

A Statistical Determination of Components

Represented in the Excavated Material

from

The Helen Point Midden, DfRu 8

by

John Laurence Hall

A Graduating Essay

Submitted in Partial Fulfilment

of the

Requirements for

the Degree of

Bachelor of Arts

Department of Anthropology and Sociology

University of Victoria

April 1968

his considerable and invaluable assistance, without which this paper could never have been brought to completion. I also wish to thank Mr.

INTRODUCTION

DfRu 8 is a small shell midden lying at the head of a small cove on

the north side of Helen Point, Mayne Island, bordering on Active Pass. In June of 1966, four squares each two meters by two meters were dug, forming an L-shaped cut, the longer length of which paralleled the eroded face of the deposits. One square was set inland, forming the shorter length of the L. The squares are numbered from one to four, with square 1 being the square forming the shorter length of the L, square 2 being the square at the junction of the two lengths, square 3 the square adjacent to square 2, and square 4 the square at the end of the longer length of the L.

These four squares yielded six hundred sixty-two artifacts, one feature and three burials, all of which are described in Appendix I of this paper. Statistical methods of component determination could not for obvious reasons be applied to the features or to the burials. Faunal remains could not be statistically treated either, since the relationship of the faunal remains collected to the universe of faunal remains within the site is not known. Because of these limitations, only the artifacts have been used in the determination of components.

I would like to sincerely thank Mr. Donald Mitchell, of the Department of Anthropology and Sociology of the University of Victoria, for

his considerable and invaluable assistance, without which this paper could never have been brought to completion. I also wish to thank Mr. Derek Smith, also of the Department of Anthropology and Sociology of the University of Victoria, for many hours of fruitful discussion, and for his support and encouragement.

THE ANALYSIS

Two preliminary tasks had to be completed. These two tasks were:

1. The description of the artifacts, and
2. The division of the stratigraphy into discrete culture-bearing layers.

The artifacts are described using the presently in vogue classification for assemblages from Gulf of Georgia sites (Jordan 1950a, 1950b, 1957, 1962; Bryan 1963; Capes 1964; Carlson 1960; Drucker 1943; Duff 1958; King 1950; Mitchell 1965, 1968; D. G. Smith 1964), since the construction of a statistically-based typology is beyond the scope of this paper. The descriptions of the artifacts are given in Appendix I.

The stratigraphy is divided on the basis of natural stratification within the site, as recorded on the profile drawings. There are a great number of discrete strata recorded in the profile drawings, but to consider each one as potentially distinguishable culturally would be impractical since the total number of artifacts within most of these individual strata is not large. Consequently the strata are grouped into zones. A zone is here defined as one stratum that differs from adjacent strata, or a number of adjacent and similar strata which show greater similarity among themselves than between themselves and the zone either above or

THE ANALYSIS

I. Preparation of the Data

Before statistical methods could be applied, two preliminary tasks had to be completed. These two tasks were:

1. The description of the artifacts, and
2. The division of the stratigraphy into discrete culture-bearing layers.

The artifacts are described using the presently in vogue classification for assemblages from Gulf of Georgia sites (Borden 1950a, 1950b, 1957, 1962; Bryan 1963; Capes 1964; Carlson 1960; Drucker 1943; Duff 1956; King 1950; Mitchell 1965, 1968; D. G. Smith 1964), since the construction of a statistically-based typology is beyond the scope of this paper. The descriptions of the artifacts are given in Appendix I.

The stratigraphy is divided on the basis of natural stratification within the site, as recorded on the profile drawings. There are a great number of discrete strata recorded in the profile drawings, but to consider each one as potentially distinguishable culturally would be impractical since the total number of artifacts within most of these individual strata is not large. Consequently the strata are grouped into zones. A zone is here defined as one stratum that differs from adjacent strata, or a number of adjacent and similar strata which show greater similarity among themselves than between themselves and the zone either above or

below. The arbitraryness of this definition is recognised, involving essentially subjective descisions on my part as to what constitutes similarity, but a more exact determination of zones than this would require a greater length of time and more sophisticated techniques of soil analysis than were available to me. A description of the stratigraphy of the excavations and of the bases of the zonation used in this paper are given in Appendix II, but I will note here that there are seven zones designated in alphabetical order from highest to lowest, beginning with the letter A.

An alternative to dividing the stratigraphy into discrete culture-bearing layers by natural zonation is to divide it by metrical levels each of equal thickness. Thus that section of midden deposit from the surface to, for example, ten centimeters below the surface would constitute one level, that section from ten centimeters below the surface to twenty centimeters below would be the second level, and so on, until all culture-bearing strata are included in one or more levels. This method of stratigraphic division was not used here since the presumed units of similar culture - the natural strata - are not parallel to the surface, and a division by arbitrary metrical levels would tend to render less distinct the division between differing cultures when two or more culturally differing strata run through the same metrical level - as they often do in the Helen Point midden. Where usable, however, a division by arbitrary metrical levels parallel to the surface would be preferable a division by natural stratigraphy, since a metrical division, where the

levels are relatively thin, would indicate cultural differences within a single stratum where the strata are thick, deposited over a ^{long} period of time, and are unaffected in deposition by the cultural activities of men.

These two preliminary tasks resulted in two tables, one giving the distribution of artifact categories by zone - Table 1 - and the other giving the distribution of artifact classes by zone and by square - Table 2.

II. The Statistical Devices Used in the Determination of Components

The statistical devices used here in determining components are:

1. analysis of variance, with Duncan's New Multiple Range Test, and
2. chi-square, for the distribution of certain artifact categories.

1. Analysis of Variance:

a. Procedure

The significance of the distribution of artifact classes by zones was tested using the analysis of variance (Table 3) on a randomized block design. The randomized block design increased the power of the test by removing from the calculations the differences in occurrence of artifact classes by square. For those classes with an F value significant at the .01 level (chipped stone, ground stone, pecked and ground stone, bone, and antler), the zones were ranked using Duncan's New Multiple Range Test. For both methods see Li (1964).

b. Results

Table 4 gives the results obtained. All results are significant

TABLE 1: DfRu 8-- THE DISTRIBUTION OF ARTIFACT CATEGORIES BY ZONE

CATEGORY	ZONE						
	A	B	C	D	E	F	G
CHIPPED STONE							
Leaf-shaped points		2	2		5	1	
Small triangular points		1	5				
Asymmetric triangular point with single barb	1				1		
Large triangular point with concave sides and base	2				1		
Contracting stem points		1	2		3	1	
Bi-pointed points		1	1		1		
Side-notched points		1			1		
Stemmed and barbed points					2		
Chipped point fragments		6	9		5	1	
Microblades			1	1	3		
Microblade cores			2		2		
Slate awl			1				
Sandstone bifaces	1				2		
Cobble core tools		1			2		
Cobble spall tools				1	1		
Chipped slate scrapers or knives		3	10		6	3	
Split and chipped stone		3	8	1	24	3	
Utilized flakes	1	17	23	7	26	10	
Large chipped club-like object			1				
Miscellaneous bifaces		1	2		5		
GROUND STONE							
Points	1	9	11	1	2		
Celts		3	5				
Gulf Islands complex artifacts		1	2		2		
Beads			1		1		
Drill					1		
Ground and sawn fragment	1	13	16	3	9		
Miscellaneous ground stone		12	9	1	4	1	
PECKED AND GROUND STONE							
Hammerstones		1	1		2	1	
Handstones					1	1	
Incised stones			1		1		
Saws		1			1		

TABLE 1 - Continued.

CATEGORY	ZONE						
	A	B	C	D	E	F	G
Shaped abrasive stones			2	1	1		
Irregular abrasive stones		19	21	1	21		
BONE							
Barbed bone points		1	4				
Wedge-based bone points	1		2		1		
Serrated bone point			1				
Bi-pointed bone objects	2	49	3	1			
Small single pointed bone objects		1	1				
Split bone awls		2			1		
Ground bone awls		5	3	1			
Needles				2			
Drill			1				
Ulna tools		2			4		
Fragments of pointed bone objects	1	29	7		3		
Chisels or wedges		1		2	1		
Sea mammal bone wedge					1		
Carved ribs			1		1		
Bird bone tubes		1	1		2		
Miscellaneous worked bone		20	14	1	9	1	
ANTLER							
Fixed barbed points			2		1		
Non-toggling harpoons		1	1				
Barbed Antler fragments			4		2		
Composite toggling harpoon valves		2	1				
Antler sleeve haft			1				
Split antler wedges		8	1	1	6		
Antler tine wedges		1	1				
Carved antler			3	1	1		
Antler bead			1				
Miscellaneous worked antler	1	13	16	3	9		
SHELL							
Mussel shell knives		3	1				
MINERAL							
Red ochre		1			2	1	
Mica		1					

TABLE 1 - Continued DISTRIBUTION OF ARTIFACT CLASSES BY SQUARE AND ZONE

CATEGORY	SQUARE	ZONE							
		A	B	C	D	E	F	G	
Quartz crystals	1	0	7	5	2	25	0		
EUROPEAN TRADE GOODS	1	0	5	15	11	40	0		
Clay pipes	3	0	1	10	3	9	0		
Buttons	4	0	17	1	1	17	1		
Iron nails	Mean	.25	5.25	3.5	2	22.75	2		
Ceramics	1	0	9	1	2	2	0		
TOTALS	1	0	7	239	191	26	175	24	0
	4	0	7	18	0	3	1		
Mean	0	6.25	7.0	.50	2.25	.25	0		
PERIOD AND GRIND STONE	1	0	7	2	0	4	0	0	
	2	0	3	5	0	9	0	0	
	3	0	7	5	1	2	0	0	
	4	0	4	13	1	11	2	0	
Mean	0	5.25	6.25	.50	6.50	.50	0		
KNIFE	1	0	23	0	3	5	0	0	
	2	1	19	8	0	9	0	0	
	3	0	10	14	2	6	0	0	
	4	3	48	12	0	3	3	0	
Mean	1	27.25	8.5	1.25	6	.75	0		
ARROW	1	1	13	3	3	5	0	0	
	2	0	0	4	1	7	0	0	
	3	0	6	7	1	1	0	0	
	4	0	10	17	0	6	0	0	
Mean	.25	7.25	7.75	1.25	4.75	0	0		
SHILL	1	0	0	0	0	0	0	0	
	2	0	0	1	0	0	0	0	
	3	0	2	0	0	0	0	0	
	4	0	1	0	0	0	0	0	
Mean	0	.75	.25	0	0	0	0		
MINERAL	1	0	0	0	0	1	0	0	
	2	0	0	0	0	0	0	0	
	3	0	1	0	0	1	0	0	
	4	0	0	0	0	2	1	0	
Mean	0	.25	0	0	0	1	.25	0	

TABLE 2: DfRu 8 - DISTRIBUTION OF ARTIFACT CLASSES BY SQUARE AND ZONE

CLASSIFY	SQUARE	ZONE						
		A	B	C	D	E	F	G
CHIPPED STONE	1	0	7	5	2	25	0	0
	2	1	5	15	11	40	0	0
	3	0	8	9	3	9	0	0
	4	0	17	38	27	17	19	0
	Mean	.25	9.25	16.75	12.75	22.75	4.75	0
GROUND STONE	1	0	9	1	2	2	0	0
	2	0	4	4	0	3	0	0
	3	0	5	5	0	1	0	0
	4	0	7	18	0	3	1	0
	Mean	0	6.25	7.0	.50	2.25	.25	0
PECKED AND GROUND STONE	1	0	7	2	0	4	0	0
	2	0	3	5	0	9	0	0
	3	0	7	5	1	2	0	0
	4	0	4	13	1	11	2	0
	Mean	0	5.25	6.25	.50	6.50	.50	0
BONE	1	0	23	0	3	5	0	0
	2	1	19	8	0	5	0	0
	3	0	19	14	2	6	0	0
	4	3	48	12	0	8	3	0
	Mean	1	27.25	8.5	1.25	6	.75	0
ANTLER	1	1	13	3	3	5	0	0
	2	0	0	4	1	7	0	0
	3	0	6	7	1	1	0	0
	4	0	10	17	0	6	0	0
	Mean	.25	7.25	7.75	1.25	4.75	0	0
SHELL	1	0	0	0	0	0	0	0
	2	0	0	1	0	0	0	0
	3	0	2	0	0	0	0	0
	4	0	1	0	0	0	0	0
	Mean	0	.75	.25	0	0	0	0
MINERAL	1	0	0	0	0	1	0	0
	2	0	0	0	0	0	0	0
	3	0	1	0	0	1	0	0
	4	0	0	0	0	2	1	0
	Mean	0	.25	0	0	1	.25	0

TABLE 2- Continued

ANALYSIS OF VARIANCE

CLASSORY	SQUARE	ZONE						
		A	B	C	D	E	F	G
EUROPEAN TRADE GOODS	1	0	0	0	0	0	0	0
	2	1	10	1	0	1	0	0
	3	0	3	0	0	1	0	0
	4	0	3	0	0	0	0	0
	Mean	.25	4	.25	0	.50	0	0

BRICKS	REPLICATION	31.8214	3	10.6071	4.1955,
	TREATMENT	282.8572	6	47.1428	significant
	ERROR	159.4286	18	8.8571	at .1% level
	TOTAL	474.1072	27		
FINED AND BRAND STONE	REPLICATION	28.5714	3	9.5238	6.3404,
	TREATMENT	236.2143	6	39.3690	significant
	ERROR	108.9286	18	6.0515	at .5% level
	TOTAL	373.7143	27		
STONE	REPLICATION	170.9643	3	56.9881	12.2938,
	TREATMENT	2271.4286	6	378.5714	significant
	ERROR	554.2857	18	30.7926	at .5% level
	TOTAL	2996.6786	27		
ARTILE	REPLICATION	29.5357	3	13.1785	4.2426,
	TREATMENT	289.2143	6	48.2023	significant
	ERROR	204.2143	18	11.3452	at 1% level
	TOTAL	523.9643	27		
SHELL	REPLICATION	.2857	3	.0953	1.6005, not
	TREATMENT	1.9286	6	.3214	significant
	ERROR	3.2143	18	.1785	
	TOTAL	5.4286	27		
MINERAL	REPLICATION	.7143	3	.2381	3.4526, not
	TREATMENT	3.2143	6	.5357	significant
	ERROR	2.7857	18	.1547	
	TOTAL	6.7143	27		
EUROPEAN TRADE GOODS	REPLICATION	13.4286	3	4.4785	3.5672, not
	TREATMENT	51.2143	6	8.5357	significant
	ERROR	43.0715	18	2.3928	
	TOTAL	107.7143	27		

TABLE 3: DfRu 8 - ANALYSIS OF VARIANCE

CLASSIFICATION	SOURCE OF VARIATION	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	F
CHIPPED STONE	REPLICATION	346.1070	3	115.3690	6.7527, significant at .05% level
	TREATMENT	1865.2143	6	310.869	
	ERROR	828.6429	18	46.0357	
	TOTAL	3039.9643	27		
GROUND STONE	REPLICATION	31.8214	3	10.6071	4.1935, significant at .1% level
	TREATMENT	222.8572	6	37.1428	
	ERROR	159.4286	18	8.857	
	TOTAL	414.1072	27		
PECKED AND GROUND STONE	REPLICATION	28.5714	3	9.5238	6.3404, significant at .5% level
	TREATMENT	230.2143	6	38.3690	
	ERROR	108.9286	18	6.0515	
	TOTAL	367.7143	27		
BONE	REPLICATION	170.9643	3	56.9881	12.2938, significant at .5% level
	TREATMENT	2271.4286	6	378.5714	
	ERROR	554.2857	18	30.7936	
	TOTAL	2996.6786	27		
ANTLER	REPLICATION	29.5357	3	13.1785	4.2486, significant at 1% level
	TREATMENT	289.2143	6	48.2023	
	ERROR	204.2143	18	11.3452	
	TOTAL	532.9643	27		
SHELL	REPLICATION	.2857	3	.0953	1.8005, not significant
	TREATMENT	1.9286	6	.3214	
	ERROR	3.2143	18	.1785	
	TOTAL	5.4286	27		
MINERAL	REPLICATION	.7143	3	.2381	3.4628, not significant
	TREATMENT	3.2143	6	.5357	
	ERROR	2.7857	18	.1547	
	TOTAL	6.7143	27		
EUROPEAN TRADE GOODS	REPLICATION	13.4285	3	4.4785	3.5672, not significant
	TREATMENT	51.2143	6	8.5357	
	ERROR	43.0715	18	2.3928	
	TOTAL	107.7143	27		

TABLE 4: DfRu 8 - SIGNIFICANT DIFFERENCES BETWEEN ZONES

IN THE CLASSES BELOW:	THE FOLLOWING ZONES:	ARE SIGNIFICANTLY DIFFERENT FROM THESE ZONES:	BUT NOT FROM THESE:
CHIPPED STONE	Zone E Zone C	Zones A, B, D, F, G Zones A, D, F, G	Zone C Zones B, C
GROUND STONE	Zone C Zone B	Zones A, D, E, F, G Zones A, D, F, G	Zone B Zones C, E
PECKED AND GROUND STONE	None	None	
BONE	Zone B	Zones A, C, D, E, F, and G	-
ANTLER	Zone C Zone B	Zones A, D, F, G Zones A, D, F, G	Zones B, E Zones C, E

at the 95% level of confidence, which is here taken to indicate a culturally-produced difference rather than a difference resulting from chance.

c. Conclusions

If a ^{culture-bearing} zone or a series of adjacent ^{culture-bearing} zones which have no significant differences between themselves (significant differences being defined above and all existing significant differences between artifact classes by zone ^{for Helen Point} being listed in Table 4) differ significantly from the zones adjacent to them above or below, then I will accept this zone or this series of similar zones as constituting one component pending examination of the ^{size of the} total artifact sample within that zone or series of zones.

