

# ANTHROPOLOGICAL RECORDS

3:2

## CALIFORNIAN BONE ARTIFACTS

BY

E. W. GIFFORD

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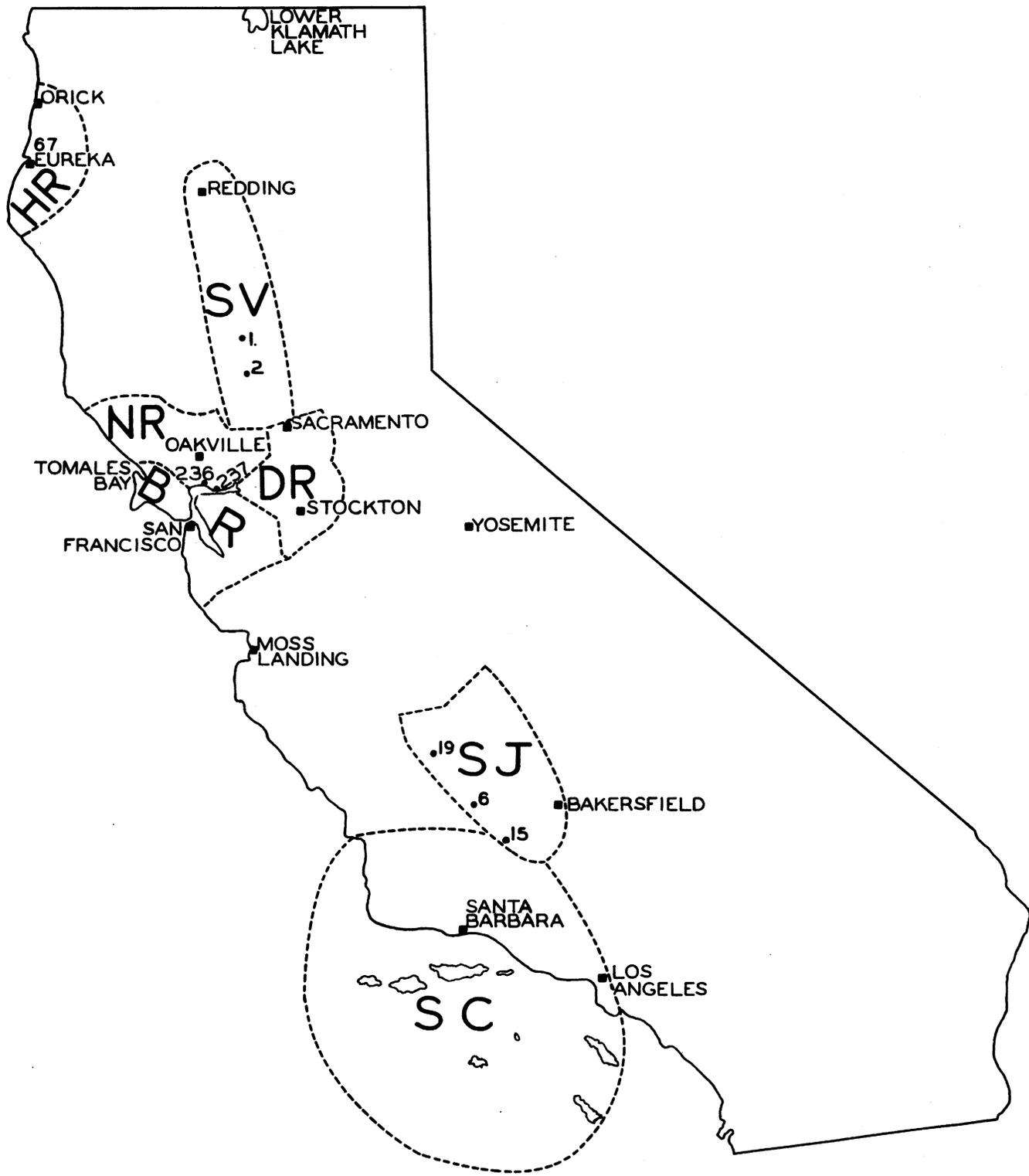
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Map 1. Seven archaeological areas: HR, Humboldt Region; SV, Sacramento Valley; NR, Napa Region; BR, Bay Region; DR, Delta Region; SJ, San Joaquin Valley; SC, Southern Coast Region.

# CALIFORNIAN BONE ARTIFACTS

BY

E. W. GIFFORD

## PREFACE

Archaeology can progress only as artifact types and their distributions are defined. For determining the sequence of prehistoric happenings these are prerequisite. This paper is a step in such a definition for the state of California. Undertaken at the suggestion of Professor A. L. Kroeber, it is the first of several projected to describe and illustrate the types of artifacts found archaeologically within the modern boundaries of California and represented by specimens in the collection of the University of California Museum of Anthropology.<sup>1</sup>

In the initial classification of the specimens the services of several students were enlisted. Harold E. Driver worked on bone and antler artifacts, Frank J. Essene on shell, Essene and Mary S. Fujii on polished stone, Louise F. Lorenz on chipped stone. Miss Lorenz did most of her work as a volunteer. Most of the drawings in this paper are by Miss Caroline C. Coffin and William C. Massey.

Museum staff members who assisted were Robert F. Heizer, Alex D. Krieger, and Llewellyn L. Loud. To the last, I am particularly indebted for aid with the present paper. Miss Edna M. Fisher gave generously of her time in the identification of bones. Mr. Wilbur I. Follett aided with the fish bones.

The accumulation of the collections for study is in great measure due to the generosity of various friends of the University who have donated either specimens or funds for making collections. Moreover, the James A. Barr collection, chiefly from the Delta Region around Stockton, has been available for study.

The generous financial support accorded the University of California Museum of Anthropology by Mrs. Phoebe A. Hearst is responsible for vast numbers of specimens in the collections. More recently funds for archaeological work have been contributed by the late Mr. P. E. Bowles and by Mr. and Mrs. Beverly Blackmer. Others who have contributed funds or specimens to the Californian archaeological collection are listed below. Donors of ethnological specimens and of specimens from beyond the modern boundaries of California are not included in this list; nor are there included the numerous property owners who have courteously granted the University permission to conduct excavations in mounds on their property.

<sup>1</sup> Assistance in the preparation of these materials was furnished by the personnel of Works Projects Administration Official Project No. 665-08-3-30, Unit A-15.

Three especially large private collections of Californian archaeological material donated to the Museum were those of the late Mrs. Blanche Trask, Mr. J. D. Howard, and Mr. Jesse Peter. Mrs. Trask's collection from the Southern Coast Region was particularly rich in bone artifacts and has been extensively used in preparing the present paper.

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Baker, M. S.  
Barrett, S. A.  
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Beck, P. R.  
Becker, C. H.  
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 McKern, W. C.  
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 Merrill, H. F. F.  
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 Miller, Oscar  
 Miller, R. G.  
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 Morse, Fremont  
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 Nolasco, Louis  
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 North, Edward  
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 O'Connor, John  
 Olmstead, Mrs. E. W.  
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 Page, G. H.  
 Palmer, Theodore  
 Parker, Hollis  
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 Reynolds, N. H.  
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 Salz, Ainsley  
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 Shinn, Milicent W.  
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 Thompson, Henry  
 Tucker, Chas.  
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 Walker, P. A.  
 Walker, W. W.  
 Ward, A. R.  
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 Warren, J. B.  
 Way, S. C.  
 Wedel, W. R.  
 Welty, H. O.  
 White, J. T.  
 Whitworth, G. F.  
 Wieland, C. F.  
 Wilson, Mrs. J.  
 Wilson, L. K.  
 Wood, A. E.  
 Woods, F. H.  
 Woods, F. M.  
 Woodward, Arthur

Excavations by members of the Department and Museum have yielded specimens ranging from a few from a single mound to the vast accumulations of N. C. Nelson in the San Francisco Bay Region and of R. L. Olson in the Southern Coast Region. The list of members who have conducted excavations in California appears below. Although his name does not appear in the list of actual excavators, the greater part of this work was planned and directed by A. L. Kroeber, in earlier years by J. C. Merriam. Excavators: S. A. Barrett, E. L. Furlong, E. W. Gifford, Malcolm Goddard, Eugene Golomshtok, R. F. Heizer, P. M. Jones, A. D. Krieger, L. L. Loud, J. C. Merriam, N. C. Nelson, R. L. Olson, Leonard Outhwaite, J. Peterson, W. E. Schenck, J. H. Steward, W. D. Strong, Max Uhle, T. T. Waterman, W. R. Wedel, A. V. Wepfer.

## INTRODUCTION

This paper describes 154 types of bone artifacts, 17 types of antler artifacts, 11 of tooth, and 1 of claw. This determination of 183 archaeological types is based on the study and classification of 3193 artifacts, of which 2966 are of bone, 199 of antler, 19 of tooth, 9 of claw. Roughly, 52 per cent of the specimens are from the Southern Coast, 24 per cent from the San Francisco Bay Region, 15 per cent from the Delta Region, 5 per cent from the Sacramento Valley, 2 per cent from the Humboldt Bay Region, 1 per cent from the Napa Region, and less than 1/2 per cent from the southern San Joaquin Valley. The delimitation of these various regions is set forth below and shown in map 1.

For ease in reference and to allow for the insertion of additions, types of artifacts are lettered and numbered. In arranging the types linearly, probably no two investigators would agree. For the present arrangement it can merely be said that it seemed the most convenient to me. The difficulties involved are akin to those which beset the naturalist in constructing check lists of birds or other life forms. Another, and perhaps more annoying, difficulty is in guessing the precise function of each type, a difficulty made greater by the considerable range of variation in each type, which I have usually interpreted as individual, but which may actually be functional.

Counts of occurrence of artifact types in separate regions and in separate sites within the various regions are affected by varying extent of excavations, a factor that is difficult to offset satisfactorily. It might in a way be done by calculating the number of cubic feet or yards of material handled and then prorating the probable number of each type of artifact accordingly. But then other factors would enter in, such as thoroughness of the excavators, size of the mesh of screens used if any, dry or moist mound material, and so forth. In short, there seem to be too many precarious factors to render an attempt at "correction" of counts worth while; so I shall take them literally as they stand and ignore the amount of work done in each region. From a negative point of view, however, it is safe to say that the more work done in a region, the less the chance of finding a hitherto unreported type. Ethnological specimens are not included in counts, nor are archaeological specimens in the literature. The specimen counts cover only specimens recognizable with certainty as to type and housed within the University of California Museum of Anthropology on December 31, 1937, the date of completion of this paper.

Bone artifacts present a bewildering series of intergrading forms. Awls grade into daggers and needles. Blunt or bladed forms grade into gouges, knives, chisels, and wedges. Beads grade into tubes, and wand handles. Whistles and flutes are among the tubular artifacts. No doubt other col-

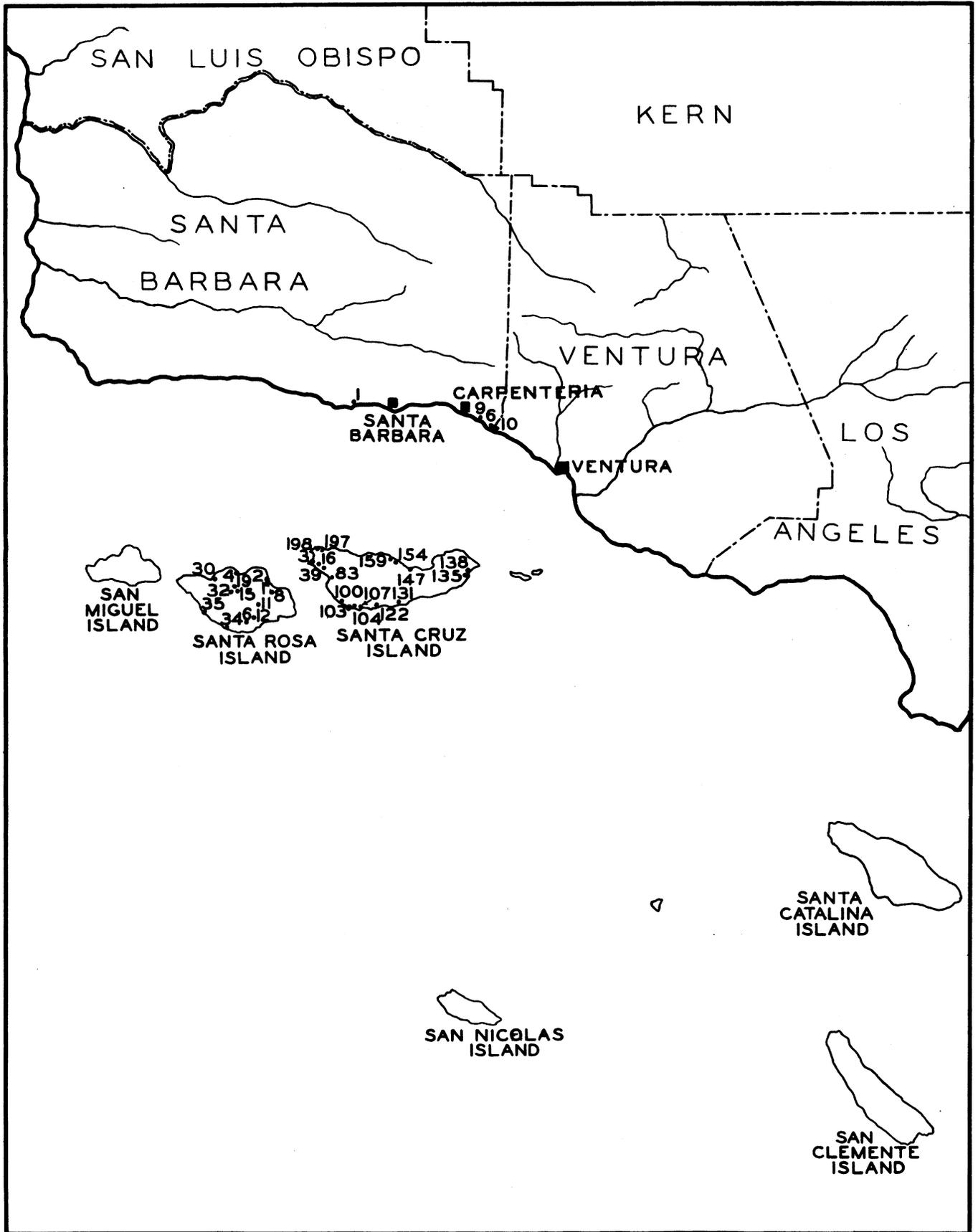
lections will reveal additional types and extend the distribution of those described here.

