Excavations: Stratigraphy And Artifacts

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INTRODUCTION

Initial survey data suggested that human habitation occurred in three different but mutually inter-related zones along an east-west transect; the "fiord headwater", "protected coastal waterway", and "exposed island coastline" areas of occupation (Hester 1968). The central zone, the protected coastal waterways, had the greatest site density and was geographically the largest of the three zones. Those zones to the east and west, it was suggested, owed their low site density and small site sizes to the naturally harsh climatic conditions or rough terrain, and were occupied probably on a seasonal basis. More specifically, the survey evidence suggested that extensive archaeological excavation results could be used ' to examine the potential of ecological factors being used as diagnostic characteristics for the definition of archaeological phases" (Hester 1968:1).

Selection of Namu (Fig. 7) as the initial place to apply this approach was arbitrary although testing during the 1968 site survey had revealed deep cultural deposits. Two additional sites, ElSx 3 at Kisameet Bay and FbSx 6 near Roscoe Inlet, were subsequently excavated in order to obtain comparative data, particularly cross-section and midden matrix samples. No other site in the region, however, was handled so intensively as was Namu, and, in retrospect, Namu is distinctive in having the deepest continuum of dated cultural deposits of any site on the Coast.

SITE SITUATIONS

The Namu midden, and two additional sites selected and sampled on the basis of their differing physiographic settings, (Figs. 7, 8) will be described here. These two sites include Kisameet Bay, ElSx 3, sampled during each of our three field seasons, and the site in Roscoe Inlet, FbSx 6, which we sampled in 1970. The latter was also tested by Drucker in 1938 at which time it was referred to as Roscoe Inlet 1A (Drucker 1943). Information from these last two sites provides the background necessary for our comparative discussions.

Namu: ElSx 1

The town of Namu, at site ElSx 1 in Figure 7 (north lat. 51°51'32", west long. 27°51'50"), is located on the mainland shore of Fitzhugh Sound approximately two miles south of King Island. The first white habitation recorded for the village began in 1893 when the Robert Draney family established a fish cannery (Lyons 1969). In 1909 a sawmill was built in order to provide lumber for salmon cases and building projects. Throughout the following years, the facilities grew and underwent frequent ownership changes until 1928 when the present owners, British Columbia Packers Ltd., took over the operations. An extensive fire in January 1962 destroyed a large portion of the plant facilities, and the company was forced to rebuild and retool the major portion of the complex. Introduction of more modern machinery and processing techniques after the fire enabled the cannery to increase production output while dropping employment levels. At present, the physical structures include, besides the processing facilities, large two-storey bunkhouses, family cottages for employees, an oil dock, an electric power plant, a fresh water supply, recreation and mess halls, and a system of boardwalks permitting access to each of these. The labour force serving

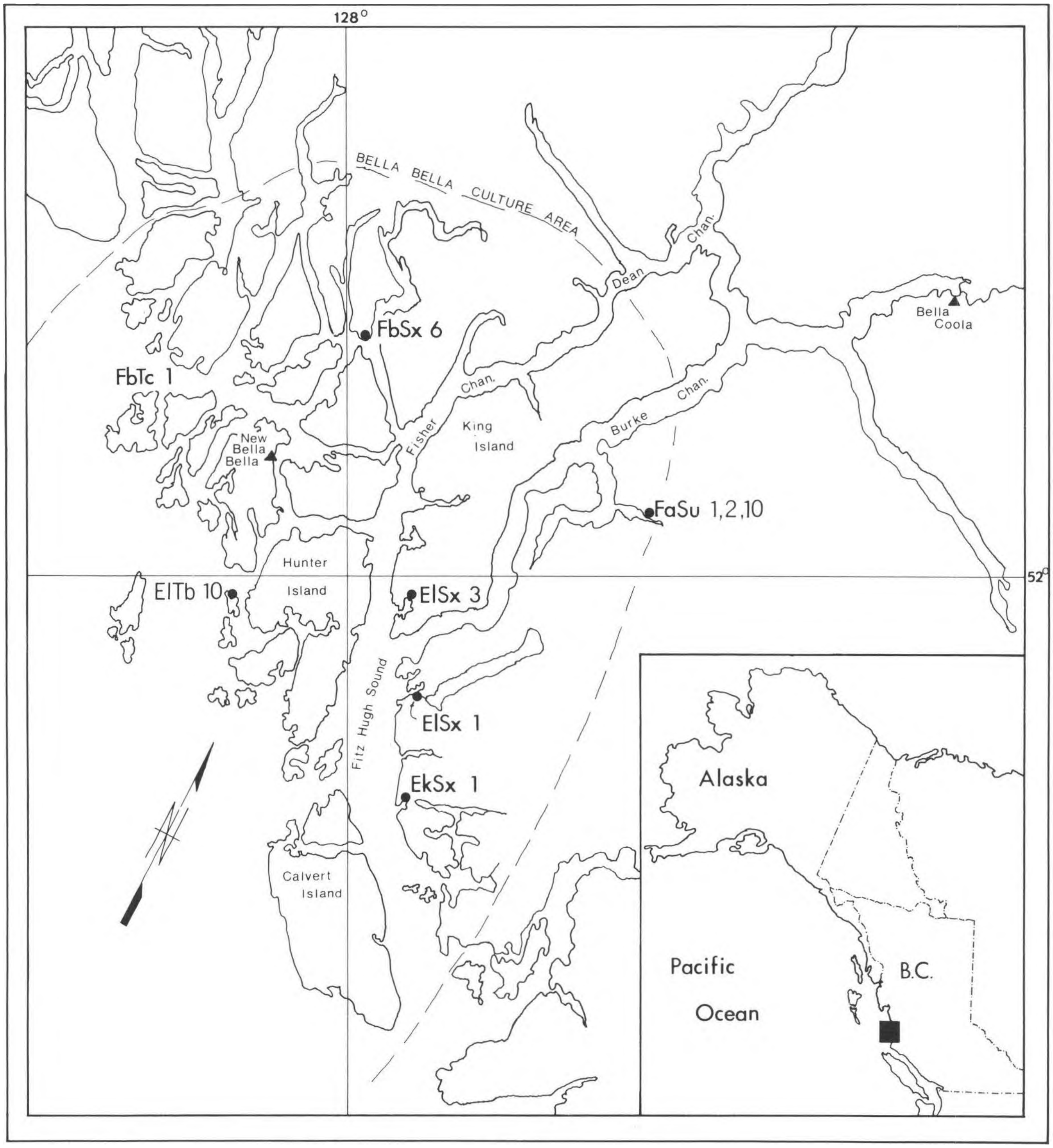


Fig. 7 Location of excavated sites ElSx 1, ElSx 3, and FbSx 6, within the Bella Bella Culture Area. Triangle indicates the village of New Bella Bella. Map information taken from Canadian Hydrographic service Chart 3744.

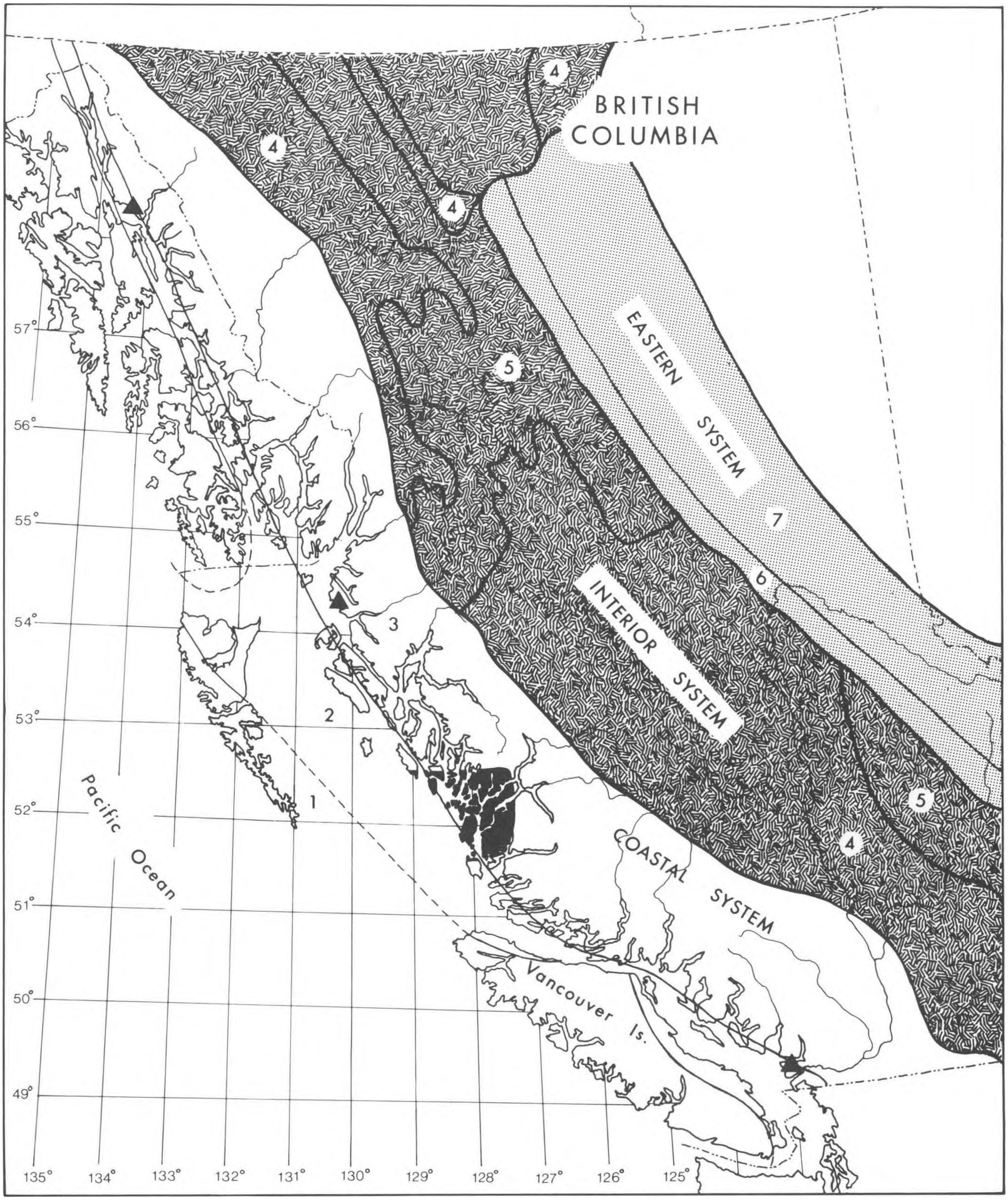


Fig. 8 Physiographic systems of British Columbia. Blackened area represents research region. North to south, triangles represent cities of Juneau, Prince Rupert, and Vancouver.

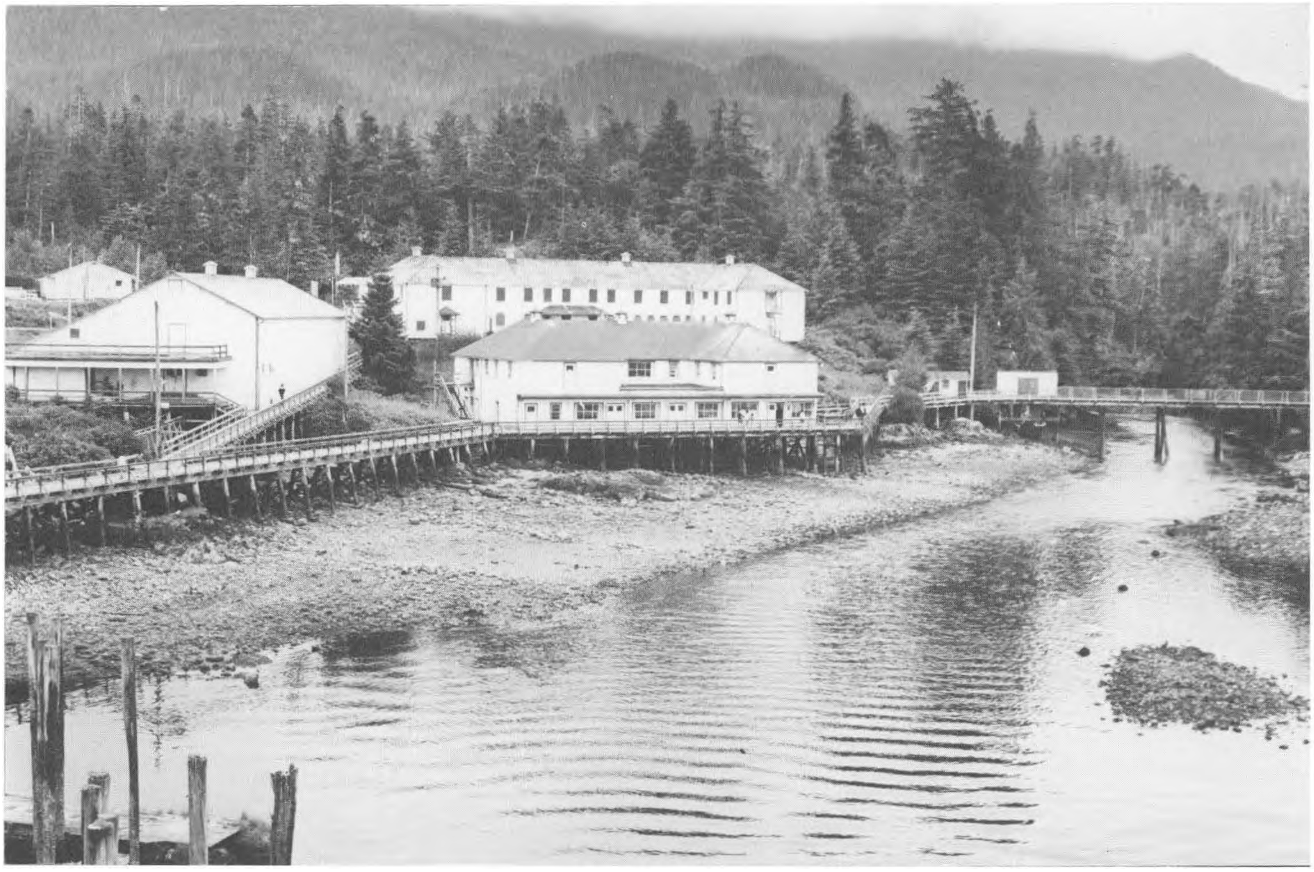


Fig. 9 View of ElSx 1 (1968) from Namu Harbor, facing east during approximate mean low tide. The Namu mess hall/cafeteria is in the foreground and the two-storey bunkhouse rests atop the midden in the background. The Namu River flows on the right and the cannery facilities are immediately off the picture to the left.

the facility is composed primarily of Bella Bella Indians who either work in the cannery or bring in fish during the summer fishing season. These people leave the town after the season and return home to New Bella Bella. Personal accounts from several Bella Bella Indians indicated that an Indian village existed on the site as recently as thirty to fifty years ago, inhabited only in the summer months. Certain older individuals were able to point out the former location of their homes, now covered by recent cannery structures.

The shell midden deposits (Figs. 9 and 10) lie beneath a large abandoned bunkhouse (built in 1946) situated immediately north of the mouth of Namu River. We have not been able to establish the original limits of the midden. Modern construction is the primary contributing factor to this situation. The cannery rests upon stone debris dynamited from the adjacent shore and cliffline, while nearby buildings, recreation fields and so on have replaced or disturbed unknown amounts of the midden deposits. Midden debris occurs on the high cliffs overlooking the river and can be traced from the excavated area up to termination by modern construction just north of the locale illustrated in Figure 10. The inland boundaries terminate abruptly at the face of a 7–8 metre bedrock exposure behind the abandoned bunkhouse. The excavations also terminated at this boundary. The extent to which these deposits continue northward along the shoreline could not be determined, due to recent alteration of the area. Employing traditional midden morphologic terms, that part of the midden at the shoreline is considered its front with its long axis parallel to the shoreline. Missing the midden's length dimension, we have been unable to calculate its volume.

Alteration of the existing midden material has occurred in a variety of ways. Construction for the foundation and furnace room of the abandoned bunkhouse disturbed deep portions of the site, while levelling fill was taken from one

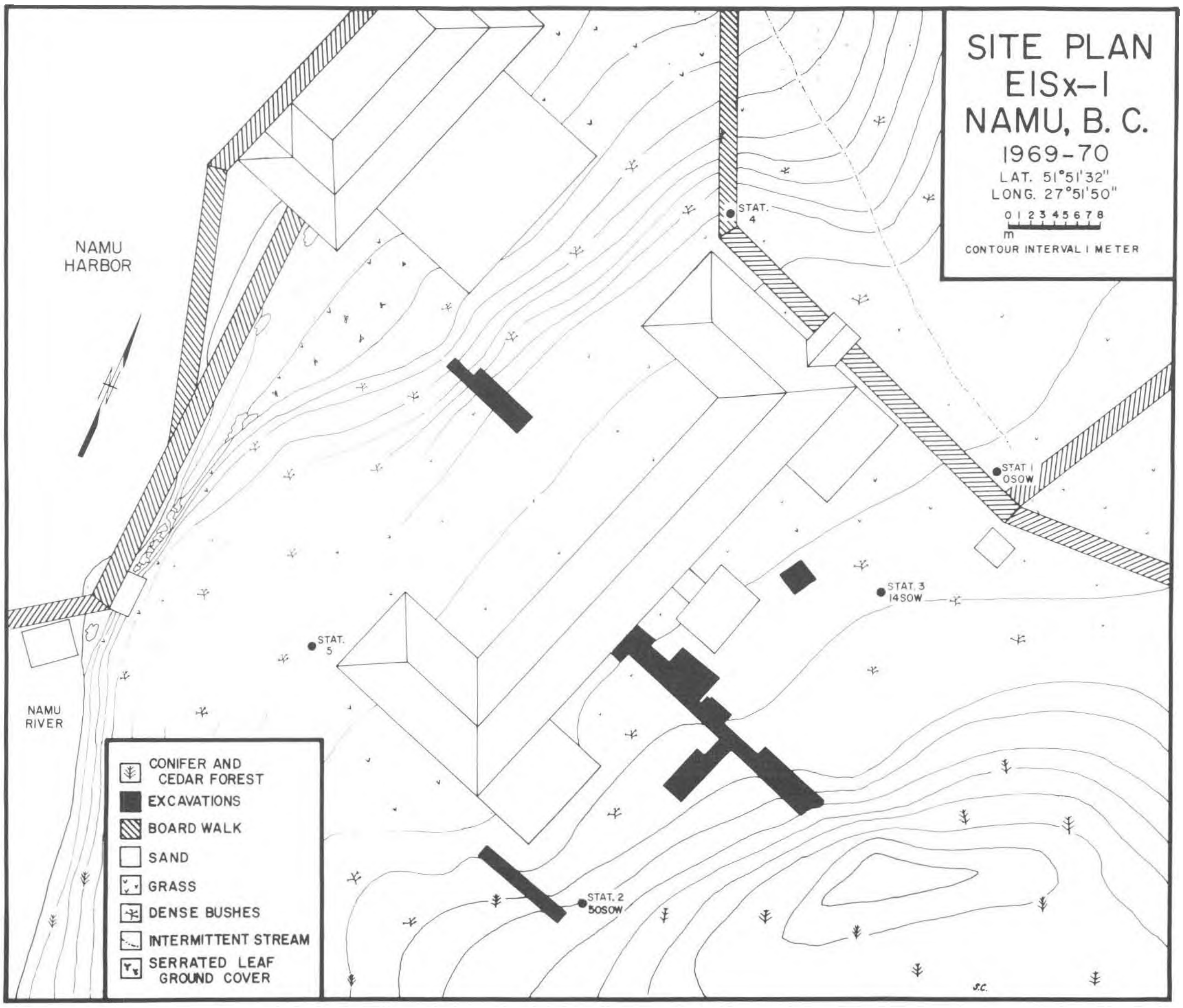


Fig. 10 Site plan of Namu, ElSx 1.

area of the site and re-deposited on another.

Construction of a mess hall at the midden's present shoreline removed unknown quantities of the site. The steep, deep front slope has been eroded by tidal activity resulting in an undeterminable loss; maximum high tide, which invades the Namu River mouth, currently inundates 2.5 metres of this front slope. Finally, modern garbage and refuse deposits, presumably from the bunkhouse occupation, and a possibly earlier shallow house depression in the rear portions of the site, attest to the nature of recent surface disturbances.

Encroaching upon the site proper from the rear is a forest of large old trees, which because of recent logging are outnumbered by trees one-fourth their age. Floral cover in this area is typical of the region as a whole. Around the midden boundaries hemlock varieties *Tsuga heterophylla* and *T. mertensia*, *Thuja plicata* (red cedar), *Picea sitchensis* (Sitka spruce) and *Alnus ruba* (red alder) exhibit mature growth. On the site itself, immature growths of alder and hemlock were cut down prior to excavation. For the most part, *Sambucus cerulea* (elderberry), *Rubus spectabilis* (salmonberry), *Rubus parviflorus* (thimbleberry), and *Gaultheria shallon* (salal) constituted the primary elements of the undergrowth removed to facilitate access. Grasses,

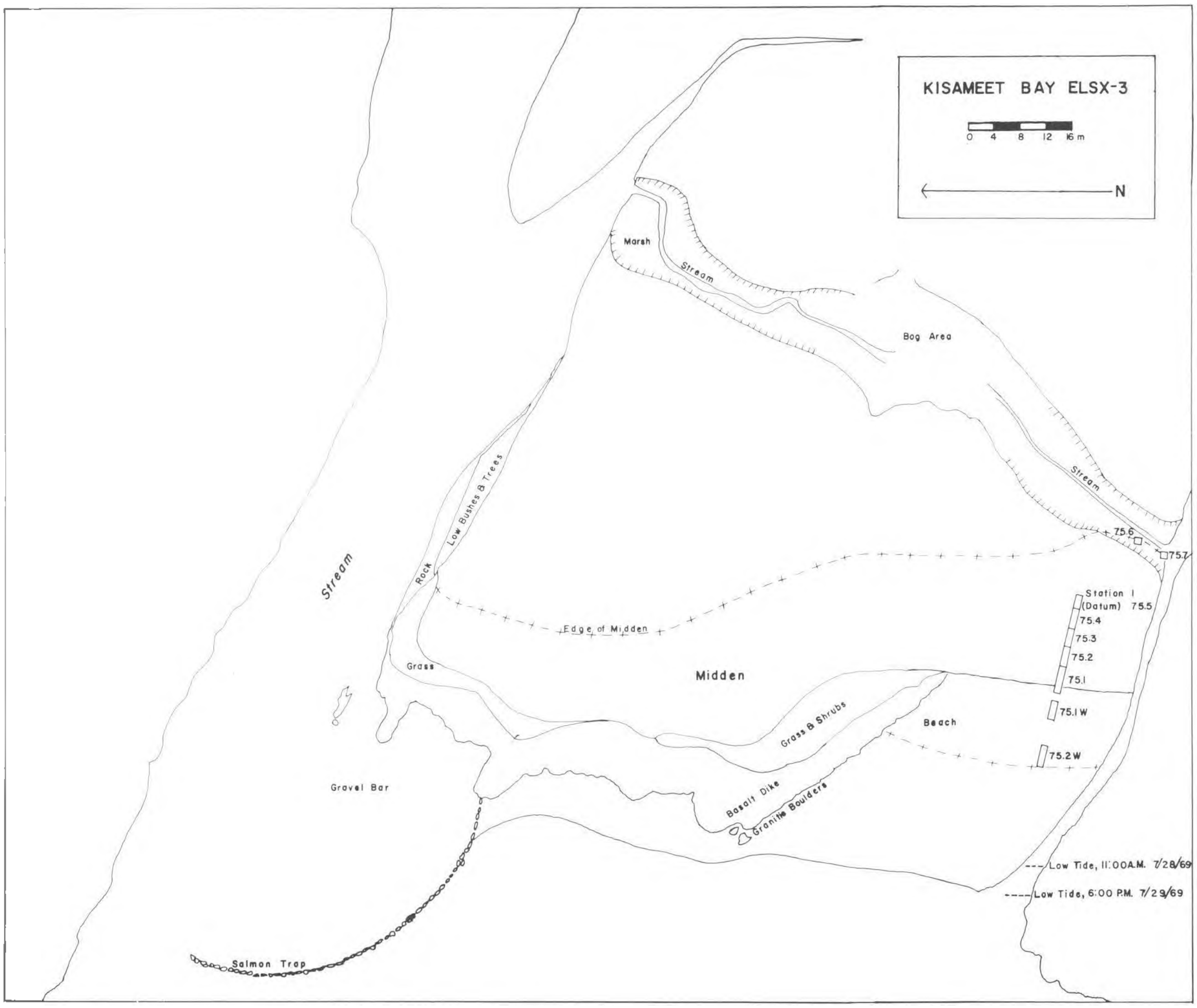


Fig. 11 Schematic plan of shell midden site, ElSx 3 at Kisameet Bay.

ferns, and mosses, while not identified, were present in number outside the midden limits.

The bedrock outcrop is an important morphologic feature of the site. It also can be found at the same elevation to the north just off the site plan and to the southeast overlooking Namu River. Behind its exposure in the rear of the site, the forest emerges from a marshy floor, the water from which drains intermittently to the north and also through the shell deposits themselves. The marshy environment lies 2 to 3 metres above the top horizon in the rear of the site.

Immediately north of Namu, the deep fiord waters of Burke and Fisher Channels join and enter Fitzhugh Sound. Burke Channel, with an average depth of over 400 metres, carries waters from a major river, the Bella Coola. Fisher Channel, which is merely a seaward extension of Dean Channel, is fed by a number of fiord head streams and is as deep and long as Burke (Pickard 1956:49). The banks of both fiords and Fitzhugh Sound are steeply sloping with abruptly vertical stone cliffs occasionally interrupting the dense forest cover which otherwise grows down to the water's edge. Mountains rise directly above the fiord walls, becoming higher and more rugged to the east along Burke Channel and north along Fisher Channel. In more protected coves and bays where small freshwater streams empty into the channels, small narrow areas of the shoreline exhibit shallow sand and gravel beach deposits. More commonly, the tidal zone is readily apparent as a multi coloured band on nearly vertical rock exposures.

The mountain relief around Namu bordering Fitzhugh Sound is low and rounded, typical of the seaward regions of the fiord system. This low altitude range behind Namu includes 3000-4000 foot peaks at its greatest extent, all heavily forested. Drainage within these mountains proceeds from the north into a series of lakes, terminating in the largest, Lake Namu, before emptying into Namu Harbour. The lake is about 9-10 miles in length and lies approximately 25-50 feet above mean tide. Flow from the lake via Namu River fluctuates on a seasonal basis, with the river bed reported to be virtually dry on very rare occasions. The river bed is about 1/4 mile long, narrow and full of large boulder rapids. Sand deposits occur within the harbour and to a greater extent on the shores of a tiny island which connects with the Namu shoreline during maximum low tide. Shellfish are currently gathered from this beach.

Kisameet Bay: ElSx 3

The shell midden at Kisameet Bay (Fig. 11) is located on one of the innermost coves of King Island, an area designated as an Indian reserve in the late 1800's. Logging during the earlier parts of this century has left some trees topped while surface depressions and clearings demonstrate recent habitation. Unlike the Namu midden, this midden rises above a gently sloping beach of sand and shell to a height 2-1/2 metres above mean high tide. Two streams of water flow through the site; a major stream drains from Kisameet Lake and empties immediately to the north of the site while an intermittent stream carries a little water along its south margin. The bay area in front of the site offers greater protection against severe climate and tides than does Namu Harbour.

The floor within the Bay near the site contains coarse, angular stones which host a fair-sized mussel population. Closer to the river and on a few of the small islands in the cove, limited sand deposits line the shore. Basement sediment below the cultural deposits, while similar in size and shape to the basement level at Namu, contained only limited amounts of sand, was loose and not compacted, and gave no appearance of lateral size sorting.

The primary objective in excavating this midden was to collect environmental information without resorting to full scale excavation. Hence in 1968 exploratory samples were taken from a preliminary cut; in 1969 additional stratigraphic and artifactual samples were removed from an 8 metre trench, and the midden's boundaries were established, and in 1970 when the initial trench was again extended, a more intensive inquiry into the stratigraphy was initiated in order to provide comparability with the Namu investigation.

Roscoe Inlet: FbSx 6

Located on the mainland shore where Return Channel joins Johnson Channel, this shell midden (Fig. 12) was first excavated by Drucker (1943). He labelled it "Roscoe Inlet 1A" to separate it from an adjacent extension of the same deposit. Our interest with this site, as with Kisameet, was to investigate different habitation sites according to the tripartite zonation model discussed in the introduction. In order to achieve as close a correspondence with Drucker's observations as possible, the 15-foot long 1970 trench was located parallel to and 7 feet from the 1938 trench. Only half this trench was excavated to the sterile substratum, but correspondence between the nearly 10-foot deep deposits explored previously was achieved.