Zones A, B, C, D, and E are each significantly different from the zones adjacent to them on either side, in at least one of the artifact classes listed in Table 4. Zone F is significantly different from zone E but not from zone G. On the basis of significant differences alone I would have to postulate the existence of six components, given the definition of components above. Note however that zones A, D, and F have very small artifact assemblages, and that none of them are significantly different from zone G, which contains no cultural remains and therefore cannot be considered a possible component. If these three assemblages cannot be distinguished statistically from non-culture-bearing earth, then this study cannot accept them as being distinct cultural components. Consequently, zones A, D, and F are included with the components determined below on the basis of the relationships of zones B, C, and E to each other.

Zone B is accepted as constituting in itself one component, since it differs significantly from all other zones in the distribution of bone. Zone E is accepted as constituting one component since it differs significantly from zone C on the distribution of ground stone. It is then possible to postulate the existence of three components in the excavated sections of the Helen Point midden - Helen Point I, which corresponds to Zone E; Helen Point II, which corresponds to zone C; and Helen Point III, which corresponds to zone B. Zones A, D, and F were included in this scheme in the following way. Since the definition of component offered above requires that when a component consists of

more than one zone; the zones be adjacent, and since the possibility that zones A might be independent components is excluded, zone A is included with zone B in Helen Point III since zone B is the only zone to which A is adjacent. Zone F is included with zone E in Helen Point I for similar reasons. Zone D is included with zone E in Helen Point I rather than with zone C in Helen Point II because it was significantly different from E only in the distribution of chipped stone, whereas it differed significantly from C in the distributions of ground stone, and antler as well as in the distribution of chipped stone.

The distribution of artifact classes and categories by component is tabled in Table 5.

2. Chi-square:

a. Procedure

The division of zones into components in the schema suggested above was tested by applying the statistical device of chi-square to the larger categories of artifacts. The size of the categories used is determined by the need to have an expectancy of at least five in each cell of the distribution (Franzblau 1958:121). The Helen Point II component is the smallest of the three in terms of total number of artifacts (191). If Helen Point II has an expectancy of five, Helen Point I with 225 artifacts will have an expectancy of $225/191 \times 5$ or six, and Helen Point III with a total of 246 artifacts will have an expectancy of $246/191 \times 5$ or seven artifacts. Hence any category of artifacts tested by chi-

5
TABLE FIVE: DfRu 8 - THE DISTRIBUTION OF ARTIFACT CATEGORIES BY COMPONENT

CATEGORY	COMPONENT			SITE
	I	II	III	
CHIPPED STONE	(119)	(67)	(38)	(224)
Leaf-shaped points	6	2	2	10
Small triangular points	-	5	1	6
Asymmetric triangular point with single barb	1	-	-	1
Large triangular point with concave sides and base	1	-	-	1
Contracting stem points	4	2	1	7
Bi-pointed points	1	1	1	3
Side-notched points	1	-	1	2
Stemmed and barbed points	2	-	-	2
Chipped point fragments	6	9	6	21
Microblades	4	1	-	5
Microblade cores	2	2	-	4
Slate awl	-	1	-	1
Sandstone bifaces	2	-	-	2
Cobble core tools	2	-	1	3
Cobble spall tools	2	-	-	2
Chipped slate scrapers or knives	9	10	3	22
Split and chipped stone	28	8	3	39
Utilised flakes	43	23	18	84
Large chipped club-like object	-	1	-	1
Miscellaneous bifaces	5	2	1	8
GROUND STONE	(13)	(28)	(27)	(68)
Points	3	11	10	24
Celts	-	5	3	8
[Gulf Islands complex artifacts	2	2	1	5
Beads	1	1	-	2
Drill	1	-	-	1
[Ground and sawn fragment	-	-	1	1
Miscellaneous ground stone	6	9	12	27
PECKED AND GROUND STONE	(31)	(25)	(21)	(77)
Hammerstones	3	1	1	5
Handstones	2	-	-	2
Incised stones	1	1	-	2
Saws	1	-	1	2
Shaped abrasive stones	2	2	-	4
Irregular abrasive stones	22	21	19	62

TABLE FIVE: DfRu-8 - CONTINUED DISTRIBUTION OF ARTIFACT CATEGORIES BY COMPONENT

CATEGORY	COMPONENT			SITE
	I	II	III	
BONE	(31)	(38)	(114)	(183)
Barbed bone points	(21)	(24)	(111)	(156)
Wedge-based bone points	1	2	-	3
Serrated bone points	-	1	-	1
Bi-pointed bone objects	1	3	51	55
Small single pointed bone objects	-	1	1	2
Split bone awls	1	-	2	3
Ground bone awls	1	3	5	9
Needles	2	-	-	2
Drill	-	1	-	1
Ulna tools	4	-	2	6
Fragments of pointed bone objects	3	7	30	40
Chisels or wedges	3	-	1	4
Sea mammal bone wedge	1	-	-	1
Carved ribs	1	1	-	2
Bird bone tubes	2	1	1	4
Miscellaneous worked bone	11	14	20	45
ANTLER	(24)	(31)	(26)	(81)
Fixed barbed points	1	2	-	3
Non-toggling harpoons	-	1	1	2
Barbed antler fragments	2	4	-	6
Composite toggling harpoon valves	-	1	2	3
Sleeve haft	-	1	-	1
Split antler wedges	7	1	8	16
Antler tine wedges	-	1	1	2
Carved antler	2	3	-	5
Antler bead	-	1	-	1
Miscellaneous worked antler	12	16	14	42
SHELL				
Mussel shell knives	-	1	3	4
MINERAL	(1)	(0)	(5)	(6)
Red ochre	3	-	-	3
Mica	-	-	1	1
Quartz crystals	2	-	-	2
EUROPEAN TRADE GOODS	(2)	(1)	(16)	(19)
Clay pipes	-	-	11	11
Buttons	-	1	1	2

TABLE FIVE: Continued

CATEGORY	COMPONENT			SITE
	I	II	III	
Iron nails	2	-	3	5
Ceramics	-	-	1	1
TOTAL	225	191	246	662
PERCENT OF TOTAL	34	29	37	100

CATEGORY	NUMBER	CHI-SQUARE VALUE*	SIGNIFICANT AT:
Chipped slate scrapers or knives	22	5.61	.10
Split and chipped stone	39	26.41	.001
Utilised flakes	34	12.90	.01
Ground stone points	24	5.75	.10
Miscellaneous ground stone	27	1.68	.50
Irregular abrasive stones	62	1.23	.70
Bi-pointed bone objects	55	73.41	.001
Fragments of pointed bone objects	40	25.69	.001
Miscellaneous worked bone	45	1.95	.50
Miscellaneous worked antler	42	1.30	.70

* All values have two degrees of freedom.

d. Conclusions

Four of the categories tested yielded chi-square values significant at the .01 level or lower - these are the categories of split and chipped stone, utilised flakes, bi-pointed bone objects, and fragments of

square must contain at least eighteen artifacts for the chi-square test to be accurate. There are ten categories which fulfill this requirement. These categories with their chi-square values and the levels at which these values are significant are given in Table Six.

b. Results

TABLE SIX: DfRu 8 - RESULTS OF THE CHI-SQUARE TESTS

CATEGORY	NUMBER	CHI-SQUARE VALUE*	SIGNIFICANT AT:
Chipped slate scrapers or knives	22	5.61	.10
Split and chipped stone	39	26.41	.001
Utilized flakes	84	12.90	.01
Ground stone points	24	5.75	.10
Miscellaneous ground stone	27	1.68	.50
Irregular abrasive stones	62	1.23	.70
Bi-pointed bone objects	55	73.41	.001
Fragments of pointed bone objects	40	25.69	.001
Miscellaneous worked bone	45	1.95	.50
Miscellaneous worked antler	42	1.30	.70

* All values have two degrees of freedom.

c. Conclusions

Four of the categories tested yielded chi-square values significant at the .01 level or lower - these are the categories of split and chipped stone, utilized flakes, bi-pointed bone objects, and fragments of

pointed bone objects. These extremely high values strongly support the division of the excavated material into the three components suggested above.

III. Summary

The artifacts from the Helen Point midden, DfRu 8, may be statistically separated into three components on the basis of the distribution of certain materials of manufacture, and of certain techniques in the working of stone. The lowest component in the midden deposits, Helen Point I, is characterised by a dependency on chipping techniques for working stone to a degree not shown by the upper two components, and by a relatively small use of bone when compared to the uppermost component. Helen Point II, the middle component, is characterised by a lesser dependence on chipping techniques for stone than that shown by Helen Point I, a greater dependence on grinding techniques for stone than Helen Point I, and a lack of utilisation of bone as a raw material for the manufacture of tools similar to Helen Point I, but very unlike Helen Point III. The uppermost component is Helen Point III, characterised by a the least dependence on chipping techniques for working stone of all three components, by a dependence on grinding techniques for stone similar to Helen Point II but greater than Helen Point I, and a much greater utilisation of bone than either of the lower two components. The utilisation of antler and of pecking and grinding techniques for working stone is similar among all three components.

APPENDIX I

DESCRIPTIONS OF ARTIFACTS,

FEATURES AND BURIALS

APPENDICES

THE HELEN POINT MIDDEN

THE ARTIFACTS

I. ARTIFACTS OF CHIPPED STONE

POINTS

Fifty-four complete or fragmentary chipped stone points were recovered from the excavation of Helen Point. The original form is complete, or may be reconstructed from the fragments of these. Fifty of the total number are of basalt, and each of chert, andesite, and petrified wood. In the following descriptions, the fifty-four are classified as leaf-shaped, small triangular, asymmetric triangular, large triangular with concave sides and bases, contracting stem, side notched, stemmed and barbed, and miscellaneous points.

APPENDIX I

DESCRIPTIONS OF ARTIFACTS,

FEATURES AND BURIALS

FROM

THE HELEN POINT MIDDEN

LEAF-SHAPED POINTS

The ten points classified as leaf-shaped are described in Table 5. All are of basalt. Eight are complete. Flaking is crude and irregular, and the resulting objects are not particularly symmetrical. The edges of all ten are slightly convex, although not regularly so. Bases are straight or slightly convex. Two have a slight shouldering on one edge at the juncture with the base, one from battering and one from the removal of a single large flake. Cross-section are lenticular, usually somewhat more ridged on one side than on the other. All fit the 5A2 category of Collier, Hudson and Ford (1942:59). Three of

I. THE ARTIFACTS

1. ARTIFACTS OF CHIPPED STONE

POINTS

Fifty-four complete or fragmentary chipped stone points were recovered from the excavations at Helen Point. The original form is complete, or may be reconstructed, for thirty-two of these. Fifty of the total number are of basalt, and there is one each of chert, andesite, and petrified wood. In the following descriptions, the fifty-four are classified as leaf-shaped, bi-pointed, small triangular, asymmetric triangular, large triangular with concave sides and base, contracting stem, side notched, stemmed and barbed, and miscellaneous points.

TABLE 5: DATA 5 - LEAF-SHAPED POINTS

ARTIFACTS	LEAF-SHAPED POINTS	STANDARD DEVIATION	NUMBER
-----------	--------------------	--------------------	--------

The ten points classified as leaf-shaped are described in Table 5. All are of basalt. Eight are complete. Flaking is crude and irregular, and the resulting objects are not particularly symmetrical. The edges of all ten are slightly convex, although not regularly so. Bases are straight or slightly convex. Two have a slight shouldering on one edge at the juncture with the base, one from battering and one from the removal of a single large flake. Cross-section are lenticular, usually somewhat more ridged on one side than on the other. All fit the NAb2 category of Collier, Hudson and Ford (1942:59). Three of

the points described here are drawn in Figure ~~One~~¹.

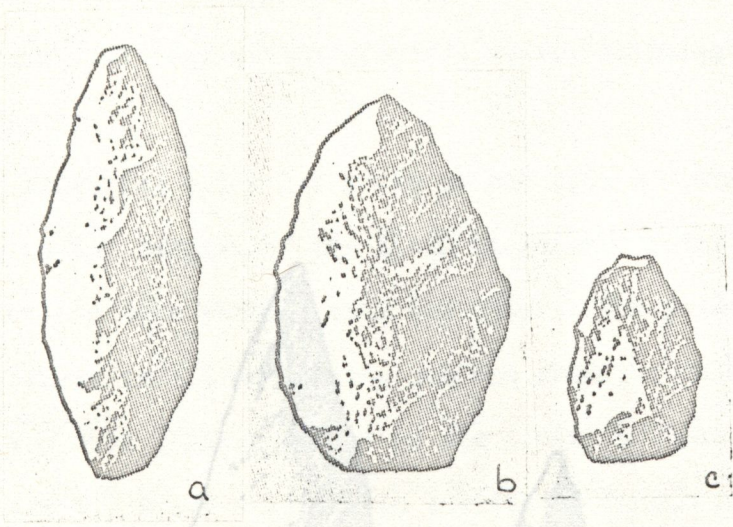


Figure 1: DfRu 8 - Leaf-shaped Points

TABLE 8: DfRu 8 - LEAF-SHAPED POINTS

ATTRIBUTE	RANGE	MEAN	STANDARD DEVIATION	NUMBER
Length	3.3 - 5.9 cm	4.7	.97	7
Width	1.2 - 3.1 cm	2.1	.48	10
Thickness	0.4 - 1.3	.9	.026	10
Width/Length	.40 - .58	.51	.61	7

BI-POINTED POINTS

Three complete bi-pointed chipped basalt points were excavated at the Helen Point site. Workmanship is rough on all three. All fit the NAa classification of Collier, Hudson and Ford (1942:59).

No. 469, the smallest of the three, measures 3.5 x 1.4 x 0.7. This

point is heavily water worn. The width to length ratio is .40. One face is ridged, the other flat. On one side, where if the point were symmetrical, one would expect the greatest width, chipping has produced a slight concavity.

No. 540, measuring 8.1 x 3.2 x 210 cm and with a width to length ratio of .40, is the largest of the three bi-pointed points. Both faces are ridged, but one more steeply than the other. The point of greatest width and thickness is 6.5 cm from one end from the center.

No. 525, has been highly polished on the ridges of both faces. Its measurements are 5.7 x 1.9 x 1.1 cm with a width to length ratio of .33. The point of greatest width and thickness is approximately mid-length.

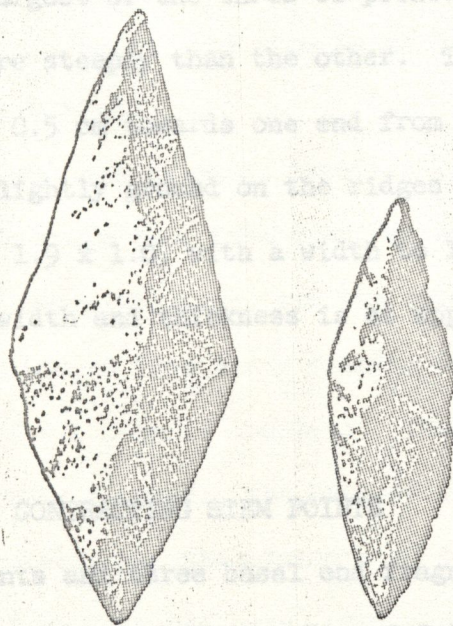


Figure 2: DfBus - Bi-pointed Points

Four complete points and three basal end fragments had contracting stems. This category corresponds to the S&C of Collier, Hudson and Ford (1949:59). All are of basalt. All are asymmetric to some extent and none are exceptionally finely worked. The greatest width is usually at or near the point at which the shoulders begin to slope inward.