Just how to classify the various types and what weight to give to certain characters constitute knotty problems. Thus, I first had "awls" classified primarily according to type of bone from which they were made, as cannon bone, ulna, radius, etc. After studying Kidder's<sup>2</sup> classification of 2479 Pueblo awls based on degree of modification, it seemed desirable to make his classification primary and mine secondary. Thus for awls made from mammal leg bones, Kidder's class "a" is typified by "head of bone intact"; class "b," head unworked except by original splitting; class "c," head partly worked down; and so on. Under these I have subdivided for cannon bone, ulna, fibula, tibia, radius. Thirty-one objectively determined types of awls are thus recognizable. That these served as many functions is extremely unlikely. Indeed, ethnological data indicate that several forms may have been used for one purpose. Similarly, flat-bone net handles occur in 3 shapes but all serve one purpose among the Yurok. These ethnological examples of diversity of form but identity of function should serve as a warning to the archaeologist not to stress different objective types too strongly. However, for comparative purposes they must be recognized at least.

The key and figures indicate the characters of the types. The scheme followed in the key is roughly comparable to a zoological classification. The types are equivalent to species. The groupings of types are analogous to genera, families, and orders.

Ethnological data seem to indicate that many of our objectively isolated types have no significance in real life but represent only academic distinctions. Thus, the northwestern Yurok and Hupa, who seem to be culturally identical, used 7 types of awls for the joint purpose of slitting lamprey eels and perforating buckskin for sewing. As these awls range from objects with head of bone intact to objects made from a mere splinter of bone, it seems that the natives did not care which bone they used, or which end of the bone, or whether most of the bone or a sliver, or whether the handle was covered with other material or left naked. The Sierra Miwok of Central California used 6 types for the single purpose of coiled-basket making. However, this failure of function to coincide with type does not relieve one of the responsibility of distinguishing objectively separable types for purposes of comparison with types of other archaeological areas. A strict definition of objective types is essential to archaeological study whether several types served one or several purposes. Scientific-

<sup>2</sup> 1932, p. 202.



Map 2. Sites in Southern Coast Region.

ically, it is as important that several types had only one function as that each had its distinctive function.

AREAS AND SITES

Southern Coast (SC)<sup>5</sup>.—Islands and adjacent San Luis Obispo, Santa Barbara, Ventura, and Los Angeles coast. See map 2.

Mainland sites (M):

- 1, Mescal is., More ranch, Goleta, Santa Barbara co.
- 6, NW bank of Rincon Cr. mouth, Santa Barbara co.
- 9, Catlin and Higgins' ranch, 1/2 mi. SE of Carpenteria, Santa Barbara co.
- 10, SE bank of Rincon Cr. mouth, Ventura co.

Islands: Santa Cruz is. (C)—

- 3, 16, 39, Forney's cove.
- 83, West ranch.
- 100, Posa landing.
- 103, 104, Johnson's landing.
- 107, Laguna point.
- 122, Willows.
- 131, Coche Prietos.
- 135, 138, Smuggler's cove.
- 147, 197, 198, Prisoner's harbor.
- 154, 159, Orizaba.

Santa Rosa is. (R)—

- 1, 2, 4, 6, 8, 11, 12, 15, 19, 30, 32, 34, 35. (No names for these sites.)

- San Clemente is.
- San Miguel is.
- San Nicolas is. (N).
- Santa Catalina is.

Miscellaneous: (Unrepresented on map 2.)

- Los Osos v., San Luis Obispo co.
- Port Los Angeles, Los Angeles co.
- Tecolote cr., Santa Barbara co.

San Joaquin Valley (SJ).—Southern San Joaquin v., chiefly in Kern and Tulare cos. See map 1.

- 6, Elk Grove, Kern co.
- 15, Elk Hills, Kern co.
- 19, Adobe Holes, Kern co.

<sup>5</sup>The following abbreviations are employed in this paper:

SC, Southern Coast	ft., feet
C, Santa Cruz is.	in., inch(es)
M, mainland	is., island
N, San Nicolas is.	md., mound
R, Santa Rosa is.	mi., mile
SJ, San Joaquin	mm., millimeter
DR, Delta Region	mt., mountain
SV, Sacramento Valley	pt., point
BR, Bay Region	r(s)., river(s)
NR, Napa Region	v., valley
HR, Humboldt Region	N,S,E,W, North, South,
co(s)., county(ies)	East, West (and com-
cr., creek	binations)

Delta Region (DR).—Delta Region between Sacramento and Stockton, to rising ground at foot of Sierra Nevada to eastward and Coast Range to westward. Includes more than physiographic delta; in terms of counties, Sacramento S of the American r., San Joaquin, and parts of Yolo, Solano, and Contra Costa are included. All sites lie below the 100-foot contour line. See map 3.

Schenck and Dawson<sup>4</sup> numbers and continuation thereof:

- 6, Johnson md.
- 80, Stockton channel md.
- 81, 89, Roberts is. mds.
- 82, Walker slough md.
- 83, Ott md.
- 85, Mormon channel md.
- 86, Pool md.
- 87, Martin md.
- 90, Lewis md.
- 91, Walker Slough is. md.
- 107, Windmiller md.
- 109, Drescher md.
- 138, Hotchkiss md.
- 139, Bagley md.
- 140, Banta md.
- 141, Orwood md. 2.
- 142, McGillivray md.

Locations not sufficiently accurate to map:

- Rosebud ranch, nr. Hood, Sacramento co.
- Dave Ray md., ca. 2 mi. W of Tracy.
- Vicinity of Stockton.

Sacramento Junior College numbers:

- 28, Strawberry md.
- 29, King Brown md.
- 51, Clarksburg md.

Sacramento Valley (SV).—Upper Sacramento v. from confluence of Sacramento and American rs. N to Redding, Shasta co. See map 1.

- 1, Miller md., 10 mi. SE of Grimes, Colusa co.
- 2, Howell's pt. md., Colusa co.
- Redding (near which there is a site).
- Site on W side Sacramento r., 7 or 8 mi. up-stream from Knights landing (not mapped).

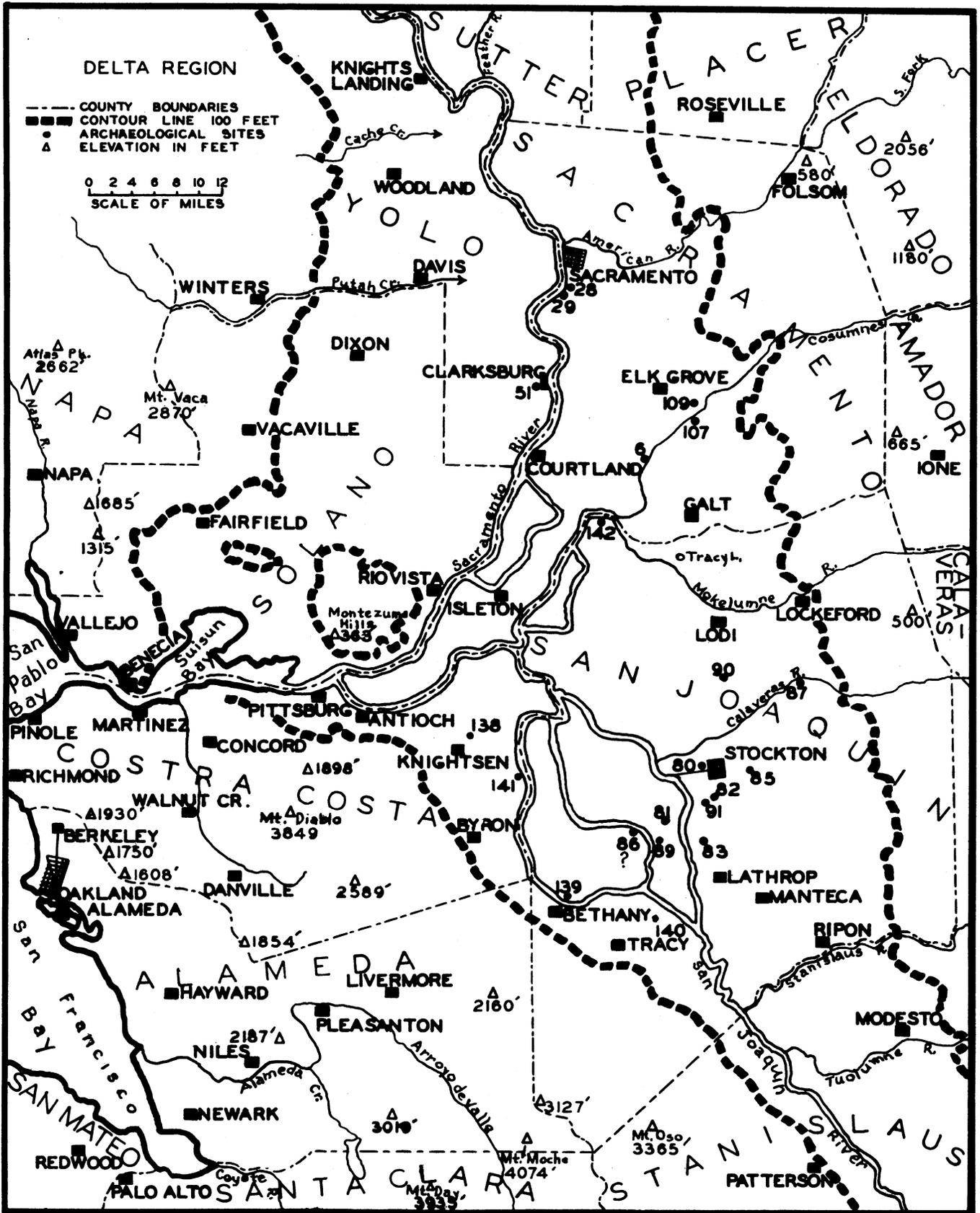
Bay Region (BR).—Shores and nearer hinterland of San Francisco, San Pablo, and Suisun bays (except Napa, Sonoma, and Solano cos.). See map 4.

Nelson<sup>4a</sup> numbers and continuation thereof:

- 3, Sausalito.
- 10, Mill Valley.
- 76, Greenbrae.
- 86c, San Rafael.
- 123, mound ca. 3 mi. N of San Rafael.
- 250a, Maltby md.
- 259, Pinole.
- 283, Potrero San Pablo.
- 295, Ellis landing.
- 298, 300, Stege.
- 307, West Berkeley.

<sup>4</sup>See under Bibliography.

<sup>4a</sup>1909.



Map 3. Sites in Delta Region



Map 4. Sites in Bay Region.

309, Emeryville.  
 328, 329, Newark.  
 356, Ponce (or Mt. View) md.  
 372, San Mateo.  
 387, Bay Shore.  
 407, Half Moon Bay.  
 420, Walnut Creek.  
 Orinda, Contra Costa co.  
 Yerba Buena is.  
 Tomales bay (2 sites). See map 1.

Napa Region (NR).—Sonoma-Napa-Solano region to cover Sonoma and Napa valleys and Vallejo-Benicia region. See map 1. Separated from BR because of prevalence of cremation here as opposed to inhumation in BR. That cremation is accompanied by peculiar artifacts is to be doubted. So far as bone artifacts are concerned there appears only one type (P4) in NR that does not appear in BR. It remains to be seen if peculiar artifacts of other materials will warrant this separation from the BR.

236, Carquinez md., Solano co.  
 237, Benicia md., Solano co.  
 Oakville (near which is Goddard md.).

Humboldt Region (HR).—Humboldt Bay region, from Cape Mendocino N to Orick. See map 1.

67, On Gunther is., off waterfront of Eureka.  
 Orick (near which is historic Yurok village site Sigonoi).  
 Humboldt bay (not mapped).

Other localities.—See map 1.

Lower Klamath lake (in which is an island site in the SE portion of the lake).  
 Moss landing, Monterey bay (near which is a site).  
 Yosemite.

More precise locations for mounds are on record in the University of California Museum of Anthropology. No useful purpose would seem to be served by giving them here.

Where given, depths are in feet, except for the layers designated by Uhle for Emeryville md.<sup>5</sup> The depths for Emeryville specimens are therefore given sometimes in feet, sometimes in layers. Layers 1 to 5 comprise the upper 12 ft. of Uhle's excavations, layers 6 to 10 the lower 19 ft. Most depths are omitted from this paper, but are on record in the museum catalogue.

In the body of the paper, mounds are listed by region abbreviation followed in parentheses by site designation; thus BR (309) is Emeryville mound (shown on map 4). The count of specimens from each region follows region abbreviation; thus SV 1 (2) means Sacramento Valley 1 specimen from mound 2. Where a number of mounds in a region are given the number of specimens from each is indicated thus: BR 11 (356, 2; 309, 6; 295, 3), which reads Bay Region 11 specimens (mound 356, 2 specimens; mound 309, 6 specimens; mound 295, 3 specimens).

ARCHAEOLOGICAL TYPES

ARCHAEOLOGICAL TYPES

Although the prime purpose of this paper is to describe the archaeological artifacts, ethnological occurrences of archaeological types are cited. Moreover, certain ethnological types, unrepresented in the archaeological collection, are described under the caption Exclusively Ethnological Types. Most of these are from extreme northwestern California, from which region the University has no archaeological materials. Consequently, as archaeological work is extended, the exclusively ethnological types should dwindle in number.

The ratio of number of types to number of specimens is exceedingly irregular, ranging from 1 type to every 2 specimens in the NR to 1 type to every 12 specimens in the SC. With few specimens the ratio is high. With many specimens the ratio is low; in other words there is a diminishing return of types. In table 1 there are listed some samples comprising the 7 main areas, parts of the SC, individual sites on Santa Cruz is., and 2 important BR sites.

