 1
0
1
2
M.

FIGURE 6

FIGURE 7


45GR68
Housepit - 2
M N
9SOE
6SOE
3SOE
ONOE
3NOE
6NOE
F 1
F 2
F 3
F 4
F 5
3S3E
3S6E
1 Meter
KEY
Horizontal position of step, break between Strata A and B
Step indication on wall profiles
Outline of hearth, Feature 7
Edge of pit on profile of E wall of ONOE and 3SOE, Feature 7
Platform
F Feature
Antler wedge
Basalt rock
S.D.S

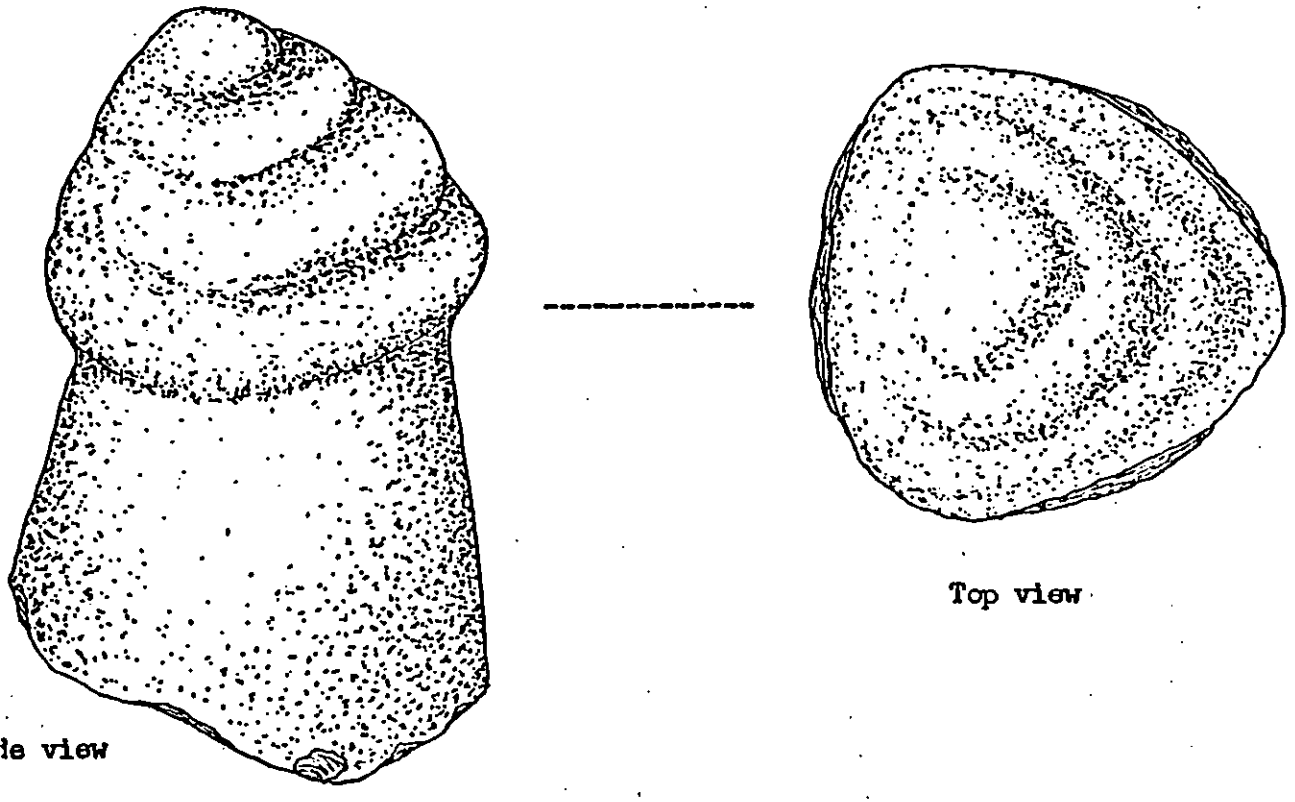


FIGURE 13

Specimen: 45-KT-28 / 816 Head of broken pestle. Made of granite.

Scale: 1 : 1

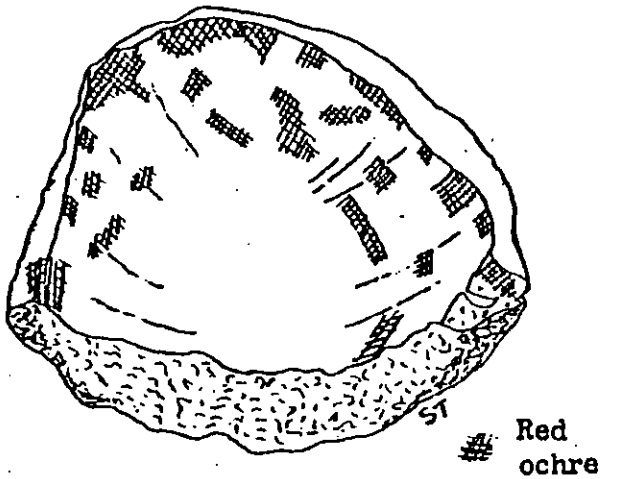
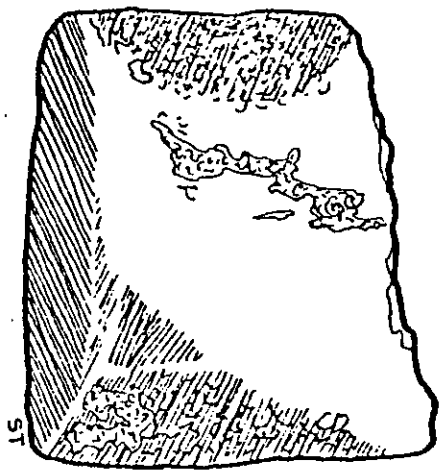


FIGURE 14

Specimen: 45-KT-28 / 3491 Stone bowl fragment with red ochre stains. Scale: 1 : 1



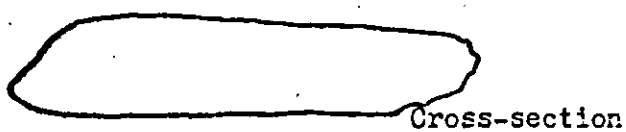
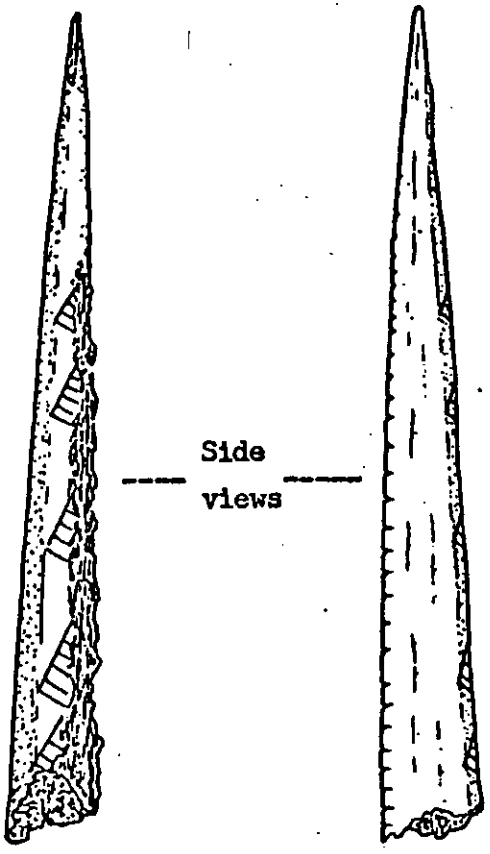