No. 104 is a basal end fragment measuring (4.0) x 2.9 x 1.4 cm. The shoulders are 1.9 cm in length. The stem thins to 1.2 cm wide at its base, which is straight.

No. 261 measures 4.6 x 2.5 x 0.8 cm. It is complete. The shoulders begin 1.2 cm above the base. The stem thins to 0.8 cm at the base,

point is heavily water worn. The width to length ratio is .40. One face is ridged, the other flat. On one side, where if the point were symmetrical, one would expect the greatest width, chipping has produced a slight concavity.

No. 540, measuring 8.1 x 3.2 x 210 cm and with a width to length ratio of .40, is the largest of the three bi-pointed points^(Figure 2:a). Both faces are ridged, but one more steeply than the other. The point of greatest width and thickness is 0.5 cm towards one end from the center.

No. 825^(Figure 2:b) has been lightly ground on the ridges of both faces. Its measurements are 5.7 x 1.9 x 1.0, with a width to length ratio of .33. The point of greatest width and thickness is at approximate mid-length.

CONTRACTING STEM POINTS

Four complete points and three basal end fragments had contracting stems. This category corresponds to the SAa of Collier, Hudson and Ford (1942:59). All the points are lenticular in cross-section, and all are of basalt. All are asymmetric to some extent and none are exceptionally finely worked. The greatest width is usually at or near the point at which the shoulders begin to slope inwards.

No. 104 is a basal end fragment measuring (4.0) x 2.9 x 1.4 cm. The shoulders are 1.5 cm in length. The stem thins to 1.2 cm wide at its base, which is straight.

No. 261 measures 4.6 x 2.5 x 0.8 cm. It is complete. The shoulders begin 1.2 cm above the base. The stem thins to 0.8 cm at the base,

which is straight. One of the two faces of the point shows the original cobble surface.

No. 261, also complete, has measurements of 5.0 x 2.0 x 0.9 cm. The shoulders begin 1.7 cm from the base. The stem thins to 1.0 cm at the base, which is straight.

No. 500, (3.7) x 3.3 x 1.1 cm, is a basal end fragment. The shoulders begin 2.0 cm from the base. The stem thins to 0.9 cm at its base, which is rounded, (Figure 3:a).

No. 610, also a basal end fragment measures (3.7) x 3.2 x 1.2 cm. It is 2 mm wider at the break than from shoulder to shoulder. The shoulders occur 2.2 cm above the base, and the stem thins to 1.4 cm at the base, which is concave from heavy flaking on one face.

No. 735, 7.9 x 3.4 x 1.2 cm is complete. The shoulders begin 2.0 cm from the base, which is rounded. The base is 1.1 cm wide.

No. 834, also complete, has measurements of 5.6 x 2.9 x 1.1 cm. The shoulders begin 2.2 cm from the base. The stem thins to 1.1 cm wide at its base, which is rounded. The edges of the point are shallowly serrated, (Figure 3:b).

SMALL TRIANGULAR POINTS

Six points are described under this heading, five of which are of basalt and one is of petrified wood. One of the basalt points is lacking its extreme distal tip, but the remaining five are complete. All are slightly asymmetric. Width is greatest at or very near the base;

TABLE 9: SMALL TRIANGULAR CHIPPED STONE POINTS

ARTIFACT NUMBER	DIMENSIONS	WET/DRY RATIO	NOTES
304	4.5 x 3.0		The greatest width of this point is five mm from the base, which is slightly concave; finely worked.
312	(3.6) x 2.8		Distal tip is missing; greatest width is at the base, which is slightly concave; finely worked. On its surface are the lacy encrusted remains of ectoprocts.

Figure 3: DFRu 8 - Contracting Stem Points

thickness is generally uniform. Two fit the NBa and four the NBb classifications of Collier, Hudson and Ford (1942:59).

713	3.1 x 1.0 x 0.6 cm		Greatest width five mm from base.
738	4.5 x 2.3 x 0.6		Made, carefully, from petrified wood; greatest width is 7 mm from the base, which is concave.
772	4.6 x 3.3 x 0.6		Markedly asymmetrical with strong concavity at the base; finely worked; Figure 4:b.

Figure 4: DFRu 8 - Small triangular Points

This markedly asymmetric specimen (Figure 4:b), made of basalt, measures 5.2 cm from tip to barb, 3.1 cm along the base, and is 1.0 cm

TABLE 9: SMALL TRIANGULAR CHIPPED STONE POINTS

ARTIFACT NUMBER	DIMENSIONS	WIDTH/LENGTH RATIO	NOTES
304	4.5 x 3.0 x 1.0 cm	.67	The greatest width of this point is five mm from the base, which is slightly concave; crudely worked.
312	(3.6) x 2.8 x 1.0 cm	-	Distal tip is missing; greatest width is at the base, which is slightly concave; crudely worked. On its surfaces are the limey encrusted remains of ectoprocts.
338	4.8 x 2.0 x 0.7	.42	Greatest width is at the base, which is straight; point base been made with considerable care; Figure 4:a.
713	3.1 x 1.5 x 0.6 cm	.49	Greatest width five mm from base.
738	4.5 x 2.3 x 0.7 cm	.51	Made, carefully, from petrified wood; greatest width is 7 mm from the base, which is concave.
772	4.6 x 3.3 x 0.8 cm	.72	Markedly asymmetrical with strong concavity at the base; finely made; Figure 4:b.

ASYMMETRIC TRIANGULAR POINT WITH BARB

This markedly asymmetric specimen (Figure 5), made of basalt, measures 5.2 cm from tip to barb, 3.1 cm along the base, and is 1.0 cm

thick. One edge forms an angle of ninety degrees or slightly more with the straight base. The other edge is convex, and doesn't intersect the base but forms a barb projecting downward. One face of the artifact is flat, while the other is ridged. All edges are bifacially flaked.

SIDE NOTCHED POINTS

Two only were recovered, one complete and one fragmentary.

No. 352 (Figure 5a) is a well made basalt end fragment made of reddish-brown chert, measuring 3.2 x 2.9 x 0.8 cm. After the tip had broken, two burin spalls, one on each side, were struck off one edge, using the fracture from breakage of the tip as a striking platform. The notches are 4 mm deep, and 6 mm wide at its base. The notches on either edge are 4 mm deep, and 6 mm wide. At midpoint they are 8 mm from the base.

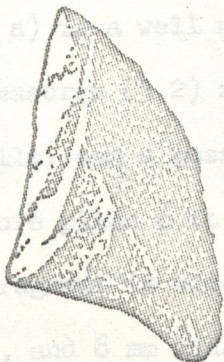


Figure 5: DfEu 8 - Asymmetric Triangular Point with Single Barb

LARGE TRIANGULAR POINT WITH CONCAVE EDGES AND BASE

The bases on both points are straight, and hence they fall none of the categories in Collier, Nelson, and Ford's 1942 classification. One example only of a point similar to that described by King (1950:12, and Figure 9:47) as "concave-convex-notched-barbed" was recovered from the Helen Point deposits. No. 734 is a basalt fragment from the basal end, one barb and much of the blade missing. If the original point resembled the reconstruction here, it would have measured approximately 7 cm from the center of the concavity to the tips.

Both of the points in this category are of basalt. No. 516 (Figure 6a) missing the tip, is 4.9 x 4.2 x 0.6 cm. The greatest width is from barb to barb. The barbs project 1.5 cm on either side of the base which is rounded and thinned to a cutting edge.

from the center of the concavity, and the fragment is plano-convex in cross-section. The higher ridges on the convex face have been lightly ground.

SIDE NOTCHED POINTS

Two only were recovered, one complete and one fragmentary.

No. 352 (Figure Six: a) is a well made basalt end fragment made of reddish-brown chert, measures (3.2) x 2.0 x 0.8 cm. After the tip had broken, two burin spalls, and a possible third, were struck off one edge, using the fracture plane 6 ft from breakage of the tip as a striking platform. The fragment is widest at its base. The notches in either edge are 4 mm deep, and 8 mm wide. At midpoint they are 8 mm from the base.

No. 618 (Figure 86: b) is made of basalt, and is complete. Its measurements are 3.2 x 1.6 x 0.5 cm. It too is widest at its base. The notches are 3 mm deep, 5 mm wide, and the mid-point of the concavity is 6 mm from the base.

The bases on both points are straight, and hence they fill none of the categories in Collier, Hudson, and Ford's 1942 classification.

STEMMED AND BARBED POINTS

Both of the points in this category are of basalt.

No. 516 (Figure Six: c), missing the tip, is (4.9) x 4.2 x 0.6 cm. The greatest width is from barb to barb. The barbs project 1.5 cm on either side of the base which is rounded and thinned to a cutting edge.

On either face of the stem are small facets of heavy grinding. The sides of the blade are shallowly concave.

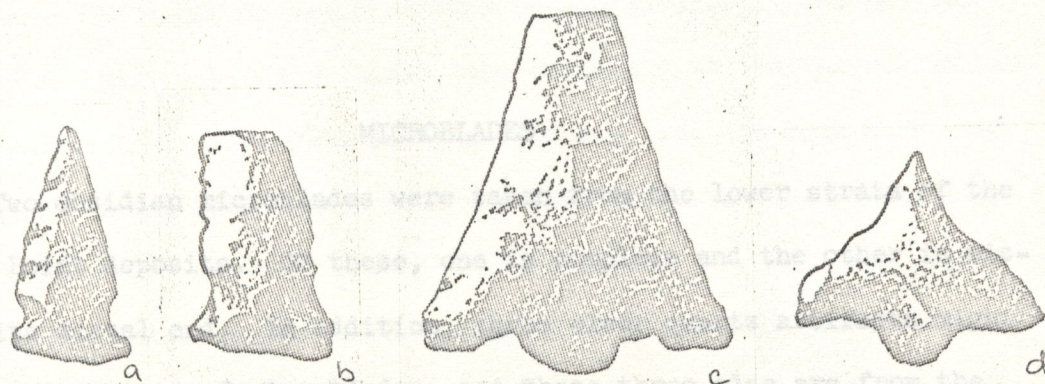


Figure 6: DFRus - Side-notched points (a, b) and Stemmed and Barbed Points (c, d).

No. 528 (Figure ⁶ Six: d) is 3.0 cm from point to base, 3.4 cm from barb to barb, and 1.6 cm thick. The sides of the blade from point to barb, are concavo-convex, and the length of the point relative to its width suggests that it may have been resharpened from an original point more like No. 516. The barbs project 1.2 cm on either side of the stem, and the stem itself is 0.7 cm wide at its base, and rounded and thinned to an edge. The cross-sections of this point as well as that of the previous one, is lenticular.

MISCELLANEOUS POINTS

The Helen Point midden yielded twenty-two fragments of points, the

original shape of which could not be inferred. Twenty of these are of basalt and there is one each of chert and of andesite. Nineteen are tip fragments and three are fragments from the mid-sections of points.

0.1 cm. The edges of the blade are nearly parallel. The central surface is longitudinally concave, the concavity increasing toward the distal end. Both sides show use, but one such more than

MICROBLADES

Two obsidian microblades were taken from the lower strata of the Helen Point deposits. Of these, one is complete and the other is missing its distal end. In addition, three clear quartz artifacts might also be fragments of microblades, and these three also are from the lower levels of the site.

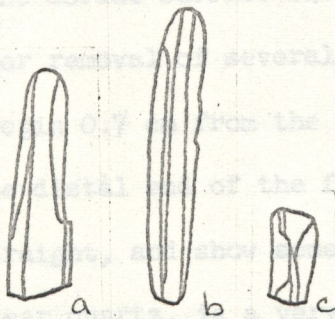


Figure 7: DfRu8-Microblades

No. 379 (Figure Seven: b) is a proximal end (Sanger 1967: Figure 1) fragment, measuring 3.1 x 0.9 x 0.1 cm. It widens towards the distal end, and is widest at the point of breakage. The ventral surface is flat, while the dorsal surface shows three longitudinal blade scars running the length of the fragment. This fragment had split longitudinally also, and is missing one cutting edge. The tip No. 399 (Figure Seven: a) is a proximal end (Sanger 1967: Figure 1) fragment, measuring 3.1 x 0.9 x 0.1 cm. It widens towards the distal end, and is widest at the point of breakage. The ventral surface is flat, while the dorsal surface shows three longitudinal blade scars running the length of the fragment. This fragment had split longitudinally also, and is missing one cutting edge. The tip No. 400 (Figure Seven: c) is a proximal end (Sanger 1967: Figure 1) fragment, measuring 3.1 x 0.9 x 0.1 cm. It widens towards the distal end, and is widest at the point of breakage. The ventral surface is flat, while the dorsal surface shows three longitudinal blade scars running the length of the fragment. This fragment had split longitudinally also, and is missing one cutting edge.

face is longitudinally concave. One^burin spall, 1.9 cm long, had been removed from one edge. Both edges show minute lateral flaking from use.

No. 467 (Figure 7:a) is complete and has dimensions of 3.9 x 0.7 x 0.1 cm. The edges of the blade are nearly parallel. The central surface is longitudinally concave, the concavity increasing toward the distal end. Both sides show flaking from use, but one much more than the other. These flakes have come off both the dorsal and ventral surfaces.

No. 353 is the proximal end fragment of a possible microblade. Made of clear quartz, it measures (1.5) x 0.9 x 0.2 cm. The proximal end exhibits battering around the striking platform. The edges are not parallel, and are widest at the point of breakage. The ventral surface is flat, while the dorsal surface shows several longitudinal ridges left from the prior removal of several blade scars. The majority of these ridges begin 0.7 cm from the striking platform and continue to the break at the distal end of the fragment. The edges are irregular rather than straight, and show some flaking from use.

No. 473, also of clear quartz, is a very small fragment from the distal end of a microblade. Its dimensions are (0.7) x (0.3) x 1.5 cm. The ventral surface is flat, while the dorsal surface shows three longitudinal blade scars running the length of the fragment. This fragment had split longitudinally also, and is missing one cutting edge. The tip at the distal edge is blunted from wear.

No. 474 (Figure 7:c) is a mid-section fragment of a third possible clear quartz microblade, (1.2) x 0.6 x 0.2 cm. The ventral surface is

flat, but none of several scars on the dorsal surface extend the extreme length of the fragment. The fragment itself shows a slight longitudinal twisting. Both edges are flaked from use, and the flakes have come off both surfaces. The sides are roughly parallel.

The striking platform is left. The distal end is flat rather than beveled.

produced by a natural fracture of the crystal. The core is widest

and thickest at this end. MICROBLADE CORES

Helen Point yielded three quartz crystal microblade cores and a fragment of a possible basalt microblade core. Each of the three quartz crystal cores retain sections of the crystal's original surfaces.

No. 425 is a 1.7 x 0.7 x 0.6 cm, complete, clear quartz crystal core. The striking platform had been completely removed. The widest point of the core is near the keel, but the keel itself has been bifacially chipped to form an edge. Sections of three adjacent facets of the original crystal remain.

No. 428 is basalt fragment of what was once possibly a microblade core. It measures 1.7 x 0.9 x 0.4 cm. Two parallel-sided blade scars, adjacent to each other and each 2 mm wide, extend the length of the fragment. At one end these two scars curve inward to meet the fragments opposite. Both the ridges formed by the removal of the blades show slight wear.

No. 448 is a fragment of a clear quartz crystal core, (1.2) x 0.6 x 0.9 cm. Sections of five of the original crystal faces remain, and the original crystal was 6 mm thick. The striking platform was pre-

pared by chipping, and it forms an angle of approximately fifty-three degrees with the fluted surface.

No. 808 is also a clear quartz core, based on a crystal. Its dimensions are 1.0 x 0.9 x 0.8 cm. As with No. 425, no portion of the striking platform is left. The distal end is flat rather than keeled, produced by a natural fracture of the crystal. The core is widest and thickest at this end. This fractured surface is weathered and rust coloured. Only a very small portion of the crystal's original surfaces remain.

SLATE AWL

One slender unshaped splinter of slate, (Figure 8), pointed at one end, exhibits wear only around this point. The tip of the point is visibly worn as are also the ridges leading away from it, although less so than at the tip of the point. Striations do not circle the tip as would be the case if this artifact had been used as a drill, but rather extend from the tip along the length, suggesting use as an awl. This wear extends along the ridges only approximately 5 mm away from the tip. Measurements are 5.2 cm x 1.2 x 0.5 cm.

SANDSTONE KNIFE

Two artifacts in this category were recovered from the Helen Point deposits.