TABLE 1

Ratio of Types to Specimens in UCMA

	Types	Specimens	Ratio
SC.....	138	1675	1:12
SJ.....	4	12	1:3
DR.....	46	479	1:10
SV.....	28	146	1:5
BR.....	73	764	1:10
NR.....	18	40	1:2
HR.....	15	72	1:5
4 SC mainland sites (1,6,9,10).....	31	69	1:2
San Nicolas is. ....	59	487	1:8
Santa Cruz is. ....	82	626	1:8
Santa Rosa is. ....	44	291	1:7
Santa Cruz is. site 3...	28	64	1:2
Santa Cruz is. site 83..	19	64	1:3
Santa Cruz is. site 100.	34	396	1:11
Santa Cruz is. site 138.	13	29	1:2
Ellis landing md. ....	23	94*	1:4
Emeryville md. ....	54	416*	1:8
Upper "half" Emeryville.	24	42	1:2
Lower "half" Emeryville.	50	144	1:3

<sup>5</sup> Uhle, pl. 4.

\*Includes specimens not allocated to upper and lower "halves" (see two items below).

KEY TO TYPES

(<sup>a</sup>, 1 from SJ; <sup>b</sup>, 1 from Yosemite; <sup>c</sup>, 2 from Moss landing; <sup>d</sup>, 6 from SJ; <sup>e</sup>, ethnological specimens for this type also; <sup>f</sup>, 3 from SJ; <sup>g</sup>, 2 from SJ; <sup>h</sup>, 2 from Lower Klamath lake; <sup>i</sup>, the 12 SJ specimens are included; <sup>x</sup>, occurrences in other records.)

	SC	DR	SV	BR	NR	HR	Total
BONE							
<u>A. Awl</u>							
A. Single-pointed perforating implement without eye or groove for cord attachment—more or less needle-pointed awl, pin (?), dagger (?) . . . . .	255	36	73	211	9	3	589 <sup>ab</sup>
1. Mammal leg bone . . . . .	83	33	70	181	8	2	379 <sup>ab</sup>
a. Head of bone intact to serve as handle . . . . .	45	4	2	18	1		71 <sup>a</sup>
<sup>e</sup> I. Cannon bone (distal end), awls . . . . .	1			1			2
<sup>e</sup> II. Ulna, awls, etc. . . . .	3	4	2	14	1		24
<sup>e</sup> III. Fibula, awl . . . . .	41						41
<sup>e</sup> IV. Tibia, "dagger" and "punch" . . . . .							2
V. Radius, awl . . . . .				1			2 <sup>a</sup>
b. Head unworked except by original splitting . . . . .	19	11	46	115	4		196 <sup>b</sup>
<sup>e</sup> I. Cannon bone (distal end as head) . . . . .	7		9	13	1		30
<sup>e</sup> II. Cannon bone (proximal end as head) . . . . .	10	9	35	96	3		154 <sup>b</sup>
III. Tibia . . . . .	2		1	2			5
IV. Radius . . . . .		2	1	4			7
c. Head partly worked down . . . . .	3	14	4	15	1		37
I. Cannon bone (distal end as handle) . . . . .	1			3			4
<sup>e</sup> II. Cannon bone (proximal end as handle) . . . . .	2	12	3	11	1		29
III. Tibia . . . . .		1		1			2
IV. Radius . . . . .		1	1				2
d. Head entirely removed . . . . .	7	1	1	2	1	2	14
e. Splinter . . . . .	1	3	15	16	1		36
<sup>e</sup> I. Cannon bone . . . . .	1	2	10	5	1		19
II. Tibia . . . . .		1	5	10			16
III. Radius . . . . .				1			1
<sup>e</sup> f. Awl with covered handle . . . . .	8						8
g. Sharpened deer splint (vestigial outer metatarsal) . . . . .			2	15	1		18
2. Mammal rib . . . . .	20	x	3	18	1		42
3. Mammal penis bone . . . . .	15			3			18
4. Bird bone . . . . .	124	3		5		1	133
a. Head of bone intact . . . . .	93	3		4		1	101
I. Radius . . . . .	46	3		4			53
II. Ulna . . . . .	38						38
III. Humerus . . . . .	9					1	10
b. Cut-off bone . . . . .	24			1			25
I. Radius . . . . .	17			1			18
II. Ulna . . . . .	4						4
III. Humerus . . . . .	3						3
c. Split bone . . . . .	7						7
I. Ulna . . . . .	1						1
II. Humerus . . . . .	6						6
5. Fishbone . . . . .	13			4			17
a. Sting-ray spine . . . . .				2			2
b. Polished fishbone . . . . .	13			2			15
<u>B. "Pin," "Dagger"</u>							
B. "Pin," "dagger," not perforated for attachment . . . . .	21	7		8		1	37
1. "Pin" of split proximal end of cannon bone . . . . .	1			5			6
2. "Pin" of split bone with spatulate handle . . . . .	1			1		1	3
a. Long type . . . . .				1			1
b. Short type . . . . .	1					1	2
3. Flat, broad, split cannon-bone dagger or knife . . . . .	5			1			6
4. Heavy cannon-bone dagger with half of distal head for handle . . . . .		7					7
<sup>e</sup> 5. Triangular-pointed dagger of tibia . . . . .	1						1
<sup>e</sup> 6. Flat-pointed dagger of artiodactyl tibia . . . . .	5						5

	SC	DR	SV	BR	NR	HR	Total
7. Wandlike dagger . . . . .	4						4
8. "Pin" with groove-encircled head . . . . .	3			1			4
9. Flat-pointed "dagger" of bird humerus with cross-hatched proximal end . . . . .	1						1
<u>C. Gouge or Smoother or Flaking Tool</u>							
C. Gouge or smoother (rubbing tool) or flaking tool. . . . .	196	1	6	52	2		257
1. Cannon bone . . . . .	4		1	15			20
2. Ulna . . . . .	x	1	5	18	2		26
3. Fibula . . . . .	3						3
4. Tibia . . . . .	3			8			11
5. Rib . . . . .	129			4			133
6. Mammal penis bone . . . . .	1			7			8
7. Unidentified bone, round in cross section . . . . .	5						5
8. Unidentified bone, flat on one side . . . . .	51						51
<u>D. Knife, Chisel, End-Scraper, Wedge</u>							
D. Knife, chisel, end-scraper, wedge (all end-bladed) . . . . .	80			6		19	105
1. Marine mammal chisel or knife . . . . .	17						17
2. Straight flat knife, chisel, or scraper . . . . .	32			2			34
3. Hafted knife, chisel, or scraper . . . . .	5						5
4. Tang-hafted chisel or scraper of marine mammal . . . . .	1						1
5. Straight elk-bone chisel . . . . .		x		2		19	21
6. Bone wedge . . . . .	12			2			14
7. Bar for prizing off abalones . . . . .	13						13
<u>E. Double-ended Spatulate Knife or Scraper</u>							
E. Double-ended spatulate knife or scraper . . . . .	31						31
1. Knife or scraper, flat . . . . .	7						7
2. Knife or scraper, bowed . . . . .	24	x					24
<u>F. Strigil</u>							
F. Strigil . . . . .	3	1	1	19			24
<u>H. Serrate Bone</u>							
H. Serrate bone or "flesher" . . . . .		2		89	4		97°
1. Scapula . . . . .		2		81	4		89°
2. Rib . . . . .				3			3
3. Fishbone . . . . .				5			5
<u>I. Split Cannon Bone</u>							
I. Split cannon bone . . . . .		1		3			4
<u>J. Whole Cannon Bone</u>							
°J. Whole cannon bone . . . . .				4	2		6
<u>K. Ceremonial Wand</u>							
K. Ceremonial wand . . . . .	12						12
1. Of artiodactyl tibia, with quartz crystal head . . . . .	9						9
2. Capped with Haliotis disk . . . . .	1						1
3. Large; with punctate decoration . . . . .	1						1
4. Large; with punctate decoration; head perforated . . . . .	1						1
<u>L. "Spear Head"</u>							
L. "Spear head" . . . . .	4						4
1. Basal stem, barbed, flat blade, ornamented . . . . .	2						2
2. Deeply notched base with 2 spurs, flat blade . . . . .	1						1
3. Cylindrical head, basal tang, not barbed, unornamented . . . . .	1						1
<u>M. Elk-Tibia "Sword"</u>							
M. Elk-tibia "sword" . . . . .	3			2			5
1. "Hilt" not perforated . . . . .	1						1

	SC	DR	SV	BR	NR	HR	Total
2. "Hilt" with 2 perforations . . . . .	2						2
3. "Hilt" with 1 perforation . . . . .				2			2
<u>N. Shoehorn-shaped Object</u>							
N. Shoehorn-shaped object, not perforated . . . . .	3			2			5
1. Long handled, of dolphin jawbone . . . . .	1						1
2. No distinct handle . . . . .				1			1
3. Spoon shaped, but flat . . . . .	1						1
4. Very broad, with narrow stem handle . . . . .	1						1
5. Flat, tapering, punctate decoration . . . . .				1			1
<u>O. Hair Ornament (?) or Head Scratcher</u>							
O. Hair ornament (?) or head scratcher . . . . .	1			2			3
1. With noselike projection . . . . .	1						1
2. With forked end . . . . .				2			2
<u>P. Eyed Dagger, Awl, Needle, Gouge, Etc.</u>							
P. Dagger, awl, needle, gouge, etc., with perforated handle, i.e., with eye . . . . .	25	5		9	1	1	41
1. Cannon-bone dagger with shouldered handle . . . . .	7						7
2. Cannon-bone dagger without shouldered handle . . . . .	4						4
a. With one perforation in handle . . . . .	3						3
b. With 3 perforations in handle . . . . .	1						1
3. Awl or needle . . . . .	2	5		8			15
* a. Less than 200 mm. long . . . . .	2	*		8			10
b. More than 300 mm. long, "thatch needle" . . . . .		5					5
4. Hairpin (?) or head scratcher (?) . . . . .	1				1	1	3
5. Double-pointed needle . . . . .	1						1
6. Gouge or smoothing implement . . . . .	1			1			2
7. Pin with ring eye . . . . .	9						9
<u>Q. "Pendant"</u>							
Q. "Pendant," i.e., rather flat object with perforation for suspension, not pointed . . . . .	33			5		2	40
* 1. Head scratcher (?) or elongate pendant, not engraved . . . . .				3		2	5
2. "Shoehorn" shaped, not engraved . . . . .	3						3
3. Square ended, not engraved . . . . .				1			1
4. Elongate pendant, not engraved, not serrate . . . . .	3			1			4
5. Elongate, more or less rectangular pendant showing concave interior of bone; punctate engraved, not serrate . . . . .	6						6
6. Worked down so original inner surface of bone not visible, elongate to ovoid in shape; punctate engraved; single perforation . . . . .	14						14
7. Small ovoid pendant, serrate edges, single perforation . . . . .	4						4
8. Bullroarer-like pendant . . . . .	2						2
9. Multiholed bar pendant . . . . .	1						1
<u>R. Turtle-Bone Rattle</u>							
*R. Turtle-bone rattle . . . . .	3						3
<u>S. Gaming (?) Piece</u>							
*S. Gaming (?) piece of solid bone . . . . .		1	1				2

	SC	DR	SV	BR	NR	HR	Total
<u>T. Bipointed Object</u>							
T. Bipointed object, straight, bowed, or beveled; not perforated	163	33	17	3			222 <sup>d</sup>
1. Straight . . . . .	94	33	17	3			153 <sup>d</sup>
a. Circular in transverse cross section, even diameter for greater part of length, more sticklike than spindle-like, conical point . . . . .	15	x					15
<sup>e</sup> b. Circular in transverse cross section, fusiform, conical point . . . . .	38	28	9				81 <sup>d</sup>
<sup>e</sup> c. Circular in transverse cross section at one end, flattened at other end . . . . .	1	1		3			5
d. Of split mammal bone, more or less flat, showing cancellous interior of bone . . . . .	11						11
e. Of bird bone . . . . .	5						5
f. Rectangular (more or less) in cross section, usually broadest near abruptly beveled, pointed base . . . . .		1	8				9
g. More or less circular or elliptical in transverse cross section, but with one side flat . . . . .	15	3					18
h. Circular in transverse central cross section but with one end beveled . . . . .	9						9
2. Bowed . . . . .	69						69
a. Rather flat and horizontally bowed . . . . .	10						10
b. More or less circular in transverse cross section, curved or bowed laterally (including 36 undifferentiated as to I and II) . . . . .	50						50
I. Only one point exposed, other completely covered with asphaltum and thread winding . . . . .	2						2
II. Both points exposed, asphaltum and thread winding in middle . . . . .	12						12
c. Rather flat, double curved . . . . .	9						9
<u>U. Pointed, Blunt-based Object</u>							
U. Pointed, more or less blunt-based object, suggesting barbs and toggle points for fishing devices . . . . .	25		2				27
<sup>e</sup> 1. Straight, symmetrical, flat on one side . . . . .	3		2				5
2. More or less curved or double curved, asymmetrical . . . . .	18						18
3. Double curved, base transversely notched or grooved . . . . .	4						4
<u>W. Harpoon or Spear Head, Barbed</u>							
W. Harpoon or spear head, barbed . . . . .	6		1	1		1	9
<sup>e</sup> 1. Of mammal bone, barb pointing backward . . . . .	3		1	1		1	6
2. Of split bird bone, barb pointing backward . . . . .	2						2
3. Of whale bone, "barb" cut at right angle . . . . .	1						1
<u>X. One-Piece "Circular" Fishhook</u>							
X. One-piece "circular" fishhook . . . . .	1						1
<u>Y. Perforated Swordfish Bill</u>							
Y. Perforated swordfish bill . . . . .	1						1
<u>Z. Conical-headed Object, Flat Stemmed</u>							
Z. Conical-headed object with flat thin stem . . . . .	7	1		1			9
1. Stem not perforated . . . . .	5						5
2. Stem perforated . . . . .	1						1
3. Stemmed in middle only, proximal end knobbed . . . . .	1	1		1			3