The site shares physiographic similarities with the Namu midden. Both rise approximately 25-35 feet above mean tide at their bases; both are enclosed by rock outcrops, and freshwater flows near each. Unlike other sites, lake water drainage is not present at the Roscoe Inlet site; rather, local

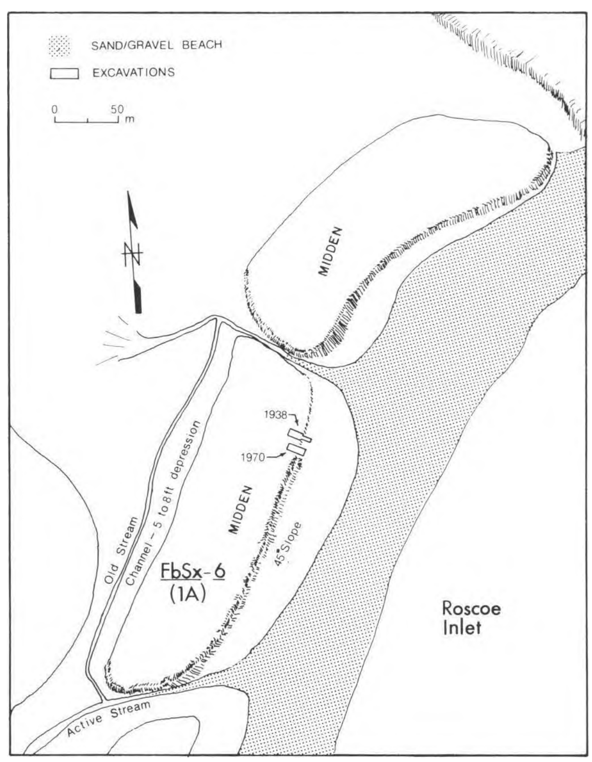


Fig. 12 Schematic plan of shell midden FbSx 6, at Roscoe Inlet. After Drucker (1943) and Pearson (1970).

precipitation and melt water from winter ice provide the stream sources. No fine sediments were found in the neighbouring cove. Coarser materials lined the cove's floor, in contrast to Namu and Kisameet. After repeated efforts, the field crew determined that fish and shellfish could not be easily found. Therefore the current marine environment surrounding this prehistoric deposit is markedly different from those surrounding the other two sites.

Our next step was to compare each of these sites in terms of the results of our analysis, and in relationship to the chronology developed for each.

EXCAVATIONS

Organization

The 1969 Namu excavations developed stratigraphic profiles of the midden parallel and perpendicular to the present shoreline in order to detect intrasite accumulation patterns along these two major intersecting axes. A grid system with a north-south major axis (Fig. 13) forming a perfect rectangle with its sides approximately parallel to those of the abandoned bunkhouse was established with a Brunton transit. Station 1, designated "0 metres south and 0 metres west" is the primary point of reference. The straight line between stations 1 and 2 was utilized as the primary excavation north-south axis. Station 3, located along this axis, is the primary datum plane in the profile labelled "Rear Trench (West Portion)". The line of sight above Station 3 in the "Rear Trench (East Portion)" profile drawing is a secondary datum plane, the station for which is not illustrated because its location is in Station 3's reference terms. No precise elevation or bench mark was referred to for our excavations, however.

Placement of the primary north-south excavation axis involved a simple arbitrary choice. The east-west trench on the other hand, coincided with an existing vertical exposure. This bank, created by bunkhouse construction, forms the south face of the trench designated FS 4. Due to vertical displacement of the stratigraphic units in this portion of the midden, no stratigraphic controls could be exercised in 1969, when the area was first exposed. During the 1970 operations, sampling operations and measurements of this area were accompanied by accurate transit readings. For this reason, the site plan (Fig. 13) is a schematic representation of the total terrain. However, physical orientation and horizontal relationships between the excavated units are true and accurate. The location and elevation of each of these units and all depth measurements (except those occurring in the westernmost portions of the "Rear Trench") were determined by the transit.

Excavations at Kisameet were carried out along an axis reaching from shoreline to midden centre (Fig. 11). Two stations were set up to create a datum plane for the excavation. No grid system similar to that at Namu was established, however. Along the major excavation axis at the rear of the midden, two small exposures were made to locate the site's inland perimeters (pits FS 6 and FS 7). Deposits ranged in depth from 2.5 metres at midden centre to .50 metre in the exposure made in the present tidal zone.

The recording of excavated material utilized a hierarchical system indicating relative placement of any given item within the site. From the site plan locating each excavated unit at Namu (Fig. 13), it then becomes possible to place the item stratigraphically in the midden sequence. A complete designation for a specimen collected, for example, reads as follows:

("Field Sample")	FS 2.13C.3
("Field Sample Column")	FSC 2.13C.3

The terms may be interpreted in the following manner:

1. The heading FS refers to specimens collected during routine excavation whereas FSC pertains to a specific column from which controlled sampling took place. The distinction serves to identify sample sources during storage.

2. The first number or decimal place following the letters FS or FSC refers to the excavation unit – pit or trench number. These were numbered chronologically as they were dug and appear in Fig. 13.

3. The second decimal place can contain two types of information. The number itself indicates the level (in the case of artificial levels) or the stratum (in the case of natural strata), and each of these sequences begins with the top of the midden. The letter refers to a specific feature encountered at that level or stratum, such as a burial, a hearth, etc.

4. The third decimal place refers to the specific item, whether an artifact, a charcoal sample, or human remains. Feature designation receives its own sequence of numbers in the third decimal place.

Hence, the designation FS 2.13C.3 might refer to an artifact recovered with the burial, feature C., somewhere within the thirteenth level below surface in pit FS 2. Should "FSC" replace "FS" in the same designation,

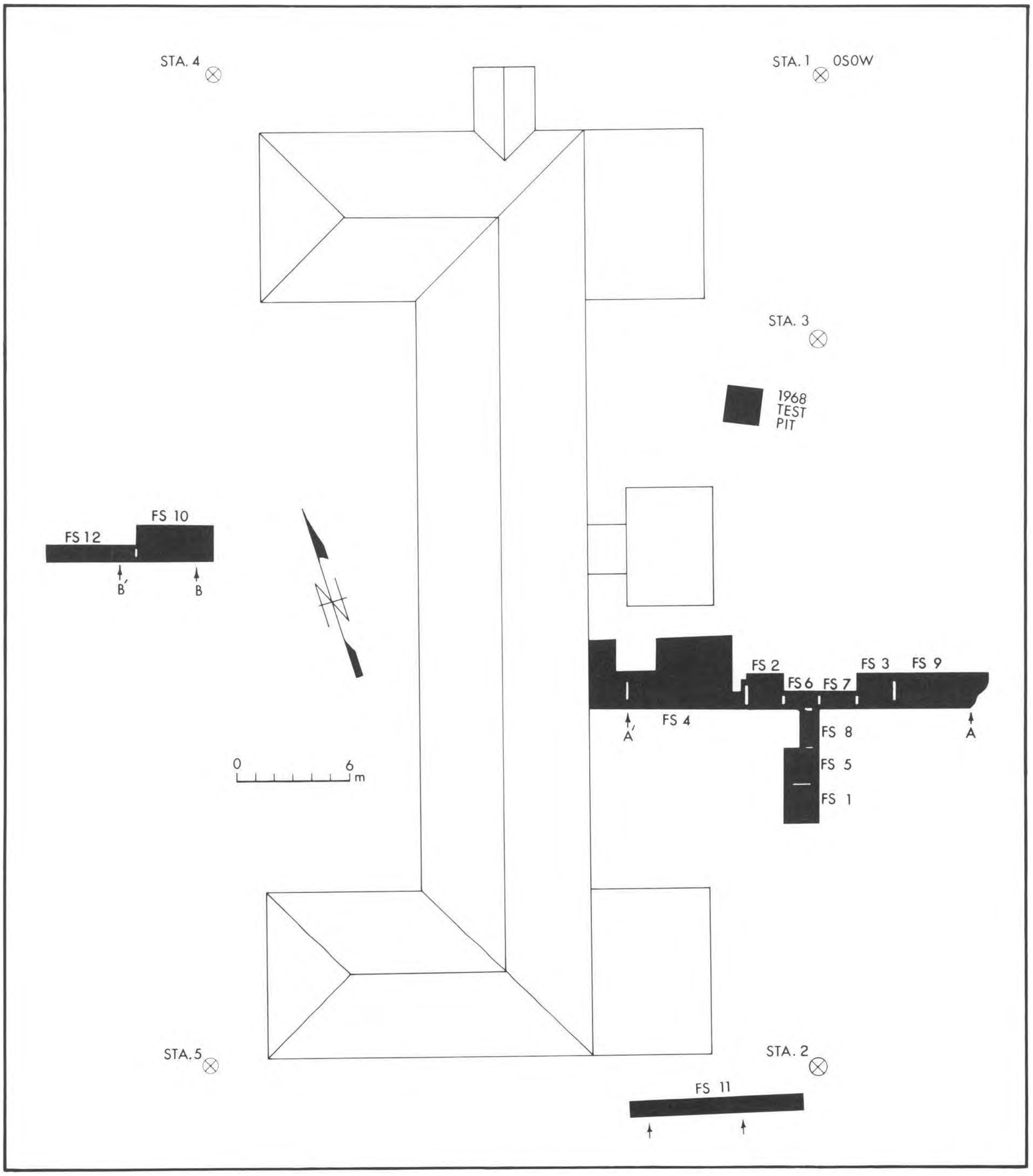


Fig. 13 Designation and relationship of excavated units at Namu. The largest U-shaped outline is the abandoned bunkhouse on top of the midden. ElSx 1

specific reference would be made to a unique vertical area (Column) within pit FS 2.

Numbering of each pit was established in the order each was excavated. Table I should be read along with Figure 14 to clarify this ordering and explain the approach employed in each case.

Table I: Excavation controls by unit at Namu.

Excavation Unit.	Type of Excavation Control:	Year Excavated:
Test Pit	artificial levels	1968
FS 1-8	artificial levels	1969
FS 9-10	natural strata	1970
FS 11	no control by level	1970
FS 12	natural strata (entrance trench to FS 10)	1970
FS 4	no control by level (transit readings only)	1969-1970

The excavation units fall into size groups based on field operational decisions. The basic size, set by the ability of one excavator to handle it, was the 2 x 2 metre pit. The 1968 Test Pit and units FS 1-3 were the sources from which controlled samples were taken during the first two field seasons. In order to avoid local biases in the evidence, these last three units were spaced as far away from each other along the two intersecting axes as our strategy would allow. When limitations posed by time became apparent, the connecting excavation units were reduced to 2 x 1 metre trenches to assure that stratigraphic continuities could be observed. No stratigraphic control was exercised during excavation of trench FS 11 because we wanted merely to examine stratigraphic profiles in that portion of the site and did not have the manpower to maintain excavation levels.

We employed similar excavation strategies in 1970. However our emphasis on natural strata definition subordinated concern for basic pit dimensions in the interest of isolating each individual stratum as it was being removed. For this reason units FS 9-10 were 2 x 4 metre trenches. Because an entrance trench was required for FS 10, FS 12 became 3 x 1 metres. Table II summarizes the pit dimensions and provides a volumetric record of our excavations from 1968 to 1970 at Namu.

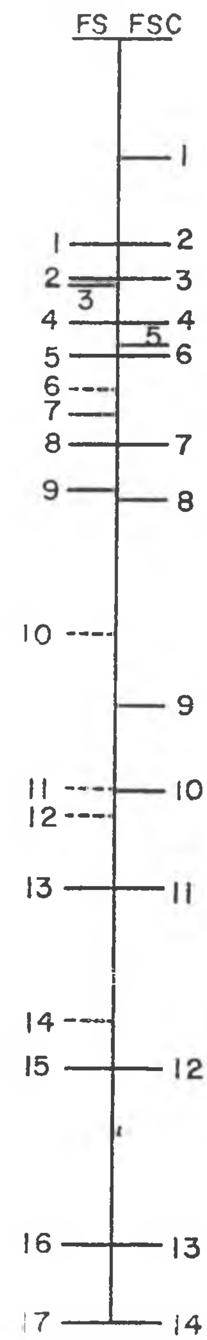


Fig. 14 Correspondence between excavation units and natural stratum units. Dotted lines represent arbitrary boundaries, while solid lines represent natural strata boundaries. EISx 1

Table II Volumetric and removal descriptions by excavation unit

SITE	EXCAVATION UNIT	YEAR	DIMENSIONS L W D		VOLUME	MEANS OF REMOVAL
ElSx 1	1968 Test Pit	1968	2 x 2 x 2.1m	=	8.4 m^3	artificial levels
	FS 1	1969	2 x 2 x 2.1m	=	8.4 m^3	artificial levels
	FS 2	1969	2 x 2 x 2.1m	=	8.4 m^3	artificial levels
	FS 3	1969	2 x 2 x 2.3m	=	9.2 m^3	artificial levels
	FS 4	1969/1970	6 x 2 x 2.3m	=	24.0 m^3	bulk/natural strata
	FS 5	1969	2 x 2 x 2.1m	=	8.4 m^3	artificial levels
	FS 6	1969	2 x 2 x 2.0m	=	4.0 m^3	artificial levels
	FS 7	1969	2 x 1 x 2.1m	=	4.2 m^3	artificial levels
	FS 8	1969	2 x 1 x 2.0m	=	4.0 m^3	artificial levels
	FS 9	1970	4 x 2 x 2.4m	=	19.2 m^3	natural strata
	FS 10	1970	4 x 2 x 6.2m	=	49.6 m^3	natural strata
	FS 11	1970	9 x 1 x 2.0m	=	18.0 m^3	bulk
	FS 12	1970	3 x 1 x 2.5m	=	7.5 m^3	natural strata
	TOTAL VOLUME REMOVED				173.3 m^3	
ElSx 3	FS 1	1968	4.05 x 1.0 x 2.3m	=	9.3 m^3	artificial levels
	FS 1W	1969	3.00 x 1.0 x 1.0m	=	3.0 m^3	bulk
	FS 2	1969	3.00 x 1.0 x 2.5m	=	7.5 m^3	artificial levels
	FS 2W	1969	3.28 x 1.0 x .5m	=	1.6 m^3	bulk
	FS 4	1970	4.60 x 1.5 x 2.5m	=	17.3 m^3	natural strata
	FS 6	1969	1.00 x 1.0 x 1.0m	=	1.0 m^3	bulk
	FS 7	1969	1.00 x 1.0 x .6m	=	.6 m^3	bulk
	TOTAL VOLUME REMOVED				40.3 m^3	
FbSx 6	FS 1	1970	4.6 x 1.5 x 3.7m	=	25.5 m^3	natural strata
EkSx 1	FS 1	1969	.5 x 1.0 x 4.0m	=	2.0 m^3	artificial levels
FbTc 1	FS 1	1969	.5 x 1.0 x 2.8m	=	1.4 m^3	artificial levels

Techniques

The exploratory nature of our research design led initially to excavation by artificial levels. Subsequent exposure provided indisputable evidence of stratigraphic superpositioning. Our decision in 1970 was to implement an excavation strategy emphasizing these stratigraphic units. The techniques designed to acquire these data are discussed below.

The provenience data recovered from each excavated unit depended upon the technique of excavation. Artifacts and specific samples removed from artificial levels were measured and mapped according to the three spatial axes needed to locate them. Recognition of the natural stratigraphy was not systematic during excavation, nor did we record stratigraphic boundaries until completion of excavation. The natural stratum excavation technique, in contrast, required the excavator to determine stratigraphic boundaries during excavation. When material was uncovered *in situ* it was mapped and recorded. With these data at hand, the excavator maintained a single "in-progress" profile drawing onto which were recorded stratigraphic boundaries and radiocarbon sample locations as they were determined. These drawings became the basis for all our stratigraphic control.

Radiocarbon samples collected in either manner utilized full descriptive and stratigraphic control. Of particular emphasis was the condition in which they were found – randomly scattered pieces, several small associated fragments, or a single chunk. Each sample was wrapped in aluminum foil and then placed in a plastic bag. The only samples selected for assay were single portions of charcoal at least three times the laboratory's minimal size requirements, with one exception.

The primary difficulty encountered in our excavation procedure was the delineation of natural stratum boundaries. In order to maintain comparability and standardization in the criteria employed to identify natural strata, the writer identified all stratigraphic boundaries used during the excavations at Namu and Kisameet. Contamination of levels was rigorously avoided and level boundaries were maintained except in one case where severe weather and limited time diminished our control.

Taking advantage of the 1969 profile drawings, the 1970 excavation of FS 9 by natural strata became a simple operation. The very deep trench FS 10 was not excavated as simply however, despite its fairly clear stratigraphy. Some disparity does exist between the natural level boundaries and those established by excavation. Hence, some boundaries separating excavated units were arbitrarily established. In order to clarify stratum identity, a Field Sample Column was located on the profile wall (see profile drawing "Front Trench") and the area sampled according to natural stratum boundaries. Figure 14 illustrates the correspondence between the excavated units and those sampled in the column. While not perfect, the correlation appears to be quite high. Therefore the samples need not be discarded. In conclusion we believe the excavator achieved close to a 100% correspondence between the natural strata identified during excavation and those observed on the completely exposed face.

Location of artifacts *in situ* was uncommon due to the masking qualities of the soil matrix. For this reason, excavation midden material was screened in the field. The adhesive quality of the matrix, however, precluded "dry" screening. We used water under pressure directed through two screens; an expanded-steel sheet and a 2 mm wire screen. A wheelbarrow was pushed up the ramp and its contents unloaded onto the nested screens. After all the finer material was washed through the larger meshed screen and its contents examined, the hinged screen frame was folded over and emptied. The finer material caught on the bottom screen was again washed then examined for pertinent material. With a screen crew of four, considerable material was processed quickly retaining at the same time large portions of the finer sized material.

Midden removal from the deep (ca. 6 metres total) levels of FS 10 was solved through reliance on the rich junk piles of Namu. A series of troughs was built out of lumber, old tin, and plastic. This flume extended downslope from the lip of FS 10. A heavy set of screens and an overlooking platform (for the water hose operator) was constructed at the base of the flume at shoreline. Water was introduced at the top, transporting shovel-loads of midden down to the nested screens. Because the metal troughs were open at the top, the hopper at the trench opening could be moved up or down the slope to meet changing excavation needs.

Despite the strong water pressure, very little crucial material was lost or damaged in screening. The one exception was the fragmentation of delicate mussel shell implements and ornaments, which rarely were recovered intact even if found *in situ*.

STRATIGRAPHIC CONSIDERATIONS

Methodology

Our stratigraphic examinations, in the field and in the laboratory, were directed to determine content, rate and mode of deposition, layer distributions, environment of formation, and the nature of numerous time-and-space-specific events we term depositional episodes. Several factors made it difficult to maintain standardization at all three sites. In particular, archaeologic features confused stratum delineation; textural differences were caused in part by fluctuations in water content; differential or very diffuse lighting created misleading visual cues; and even moss growth generated unique patterns on the exposed walls according to specific moisture and sunlight relationships. In short, the day-to-day stratigraphic observations varied considerably.

The excavators eventually realized that major stratigraphic trends were not present at every point within the cultural deposits. Furthermore, major depositional events could not always be reconstructed from such points. In an attempt to cope with this situation, in 1970 we re-examined the wall profile of FS 4. Discrepancies were noted between the 1970 and 1969 records of the unit's stratigraphy. We then carefullly controlled excavation of the profiled face to determine the extent of isolated concentrations or minor depositional episodes, the nature of suspected interfaces between major episodes, and the origin of intrusive materials. Here, as elsewhere in the site, our Field Sample Columns provided additional stratigraphic data. In this manner we were able to establish critical strata-selection criteria for FS 4.

Our stratigraphic analytical procedure may best be described as multi-factor. It defines a wide variety of stratigraphic descriptive data which is then integrated through the patternings of the deposits revealed through excavation. Knowledge so derived permits identification of those layers most significant to the reconstruction of the site's depositional history, and leads to simplification of the drawn profile.

A multi-factor approach remains flexible by virtue of not requiring that all factors be applied to any one situation. Features unique to a particular stratigraphic sequence or level in the site often constituted the principal strata-determinants in those situations, but might not appear in other parts of the site. For example, some patterns of

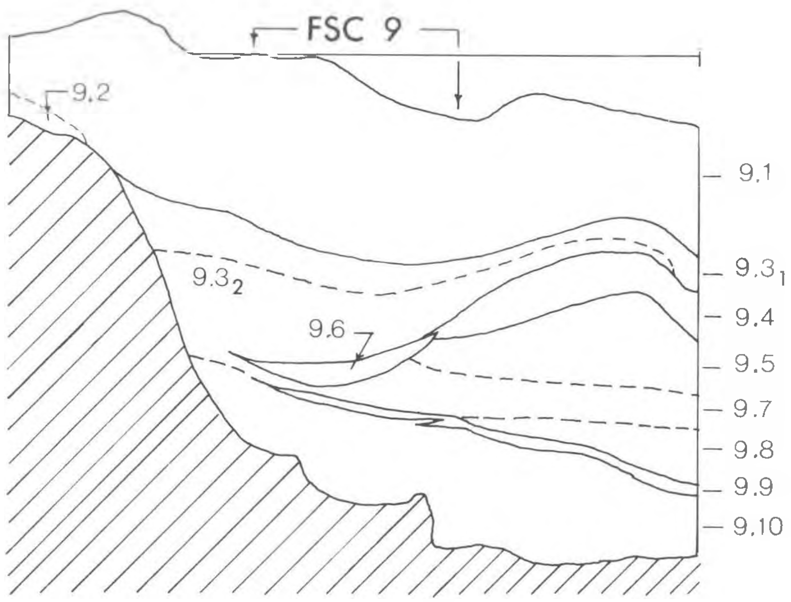


Fig. 15 Location of strata identified in Field Sample Column 9 (FSC 9) in "Rear Trench". Solid line indicates natural stratum boundary, dashed line indicates artificial boundary. ElSx 1

discontinuity or continuity were interrupted by horizontal layers of black matrix. In other cases there was concentration of a few specific components. Each situation confused the identification of major strata. The inter-dependence of factors further complicated decisions as to which factor was most diagnostic. Colour, a frequently used criterion, was often dependent upon content – but not always. Colour variation in some cases resulted from a localized staining or from fine laminæ of one midden component (*e.g.,* iron and organic stains, and lenses of purple mussel shell). In addition, daily fluctuations in water content in the midden layers created coloration patterns.

We conclude from our study of midden accumulation that confusion between strata boundaries most often arose because of almost indiscernable intrusions from above, localized disturbances, or minor episodes, all of which disrupted the patterning characteristic of the stratum as a whole.

The stratigraphic examinations undertaken at two of these Field Sample Column locations are related here to illuminate the multi factor approach as well as the nature of the site's stratigraphic units.

FSC 9 contains segments of all major stratigraphic units present in the ' East Portion" of the rear trench deposits (Fig. 15). Content and colour contrasts between successive strata in this area are striking. The first major unit below the surface humus, FS 9.1, was a light-coloured mixture of moderately fragmented shell and fine ashy material. Localized concentrations of shell exhibiting unique internal patternings were isolated and infrequent within the stratum. Humic intrusions were also at a minimum. The lower boundary was abrupt except where bedrock intruded upward into the shell layer. FS 9.2 is considered a localized depositional event peculiar to FS 9.1. The next unit immediately below, FS 9.3 is distinctive in both colour and content being rock-laden, and virtually shell-less, with a soil matrix. The layer was excavated as a single unit despite internal differences in coloration. According to laboratory analysis there was no content variation between the differently coloured areas. However lab numbers were assigned to distinguish the two sub-samples from this stratum, FS 9.3, and FS 9.3$_2$. The third major stratigraphic unit from the top, FS 9.4, contained more shell than FS 9.1 (about 75% shell) and possessed abrupt upper and lower boundaries. There was little shell fragmentation with nearly complete valves occurring in occasional clusters. To categorize the sharp distinction between shell-containing and non-shell-containing layers, we used the terms ' shell layer" and "black matrix". The black matrix extending below FS 9.4 to the sterile sand/gravel substratum was

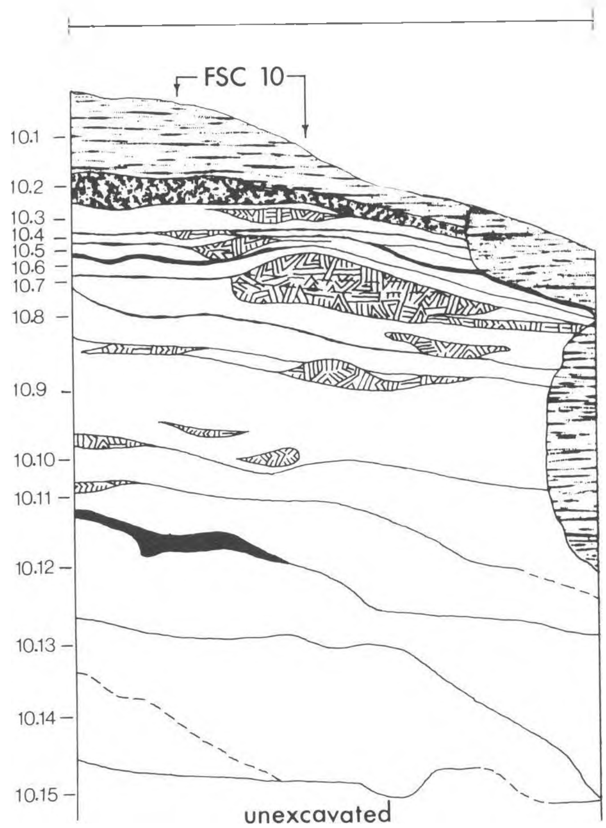


Fig. 16 Location of strata identified in Field Sample Column 10 (FSC 10) in "Front Trench". Solid line indicates natural level stratum boundary, dashed line indicates artificial boundary. ElSx 1

excavated by arbitrary layers, the only evidence for internal stratification being a compact red matrix labeled FS 9.9. Hence FS 9.5, 9.7, 9.8 and 9.10 represent subdivisions of the black matrix. The presence of a heavy rock concentration accounts for the distinction between FS 9.7 and FS 9.8 (see dotted line on profile drawing) and its significance will be discussed below. Adjacent to the shell layer FS 9.4 was a red stained area, FS 9.6 which was similar in content to FS 9.4 except for very fine red material mixed with the pulverized shell matrix. We speculate that this originated in the same manner as the compacted red matrix, an iron oxide precipitate.

The second column, FSC 10, is located in the "Front Trench", and presented different problems in layer definition (Fig. 16). In trench FS 10 the correspondence between excavated layers and natural layers was not perfect, although close (see Fig. 14). Although all stratigraphic units in this portion of the site are shell layers, the confusion arose from several overlying large hearths whose boundaries appeared intermixed. Colour distinctiveness was nowhere as sharp as in the "Rear Trench", being generally one of various shadings from white to grey. Content differences were even less distinctive than colour. The final procedure involved almost equal weighting given to colour, content status (particularly fragmentation and homogeneity of mixture), layer compaction and artifact content changes observed during excavation. The depositional history of the FSC 10 strata will be discussed in more detail below. The profile drawing of this area presents, however, only the 'corrected' stratigraphic succession, that determined after excavation of the trench was complete.

In summary, our method requires first exposure and then detailed *in situ* examination of a midden cross-section. In situations presenting unfamiliar patternings, the *in situ* study must be supported by a controlled stratum sample analysis producing content descriptions and relationships.

A detailed description of the stratum matrix with explanation of criteria used for selection accompanied the removal of each stratigraphic unit, especially during sampling of the "Field Sample Column" locations. This information, derived from *in situ* evidence and combined with the laboratory analysis of content provides our knowledge of the stratum reality. Use of this knowledge permitted a more graphic representation in the profile drawings and a more accurate reflection of 'stratum reality" than is usual in similar reports.

Written descriptions of midden deposits frequently fail to provide comparable evidence on all levels of measurement and perception. To overcome this problem, visual controls have been designed into the profile drawings. The field drawings record the stratigraphic layers and sequences. The laboratory analysis of components was standardized by Conover for routine sample examination with component categories being established in terms of weight percentages.

The laboratory procedure involved the screening of the 35 lb. (dry) standardized sample through a system of 4 mm and 2 mm square mesh screens. The 2 mm and smaller debris was not systematically identified, as testing demonstrated that the 4 mm debris provided an adequate representation of all major stratum components.

Occasionally the material passing through the 2 mm square mesh screen (termed "residue") represented 70—80% of the total sample weight. When this situation occurred, a subjective assessment was made as to its basic ingredients by weight.

In this manner, suits of column samples were examined and rock and shell weights were established. It soon became apparent that stratum differences pertained not only to perception but also to content. For example, the increase of shell in shell-bearing strata is accompanied by an almost

Table III Assayed radiocarbon dates

SITE	PROFILE CODE NO	LABORATORY NUMBER	OUR SAMPLE DESIGNATION	MATERIAL SAMPLED	YEAR ASSAYED	AGE IN YEARS BP	BASE DATE (HALF-LIFE)
ElSx 1	1	GaK-3119	FS 9. 3.31	charcoal	1970	2440 ±100	5570 yrs.
	2	GaK-3118a	FS 9. 1.20	shell	1970	1880 ± 90	"
	3	GaK-3120	FS 9.10. 5	charcoal	1970	7800 ±200	"
	4	GaK-3244	FS 9.11. 1	charcoal	1970	9140 ±200	5568 yrs.
	5	GaK 2714	FS 3.12. 3	charcoal	1969	2810 ±100	5570 yrs.
	6	GaK-2713	FS 2. 5. 1	charcoal	1969	2880 ±100	"
	7	GaK 2717	FS 4. G. 9	charcoal	1969	4290 ±120	"
	8	GaK-2715	FS 4. O.34	charcoal	1969	3400 ±100	"
	9	GaK-2716	FS 4. O.31	charcoal	1969	4540 ±140	"
	10	GaK-3121	FS 10. 4. 1	charcoal	1970	480 ± 80	"
	11	GaK 3122	FS 10.8C. 1	charcoal	1970	680 ± 90	"
	12	GaK 3123	FS 10.11. 3	charcoal	1970	980 ±100	"
	13	GaK-3124	FS 10.11.90	charcoal	1970	1840 ± 80	"
	14	GaK 3125	FSC 10.12	charcoal	1970	1470 ± 80	"
ElSx 3	15	N 788	FS 2.10B.1	charcoal	1969	1810 ±100	5568 yrs.
	16	N 789	FS 2.17C.1	charcoal	1969	2290 ±110	"
FbSx 6	17	GaK 3126	FS 1. 3. 2	charcoal	1970	2140 ±100	5570 yrs.

proportional decrease in stone materials. For this reason our tripartite separation of the shell layers into $\geqq$ 75%, $\geqq$ 25% and $\geqq$ 5% shell groups is rather arbitrary.