No. 837 (Figure 9) is a fragment of a chipped sandstone knife missing one end. It measures $(9.1) \times 7.9 \times 1.1$ cm, and may have been originally oval in outline. The break, however, has squared one end. The original perimeter is bilaterally chipped, except for one four-centimeter length along one side, adjoining the break. This four-centimeter length is probably a breakage during manufacture of the implement, for the edges of it are well worn, as are the cutting edges.

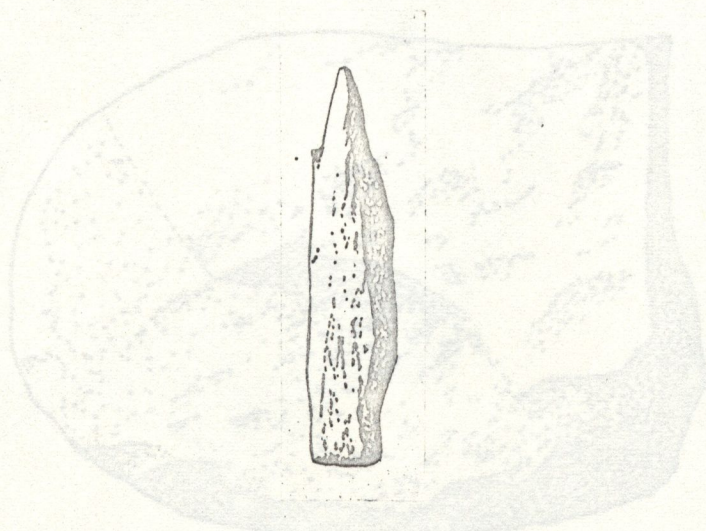


Figure 8: DfEu 8 - Slate Awl

Figure 9: DfEu 8 - Sandstone B face

The break at one end of implement, however, is not worn at all. The artifact may have been used as a saw, although the direction of use could not be determined, and wear on the two faces is light, probably due only to handling.

No. 800 is a roughly triangular fragment, one side of which is a chipped edge and the other two sides breakages after completion of the

No. 837 (Figure 9) is a fragment of a chipped sandstone knife missing one end. It measures (9.1) x 7.9 x 1.1 cm, and may have been originally oval in outline. The break, however, has squared one end. The original perimeter is bifacially chipped, except for one four centimeter length along one side, adjoining the break. This four centimeter length is probably a breakage during manufacture of the implement, for the edges of it are well worn, as are the cutting edges.

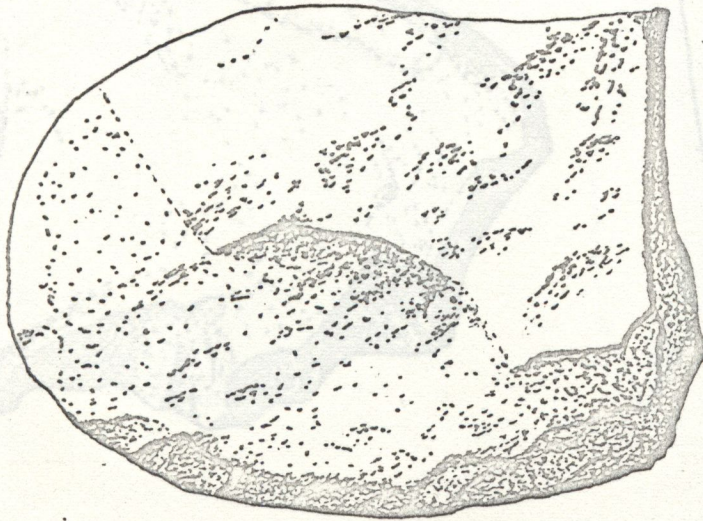


Figure 9: DfEus - Sandstone Biface

The break at one end of implement, however, is not worn at all. The artifact may have been used as a saw, although the direction of use could not be determined, and wear on the two faces is light, probably due only to handling.

No. 802 is a roughly triangular fragment, one side of which is a chipped edge and the other two sides breakages after completion of the

artifact. The cutting edge is 5.7 cm long and the fragment is 5.7 cm wide and 0.7 cm thick. Heavy wear along the edge and also 1.5 cm from the cutting edge inward, and very little wear elsewhere, hence probably used as a saw.

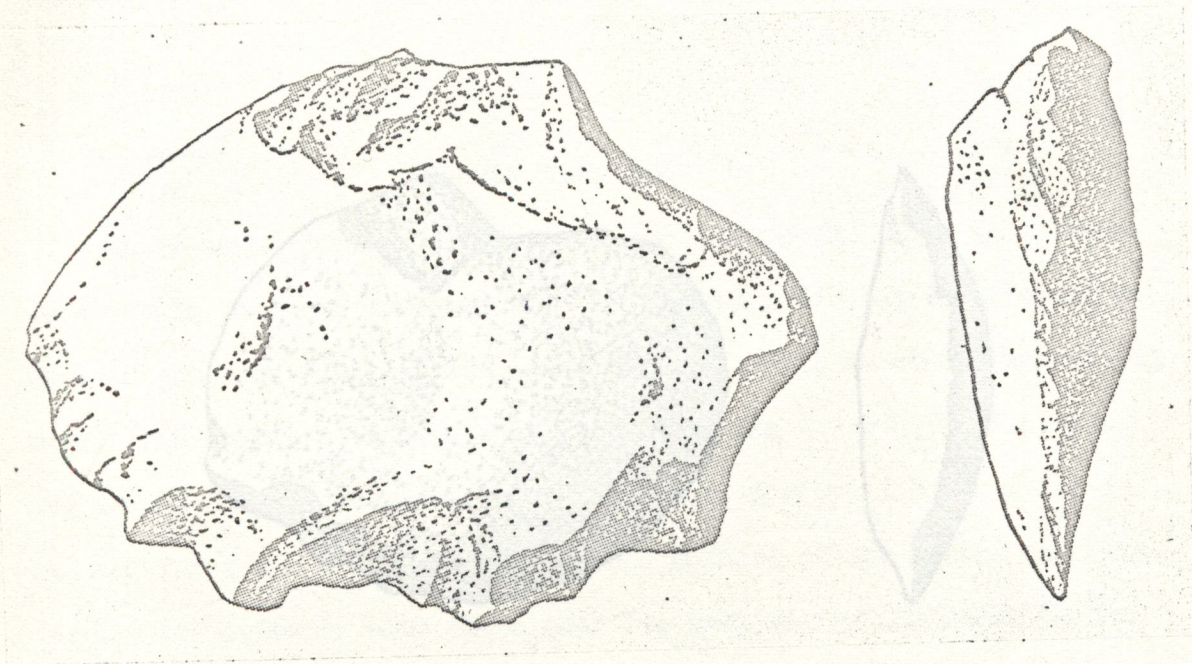


Figure 10a: Cobble Spall Tool.

BOULDER SPALL TOOLS

Helen Point yielded two boulder spall tools. No. 305 is an oval spall of porphyry measuring 7.9 x 5.9 x 1.8 cm (Figure 10:a). The cortex is battered at the point where the boulder was struck to remove the spall and the bulb of percussion is prominent. The spall is slightly convex on both faces. Much of the edge is lightly worn, and has had three flakes bifacially removed from one section of it.

No. 214, (Figure 10:b) measuring 10.5 x 7.9 x 2.3 cm of brown coarse grained basalt has had 13 flakes bifacially removed from the edge opposite the prominent bulb of percussion, producing a cutting edge. The spalling blow dislodged several flakes from the dorsal surface at the point of impact.

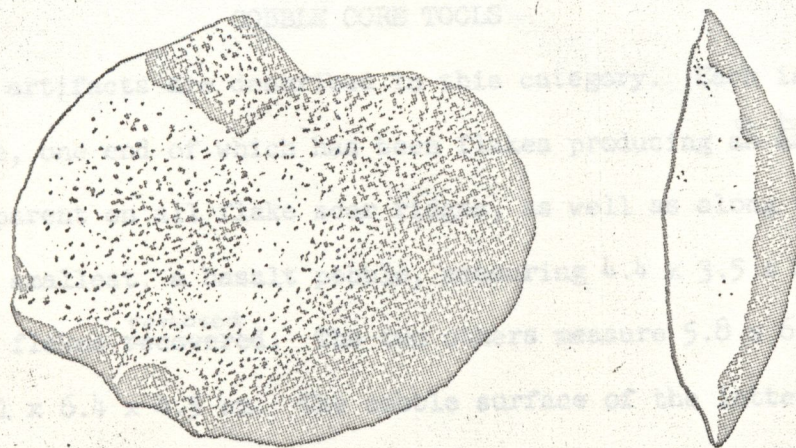


Figure 10 b: DFRus - Cobble Spall Tool

SPLIT AND CHIPPED TOOLS

This category is not a cohesive one. It has been difficult to distinguish breaks between the categories of 'cobble core tools', 'cobble spall tools' and 'chipped slate scrapers or knives'. Those artifacts which do not fit into these categories, as these categories are described in other reports for sites in the Gulf of Georgia region, are here described under the heading of 'split and chipped tools'. In addition, this category includes that form of artifact frequently re-

No. 814, (Figure 10:b) measuring 10.8 x 7.9 x 2.3 cm of brown coarse grained basalt has had 10 flakes bifacially removed from the edge opposite the prominent bulb of percussion, producing a cutting edge. The spalling blow dislodged several flakes from the dorsal surface at the point of impact.

COBBLE CORE TOOLS

Three artifacts are described in this category. Each is a water-worn cobble, one end of which has been flaked producing ^{a bi}an bifacial edge. Wear is apparent on all flake scar ridges, as well as along the cutting edge. The smallest, a basalt pebble, measuring 4.4 x 3.5 x 2.5, has had only 4 flakes ^{removed} recovered. The two others measure 5.8 x 6.1 x 4.5 cm, and 7.1 x 6.4 x 4.5 cm. The cobble surface of the latter one (Figure 11) is pitted on both faces near its proximal end, resembling the characteristic wear on hammerstones.

SPLIT AND CHIPPED TOOLS

This category is not a cohesive one. It has been difficult to distinguish breaks between the categories of 'cobble core tools', 'cobble spall tools' and 'chipped slate scrapers or knives'. Those artifacts which do not fit into these categories, as these categories are described in other reports for sites in the Gulf of Georgia region, are here described under the heading of 'split and chipped tools'. In addition, this category includes that form of artifact frequently re-

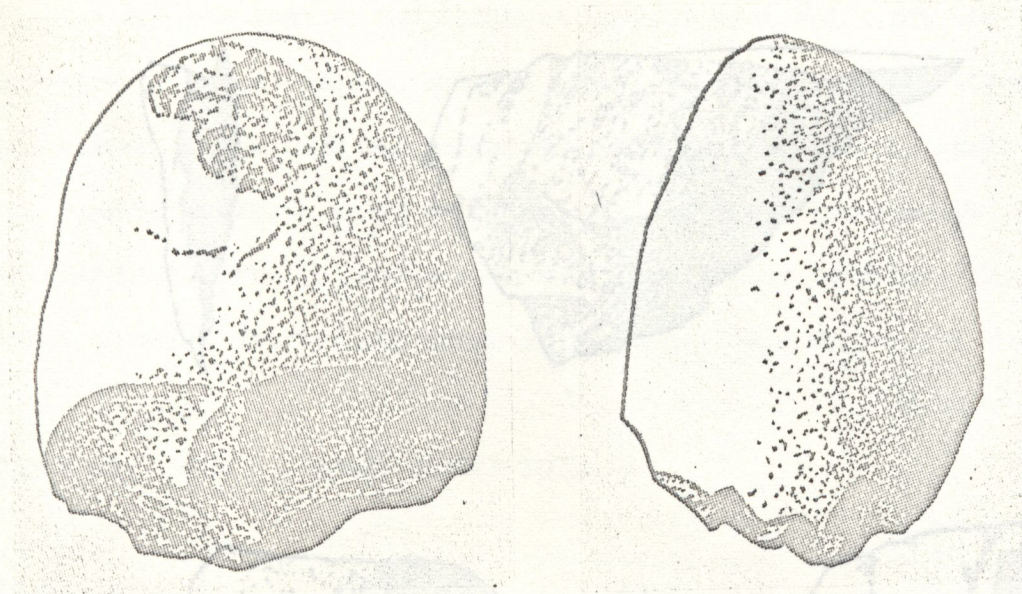


Figure 11: DfRu 8 - Cobble Core Tool

ferred to as cores. Were the assemblage larger it might have been possible to distinguish modes in the frequency of occurrence of some attributes that would have justified distinguishing several categories among the artifacts which are described here under this one heading.

Of a total of thirty-nine artifacts, twenty-nine are of basalt, eight are of slate and one each is of clear quartz, quartzite and andesite. Flakes have been detached from heavy blows to the surface of the artifact, and where cutting edges exist they are steep, thick and only very roughly shaped. Many have one or more weathered or waterworn surfaces, and must represent a substantial percentage of an original cob-

Figure 12: DfRu 8 - Split and Chipped Tools

Fig. 11. A few are smaller artifacts which have been split off the outer surfaces of the cobbles; most are of basalt and some are of quartzite. That have had several surfaces split off. The smallest tool is a water-worn quartzite pebble with one surface detached. Measurements of the thirty-nine tools are given in Table 10.

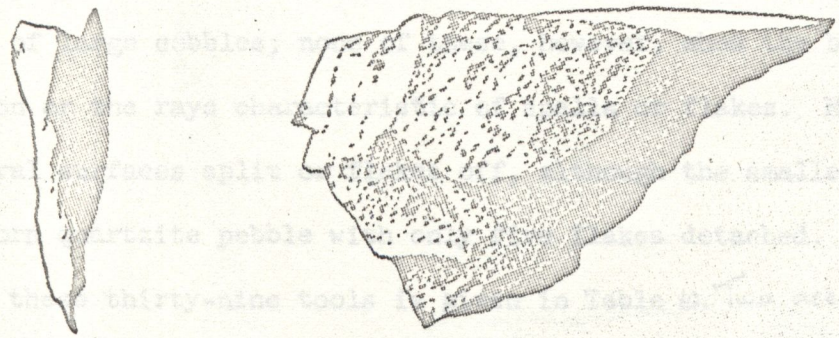


TABLE 10: DFRu 8 - SPLIT COBBLE TOOLS

ATTRIBUTE	MEAN
Length	7.4
Width	5.3
Thickness	2.5

Figure 12: DFRu 8 - Split and Chipped Tools

ble. A few are smaller artifacts which have been split off the outer surfaces of large cobbles; none of these, however, show the bulbs of percussion or the rays characteristic of spalls or flakes. Most have had several surfaces split or flakes off, although the smallest tool is a waterworn quartzite pebble with only five flakes detached. Measurements of these thirty-nine tools is given in Table 10. Two are shown in Figure 12.

TABLE 10: DfRu 8 - SPLIT COBBLE TOOLS

ATTRIBUTE	RANGE	MEAN	S.D.	NUMBER
Length	2.8 - 12.9	7.4	2.5	39
Width	2.6 - 9.0	5.3	1.5	39
Thickness	1.0 - 4.2	2.5	.8	39

CHIPPED SLATE SCRAPERS OR KNIVES

Twenty-three irregularly shaped pieces of chipped slate have the measurements given in Table 11 below. One or more of the sides on each of these artifacts show wear, usually heavy, and highly irregular removal of flakes, ^(Figure 13) It is suggested that the flaking may frequently be the result of use. None seem to be intentionally shaped beyond the production of an edge. One has limy skeletons of ectoprocts on it.