	SC	DR	SV	BR	NR	HR	Total
<u>AA. Double-hooked Flat-backed Object</u>							
AA. Double-hooked flat-backed object . . . . .	1						1
<u>BB. Container Made from Cetacean Vertebra</u>							
BB. Container made from cetacean vertebra . . . . .	7			1			8
1. Mortar . . . . .	1			1			2
2. Dish without cover . . . . .	5						5
3. Dish with cover . . . . .	1						1
<u>CC. Perforated, Spool-like Object</u>							
CC. Perforated, spool-like object . . . . .	32			2			34
1. Of astragalus bone . . . . .	7			2			9
2. Of mammal vertebra . . . . .	3						3
3. Of mammal vertebra, sides with red pigment . . . . .	2						2
4. Of mammal vertebra, sides with Olivella square beads . . . . .	20						20
5. Of fish vertebra . . . . .							
<u>DD. Thin Perforated Disk and Ring</u>							
DD. Thin perforated disk or ring . . . . .	13						13
1. Of cetacean vertebral epiphysis . . . . .	7						7
2. Of other cetacean bone . . . . .	5						5
3. Ring of unidentified bone . . . . .	1						1
<u>EE. Bead or Tube</u>							
EE. Bead or tube . . . . .	633	223	26	150	14	6	1055 <sup>f</sup>
1. Undecorated . . . . .	585	217	18	146	13	5	987 <sup>f</sup>
a. Bird . . . . .	371	118	15	131	4	4	643
b. Mammal . . . . .	202	98	3	12	9	1	328 <sup>f</sup>
c. Mammal, constricted center . . . . .	2	x					2
d. Bird-bone mouthpiece for tobacco pipe . . . . .	9						9
e. Inserted tube or bead . . . . .	1			3			4
2. Incised . . . . .	24	7	8	3	1	1	44
a. More or less encircling marks . . . . .	8		1	1		1	11
b. Geometric decorations . . . . .	13	7	7	2	1		30
c. Encircling deep grooves . . . . .	2						2
d. Encircling striations at one end, asphaltum plugged at other . . . . .	1						1
3. Beaded . . . . .	24			1			25
a. Mammal bone, not grooved . . . . .	17						17
b. Mammal bone, encircling grooves . . . . .	6						6
c. Bird bone . . . . .	1			1			2
<u>FF. Whistle, Single Hole</u>							
FF. Whistle, single hole . . . . .	85	112	7	101	7	3	317 <sup>g</sup>
1. Mammal bone, no incised decoration . . . . .	34			11	2		47
a. Both ends of bone cut off . . . . .	18	x		11	2		31
b. Tibia with distal end not cut off . . . . .	6						6
c. Tibia with proximal end not cut off . . . . .	10						10
2. Bird bone, no incised decoration . . . . .	48	111	7	90	5	1	264 <sup>g</sup>
3. Incised decoration . . . . .	3	1				2	6
<u>GG. Flute</u>							
GG. Flute . . . . .	3		1				4

	SC	DR	SV	BR	NR	HR	Total
<u>ANTLER</u>							
<u>HH. Wedge or Chisel</u>							
°HH. Wedge or chisel . . . . .	5	5	9	68		31	120 <sup>h</sup>
<u>II. Biperforated Antler Tine</u>							
II. Biperforated antler tine . . . . .				2			2
<u>JJ. Antler-Base Handle</u>							
JJ. Antler-base handle . . . . .				3			3
<u>KK. Elk-Antler Tube</u>							
KK. Elk-antler tube . . . . .	1						1
<u>LL. Shaft Wrench</u>							
°LL. Shaft wrench . . . . .		2					2
<u>MM. Barb or Blade for Fish Gig or Toggle Head</u>							
MM. Barb or blade for fish gig or toggle head . . . . .		1		12		2	15
1. Bipointed . . . . .				4		2	6
a. Rather flat or slightly rounded on 2 sides . . . . .				4			4
b. Grooved on one side . . . . .						2	2
2. Square based . . . . .		1		8			9
a. Base shouldered on one face . . . . .				2			2
b. Base shouldered on one side . . . . .				5			5
c. Base tapered . . . . .		1		1			2
<u>NN. Harpoon Head</u>							
NN. Harpoon head . . . . .		7		1	1	3	12
1. Unilaterally barbed . . . . .				1		3	4
a. One barb . . . . .						3	3
b. Two barbs . . . . .		x		1			1
2. Bilaterally barbed . . . . .		7			1		8
a. Barbs opposite one another, in 3 pairs . . . . .		5					5
b. Barbs not opposite one another, more than 3 pairs . .		2			1		3
<u>OO. Barb for Composite Fishhook (?)</u>							
OO. Barb for composite fishhook (?) . . . . .		37	2	4			43
1. Unshouldered, thicker type . . . . .			2	4			6
2. Shouldered, thinner type . . . . .		37					37
<u>PP. Awl-like Pendant</u>							
PP. Awl-like pendant . . . . .		1					1
<u>TOOTH</u>							
<u>QQ. Conical-headed, Shouldered Object</u>							
QQ. Conical-headed, shouldered object, with broad flat stem, of whale ivory (?) . . . . .	6						6
1. Plain . . . . .	2						2

	SC	DR	SV	BR	NR	HR	Total
2. With punctate ornament . . . . .	4						4
a. Smooth edged . . . . .	2						2
b. Serrate edged . . . . .	2						2
<u>RR. Beaver-Tooth Gouge</u>							
RR. Beaver-tooth gouge . . . . .		2					2
<u>SS. Perforated Shark's Tooth</u>							
SS. Perforated shark's tooth . . . . .	4						4
1. One perforation . . . . .	1						1
2. Two perforations . . . . .	3						3
<u>TT. Perforated Stingray Mouth Plate</u>							
TT. Perforated stingray mouth plate . . . . .	1						1
<u>UU. Perforated Mammal Tooth</u>							
UU. Perforated mammal tooth . . . . .	2	1		3			6
1. Human incisor . . . . .	1						1
2. Deer's (?) molar . . . . .	1						1
3. Bear's tooth . . . . .				1			1
4. Carnivore canine tooth . . . . .		1		2			3
CLAW							
<u>VV. Perforated Eagle Claw</u>							
VV. Perforated eagle claw (terminal phalange) . . . . .	9						9
-----							
Total UCMA specimens . . . . .	1675	479	146	764	40	72	3193 <sup>1</sup>
Percentage of specimens . . . . .	52.5	15.0	4.8	23.9	1.3	2.3	

## BONE

A. Awl

A. Single-pointed perforating implement without eye or groove for cord attachment—more or less needle-pointed awl, pin (?), dagger (?). The paucity of awls in HR probably indicates that anciently, as now, no coiled basketry was made. Awls from other archaeological regions were presumably used primarily in making coiled baskets. Among the modern Yurok and Hupa awl-like tools were used for perforating skins for sewing and for slitting lamprey eels for drying.

Al. Awl of mammal leg bone. Of 358 identified bones, 238 are cannon bones, 24 ulnae, 41 fibulae, 25 tibiae, 12 radii, and 18 deer splints (vestigial outer metatarsals). The distribution of archaeological Al awls used by modern groups, incomplete as it is, suggests that any or all of a large range of types were used without distinctive differences of function. The same was probably true in ancient times, so that my objectively determined types were probably not functionally different. Distribution:<sup>6</sup> Hupa: AlaI (5 specimens), AlbII (1); Yurok: AlaII (4), AlaIV (2), AlbII (1), Ale (3), Alf (1); Yuki: AlcII (1); Pomo: AlaII (3); Maidu: AlaII (2), AlbII (1); Miwok: AlaIII (1), AlbII (4), AlcII (3), Ale (1), AleI (1), Alf (4); Yokuts: Alf (1); Yokuts or Mono: AlbI (5), AlbII (2); Mono: AlcII (4); Cahuilla: AlaI (3).

Ala. Awl with head of bone intact to serve as handle.

AlaI. Cannon bone (distal end as handle): 2. SC 1 (M 10); BR 1 (309), figured. Ethnological: 5 Hupa lamprey eel slitters; 3 Cahuilla coiled basketry awls from Torros and Morongo reservations, Riverside co.

AlaII. Ulna awl, etc.: 24. 18 ungulate, 6 carnivore. Ungulate: SC 1 (R 35);<sup>7</sup> DR 4 (86, 3 [1 figured]; 90, 1); SV 1 (2); BR 11 (356, 2; 309, 6 [1 figured]; 295, 3); NR 1 (236). DR all elk; others deer, some perhaps antelope. Carnivore: SC 2 (N; C 3); SV 1 (2),<sup>8</sup> figured; BR 3 (356, 329, 309). Probable identifications.—Sea otter: SC (C 3; prob. also N); coyote: SV (2), BR (329, 309); unidentified: BR (356). Ponderous figured DR specimen must have served different purpose from slender SV one. Ethnological: 4 Yurok, 1 catalogued as eel slitter, 3 as awls; 3 Pomo basket awls with very slender, sharp points, from Mendocino co. and Upper Lake, and Lower Lake, Lake co.; 2 Maidu, with thin knife-like blades, but sharp points, from Butte co., catalogued as bone arrowshaft cutters.

AlaIII. Fibula awl: 41. 11 sea otter, others probably seal and sea lion. SC 41 (C 3, 10 [1

figured; sea otter]; C 147, 2; C 100, 1; C 138, 1; R 30, 1; R 35, 3; R 12, 2; R —, 2; N, 19 [2 figured: seal and sea lion]). Ethnological: 1 Central Miwok basket awl, from Tuolumne co.

AlaIV. Tibia "dagger" or "punch," distal end of tibia as handle: 2. BR 2 (307, 328 [both figured]). Latter, "punch," very crude, perhaps unfinished or broken. Ethnological: 2 Yurok eel slitters.

AlaV. Radius awl: 2. Canis: SJ 1 (6); ungulate (proximal head): BR 1 (309); both figured. Canis apparently had complete head which has weathered away; point made by oblique cut across hollow bone.

Alb. Awl of mammal leg bone, head unworked except by original splitting.

AlbI. Cannon bone (distal end as handle): 30. Seven lack epiphysis, apparently because from bones of young. SC 7 (N, 1; R 30, 2; C 3, 1; C 197, 1; M 10, 1 [figured: type; with epiphysis]; M 1, 1 [figured: variant]); SV 9 (1, 7 [1 figured: type; without epiphysis]; 2, 2); BR 13 (387, 1; 3, 1; 76, 1; 295, 2; 307, 1; 309, 7 [1 figured: variant]); NR 1 (236). Ethnological: 4, with epiphysis, from Yokuts and Shoshonean in Sierra Nevada of Tulare and Kern cos.

AlbII. Cannon bone (proximal end as handle): 154. SC 10 (C 3, 1; C 100, 1; M 1, 2; M 6, 1; M 10, 2; Port Los Angeles, 1; R 35, 1; Catalina, 1); DR 9 (85, 1; 80, 1; 82, 1; 86, 1; 89, 1; 90, 2; 91, 1; 138, 1); SV 35 (1, 12; 2, 19 [1 figured]; Redding, 4); BR 96 (3, 1; 10, 2; 76, 4; 86c, 1; 123, 1; 259, 1; 295, 15; 307, 3 [1 figured: type]; 309, 52; 328, 1; 329, 4; 356, 2 [1 figured: variant]; 372, 1; 387, 4; 407, 2 [1 figured: variant]; 420, 2); NR 3 (236); Yosemite 1. Ethnological: 2 Hupa, Yurok eel slitters; 1 Maidu basket awl, from Butte co.; 4 N, C, S Miwok (Amador to Mariposa cos.) basket awls; 2 basket awls, from Kern co.

AlbIII. Tibia awl: 5. SC 2 (N), 1 figured: seal; other sea otter; SV 1 (2); BR 2 (309), 1 figured. SV and BR specimens probably deer.

AlbIV. Radius awl: 7. DR 2 (91; 80), both figured: extremes of length; SV 1 (2); BR 4 (76; 295; 307; 328). As with AlbIII, this type tends to be crude.

Alc. Head partly worked down.

AlcI. Cannon bone (distal end as handle): 4. SC 1 (C 3), figured; BR 3 (309, 2 [1 figured]; 295, 1).

AlcII. Cannon bone (proximal end as handle): 29. SC 2 (R 35; Port Los Angeles); DR 12 (80, 3 [1 figured: unique, slender, flexible pin]; 83, 1; 86, 1; 90, 2; 91, 2; 107, 3); SV 3 (1, 2 [1 figured: short, broad, abruptly cut to point]; 2, 1); BR 11 (76, 1 [figured: type]; 295, 2 [1 figured: long, slender, stout]; 307, 1; 309, 4 [1 figured: triangular in transverse cross section]; 329, 1; 387, 2); NR 1 (236). Ethnological: 1 Yuki, Round v., Mendocino co.; 3 C Miwok, Calaveras and Tuolumne cos.; 4 North Fork Mono, Madera co.

AlcIII. Tibia: 2. BR 1 (309); DR 1 (82); both

<sup>6</sup> See Kroeber, 1925, pl. 1, for location of groups.

<sup>7</sup> Heye pictures 2 deer ulnae from San Miguel Is., fig. 12.

<sup>8</sup> Lillard and Purves picture 1 from Delta, pl. 9, left-hand figure.

figured. Former flat, broad, almost a dagger; latter triangular in transverse cross section.

AlcIV. Radius: 2. DR 1 (80); SV 1 (2);<sup>9</sup> both figured, former thick, heavy, latter thin, slender.

Ald. Awl of mammal leg bone with head entirely removed: 14. SC 7 (N, 5 [3 figured: 1 apparently fibula of marine mammal; another circular in transverse cross section]; Catalina, 2); DR 1 (138); SV 1 (2); BR 2 (76), 1 figured; NR 1 (236); HR 2 (67). 1 SC (N) has base worked down to spatulate form with point showing traces of asphaltum coating; another shows such traces at median part; perhaps neither is an awl. A variable type, since different bones included. Identifications difficult with heads wholly removed. One figured SC (N) specimen suggests half of a double-pointed pin (Pla).

Ale. Awl of mammal leg-bone splinter. Awls have crude appearance because splinters used. This crude appearance, if correlated with stratification and absence of more finished forms, might be interpreted as indicating early cultural stage. That it does not necessarily indicate antiquity is further revealed by 5 modern specimens (1 from cannon bone, 1 sawed beef bone, 3 others, unidentified bones): 3 are Yurok eel slitters; 2 are, respectively, N and S Miwok basketry awls from Calaveras and Mariposa cos.

AleI. Awl of cannon-bone splinter: 19. All concavo-convex. SC 1 (C 100); DR 2 (139, 1; 141, 1); SV 10 (2), 1 figured; BR 5 (309); NR 1 (Oakville). Ethnological: 1 N Miwok, Calaveras co.