In conclusion, the profile drawings are an integration of both subjective and objective information and provide a visual summary of the stratigraphic evidence. One consequence of this method is that basic relationships in content, tone, and texture of each stratigraphic unit are illustrated, thus eliminating involved written descriptions.

Not all information placed on the drawings is actually obtained from the profile face. In most cases, the location of a radiocarbon sample or burial is extrapolated from the adjoining excavation unit. In the specific case of burial FS 4.h,I,J the interment was displaced laterally .50 metres east in order to assure its appearance on the profile drawing.

Table III provides a listing of the radiocarbon information available. The profile code numbers at the left occur in the profile drawings beginning in the "Rear Trench, East Portion" and are numbered east to west on each of the three drawings.

Data and Conclusions

Particular attention has been directed towards the genesis of the sterile sand matrix under the Namu midden. With respect to its origin, it should be apparent that complex problems of the late or post-Pleistocene glacial events remain to be resolved. Figure 17 provides a transverse section of the site as it is known from excavation. The illustration combines two parallel east-west excavation axes for purposes of simplicity. Deeply weathered surfaces of the bedrock formation (Fig. 18) exposed at the rear of the site exhibit erosional patterns identical to those appearing on similar exposures in the present tidal zone. Along an axis perpendicular to the shoreline (Fig. 19) the sandy sterile substratum exhibits size sorting: angular gravels at the base of the outcrop, a predominantly compacted sand matrix approaching the bunkhouse, and large rounded boulders loosely cemented into this sand matrix beneath the bunkhouse. No sand matrix was uncovered in FS 11; only bedrock.

The morphologic similarities between the present beach and the sand and outcrop formation beneath the midden argue strongly for a different sea-stand existing prior to occupation of the site.

With respect to the origin and time of deposition of the beachlike substratum it seems probable that the matrix is outwash debris from the direction of Lake Namu and that subsequent tidal or stream activity created the beach morphology some time prior to the arrival of human occupants.

All deposits occurring above the sterile substratum appear to be direct or indirect products of cultural activity (Fig. 20). The most striking feature in the 'Rear Trench" is the stark contrast of the black basal midden layers with the overlying heavy shell-bearing units. This contrast reflects content differences. Almost invariably, the non-shell matrix contains ash and charcoal, bone remains, and sand and possible humic material, all relatively small in size. In the

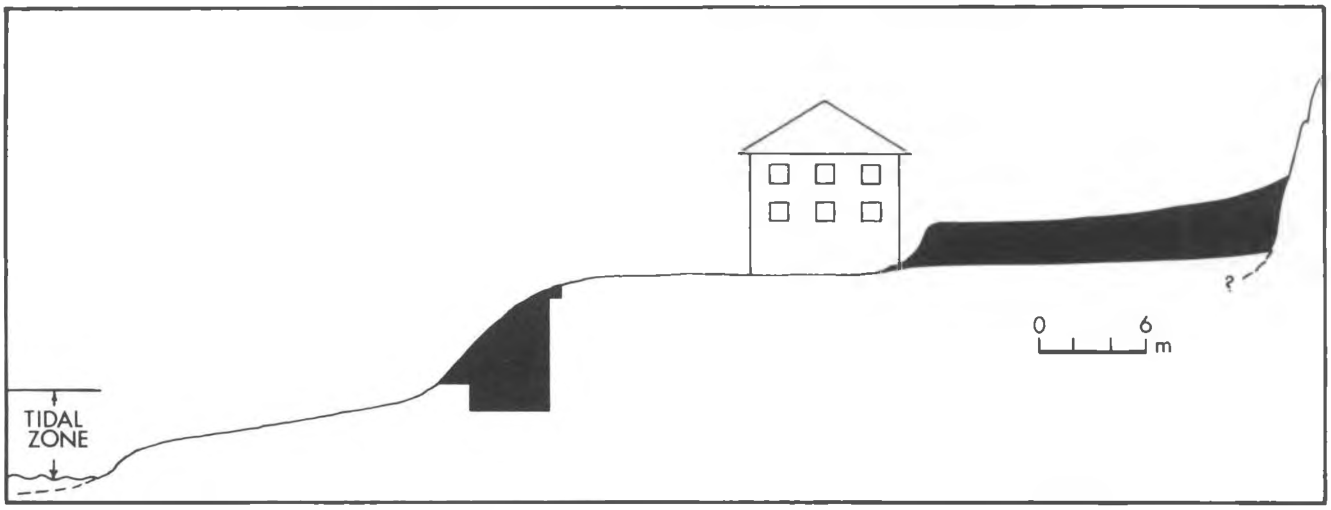


Fig. 17 Schematic cross-section of ElSx 1 with excavated areas in black; facing north.

shell-bearing layers, while shell may comprise the largest single constituent by weight, non-shell material is present in weights ranging from 1% to perhaps 85% per standardized sample. In order of frequency, major shellfish species present throughout the Namu midden are *Saxidomus giganteus, Schizothaerus nuttallii capax, Balanus cariosus, Thais lamellosa,* and *Mytilus edulis.* It is the presence of shellfish remains, therefore, which gives the layer its contrasting white appearance.

The contact zone between the black matrix and the sterile substratum has yielded charcoal radiocarbon dated 9140 ± 200 (see profile "Rear Trench, East Portion"). This zone possesses a sharp boundary featuring a slight upward intrusion of the yellow sand component. The upper contact zone of the black matrix is equally sharp, except for infrequent localized shell intrusions from above.

The black layer was clearly visible in FS 8, FS 5, and FS 1 along the north-south axis in the rear of the site. No evidence of this layer was uncovered in FS 11. Downward intrusions and intermixtures of shell into this black matrix were particularly frequent in FS 5 and the most shoreward portions of FS 2 and FS 4, resulting in distinct localized mixtures of shell within the black material. Radiocarbon sample 5 (2810 ± 100 radiocarbon years) as well as adjacent hearths located at or near this interface further suggest mixture of cultural material.

Due to its greater antiquity material recovered from the black matrix has undergone long weathering processes. Scattered randomly in the upper part of this layer but clustered in loosely associated groups along a line (dashed line on profiles) were large disintegrating stones of granite, gneiss, schist, and occasionally slate and sandstone. Each had contributed through disintegration to the granular texture of the matrix. Despite the presence of sand and weathered stone, however, the black stratum exhibited slick, sticky qualities suggesting a very fine, clay component. Bone was also recovered in quantity. Table IV presents the humic content of these strata, determined by igniting small oven-dried quantities of the matrix at 550°C for two hours.

Table IV Humic content in black matrices

Age	Unit	% Humus
2440 1880BP	FS 9.3	11.5
2880-4540?BP	FS 9.5[1]	13.3
4540 7800BP	FS 9 9	22.7
7800-9140BP	FS 9.10	28.9

Within the black matrix near the bedrock outcrop, is a water saturated zone the top of which is a "compacted red-brown matrix". This matrix is characterized as a very hard, abrupt to diffusely delineated zone of cementation containing small amounts of reddish to yellow ferric oxides. Toward the west its boundaries dip downward and almost come in contact with the sterile sand. At the east end of the trench it turns upward and becomes less distinct. Artifactual material within the red zone is identical typologically to that found above and below it. *In situ* examination suggests the constituents within the surrounding black matrix are identical to those of the ' compacted red matrix". Finally, the distal portion of a microblade uncovered 30 cm above the red zone fit a fragment recovered 20 cm below the zone. The zone was sufficiently cemented to have prevented any vertical displacement through it after its formation. We conclude from this evidence that the zone did not exist during the deposition of the black matrix. We believe that the ' compacted red matrix" represents a zone of oxidation where iron in solution precipitated out and was deposited, consequently cementing and staining the zone. This precipitation may be a relatively modern event (Walker 1971).

Three small hearths/lenses located one metre west of radiocarbon sample 5 were the only evidence for internal stratification within this black matrix. They were superpositioned with the lower hearth resting on a zone of loosely associated stone. No horizons could be detected in association with these hearths, however, nor did any other evidence support intralevel separations. Had stratification originally existed within the black matrix several factors could have obliterated the evidence. The present flow of ground water below the red zone probably has reduced any internal variation. In addition, much of the zone in contact with bedrock was saturated, a condition most typical of the rear portions of the site. It seems probable that later stratigraphic units (shell) at this contact point have moved laterally downslope due to solifluction.

It is also possible that stratification never existed. Unfortunately, we have no evidence to clarify this situation. The possibility that the remains found within the matrix were originally deposited elsewhere and then redeposited where we found them seems untenable. Some articulation occurred in skeletal material, and we found no evidence of abrasion or fragmentation of specimens through rolling.

The upper boundary of the western portion of the black

Fig. 18 View showing relationship between midden deposits and weathered bedrock exposure in "Rear Trench, East Portion" of ElSx 1.

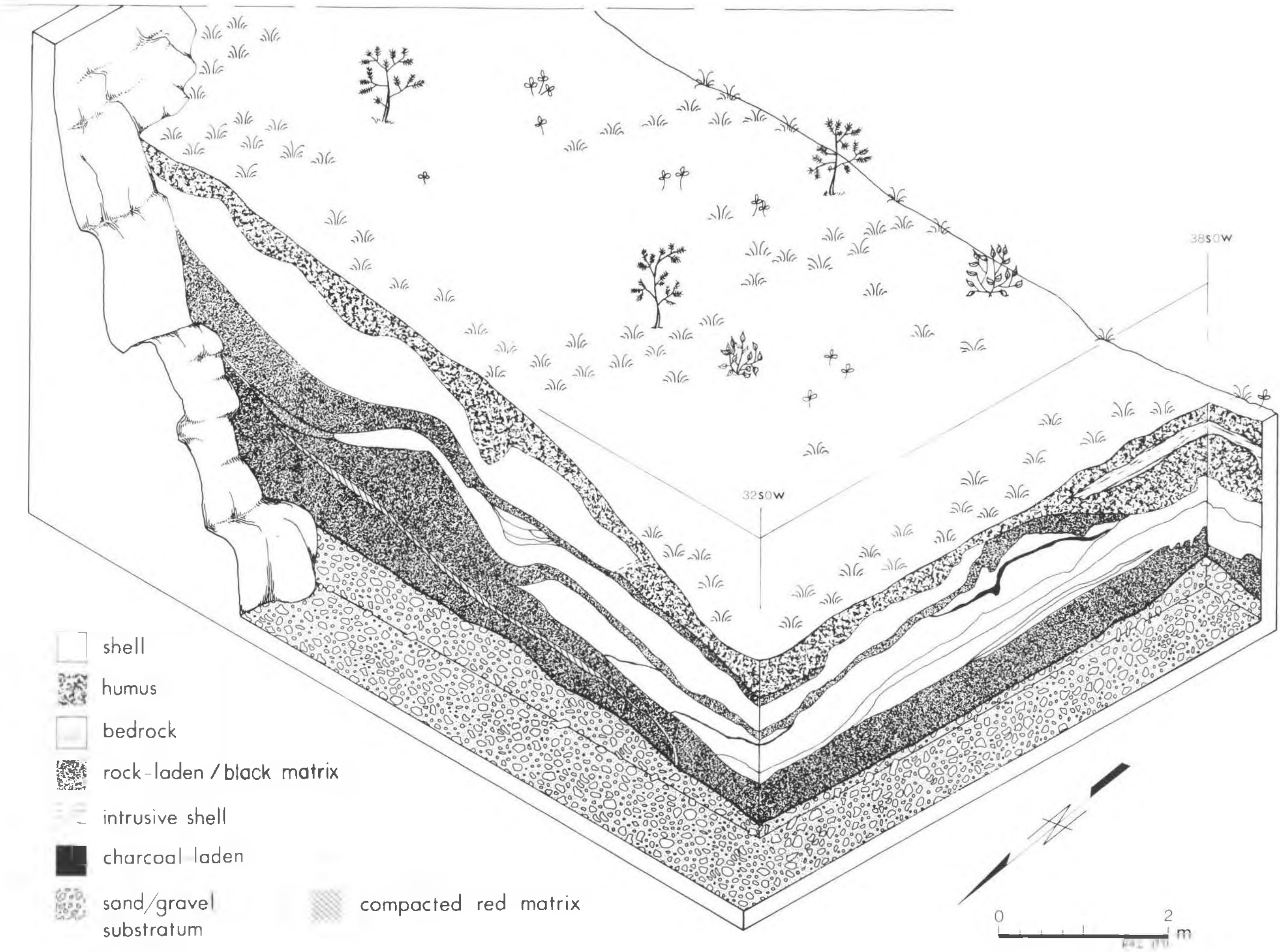


Fig. 19 Diagrammatic view of Rear Trench deposits at site ElSx 1, Namu, B.C.

matrix possessed a sharp contact with shell layers above. This is an apparent shoreward interruption of the unit by a sequence of shell-bearing layers which in part rest on sterile sands. This feature could be explained by the presence of a terrace beneath the bunkhouse. Large water-worn boulders occur beneath the bunkhouse floor. In addition a steep drop of the substratum occurs between the bunkhouse and the present shoreline. The shoreward interruption may represent an early transgression of tidal waters which removed portions of the black matrix and the then-develop-

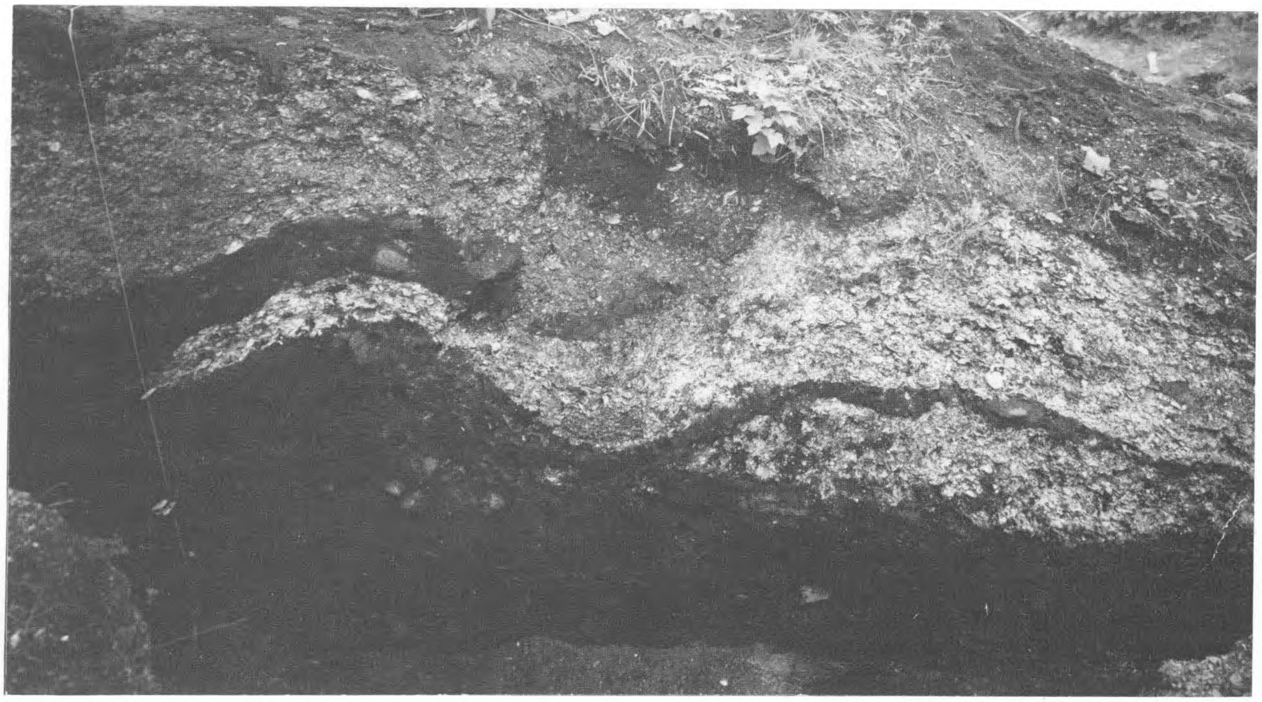


Fig. 20 View of south face (FS 9 and FS 3) in "Rear Trench, East Portion". Note three superpositional hearths below second black convolution in black matrix. ElSx 1

ing earliest shell deposits in the area. The suggestion that high tidal waters were responsible for this erosion is supported by the absence of channeling or other evidence of terrestrial erosion. Furthermore, a terrace with its higher elevation would have protected some deposits from tidal erosion. The nature of the black matrix is especially important since one-half the site's depositional history is contained within it. Undoubtedly, the flow of ground water plus tidal action must have been strong agents in the deterioration of stratigraphic evidence. The hearths, however, provide indisputable evidence of stratification within the upper regions of the matrix where radiocarbon sample 5 occurs. It is clear in the profiles that the shell layers over this sample were deposited later (ca. 2810 BP) than the earliest shell date of 4540 BP. The radiocarbon sample is considered associated with events related to the shell layers above and hence dates those events. Two dates of 7800 BP and 9140 BP from the mid and lower sections, respectively, date the black matrix.

The shell-bearing layer found at Namu dated 4540 ± 140 BP ("Rear Trench, West Portion") records the earliest depositional event following the black matrix. From the western extent of the exposure, the shell progresses horizontally in overlapping units until it terminates in the "East Portion" and is subsequently covered by another black stratigraphic unit. These overlapping events occur within a single stratigraphic unit resulting from 1100 years of deposition, according to radiocarbon sample 9 (3400 ± 100 BP).

The events following are marked by a black organic matrix alternating with a shell matrix. While the shell unit between the two convoluted black units contains much whole shell, the unit nonetheless conforms to the shell-in-fine-matrix pattern mentioned above. Of interest in this portion of the profile exposure is the convoluted distortion exhibited by the two black organic units and the shell-bearing units. There are two possible explanations for this configuration.

During excavation of the lowest black convolution (in FS 3), the regular sinuous configuration was found to continue across the pit. With the subsequent exposure in FS 9, morphologic similarities were demonstrated not only with

FS 9.5 but to stratigraphy above and to both sides of FS 3. We conclude that stratigraphic configuration at or near the rock outcrop is the result of continual mechanical pressures which have shaped or distorted the sequences through soil flow.

The top portion of the midden and the overlying humic levels at the rear of the site may not record the last depositional events for that portion of the site. Recent construction and habitation could have been responsible for removal of the upper units with recent humic buildup terminating the sequence. Rough sawed wooden planks within humus and the general irregular configuration of the contact between humic and midden deposits bear witness to the state of disturbance and suggest that the midden's top is truncated. Radiocarbon sample 2, dated at 1880 ± 90, is considered to represent the final dated phase of occupation at the rear of the site. The stratigraphic overlap between the Front and the Rear portions of the site is dated at around 1880 BP, with the top of the rear portion corresponding to the lower layers in FS 10. These two units are similar in texture, content, and morphologic configurations (Fig. 15).

We were unable to expose the basement upon which the Front layers were deposited in FS 10 due to the lack of time and the presence of ground water. A transit reading determined that we were within 65 cm of a probable bedrock basement exposed at the shoreline only a few metres away. At these levels petroleum odor was accompanied by petroleum "slicks" floating on the water. This condition is best explained by the invasion of tidal water containing petroleum discharges from local boat traffic. The ground water on the other hand, flowed from the uphill portion of the trench.

All shell-bearing layers discussed up to this point in the depositional sequence were delineated by thin black charcoal layers. In the basal portions of FS 10, these black layers became sharply defined in thickness and horizontal distribution revealing two distinct structural patterns for the shell layers. The first of these two structural patterns contained thick, short lateral distributions of irregularly contoured shell layers with fragmented shellfish remains in a homogenous mixture with ash and charcoal. The fragmented shells were mixed with infrequent concentrations of whole shells. A few small, thin hearths occurred in this sequence. This pattern is represented by all shell deposits in the rear of the site, beginning at 4540 BP, and all those in the Front Trench up to 980 BP, when the second pattern becomes apparent.

The latest sequence of deposits is charaterized by thin flat shell layers containing concentrations of species-specific shellfish remains in direct association with hearths. Fragmentation of shell is less severe than in the first pattern. Often nearly whole specimens occur. In addition, ash and charcoal are not mixed throughout these layers but are primarily confined to the charcoal layers separating each unit. The hearths are superimposed upon each other through time. This pattern began at 980 BP and continued until the final deposit. Inasmuch as the final radiocarbon date of 480 ± 90 BP dates the fourth stratigraphic unit below the midden's original top, we consider the final phases of deposition date within the last 200 years. Support for this conclusion includes the recovery of organic membranes of clam and even fully articulated fish in the uppermost layers. These finds occurred in small clusters resting on living floors near hearths. No historic materials were uncovered in association, however.

Immediately above the aboriginal midden are two layers associated with recent site construction and leveling operations. The first to be deposited represents recent habitation before the bunkhouse was built, as rifle shells with 1907 stamps were found. This debris may represent Indian occupation. The final phase involved construction of the bunkhouse and contains a wide range of modern debris.

The sloping contours of these Front stratigraphic units are especially noteworthy. Beginning at the bottom of FS 10 and the entrance trench FS 12, the short, thicker shell deposits exhibit a downhill slope accompanied by thinning. As subsequent layers were deposited, it appears that slumping occurred only at the front edge of the laterally advancing midden. Hence the surface contours become more horizontal for successive stratigraphic units. The upper units of this front trench meet the sloping midden front almost horizontally (Fig. 21).

In summary, two distinct depositional phases are visible in the Namu midden; the first involves a non-shell matrix, and the second a predominantly shell matrix. The first matrix records deposition unlike that of later units and contains dissimilar artifactual evidence. Nonetheless we know very little about specific events within the sequence between 9140-4540 BP. There is, in addition, evidence of an unconformity between the black matrix and the succeeding shell layers.

FEATURES

Burials

At Namu, interments conformed to three basic configurations according to the number of individuals involved and the pnysical relationship between burial locations. The first, the single, contained one interred body per grave site. The multi-individual pattern includes several individuals intro-

Fig. 21 View of south face, FS 10 and FS 12, in "Front Trench". Horizontal line is level while sequence of wooden markers along vertical line indicates strata boundaries established in FSC sampling sequence. Aboriginal deposits terminate immediately below topmost black layer at left on face. ElSx 1

duced during a single interment. The sequential multi-individual pattern is characterized by a number of individuals buried at different times within the same burial pit. An individual is considered extended within the pit when all limbs are arranged roughly parallel to the body axis, although the lower legs are commonly doubled at the knees. In contrast, in the flexed position, the knees are tightly drawn into the chest area and the arms casually placed somewhere within the pelvic area, often embracing the lower limbs, and the vertebral column arches forward. Bundle burials display no natural anatomical arrangement and appear to be little more than piles of bone. Whenever the arrangements appeared to have been drastically disturbed by post-depositional events, the interment was termed a bundle burial.

Body orientation conformed to a variety of patterns, but none seemed to be influenced by the burial type, sex, or number of individuals involved. A north-south orientation, with head in either direction, was the most common pattern. Where several individuals appeared together, all conformed to a single general orientation, but not necessarily north-south. The direction a body faced was difficult to determine owing to post-burial fragmentation and movement. Obviously, the flexed condition of an individual could predetermine the direction it faced, but in extended burials it would appear the facing was a highly variable result of circumstances. In no case was an individual found buried face down.

Determination of the time at which interments occurred was difficult. In two examples, much of the overlying stratigraphy was missing, hence the evidence of introduction was missing as well. In the course of excavation care was exercised once a burial was discovered and in every situation the profile walls were examined for additional burial evidence. We have concluded that the burial pits were shallow and rarely intruded through more than one complete stratigraphic unit. The most common pattern suggested that the burial pit was introduced into a stratum for which deposition had recently ceased and through a part in which deposition had just been initiated. Using this information the Namu burials have been assigned to the stratigraphic unit immediately above the burial. While inaccuracies are possible through use of this assumption, there is no evidence that burial pits penetrated stratigraphic units to a depth of more than one metre (Table V).

Assigning artifacts to specific burials was not difficult. In the first place most burials were devoid of artifactual associations. Where artifacts were uncovered, however, they primarily consisted of body ornaments. With the specific finds in parentheses, these occurrences are: FS 4.H, FS 2.12E, FS 4.K.11, (clam shell disk beads) and FS 11.1A (amber beads— see Fig 41). Two lanceolate points (see Fig. 32a b) uncovered 3 cm below individual FS 9.OA may have been associated with that individual. Groups of cobbles, from two to twenty, were found near the cranial and neck areas of all burials except FS 4.G.6,8, FS 4.H I,J, FS 6.13A, and FS 1.13D. Very large boulders covered individuals FS 4.G 6 8 and may have covered FS 4.J, I,H. Table V provides a complete listing of burial data. Two specific burial locations "Rear Trench, West Portion" will be discussed in detail in order to provide data to illustrate the interpretative remarks.

Burial FS 4.H,I,J (Fig. 22) represents a multi-individual interment containing a ca. 50-year-old male and two females, about 15 and 30 years old. Oriented along a north-south axis, each individual lay extended with limbs intermingled with those of the others. The adults' crania were fragmented, although probably intact at the time of interment. The 15-year-old female's cranium was completely crushed.

With the exception of a possible clam shell pendant associated with the 15-year old, all artifacts recovered from the burial (Fig. 40) were in direct association with the male. Clustered about the head, neck, pectoral and wrist areas were strands of clam and mussel shell disk beads totalling approximately 4000 individual beads. A concentration of red ochre was located next to the mandible in the neck region in direct contact with two ivory "gambling pieces" and a possible clam shell pendant. Grouped at each shoulder were caches of bone and stone tools fashioned for marine hunting. A bone projectile point (specimen 1, Fig. 40) was found in the male's back embedded between two thoracic vertebrae and penetrating through the spinal cord canal.

Table V Descriptive breakdown of all Namu interments excavated in 1969-1970

Field Design	Burial Type	Age**	C^1	Sex**	C^2	Time of Interment
1.11B.1	Bundle	40-50	(4)	M	(2)	4540 BP(?)
1.13D.1	Bundle	40-50	(6)	?		7800-4540 BP
2.11C.1	Flexed	15-17	(2,3)	M	(2)	3400 BP
2.12E.1	Extended	35-45	(4,5)	F	(2)	3400 BP
4.B.1	?	5-6	(3)	?		3400-1880 BP
4.C.1	Extended	35-45	(4,5)	M	(2)	3400-2880 BP
4.G.1	Flexed	25-35	(4)	F	(1,2)	3400-3000 BP
$4.G.2_1$	Bundle	45-55	(4,5)	M	(1,2)	3400-3000 BP
$4.G.2_2$	Bundle	40-50	(4,5)	M	(2)	3400-3000 BP
4.G.3	Bundle	16-18	(2)	?		3400-3000 BP
4.G.4	Flexed	45-55	(6)	M	(1)	3400-3000 BP
4.G.5	Flexed	7-8	(3)	?		3400-3000 BP
4.G.6	Extended	30-35	(2,5)	F	(1,2)	4290-3400 BP
4.G.7	Flexed	5-6	(3)	?		3400-3000 BP
4.G.8	Flexed	16-17	(2,3)	F	(1,2)	4290-3400 BP
4.H.1	Extended	45-55	(4,5)	M	(1,2)	3800 2880 BP
4.I.1	Extended	15-16	(2,3)	F	(1,2)	3800-2880 BP
4.J.1	Extended	28-38	(4,5)	F	(1,2)	3800-2880 BP
$4.K.1_1$*	Flexed	35-45	(4,5)	F	(2)	3400-2880 BP
$4.K.1_2$*	Bundle(?)	adult		M	(2)	3400-2880 BP
$4.K.1_3$*	Bundle(?)	subadult		?		3400-2880 BP
5.11P.1	Bundle	45-55	(5)	F	(2)	3400-2880 BP
5.11P.2	Bundle	neonatal	(3)	?		3400-2880 BP
6.13A.1	?	?		?		?
8.12A.1	Flexed	50-60	(4)	F	(1,2)	3400-2880 BP
8.12B.1	Extended	adult		?		3400-2880 BP
9.OA.1	Bundle	4	(3)	?		1800 BP
9.3B.2	Bundle	17	(2)	F	(3)	2440 BP
11.1A.2	?(Cairn)	15-17	(2)	?		Recent

C^1 Age Criteria
1) public symphyseal (Todd method)
2) epiphyseal closure
3) dental eruption sequence
4) suture closure
5) dental attrition
6) porosity of femoral cortical bone

C^2 Sex Criteria
1) pelvic structure
2) cranial morphology
3) discriminant analysis

* = individuals heavily charred

** = assigned by Michael Finnegan

The burial series FS 4.G.1-8 contains nine individuals who were buried within the same pit. On the basis of stratigraphic evidence we believe they were interred at two separate times. The pit itself, cut into the sterile substratum, contained all nine individuals. This group lay immediately below individuals FS $4.K.1_1$-1_3. In addition, FS 4.C.1 and FS 4.B1 were present as single individual interments resting on or near sterile at the periphery of burial pit FS 4.G. At least three major phases of interment were represented at this single burial place.