ATTRIBUTE	RANGE	MEAN	S.D.	NUMBER
Length	3.1 - 13.0	7.2	2.1	23
Width	MISCELLANEOUS CHIPPED STONE			23
Thickness	4 - 1.5	.8	.28	23

1. Bifaces: eight irregularly shaped pieces of basalt and two of

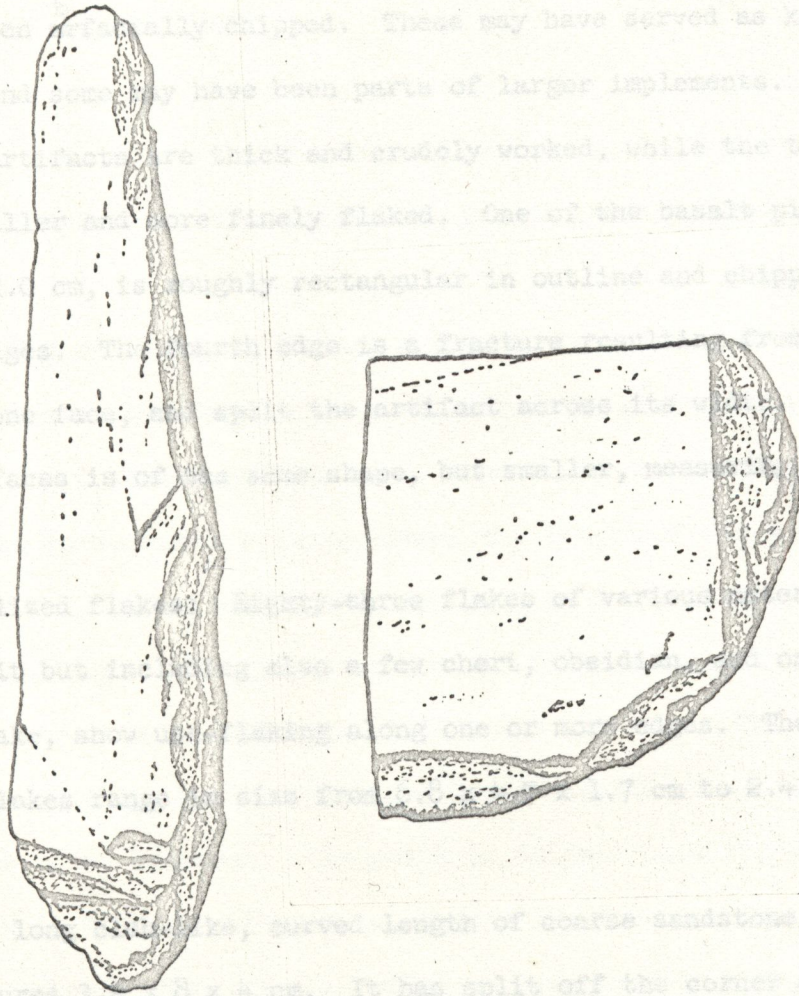


Figure 13: DfRu 8 - Chipped Slate Scrapers or Knives

TABLE 11: DfRu 8 - CHIPPED SLATE SCRAPERS OR KNIVES

ATTRIBUTE	RANGE	MEAN	S.D.	NUMBER
Length	3.1 - 13.0	7.2	2.1	23
Width	1.9 - 6.4	3.4	1.1	23
Thickness	.4 - 1.5	.8	.28	23

chert have been ^{b1}artificially chipped. These may have served as knives or scrapers and some may have been parts of larger implements. The nine basalt artifacts are thick and crudely worked, while the two of chert are smaller and more finely flaked. One of the basalt pieces, 6.5 x 4.7 x 2.0 cm, is roughly rectangular in outline and chipped on only three edges. The fourth edge is a fracture resulting from a single blow to one face, and split the artifact across its width. One of the chert infaces is of the same shape, but smaller, measuring 2.8 x 1.6 x 0.6 cm.

2. Utilized flakes: Eighty-three flakes of various materials, chiefly basalt but including also a few chert, obsidian, and one quartzite flake, show use-flaking along one or more edges. These eighty-two flakes range in size from 6.8 x 4.7 x 1.7 cm to 2.4 x 1.4 x 0.5 cm.

3. One long club-like, curved length of coarse sandstone, unshaped, measures 3.2 x 8 x 4 cm. It has split off the corner of a larger boulder or shelf of sandstone and two adjoining sides are wind-weathered. The specimen flattens towards one end, and from its edges near this flatter end several irregularly spaced flakes have been struck.

The opposite face is a flat surface with two narrow flanking bevels running along each cutting edge from tip of barb to tip of point. This point is sheared, and the shea is 1.0 cm long, and 0.5 cm wide at the base. One edge of the point is very slightly convex, while the other is straight, and the shea is parallel-sided. The barbs are well-made and are formed by sawing down-

2. ARTIFACTS OF GROUND STONE

POINTS

The five complete or nearly complete ground slate points are described below.

No. 244 (Figure 14:a), 4.9 x 1.2 x 0.3 cm, is triangular in outline, and has a straight base. One basal corner is ground to a curve. The point has three facets on each face--a broad one centered on the midline and two narrow ones running almost the length of the point on each edge. Corresponding edge facets on opposite faces intersect to form the cutting edges. The cross-section is lozenge-shaped.

No. 297 (Figure 14:b) measures 5.5 x 2.0 x 0.4 cm. The tip is broken off and missing, but the fracture shows considerable wear indicating use after breakage. The point is thinned basally, and the greatest width is approximately at two-thirds the distance from the tip towards the base. The greatest width is from barb to barb, the upper half of one face is formed by two intersecting levels which slope to the cutting edges, while the basal half of this same face has an additional bevel between them, sloping towards the base. This face then has a ridged upper half only. The opposite face is a flat surface with two narrow flanking bevels running along each cutting edge from tip of barb to tip of point. This point is shemmed, and the shem is 1.0 cm long, and 0.8 cm wide at the base. One edge of the point is very slightly convex, while the other is straight, and the shem is parallel-sided. The barbs are well-made and are formed by sawing down-

wards from each face.

No. 346, measuring $(6.4) \times 2.0 \times 0.3$ cm., is a leaf-shaped point, with its point of greatest width one-quarter of the distance from base to tip. Originally, the point was probably longer than 8 cm. It is lozenge-shaped in cross-section. Both faces are flat with narrow flanking bevels forming the cutting edges.

No. 968, $8.0 \times 1.9 \times 0.7$ cm, is almost an oval in outline. One half of the length of one edge is broken off. This point is almost twice as thick as any of the other-ground plate points. Bevelling is not distinct, and the cross-section through the point is lenticular. The blade is thickest near the mid-point in length, thinning gradually toward either end. The edges are more rounded and less blunt than those of the other ground slate points.

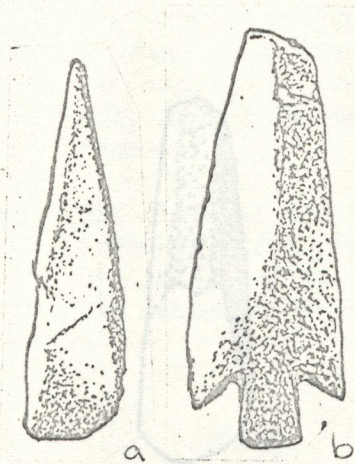


Figure 14: DfRu 8 - Ground Slate Points

Of the nineteen fragments of ground slate points found, eleven are tip fragments, five are mid-section fragments and three are basal end fragments. Nine of the total number are of similar thickness to No. 468, seven of them with equally indistinct bevelling. The other ten fragments are thinner, and on all but two, the bevels are clearly evident.

No. 542 is a tip fragment of what must have been a very large blade. The base and sections from either edge are missing. Each face is very flat, with narrow (0.2 to 0.4 cm) flanking bevels forming the cutting edge. At its widest point the fragment is 4.8 cm wide and 7.1 cm long, and the original blade would have been wider still. Thickness is uniformly 0.3 cm. The breaks show no signs of wear.



Figure 15: DFRu8 - Celt

Four complete, nearly complete, celts of serpentine were recovered from the Indian Point deposits. All are similar in that they are widest at the bit with sides greatly tapering towards the poll;

TABLE 12- CELTS

NO.	DIMENSIONS	NOTES
162	4.0 x 3.4 x 1.8 cm	This is the symmetrical one. The width at the poll is 3.0 cm, but is heavily battered and much of original poll end is now missing. The poll end is rounded. The artifact is elliptical in cross-section and the bit is symmetrically and deeply ground to form the cutting edge.
167	3.3 x 2.7 x 1.4 cm	The width at the poll is 1.7 cm. This celt is complete but was fashioned from presumably a small pebble of serpentine, and one face and one side of the celt keep the original battered pebble surfaces, with their high points ground smooth. One side of the bit is double-bevelled as if reground. The bit is straight, but the bevelling producing it is slightly assymmetric. In cross-section the celt is rectangular, but the sides are greatly excurvate and the corners are rounded. Bevelling is steep.
633	4.7 x 1.5 x 1.0 cm	Gently sloped bevelling, with the blade a little more than one third of the total length of the celt. Celt is thinned at the poll end. The poll is 0.8 cm wide. In cross-section the celt is a polygon. One side is shallowly grooved along the entire length. Battering has removed a section of one side, from the poll to 1.7 cm towards the bit. The bit is rounded.
709	4.9 x 4.2 x 1.1 cm	The width at the poll 3.8 cm. Rectangular cross-section. Battering has heavily damaged the poll, and one edge from the blade towards the center of the celt. The bit is straight.

571, is cut square at one end and cut at an angle at the other, a characteristic which, according to CELTS is typical of this type of the

Four complete, nearly complete, celts of serpentine were recovered from the Helen Point deposits. All are similar in that they are widest at the bit with sides greatly tapering towards the poll;

all are ground to a highly polished finish; and all but one are slightly asymmetric in outline. The bit is formed by intersection of bevelling on the two faces. All are symmetrically bevelled.

In addition to these four, the excavations yielded fragments from the bit ends of one celt, and from the poll end of three others. The bit end fragment is bevelled heavily on one face and almost not at all on the other. All of the three poll fragments resemble the complete celts described above in that they increase in width toward the missing bit. One of these is very thin at the poll (4 mm) increasing in thickness to 1.1 cm at the break. This one is also more rectangular in cross-section, than are the other two. One of these has a shallow (1 mm) groove along one side.

GULF ISLANDS COMPLEX ARTIFACTS

Five highly polished problematic objects are described under this category. Two of them fit Type C of Duff's (1956) description of forty-two of these objects from sites in the Gulf Islands area.

Of the two which fit into Duff's Type C, both are fragmentary. Each has broken along the mid-line of the original groove. One of them, No. 571, is cut square at one end and cut at an angle at the other, a characteristic which according to Duff, is typical of this type of the Gulf Islands complex artifacts.

The other specimen is cut squarely at both ends. Both are larger in cross-section at the ends than at the middle, "waisted", which is

another typical characteristic. They measure 2.2 x 0.4 x 1.3 (No. 750) and 1.7 x 1.5 x 0.3 cm (No. 571).

The other three artifacts do not fit any of Duff's categories. No. 283 is rectangular, 1.7 x 0.9 x 0.3 cm. One face has two ground depressions extending about 4 mm inward from either of the shorter sides. It is trapezoidal in cross-section. Ground to a smooth finish over all surfaces.

No. 355 is an unbroken (1.6 x 0.5 x 0.2 cm) oval shaped object of soapstone. There is one small flake scar at either end. The object is curved, and one end is slightly hooked. The point of greatest thickness is at the end opposite this hook.

No. 816 is fragmentary, missing sections at both ends. It is curved along its length, and thinned at either end. Most of these ends are missing. It looks as if it might have had a hole through the center of the original artifact, since the original inner surface forms a semicircle between the two breaks. The sides are squared off.

BEADS

The two very similar ground stone beads recovered measure 1.0 and 0.9 cm in diameter. Both are 0.5 cm thick. The center perforation of each has been drilled from both faces. The inner diameter of each hole is 4 mm. Both beads are uniformly polished.

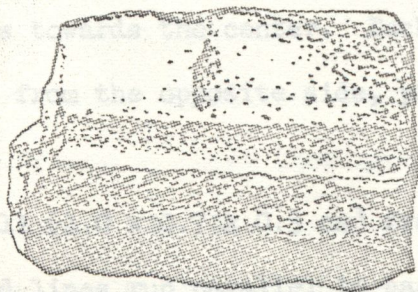
ing a flake of stone between DRILL has now broken and is missing,

One broken drill made of soft sandstone-like rock, measures 5.4 x 3.6 x 1.3 cm. The distal end is 9 mm from the drill tip to the shoulders and this area is ringed by very fine abrasion lines. The faces on the body of the drill are flat, and the body is rectangular in cross-section, with rounded edges. Cross-section of the drill bit is ovoid. Towards the fractured end the grinding is less heavy, and the faces are rougher.

INCISED STONES

Two artifacts of stone have had lines incised into them producing symmetrical patterns. GROUND AND SAWN OBJECT

No. 288 is a battered weatherworn or waterworn stone, pebble shaped, 9.3 x 4.3 x 1.7 cm. On one face are several lines shallowly incised from the edge to the center. One line from one side corresponds to a line from the other side, forming a roughly symmetrical pattern.



No. 281 is a small fragment of basalt. Three very shallowly incised lines are spaced 3 mm apart, the full length of the fragment. The lines are not complete but they have broken off.

Figure 16: DFR 8 - Ground and Sawn Fragment

This fragment (Figure 16) is broken on three sides and one face, so that only one face and one side of this object are sections of the original artifact's surfaces. This side and much of the face have been ground to a smooth finish. The face bears two lengthwise grooves, form-

ing a ridge of stone between them which has now broken and is missing, leaving an unground section running the length of the object separating the two grooves, running along what is approximately the fragments midline, is shallow, only 3 mm deep at its deepest point (at one end). The second groove, if it was in fact originally a groove, has been broken through its length.

No. 755 is a winged fragment of ground slate missing most of one face and split along its entire length. At the end opposite the wing, both faces are preserved. **INCISED STONES** at this point is 6 mm thick.

Two artifacts of stone have had lines incised into them producing symmetrical patterns.

No. 288 is a battered weatherworn or waterworn stone, pendant shaped, 9.3 x 4.3 x 1.7 cm. On one face are several lines shallowly incised from the edges towards the center. Each line from one side corresponds to a line from the opposite side, producing a roughly symmetric pattern. the surfaces of which show marked pitting from use in

No. 841 is a small (1.0 x 0.7 x 0.3 cm) fragment of basalt. Three very shallowly incised lines run parallel to each other 3 mm apart, the full length of the fragment. There may have been more but they have broken off. the surfaces, and here it is limited to sections near the narrow ends. Measurements of the five hammerstones from Helen Point are given in Table 13 below.

MISCELLANEOUS GROUND STONE

Twenty-seven fragmentary sections of ground stone were found. Three of these were thin sections of ground slate with lengths of bi-

facially bevelled cutting edges. Two others may be described in more detail. No. 194 is a thin fragment of ground slate measuring (6.0) x 2.5 x 0.4 cm; broken at its widest end and for a short distance along one edge. Both faces are flat and smooth, and all edges are rounded and blunt. The tip is curved, and damaged and roughened from several small fractures.

No. 755 is a winged fragment of ground slate missing most of one face and split along its entire length. At the end opposite the wing, both faces are preserved, and the artifact at this point is 6 mm thick.

3. ARTIFACTS OF PECKED AND GROUND STONE

HAMMERSTONES

Hammerstones are naturally flattened, oval river or beach cobbles with sections of the surfaces of which show marked pitting from use in a pounding or pecking manner. All five artifacts in this category are complete. All show some use at several points around their circumference, but use is concentrated near one or both ends. Only one shows use on the flat surfaces, and here it is limited to sections near the narrow ends. Measurements of the five hammerstones from Helen Point are given in Table 13 below.

Two oval river or beach cobbles show heavy grinding wear - one on one face and the other on both faces. The larger of the two shows some pitting around its sides and on its non-ground face and it may have served also as a hammerstone. Measuring 9.3 x 8.2 x 4.3 cm, it falls well within the range given for hammerstones in Table

The smaller handstone (Figure 17) measures 7.0 x 4.8 x 2.8 cm,

TABLE 13: HAMMERSTONES

ATTRIBUTE	RANGE	MEAN	S.D.	NUMBER
Length	6.4 - 11.6	9.3	2.3	5
Width	4.0 - 10.4	7.3	2.3	5
Thickness	3.2 - 5.7	4.4	.9	5

HANDSTONES

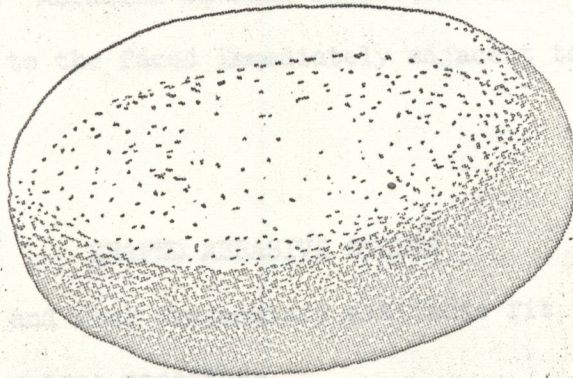


Figure 17: DfRus - Handstone

IRREGULAR ABRASIVE STONES

In the Helen Point assemblage are fifty-nine abrasive stones of irregular outline and shape. Two oval river or beach cobbles show heavy grinding wear - one on one face and the other on both faces. The larger of the two shows some pitting around its sides and on its non-ground face and it may have served also as a hammerstone. Measuring 9.3 x 8.2 x 4.3 cm, it falls well within the range given for hammerstones in Table .

The smaller handstone (Figure 17) measures 7.0 x 4.8 x 2.8 cm,

and has been used on both faces. On one of these is a red stain, probably ochre.