FIGURE 15

Specimen: 45-KT-28 / 793 Ground nephrite adze fragment. Scale: 1 : 1



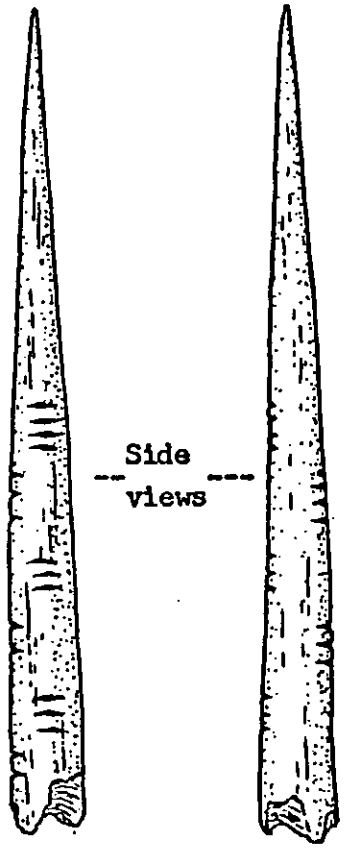


FIGURE 16

Specimen: 45-KT-28 / 50
Incised fragment of bone awl.
Scale: 1.5 : 1

Specimen: 45-KT-28 / 1410
Incised fragment of bone awl.
Scale: 1.5 : 1

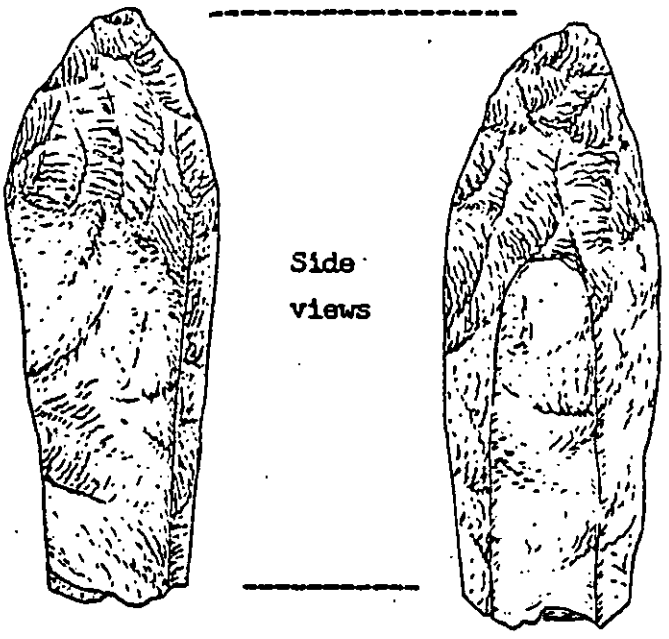
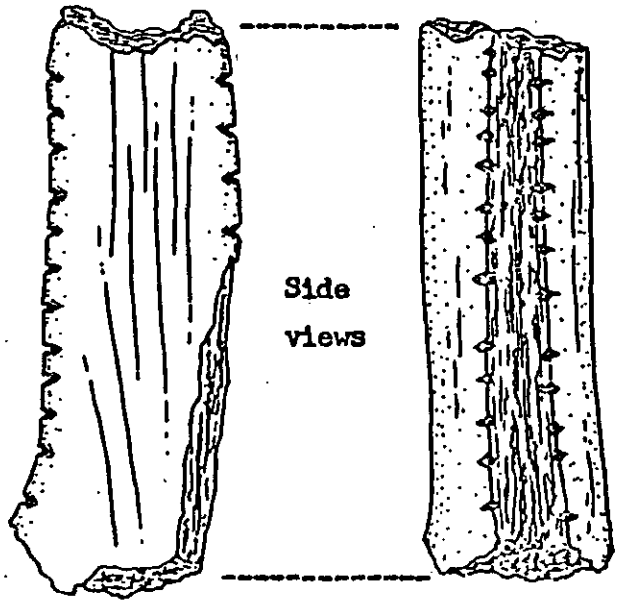
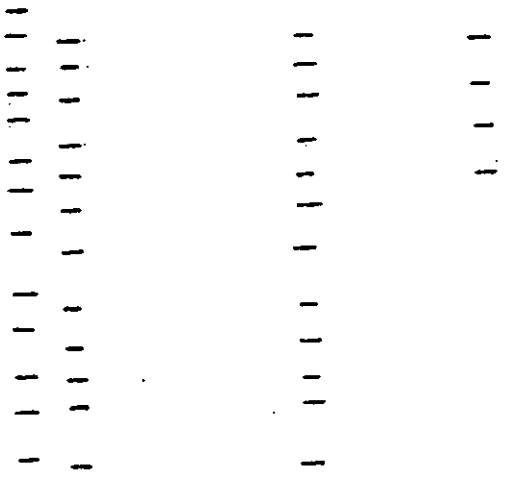


FIGURE 17

Specimen: 45-KT-28 / 4152 Whittled bone point with two longitudial grooves and approximately rectangular cross-section. Scale: 2 : 1



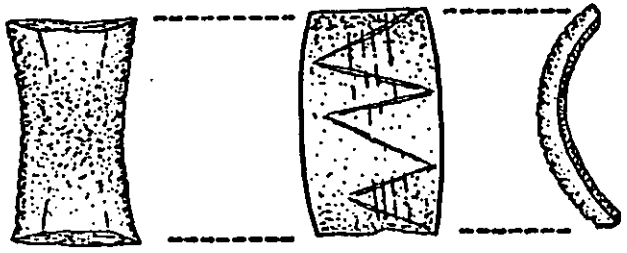


Incised designs

FIGURE 18

Specimen: 45-KT-28 / 1343 Incised bone fragments with cellular structure exposed on two opposite longitudial faces and ground on other two faces. Scale: 2 : 1