The earliest phase contained two females: an extended 30-35-year-old and a flexed 16-18-year-old (Fig. 23). The

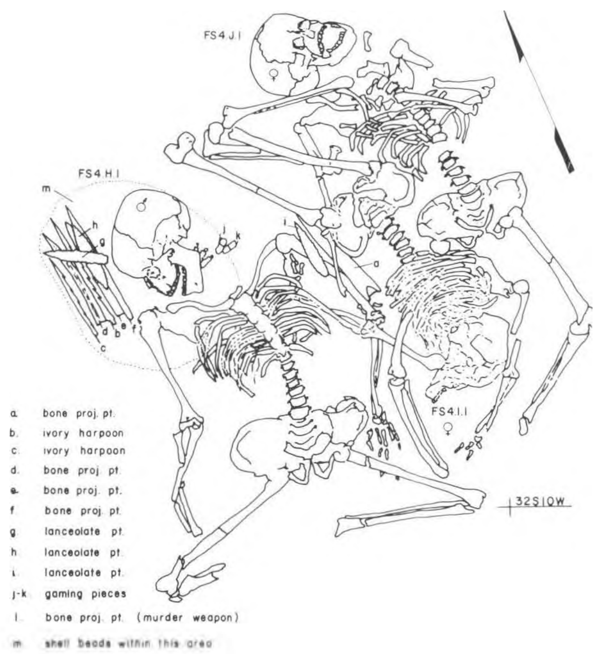


Fig. 22 Multiple burial, FS4.H,I,J, ElSx 1. Artifact letters refer to Figure 40.

bodies rested on the sandy substratum while one large boulder was placed over the flexed individual and two were placed over the extended one.

The second phase contained seven individuals in either bundle or flexed arrangement. During this interment the original pit boundaries were exposed and in one area enlarged to accommodate the larger number of bodies. However, disturbance of the initial interment did not occur. An interesting episode in this phase is evident in the arrangement of two children cradled in the arms of an adult male, all three in a loosely flexed position (Fig. 24). The remaining four individuals lay to the right of the trio in both bundle and flexed arrangements. A small number of river cobbles was in association with this group. Owing to the interwoven complexity of the skeletal remains, association with specific individuals could not be determined.

Inclusion of the following complex as the third and final phase of interment is a matter of some inference. Individuals FS 4.K.1_1-1_3 lay directly above the burial pit FS 4.G, but 20-25 cm separated the interments and conclusive stratigraphic evidence of their association was missing. The presence of burials FS 4.C and FS 4.B at the pit's edge lends credence to the argument that this area existed as a cemetery plot. The 'K'' series is thus considered the terminal manifestation of a three-phase interment.

Two of the three individuals in the third phase were completely charred and the third, a fully flexed and articulated 35-45-year-old female, was charred on 70% of the body. Eighty charred clam shell disk beads were in direct association. It was determined that a very intense localized fire was built on top of the three individuals, which cremated the skeletal evidence, and baked the midden matrix below. The uncharred portions of the female were unaffected due to the fact that they were not in contact with the heat but rather were facing outward. The other two bodies, while not reduced to ashes, were severely fragmented and failed to provide evidence of their relative positions or ages.

We know these represent a formal interment from their position and association. The question still to be answered is whether the burning represents intentional cremation or is the result of accident or utilitarian activity. If the cremation denotes formal practice, why was one individual only partially cremated? Obviously the evidence at hand is limited. Considering the number, positioning, and close proximity of individuals plus the presence of beads, the writer speculates that cremation in this case was an aspect of burial custom.

Examination of each individual at Namu reveals a further distinction between body positions and articulation. Bundle burials at Namu were observed to have little articulatory positioning; often ribs and vertebral elements were

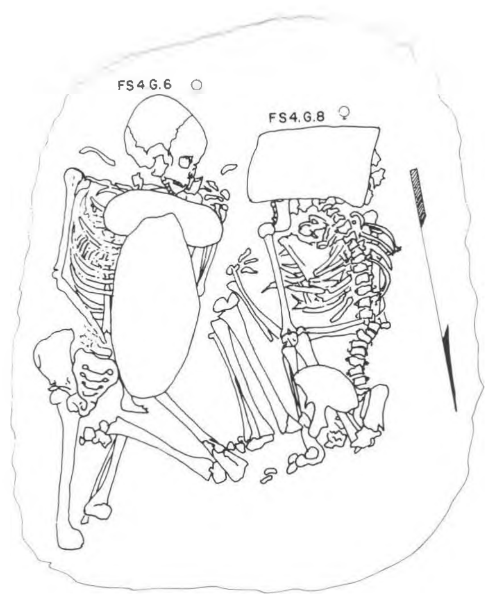


Fig. 23 Multiple burial complex, FS4.G.6,8 within sandy substratum as outlined by dashed line; first interment.

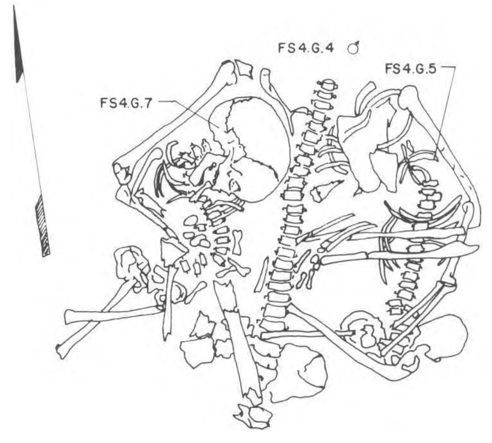


Fig. 24 Multiple burial above FSv.G.6,8 and within sandy substratum; second interment.

missing. Flexed individuals always exhibited articulated vertebral columns with frequent natural alignment of the pelvic and pectoral girdles. Long bones in certain cases were not always found to be articulated and in two cases humeri and femora were transposed in position and bundled with the remaining long bones. The extended pattern, while displaying isolated occurrences of disarticulation (always of the extremities), never exhibited disarticulation of the trunk or fore-limb elements.

Re-evaluation of the multiple burials reveals that in each case at least one individual within a complex is fully articulated and extended. In burial FS 4.H,I,J three bodies are extended and articulated. In sequence FS 4.G.6,7 one body is fully articulated and extended. The same is true of FS 8.12A&B. Of the remaining individuals in the "G" series, the only fully articulated individuals, FS 4.G.4,5,7 are not extended, but otherwise conform to this pattern.

Our interpretations rest, in part, upon burial patterns observed in the historic period mummies located in burial caves within the Bella Bella area. In these situations, the body is commonly bound in a flexed, seated position either outside of or within a burial box. This position is identical to those observed at Namu. Frequently these individuals exhibit evidence of post-mortem dismemberment.

The Namu interments therefore may represent a combination of both primary and secondary burials where, it is suggested, deceased individuals were interred together, with the death of one being very recent. The recently deceased person was placed in the extended position alongside individuals who might be either macerated or totally without flesh.

The adult male and the two children cradled within his arms, FS 4.G.4,5,7 represent a primary interment in direct association with FS 4.G.1,2_1,2_2,3 which in turn are secondary flexed and bundle burials. FS 4.H.I.J on the other hand, were all primary interments. Burials FS 8.12A and B and FS 4.G.6,8 also exhibit this pattern.

How do we interpret this evidence? Evidence of violence in FS 4.H,I,J is present within the spinal column of H, and in the general disorder of the bodies. The associated artifacts with the male indicate he possessed considerable rank and status. It seems evidence that the "patriarch" was killed and placed in the grave with his weapons. The two other individuals may have met similar violent deaths and then were interred alongside the male. We would like to know who these individuals were and how they were related. The age and sex grouping suggests a family group, but slaves and servants were known to have been treated in a similar fashion in historic times. At any rate we believe that a series of related events led to the demise of these three individuals and their subsequent placement in the grave.

On the other hand, the appearance of the three individuals, FS 4.G.4,5,7 could be explained as death by calamity or stress. Drowning, disease, warfare, and so on hence became suspected causes of death, but whichever, it seems probable that all three succumbed to the same cause. After burial, other individuals were introduced.

A summary of the burial information from Namu provides a number of revealing facts. Of the 29 individuals uncovered, 19 were located within a 6 metre circle, and of these, 17 occur in multiple interments. Furthermore, assuming that the dating is correct, 24 individuals fall within the 4290-2880 BP time range. These numbers point out that specific burial areas were used and re-used during a relatively short time period. Finally, it seems possible that these were relatives or people known to each other, and that when the last members died, the whole group was buried together. Hence, small interment groupings may have been formed on the basis of the special circumstances surrounding each death and each group. Quite clear is the fact that those individuals who were doing the burying had intimate knowledge of the burial area and were familiar with the history of its occupants.

Other Features

A series of thin, well compacted layers of fragmented shell was uncovered in FS 5. These were separated by other layers of loosely compacted shell. The formation extended across most of the pit. At least five distinct layers were readily recognized. Each had a harder surface than the surrounding matrix. Dispersed across each of these surfaces were small concentrations of whole shellfish remains and clusters of fragmented sea urchin spines. Several of these layers appear to have been associated with hearthside activities, and two well-defined hearths were located. The hearths measured 25 x 35 cm, and were basin shaped. Yellow ash was concentrated within each. Charcoal and grey ash covered the adjacent surface and separated it from the adjoining matrix.

The most reasonable explanation of these layers is that they are the result of people walking over the surface as they made use of the hearths. Although irregular in contour, the layers are relatively flat and uniform in thickness. No architectural structures were found in association with these working areas.

The "Front Trench", FS 10, yielded a series of compacted shell layers in the final 70 cm of deposition which resemble those found in FS 5. Again well-defined hearths were in association and at least one hearth could be assigned to each of the seven layers. Small concentrations of shellfish surrounded the hearths, while quantities of ash and charcoal separated each layer from the next.

These hearths are yellow or beige in the centre with a grey to black periphery. No internal stratification or striations were detected. Unlike those found at the rear of the site, hearths in FS 10 are typically thick – up to 35-40 cm in depth. The black charcoal layer emanating from each hearth can be recognized throughout the pit's walls. The charcoal fragments within these layers are small and frequently reveal the original size of the wood source. The small quantities of grey ash suggest that the temperature of the fire was not high. These hearths and their associated layers are illustrated on the profile drawings (Appendix D).

Immediately above but in contact with radiocarbon sample 10, a thin, compacted layer of wooden debris was found and tentatively identified as cedar. Because of its fragile nature, a section was removed for examination. This revealed that the matrix contained flat thin chips of irregular shape and short (10 x 25 cm) "shingles" of uniform thickness and shape. There was no apparent arrangement of these forms. The matrix seemed to be an intermixture of both chips and "shingles" aligned flat on the ground. While the wood may have been a part of a house floor (no architectural structure was found) it may also have been refuse from a work area where canoes or house beams were being crafted, the chips being the by-product of these operations.

These features from the rear and the front of the site provide additional evidence of habitation patterns. The hearths' colour and deep homogenous cores testify to intense heat and prolonged use. The chacoal layers emanating from these hearths however, involving small brush, limbs and perhaps grass, were not the result of intense fires. The fact that these layers formed boundaries between depositional events indicates that these events and the cultural activities associated with the hearths were periodically terminated. The charcoal layers strongly suggest that the site was periodically burned off, possibly to rid it of debris and low vegetation. The hearths were associated with work areas and the compacting of the shell matrix surfaces is believed to be the result of people walking to and from the fire. The episodic nature of these events is inferred from the pockets of shellfish next to the hearths; barnacle here, clam there, mussel in between.

ARTIFACTS

Our sample includes all suspected "artifactual" material removed from the excavations at the Namu, Kisameet Bay, and Roscoe Inlet sites. After cleaning, this sample was examined under a 75x (max.) stereoscope in order to establish criteria to distinguish *manufactur*ing marks from those resulting from *use*. At this stage in the operation, items which did not display either kind of mark were discarded as unusable for the objectives at hand. The remaining artifacts were termed "the collection".

In distinguishing between manufacture and use-related marks, functional attributes were also identified. This was in fact quite simple since manufacturing marks were found to be fairly consistent in pattern, reflecting grinding, cutting, and polishing. This procedure enabled the writer to establish the function of a specific artifact on grounds other than form alone, although form provided the initial clue as to where to look for what kind of evidence.

After wear patterning evidence was initially recognized, the artifacts were separated according to constituent materials and classified according to culturally significant functions. These were in part based on Semenov's functional categories as well as intuitive criteria established at two functional levels : tools whose functions were complexly related to form, and those whose form-function relationship was simple. Tools classified functionally as needles or adzes, for example, are simple. Hooks and the various projectile elements were considered functionally more complex in terms of manufacture, assembly, and deployment. At this stage in the process groups of classified artifacts were microscopically examined to re-assess evidence of wear.

Microscopic examination revealed that some individual artifacts within each class displayed wear patterning which did not fit functional attributes assigned to that class. Furthermore it revealed that imprecise distinctions were being made between certain form criteria. Particular bone tools, for example, included in hand tool categories on the basis of form, showed evidence of hand polish, whereas others possessed patterns which disclaimed use in the hand. Consequently, a re-evaluation of the form-function relationships was performed and the tools re-examined.

A solution to this problem involved the subdivision of some tools into type classes according to already established functional modes. For example, while barbs function in similar manners, they vary in attachment, material and whether used in conjunction with a spear, a line, or an arrow. The same is true of the less complex awl, which may perform a wide range of perforating operations on differing materials. Just what these specific requirements are and how they influence tool manufacture is one of our research goals. Once having generated the subdivided groupings, we perceived the patterns of form and function of each designated group which was verified by their wear patterns.

Only at this stage in the classification system then, were the tools given classificatory status on the basis of form-function relationships. Once in the class, and where appropriate, a final "label" was assigned for that function-specific class. Under the functionally related group of "Barbed Bone Projectile Element," one finds the "Wide" and the "Single Barb-Points" – each a descriptive type of the projectile's presumed procedural mode as defined by Rouse (1970:192). Each is functionally related to the other, but was used in some unknown distinctive manner. Similarly, the "Awls" or the "Utilized" and "Developed Flakes" and "microblades" are distinguished according to form-function.

At the conclusion of this procedure, and only then, the classes were ordered according to the radiocarbon chronology, thus avoiding the weaknesses of the "historic type". Also at this stage artifactual samples from ElSx 3 and FbSx 6 were introduced into the collection. This inclusion was made only when the time span for each class coincided with those generated by the Namu collection. In retrospect, this restriction was not necessary due to the fact that none of the classificatory units conflicted chronologically from site to site. All artifactual units developed for the other two sites therefore were admitted into the collection.

A count of the complete collection from all three sites is presented in Table VI. A breakdown according to the fragmentation of bone artifacts helps explain why only 25% of this collection was assigned to formal classes. After all, our method requires the individual artifact to have preserved evidence of both its original form and its function as indicated by wear patterns. Without reliable evidence of both the specimen was not assigned to an artifact class. Therefore, in the instances in which only a shaft segment remained, the inclusion of that artifact into the classification could not be justified. It would of course be possible to use descriptive terms typical of many archaeological reports such as "pointed bone object" or "shaft", but these fail to convey meaningful information of the sort sought here.

Table VI Artifact count of entire collection
(the term 'complete' means diagnostically complete)

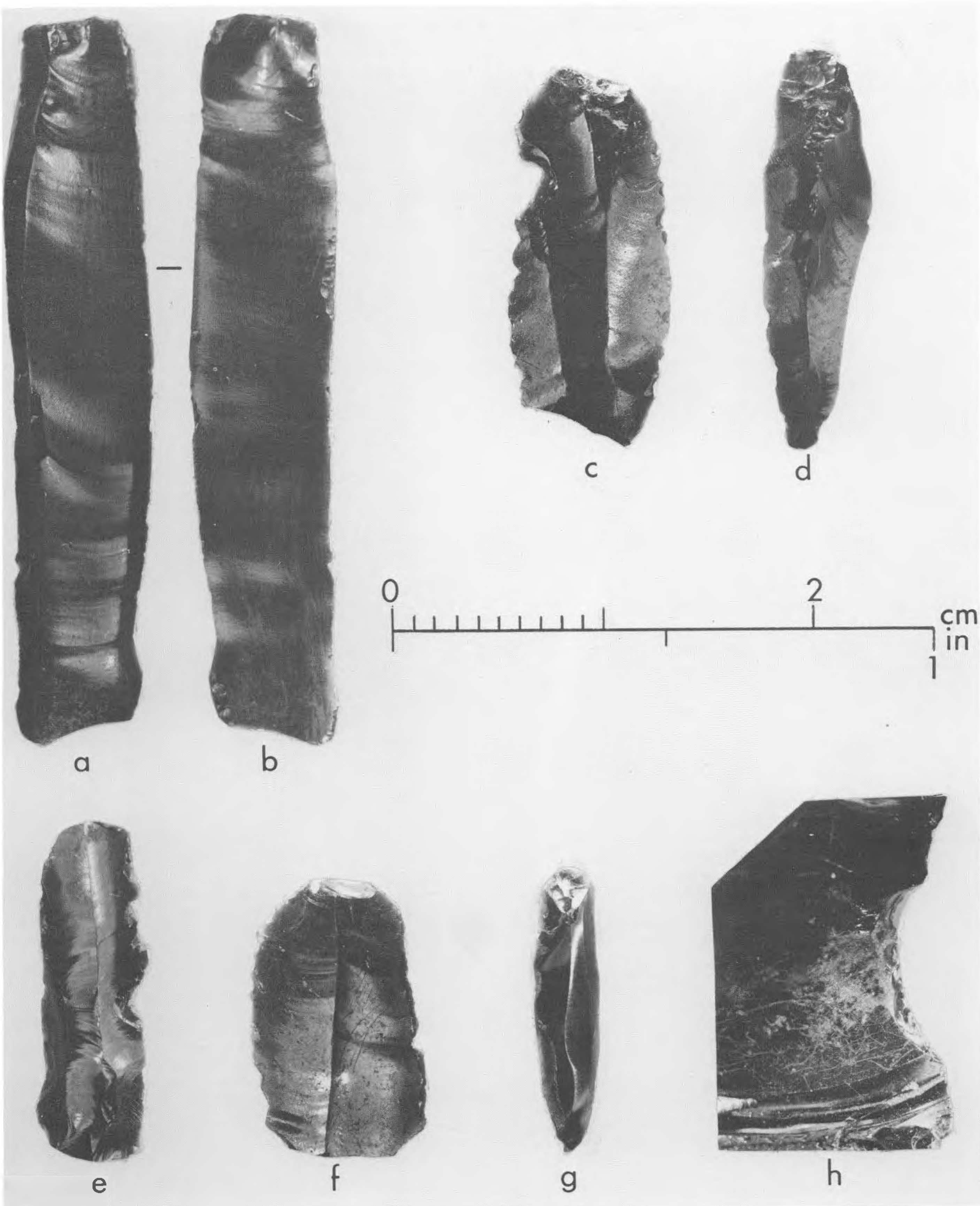
Material	Fragmentation	No. of Artifacts
Bone	(75.3%)	
	complete	215
	ant./post.frag.	790
	midshaft frag.	265
	indeterminable form	8
Stone	(23.5%)	
	complete	195
	other	203
Shell	(1.2%)	
	fragments	21
	Total Artifacts	1697

Evidence of manufacturing techniques in bone is abundantly clear. Most bone implements are fashioned from land mammal long bones, primarily deer. Other utilized bone elements include ulnas, mandibles, and ribs. Sea mammal bone is also present, but identification of it is more difficult, due to extensive alteration during manufacture. Long bones typically are split or divided longitudinally prior to manufacture into the desired tool form, while other skeletal elements are commonly not fragmented.

The process of splitting long bones for the production of tools is not completely understood. Certain evidence

Fig. 25 Range of evidence from obsidian microlithic collection. *a-b* parallel sided microblade (dorsal and ventral views respectively); bilateral edge grinding and chipping at distal end; localized ventral lateral use-chipping or battering; striking platform intact and laterally wide; trapezoidal cross-section; 9140 BP. 3.16.1*. *c* dorsal view with distal end missing; proximal battering and constricted platform; moderate bilateral edge use-chipping; 7800 BP. 3.15.4. *d* dorsal view of microflake; no evidence of use-chipping or abrasion; severe proximal and dorsal battering along arris; 7800 BP. 9.10.123. *e* dorsal view of microblade with both proximal and distal ends missing; bilateral use-chipping with apparent extensive retouch to single lateral edge; trapezoidal cross-section; 7500 BP. 9.10.42. *f* dorsal view of microblade with only proximal end intact; narrow and extensively prepared platform; moderate bilateral edge use-chipping and dorsal surface striations; triangular cross-section; 7800–6000 BP. 9.8.22. *g* dorsal view of complete microflake; proximal battering and no evidence of use marks; 7800–5000 BP. 9.7.12. *h* magnified view (not to scale) of surface abrasion occurring immediately behind obsidian graver/scraper edge (see specimen *n* figure 28); 1470 BP.

* *Artifact numbers given serve to identify the provenience of each artifact illustrated.* ElSx 1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suggests the use of splitting wedges while other evidence implies that bone was crushed with a stone while being held against an anvil. Whichever technique was employed, long splinters were the initial tool blanks. Another pattern typical of thick, heavier long bones, like those of large sea mammals, is the technique of cutting very deep longitudinal grooves in the whole or halved bone section. Evidence of cutting includes manufacturing marks plus the recovery of rhombic cross-sectioned grinding tools. After the grooves were completed, each bone segment was broken along the thin walls of attachment hence producing roughly ground "blanks" to be crafted into complex tools, such as fixed barbed points (see Fig. 33).

Surface striations on implements suggest that the tool blank was ground to its final shape with grinding and burnishing stones. The grinding marks are either transverse or about 45 degrees to the long axis, very rarely coinciding with it. Inasmuch as the difference between a ground surface and a polished one is determined by the coarseness of the abrader, it is difficult to recognize the intent of the craftsmen in this regard. Fresh bone and antler ground on Namu burnishing stones in the laboratory exhibited very smooth and almost polished surfaces. Yet from this experiment it seems probable that coarser stones were employed whenever considerable material was to be removed.

The cutting of an artifact to shape is rare and appears only in specialized tools such as points (fixed and composite barb types) and hooks. In these cases, the barbs seem to have been shaped at the barb base by cutting with a very sharp tool, but often final grinding and polishing obscures their markings. Bone blanks exhibit cutting at both ends where the bone was originally sectioned, the articulatory processes then being discarded. There is good evidence to suggest that as harpoons were being made a portion of the blank at the posterior end was left unaltered. This portion served as a handle, and then was cut off after completion of the point.

Two general kinds of manufacturing techniques were applied to stone : shaping by percussion, or by grinding and polishing. In some cases, both were employed on a given artifact. A distinction is made between the grinding and polishing of celts. Again, two celts show a shine which must be regarded as a polish, while other celts exhibit only grinding although the material could have taken a polish. Incidental to this observation is the fact that slate, which was prevalent in the site, exhibited no signs of intentional polishing or grinding.

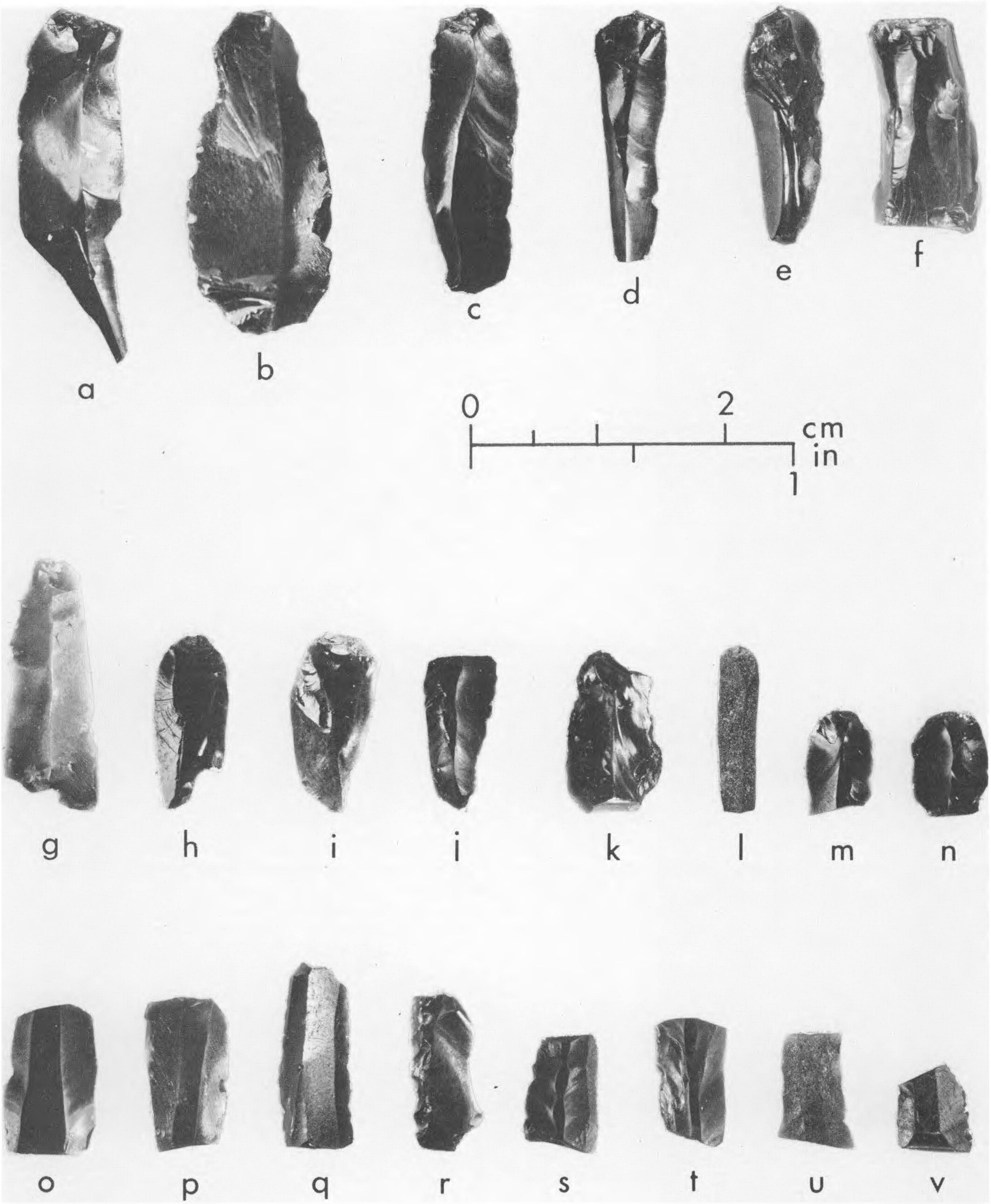
Microblades (Figs. 25, 26)

Namu microblades are obsidian tools exhibiting prepared striking platforms with the bulb of percussion commonly intact, a slightly convex ventral face, and a multi-faceted dorsal face. Sides may be parallel or may converge distally. Whether trapezoidal or triangular in cross-section, each is relatively thin, with two exceptions discussed below. Commonly one or both ends are missing, the fracture nearly straight and perpendicular to the long axis. Table VII summarizes this information.

Manufacture of microblades involves not only production of the blade itself, but many chips and flakes as well. Some are mere debitage, whereas others appear to have been put to use. Those believed to be discards are labelled "Microflakes" and appear in Figures 25, 26.

Microflakes which show use are labelled "Utilized Microflakes" to distinguish them from those possessing edge retouch. The latter are referred to as "Developed Micro-

Fig. 26 Obsidian microliths (dorsal views). *a* complete microblade with wide striking platform intact exhibiting battering; slight to moderate bilateral edge chipping which is also present laterally along the distal spur; triangular cross-section; 7800 BP. 9.10.96. *b* Microflake; no striking platform or concloidal fracture; bilateral edge chipping; rhomboid cross-section; 1850 BP. 10.11.144. *c* Developed microflake with platform and battering at proximal end; possible lateral use-chipping; distal end missing with end retouch into sharp cutting edge - use striations and abrasions present; triangular (midpoint) and trapezoidal (distal) cross-section; 9140 BP. 3.16.8. *d* Utilized microflake with broad platform — limited battering; no evidence of use patterns; distal tip missing; triangular cross-section; 7800 BP. 9.10.106. *e* nearly complete utilized microflake, broad platform with moderate battering; use-chipping to single lateral edge; distal tip missing; triangular cross-section; 9140 BP. 3.17.5. *f* multi-faceted blade with proximal-distal ends removed; proximal end battering; edge chipping to single lateral edge; light grey colour; thick trapezoidal cross-section; 9140 BP. 3.16.9. *g* proximal fragment of microflake with limited platform battering; no evidence of use patterns; triangular cross-section; 7800 BP. 9.10.169. *h* proximal fragment microflake with limited platform battering, no evidence of use patterns; trapezoidal cross-section; 9140 BP. 8.14.4. *i* developed microflake with proximal end retouch; trapezoidal to triangular cross-section; 7800 BP. 9.10.105. *j* distal fragment of developed microflake with distal tip retouch and slight bilateral use-chipping; trapezoidal cross-section; 7800–5000 BP. 9.7.10. *k* proximal fragment of utilized microflake with slight bilateral use-chipping; trapezoidal cross-section; 7800–6000 BP. 9.8.26. *l* proximal fragment of microflake (poorly vitrified); no evidence of use marks; triangular cross-section; 7800–5000 BP. 9.7.17. *m–n* proximal fragments of microflakes with limited platform battering; no evidence of use marks; trapezoidal cross-sections; 7800 BP–5000 BP. 9.10.52 + 9.7.7. *o* Microblade medial fragment with possible use chipping; trapezoidal cross-section; 7800 BP. 8.14.3. *p* Microblade medial fragment with possible use-chipping trapezoidal cross-section; 7800–5000 BP. 9.7.14. *q* Microblade medial fragment with steep bilateral edge retouch; trapezoidal cross-sections; 6800–4540 BP. 4.11.16. *r* Microblade proximal fragment with severe, steep lateral retouch to single edge; platform removed, but most of bulb of percussion intact; triangular cross-section; 7800 BP. 9.10.122. *s–t* two fragments comprising single microblades — proximal/distal ends missing; use-chipping and retouch on single edge; trapezoidal cross-section; 7800 BP. 9.10.53. *u* Microblade medial fragment with no evidence of use marks or retouch; poorly vitrified; trapezoidal cross-section; 7800 BP. 8.13.1. *v* microblade medial (?) fragment with extensive bilateral ventral edge retouch; trapezoidal cross-section; 7800 BP. 9.8.28.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flakes", but neither is necessarily regarded as a direct by-product of microblade manufacture.