303 (6.6) x 2.2 x 1.9 cm

A tip end fragment of a long, parallel sided, abrasive stone. The surfaces are flat and the stone is square in cross-section.

SAWS

Two irregular fragments of saws measured (9.1) x (4.5) x 0.5 cm and (11.1) x (7.6) x 0.8 cm. Both are of sandstone and neither has been carefully shaped. The cutting edge on the first is 4 cm long; on the second 6.5 cm. Abrasion on both implements is restricted to the cutting edges and to the faces immediately adjacent to them.

362 (3.0) x 1.9 x 1.3 cm

A bevelled tip fragment only. This stone is like No. 303 but found in cross-section. It is bevelled only on one plane, a rounded blunt edge at

SHAPED ABRASIVE STONES

Two complete and four fragmentary artifacts fit into this category. Each is made from coarse sandstone.

A small triangular fragment of uniform thickness, the fragment is widest at the fracture. It resembles the drill described above, but is without shouldering or an abrasive black ring at tip.

IRREGULAR ABRASIVE STONES

In the Helen Point assemblage are fifty-nine abrasive stones of irregular outline and showing little or no evidence of purposeful shaping. Many have one or more weathered or worn edges, and most are fragments broken or split from larger pieces. Most are of coarse sandstone although one is of fine grain siltstone and one is of schist.

For the greater number, the size and shape of the original abrasive stone can not be determined. Two have on them the limy circular

TABLE 14: SHAPED ABRASIVE STONES

ARTIFACT NUMBER	DIMENSIONS	NOTES
308	(6.6) x 2.2 x 1.9 cm	A tip end fragment of a long, parallel sided, abrasive stone. The surfaces are flat and the stone is square in cross-section. One end is missing. Three sides are bevelled to form the tip. This beveling is 3 cm wide. The bit is straight.
375	(3.3) x (3.7) x 0.6 cm	A corner fragment, forming an angle of approximately 125 degrees. The sides and faces are at right angles to one another.
462	(3.0) x 1.9 x 1.3 cm	A bevelled tip fragment only, this stone is like No. 308 but round in cross-section. It is bevelled only on one plane, forming a rounded blunt edge at the bit.
740	(2.9) x 1.5 x 0.5 cm	A small triangular fragment of uniform thickness, the fragment is widest at the fracture. It resembles the drill described above, but is without shouldering or an abrasive lines ringing the tip.

scars of barnacle shells. Size varies considerably, up to 18 x 11.5 x 6 cm, a large heavy complete abrasive stone, clumsy and heavy to hold. The flat, rectangular, well made bone point has had several shallow notches, each one millimeter deep, cut into the point along one edge. These eleven notches are irregularly spaced. The other edge is smooth. The first notch is 2.5 cm from the tip, and the notches continue to the base of the point. At approximately the center of the

4. ARTIFACTS OF BONE POINTS

WEDGE-BASED BONE POINTS

Three wedge-based bone points were found, two complete and one fragmentary. All have bases that taper to under 2 cm in thickness. All are worked over all faces. Cross-sections are rectangular, becoming more rounded closer to the tips. Measurements are (5.5) x 0.8 x 0.4 cm, 6.7 x 1.0 x 0.5 cm and 4.8 x 0.4 x 0.3 cm.

BARBED BONE POINTS

Five fragments of barbed bone were found. Four have pendant-shaped cross-sections, the barbs being cut through the sharp edge. These five have their barbs enclosed. The odd one is round in cross-section, and has only one isolated barb. All are mid-section fragments but one, which is the tip end of a barbed bone object. Table 15 describes these artifacts in more detail. All are unilaterally barbed.

SERRATED BONE POINT

One flat, rectangular, well made bone point has had several shallow notches, each one millimeter deep, cut into the point along one edge. These eleven notches are irregularly spaced. The other edge is smooth. The first notch is 2.5 cm from the tip, and the notches continue to the base of the point. At approximately the center of the

TABLE 15: BARBED BONE POINTS

NO.	DIMENSIONS	NUMBER OF BARBS	BARB	NOTES
227	(3.0) x (0.8) x 0.4 cm	4	0.1 cm	The barbs are enclosed. The entire point is calcined.
245	(3.7) x 0.8 x 0.5 cm	3	0.2 cm	The barbs are 0.9 cm apart. Tip fragment, with first barb 2.1 cm from point, with barbs enclosed.
299	(2.5) x (0.9) x 0.5 cm	3	0.1 cm	A mid-section fragment. A very shallow incised line runs the length of one face. The artifact is charred. The barbs are enclosed.
434	(2.7) x (0.6) x 0.5 cm	1	Barb Missing	A mid-section fragment. The single isolated barb is circular in cross-section.
697	(2.8) x (1.0) x 0.7 cm	3	0.2	Tip is chipped; barb enclosed.

point. At approximately the center of the point, on one face, running lengthwise is a 3.5 cm long groove, 1 mm deep and 2 mm wide. This point measures 8.3 x 0.9 x 0.4 cm.

BIPOINTED BONE OBJECTS

Of the fifty-two bipointed bone objects found, the artifact in thirty-six cases was fragmentary, although enough remained to tell that they tapered to a point at each end.

and sharpened by FRAGMENTS OF POINTED BONE OBJECTS

Forty fragments of bone, all tapering to a point, range in size from 0.6 cm to 5.5 cm. Form and function of these fragments can not be inferred. Three of these are sharpened splinters of bird bone, while the others are fashioned from the bones of mammals. One awl is based on a single splinter of mammal long bone. All has been carefully pointed at one end, although two are missing the extreme end of the point. SMALL SINGLE POINTED BONE OBJECTS

Two small (2.4 cm and 2.0 cm) triangular bone objects are squared at one end and taper to a point at the other. Both are of mammal bone. Both are roughly circular in cross-section. The diameter is greatest near the squared end, and is 4mm for both. Both have a slight flattening towards the base. The channel has been obliterated.

Six retain a section of the head of the bone, while one was taken from further down on the long bone. The two others are tip fragments.

BONE DRILL

One small rectangular fragment of bone is asymmetrically shouldered and rounded at one end, forming a point the extreme tip of which is missing. Around the circumference of this point are tiny striations suggesting use as a drill. The fragment measures (1.7) x 0.5 x 0.4 cm.

Of these four, the shafts on three have been sharpened to awl-like points, while the fourth has a broad, flat blade. Working on all four is restricted to the

SPLIT BONE AWLS

Three splinters of mammal bone have been split obliquely, producing a point on each. The point so produced on one has been thinned

and sharpened by grinding on the two flat faces of the bone.

GROUND BONE AWLS

Of a total of nine, five are complete. Each of the ground bone awls is based on a single splinter of mammal long bone. All has been carefully pointed at one end, although two are missing the extreme end of the point. The remaining lengths of the artifacts show varying amounts of working, from none at all to, in one case, heavy grinding, and squaring of the end opposite the point. Lengths of these artifacts range from 4.5 to 16.0 cm. Five show sections of the marrow channel. Two are made from ulnae and have no marrow channel, and two have been ground so heavily that the channel has been obliterated.

Six retain a section of the head of the bone, while one was taken from further down on the long bone. The two others are tip fragments.

ULNA TOOLS

Six deer ulna recovered show intentional sloping of the shaft below the head of the bone (Figure 18). Four of the six are complete tools. Of these four, the shafts on three have been sharpened to awl-like points, while the fourth has a broad, flat blade. Working on all four is restricted to the shaft portions. Lengths of the three slender-pointed ulna tools are 8.0, 10.6 and 11.2 cm, and the broad flat ulna tool is 13.3 cm long and the blade, slightly tapering with a wide

MAXIMAL BONE OR WEDGES

The four specimens which fall into this broad category vary widely in form and dimension. Their most common properties are the wedge shaped bit and the fact that they are made of animal bone. Each piece is described below.

No. 668: This specimen, which is a maximal long bone, still has a portion of the marrow groove. Measuring 3.0 x 0.8 x 0.4 cm, the specimen is a tip of a bone. In side view, the fragment is rectangular in cross-section and the sides are squared. The sides are parallel, and the wedge tip, which is straight and squared, is formed by gentle sloping bevels. The bit has had several small flakes of bone detached through use.

No. 742, completely broken, measures 2.5 x 0.3 cm. Width and thickness are roughly uniform to about one centimeter from the tip, where both sides and a face bevel gently towards the bit, which is straight and squared. The specimen is rectangular in cross-section, although the sides are deeply bevelled rather than squared. The poll is rounded.

No. 744 is also complete and has dimensions of 2.8 x 0.9 x 0.8 cm. The two sides are parallel up to 7 mm from the end, where they begin to curve inward. In side view, the specimen is triangular, since the two blunt tip, is 2.5 cm wide at its widest point (1.5 cm wide at the tip) and 0.7 cm in thickness, which is roughly uniform throughout.

In addition, the proximal ends of two broken deer ulna show slight intention modification on the small portions of the shaft remaining.

Figure 18: Df Rus - ulna Tool



MAMMAL BONE CHISELS OR WEDGES

The four specimens which fall into this broad category vary widely in form and dimension. Their only common properties are the wedge shaped bit and the fact that they are made of mammal bone. Each piece is described below.

No. 628: This specimen, made of mammal long bone, still has a portion of the marrow groove on one side. Measuring 3.0 x 0.8 x 0.4 cm, the specimen is a tip fragment. Well-made, the fragment is rectangular in cross-section, and the edges are squared. The sides are parallel, and the wedge-tip, which is straight and squared, is formed by gentle sloping bevel on one face. The bit has had several small flakes of bone detached through use.

No. 742, complete, measures 7.4 x 1.1 x 0.3 cm. Width and thickness are roughly uniform up to approximately one centimeter from the tip, when both sides and one face begin to bevel gently towards the bit, which is straight and 3 mm wide. The specimen is rectangular in cross-section, although one side is steeply bevelled rather than squared. The poll is rounded.

No. 744 is also complete, and has dimensions of 2.8 x 0.9 x 0.8 cm. The two sides are parallel up to 7 mm from the end, where they begin to curve inward. In side view, the specimen is triangular, since the two faces slope towards each other and at no point are they parallel. The bit is 3 mm wide. The poll is squared, and two flakes have been removed from one side from battering.

No. 779 is a fragment of a wedge of mammal long bone, now missing

its poll end and one side. A section of the narrow groove is preserved along the length of one face, the fragment has split through its length. The bit is formed from bevelling on one face, and is rounded on the remaining portion.

BIRD BONE TUBES

Four lengths of seal WHALEBONE WEDGE have been sectioned and ground.

One large thin wedge-shaped fragment of whalebone, missing its poll end, measures (13.3) x 4.5 x 0.8 cm. It is gently tapering from poll end to bit, the taper increasing towards the bit, but the thickness is uniform except for an asymmetrical unifacial bevel at the extreme tip. The edges are rounded, and in cross-section the wedge is concavo-convex. The length of bone has been sectioned at both ends, both at right

angles to the long axis. Both ends have been ground flat and polished, and much of the surface of the bone shows a high polish also but no abrading lines. This artifact

NEEDLES

Both needles recovered were perforated at their distal ends. One is complete, and one is broken through the hole and is lacking the proximal end. The complete specimen, 5.9 x 0.9 x 0.3 cm, is widest at the poll and tapers to form the rounded, rather blunt tip. It has been made from an end section of long bone of a small mammal. The poll, which has been only lightly worked, shows battering use. The tip end is much more finely worked. The hole, 2 mm in interior diameter and 1.4 cm from the tip, has been produced by incising and drilling. Rectangular in cross-section, this artifact may be an awl with a suspen-

sion hole rather than a needle. The fragmentary specimen, (1.7) x 0.5 x 0.2 cm, is finely worked and is ground to a relatively sharp point. The drilled perforation is 1.5 cm from the tip.

BIRD BONE TUBES

Four lengths of hollow bird bone have been sectioned and ground. Two of these, one 6 mm in diameter and 5.1 cm long, and the other 4 mm in diameter and 3.0 cm long, have been sectioned at one end only, at right angles to their long axes. The opposite ends have broken away. The sectioned ends and parts of the surfaces on each have been ground and polished to a high finish.

One length of bone has been sectioned at both ends, both at right angles to the long axis. Both ends have been ground flat and polished, and much of the surface of the bone shows a high polish also but no abrading lines. This artifact has a diameter of 8 mm and a length of 3.7 cm. Because of its short total length, this one probably was used as a bead, rather than as a drinking tube, and it has no oblique cut as do whistles.

The fourth length of hollow bird bone, sectioned squarely across one end, does have an oblique cut at the opposite end although here the specimen has broken leaving only part of the cut. This oblique cut extends only .3 cm into the bone, and is dish-shaped before it intersects with the fracture.

CARVED RIBS

Two lengths of mammal rib, each broken at both ends, have been carved. The longer of the two fragments, No. 640, measures (5.0) x 1.0 x 0.5 cm. Along the length of the fragment on both sides are a series of short incised lines, each extending approximately 1 mm from the edge in towards the center of the bone. Each line is approximately 1 to 2 mm from the lines on either side of it. The designs on the two sides are not particularly symmetrical. On the opposite face to that with the incised lines, at one end of the fragment, is a hole drilled deeply into the bone, though not completely through. Half of this depression only remains, since the break runs through it.

The smaller of the two fragments of decorated rib has two biconically drilled holes through it, one hole near either end. Between these two perforations on one face are three shallowly drilled depressions, with no corresponding markings on the opposite face. Dimensions of this artifact are 2.9 x 0.9 x 0.4 cm.

MISCELLANEOUS WORKED BONE

Forty-five fragments of mammal bone exhibiting varying amounts and kinds of working cannot be classified with any degree of certainty. All but two exhibit grinding marks except two fragments of sea mammal bone which have been adzed. One specimen deserves special comment.

No. 565 is a 3.6 x 1.0 x 0.5 cm fragment of well-finished bone; a section along one side is missing. One end is squared. The opposite

end is divided by a sawn central 9 mm groove into two halves, only one of which remains. This is shaped into a blunt point, and was perhaps matched by a second point now broken off. This artifact might possibly have been an atl-atl barb.

5. ARTIFACTS OF ANTLER

FIXED BARBED ANTLER POINTS

Three basal fragments of fixed barbed antler points were recovered at Helen Point. Each had broken immediately above the first barb in all cases. The barbs are produced by sawing from both faces.

No's. 209 and 769 are very similar. Both are 5.0 cm long. Both are round in cross-section, and each is approximately five millimeters in diameter at the point of breakage. The bark on No. 769 begins 3.3 cm from the base, and is very low (2 mm). The extreme tip of the barb is missing, but originally it could not have been much higher than this. The barb on No. 208 began 4.0 cm from the base but is now completely missing, leaving only a scar where it once was.

No. 547^(Figure 19:a) is a broad, flat point, with measurements of (5.3) x 1.9 x 0.7 cm. The barb on this specimen is also very low (3 mm), and begins 3.1 cm from the base. One face, from the bevel of the barb to the base, is decorated with a series of incised lines in ladder-like patterns running almost across the width of the specimen. In cross-section this point is ovoid. The base is rounded.

NON-TOGGLING HARPOONS

Artifacts in this category include one substantially complete specimen and one basal end fragment.

No. 190^(Figure 18:b) 12.9 x 2.2 x 0.8 cm, has broken obliquely from one side to the base; hence one corner is missing. The single barb is 2.5 cm from the tip, and is one centimeter away from the shaft of the harpoon. The shaft is flat and rectangular in cross-section, and widens towards the base. Two centimeters from the base the shaft expands to its widest thickness, and on one side there is the incipient bulge of a line guard at the point where the fracture begins. Assuming the weapon to be originally symmetrical, the shaft would thin from here to the straight base.

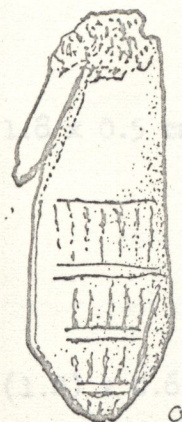
No. 300 is a basal fragment, with a single line guard, on one side. The harpoon has broken just above this guard, leaving a fragment that measures (5.2) x 2.0 x 1.0 cm. The fragment is widest through the line guard, tapering to 1.2 cm at its base, which is rounded off. The line guard is a rectangular projection extending 6 mm from the side of the shaft. A cross-section of the shaft taken through the line guard would be shaped like a pendant in outline.