FIGURE 19



Inner surface Outter surface Side

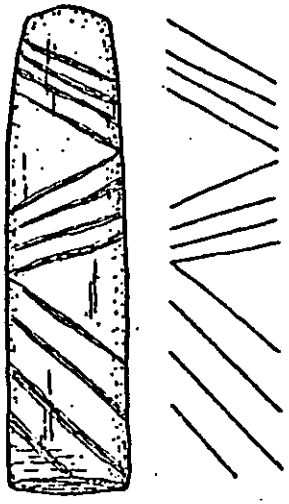
Specimen: 45-KT-28 / 4150

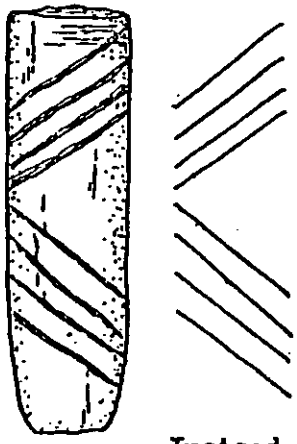
Incised bone bead Scale: 2 : 1

Specimen: 45-KT-28 / 3456-3500

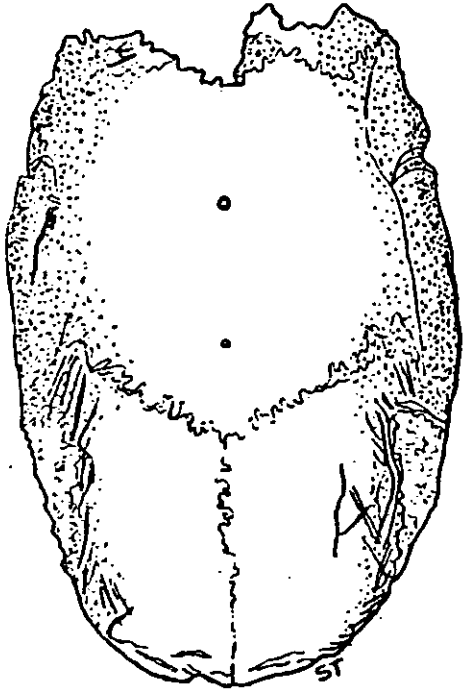
Incised gamming sticks

Scale: 1: 1

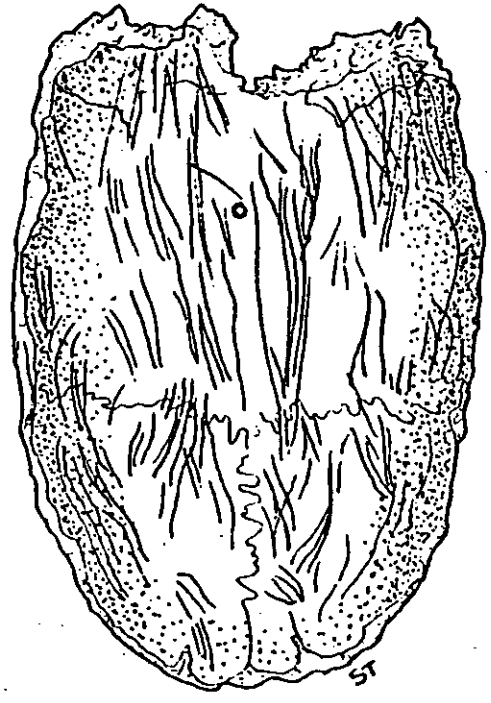




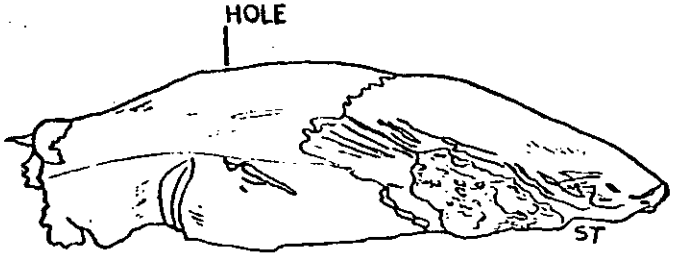
Incised design



Top view



Inside view



Side view

FIGURE 20

Specimen: 45-HT-28 / 3057 Modified skull cap of dog or wolf. Scale: 1 : 1

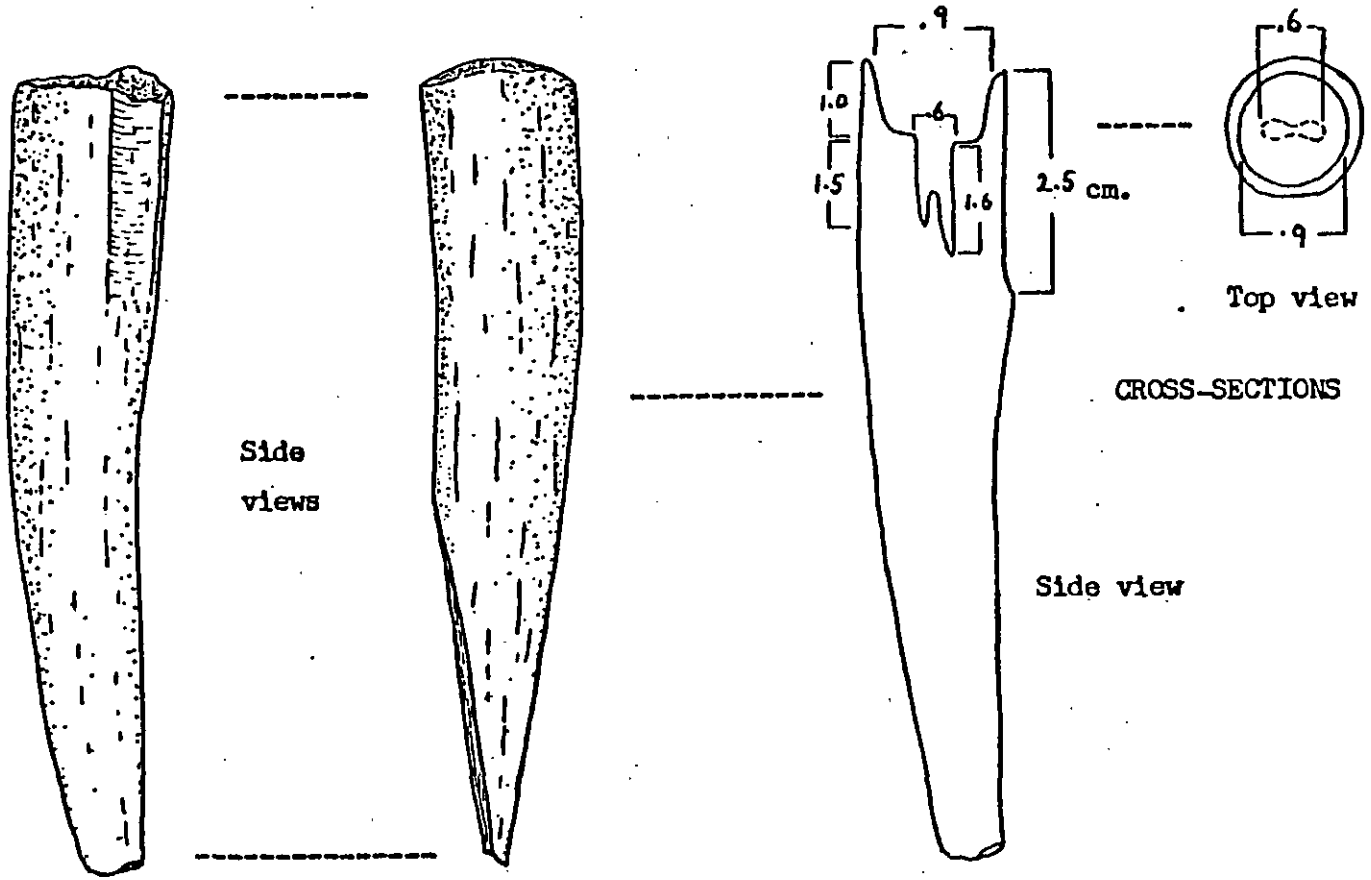


FIGURE 21

Specimen: 45-KT-28 / 1011 Antler haft with side groove and tapering base.