Table VII Namu microblades. quantitative attributes

	Attribute	No.	Range	Mean	s.d.
Total Collection	(mm)	39			
	length		4.3-35.5	14.0	6.0
	width		3.0 8.8	6.1	1.3
	thickness		.9-3.0	1.7	.59
	T/W index		17.1-46.6	27.7	8.5
Complete Specimens	(mm)	6			
	length		11.6-23.0	17.0	4.3
	width		3.0-7.9	5.4	1.7
	thickness		1.4-2.7	1.7	.53
Prox./Distal Squared	(mm)	17			
	length		7.1-27.0	13.5	5.5
	width		4.1-8.8	6.1	1.2
	thickness		.9 3.0	1.8	.58

Figure 25 illustrates the range in form, manufacturing evidence and wear marks within the collection under higher magnification than the following artifact plates. Figure 26 illustrating a large number of microblades, again shows the range of variation. Wear evidence is well represented in individual microblades and provides limited clues regarding function. We infer that the high frequency of distal-proximal squaring (26o-v) relates to hafting requirements. Retouch and wear marks typically occur along lateral edges when present. Specimens 25e and 26r represent cases of extreme lateral retouch and wear. On the other hand, many specimens exhibit only slight, but patterned, lateral edge chipping, the result of use. Surface abrasions are concentrated on a few microblades. These do not appear to be associated with the tool's manufacture.

Specimen 25a is unlike all other microblades at Namu by virtue of its uniform parallel lateral edges, wide striking platform, and length (35.5 mm), all of which reflect the form of the core from which it was struck. In addition it possesses bilateral edge chipping and grinding of these edges. The grinding created two flat straight contracting edges at the basal (distal) end. No other grinding is present on the tool.

Battering of the striking platform's dorsal face is a common attribute. In most cases this battering is neither severe nor widespread. In a few cases a small portion of the proximal end has been removed, along with some of the bulb of percussion, hence removing most of this battering. Specimen 25f represents the best example of a well defined and battered platform, while 25d has a less well defined but more severely battered platform.

An examination of the proximal ends of specimens 25d and g and 26 d and e raises questions concerning their manufacture. While proximal battering is frequent, the appearance of other proximal edges suggests that the striking platform may not have been prepared in all specimens. In the Aleutians a distinction has been noted between prismatic blades and "ridge flakes" recovered at Anangula (Laughlin and Aigner 1966:42-3). This evidence supports an argument for the simultaneous production of microblades and microflakes.

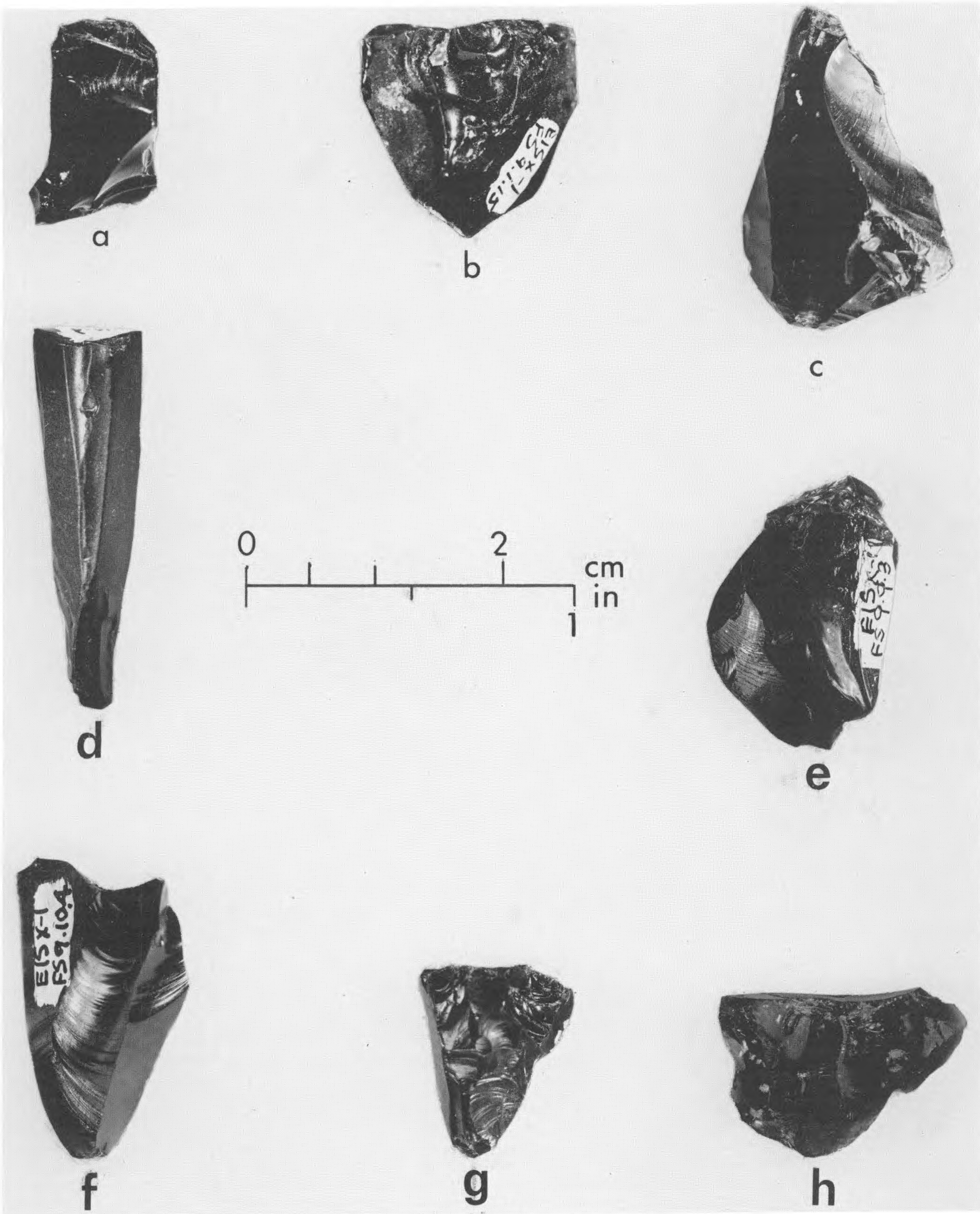
On the basis of wear patterns, the functional role of the Namu microblades was one of cutting, like that of a chisel or knife. Two modes of hafting are suggested in this collection on the basis of retouch and wear patterns appearing on mutually exclusive areas on the microblade's edges. The first involves inserting the obsidian into the side of a shaft and fastening it either by a friction fit or some type of adhesive. Only a single lateral edge shows use in this style. Hafting of the microblade at either of its ends, with binding or cementation securing it, comprises the second pattern. Specimen 26f is an example of the second pattern. This "straight pen haft" was described by Giddings (1964:272) and proposed for microblades by Sanger (1968b:201).

Bone material recovered from our excavation fails to provide any information on hafting. The fact that distinct hafting techniques were employed is inferred from presence of both lateral and distal edge retouch, but we don't know if this indicates separate functional roles for each. The high frequency of distal/proximal squaring supports this inference, but might also be the result of accidental fracturing.

Microcores

The collection of microcores (Fig. 27) is small and cannot easily be characterized. Most are fragmentary, irregular in form, and exhibit few, if any, platform preparation marks. Facet scars appear on single faces and rarely exceed two in number. Specimens b, e, and f are unifacial on the reverse side as illustrated indicating that a single blow

Fig. 27 Obsidian Microcores. *a* irregular flakecore fragment; single faceted platform with very little evidence of platform preparation; 2440 BP. 9.3.5. *b* irregular flake core fragment with moderate surface erosion; no evidence of platform preparation, although a single faceted platform face is present 1880 BP. 9.1.15. *c* irregular core with wide facet scars; single point platform; bipolar battering; 9140 BP. 3.17.6. *d* regular prismatic microcore; hexagonal cross-section; uniform surface pitting; proximal end missing; possible battering to keel 980 BP. 10.10.9. *e* core fragment (?); reverse face unifacial; severe proximal battering with irregular facet scars; 9.9.3. *f* irregular core fragment; bipolar battering, single facet platform; 7800 BP. 9.10.4. *g* prismatic core fragment; irregular surface scars with apparently arbitrary placement; distal tip battering; 7800 BP. 9.10.39. *h* irregular core fragment (?) exhibiting positive scars from pressure tool located across single facet platform; no evidence of bipolar battering; 1840—1470 BP. 10.13.51.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removed them from their parent source. Distal end battering (the end opposite the platform) exists in specimens c, f, and g (the term used by Sanger is "keel'). Platform battering is present in a, b, c, e(?), f, g, h. The striking platforms of specimens b, f, g, h are single faceted, slightly concave and exhibit no grinding or battering on the surface. The remaining specimens have irregular platforms (when present) with no flat surfaces, and are characterized by severe battering.

The microcores are assumed to be the source of microblades and may even have produced microflakes. The form of these cores and the nature of their striking platforms are unexpected,however, if we assume the microblades in the collection were produced from them. With the possible exception of specimen d, most of these microcores could not have produced the parallel sided microblades such as 25a, 25e, or 26f, 26l, and 26o-v. Instead, they could have produced more tapered irregularly shaped microblades such as 25d, 26c, g, or i. On the basis of its nearly parallel fluted scars however, 27d conceivably could have produced parallel sided microblades such as 25a.

As mentioned above, evidence of prepared striking platforms is not always convincing. Still unclear is the extent to which the core was prepared for blade removal. If we are to accept the specimens in Figure 27 as microcores, the evidence for platform preparation is very limited. Most exhibit no tablet but rather a single irregularly shaped facet or point from which flakes or blades were struck. This evidence suggests that both flakes and blades were struck from similar if not the same cores. Hence, any microcore could yield tools in a variety of shapes and forms. Thus, the production of micro-'ridge flakes' is plausible.

We conclude from these observations that either few of these specimens are in fact prepared microcores, or that two forms of microcore exist at Namu. Because only one microblade type is present — namely, those with portions of the striking platform intact and with even, parallel sides — we prefer the former conclusion. Rather than cores, these specimens (with the possible exception of 27d) would appear to be by-products of core preparation, including rejuvenation flakes and tablets.

The radiocarbon age of microcore 27d (980 BP) was totally unexpected and at variance with the distribution of other microblades and cores. It should be noted however, that the entire surface is pitted and weathered, especially along exposed ridges. This condition is rare in the obsidian collection as a whole, thus its presence suggests stratigraphic displacement. Typologically, this tool is similar to those from an older stratigraphic unit. Owing to the uncertainty of its placement, the microcore is assigned to the latest unit from which other cores were recovered.

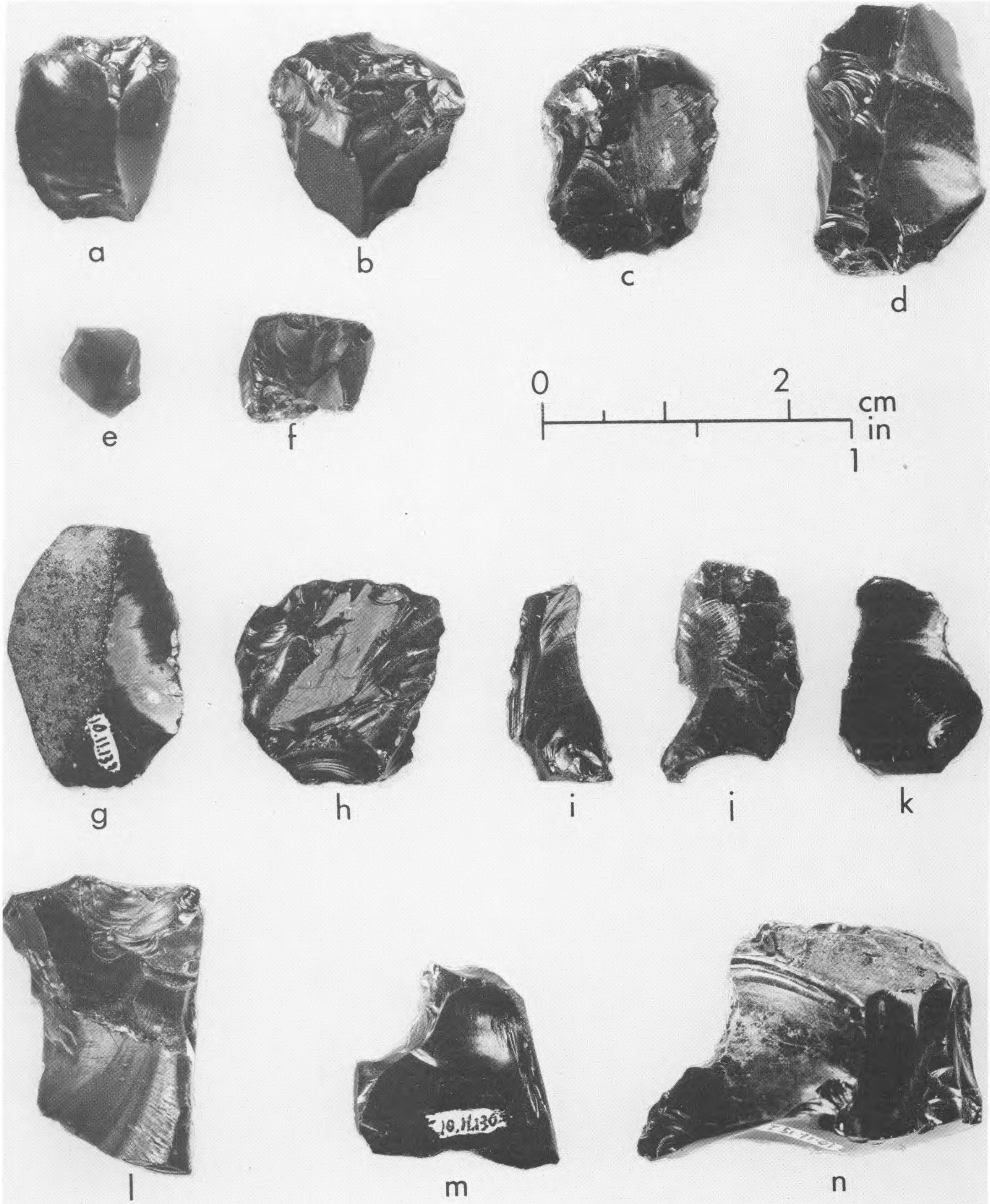
Utilized and Developed Flakes, Scrapers, and Gravers of Obsidian

Utilized flakes occur in a wide variety of forms, the most common being an amorphous, unifacial flake, irregular in cross-section. Wear patterns are limited to localized chipping or abrasion on an otherwise sharp edge. These flakes are frequently large enough to be held between the fingers. The limited wear suggests they were utilized briefly. We infer that they were used to cut or incise bone or wood.

Flakes altered by secondary retouching after removal from the core are considered to be developed flakes fashioned for a specific task. The end scrapers and gravers are included within this classificatory distinction. The end scrapers (Fig. 28) are thick, unifacial flakes whose proximal (anterior) leading faces are obtuse, multifaceted, and curvilinear. Their working edges are sharp. The wear patterns include abrasion and battering located along the edge. Lateral and distal (posterior) edges are heavily retouched so that the posterior portion of the tool is narrower than the anterior, as viewed in plan.

Specimens l-n comprise another kind of scraper with a function similar to that of a spoke shave. Like the end scraper, its leading face is obtuse and concave. The wear patterns of n indicate that it was drawn across the surface of the material being crafted sustaining considerable surface abrasions. The shape of n suggests that it was formerly a projectile point, the base of which was then used

Fig. 28 Obsidian end scrapers, developed and utilized flakes. End scrapers: *a* complete, with steep proximal edge; triangular cross-section; distal percussion damage during initial flake removal; bilateral edge chipping suggests hafting method; date unknown. 4.0.50. *b* identical to *(a)* above except distal battering absent and cross-section is thick triangle; 1850 BP. 10.14.13. *c* complete, with extensive bilateral edge modification; cross-section roughly plano-convex; 1840–1470 BP. 10.13.27. *d* similar to *(a)* above except cross-section is roughly trapezoidal; 1470 BP. 10.11.154. Utilized and developed flakes: *e* utilized graver/chisel with retouched and use-abraded straight cutting edge; 9140–7800 BP. 3.16.7. *f* developed flake fragment of unknown function; bifacially developed edge exhibits cutting abrasion marks; 9140–7800 BP. 3.16.6. *g* utilized flake with localized edge use-chipping; 1470 BP. 10.11.133. *h* utilized flake with limited evidence of use marks; surface weather-polished; 1840 BP. ? *i* developed flake with moderate retouch to single lateral edge; no evidence of use marks; 1470 BP. 10.11.130. *j* developed knife with unifacial converging retouch along lateral and proximal edge; slight use abrasion marks; 1470 BP. 10.11.136. *k* utilized flake with localized bilateral edge chipping; no sign of proximal wear; 2440 BP. 9.3.37. *l* developed scraper/spoke shave with retouched and use damaged proximal edge; distal end removed and lateral corner abrasion patterns suggest hafting technique, 1470 BP. 10.11.143. *m* developed scraper/spoke shave with moderate edge use-abrasion; 1470 BP. 10.11.130? *n* developed spoke shave with intensive use abrasion patterns on surfaces immediately distal to cutting edge; retouch pattern around edges suggest this specimen may have been a projectile point now re-fashioned; 1470 BP. 10.11.152.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as a scraper after being broken. These tools are presumed to have been used on both wood and bone.

Core Flakes

Core flakes (Fig. 29) are so named because they were removed from large cores. They are unifacial, relatively thin flakes exhibiting an unprepared striking platform (at the bottom in the photographs). Crude secondary flaking frequently occurs around the periphery terminating at the platform. No evidence of wear appears on these flakes, however. Specimen g, a developed flake, indicates a possible final form of the core flakes. It is unifacially retouched and shows possible wear along much of its curvilinear edge. Evidence of the removal of large flakes from these specimens suggests that they may also have functioned as flake cores.

Choppers, Cores, and Developed Flakes

The occurrence of large heavy choppers is common to many Northwest Coast sites. Those occurring at Namu do not conform to a particular form but are bifacially flaked and battered, usually along a single working edge (Fig. 30a, b). The form of the parent material dictated somewhat the final shape and thickness of the tool, as no flakes were removed from the central portions, but instead were struck only from the periphery. Bipolar battering is localized in a, while it occurs across the entire edge in b. The sizes and weights suggest that these specimens were used in two hands, rather than one. The function of these tools is unclear. A chopping motion is implied from the wear on these specimens only if we assume that soft nonabrasive material was processed. The choppers could have been used to crush bone or fibrous material.

Large Prismatic Cores

Only five large prismatic cores were recovered at Namu (Fig. 30 d-e). These cores possess wide flat platforms located at both ends from which flakes were struck. Specimen d exhibits preparation scars at a single location along the edge. The scars resulting from flake removal typically extend completely across the core and terminate at its distal end. On the basis of size and form of these cores, it appears that core flakes (Fig. 29) were struck from them.

Developed Flakes

Developed flakes (Fig. 30 h-j), possess specialized attributes. Specimen h is a unifacial flake, the anterior portion of which has been retouched to form a concave edge. Within a narrow range of cutting angles, this tool has experimentally been determined to be an effective cutting instrument. Specimen i is a unifacial flake on which a scraping edge was fashioned on a single lateral side; its face is obtuse and multifaceted from repeated resharpening. Like h, it was used to create rounded and smooth surfaces. Most edges were dulled to make it fit more comfortably in the hand, or to provide a more secure haft. Specimen j is an asymmetric, unifacial flake. However, its wear is insufficient to provide evidence of its function.

Burnishing Stones and Utilized Flakes

Burnishing stones were important in the manufacture of bone implements. Those in the collection (Fig. 31) exhibit a uniform granular structure. Longitudinal striations concentrated at either end, but occurring throughout, indicate the mode of operation. Specimen a is of irregular shape, is relatively hard being an intrusive stone, and was not formally shaped. Specimens b and c are bifacial, have granular abrasive surfaces exhibiting two distinct grits, and the edges of both ends were formally shaped. Generally, the ends are tapered, and the edges thin.

Surface polishing and manufacturing marks indicate that the final preparation of a bone artifact was accomplished by a tool which could remove bone and polish it at the same time. The burnishing stone can be used for both operations since a fine bone powder is produced which when rubbed into the bone structure enhances the polish and the tool's resistance to deterioration. Damaged tools can be sharpened in the same manner.

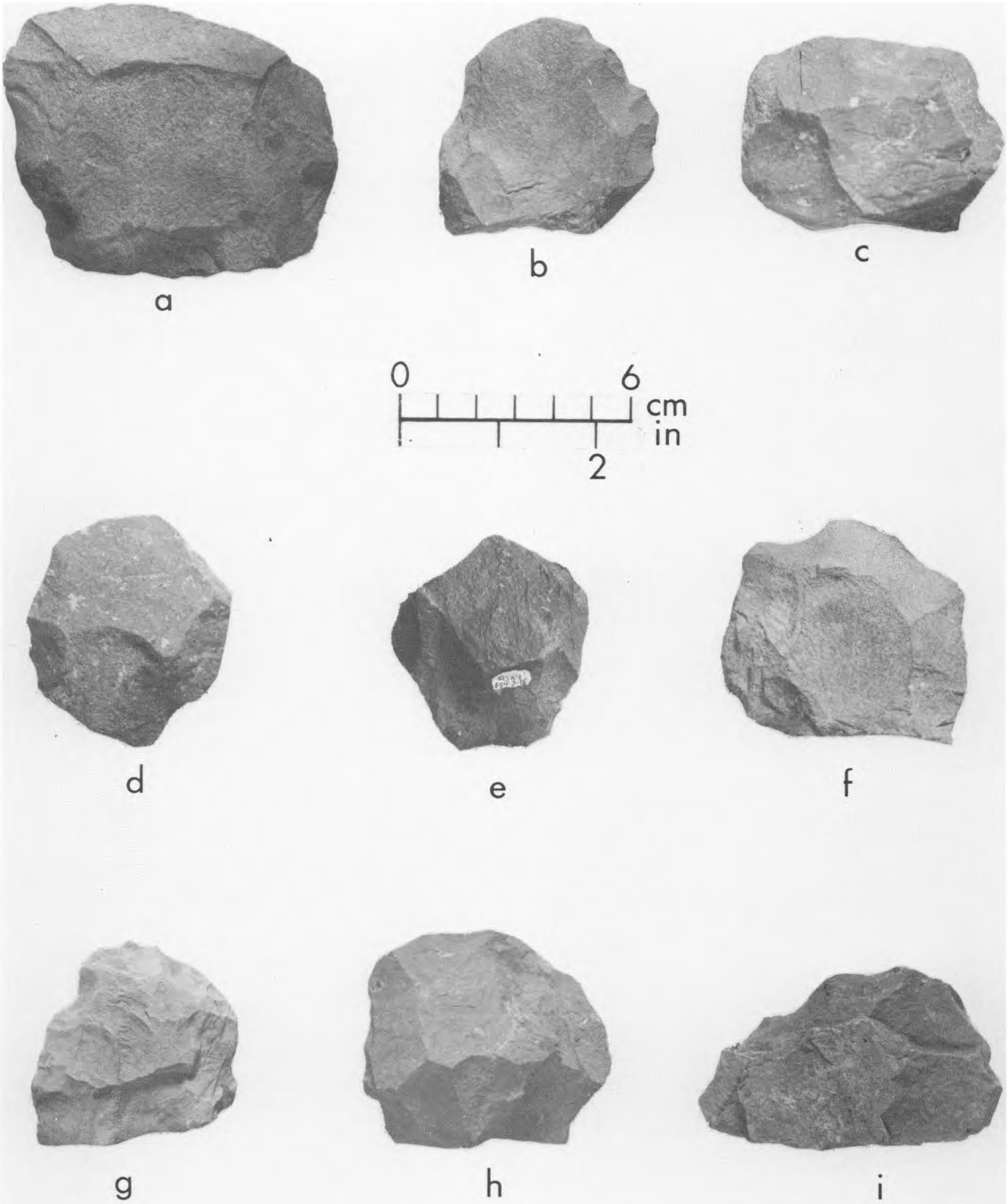
Utilized Flakes

Utilized flakes, (Fig. 31 d-h) are unifacial flakes with slight wear in localized areas along the flakes' edges. The dorsal facets are regular with their edges converging along the mid-point. The cross-sections, therefore, are triangular. Large prismatic cores such as d-e, are believed to be the sources from which these flakes were struck. Use evidence takes the form of abrasion.

Crude Bifacial Projectile Points

Crude bifacial projectile points were recovered from the earliest depositional phases of the Namu midden and exhibit a wide range of forms (Fig. 32 n, p-t). The distinguishing characteristics of these as a group include small irregular shape, thick rhombic cross sections with high

Fig. 29. Core flakes. *a* unifacial flake (material unidentified); 1840–1470 BP. 10.13.35. *b* basalt bifacial flake; 1880 BP–present. 1.2.3. *c* bifacial flake (material unidentified); date unknown. ? *d* granitic bifacial flake; date unknown. ? *e* basalt bifacial flake; 2440 BP. 9.3.15. *f* basalt unifacial flake; 1880 BP. 9.1.41. *g* developed unifacial flake (material unidentified); 7800 BP. 9.10.12. *h* unifacial flake (material unidentified); 7800 BP. 9.10.127. *i* unifacial flake (material unidentified); 7800 BP. 9.10.125.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central ridges and comparatively rough, angular edges and surfaces. The stone material from which these points are made is also more variable than is the case later in time. No evidence of wear was observed nor is there any formal shaping or modification of the posterior portions to indicate the type of haft.

Leaf-shaped Projectile Points

Leaf-shaped projectile points (Fig. 32 c,d,e,g,m,o) are thinly biconvex in cross-section and exhibit a posterior constriction presumably for hafting. The edge flaking along parallel to converging sides is delicately executed, creating sharp lateral edges as well as a sharp anterior tip. To a degree the parent material influenced the angularity of the surface flakes. Specimens c and e are especially delicate and sharp, while d and m, which are basaltic, are less refined. Specimen t is thick and exhibits deeper surface scars and clearly is different in degree. The range of lengths observed in this collection is smaller than in the crude projectile point group.

Lanceolate Points

The lanceolate projectile points are generally composed of large, long slate or basalt blades with rhombic or biconvex cross sections (Fig. 32a,b,h-j). The anterior tips and both lateral edges are very sharp and well made. Only a is wide and flat, with a constricted tanged stem. Bases on the remaining points are gently curvilinear, with the exception of h, which is pointed and sharp. Remnants of the striking platform remain in the posterior base of j.

Specimens h-j were uncovered with burial FS 4.H and are presumed to be evidence of his importance and one means by which he obtained a livelihood. No wear was observed on the blades, nor were they damaged. Specimens a and b were found in close proximity and are believed to be associated with burial FS 9.OA, an infant. The anterior tip and the two faces behind it are abraded and worn smooth, as are certain other scar ridges on its surface. Both blades are thin in cross-section and their edges remain very sharp.

Barbed Bone Harpoons and Fixed Barbed Points

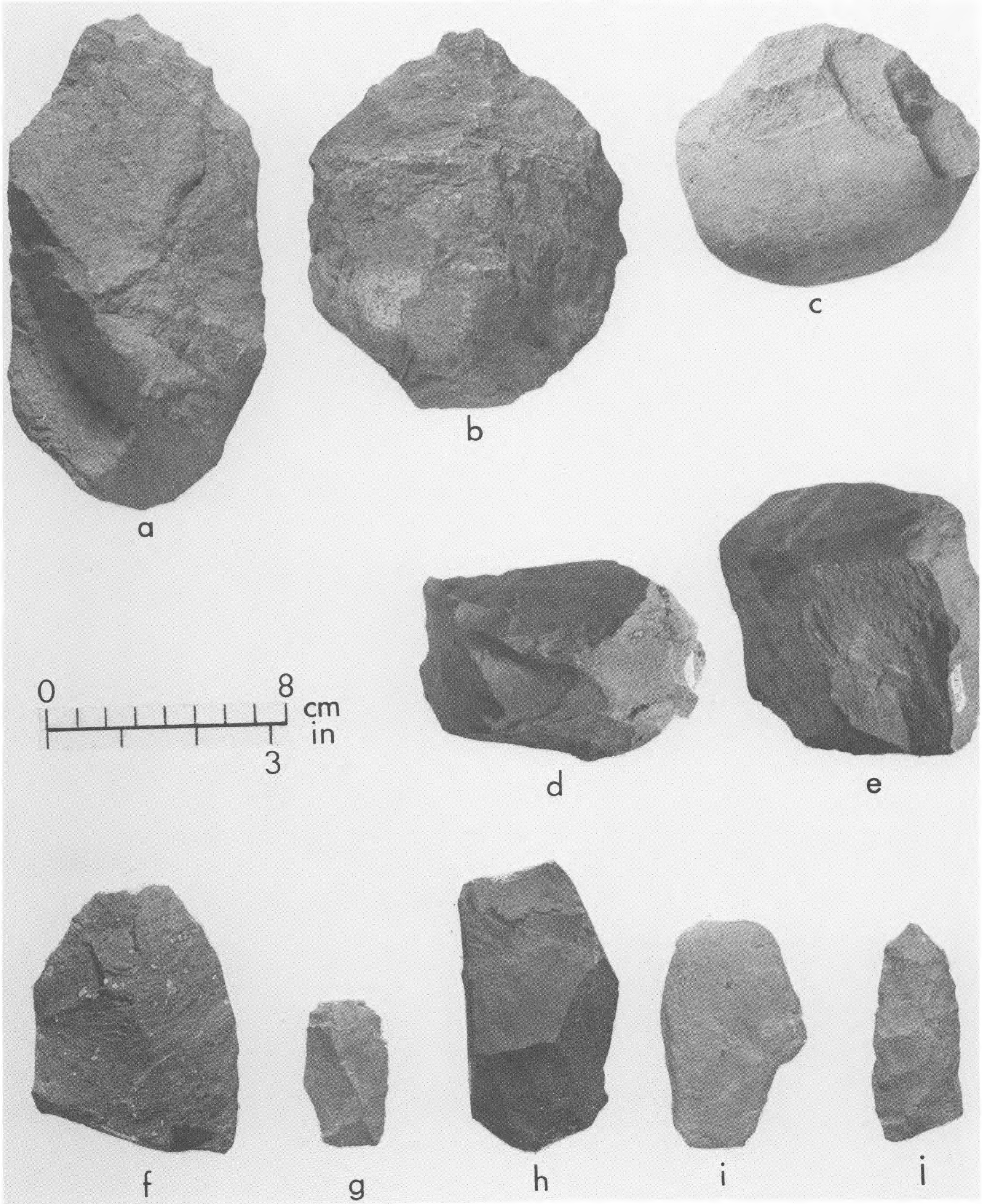
The barbed projectiles (Figs. 33, 34, and 40b and c) occur in a wide variety of forms; all were studied as a group. They appear in chronological order in the illustrations. Basal stems present in complete specimens taper posteriorly. Cross-sections at the midpoints range from flat rectangular (34g) through ovoid (34c), to irregular (33a and b). Where intact, anterior tips and barbs are pointed but rarely sharp. Wear patterns occur on the front leading edges of each barb and at the anterior tip. Occasional evidence of hafting (compression scars) or line attachment is apparent on certain artifacts (33k and 34h). Except when indicated, all of these projectile heads are bone. The preservation of these artifacts is conditioned by the length of time each was buried within the midden with deterioration increasing with age. In 33i j and k however, these oldest heads are well preserved due to the fact that their surfaces were finely worked, perhaps with a burnishing stone. Specimen 33f, which is nearly as old as the three others, was uncovered in the more erosive black matrix and hence experienced chemical weathering. The outer layers of bone in 34i have exfoliated as a result of *in situ* weathering.