BARBED ANTLER FRAGMENTS

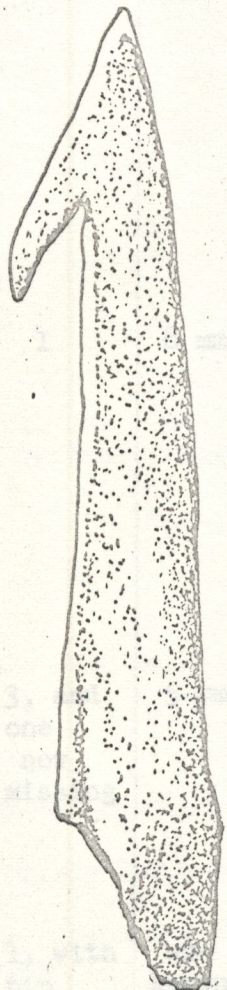
Six fragments of barbed antler are mid-sections from fixed points or harpoons. Descriptions are given in detail in Table 16.

TABLE 19. BARBED ANTLER FRAGMENTS

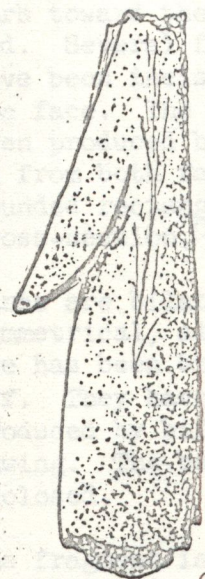
NO. SPECIMEN	DIMENSIONS	NUMBER OF BARBS	BARB HEIGHT	NOTES
133	(4.5) x (1.1) x 0.6 cm	2	4 mm	The two still extant barbs are missing their tips. There is a possible third, in that the shaft expands although there is no indication that this expansion became a barb. All three are enclosed.
347	(7.4) x 1.8 x 1.2 cm	1	2 cm	The original artifact may have had another barb to the distal end. The lines suggest a barb has been produced by bifacial sawing.
301	(4.4) x 1.0 x 0.5 cm	3	1 cm	The fragment has split along its length and is missing one side.
328	(1.6) x (1.1) x 0.4 cm	1	1 cm	



a



b



c

Figure 19: DFRs - Barbed Antler Points, and Non-Toggling Harpoon.

TABLE 16: BARBED ANTLER FRAGMENTS

NO.	DIMENSIONS	NUMBER OF BARBS	BARB HEIGHT	NOTES
335	(4.5) x (1.1) x 0.6 cm	2	4 mm	The two still extreme barbs are missing their tips. There is a possible third, in that the shaft expands although there is no indication that this expansion becomes a barb. All three are enclosed.
347	(7.4) x 1.8 x 1.2 cm	1	8 mm	The original artifact may have had another barb toward the distal end. Several fine lines have been incised on one face. The barb has been produced by sawing in from both faces. Rounded rectangle in cross-section, (Figure 19:c)
361	(2.4) x 1.8 x 0.5 cm	3, and one now missing	5 mm	Barbs are bilateral and symmetrical, although one has been broken off. They have been produced by bifacial sawing. The barbs are enclosed.
368	(1.6) x (1.2) x 0.6 cm	1, with tip missing	unknown	The fragment is too small to indicate whether or not more barbs existed on either side of the one still preserved. This one barb has been produced by bifacial sawing. The fragment has also split along its length and is missing one side.

TABLE 16 - Continued

NO. DIMENSIONS	NUMBER OF BARBS	BARB HEIGHT	NOTES
431 (3.6) x 1.9 x 0.8 cm	4, possibly 6	3 mm	Fragment is bilaterally barbed. Bifacial sawing has produced the barbs and the sawing marks at the distal end indicate that there was probably at least one more pair. The proximal end pair may not be barbs at all, but simply a widening in the shaft. The barbs are enclosed.
638 (4.9) x 1.0 x 0.7 cm	1, now broken	unknown	The single barb is isolated. There are no strong indications that there were any more barbs on the original weapon. The shaft is round in cross-section.

COMPOSITE TOGGLING HARPOON VALVES

Of the three composite toggling harpoon valves recovered, only one is complete. The other two are distal end fragments. None of the three show lashing grooves.

No. 567, measuring (3.2) x 1.2 x 0.6 cm, is a distal end fragment, broken just beyond the point of greatest width where the valve begins to taper towards its proximal end. A foreshaft socket 4 mm deep extends 1.4 cm from the break towards the tip, but is abruptly replaced by a flat blade bed 1.8 cm long.

No. 572, also a distal end fragment, has measurements of (3.3) x 1.0 x 0.5 cm. The valve has broken one millimeter beyond the point of greatest width. The pointed bed, very shallowly hollowed, extends from the tip 2.6 cm towards the broken end, where it is separated from the fore shaft socket by a flat contact area 4 mm wide. Two millimeters of the foreshaft socket are still visible. Drucker has classified this sort of composite toggling harpoon valve as Type I.

No. 762 is the single complete valve found at Helen Point. Its dimensions are 7.9 x 0.8 x 0.6 cm. One 5.0 cm long, 3 mm deep, roughly sawn groove undifferentiated into foreshaft or blade sockets extends from the proximal end to 4.9 cm from the distal end, at which point a flat blade bed begins. The distal end is considerably sharper than the rounded, rather blunt proximal barb.

ANTLER SLEEVE HAFT

The one specimen from the Helen Point deposits was found in several fragments, and is not entirely complete. It is 9.0 cm long, 6.9 cm wide and 3.3 cm thick. The sleeve narrows towards one end, to 6.5 cm wide. The two ends are shaped by adzing and abrading. Several adze blows are prominent around the thinner end. The thinner end has been roughly squared, while the wider end, where still extant, has been bevelled. The porous center has been completely hollowed out, and the sleeve is a hollow, flattened cylinder. The walls of the sleeve are approximately 6 mm thick.

ANTLER WEDGES

Fragments of eighteen antler wedges were recovered. Fifteen of the recovered fragments were splinters with a short length of bevelling along one edge. Most of the artifacts in this category have not been preserved well. Heavy battering from use is no doubt responsible for many of the splinters.

These range in length from 15.8 cm to 2.3 cm. Two antler tine wedges were also found, both curved following the shape of the tine. These were bevelled at the narrow end, and one had been split along its length and bevelled at the narrow end of this split surface.

Five fragments are the complete or nearly complete bit ends of wedges split from the beam section of the antler. All have blunt bits ranging in width from 4.5 cm to 2.0 cm, except for one which is shaped by two straight lines intersecting at a 20 degree angle forming a rather dull point. One specimen, No. 724, measuring 4.2 x 3.0 x 0.8 cm, has had the poll end removed by adzing and snapping. The end so produced shows no subsequent battering wear.

Figure 20: D.C.P. 8 - Carved Antler

CARVED ANTLER

(Figure 20a)

No. 253_A is an asymmetrical but roughly circular object of antler decorated with shallow incised lines on one face (the cortex). Originally two shafts of antler divided by a groove sawn from both faces projected from one side, but all of one shaft and much of the second are now broken away. The shallowly incised design is of two concentric

circles, the outer one not quite complete, placed slightly off-center and towards the now broken projecting shafts. The circles are surrounded by wavy and straight lines running from the edge almost to the outer of the two circles. In cross-sections the object is plano-convex. Its measurements are $(4.5) \times 3.6 \times 0.9$ cm.

No. 270, possibly a blanket pin, is a curved oval with a tapering projection 3.5 cm long begins. The entire artifact measures $6.8 \times 2.9 \times 0.7$ cm. The extremity of the projection is missing. Most of the surface of the oval end of the artifact has been carved into a large semi-circle and a smaller rectangular one.

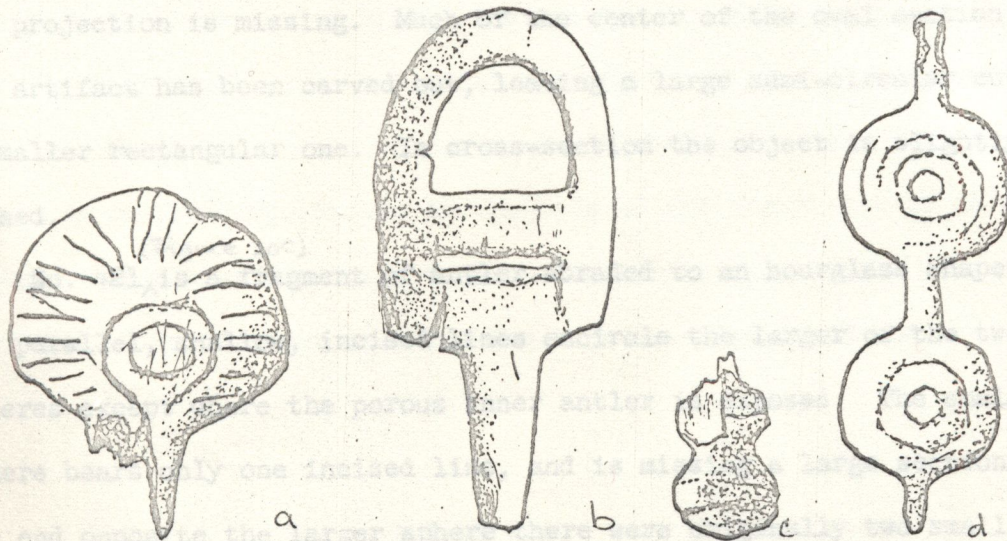


Figure 20: DFR 8 - Carved Antler

Dimensions of this object are $2.2 \times 1.3 \times 1.0$ cm.

No. 712 consists of two circular flat discs of unequal diameters joined by a thin neck. There are two projections on either side of the two discs, along the same axis as the neck. The projection from the smaller circle is the shorter and is pointed, while that from the larger disc is thicker and perforated. Concentric circles have been incised into the same face on each disc - three on the larger and two on the

circles, the outer one not quite complete, placed slightly off-center and towards the now broken projecting shafts. The circles are surrounded by many and straight lines running from the edge almost to the outer of the two circles. In cross-section the object is plano-convex. Its measurements are (4.3) x 3.6 x 0.9 cm.

No. 270^(Figure 20b) possibly a blanket pin, is a curved oval shouldered towards one narrow end, where a tapering projection 2.2 cm long begins. The entire artifact measures 6.8 x 2.9 x 0.7 cm. The extreme tip of the projection is missing. Much of the center of the oval section of the artifact has been carved out, leaving a large semi-circular cut and a smaller rectangular one. In cross-section the object is slightly arched.

No. 421^(Figure 20c) is a fragment of antler abraded to an hourglass shape. Two parallel, shallow, incised lines encircle the larger of the two spheres except where the porous inner antler is exposed. The smaller sphere bears only one incised line, and is missing a large section. On the end opposite the larger sphere there were originally two small circular projections which are now almost completely broken off. Dimensions of this object are 2.2 x 1.3 x 1.0 cm.

No. 772^(Figure 20d) consists of two circular flat discs of unequal diameters joined by a thin neck. There are two projections on either side of the two discs, along the same axis as the neck. The projection from the smaller circle is the shorter and is pointed, while that from the larger disc is thicker and perforated. Concentric circles have been incised onto the same face on each disc - three on the larger and two on the

smaller. These are, however, now worn so that in some sections they can no longer be seen. The two discs are 2.0 and 2.2 cm in diameter, and the entire object is 6.8 cm long and 5 cm wide.

No. 838 is a carved antler tine representing the right side of a seated human figure. The tine, calcined, has split down its length and half of the figure may be missing, although it is possible that the tine was split before the carving was done. The carving is grooved above the head, but has broken along the bottom of this groove, removing what was perhaps a suspension knot. The carving now measures 5.4 x 1.5 x 0.9 cm. Drilled depressions represent the right eye and the elongated right ear, and third represents an ear spool in this ear's lobe. There are also two drilled depressions at the base of the figure but it is not apparent what they are meant to be. The figure curves with the shape of the tine. The arms are bent and the legs are tightly flexed.

deposits and recorded as artifacts.

ANTLER BEAD

The one bead of antler that was uncovered measured 1.4 cm in outer diameter, and was .45 cm thick. The biconically drilled perforation in the center is 8 mm in diameter. Both faces of the bead are flat, while the sides are rounded and edges are not distinct.

mic, also un-
worked, was found. All were recorded since neither quartz crystals nor
mic are native to the site or to the area immediately adjacent.

ARTIFACTS OF SHELL

6. ARTIFACTS OF SHELL

MUSSEL SHELL KNIVES

Four fragments of California mussel (*Mytilis californianus*) shells have varying lengths of bevelled cutting edges. Length of the longest section of blade is 4.3 cm and the length of the shortest is 1.8 cm.

7. MINERALS

RED OCHRE

In addition to the ochre stains on the abrasive stone and the sandstone noted above, three pieces of ochre were uncovered separately in the deposits and recorded as artifacts.

QUARTZ CRYSTALS AND MICA

Two crystals of quartz, one clear and measuring 2 cm in length and the other an opaque white crystal 3.5 cm long, show no evidence of having been worked. One small thin layer of muscovitic mica, also unworked, was found. All were recorded since neither quartz crystals nor mica are native to the site or to the area immediately adjacent.

8. EUROPEAN TRADE GOODS

CLAY PIPES

Twelve pipe fragments are from English-made clay trade pipes. One of them has a fragment of the bowl still remaining; the others are fragments from the stems.

APPENDIX II

DESCRIPTION OF THE STRATIGRAPHY

BUTTONS

Of the two buttons, both circular, that are found, one is flat and undecorated except for a raised rim around the circumference on the underneath side. The other is hemispherical, and on the rounded face bears the American coat of arms surrounded by nineteen stars in a circle. Its underside bears an inscription now too worn to read, around its perimeter.

IRON NAILS

Nails were the only iron goods that the site yielded. These included one bent wire nail 5 cm long, one complete square nail 6.5 cm long, two end fragments of square nails 2.5 and 2.4 cm long, (both almost completely disintegrated), and one triangular nail 4.6 cm in length.

The profiles of the south walls of the three squares facing the longer length of the cut when completed, show the profile south wall of the ^{cut} section. This profile is given in Figure 4. Drawing the profiles at different times, under different lighting conditions, is probably the cause of the lack of continuity in some of the strata from one square to the next. Figure 5 shows the stratification at the western end of the site.

APPENDIX II

DESCRIPTION OF THE STRATIGRAPHY

Overlying the horizontal layer of Zone 1 is a thin, approximately five centimeters in thickness. This layer is termed Zone 4.

Beneath Zone 4, and extending downwards to 100 centimeters at its greatest depth are layers of brown soil alternating with numerous hearths. This layer of alternating brown soil and ash is thickest at the midpoint of the main trench, and thins towards the east and west ends of the cut as the strata underlying it rise closer to the surface. This is Zone 5. At either end of the main cut Zone 5 thins to between sixty and seventy centimeters thick. Zone 5 also thins towards the north wall, and in the south wall of square 4 is only 32 centimeters thick. Ash colour varies from white through yellow and orange to red. Scattered throughout this whole zone are ash shells, charcoal, and fire-cracked rocks. Breaking the horizontal layers, and extending downwards at uneven intervals throughout this zone are numerous post moulds, the outlines of which can be seen on the main cut profile. None of these were reported as features.

Beneath Zone 5 is a markedly distinct stratum, one of compact

The profiles of the south walls of the three squares forming the longer length of the cut when connected, show the entire south wall of the ^{cut} trench. This profile is given in Figure 21. Drawing the profiles at different times, under different lighting conditions, is probably the cause of the lack of continuity in some of the strata from one square to the next. Figure 22 shows the stratification at the western end of the site.

Overlying the whole of the site is a thin horizontal layer of leaf mould, approximately five centimeters in thickness. This layer is termed Zone A.

Beneath Zone ^A V, and extending downwards to 108 centimeters at its greatest depth are layers of brown soil alternating with numerous hearths. This layer of alternating brown soil and ash is thickest at the midpoint of the main trench, and thins towards the east and west ends of the cut as the strata underlying it rise closer to the surface. This is Zone B. At either end of the main cut Zone B thins to between sixty and seventy centimeters thick. Zone B also thins towards the north wall, and in the south wall of square 4 is only 32 centimeters thick. Ash colour varies from white through yellow and orange to red. Scattered throughout this whole zone are shell, charcoal, and fire-cracked rocks. Breaking the horizontal layers, and extending downwards at uneven intervals throughout this zone are numerous post moulds, the outlines of which can be seen on the main cut profile. None of these were recorded as features.