Scale: 1 : 1

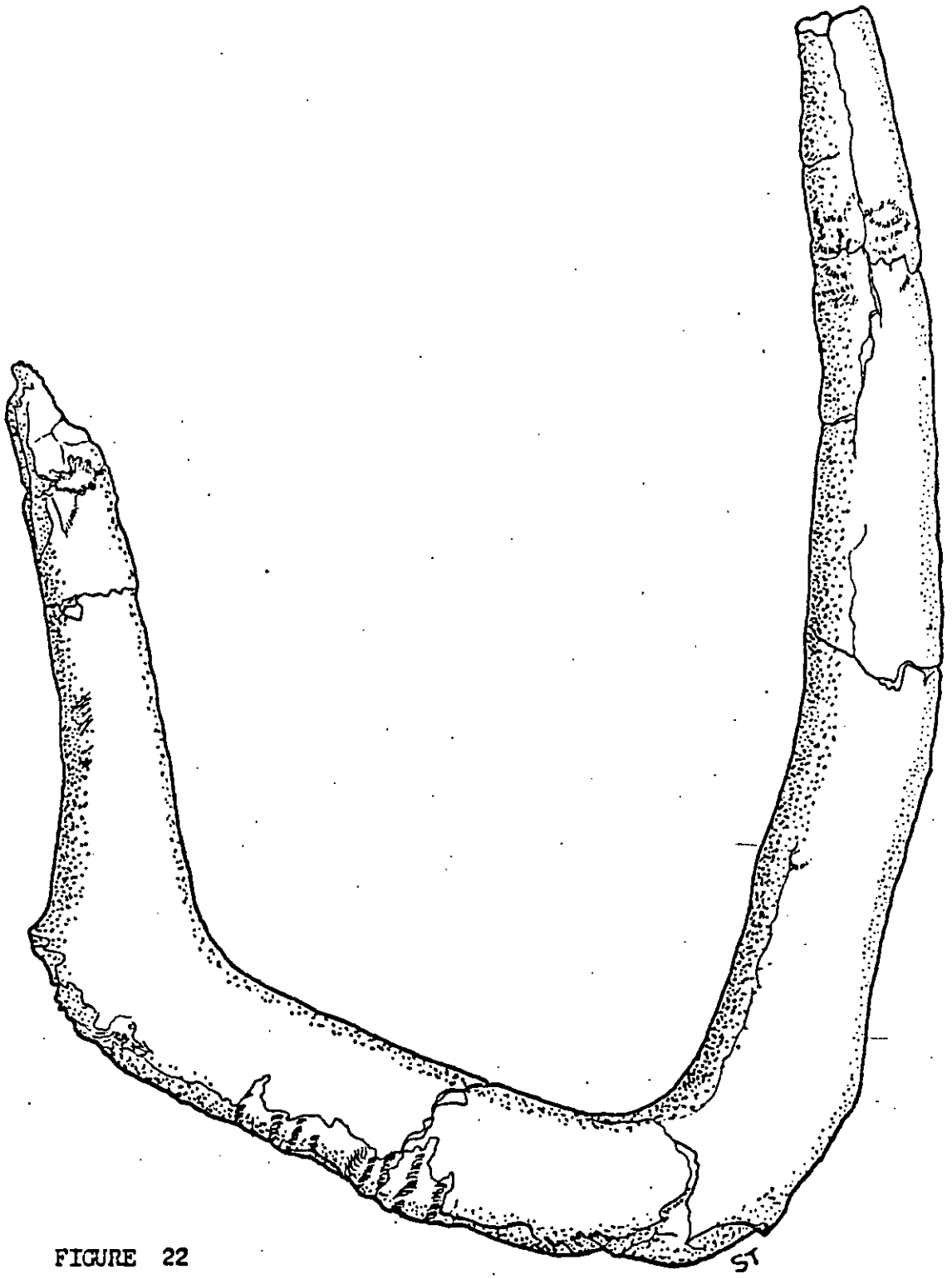


FIGURE 22

Specimen: 45-KT-28 / 806A Modified antler beam with two grooved tines. Scale: 1 : 1

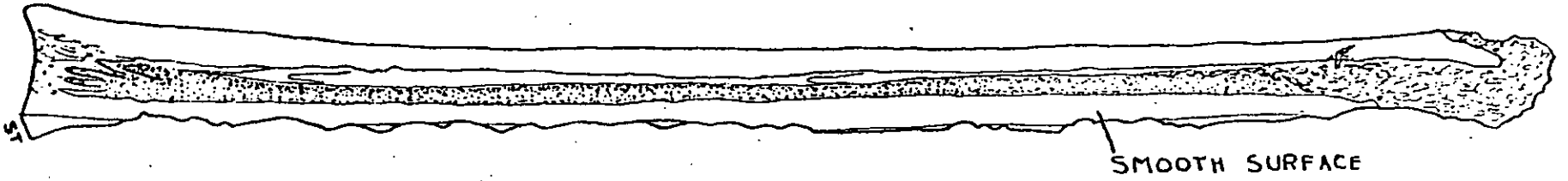


FIGURE 23

Specimen: 45-KT-28 / 2186 Modified deer tibia. Scale: 1 : 1

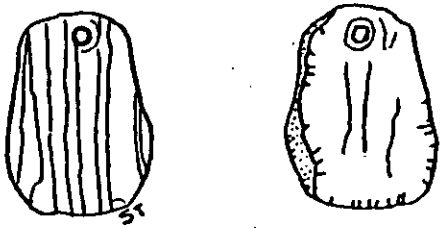


FIGURE 24

Specimen: 45-KT-28 / 753 Shell pendant with incised lines. Scale: 1 : 1

Plate 1

I A
45-KT-28, Stratum A-2, #3458
45-KT-28, Stratum A-2, #1067
45-KT-28, H.P. 18, #1110

I B
45-KT-28, Stratum A-2, #3498
45-KT-28, Stratum A-2, #3430
45-KT-28, H.P. 18, #3175
45-KT-28, H.P. 18, #399
45-GR-68, H.P. 2, #284 (basalt)
45-KT-28, Stratum A-2, #3361

I C
45-KT-28, Stratum A-2, #1327
45-KT-28, H.P. 18, #676
45-KT-28, Stratum A-2, #1182

II A
45-KT-28, H.P. 32, #1261 *
45-KT-28, Stratum A-1, #1380
45-KT-28, Stratum A-1, #1487
45-KT-28, Stratum A-1, #3115

II B
45-KT-28, Stratum A-1, #1653
45-KT-28, H.P. 18, #662
45-KT-28, H.P. 11, #2238 (basalt)
45-KT-28, Stratum A-2, #3164
45-KT-28, H.P. 18, #1064

II C
45-KT-28, H.P. 11, #2099
45-KT-28, H.P. 18, #957
45-KT-28, H.P. 18, #750
45-KT-28, H.P. 18, #3105

II D
45-KT-28, H.P. 32, #134
45-GR-68, H.P. 2, #244
45-KT-28, H.P. 18, #3205
45-KT-28, H.P. 18, #3338

II E
45-GR-68, H.P. 2, # 5
45-KT-28, H.P. 18, #173
45-KT-28, Stratum A-1, #143
45-GR-68, H.P. 2, #47

II F
45-KT-28, Stratum A-2, #4364
45-KT-28, H.P. 18, #1678
45-KT-28, H.P. 18, #1159
45-KT-28, Stratum A-2, #3363

II G
45-KT-28, H.P. 18, #1289
45-KT-28, H.P. 18, #3293

* Projectile # 1261 was found in association with Feature # 12 (See Fig. 2) from which a C-14 date was obtained, 1,170 ± 200 years B.P.