Barbs project toward the rear and with the exception of 34a and 34b, extend beyond the width of the body as seen in plan view. Barbs on the two exceptions are located at the tip only and taper forward in diminishing sizes. Only one example of serrated barb edges is present (42h). The widths of barbs at their bases commonly conform to the shafts' widths, except for those of 34n which are inset and 33a and b whose body dimensions are irregular. Manufacture marks at the base of each barb suggest that a burnishing stone was used to "file" the posterior edges flat and smooth. An extreme example of this can be seen in 33h-j and in many line guards.

Line guards are present on all harpoon heads whose posterior portions are intact. They occur in three forms. The most common form is a series of cuts located on one or both lateral edges immediately anterior to the basal stem. The second most common pattern is the unnotched basal stem in which a basal constriction separates two extended nodules. Specimens 33f, 33k, 33h, and possibly 34n are examples. Specimen 33k fits into a tapering socket in the shaft as indicated by compression scars at the posterior shoulder and tip. The third pattern consists of attachment with the line being inserted through a hole, as seen in 34e.

Four harpoon heads (33e and h-j) resemble each other. Of special note is their wide outward flaring barbs and

Fig. 30 Choppers, cores, and developed flakes. Large hand choppers: *a* bifacially flaked with slight secondary edge retouch; (material unidentified); pre-4540 BP. 2.12.1. *b* bifacially flaked at anterior edge (material unidentified); 7800–4540 BP. 1968 T. Pit Lev. 13. *c* bifacially flaked cobble with edge battering (material unidentified); 7800–4540 BP. 2.13.2. Large prismatic cores: *d* prepared platform with localized multiple flake scars (material unidentified); 2440 BP. 5.4.1. *e* unprepared (fortuitous), multi-faceted platform (material unidentified), 2880–1840 BP. 10.16A.9. Large utilized flakes: *f–g* basalt; no evidence of use marks; 3400–1840 BP (see figure 31). Lev. 13. 1968 T. pit. 10.13.84. Large developed flakes: *h* Developed scraping edge with positive retouch (material unidentified); 1840–1470 BP. 10.13.49. *i* Developed scraping or cutting edge (material unidentified), 1840 BP. 10.14.10. *j* Developed asymmetric knife edge; basalt (?); 7800–4540 BP. 7.12.1.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identical line attachment guides. Each barb is further accentuated by deep forward curving incisions at its base.

Bone Projectile Points

The presence of single element bone projectile points (Fig. 35a and b) is uncommon in the Namu collection and their provenience is uncertain. Basically these points resemble certain stone counterparts in that they have biconvex cross-sections, moderately wide shoulders which taper to an anterior tip, and some type of basal stem (specimen 35a). Whereas the posterior portions of b are missing, its lateral edges are thin and sharp. Moderate tip damage is the result of percussion in both artifacts. The small sample and fragmented condition limit our assessment of their functional roles.

Toggle Valves

Our collection of toggle harpoons contains two valves and one pre-formed antler blank. The elements are described in many ethnographic accounts. In form they conform closest to Drucker's "Type 1 composite harpoon" (1943:39-40). Each valve constitutes half of the body of a composite harpoon head, the posterior portion of each functioning as a barb while the posterior cavities form a socket for the shaft once the components are assembled. The anterior cavity could have received rounded shafts, possibly a sharpened bone.

Composite Projectile Point Heads

This class contains complexly formed elements resembling the "Class B fixed bone projectile points" (Drucker 1943:39), which ethnographically are arrow and dart points. Most of those illustrated (Fig. 35e-m) were recovered from ElSx 3, although four came from Namu. In form they are sharply pointed, parallel-sided shafts with a thin and constricted segment approximately three-quarters of the length behind the tip and a concavity at the posterior end. This end is tapered and may be outwardly beveled (35g, h, and j). The natural cavity of the bone is retained to become a distinctive feature of the tool. Some outward flaring of the posterior segment is noted (35g and l). With two exceptions, i and m, the anterior tip exhibits extensive damage by percussion. Severe tip damage is a common occurrence suggesting that resharpening was necessary. By virtue of its outstanding length and very sharp tip, specimen 11m is in prime condition and almost unused. The continual process of resharpening would result in shorter forms, such as 11i, which shows a freshly sharpened tip. These projectile points may have been elements of a composite harpoon head.

Bone Wedges

Bone wedges are not common in the collection, and are represented by three poll ends. These wood-working tools are made from dense land or sea mammal bones with the surfaces roughly finished (Fig. 36a) or completely finished (36b and c). The anterior edge is beveled or symmetrically tapered in side view, with the edge and shoulder exhibiting compression scars and slight burring due to percussion.

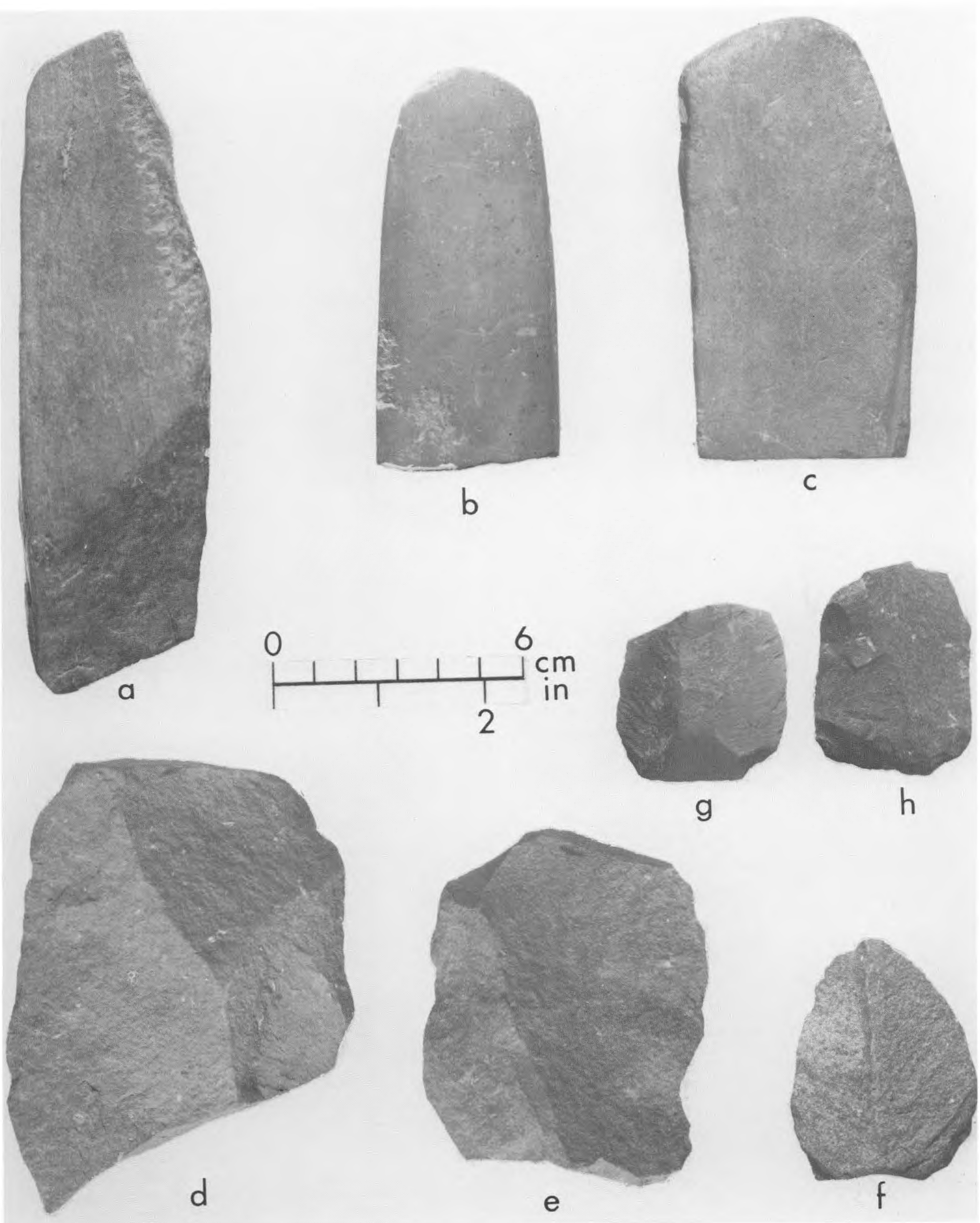
Ground and Polished Celts

A distinction is made between two celt forms on the basis of the presence of surface polish. The ground and polished celts (Fig. 36d, e) are larger and more massive than those without polish. They have thick regular cross-sections and symmetrically tapered faces which converge sharply at the anterior edge. All surfaces have been ground smooth and polished. The lateral edges received less polish, while the basal edges are obtuse but curvilinear in plan view. All wear appears as severe damage to the working edge and shoulder and there is no indication of wear polish from hafting. Specimen 36e has deep natural surface contours with pitting, while 36d's surface has been completely modified. A single posterior face on each celt has beveled corners.

Ground Celts

Ground celts, (Fig. 36f-h) are smaller and thinner than the ground and polished celts and exhibit cross-sections ranging from rectangular to ovoid. Poll ends are intact, regular, curvilinear, and obtuse. Lateral edges were prepared only on specimens with a rectangular cross-section. Few are sufficiently complete to enable reconstruction of form, but it is clear that a wide range of forms exists. All the celts were made from similar stone material. All fragments are fractured on both poll and bit ends, although 36h exhibits flake scars created by lateral blows. This specimen was refashioned into a cutting instrument and these blows may have been caused by that process. The fragmentation patterns of celts produced fractures occurring at either end, but located laterally at each edge. This pattern suggests the celts were end-hafted so that the axes of celt and shaft were parallel. Assembled, the mode of operation may have involved the use of large stones or

Fig. 31 Burnishing stones and utilized flakes. Burnishing stones: *a* very fine-grained, hard irregular surface; 980 BP. 10.10.7. *b* coarse and fine-grained surfaces – formal shape; ElSx 3; 1860–1200 BP. 2.7.1. *c* coarse and fine-grained surfaces – formal shape; 1470 BP. 10.12.76. Large Utilized Flakes: *d–h* unifacial basaltic flakes with possible evidence of localized use marks along lateral edges. No secondary retouch – occasional surface abrasions. 3400–1470 BP. *d* 9.1.11; *e* lev. 13 T. pit; *f* 10.13.34; *g* 9.3.16; *h* 10.11.156.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heavy timber to drive the celt into wood or bone, thus splitting it. The smaller ground celts received greater damage than the larger ground and polished forms particularly in the posterior areas.

Mussel Shell Adzes

A sharp, beveled bit end is the diagnostic feature of the parallel sided shell adze (Fig. 36i-k). The fragile nature of the shell is responsible for the lack of complete specimens. The size and shape of the adze may be a result of the form of the material, *Mytilus californianus.* Lateral edges are straight and rounded, except in 36k which has a beveled edge.

Bone Barb-points

Many sharpened bone points are grouped together due to similar morphology, tip patterns, and wear. These are considered to be elements of composite tools and are termed barb-points because they could perform as either points or barbs, or both. A description of each group follows.

Outcurving Barb-points

Outcurving barb-points (Fig. 37) possess a gently curving posterior point which is either blunt (h) or pointed (f and g). The form is due to the natural curvature of the bone, but is accentuated by posterior beveling and anterior thinning of the same face. Lateral edges are either parallel, in which case the shaft is narrow, or forward tapering, in which case the shaft is comparatively wide. The natural internal channel of the bone is always retained and seems to be essential to the assembling of the head. Severe percussion damage to the tip occurs in a single case (h), whereas slight percussion and abrasion are typical for the group as a whole. Two specimens exhibit midshaft polish.

Square-end Barb-points

The diagnostic feature of the square-end barb-points (Fig. 37, l-x) is the slightly tapering, square posterior end of the shaft, which is more finely shaped than other barb-points. The midshaft cross-section of these tools is rectangular and regular. The anterior portion features round, symmetrical shoulders with moderate tapering and a sharp tip. Wear patterns occur only at the anterior tip and consist of polish or abrasion. The posterior edges are frequently rounded but rarely beveled (r). Posterior thinning is common.

Posterior Beveled Barb-points

The lateral extent of the bevel distinguishes the beveled barb-point (Fig. 37y-ee) from the square end barb-point. Involving the entire posterior face of the shaft, the bevel begins at the wide mid-shaft and terminates posteriorly at a sharp edge. The reverse face remains straight, with occasional thinning. Lateral edge development is irregular. The anterior morphology consists of a sharp symmetrical point and moderately tapering shoulders. Wear patterns, limited to the anterior tip, include moderate percussion and abrasion. Specimen cc exhibits identical midshaft side notches.

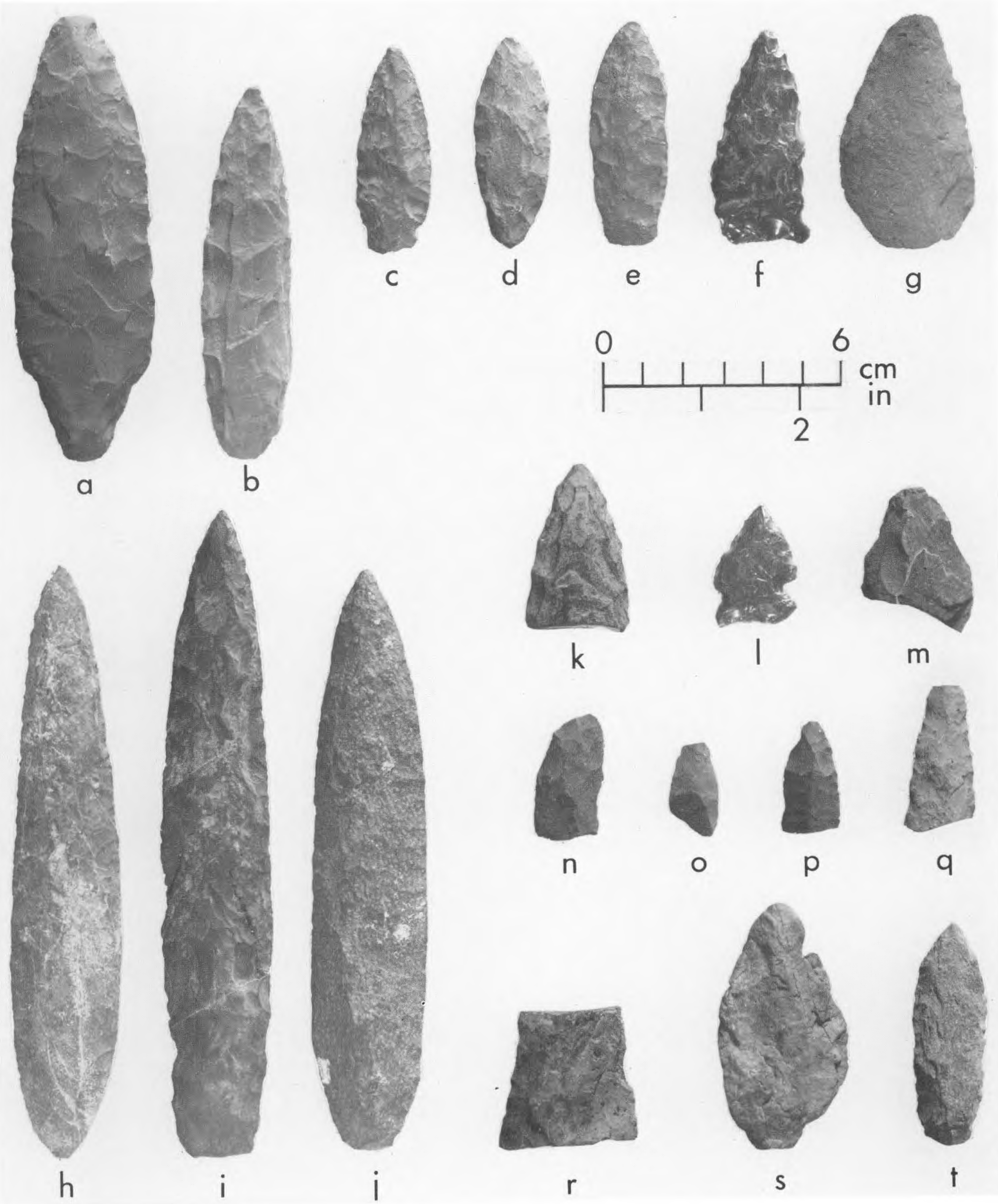
Simple Barb-points

Simple barb-points (Fig. 37ff-kk) are double-ended, short, symmetrical shafts. Tip form and wear patterns are identical thus it appears both ends were simultaneously functional. The midshaft cross-section is ovoid. Specimen ff exhibits a patterned surface stain and associated wear pattern suggesting the shaft was hafted in a fixed position about 45 degrees to its axis with a small portion of the anterior (?) tip exposed. Specimen kk shows similar but less conclusive evidence.

Wide Barb-points

Wide barb-points (Fig. 37a-e) are characterized by a wide, curvilinear midshaft and an irregularly thick cross-section. Little shaping is in evidence on the surface other than on the irregular, symmetrical tips. No percussion damage is present but limited resharpening has occurred.

Fig. 32 Stone projectile points (all bifacial). *a* slate, tanged base lanceolate point; extensive bifacial surface abrasion at tip; biconvex cross-section; 1880 1600 BP. 9.OA.3. *b* slate; round base lanceolate point; no evidence of wear; biconvex cross-section; 1840 BP. 9.0.12. *c* slate, side notched, straight base leaf-shaped point; slight tip abrasion, biconvex cross-section; 1840 BP. 10.14.1. *d* Basalt; constricted stem, leaf-shaped point no evidence of wear; biconvex cross-section; 980 BP. 10.10.10. *e* slate; square base leaf-shaped point; very sharp edge — no evidence of wear; biconvex cross-section; 2440 BP. 9.3.1. *f* obsidian; corner-notched point; fragmented base— no evidence of wear; biconvex cross-section; 1470 BP. 10.11.98. *g* vitreous; (base missing) leaf-shaped point; biconvex cross-section; 2440 BP. 9.3.35. *h* slate constricted base lanceolate point; no evidence of wear; rhombic cross-section; 4000—3000 BP. 4.H.8. *i* slate; square base lanceolate point; no evidence of wear rhombic cross-section; 4—3000 BP (?). 4.H.20. *j* basalt; constricted base lanceolate point no evidence of wear; rhombic cross-section; 4—3000 BP (?). 4.H.5. *k* slate; base missing(?); biconvex cross-section; 2880—1840 BP. 10.16A.1. *l* obsidian; side notched point, concave base; no evidence of wear; biconvex cross-section; date unknown. 10.1.2. *m* basalt; leaf shaped point (base missing); tip battered; biconvex cross-section; 2880—2440 BP. 9.4.3. *n* material unidentified; asymmetric point fragment; 7800 BP. 9.10.141. *o* material unidentified; leaf shaped point fragment; biconvex cross-section; 2440 BP. 9.3.29. *p* basalt; parallel sided point (base missing); rhombic cross-section; no evidence of wear; 9140—7800 BP. 9.10.138. *q* material unidentified; base and tip missing; rhombic cross-section; 7800 BP. 9.10.19. *r* slate; base and tip missing; rhombic cross-section; heavy localized edge battering; 7800—4540 BP. 3.12.4. *s* cryptocrystalline; crude-leaf-shaped point; no evidence of wear; rhombic cross-section; 7800—4540 BP. 4.0.18. *t* basalt; crude leaf-shaped point, slight edge abrasion on shoulders; roughly rhombic cross-section; 7800—4540 BP. 5.12.2.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Bone Awls

Bone awls (Fig. 38) are one of the most frequent hand tools in the collection. On the basis of wear patterns they must have served a wide variety of functions.These could include sewing, perforating, enlarging holes, cutting cedar bark, and preparing food. Despite the need for specific tip forms the bone awl is functionally simple. The most common source for these tools was the simple long bone shaft or splinter, which was then sharpened. Another common bone, the ulna, easily lent itself to certain tasks. A grouping of these tools according to form, tip type, and wear patterning reveals some correlation between form and function.

Wide Back Awls

Wide back awls (Fig. 38a-c) are flat and posteriorly broad. The tapering lateral edges have been use-rounded and abraded near the tip. The posterior end is rounded and polished by hand use. The posterior portion of c possesses abrasions suggesting that both ends were functionally significant. There was no evidence of hafting.

Ulna Awls

Ulna awls, made typically from deer ulnæ, are common artifacts in the collection. They occur in a variety of shapes depending upon the original bone form and the degree of resharpening. Tips are broad in the larger ulnæ, while the smaller variety (38d-f) are narrow and sharp. The natural shape of the original ulna in f and g has been severely altered, with the former receiving an unusual amount of surface polish. Hand use-polish occurs frequently at the posterior end and around the high articulatory surfaces and ridges. A single specimen (g) exhibits bifacial engraved surface decoration.

Square End Awls

Square end awls (Fig. 38j-o) are constructed from simple bone shafts and splinters. They are characterized by a sharp symmetrical tip and shoulder and a square and often beveled posterior end. Tips possess long slender tapering shoulders, with wear patterns suggesting use in perforation. Hand use-polish is neither extensive nor frequent.

Simple Awls

Simple awls are made (Fig. 38p-t) from slender bone shafts or simple bone splinters. Except for rudimentary shaping of rough edges along the shaft, the only modified portion of the tool is the symmetrical sharp tip. A limited amount of hand use-polish is present on the other end but this is not developed as a pattern. Specimens r and t display more extensive tip and shoulder polish, with the lateral edge of the latter exhibiting what appear to be remnants of barbs.

Fishhook Barb-points

Fishhook barb-points (Fig. 39a-f) are short, cylindrical bone shafts with very sharp tips and square blunt ends. The entire surface is modified, and in specimens c and d a single deep transverse notch appears near the rear end, which has been cut and ground. We infer that these tools were fishhook elements from historic photographs and descriptions of composite hooks. These specimens were fixed into a curved bone or wooden hook shaft.

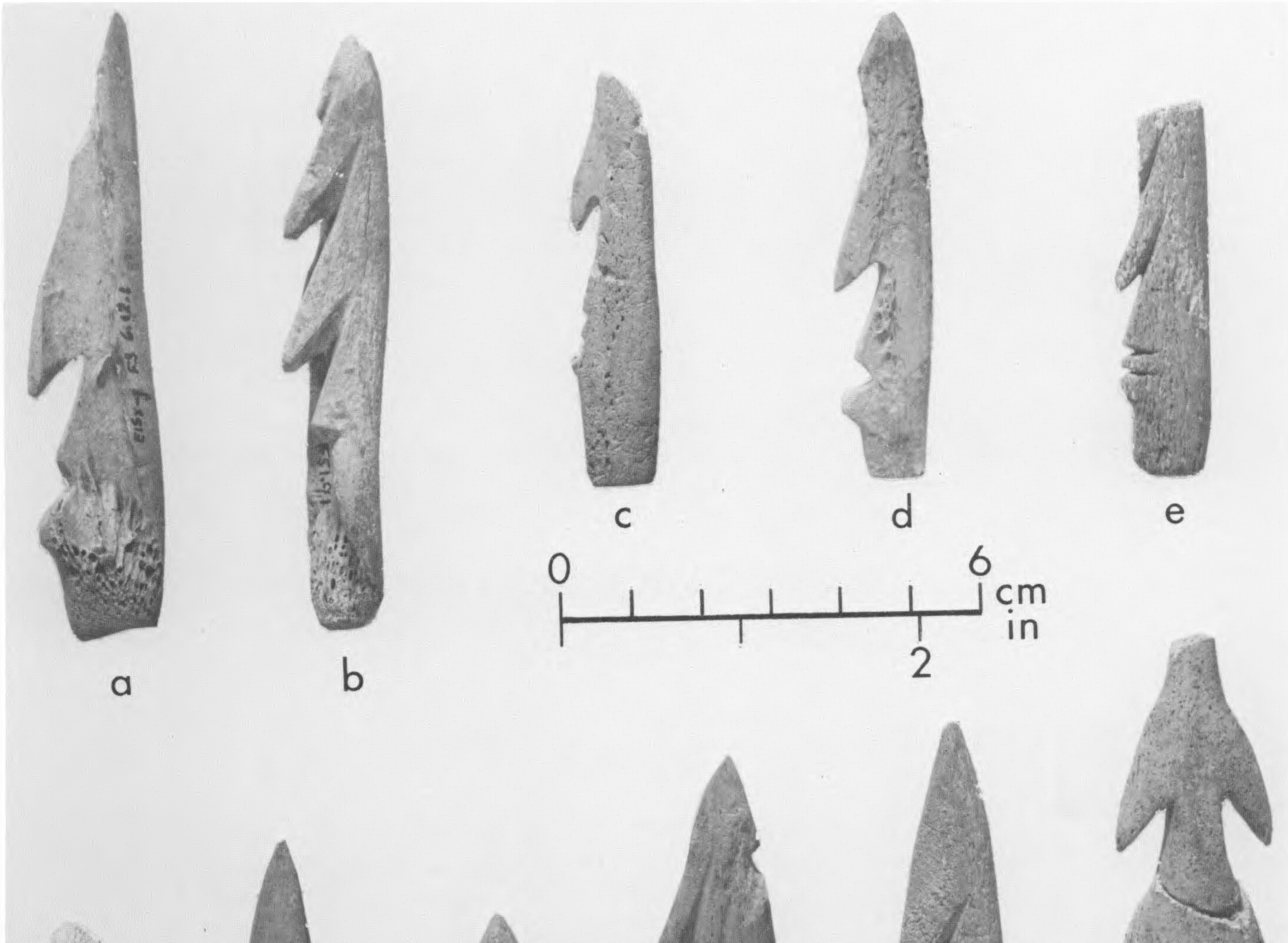
Double Ended Barb-points

A large quantity of double ended barb-points was recovered from Namu (Fig. 39g-v). Their cross-sections range from square or rectangular (o and t) through ovoid (n) to irregular (g). Where complete specimens were found, tips are identical at both ends. They have sharp, asymmetrically tapering shoulders, and are usually thin. Artifacts g, k, and o exhibit dark patterned surface staining at the midshaft or at one end which appears to be a resinous material. Probably these barb-points served a wide variety of purposes.

Other Artifacts

Not illustrated is a large collection of beach cobbles exhibiting localized battering. These range from 8 cm in diameter to about 15 cm. Irregular forms were frequent. Two such stone fragments (mauls) were formally shaped into long cylindrical forms and exhibited bipolar battering and abrasion, on their comparatively flat, pointed ends. Four fragments of fine needles with eyes were uncovered.