AleII. Awl of tibia splinter: 16. Ungulate tibia particularly suitable because of thickness. No evidence whether irregular proximal end handle wrapped. DR 1 (91); SV 5 (2), 1 figured; BR 10 (309, 9 [2 figured]; 307, 1). That this crude type was late as well as early is indicated by occurrence from top to bottom of SV (2) and BR (309).

AleIII. Awl of radius splinter (ungulate): 1. BR (387), figured.

Alf. Awl with covered handle: 8. All asphaltum covered; 1 at least is cannon bone, others may be. SC 8 (M 1, 3 [1 figured]; M 9, 1 [figured]; M 10, 3; C 138, 1 [figured]). Ethnological: 1 Yurok, cannon bone, pitch-covered handle, evidently eel slitter; 5 basket awls, rag-covered handles: 1, not cannon bone, from Chukchansi Yokuts; 4, cannon bone, from C and S Miwok of Calaveras, Tuolumne, and Mariposa cos.

Alg. Sharpened deer splint (vestigial outer metatarsal): 18.<sup>10</sup> SV 2 (2); BR 15 (309, 9; 3, 1;

356, 4 [1 figured]; 328, 1); NR 1 (Oakville). From near top to near bottom of BR (309).

A2. Awl of mammal rib: 42.<sup>11</sup> More or less bowed, unless very short. Excepting 2, with rounded, smoothed proximal ends, all are abruptly broken off or left unfinished there. All are pointed, but show no sharpening of the edges to make blades. Some are of split rib, exposing cancellous bone; others are of deer ribs which are rectangular in transverse cross section and sliced obliquely like a bird-bone awl; some are made from small splinters of ribs. SC 20 (N, 13 [2 figured]; C 3, 2; C 100, 2; C 103, 1; C 135, 1; Catalina, 1); SV 3 (2, 1; 1, 2); BR 18 (387, 1; 356, 1; 309, 15 [2 figured]; 76, 1); NR 1 (Oakville).

A3. Mammal penis bone: 18.<sup>12</sup> Mostly sea otter; remainder perhaps seal. Distal end ground to point, mostly not very sharp,<sup>13</sup> so may not have been awls; in half the cases proximal end also ground smooth. SC 15 (N, 11 [1 figured]; Catalina, 1; R 30, 1 [figured]; R 35, 1; C 104, 1); BR 3 (372, 309, 295).

A4. Bird-bone awl. Environment apparently explains abundant use in SC. Awls made of whole bird bone are cut obliquely to form point.

A4a. Awl of bird bone with head of bone intact.

A4aI. Radius: 53. Probably mostly waterfowl. SC 46 (N, 43 [3 figured]; C 3, 1; C 100, 1; C 197, 1); DR 3 (90, 1; 138, 1; 139, 1); BR 4 (356, 1; 309, 2; 295, 1).

A4aII. Ulna: 38. More than 1 species. SC (N, 29 [3 figured]; R—, 1; C 39, 1; C 104, 1; C 138, 1; C 147, 5).

A4aIII. Humerus: 10. More than 1 species. SC 9 (N), 1 figured; HR 1 (67), figured.

A4b. Awl of bird bone with head of bone cut off.

A4bI. Radius: 18. Divide evenly between longer heavy radii and shorter slender ones; obviously from 2 or more species. SC 17 (N, 13 [1 figured: shortest]; C 100, 3 [1 figured: longest]; C 3, 1); BR 1 (356), figured.

A4bII. Ulna: 4. All have proximal end sawed or ground off to form handle, not broken off. SC 4 (N, 2 [1 figured: smallest]; C 3, 2 [1 figured: largest]).

A4bIII. Humerus: 3. SC 3 (N), 2 figured. 1 has distal end somewhat rounded, perhaps after fracturing which is in evidence; this suggests secondary use, perhaps as smoother.

A4c. Awl of split bird bone.

A4cI. Ulna: 1. SC 1 (N), figured.

<sup>9</sup>This resembles in general form 2 so-called hairpins reported and pictured by Heye (pl. 62, d, e; p. 97) as made of human fibulae. Heye also pictures 2 others of human fibulae worked down to a much greater extent (pl. 62, b, c).

<sup>10</sup>J. P. Harrington pictures (pl. 21, i, j) 2 eyed needles of California mule-deer splints from Burton md., Santa Barbara, a type unrepresented in UCMA collection.

<sup>11</sup>Some artifacts illustrated by Heye, pls. 49, 50, from San Miguel is., apparently belong in this class.

<sup>12</sup>2 from San Miguel is. are figured by Heye as "bone fishhook barbs," op. cit., fig. 11, a, b.

<sup>13</sup>However, they are not nearly so blunt as gouges from the same bone (class C6).

A4cII. Humerus: 6. 3 have exceedingly sharp centrally placed points; 1 has point at side; 2 have points which may have been secondarily rounded, perhaps after being broken. SC 6 (M 10, 1; R —, 1 [figured: smallest]; N, 3 [2 figured: largest and point off center]; C 104, 1).

A5. Awl or perforator of fishbone.

A5a. Stingray spine: 2. BR 2 (309), 1 figured. From *Myliobatis californicus*, with barbs ground off. Unworked spines not uncommon in BR mounds.

A5b. Polished fishbone: 15. SC 13 (M 10, 1; R 15, 4 [1 figured]; N, 7 [2 figured]; C 122, 1); BR 2 (309). This is a dubious group for 2 reasons: (1) Without comparative ichthyological material I am not certain in each case as to the points being ground down; (2) that the tiniest ones are awls is perhaps doubtful—possibly they were barbs on some weapon, although none such known ethnologically.

### B. "Pin," "Dagger"

B. "Pin," "dagger," not perforated for attachment. This group comprises objects which differ only slightly from awls (A) and from gouges and smoothers (C). Some "daggers," such as B4, may have been used as sweat scrapers or strigils.

B1. "Pin" of split proximal end of cannon bone: 6.<sup>14</sup> Distal end flat, tapered, rounded; proximal end for handle. SC 1 (C 3); BR 5 (407), 1 figured. Some examples might be placed under class A (awls).

B2. "Pin" of split bone with spatulate handle.

B2a. Long type: 1. Of split cannon bone, with thin handle. BR 1 (309), figured.

B2b. Short type: 2. SC 1 (R—); HR 1 (67); both figured. Latter figured also by Loud.<sup>15</sup> Former shows cancellous surface on 1 side.

B3. Flat, broad, split cannon-bone dagger or knife: 6. SC 5 (Clemente, 1 [figured]; C 3, 4 [1 figured]); BR 1 (407), figured.

B4. Heavy cannon-bone dagger with half of distal head for handle: 7. Three only have handle intact. DR 7 (86, 6 [3 figured: incised designs on convex surface of 2]; 83, 1).

B5. Triangular-pointed dagger of tibia: 1. Handle ground flat; point roughly triangular in transverse cross section (thus differing markedly from B4, which is flat at tip). Bone too much worked down to identify species. SC (R 30), figured.

B6. Flat-pointed dagger of artiodactyl tibia: 5. Probably deer. Smallest has head of tibia ground down most, and is unornamented. Other 4 have punctations and incised transverse lines on convex surface: on proximal third, or handle, of 3; on distal half of 1, the handle of which has 5 incised transverse lines, 1 close to head, 4 in a group an inch down. SC 5 (C 3), 3 figured:

<sup>14</sup>Some San Miguel is. specimens shown by Heye, pl. 55, appear to be of this type.

<sup>15</sup>1918, p. 383; pl. 20, fig. 7.

smallest, largest, typical. Ethnological: 1 Yurok, undecorated, with handle formed by whole distal head of tibia; flat point; probably an eel splitter.

B7. Wandlike dagger: 4. May be of artiodactyl tibia, but ground down past certain identification. Handles worked down so circular in transverse cross section, yet no 2 identical. SC 4 (C 107), 3 figured: 1 has groove around head. Superficial resemblance to bone wands (K) in which quartz crystals inserted.

B8. "Pin" with groove-encircled head: 4.<sup>16</sup> 1 (marine mammal) is more or less rectangular in transverse cross section near the head and tapers to a rather thick rounded distal end—actually more a rubbing tool than a pin; 2 others (1 bird, 1 marine mammal) are sharp pointed; another (land mammal) lacks distal end, which is assumed to have been pointed. SC 3 (N), all figured: 1 bird, 2 marine mammal; BR 1 (309), land mammal.

B9. Flat-pointed "dagger" of bird humerus with cross-hatched proximal end: 1. Probably pelican. Bone cut or ground off obliquely to form blade. SC (R 11), figured.

### C. Gouge, Smoother, or Flaking Tool

C. Gouge, smoother (rubbing tool), or flaking tool. These uses are guesses on my part. Heye regards those of ribs (C5 and C7) as pressure flakers. The implements are characterized by blunt, rounded points, and sturdy solidity; most of them are short, relatively heavy, and range from bones with complete head for handle to splinters; shafts but little shaped if at all. Rounded, polished tip suggests an abrasive use, rather than perforating. Many of them, especially those from mammal leg bones, may once have been awls the points of which broke, and which were then ground down to serve a new purpose as gouges or smoothers. None is of bird bone.

C1. Cannon bone: 20.<sup>17</sup> Range from implement with complete distal end of cannon bone to mere splinter. All relatively crude. Some are represented by points only, so impossible to know character of handle. Two have points flattened in vertical plane; others are horizontal. SC 4 (M 10, 1; R 32, 1; C 135, 1; C 147, 1); SV 1 (1); BR 15 (356, 1; 407, 1 [figured: elk]; 372, 2 [1 figured]; 309, 8 [3 figured]; 307, 1; 295, 1; 3, 1). Ethnological: 1 Yurok salmon harpoon toggle head (ethn. fig. 1, p. 236) has cannon-bone point with elk-antler barbs. If point found archaeologically it would be classed as a gouge.

<sup>16</sup>Putnam pictures a sharp pin with a double-grooved head, from San Miguel is. (pl. 11, fig. 9); a bird-bone pin from San Clemente is., which he calls a "marrow extractor" (fig. 111); and a solid-bone pin from San Clemente is. (fig. 110). Moorehead figures an 11-inch pin of cetacean bone (fig. 362, no. 6).

<sup>17</sup>J. P. Harrington shows 1 with complete distal head, from Burton md., Santa Barbara (pl. 20, z).

C2. Ulna: 26.<sup>18</sup> All ungulate, probably deer and antelope mostly. Differ from ulna awls (AlaII) in having blunt or rounded points. Perhaps some were originally awls which were ground down after the points broke. DR 1 (138); SV 5 (2); BR 18 (76, 4 [1 figured]; 307, 1; 309, 6 [1 figured]; 329, 1 [figured]; 372, 1; 387, 4; Yerba Buena, 1 [figured]); NR 2 (Oakville).

C3. Fibula: 3. Two at least seal. One has distal end damaged, proximal end unworked. Another has smoothly rounded, flattened blade at distal end; while proximal head ground flat exposing spongy bone. Last has proximal end weathered away; species unidentified. SC 3 (N), 2 figured.

C4. Tibia: 11. One each from proximal end of seal and sea otter; employed without splitting head, but bone broken to form working end. Nine ungulate (1 deer, 2 elk; others uncertain), all split; some from splinters without head of bone. SC 3 (N, 1 [figured: sea otter]; R—, 1 [figured: seal]; C 104, 1); BR 8 (407, 2 [1 figured: elk]; 309, 4 [1 figured: from splinter]; 298, 1; 250a, 1). Ethnological: 1 Luiseño of Valley Center, San Diego co.; single edged, knifelike; proximal end for handle; tool called maavish for removing acorn meats from split nuts.<sup>19</sup>

C5. Rib: 133.<sup>20</sup> Sixty-seven sea otter: SC 66 (N, 53 [2 figured]; R 19, 2; R 35, 4; R 12, 1; R—, 1; C 100, 5); BR 1 (3). Sixty-six unidentified (1 seal or sea lion): SC 63 (M 10, 9; N, 23; C 100, 12; C 104, 3 [1 figured; another: seal or sea lion]; C 131, 1; C 83, 1; C 122, 1; C 138, 4; C 135, 2; R 4, 1; R 12, 1; R 19, 5); BR 3 (329). Type evidently environmentally determined by presence of marine mammals. Usually is cut obliquely on concave surface of distal end, making edge of convex side working edge. Angle of cut varies, some being almost 90°, others forming more definitely bladed gouges. It seems likely they must have served different purposes. BR (3) specimen differs from all others having lateral oblique cut, so that the working edge is in a plane at right angles to that in 132 others.

C6. Mammal penis bone: 8. Seven sea otter. SC 1 (C 197); BR 7 (3, 1; 295, 1; 307, 3 [1 figured]; 309, 2 [1 figured]). One BR (307) has coating of black substance on proximal half.<sup>21</sup>

C7. Unidentified bone, round in cross section: 5. Probably mostly from sea mammals. SC 5 (N), 3 figured: longest, shortest, thinnest. Shortest seems to have traces of asphaltum for half its length, suggesting that it was hafted; thinnest is possibly a pressure flaking tool.

<sup>18</sup> Heye figures (p. 87, fig. 12) 2 from San Miguel is., the only examples from SC.

<sup>19</sup> Sparkman, p. 194.

<sup>20</sup> Heye (p. 82, pl. 50) suggests they were pressure flakers. J. P. Harrington figures (pl. 19, b) some sea lion from Burton md., Santa Barbara.

<sup>21</sup> Resembles somewhat an asphaltum-handled specimen figured by Heye, pl. 51.

C8. Unidentified bone, flat on 1 side: 51. Mostly much weathered marine-mammal bone. Perhaps some are chisels or wedges, some (smaller ones) pressure flakers. Difficult to distinguish from class D. SC 51 (C 3, 1; C 138, 1 [figured]; R—, 1; Clemente, 2 [1 figured]; N, 46 [2 figured]).

#### D. Knife, Chisel, End-Scraper, Wedge

D. Knife, chisel, end-scraper, wedge (all end-bladed). Range from small objects (D3) to ponderous elk-bone chisels (D4) and whale-bone wedges (D6).

D1. Marine-mammal (other than whale) chisel or knife: 17. SC 17 (N), 3 figured. Apparently never hafted, as proximal ends, smoothed or natural, appear sufficient for handles. Angle at which bone is cut to form blade is very small, so that a long tapering blade results. Amount of curvature in handle depends on bone used, ribs giving most.