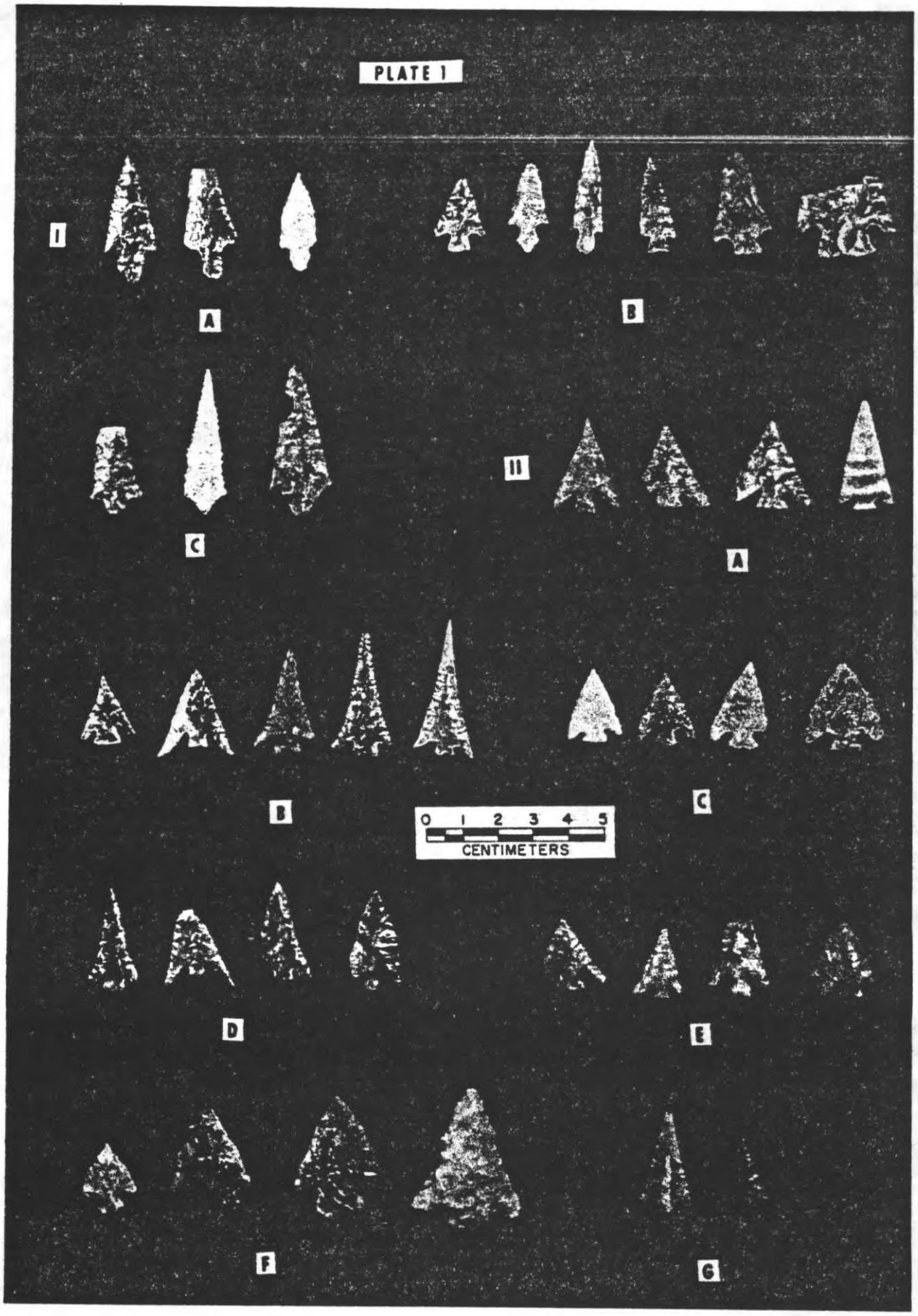


PLATE I
I
A
B
C
II
A
B
C
0 1 2 3 4 5
CENTIMETERS
D
E
F
G

III
45-KT-28, H.P. 18, #3104
45-KT-28, H.P. 18, #177
45-KT-28, Stratum A-2, #3007
45-KT-28, H.P. 18, #593
45-KT-28, H.P. 11, #2066

IV A
45-KT-28, H.P. 18, #337
45-GR-68, H.P. 2, #476
45-KT-28, H.P. 11, #2240
45-KT-28, H.P. 18, #3323
45-KT-28, H.P. 11, #2241
45-KT-28, H.P. 18, #935

IV B
45-KT-28, H.P. 18, #1153
45-KT-28, Stratum A-1, #1413
45-KT-28, Stratum A-2, #3010
45-KT-28, H.P. 32, #251

V A
45-KT-28, Stratum A-2, #3472
45-KT-28, Stratum A-2, #3006
45-KT-28, Stratum A-2, #4263

V B
45-KT-28, Stratum A-2, #4521
45-KT-28, H.P. 11, #2141
45-KT-28, Stratum A-1, #708

VI
45-KT-28, H.P. 18, #1085
45-KT-28, Stratum A-1, #1426

VI
45-KT-28, H.P. 11, #2262
45-GR-68, H.P. 2, #430
45-GR-68, H.P. 2, #432
45-KT-28, Stratum A-1, #1466