Fig. 33 Fixed bone points *a* posterior unilaterally barbed fragment; unilateral line attachment guide; 4540–3400 BP. 6.12.1. *b* complete; unilaterally barbed point; severe anterior tip damage; unilateral line attachment guide; 3400–2800 BP. 1.9.1. *c* posterior; unilaterally barbed fragment; unilateral line attachment guides; finely finished surfaces; 3400–2800 BP. 4.0.8. *d* complete; unilaterally barbed point; unilateral line attachment guide; moderate percussion damage to anterior tip; 3400 BP(?). 4.0.9. *e* posterior; unilaterally barbed fragment; unilateral line attachment guides; finely finished surfaces; 3400-2800 BP. 1.9.1. *f* posterior; unilaterally barbed fragment; sea mammal bone unilateral line attachment guide; severe surface deterioration; 3400–2810 BP. 3.11.2. *g* anterior; unilaterally barbed fragment; bilateral edge polish; 3400 BP. 4.0.14. *h* complete; unilaterally barbed point; severe surface deterioration; unilateral line attachment guides; 2810 BP. 2.8.7. *i* complete; unilaterally barbed point; unilateral line attachment guides; finely finished surfaces; 2880 1880 BP. 5.6.1. *j* identical to specimen *(i)* above. 3.13.1. *k* posterior; bilaterally symmetric barbs; finely finished surfaces; bilateral polish patterns on barbs define direction of use; localized transverse polish marks ahead of posterior forward-pointing barbs suggest line attachment position; biconvex or ovoid cross section; 4500–3400 BP. 4.0.32.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A small manibular fragment of bighorn sheep bearing a single molar was recovered, with cusps filed to a single sharp point. In addition, two or three curved bone fishhooks were found with single barbs at the anterior tips. Finally, a finely polished flat bone fragment with a series of randomly located holes documents the use of a drill.

Figure 40 presents artifacts uncovered from burial FS 4.H (excluding a possible clamshell pendant too fragile to restore). No evidence of use was observed on these tools. On the basis of the overall configuration of the assemblage these tools were designed for marine hunting. Lateral edges of a are thin but rounded as is the pointed tip. The natural bone channel is deeply carved at the posterior end. Natural bone surfaces are intact on the ventral face, except at the posterior end, which is an altered articulatory surface. Specimens e and f are identical in form and presumably in function. Lanceolate points g-i are thought to be projectile points used either in a composite association with a harpoon head or in a single fixed haft. It is possible that these blades could have been used as hafted knives. Specimens j and k, which are located with a large concentration of ochre and a shell pendant, each exhibit an incised line on the concave and convex faces. In ethnographic accounts (Davis 1949: Plates 129 and 130; Miles 1963. Plates 10:18 and 10:19) these are gaming pieces. The bone projectile point (1) is the weapon extracted from the spinal column of burial FS 4.H.1. It shows staining indicative of hafting.

The inclusion of this assemblage of artifacts with the deceased male reflects its role as a tool inventory required for a hunt. For example, 40a could have been attached to a shaft either as a single or composite element, to be used as a killing implement. The two ivory harpoon heads were probably hafted singly with a line attachment. The three remaining bone implements would appear to be blades, again hafted.

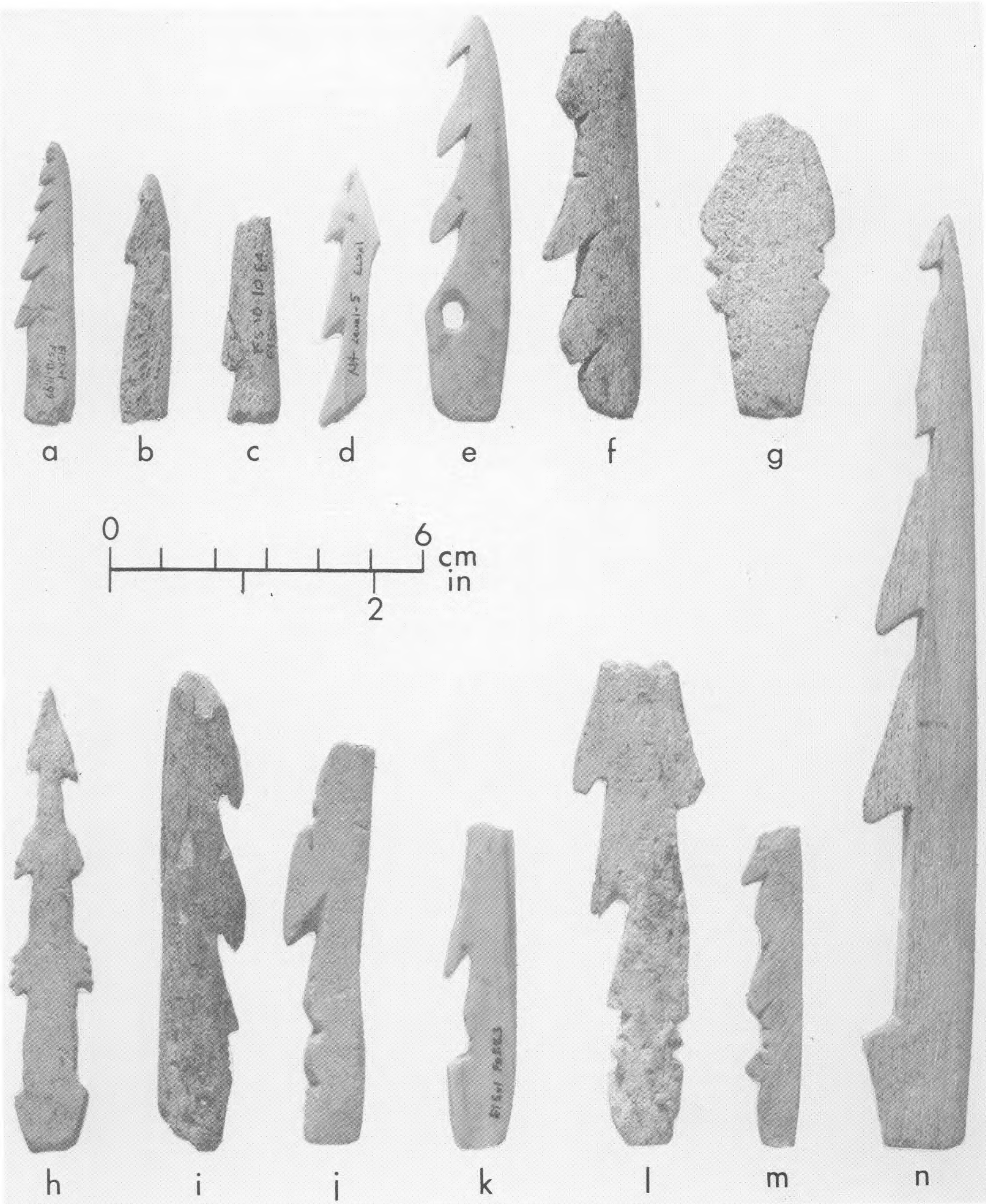
It is difficult to classify objects as ornaments without knowing how they were used. For purposes of this examination, we will use the term 'ornamental" to emphasize the biases on the part of the investigator. From this point of view, very few ornamental objects were recovered. At least one disk bead, two pendants (41a) and several fragments were made of jet. Specimen 41b which is made from highly polished flat bone may also have been a part of a pendant or a pinhead. It closely resembles a duck with its upper bill missing.

A large number of artifacts could not be classified due to their unique form. Still fewer were selected for illustration (Fig. 42). The tip of the grizzly bear rib, g, is wide and flatly pointed, smooth, and sharp. The posterior articulatory surfaces have been reduced and exhibit considerable hand use-polish. Specimen f is uniformly thick through its length, except at the base where initial thinning is suggested. In side view the tool is slightly curvilinear. Specimens i and j represent bone artifact "blanks" or "pre forms'. In particular, specimen j involves three of a total of 10 such blanks recovered together accompanied by a group of small cobbles. One of these coarse grained stones was fractured to form a thin rhombic cross-section. The 'blanks" were cut out of the sea mammal long bone section with this tool. Reassembled, a set of five of these blanks constituted a section of halved long bone.

CONCLUSIONS

The distribution of each class of artifacts was plotted along a linear scale graduated in units of 600 years. Figure 43 presents the results of this operation from all three site collections. Terminal settlement at Namu and at Kisameet Bay is assumed to have been around 200 BP, and at Roscoe Inlet at 1500 BP, although the date of 2140 BP comes from very near the surface of the deposits. Where an uncertain date is assigned to termination or initiation of a class, a question mark accompanies the plot. Class totals appearing above each sequence may exceed artifacts actually

Fig. 34 Fixed bone points. *a* anterior, unilateral barbs; no surface polish, slight tip use-rounding; 1470 BP. 10.11.99. *b* anterior, unilateral barbs; no surface polish, moderate tip damage; rectangular cross-sections; 2880—2440 BP. 8.6.1. *c* midshaft fragment; unilateral barbs slight surface polish; ovoid cross-sections; 980 BP. 10.10.64. *d* anterior, unilateral barbs (?); extensive surface polish; 2880 BP—present. 1968 lev. 5. *e* complete detachable head; unilateral barbs; slight bilateral edge use polish; date unknown. 10.0.6. *f* midshaft fragment; unilateral barbs; sea mammal bone; biconvex, rectangular cross-section; 1470 BP. 10.12.2. *g* posterior fragment; bilateral, asymmetric barbs; bilateral line attachment guides; flat rectangular cross-section; sea mammal bone; date unknown. 11.0.4. *h* complete bilaterally symmetric head; serrated barb edges; moderate surface deterioration; 1470 BP. 10.11.97. *i* posterior, unilaterally barbed fragment; FbSx 6; unilateral line attachment guides; extensive surface polish despite exfoliated state; 2140 BP. 1.3. *j* posterior, unilaterally barbed fragment; unilateral line attachment guides; moderate surface deterioration; 1840 BP. 10.14.24. *k* posterior, unilaterally barbed fragment unilateral line attachment guides; extensive surface polish; 1880 BP. 5.4.3. *l* posterior, bilaterally asymmetric barbs; bilateral line attachment guides; sea mammal bone; flat, rectangular cross-section; moderate surface deterioration; 2800—1840 BP. 10.16.4. *m* posterior, unilaterally barbed fragment cross-hatched bifacial surface incisions; unilateral line attachment guides; 1470 BP. 10.11.100. *n* complete, unilaterally barbed head; sea mammal bone (?); barbs emerge from squared, flat edge and exhibit use polish on leading edges no use-pattern evidence suggests method of hafting or attachment; all surfaces moderately polished; 1470 BP. 10.11.2.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illustrated. This occurs because several artifacts were recovered without provenience data. In addition, class membership in "Double-ended Barb Points" and "Fixed Barb Points" was too large to plot each specimen.

A major assumption underlying our interpretation of artifact distribution is that functional roles of these classes indicate economic exploitation patterns of the settlements. The micro-environment involved in each instance is identified through constituents from each stratum, including both artifactual and non-artifactual material. It is proposed from such considerations that significant shifts in the exploitation patterns will be reflected in these data. Finally, when the mode of subsistence – which is an expression of the interaction of tools and environment at a specific locale– changes in character, so too does the economic structure of the community.

Three major trends are seen in Figure 43. The first involves a brief but specialized lithic industry emerging early in the Namu sequence. The second trend, with a sparse but functionally diverse inventory, began approxi-

Fig. 35 Bone projectile head elements. Single element projectile points. *a* bifacially ground; posterior portion missing; thin ovoid cross-section; 1470–980 BP. 12.9–11.10. *b* bifacially ground, parallel stem; biconcave cross-section; date unknown. 10.0.18. Toggle valves: *c* outcurving posterior; extensive surface deterioration; antler; date unknown. 10.0.30. *d* outcurving posterior (terminus missing); 480 BP –present. 10.2.7. Composite Projectile Point Heads: *e* anterior fragment with severe tip use damage; ElSx 3; date unknown. 1.0.2. *f* anterior fragment with slight tip use damage; 2440–1840 BP. 10.16.6. *g* complete element with extensive anterior tip use damage and surface deterioration; posterior terminus slightly beveled; 480 BP. 10.5.8. *h* complete element; posterior terminus completely beveled; ElSx 3; 1000 BP–present. 1.4.4. *i* complete element with extensive anterior shoulder polish; posterior terminus thin and tapered.; 480 BP. 10.4. *j* complete element; posterior terminus tapered and beveled; ElSx 3; date unknown. 0.0.2. *k* complete element; considerable medial constriction with thin posterior terminus; ElSx 3; 1860–1000 BP. 2.7.2. *l* complete element; blunt posterior terminus with no medial constriction; ElSx 3; 1860 BP–present. 1.5.3. *m* complete element before wear and retouch has reduced length; anterior tip very sharp and shoulder polished; ElSx 3; date unknown. 1.0.6.

Fig. 36 Wedges, celts, and adzes. Bone wedges: *a* sea mammal bone; abraded and blunted anterior edge; posterior missing; tapered with rough rectangular cross-section; 1640–1470 BP. 12.12–14.67. *b* sea mammal bone; very slight anterior end use-damaged; plano-convex cross-section; polished surfaces; approx. 4540–3400 BP. 5.10.2. *c* land mammal bone; severe anterior tip use damaged, posterior missing; ovoid cross-section; 1840 BP. 10.15.18. Ground and Polished Celts: *d* dark green material unidentified; all surfaces finely smoothed and polished; posterior end flat; biconvex rectangular cross-section; Approx. 4280 BP. 1.8.1. *e* dark green material unidentified; natural indentation present all surfaces polished; biconvex, rectangular cross-section; 4540–3400 BP. 2.13.1. Ground celts: *f* light green, fine-grained material unidentified; severe anterior/posterior damage (source undetermined); no polish present; ovoid cross-section; date unknown. 10.0.5. *g* light green, fine-grained material unidentified; severe use (?) damage to anterior edge; posterior end square and flat; roughly biconvex rectangular cross-section; 680 BP–present. 10.6.3. *h* light green, fine-grained material unidentified; severe damage to all surfaces and edges retouched anterior and lateral edges suggest reuse as knife – limited original ground surfaces intact; date unknown. 10.1.28. Mussel shell adzes: *i* fire tempered (charred); complete anterior edge beveled, single lateral edge remnant and posterior terminus intact 1470 BP. 10.11.196. *j* external anterior surface beveled; bilateral edges square in section view, posterior missing. 1470 BP. 10.11.193. *k* anterior edge and single lateral edge beveled; 1840–1470 BP. 10.13.69.

Fig. 37 Bone Barb-points. Wide barb-points: *a* date unknown. 12.0.4. *b* 2360–1860 BP; ElSx 3. 11.12.4. *c* 2360–1860 BP. 2.12.2. *d* 1840–1470 BP. 10.12.4. *e* 1840–1470 BP. 10.12.7. *f* 1470 BP. 12.9–11.6. *g* 1840–1470 BP. 10.13.25. *h* 1840–1470 BP. 10.14.26. *i* date unknown. 10.0.13. *j* 680 BP. 10.8.11. *k* 2360–1860; ElSx 3. 2.11.5. Square end barb-points: *l* 680 BP. 10.8. *m* 1470 BP. 10.11.27. *n* 1840–1470 BP. 12.12–14.23. *o* 2310–1860 BP; ElSx 3. 1.11.1. *p* 680 BP. 10.8.7. *q* 4300–3200 BP; ElSx 3. 2.15.1. *r* 1840–1470 BP. 10.13.21. *s* 2140 BP; FbSx 6. 1.3.3. *t* 1840–1470 BP. 12.12–14.20. *u* 1470–980 BP. 10.10.31. *v* 1840BP. 10.15.7. *w* 980 BP. 10.10.41. *x* 1840 BP. 10.14.42. Posterior Beveled Barb-points: *y* 2880 BP. 2.7.1. *z* 200 BP. 10.1.34. *aa* 200 BP. 10.1.35. *bb* 980 BP. 10.10.36. *cc* date unknown. 10.0.42. *dd* 2360 BP; ElSx 3. 2.16.2. *ee* 3400 BP. 1968 lev. 13 #5. Simple barb-points: *ff* 1840 BP. 12.12–14.31. *gg* 1470 BP. 10.12.23. *hh* 1240–1470 BP. 10.12–14.27. *ii* 1470 BP. 10.11.7. *jj* date unknown, 10.0.17. *kk* 1470 BP. 10.12.18.

Fig. 38 Bone awls. Wide back awls: *a–c* anterior tips slightly use polished and abraded; posterior edges each square to slightly convex; some evidence of lateral shoulder use polish; 2880–480 BP. *a* 10.7.4, *b* 10.11.68, *c* 1968 lev. 14, # 3. Ulna awls: *d Procyon lotor* ulna; extensive tip and shoulder polish; 980–680 BP. 10.9.6. *e* species unidentified; moderate tip use damage; shaft cross-section circular; ElSx 3; 1860–1200 BP. 2.7.4. *f* species unidentifiable; extensive polish to all surfaces; extremely sharp tip; date unknown. 10.0.3. *g* cervid ulna; blunt, use rounded tip; geometric surface incisions to both faces; date unknown. 4.0.1. *h* cervid ulna; sharp, broad tip; 2880–1880 BP. 1968 lev. 13 #1. *i* cervid ulna; extensive alteration to all original surfaces; sharp, thin shaft and tip; date unknown. 0.0. Square end awls: *j–o* sharp to slightly use rounded tips, moderate mid-shaft shaping, posterior terminus square and often beveled; 2880 BP–present. *j* 12.8.6; *k* level 6 # 2; *l* 10.9.11; *m* lev. 3 # 5; *n* 10.12; *o* 10.15.9. Simple awls/gouges: *p–t* sharp to slightly use rounded tips, slight mid-shaft shaping and very limited posterior alteration; specimen *(r)* and *(t)* from ElSx 3; 3400 BP–present. *p* 10.12.12; *q* 11.0.14; *r* 2.7.3; *s* 4.k.3; *t* 1.2.16.

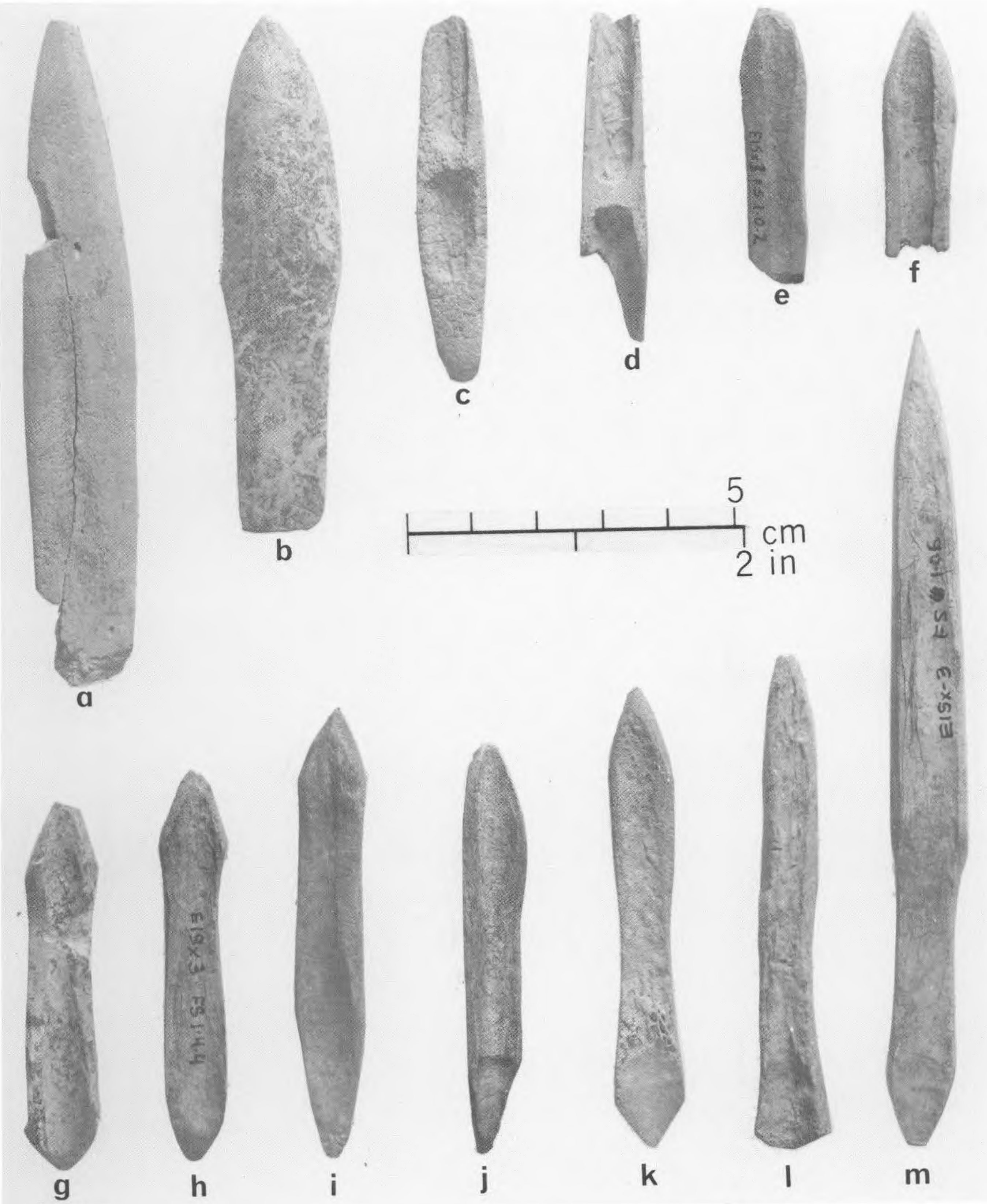
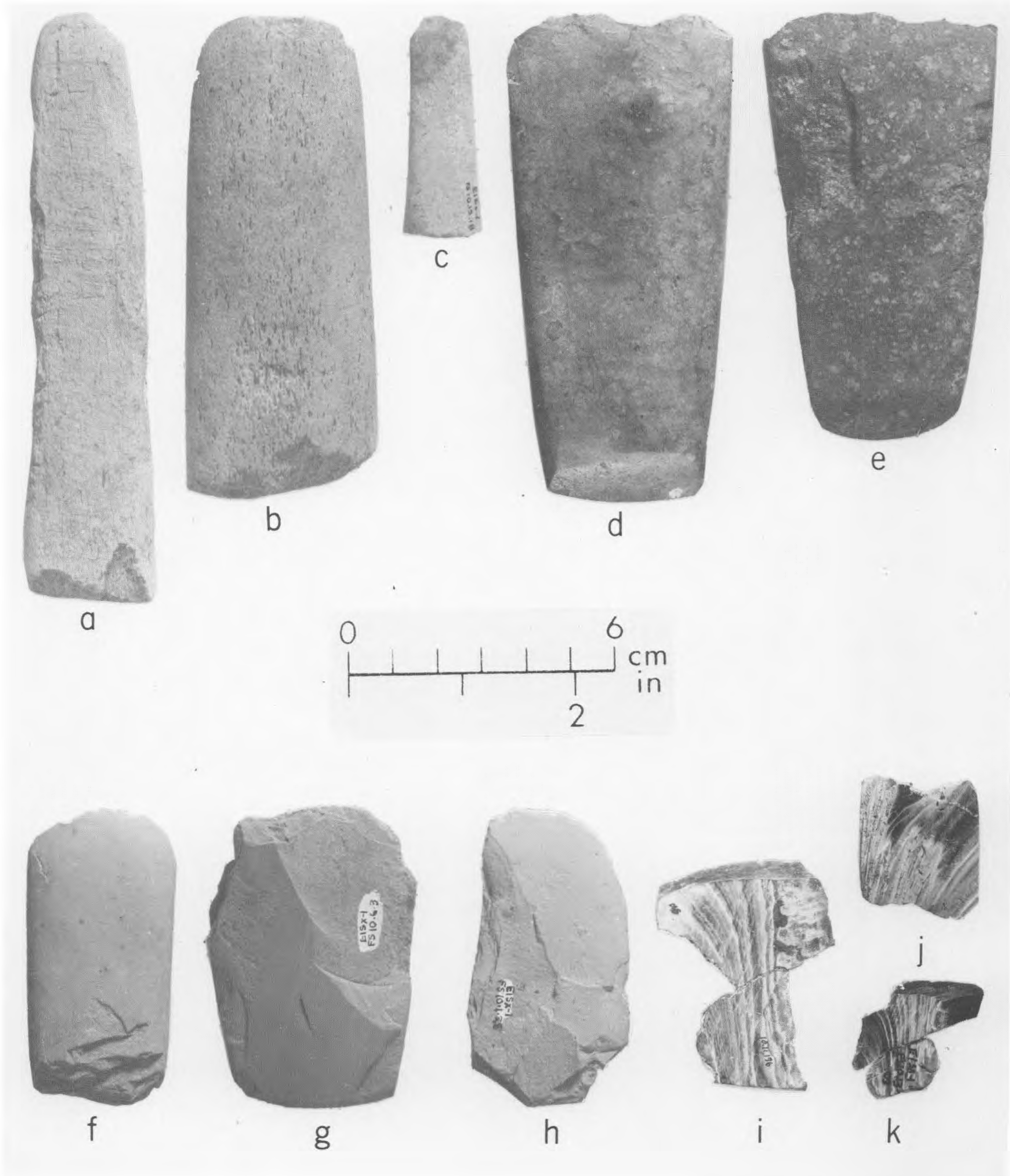


Fig. 35



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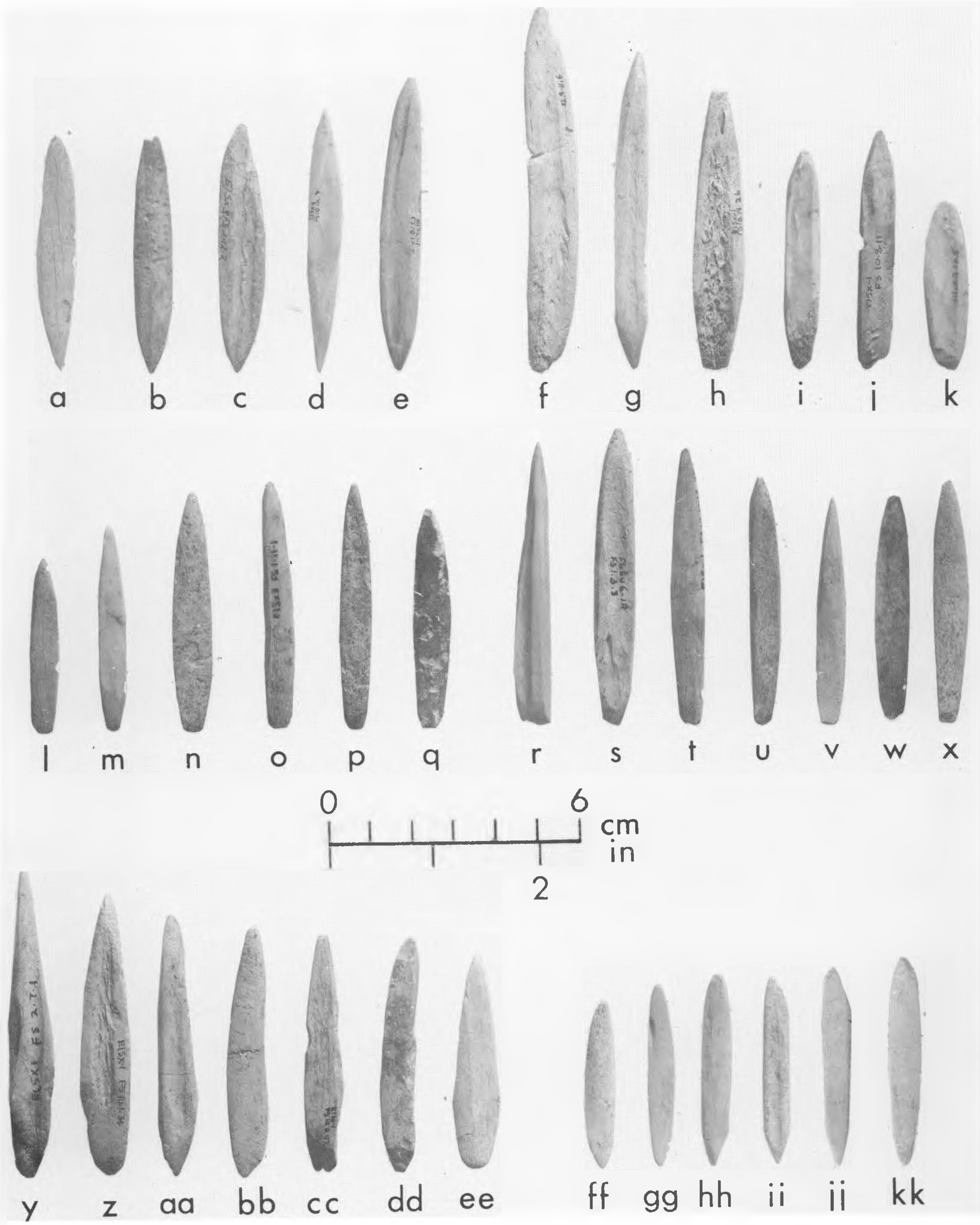
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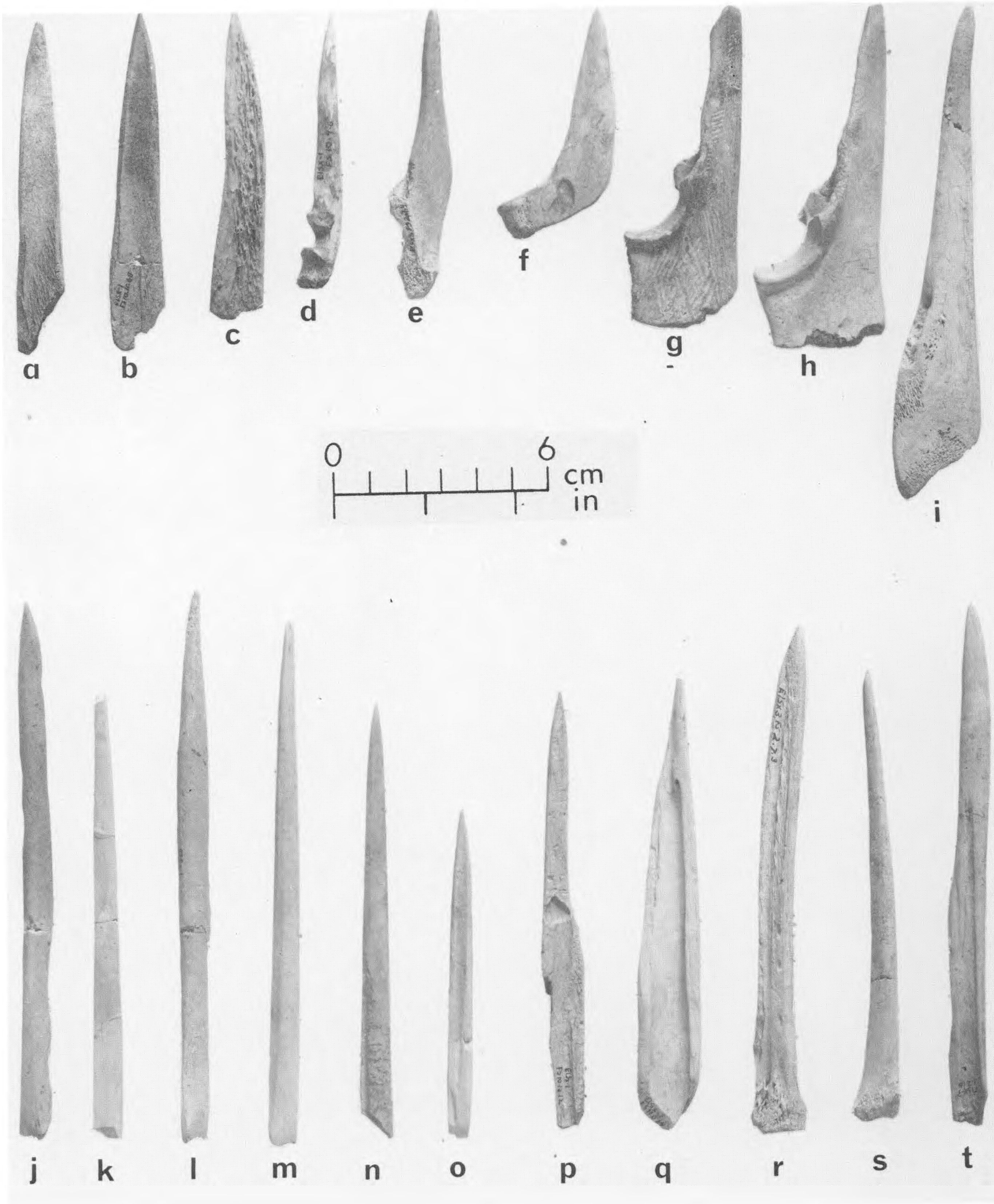