D2. Straight flat knife, chisel, or scraper: 34. SC 32 (N), 3 figured; BR 2 (309), 1 figured. Two BR, proximal ends broken off, seem to be of rib, and perhaps should be termed end-scrapers. SC are of sea mammal; their porosity contrasts with hard, close-grained bone of 2 BR examples.

D3. Hafted knife, chisel, or scraper: 5. Evidence of asphaltum on proximal end. Four are flat, as though from pieces of ribs; 5th is circular in transverse cross section. SC 5 (N), 3 figured: smallest, broadest, longest; broadest shows evidence of string winding.

D4. Tang-hafted chisel or scraper of marine-mammal bone: 1. Presumably fitted into a handle, but no adhesive remains. SC 1 (N), figured.

D5. Straight elk-bone chisel: 21. Probably most of cannon bone, several being distinguished. About half show proximal end, where, on most of these, are signs of pounding; rest<sup>22</sup> have this end cut off. BR 2 (309, 1 [figured: has smooth rounded base as though to fit hand]; 407, 1); BR 19 (67), 4 figured.

D6. Bone wedge: 14. Probably whale or other sea mammal. Differentiation of wedges from chisels or scrapers difficult; some may not be wedges. Range in size perhaps correlated with coarse and fine work. SC 12 (C 83, 1 [figured: type]; C 100, 1; R—, 1; N, 9 [2 figured]); BR 2 (407), 1 figured.

D7. Bar for prizing off abalones: 13.<sup>23</sup> Five double bladed; remainder single, though possibly once double and broken. Use hypothetical; based on such use of similar wooden objects by Coast Yuki of Mendocino co. Also possible that some of the curved ones were used as boomerangs (throwing sticks), because they suggest wooden

<sup>22</sup> Loud (p. 382) thinks these may have been adz blades.

<sup>23</sup> Somewhat suggesting this type of artifact is the "sword" of cetacean rib described and pictured by Putnam (p. 231, fig. 112).

prototypes in use by S California Indians. Bone probably more abundant than wood on SC islands. SC 13 (C 3, 1; C 100, 1; R 34, 1; R—, 1; N, 8 [1 figured]; Clemente, 1).

#### E. Double-ended Spatulate Knife or Scraper

E. Double-ended spatulate knife or scraper. All relatively small articles.

E1. Knife or scraper, flat: 7. Marine mammal, except possibly 1. SC 7 (N), 2 figured: max. and min. length and thickness. Possibly some belong to D3 but have lost all trace of asphaltum used in hafting. Ends rounded; objects appear to be tools rather than toilet articles.

E2. Knife or scraper, bowed: 24. Apparently all sea-mammal ribs. In all but 1 (possibly unfinished), lateral edges are thin, suggesting use as scrapers, possibly as strigils for removing perspiration from body (described by Fages<sup>24</sup> for Indians of Monterey Bay region). SC 24 (N, 22 [3 figured: median, and max. and min. lengths]; Clemente, 1; Miguel, 1).

#### F. Strigil

F. Strigil: 24. Side-bladed scraper of mammal rib, with distal end worked to "rounded point." Probably all artiodactyl except 2 from SC (N). Bases of all but 1 specimen from regions other than SC are broken off. Exception from BR (295) is cut straight across. 10 specimens have noticeable gloss, which one might imagine was imparted to them by their use as sweat removers.<sup>25</sup> SC 3 (N, 2 [both figured]; 1, of seal or sea-lion rib is aberrant in being thick and heavy); C 100, 1; DR 1 (90), figured; SV 1 (1); BR 19 (295, 1 [figured]; 309, 7; 356, 1; 372, 2; Orinda, 8 [1 figured]). If these are truly strigils as assumed, the depth of 22-24 ft. in BR (309) and considerable depths elsewhere would indicate ancient usage, while Fages' account tells of their use in 1769. Dr. E. M. Loeb tells me he has heard of their use among the modern Pomo.

#### H. Serrate Bone

H. Serrate bone. That these are fleshers seems to be a common opinion of archaeological colleagues. Ethnological substantiation is given by Schenck.<sup>26</sup> An alternative use as bark shredders is suggested by M. R. Harrington.<sup>27</sup> Loud

<sup>24</sup>H. I. Priestley, Fages' Description of California, p. 67. Heye (p. 81) suggests possible use "for weaving or plating sea-grass into garments or mats, or possibly for the shanks of fishhooks." He figures 5 of them (pl. 49) from San Miguel is.

<sup>25</sup>Priestley, p. 67.

<sup>26</sup>1926, p. 219.

<sup>27</sup>1933, fig. 12, p. 137.

and Harrington<sup>28</sup> found 1 in Lovelock cave and quote Gilbert Natches, a N Paiute informant, as saying "it was probably used for scraping greasewood in making awls and arrow foreshafts." The possibility that they were musical rasps has also been suggested.

H1. Serrate deer or elk scapula: 89. Proximal portion served as handle. "Teeth" of the serration are not pointed as a rule. DR 2 (107, 1; 138, 1); BR 81 (86c, 1; 283, 1; 295, 4; 298, 1; 307, 4; 309, 45 [1 figured]; 328, 4; 329, 12; 356, 5; 372, 1; 420, 1; Tomales, 2); NR 4 (236, 2; Oakville, 2); Moss landing, 2. Use over a long period of time is indicated especially by the range of depths for the BR (309) specimens.

H2. Serrate implement of ungulate rib: 3. BR 3 (309, 1 [figured]; 329, 1; 356, 1 [figured]). Presumably served same purpose as serrate scapula, although figured BR (309) specimen has much finer serrations.

H3. Serrate implement of fish jawbone: 5. From large fish. Perforation in figured specimens natural. BR 5 (295, 1; 309, 4 [1 figured]).

#### I. Split Cannon Bone

I. Split cannon bone, of deer: 4. Perhaps beaming tool for hide dressing, or perhaps unfinished artifact. DR 1 (82); BR 3 (295, 2; 309, 1 [figured]). Schenck and Dawson<sup>29</sup> describe 4 elk-bone "beamers," 3 from Lodi, 1 from a Yolo co. mound. The partial one they figure appears to be a tibia.

#### J. Whole Deer Cannon Bone

J. Whole deer cannon bone: 6. BR 4 (309 [1 figured]); NR 2 (236). All but 1 have transverse scratches or cuts, as though they had served as a base on which to cut some soft material, or to keep string wrapping from slipping. One has a few crosshatched scratches on 1 side. 1 BR and 2 NR pieces are calcined.

Ethnological: 1 C Pomo of Hopland, Mendocino co.; 2 Concow Maidu of Round Valley reservation, Mendocino co.; 3 Yurok. Pomo piece has 5 deep notches on 1 edge of natural longitudinal groove; tied around it is mesh portion of large carrying net; precise purpose not clear, but it may have served as handle or as means of reducing size of net for small load. Possibly BR (309) specimens served similar purpose. 3 Yurok pieces and 2 Maidu used as tappers for basket trays on which acorn meal sifted.

#### K. Ceremonial Wand

K. Ceremonial wand. Were it not for ethnology, we might be at a complete loss as to the interpretation of these objects. Similar arti-

<sup>28</sup>1929, p. 40; pl. 13, j.

<sup>29</sup>1929, pl. 81, f.

facts of wood have been reported for the Luiseño and Diegueño. Contance G. DuBois<sup>50</sup> says of the Luiseño that "The sacred stick, Sivut paviut ('stick with a crystal inserted in one end, and having a ceremonial use'), was brought from one pueblo to another in a ceremony, and served the same purpose as money, being given in return for presents of food. These sticks were painted red, white, and black." Sparkman<sup>51</sup> mentions sticks with a "pointed crystal in one end, and sometimes bits of shell glued to the sides with pitch, a little below the crystal." Waterman<sup>52</sup> describes a different type of wand for the Diegueño. "This stick is flat, pointed at one end, and sometimes inlaid with abalone shell . . . but has no 'medicine-stone' or flint fastened in the end." Putnam<sup>53</sup> figures a wooden specimen from Santa Cruz is. which is apparently identical with the one referred to by Waterman for the Diegueño.

K1. Wand of artiodactyl tibia, crystal inserted in distal end of tibia: 9. Bone cut open about half its length; hole drilled in distal end and quartz crystal fastened in place with asphaltum. Actually only 6 have crystals in place, but other 3, incomplete, are indubitably of this type. Natural outer surface was ground down almost beyond identification. 2 are decorated with band of crosshatching encircling handle near head. Heye<sup>54</sup> reports 1 specimen from San Miguel is.: calls it hair ornament, apparently because found under a skull. SC 9 (M 1, 1; C 107, 3 [1 figured]; C 138, 2; R 2, 3).

K2. Wand of probable artiodactyl bone, Haliotis cap: 1. SC 1 (C 100), figured. Top capped with Haliotis-shell disk stuck fast with asphaltum. Dozen small Olivella-shell beads inlaid in asphaltum at intervals around sides. Carved raised collars separate handle from blade. Possibly types K3 and K4 are incomplete K2 type. Heye illustrates<sup>55</sup> somewhat similar specimen from San Miguel is., with notched edges but without bead inlay or Haliotis cap. He calls it hair ornament.

K3. Wand of unidentified bone, large, with punctate decoration: 1. Certainly land mammal, possibly elk. Tiny punctations in intersecting lines on what is left of lower part. SC 1 (C 135), figured.

K4. Ceremonial wand, large, with punctate decoration, head perforated: 1. SC 1 (C 135), figured. Longitudinal split in handle is result of breakage; distal end also broken off. Drilled holes near top look as though made in an attempt at repair. Another serious split between 2 holes. About an inch of edge of handle has asphaltum ad-

hering to it, suggesting that it may have been capped with a Haliotis disk like K2.

#### L. "Spear Head"

L. "Spear head." Except for L2, objects appear too fragile and too ornamental for utilitarian purposes.

L1. "Spear head": basal stem, barbed, flat bladed, ornamented: 2. May be of swordfish beak or mandible. SC 2 (C 83), both figured. Design on fragment of a third possible one is also figured; differs from the 2 more complete specimens in having punctate design on both flat surfaces. Thickness of all 3 ranges from 2-4 mm.

L2. "Spear head" with deeply notched base with 2 spurs: 1. Bone apparently same as L1. No decorative design. Thickness 2-4 mm. SC (M 1), figured.

L3. "Spear head," cylindrical, basal tang, of marine-mammal bone: 1.<sup>56</sup> SC 1 (N), figured.

#### M. Elk-Tibia "Sword"

M. Elk-tibia "sword." Identification of bone not positive on account of alteration in the finished artifact. The "hilt" of the "sword" is the distal end of tibia. Average thickness ca. 3 mm. Putnam<sup>57</sup> shows a type M1 implement which he says is made from the lower jaw of a porpoise, but is really probably also elk tibia, since it agrees in every detail with UCMA specimens, including presence of nerve foramen. Whether the 20 specimens recovered from graves on Santa Catalina is.<sup>58</sup> are also elk, I cannot say, but if so, it indicates extensive contact with the mainland. Of the Santa Catalina specimens, Putnam states that several have small holes on the margin of the bone at the "hilt," and had probably been mounted in handles, very likely of wood. Presumably these "swords" were of type M2. Heye figures<sup>59</sup> from San Miguel is. "a split cetacean-rib hair ornament," analogous in form to the elk-tibia swords and most closely resembling type M1.

It is possible that these "swords" were primarily strigils for sweat scraping, and weapons only secondarily. Fages<sup>60</sup> says of the Indians of the Monterey region: "If two of the natives quarrel with each other, they stand body to body, giving each other blows as best they can, using what might be called spatulas of bone, which they always carry for the purpose of scraping off their perspiration while in the bath and during the fatigue of their marches. But as soon as blood

<sup>50</sup>P. 98.

<sup>51</sup>P. 211.

<sup>52</sup>1910, p. 299, fig. 1.

<sup>53</sup>P. 232.

<sup>54</sup>Pl. 59, a.

<sup>55</sup>Pl. 60, b.

<sup>56</sup>Heye illustrates (pl. 46, c) rather similar example from San Miguel is.

<sup>57</sup>Fig. 113, p. 231.

<sup>58</sup>Putnam, p. 232.

<sup>59</sup>Pl. 61, c; p. 97.

<sup>60</sup>Priestley, pp. 67, 68.

is drawn from either of the combatants, however little he may shed, the quarrel is forthwith stopped, and they become reconciled as friends, even when redress of the greatest injury is sought." Referring to the use of the implement in the sweat house, Fages states: "The Indian gets into it [sweat house], and others make a fire for him with small pieces of wood near the door, and the one who is inside receives a good scorching for an hour, during which he perspires copiously, scraping himself with the poniard or spatula mentioned above."

Heye's guess as to "hair ornament" may have an element of likelihood, as it is possible they were carried in the hair when not in use.

M1. Elk-tibia "sword," without perforated "hilt": 1. SC 1 (R 30), figured. From same grave comes an example of M2, which raises the possibility that M1 is unfinished. However, Putnam<sup>41</sup> pictures 1 from Santa Catalina is.

M2. Elk-tibia "sword," with 2 perforations in "hilt": 2. SC 2 (M 1, 1; R 30, 1 [figured]). Former thicker and heavier than latter, which is thin and fragile; also former has trace of asphaltum adhesive on "hilt," bearing out Putnam's suggestion of hafting.

M3. Elk-tibia "sword" with single median perforation in "hilt": 2. Represented by two basal fragments only. Possibly the single, fairly large perforation was for attaching a cord rather than hafting. BR 2 (309), 1 figured.

#### N. Shoehorn-shaped Object

N. Shoehorn-shaped object, not perforated. Under this designation are 5 different objects, each a unique type.

N1. Shoehorn-shaped object, long handled, of dolphin jawbone. From right side of mandible; "spoon" section only 2-3 mm. thick, the natural thickness of the bone, and not due to shaping. Heye figures<sup>42</sup> an apparently similar object from San Miguel is. SC 1 (R 2), figured.

N2. Shoehorn-shaped object, no distinct handle: 1. Most like modern shoehorn. Maximum thickness 5 mm. Probably of elk long bone. BR 1 (309), figured.

N3. Spoon-shaped, flat object: 1. Marine mammal. Ground down on both surfaces. Tapering handle broken off distally. SC 1 (N), figured.