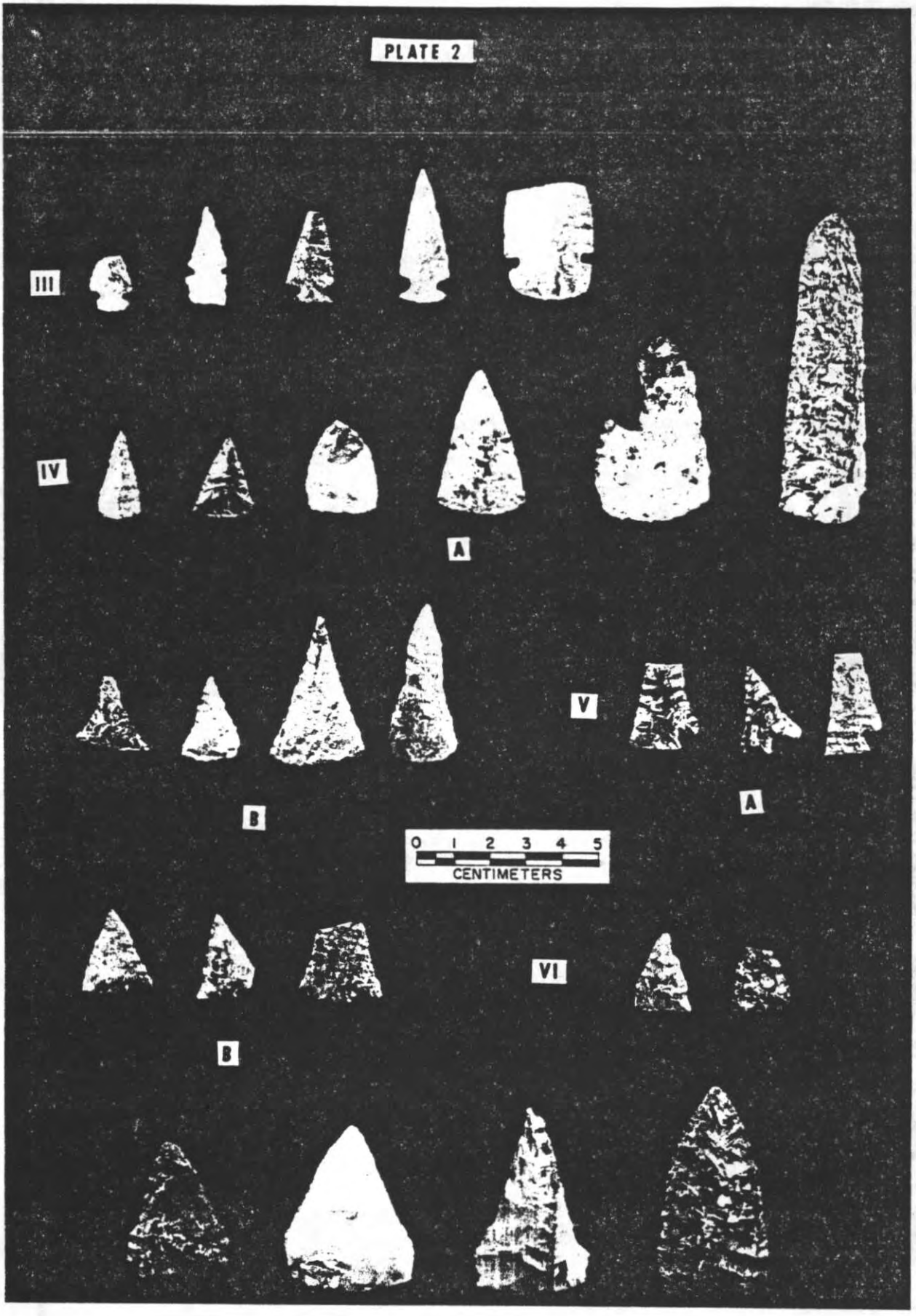


PLATE 2
III
IV
A
V
A
B
0 1 2 3 4 5
CENTIMETERS
VI
B

Plate 3

VII 45-KT-28, H.P. 18, #397
45-KT-28, Stratum A-2, #943
45-KT-28, Stratum A-2, #3459
45-KT-28, Stratum A-2, #3508

VIII 45-KT-28, Beach surface,#1516
(mistake in plate not class VIII)

IX 45-KT-28, H.P. 32, #787
45-KT-28, Stratum A-2, #3366

Drills 45-KT-28, H.P. 18, #1433
45-KT-28, H.P. 18, #563
45-KT-28, Stratum A-2, #3031
45-KT-28, H.P. 18, #1672

Drill-gravers 45-KT-28, H.P. 18, #1681
45-KT-28, H.P. 18, #3933
45-KT-28, Stratum A-2, #1019
45-KT-28, H.P. 18, #1494
45-KT-28, H.P. 18, 3731

A 45-GR-68, H.P. 2, #146

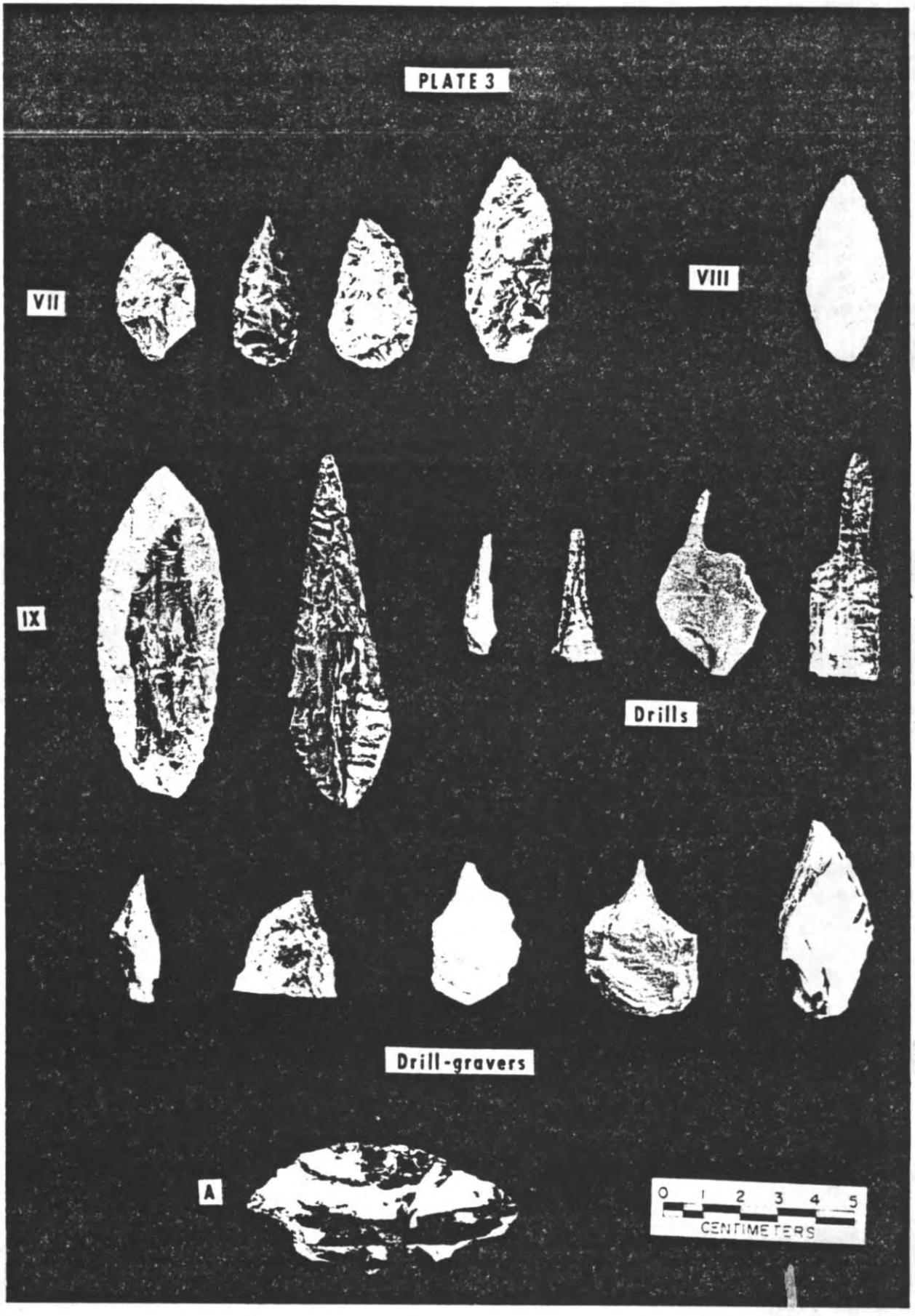


PLATE 3
VII
VIII
IX
Drills
Drill-gravers
A
0 1 2 3 4 5
CENTIMETERS

Plate 4

I
45-KT-28, Stratum A-1, #1133
45-GR-68, H.P. 2, #438
45-GR-68, H.P. 2, #129
45-GR-68, H.P. 2, #234
45-KT-28, H.P. 18, #1563
45-KT-28, H.P. 18, #3275
45-KT-28, H.P. 18, #459
45-KT-28, Stratum A-2, 1018