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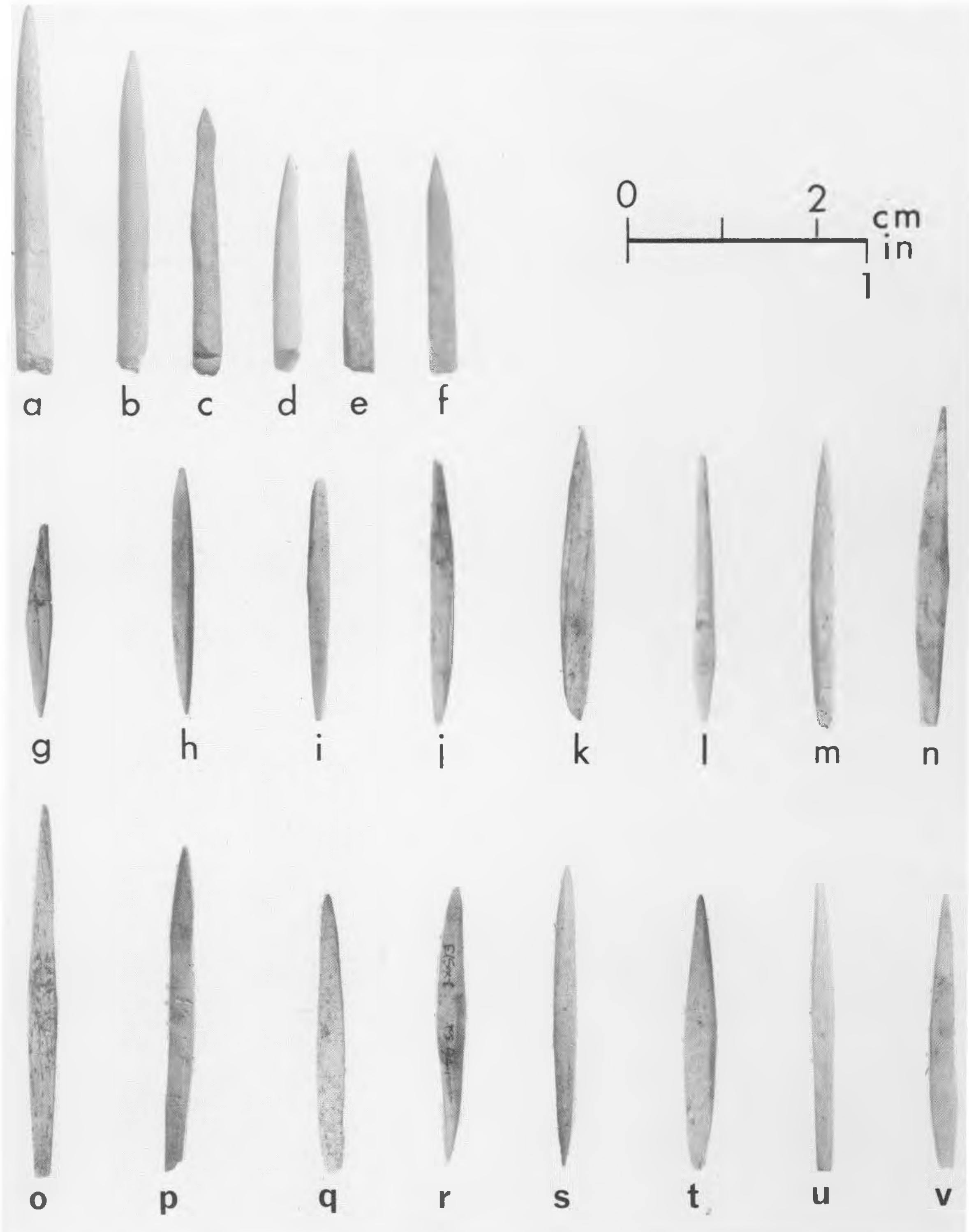


Fig. 39 Bone barb-points. Fishhook barb-points: *a–f* moderately tapering anterior tips with slight tip abrasion; posterior end (present in all but one case) square and in two cases, *(c)* and *(d)*, a deep transverse notch is present; 2440–1470 BP. *a* 10.11.46; *b* 10.19.63; *c* 10.11.49; *d* 10.11.57; *e* 10.14.57; *f* 10.11.56. Double ended barb-points: *g–v* identically shaped tips with limited medial shaping. Use damage rarely occurs to both ends and is not related to percussion blows. Specimen *(g)* exhibits patterned staining to single end; specimens *(j)*, *(k)*, and *(o)* exhibit midshaft patterned staining each suggestive of hafting or line attachment practices. Cross-section varies from circular to square; 2800–980 BP. *g* 10.10.38; *h* 10.11.39; *i* 10.14.62; *j* 10.10.39; *k* 10.11.66; *l* 10.12.4; *m* 10.15.16; *n* 12.12–14.13; *o* 10.10.26; *p* 10.11.111; *q* 10.13.1; *r* 9.4.1; *s* 10.10.49; *t* 10.10.37; *u* 10.13.78; *v* 12.12–15.5.

mately 4540 BP and dominated the picture until nearly 3000 BP. This trend is seen as a diversification of the functional attributes of equipment as well as an increase in numerical size of the inventory. In a real sense, new tools appear to have been added to an existing range without removal or substitution. Membership grew until a climax was reached 1470 years ago. Not until about 1000 BP did this second trend collapse with a decline in number and function of the tools. A third site-wide trend took the settlement to European contact.

From Figure 43, it can be seen that earliest at Namu is a lithic industry composed of obsidian microblades, crude bifacial projectile points, large cores and core flakes, and possibly large pebble choppers. Recovered with these tools was a small amount of basaltic and obsidian debitage. The assemblage is confined to the shell-less matrix in the rear of the site below the unit designated FSC 9.5 (see Fig. 5) and is assigned to the 9140-7800 BP time period. It is expected however, that future dating could reveal that the microblade tradition lasted until 6000-5000 years ago. This inference is based on the fact that the 7800 BP date marks the midpoint of the deposit.

Absence of bone tools in the earliest period is not a result of differential preservation. Nonartifactual bone material was recovered from the black matrix in context with the microblades. Can we then assume that the first occupation phase at Namu did not include a bone industry? Our answer is based on limited evidence. Internal stratigraphy was not present in the black matrix. The distribution of microblades did not indicate a vertical or horizontal pattern in their occurrence. Site utilization patterns hence are not reconstructed for this time period. All we know for sure is that bone tools are not a part of the habitation record we excavated.

The abrupt appearance of a bone tool industry, featuring well-developed barbed harpoons, coincides with deposition of the shell-bearing layers dated 4540 BP. One harpoon (see Fig. 33k) from the uppermost zone of the black matrix is responsible for the question mark in that tool class in Figure 43. Ulna and wide back awls, burnishing stones, and ground and polished stone celts also are a part of the complex accompanied by obsidian gravers, scrapers, and developed flakes. About 3400 BP, this tool assemblage expanded to include greater quantities of tools, some with new functional characteristics. The existing inventory seems to have undergone little alteration. It is interesting to note that for the time period between 4540 and 3400 BP, no stone projectile points were recovered.

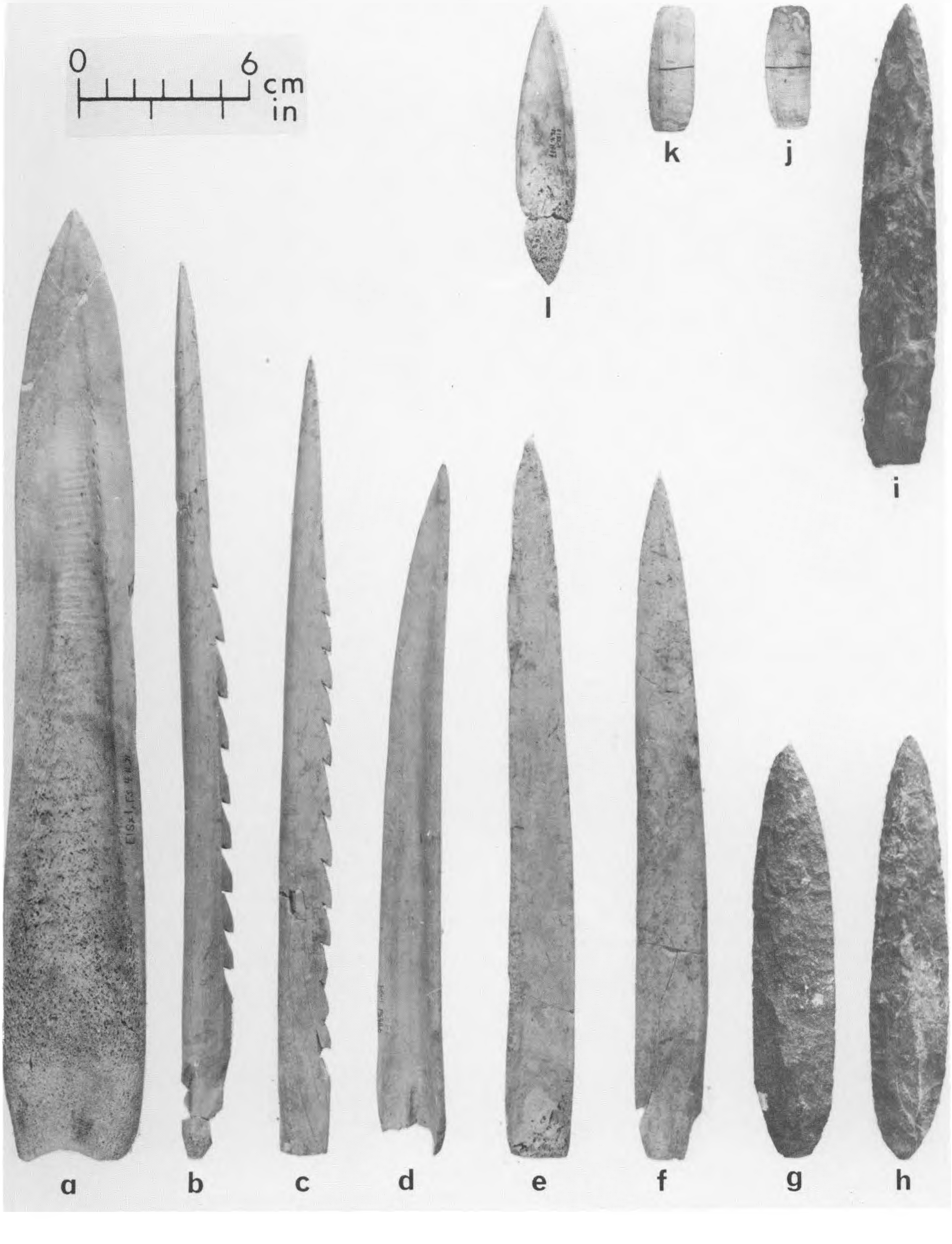
The tool inventory began to expand between 3000 and 2880 BP, with the proliferation of several types of barbed points, hunting and fishing equipment. Manufacturing tools, such as bone wedges and celts, accompanied this expansion. Large choppers, crude projectile points, lanceolate projectile points, and microblades declined or disappeared altogether. Yet addition rather than subtraction of tools forms the trend, such that by 1880 BP the inventory began to climax with a full array of both simple and complex tool forms, a wide variety of fishing gear, including hooks, spear points, and several specialized harpoon types. Tools used in wood working (i.e., celts, wedges, shell adzes) or in making other tools (burnishing stones) also increased. By 1470 BP this trend was in full bloom featuring every tool class present during the settlement's history, except certain microliths.

After 1470 BP, almost all specialized tools disappeared. Ground celts, leaf-shaped stone projectile points, some hand awls and a few barb-point types continued but declined towards the end of that period of habitation. At approximately 1750 A.D. the site's terminal occupation is seen to include only a limited tool inventory of a very generalized nature. Close similarities in the inventories exist between the final occupation at Namu and ElSx 3 in Kisameet Bay.

We have some concluding reservations regarding the temporal arrangements of these form-function classes. Their distribution in time is determined by the radiocarbon dates assigned to the stratigraphic unit from which they were recovered. The accuracy of this assignment and the integrity of the dates themselves influence our inferences. Such chronological confusion does exist in the "Front Trench". Of the three carbon samples, 12 (980 BP), 13 (1840 BP), and 14 (1470 BP), number 14 would appear inaccurate and erroneous in light of the chronological consistency maintained by samples 10-12. However, we also conclude that long periods of time do not exist between one stratigraphic unit and the next. Since there is no stratigraphic evidence of a hiatus between samples 12 and 13, the latter date (1840 BP) seems questionable.

During excavation of FS 10, the strata from which

Fig. 40 Artifacts associated with burial FS 4.H. *a* Bone projectile head (composite?); no evidence of wear — heavy tip polish and extensive alteration to posterior base, no evidence to suggest hafting. *b–c* walrus ivory harpoon heads; string attachment grooves present in specimen *(b)*; no evidence of wear or use damage. *d* bone spear point (?) thick cross-section; extensive surface polish. *e–f* bone spear points or knives; thin cross-section with extensive surface alteration; identical patterned stains to basal portions suggest fixed hafts; anterior edges sharp. *g–i* stone lanceolate points (see Plate 8); rhomboid cross-section. *j–k* ivory gaming pieces (?); single transverse incision appears on concave and convex faces of *(j)* and *(k)* respectively. *l* bone projectile point (murder weapon); penetration of vertebral column created differential staining at anterior shoulders. Transverse patterned stain at posterior shoulder suggests fixed haft. Overlying stratigraphic units were missing — adjacent units produces a time range of 3400—2880 BP. This burial is being assigned to that range.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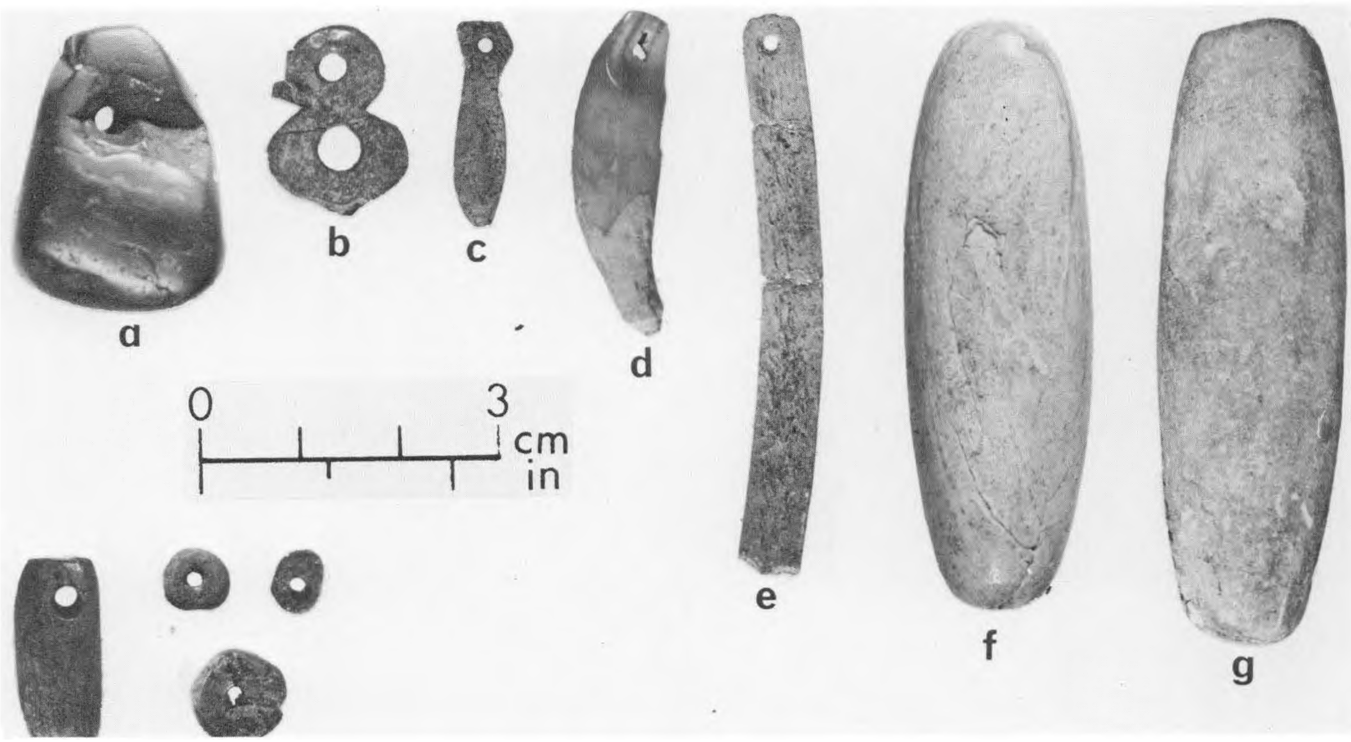

Fig. 41 Miscellaneous ornaments. *a* drilled pendant; jet; 680 BP. *b* duck (?) pin head; bone; 680 BP. *c* fish pendant (salmon); bone; 1470–980 BP. 10.10.16. *d* pendant; canine *(Canis);* 1840 BP. 10.15.21. *e* bone pendant (?) 1470 BP. 10.11.85. *f* ivory "plug"; heavily polished, ovoid cross-section; 3400–1880 BP. 4.0.3. *g* stone "plug"; not polished, ovoid cross-section; 3400–1880 BP. 4.6.12. *h* amber beads; cylindrical and disk chaped; recent. 11.OA.

radiocarbon samples 12 and 13 came were excavated as a single unit, although two natural strata later were discerned. Hence, the artifacts recovered could be assigned to either time period. The question is therefore which of the two dates indicates the age of the tool assemblage. The excavators distinguished a vertical clustering of tools within FS 10.10, enabling some clarification of the actual associations during laboratory analysis. Yet a clear separation of the two layers' contents has not been possible.

To rectify the discrepancy between samples 13 and 14 without recourse to further dating, I have accepted the possibility that an inversion between the samples has taken place. Correcting this sequence so that FSC 10.10 dates 1470 BP and FSC 10.12 (Sample 14) dates 1840 BP, in retrospect more closely agrees with our observations of the midden morphology. Obviously, uncertainty remains between FSC 10.9/FSC 10.10 association despite the correction.

In summary, two major components were identified at Namu: 1) a microlithic component exhibiting no evidence of a bone tool industry despite an inference based on functional grounds that one should be present, and 2) a bone tool industry adapted to a specialized form of maritime exploitation. A marked difference is seen between these two components in their morphology, associated faunal remains, and artifacts. The nature of the first habitation, which features microblades, is not clear but extensive site utilization is not presently indicated, nor does the tool assemblage indicate a pattern of marine exploitation. The second major component features a tool assemblage emphasizing over the past 4500 years a heavy reliance upon shellfish, fish and marine mammals, as well as a wide variety of land mammals. The mode of subsistence at Namu during this period exhibits a proliferation of marine adapted tools climaxing between 1880 and 1470 years ago, when the mode shifts away from intensive utilization. After 1470 there was a shift from a proliferated tool inventory to an obliquiated one. This suggests a change in the economic activities of Namu and hence subsistence intensity.

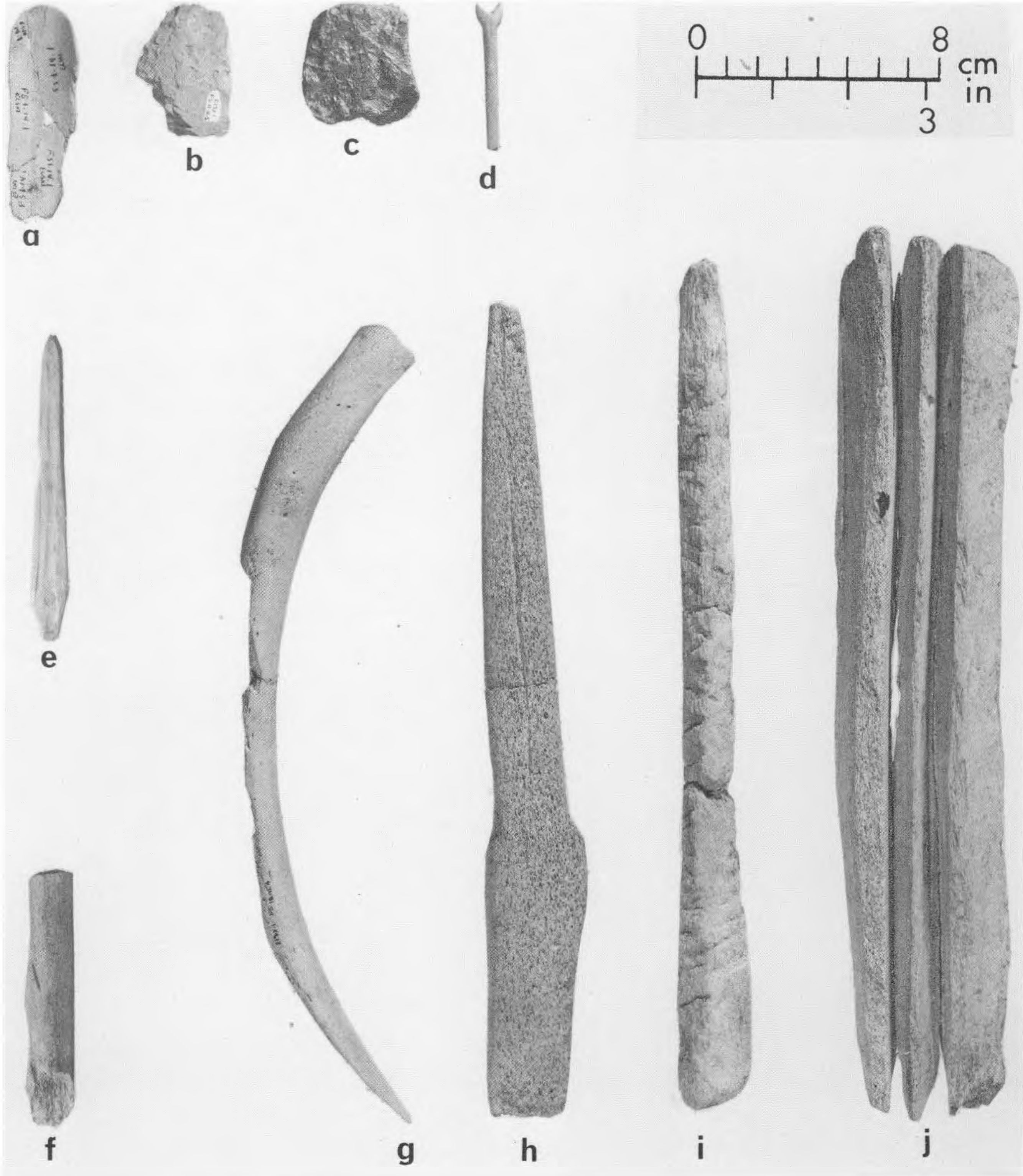

Fig. 42 Miscellaneous artifacts. *a* bone spoon (?); 4540–3400 BP. 1.14.1. *b* charred slate; bifacially developed flake; date unknown. 11.0.5. *c* pigment (galena); multiple surface abrasions; 480 BP–present. 1968 lev. 2. *d* bone; unknown function (EISx 3); 1860 BP. 1.10.2. *e* bone projectile point; date unknown. 11.0.12. *f* bone harpoon (?) midshaft; EISx 3; 1860–1600 BP. 2.9.4. *g* bear rib; finely polished, pointed shaft; 1470 BP. 10.11.4. *h* sea mammal bone; finely shaped shaft – damage to tip; EISx 3; date unknown. 1.1.2. *i* sea mammal bone; tool blank (?) – deep transverse surface cuts; 980 BP. 10.10.60. *j* sea mammal bone; tool blanks (?) – before separation; 980 BP. 10.10D. 1-9.

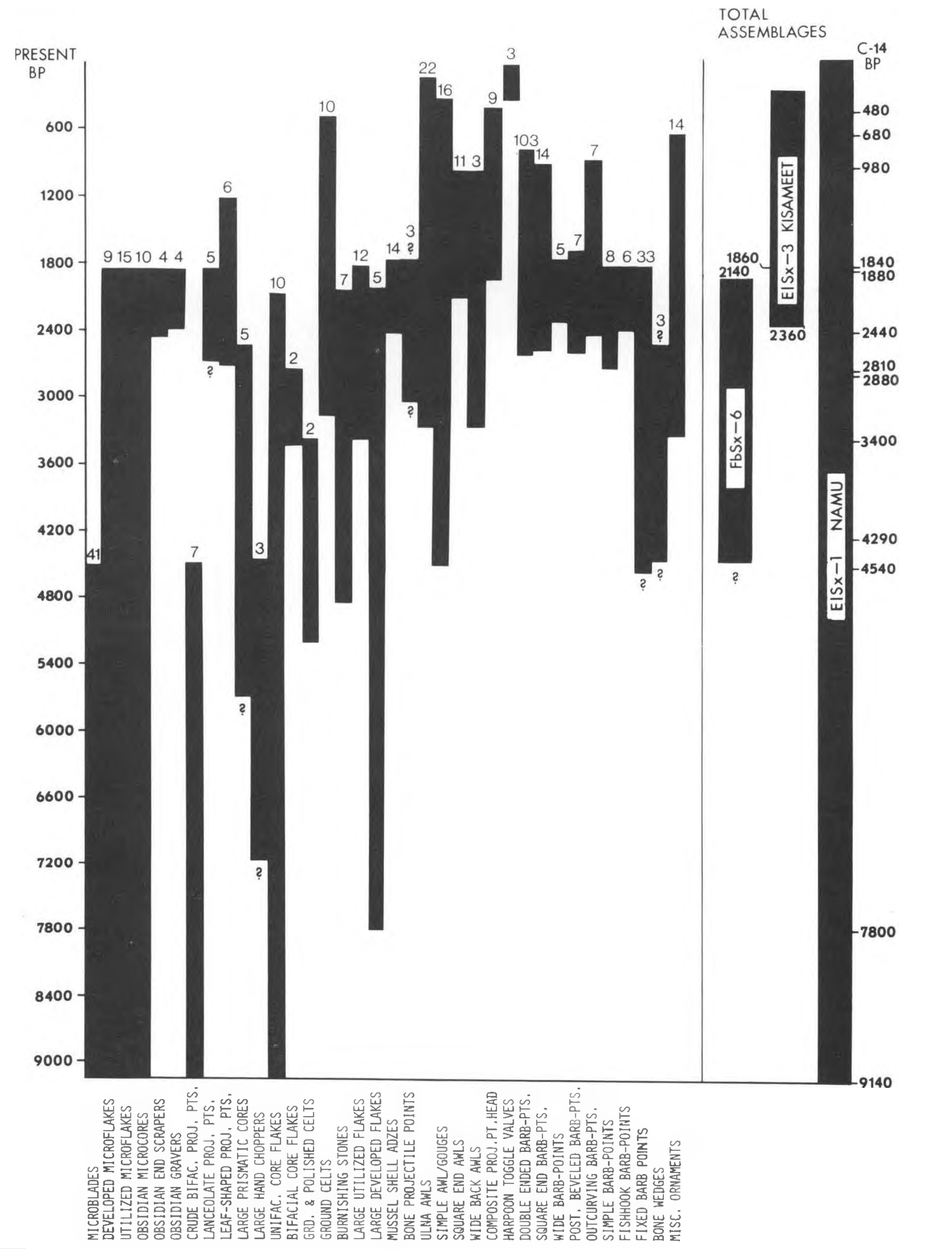

Fig. 43 Distribution of each class of artifacts through time.