N4. Shoehorn-shaped object, very broad, narrow stem handle: 1. Marine mammal. SC (N), figured.

N5. Shoehorn-shaped object, flat, tapering, with punctate design: 1. Possibly formed secondarily from section of a large "spear head" (L1); however, such have been reported only from SC. When complete, distal end may have tapered to point. Basal end has two small serrations near center. BR 1 (309), figured.

<sup>41</sup>Fig. 113, p. 231.

<sup>42</sup>Pl. 61, b.

#### O. Hair Ornament (?) or Head Scratcher

O. Hair ornament (?) or head scratcher. Two curious and dissimilar types, grouped because of possible similar function.

O1. Hair ornament (?) with noselike projection: 1. SC 1 (N), figured. Viewed horizontally, it suggests slightly a whale figurine. Max. thickness 3 mm.

O2. Head scratcher (?) with forked or "fingered" end: 2. BR 2 (295, 1 [figured]; 309, 1). Suggests Chinese back scratcher except for short length. First, 4 "fingered," second, 3 "fingered."

#### P. Eyed Dagger, Awl, Needle, Gouge, Etc.

P. Dagger, awl, needle, gouge, etc., with perforated handle, i.e., with eye. Rather miscellaneous assemblage of types, but all possessing 2 characters in common: pointed, eyed.

P1. Dagger of cannon bone with shouldered handle: 7. Distal end split down middle served for handle. Outer half of the epiphysis cut away leaving a shoulder or shelf; remaining portion perforated, but whether as an aid to attaching a handle unclear. All uniform in shape, being narrow below handle, but gradually broadening about middle, then tapering abruptly to point. 2 have distal thirds heavily coated with red ocher. SC 7 (C 3, 6 [figured]; R—, 1).

P2. Cannon-bone dagger without shouldered handle.

P2a. Cannon-bone dagger, without shouldered handle, 1 perforation in handle: 3. One has notches at 2 mm. intervals on both sides for distance of 6 cm. from base; hole in base bi-conically drilled, whereas hole in base of fragmentary specimen is cylindrically drilled. SC 3 (C 39, 1; C 83, 1; C 100, 1 [all figured]).

P2b. "Dagger" with 3 perforations in handle: 1. Thin implement of cannon bone with 3 cylindrically bored perforations in base, apparently for hafting. SC 1 (R 19), figured.

P3. Eyed awl or needle. These range in size from 47 mm. to 320 mm. and obviously embrace objects having 2 or more functions. The eyed proximal end is more or less flattened in all.

P3a. Eyed awl or needle, less than 200 mm. long: 10. Conical or needle-pointed objects, ranging in size as figured. Although proximal end is more or less flat, point is conical. SC 2 (C 138, 1 [figured]; C 198, 1); BR 8 (76, 1; 309, 6 [4 figured]; 387, 1). Ethnological: Modern Wintu dagger of bear bone, possibly fibula, is 192 mm. long. Tied buckskin cord through the perforation is for carrying the object. Perhaps this was the purpose of eye in part or all of the archaeological examples. Cora Du Bois writes<sup>43</sup> concerning this specimen: "perforated handle through which thong is passed (modern?). Formerly worn in man's topknot. Bear bone considered poisonous. Daggers also made of deer

<sup>43</sup>P. 125.

bone. Used only for fighting. Indistinguishable from awl." Yurok 2-eyed needle with point broken off measures 84 mm.

P3b. "Thatch needle," more than 300 mm. long: 5. Probably elk tibia. DR 5 (142), 1 figured. 1 lacks distal half. All found in single burial. Proximal ends flat, distal ends terminate in flattened rather than conical points. With them was 1 Tlc.

P4. Hairpin (?) or head scratcher (?): 3. SC 1 (C 100), figured; NR 1 (236); HR 1 (67), figured. Distinguished from P3 by flattened points, also by rather thin, elliptical transverse cross section throughout. HR specimen quite possibly hairpin, judging by incised design which suggests that on modern unperforated Yurok hairpin.<sup>44</sup> Function of SC specimen less certain. NR specimen lacks distal end.

P5. Double-pointed needle: 1. Has slit eye, is slightly bowed, and about equally sharp at each end. SC 1 (N), figured.

P6. Eyed gouge or smoothing implement: 2. SC 1 (N); BR 1 (372), figured. SC specimen about inch longer than figured BR specimen.

P7. "Pin" with ring eye: 9. All from 1 grave. May represent work of single individual. Shafts of these pins are roughly circular in transverse cross section. SC 9 (R 30), 1 figured: only complete example.

#### Q. "Pendant"

Q. "Pendant," i.e., rather flat object with perforation for suspension, not pointed.

Q1. Head scratcher (?) or elongate pendant, not engraved: 5. BR 3 (307), 1 figured; HR 2 (67). Thin, flat, elongate objects with single perforation at proximal end. Only figured specimen is complete, but presumably its square-cut distal end represents condition of missing ends of 2 other BR examples. Two fragmentary HR specimens, figured by Loud,<sup>45</sup> included in this type although 1 has rounded distal end and lacks head, other has perforated head and lacks distal end. Ethnological: 2 Yurok louse killers (larger than archaeological specimens). One<sup>46</sup> has row of punctations on concave face, incised design of opposing triangles on convex face. Other<sup>47</sup> (larger: 122 mm. long) not incised except for median transverse scratches on 1 surface; buckskin-thong loop in place in perforation, evidently for wearing about neck. Third Yurok specimen is catalogued as face wiper used by girl at 1st menstruation. It is spatulate in form, 176 mm. long, 28 mm. in greatest width, tapering slightly toward rounded ends. Necklace of short dentalia passes through perforation and was evi-

dently for wearing about neck. Fourth Yurok specimen<sup>48</sup> hardly differs from preceding in form, but is catalogued as head scratcher used by girl at 1st menstruation. Seems entirely possible third and fourth specimens could each have been used for both purposes.

Q2. Shoehorn-shaped pendant, perforated for suspension, not engraved: 3. Possibly toilet articles. SC 3 (C 83, 1; N, 2), all figured, concave side up.

Q3. Square-ended, broad pendant with beveled lower edge, slightly bowed from top to bottom: 1. Not incised. May have been toilet implement rather than ornament. BR 1 (309), figured, convex side up.

Q4. Elongate pendant, unengraved, unserrate, 1 or 2 perforations: 4. Figures show extremes of variation, including one with 2 holes. SC 3 (C 83, 1 [figured]; C 100, 1; Catalina, 1 [figured]); BR 1 (295), figured.

Q5. Elongate pendant, showing concave interior of bone; all punctate engraved on convex surface; single perforation for suspension; more or less rectangular in outline: 6. Mammal leg bone. No 2 identical as to punctate design. SC 6 (C 83), all figured.

Q6. Pendant worked down so original interior surface of bone not visible: 14. Usually 1 side rather flat, other slightly convex; design on flat side. No 2 designs identical: some have red ocher in punctations. SC 14 (C 83, 13 [all figured]; R 34, 1 [figured]). Ten of 13 from SC (C 83) from pit L, 6 ft. deep, such concentration suggesting work of 1 man.

Q7. Small ovoid pendant with serrate edges, single perforation: 4. Slightly convex on 1 side, flat on other; 3 with punctate design on flat side. 2 have punctations filled with red ocher. SC 4 (C 83), 3 figured.

Q8. Bullroarer-like pendant: 2.<sup>49</sup> Possible use suggested by shape of both, and lightning-like design on 1. Both have had punctations emphasized with red ocher; design on 1 side only. SC 2 (C 83), both figured.

Q9. Multiholed bar "pendant," of small piece mammal bone, in which biconical holes drilled: 1. One end broken off, so there may have been more holes when complete, but unlikely. SC (M 1), figured.

#### R. Turtle-Bone Rattle

R. Turtle-bone rattle: 3. SC 3 (C 3, 1 [figured]; R 30, 1; Catalina, 1 [figured]). "Shells" of small turtles and tortoises used by Indians of S California for rattles;<sup>50</sup> probably our 3

<sup>44</sup>Pictured by Kelly, pl. 119, fig. h.

<sup>45</sup>Heye (pl. 70, b) shows similar but smaller specimen from San Miguel is., and Moorehead (p. 237, fig. 368) 1 from Santa Barbara co., but with no indication of size.

<sup>50</sup>C. G. DuBois, pp. 181, 185; Sparkman, p. 210; Drucker, p. 25.

<sup>44</sup>Loud, 1918, pl. 20, fig. 16.

<sup>45</sup>1918, pl. 20, figs. 12, 13.

<sup>46</sup>Pictured by Loud, 1918, pl. 20, fig. 15.

<sup>47</sup>Pictured by Goddard, pl. 10, fig. 4.

perforated fragments portions of such rattles. Moreover, Heye figures a more complete example from San Miguel is.<sup>51</sup> and describes a complete one from San Clemente is.,<sup>52</sup> with Olivella-disk beads attached with asphaltum. Figured SC (C 3) specimen has small square Haliotis beads attached with asphaltum. Figured Santa Catalina specimen of plastron, other 2 of carapace. Holes in the rather thick plastron are slightly conical and drilled from outside. No drilling done from inside, which would have made perforations bi-conical.

#### S. Gaming Piece (?)

S. Gaming piece (?) of solid bone: 2. DR 1 (82), figured; SV 1 (1), figured. That these 2 are gaming pieces purely conjectural, especially for smaller SV piece. Larger DR specimen seems most likely to have been a "stick" held in hand in guessing game. SV specimen is short, but ends show polish, as from much handling. Ethnological: 4 Luiseño, of Valley Center, San Diego co.; of rib (perhaps horse or cow); each ca. 75 mm. long; Apocynum-fiber strings tied around middle; formed part of set of 8 peon-game pieces (other 4 pieces are of wood). 4 N Miwok, of West Point, Calaveras co.,<sup>53</sup> solid-bone flattened ellipsoids with rounded ends; 80 mm. in length; each about 17 mm. wide, 9 mm. thick. Two wrapped in middle with black material to differentiate from other two.

#### T. Bipointed Object

T. Bipointed object, straight, bowed, or beveled; not perforated. Undoubtedly objects served several purposes; very likely hairpins, nose sticks, fishing equipment, possibly awls. All that can be done is to describe the objects; only now and then does one give a clue as to probable function, as when signs of asphaltum and string winding are present. In consequence, the classification is wholly objective, without regard to my ideas as to possible use.

Tl. Straight bipointed bone implement.

Tla. Bipointed "pin," circular in transverse cross section, even diameter for greater part of length, more sticklike than spindle-like, conical point; more or less straight: 15. SC 15 (R 30, 14 [1 figured]; N, 1 [figured]). 14 SC (R 30) specimens—3 are from grave 17, 11 from grave 9—range from 123-202 mm. in length and 3-4 mm. in greatest diameter. SC (N) specimen is 97 mm. long, very slender, and bowed; greatest diameter 2 mm. Its more delicate appearance suggests a different function from the 14 others.

<sup>51</sup>Pl. 71.

<sup>52</sup>Pp. 114, 115.

<sup>53</sup>Pictured by Barrett and Gifford, pl. 71, fig. 1.

Tlb. Fusiform, more or less circular in cross section throughout; 81.<sup>54</sup> SC 38 (M 6, 3 [1 figured]; C 3, 4; C 159, 1; C 100, 1; R 30, 18 [1 figured; asphalted, thread-wound "fish barb"]; R—, 2; N, 9 [1 figured]; SJ 6 (6), 1 figured; "hairpin"; DR 28 (28, 1; 80, 10; 82, 8; 83, 4; 86, 1; 138, 1; 139, 1; 140, 1; 141, 1); SV 9 (1, 6; 2, 3). Some departure from circular cross section apparently due to form of bone fragments used rather than to intention. All SJ (6) specimens, of elk cannon bone, are longer than others of type and are regarded as hairpins on basis of modern analogy; no short ones, interpretable as fish barbs, were found there. Position of greatest diameter variable, sometimes near center, sometimes near 1 end. Medium ones possibly nose sticks in some instances. Some small ones give evidence of adhesive for about half of length, indicating probable barbs of composite fishhooks. For bulk of 81 specimens statements as to function would be mere guesses. Impossible to draw lines of demarcation between supposed hairpins, nose sticks, and fishing barbs, so completely does series intergrade. Small series of large- and medium-length specimens from SC (N) comprises thicker and less gracefully shaped objects, probably because of porous sea-mammal bone. Figured SC (R 30) specimen appears to be part of fishing equipment. It is 90 mm. long. One-half is free from any sign of wrapping, but ca. 33 mm. of the other half shows distinct traces of asphaltum and thread winding, which however leaves exposed ca. 12 mm. of the tip. Thus, it was apparently a fishing barb with both points exposed and so attached to a leader that a hooked fish would be impaled by both points. Two specimens: 1 SC (R 30), 1 SV (1) show clear trace of covering, but with 1 point entirely concealed. Former has distinct traces of asphaltum and thread winding for half its length of 42 mm.; latter shows dark discoloration for 48 mm. of its length of 108 mm. Ethnological: 4 Yurok hairpins from lower Klamath r.; range in length from 160-176 mm.; no feather decoration.

Tlc. Bipointed "pin," circular in transverse cross section at 1 end, flattened at other end: 5. SC 1 (C 83); DR 1 (142), figured; BR 3 (307, 1; 309, 2 [1 figured; flat side; max. width 10 mm., max. thickness 6 mm.]). BR (307) specimen is shortest, ca. 95 mm. length. SC (C 83) specimen is longest; possibly of fishbone; has part of flattened end missing. Figured DR (142) specimen is equally long as SC specimen, and has marks of string winding, which may have been for attaching rings of feathers.<sup>55</sup> Great length of

<sup>54</sup>2 examples from San Miguel is., made of human fibulae, are pictured by Heye, pl. 62, b, c; p. 97.

<sup>55</sup>Loeb (p. 156) gives a similar explanation for modern Pomo bone hairpins which are of same length. The Pomo also use bipointed wooden hairpins or skewers, which are thrust through the hair after it has been bundled on top of the head and secured with a hair net.

both SC and DR pieces suggests possibility of different use from 3 BR shorter ones, which are quite uniform in appearance.