II
45-KT-28, Stratum A-1, #3639
45-KT-28, H.P. 18, #672
45-KT-28, H.P. 11, #2056
45-KT-28, Stratum A-2, #839
45-GR-68, H.P. 2, #236
45-GR-68, H.P. 2, #434
45-KT-28, Beach surface, #4535 (mistake in plate)
45-KT-28, H.P. 11, #2189

III
45-KT-28, H.P. 32, #1126
45-KT-28, H.P. 18, #3334
45-KT-28, H.P. 18, #707
45-KT-28, H.P. 18, #4413

A
45-GR-68, H.P. 2, #57

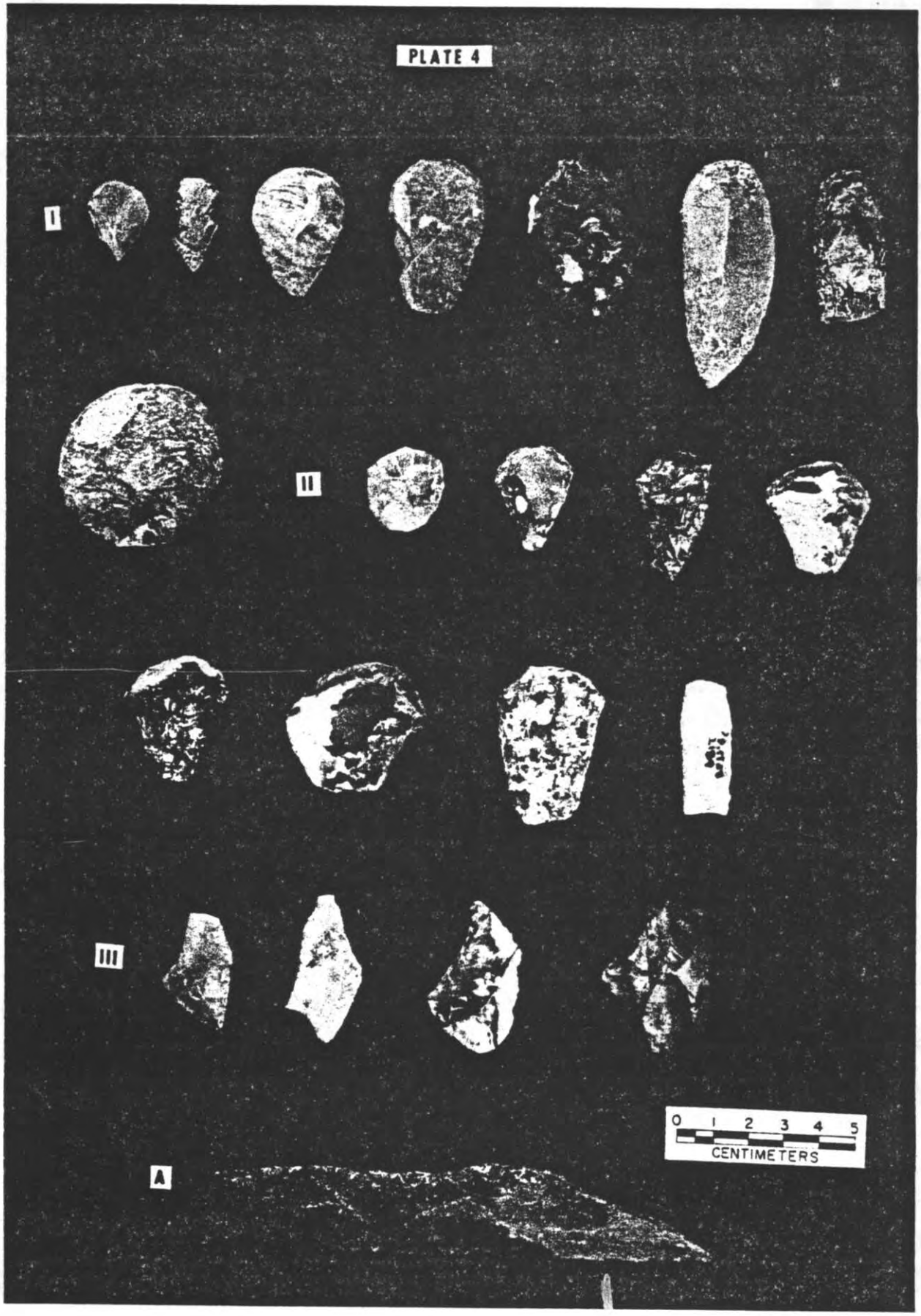


PLATE 4
I
II
III
A
0 1 2 3 4 5
CENTIMETERS

Plate 5

I A
45-KT-28, Stratum A-2, #3428
45-KT-28, H.P. 32, #790
45-KT-28, H.P. 18, #1115

I B
45-KT-28, H.P. 18, #527
45-KT-28, H.P. 18, #3008
45-KT-28, Stratum A-2, # 933

II
45-KT-28, H.P. 32, #671
45-KT-28, H.P. 18, #3278
45-KT-28, Stratum A-1, #1350

III
45-KT-28, H.P. 18, #726
45-KT-28, H.P. 18, #3067
45-KT-28, Stratum A-2, #3485