Beneath Zone B is a markedly distinct stratum, one of compact

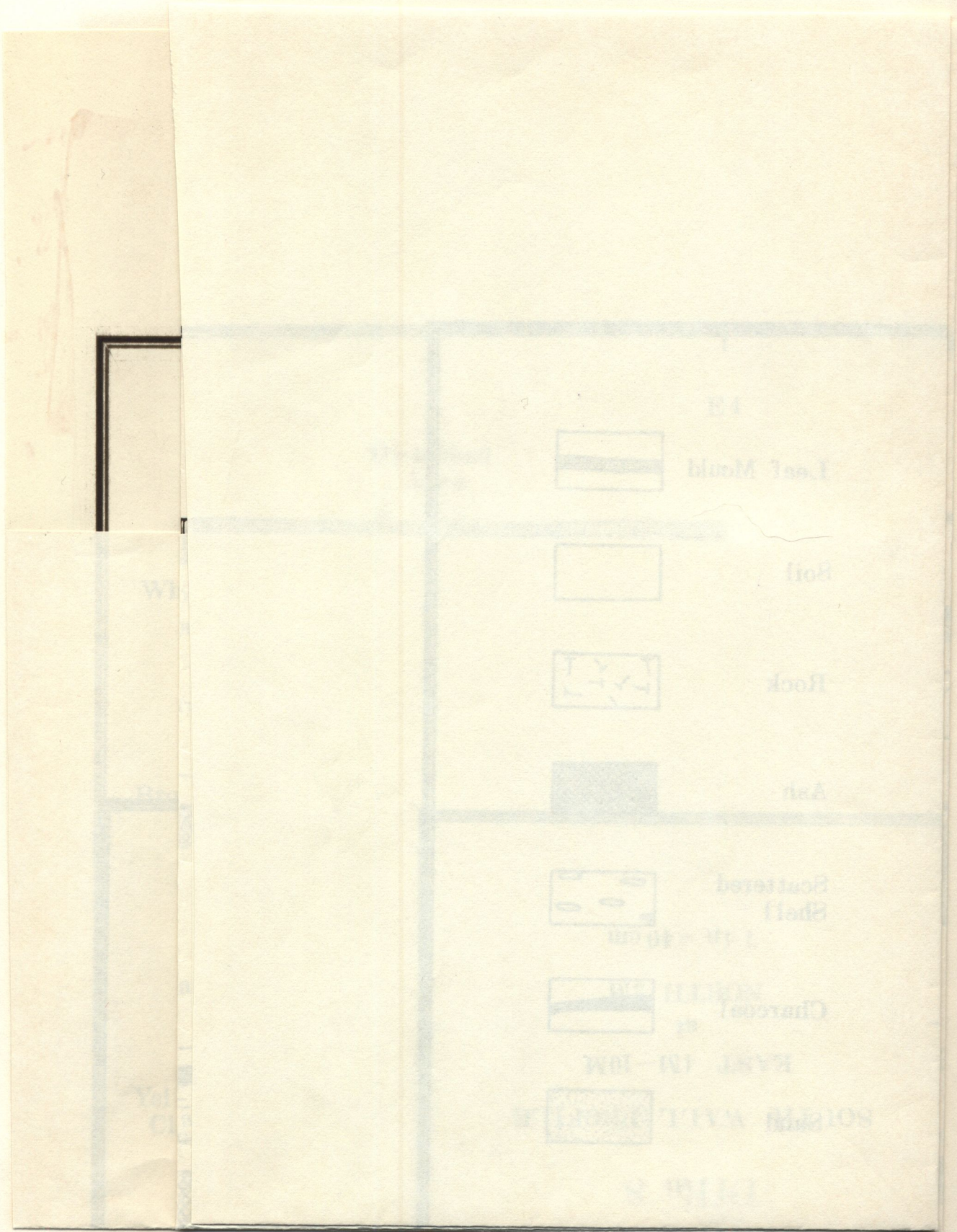
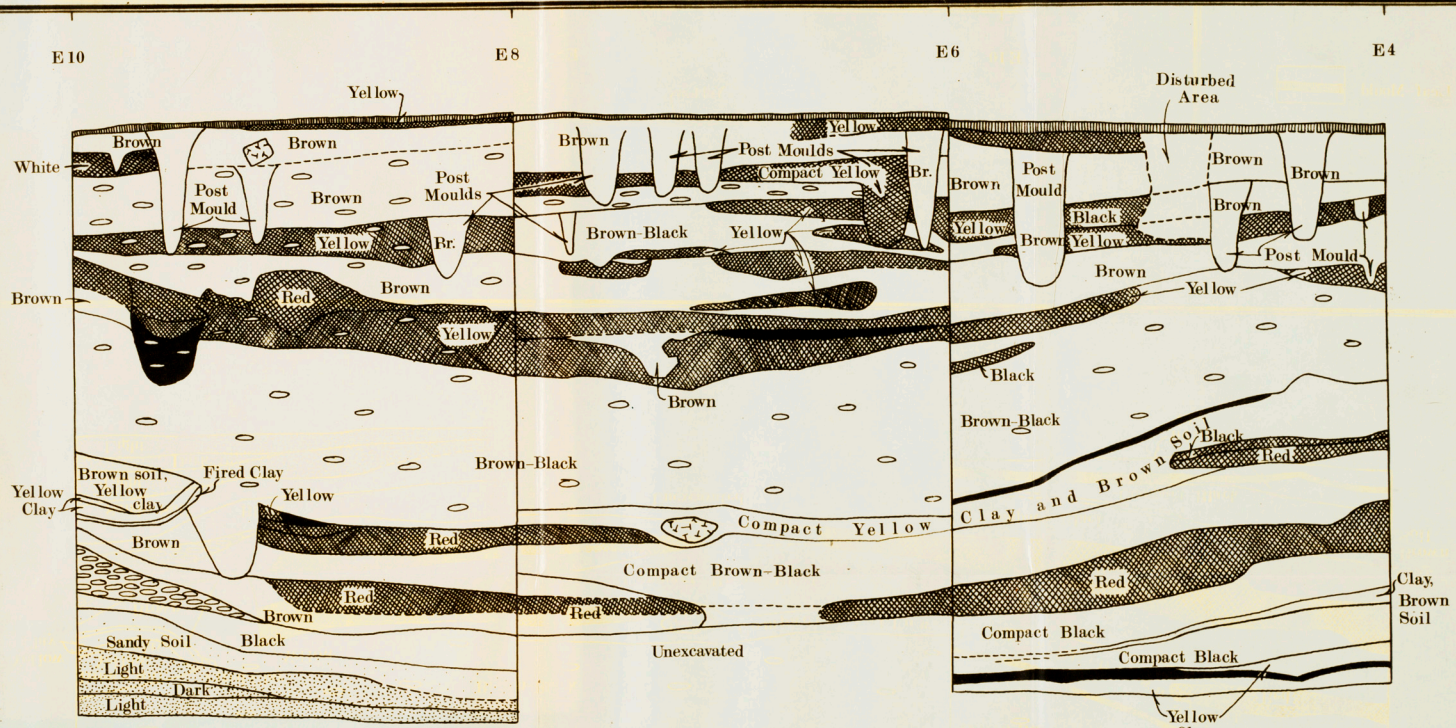


Figure 21: DFFus-South Wall Profile



- Leaf Mould
- Soil
- Rock
- Ash
- Scattered Shell
- Charcoal
- Sand

A
250

DfRu 8
SOUTH WALL PROFILE
EAST 4M-10M
at
NORTH 2M
1 in = 40 cm

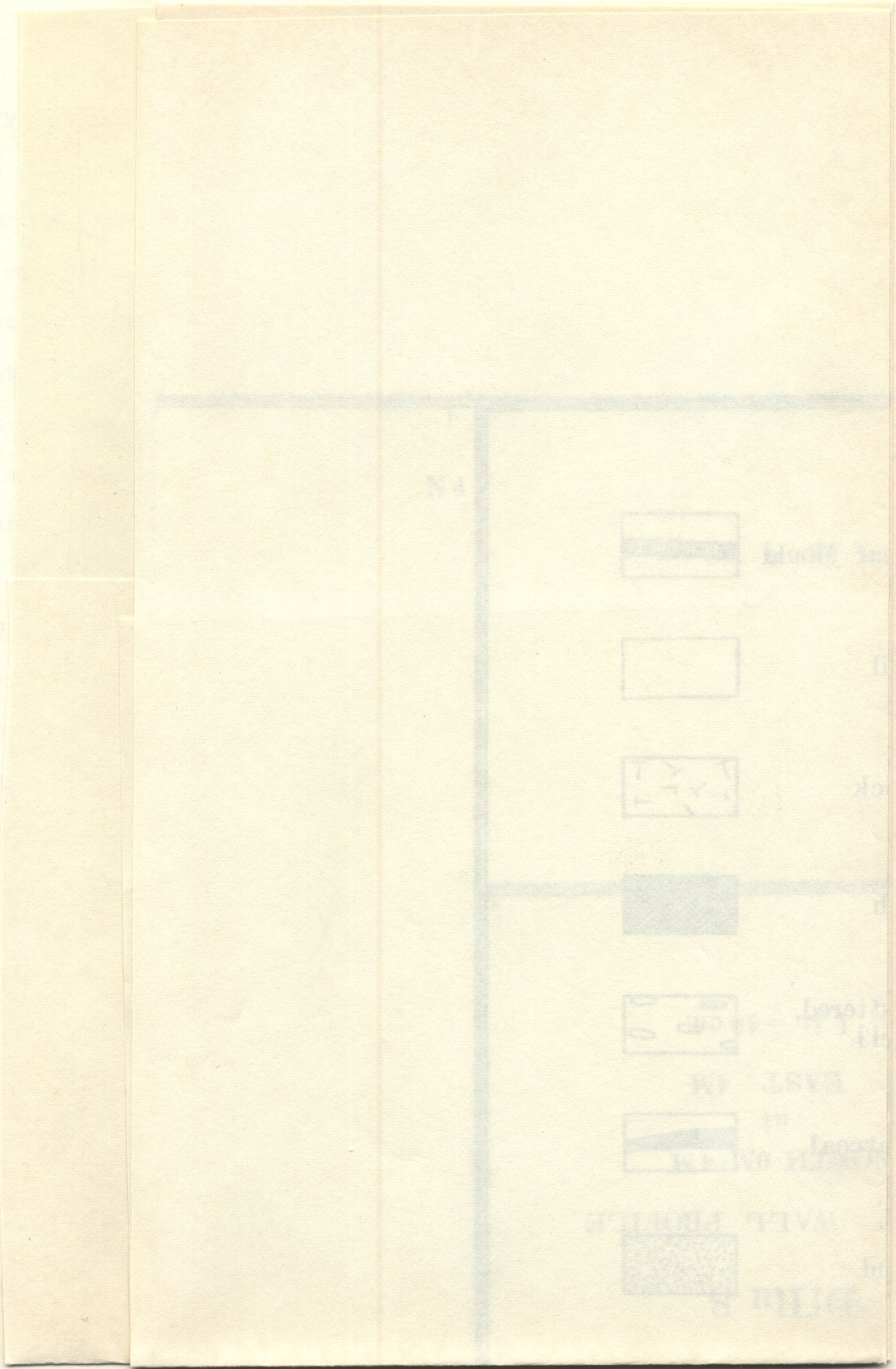


Figure 22: DFRn8- West Wall Profile

black to black-brown soil with scattered fragments of shell. It is here termed Zone C. Zone C is one stratum only; it is not composed of separable layers. It contains no hearths, except for two small ones in the very northernmost section; small amounts of ash and charcoal are scattered throughout. Zone C is deepest directly beneath the deepest point of Zone B, but although it rises closer to the surface towards the east and west ends of the trench, it thins only slightly. Towards the north wall Zone C becomes noticeably thicker, as its upper surface rises towards the surface of the midden and its lower surface sinks.

A thin layer of compact yellow clay and brown soil, Zone D, underlies Zone C. In places, this layer is overlain by a layer of black charcoal and, one of red ash, separating it from Zone C. Where this occurs, it is considered here as part of Zone D. It is possible that this layer of charcoal and ash overlies the whole of the compact yellow clay and brown soil, since the stratum ends abruptly at the edge of the profiles of one square and is just not recorded on the profiles of the next, drawn two weeks later, and probably under different lighting conditions. At the very north end of the long cut, Zone D forms a cone-shaped feature of yellow clay with fingers of red fired clay extending through it. It is here, in the east wall of the cut, that this zone is at its thickest.

Zone E is a thick zone of several layers of compact black-brown soil and ash. It parallels Zone D above it in relative depth below the surface.

Zone F is composed of three layers of sand, which occurred only in

square 4.

Zone G underlaid the whole of the site. No cultural remains at all came from its yellow clays.

Waters, C. B.

1950a Preliminary Report on Archaeological Investigations in the Fraser Delta Region. Anthropology in British Columbia, No. 1, pp. 13-27. Victoria.

1950b Notes on the Prehistory of the Southern Northwest Coast. British Columbia Historical Quarterly, Vol. 14, pp. 241-250.

1957 Prehistoric Human Life in the Fraser Canyon. British Columbia Department of Anthropology 1957, National Museum of Canada, Bulletin No. 162. Ottawa.

1964 West Coast Connections with Alaska. J. M. Campbell, editor, Prehistoric Cultural Relations Between the Arctic and Temperate Zones of North America. Arctic Institute of North America, Special Paper No. 11. Montreal.

Bryan, A. E.

1963 An Archaeological Survey of Northern Puget Sound. Occasional Papers of the Idaho State University Museum, No. 11. Pocatello.

Capes, K. H.

1964 Contributions to the Prehistory of Vancouver Island. Occasional Papers of the Idaho State University Museum, No. 5, Pocatello.

Carlson, R. L.

1960 Chronology and Culture Change in the San Juan Islands, Washington. American Antiquity, Vol. 25, pp. 362-366. Salt Lake City.

Collier, D., A. B. Hudson, and A. Ford

1942 Archaeology of the Upper Columbia Region. University of Washington Publications in Anthropology, Vol. 9, pp. 1-170.

Drucker, P.

1943 An Archaeological Survey on the Northern Northwest Coast. Anthropological Papers, No. 20, Bureau of American Ethnology, Bulletin 133. Washington.

REFERENCES CITED

- Duff, W.
1956 Unique Stone Artifacts From the Gulf Islands. Report of the Provincial Museum 1956, Victoria.
- Borden, C. E.
1950a Preliminary Report on Archaeological Investigations in the Fraser Delta Region. Anthropology in British Columbia. No. 1, pp. 13-27. Victoria.
1950b Notes on the Prehistory of the Southern Northwest Coast. British Columbia Historical Quarterly, Vol. 14, pp. 241-246.
1957 DjRi 3, an Early Site in the Fraser Canyon. British Columbia. Contributions to Anthropology 1957, National Museum of Canada, Bulletin No. 162. Ottawa.
1962 West Coast Crossties with Alaska. J. M. Campbell, editor, Prehistoric Cultural Relations Between the Arctic and Temperate Zones of North America. Arctic Institute of North America, Technical Paper No. 11. Montreal.
- Bryan, A. L.
1963 An Archaeological Survey of Northern Puget Sound. Occasional Papers of the Idaho State University Museum, No. 11. Pocatello.
- Capes, K. H.
1964 Contributions to the Prehistory of Vancouver Island. Occasional Papers of the Idaho State University Museum, No. 5, Pocatello.
- Carlson, R. L.
1960 Chronology and Culture Change in the San Juan Islands, Washington. American Antiquity, Vol. 25, pp. 562-586. Salt Lake City.
- Collier, D., A. E. Hudson, and A. Ford
1942 Archaeology of the Upper Columbia Region. University of Washington Publications in Anthropology, Vol. 9, pp. 1-178.
- Drucker, P.
1943 An Archaeological Survey on the Northern Northwest Coast. Anthropological Papers, No. 20, Bureau of American Ethnology, Bulletin 133. Washington.

- Duff, W.
1956 Unique Stone Artifacts from the Gulf Islands. Report of the Provincial Museum (1955). Victoria.
- King, A. R.
1950 Cattle Point, a Stratified Site in the Southern Northwest Coast Region. Memoirs of the Society for American Archaeology, No. 7. Menasha.
- Mitchell, D. H.
1965 Preliminary Excavations at a Cobble Tool Site (DjRi 7) in the Fraser Canyon, British Columbia. Anthropology Papers, No. 10, National Museum of Canada. Ottawa.
- 1968 Archaeology of the Gulf of Georgia Area: A Natural Region and its Culture Types. MS, Ph.d. Dissertation Presented to the Department of Anthropology, University of Oregon, Eugene.
- Sanger, D.
1967 The Southern Periphery of the Northwest Microblade Tradition. Transcript of a paper presented to the 32nd meeting of the Society for American Archaeology, held in Ann Arbor, Mich.
- Smith, D. G.
1964 Archaeological Excavations at the Beach Grove Site, DgRs 1. Manuscript in the Department of Anthropology and Sociology of the University of British Columbia.