IV
45-KT-28, Stratum A-2, #3395
45-KT-28, Stratum A-2, #1634

V
45-KT-28, H.P. 18, #1568
45-KT-28, Stratum A-2, #3483

VI
45-KT-28, Stratum A-2, #3396
45-KT-28, H.P. 11, #2288

VII
45-KT-28, H.P. 18, #430
45-KT-28, H.P. 18, #1667

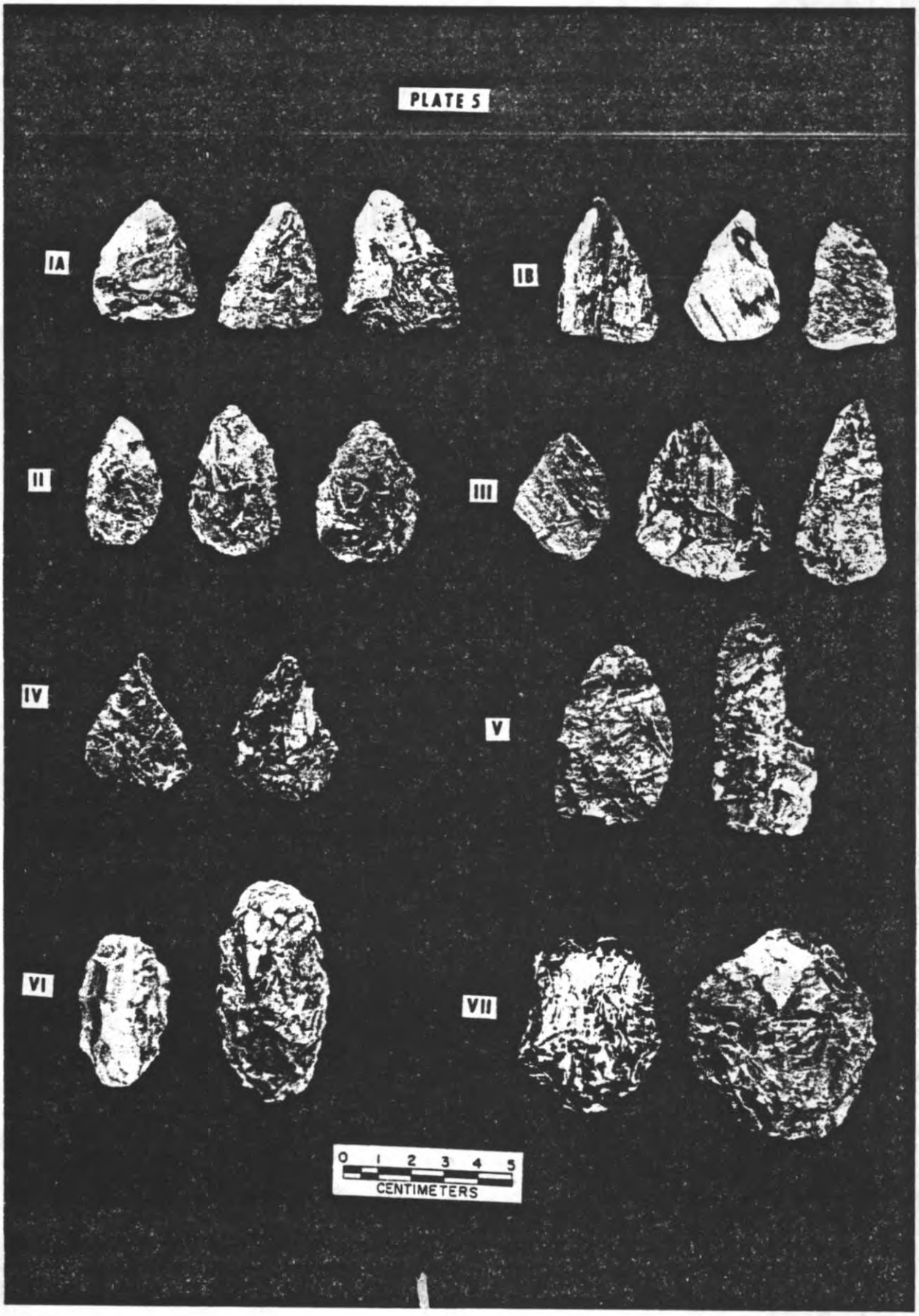


PLATE 5
IA
IB
II
III
IV
V
VI
VII
0 1 2 3 4 5
CENTIMETERS

Plate 6

I
45-GR-68, H.P. 2, #294
45-KT-28, H.P. 18, #847
45-KT-28, H.P. 32, #1013
45-KT-28, H.P. 11, #2024

II
45-GR-68, H.P. 2, #437

III
45-KT-28, H.P. 32, #3703
45-KT-28, H.P. 18, #3101
45-KT-28, H.P. 18, #3204
45-KT-28, H.P. 18, #3860

A
45-GR-68, H.P. 2, #283
45-KT-28, H.P. 32, #182
45-GR-68, H.P. 2, #40
45-GR-68, H.P. 2, #377

B
45-GR-68, H.P. 2, #321
45-KT-28, Stratum A-1, #3653
45-GR-68, H.P. 2, #172

C
45-KT-28, Stratum A-2, #4152
45-KT-28, Stratum A-1, #827
45-KT-28, Stratum A-1, #496
45-KT-28, Stratum A-1, #1470

D
45-KT-28, H.P. 18, #788
45-KT-28, H.P. 32, # 1224 and 4236

E
45-KT-28, H.P. 18, #3227

F
45-KT-28, Stratum A-2, #3649
45-KT-28, H.P. 11, #2033
45-KT-28, H.P. 32, #3690A
45-KT-28, Stratum A-1, #265

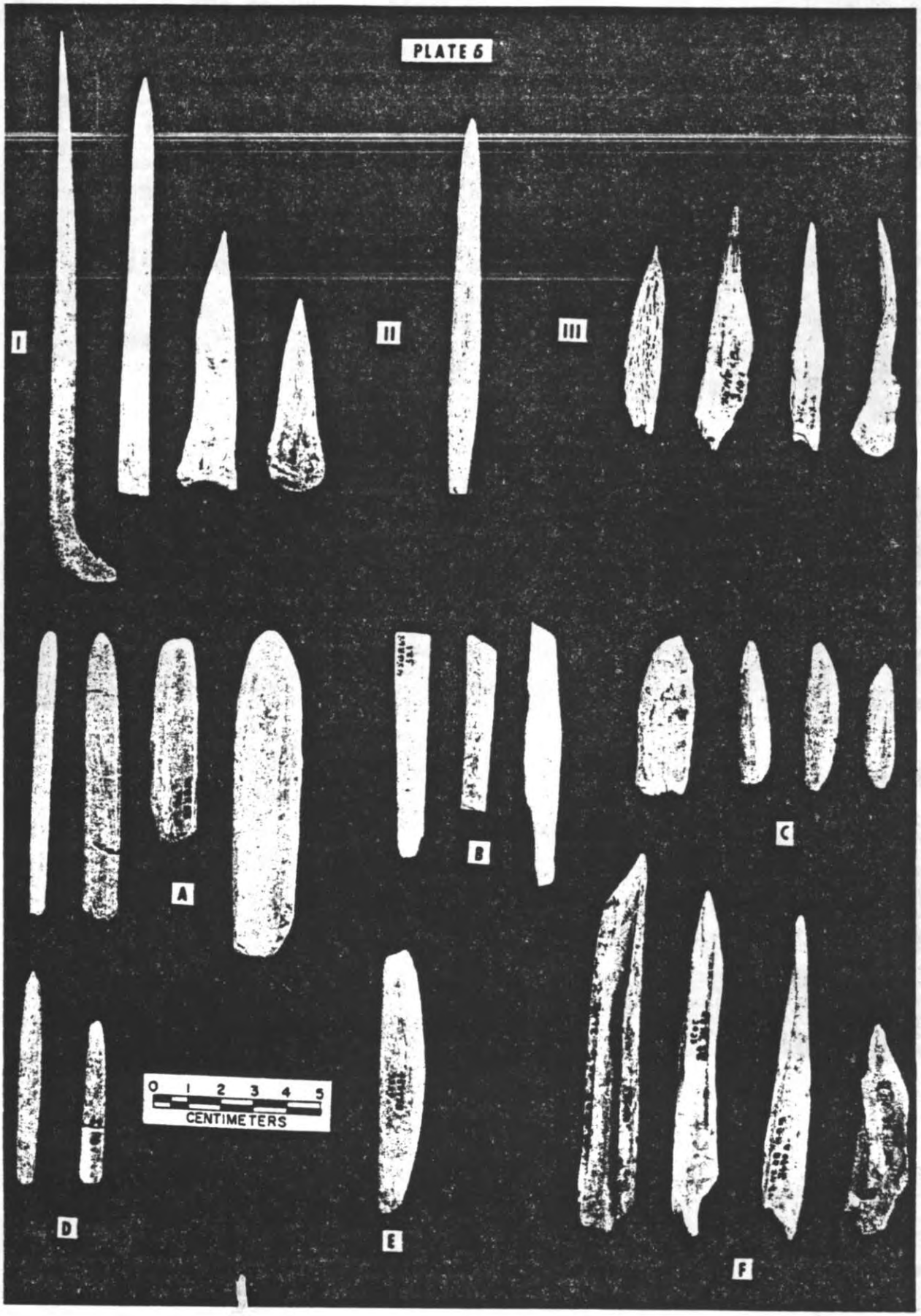


PLATE 6
I
II
III
A
B
C
D
E
F
0 1 2 3 4 5
CENTIMETERS