Tld. Bipointed "pin" of split mammal bone, more or less flat, showing cancellous interior of bone, apparently sea mammal: 11. SC 11 (C 3, 1; R 35, 1; R—, 2; N, 7 [2 figured]).

Tle. Bipointed "pin" of whole or split bird bone: 5. Two whole, 3 split. SC 5 (N), 2 figured: 1 whole, 1 split.

Tlf. Bipointed straight object, rectangular in cross section, usually broadest near abruptly beveled pointed base: 9. DR 1 (141); SV 8 (1, 1 [figured]; Redding, 7 [2 figured]). Appearance suggests they were part of harpoon toggle, perhaps central point; they do not suggest fish-hooks or gorgets as do the smaller objects in class Tlb. Figured Redding specimen is slenderest; was thought by collector to be fish gorget; it may be that, but general rectangular cross section suggests it to be a variant of Tlf.

Tlg. Bipointed object, more or less circular or elliptical in transverse cross section, but with 1 side flat: 18. SC 15 (C 3, 2; C 100, 1 [figured]; C 159, 1; R 30, 4 [1 figured]; R 35, 3; N, 4); DR 3 (6, 1; 107, 1; 139, 1 [figured]). Possibly an accidental variant of Tlb, but on other hand, flat side may be intentional and have had a definite function. Three SC (R) specimens show definite traces of asphaltum and string winding at 1 end for 1/3-1/2 their length.

Tlh. Bipointed object, circular in transverse central cross section, but with 1 end beveled: 9. SC 9 (C 197, 1 [figured]; R 32, 1; R 35, 7 [2 figured: shortest; longest]). SC (C) specimen has asphaltum on nonbeveled half, apparently indicating beveling was to make distal end of barb sharp rather than as means of hafting proximal end. Impression formed of SC (R) specimens was that beveling was for attaching to shank so as to form acute angle therewith. SC (C 197) specimen is somewhat aberrant in being more or less angular at proximal end.

T2. Bipointed more or less bowed object, probably mostly for fishing, possibly some were nose ornaments. Those with traces of asphaltum and thread winding were probably for fishing, though we cannot gainsay possibility of thread winding being for attachment of feathers on objects of personal adornment.

T2a. Bipointed, rather flat, horizontally bowed object: 10. By "horizontally bowed," I mean that when lying flat ends are bowed upward. Possibly some curvature due to weathering, especially so with SC (N) specimens, which presumably from surface. SC 10 (C 3, 1; R 35, 1 [figured]; N, 8 [1 figured]).

T2b. Bipointed, curved object, more or less circular in transverse cross section, curved or bowed laterally. By bowed laterally, I mean that on a flat surface object lies on its "side" instead of its back, so tips do not point upward, but sidewise. Those which show traces of asphaltum

and thread winding fall into 2 types, which I have designated T2bI and T2bII, and include 14 of the total 50. Remaining 36 I am forced to leave as undifferentiated T2b.

T2bI. Bipointed curved object, circular in transverse cross section, curved or bowed laterally, 1 end giving evidence of having been covered with asphaltum and string winding: 2. Probably a number of the undifferentiated T2b specimens are this type. However, only these 2 have tell-tale evidence of asphaltum. (Specimen 1-31353, of wood, is identical in form and shows evidence of winding.) SC 2 (R 12, 1; C 100, 1), both figured.

T2bII. Bipointed object, more or less circular in transverse cross section, curved or bowed laterally, both points exposed, as asphaltum and thread winding in middle: 12. Apparently fish gorgets. Probably many of undifferentiated T2b are this type, but lack evidence of binding. SC 12 (M 10, 1; C 147, 6 [1 figured]; C 100, 1; C 138, 1; C 135, 1 [figured]; R 30, 1; R 35, 1).

T2c. Bipointed, rather flat, double-curved object: 9. SC 9 (M 1, 1; C 197, 2; C 100, 2 [1 figured: smallest]; C 198, 1; Clemente, 3 [1 figured: shows probable extent of winding]). Three SC (Clemente) specimens show evidence of having been wound with thread and asphaltum, leaving points exposed, suggesting that they were fish gorgets and that the double curvature plus proper attachment of a leader was for purpose of wedging them more effectively in a fish's throat. Other 6 specimens show little or no trace of binding, but because resemble shape of San Clemente ones were undoubtedly for same purpose. Smaller specimens perhaps intergrade with small T2b objects.

#### U. Pointed, Blunt-based Object

U. Pointed, more or less blunt-based object, suggesting barb or toggle point for fishing device, or barb for stick used in extracting rodents from burrows. Some show basal traces of asphaltum and string winding, and 1 type (U3) has basal notches or grooves to prevent lashing from slipping.

U1. Straight, pointed, symmetrical, more or less blunt-based object, suggesting barb or toggle point for fishing device: 5. SC 3 (C 3, 2; R 30, 1 [figured: shortest]), SV 2 (1, 1 [figured: longest]; 2, 1). SC (R) specimen shows clear evidence of asphaltum and string winding for slightly less than half its length; 2 SV specimens are darkened for more than half their length, while their tips are lighter or bleached; 2 SC (C) specimens show no clear evidence of binding.

U2. More or less curved (or double curved) asymmetrical object with distal point and more or less blunt base, suggesting barb or toggle

point for fishing device: 18.<sup>56</sup> A variable SC type ranging from elliptical to circular in transverse cross section. Several specimens give evidence of asphaltum adhesive on basal portions. SC 18 (M 1, 1; M 10, 1; C 100, 5 [2 figured]; C 147, 2 [both figured]; C 197, 1; R 12, 4; R 30, 3 [1 figured]; N, 1).

U3. Pointed, blunt-based, double-curved, base-notched barb or toggle point: 4. Notching on 1 side only, other 3 surfaces of basal portion smooth; notching apparently to prevent seizing from slipping, although asphaltum also used as adhesive as 1 or 2 specimens show. SC 4 (M 1, 1; C 100, 2; C 197, 1), all figured.

#### W. Harpoon or Spear Head, Barbed

W. Harpoon or spear head, barbed.

W1. Single-barbed harpoon or spear head, or fishhook of mammal bone: 6. SC 3 (N), all figured: of sea mammal; SV 1 (2), figured; BR 1 (295), figured; HR 1 (67); latter 3 of land mammal.<sup>57</sup> SV (2) specimen has a tiny barb more like a crochet needle than fishing implement. That some may be parts of large composite fishhooks, rather than harpoon or spear heads, is suggested by ethnological model (ethn. fig. 24, p. 237) made of sheep bone at the museum by Ishi, a Yahi man of Tehama co. It shows manner of attachment to shank. Barb hook points away from shank.

W2. Harpoon or spear head of split bird bone, barb pointing backward: 2. SC 2 (N), 1 figured: smaller and better formed of two. Second, 160 mm. long.

W3. Harpoon or spear head of whale bone, barb cut at right angle: 1. SC 1 (N), figured.

#### X. One-Piece "Circular" Fishhook

X. One-piece "circular" fishhook: 1. SC 1 (C 138), figured: without barb.<sup>58</sup>

#### Y. Perforated Swordfish Bill

Y. Perforated bill of broad-billed swordfish (*Xiphias gladius*): 1. Both sides have been ground from central perforation to point which has been broken off. Groove around base suggests hafting. Central elliptical perforation might have been used to straighten or smooth shafts. Distal and proximal edges of perforation are beveled on both sides, but whether from use or in manufacture is

<sup>56</sup>J. P. Harrington (pl. 20) figures a number from Burton md., Santa Barbara.

<sup>57</sup>Putnam (p. 224) figures 1 from "Santa Barbara," and Moorehead (fig. 362, no. 7) 1 from San Nicolas is.

<sup>58</sup>However, Putnam (p. 222, pl. 11, figs. 1 and 3), Moorehead (fig. 378, no. 24), and Rogers (pl. 47) illustrate rather different types of "circular" bone fishhooks, some with barb.

difficult to tell. It might possibly have been a spear thrower, but if so, why is the perforation beveled in 4 places? SC 1 (R 30), figured.

#### Z. Conical-headed Object, Flat Stemmed

Z. Conical-headed object with flat thin stem. Interpreted by Heye<sup>59</sup> as arrow points for stunning birds. Possibly this is so, but one wonders why stemmed portion is laterally instead of centrally located.

Z1. Conical-headed object with flattened thin stem, stem not perforated: 5.<sup>60</sup> SC 5 (C 3, 2 [1 figured]; R—, 1 [figured: whale bone]; N, 2 [1 figured]). SC (R) specimen has adherent traces of asphaltum, but whether from hafting or accidental contact is not determinable. Two SC (N) specimens are of close-grained bone and black in color as though impregnated with petroleum.

Z2. Conical-headed object with flattened thin stem, stem perforated: 1. Whether this object was utilitarian or ornamental is not obvious to me. Just where stem joins cone base there are 2 shallow transverse grooves as though for thread lashing. Biconically drilled perforation in stem might have been for suspension or for firmer attachment to shaft. SC 1 (N), figured.

Z3. Conical-headed object with more or less flattened and thinned stem in middle only; proximal end knobbed; flat backed: 3. If these are blunt heads for arrows, probably constricted central portion is for firmer attachment to shaft. However, they may have served some other purpose. SC 1 (R 30); DR 1 (140); BR 1 (295); all figured. Two specimens, BR (295) and DR (140),<sup>61</sup> have grooved backs as though made from grooved part of cannon bone. SC (R) specimen shows traces of asphaltum.

#### AA. Double-hooked, Flat-backed Object

AA. Double-hooked, flat-backed object: 1. Marine mammal. Resemble in form certain stone artifacts, precise use of which unknown. Hook and groove suggest that string may have passed through them. SC 1 (Clemente), figured.

#### BB. Container Made from Cetacean Vertebra

BB. Container, of cetacean vertebra. These comprise mortars and bowls.

BB1. Whale-vertebra mortar: 2. SC 1 (C 100); BR 1 (307), figured. BR specimen, 25 cm. long, is unworked on exterior, but mortar hole in 1 end is ellipto-conical in shape and has diameter of ca. 12 cm. as compared with ca. 24 cm. for ver-

<sup>59</sup>P. 88, fig. 13.

<sup>60</sup>Heye figures 1 (fig. 13, b) from San Miguel is.

<sup>61</sup>Also illustrated by Moorehead, 1900, p. 279, fig. 418, no. 9.

tebra as a whole. Mortar hole is lined with thin coating of black material, perhaps asphaltum; its depth is 7-8 cm. SC specimen is 28 cm. in diameter; it is too fragmentary to be sure of original height or diameter of mortar hole, but hole is larger in proportion to size of vertebra than in BR example; hole shows no trace of asphaltum or other lining.

BB2. Dish of cetacean vertebra, without cover: 5. In modern terms, bowls and cups would describe forms represented. SC 5 (C 100, 1 [figured: tallest]; C 131, 1; C 138, 2 [1 figured: smallest; caudal vertebra of small cetacean]; R 30, 1 [figured: largest]). SC (C 100) specimen shows asphaltum filling in a foramen. Unfigured specimen also shows such plugging of foramina to a much greater extent; it also had attached to its bottom with asphaltum a piece of multiple-rod coiled basketry.

BB3. Covered dish of cetacean vertebra: 1. Similar in shape to SC (R) specimen of BB2, but larger. Foramina have some asphaltum filling. Lid a worked vertebral epiphysis. SC 1 (C 100), figured.

#### CC. Perforated, Spool-like Object

CC. Perforated, spool-like object. Except for CC1, all are definitely circular in transverse cross section. 2 BR objects of astragali are very different from SC objects.

CC1. Perforated astragalus bone: 2. BR 2 (309), smaller 1 figured: deer; other elk. It is likely that these formed part of ring-and-pin games, since 2 ethnological examples of this game (1-717, 1-725) from Wailaki of Mendocino co. are composed respectively of 18 and 19 astragalus bones strung on buckskin cord with pointed stick attached.

CC2. Spool-like object, perforated: 7. SC 7 (C 3, 2 [1 figured]; C 131, 1; R—, 3 [1 figured]; N, 1 [figured]). All mammalian vertebrae; all surfaces ground; walls convex, straight, or slightly concave. Only figured SC (R) specimen shows definite biconical drill hole; others appear cylindrically bored, though perhaps biconically originally and then worked to cylindrical form.

CC3. Spool-like object of mammal vertebra, sides painted red: 3. SC 3 (C 3, 1; C 154, 1 [figured]; R 35, 1 [figured]). Figured SC (R) specimen cylindrically bored, SC (C 3) specimen, not figured, with conical or tapering bore, SC (C 154) specimen, figured, biconically drilled. Last has encircling groove near top, traces of asphaltum and thread winding near bottom, and traces of asphaltum within bore and near top.

CC4. Spool-like object of mammal vertebra with square Olivella beads glued to sides: 2. SC 2 (C 3), 1 figured. Unfigured specimen has tapering bore with small Olivella shell, minus tip of spire, jammed within, perhaps by accident. Figured specimen is larger and has cylindrical bore, apparently begun biconically; top and bottom painted red.

CC5. Spool-like object of fish vertebra: 20.<sup>62</sup> Those with small perforations perhaps unfinished or perhaps beads. Those with large perforations do not suggest beads; possibly for ring-and-pin game. All have had spines ground off and most are ground down so cellular structure of bone shows on both outer and inner walls. SC 20 (M 10, 6; C 100, 1; C 135, 1; C 147, 3 [2 figured]; C 197, 7 [1 figured]; C 198, 2). Ethnological: 3 ring-and-pin games of salmon vertebra, 1 (1-2266) from Sinkyone of South Fork of Eel r., Mendocino co.,<sup>63</sup> another (1-924) from the Hupa,<sup>64</sup> third (1-14532) from the Shasta (has a single stick as in the Hupa game).

#### DD. Thin Perforated Disk and Ring

DD. Thin perforated disk and ring. DD3 is definitely a "ring" rather than a "disk"; the other 2 groups are disks, suggesting spindle whorls.

DD1. Thin perforated disk of cetacean vertebral epiphysis: 7. SC 7 (N), 1 figured: smallest. Six specimens have their faces and edges unground; 7th (figured) has been ground on both faces.

DD2. Thin perforated disk of cetacean bone other than vertebral epiphysis: 5. Smoothly ground on face and edges. Material so thin (ca. 5 mm.) that perforation appears cylindrical or only slightly tapered. SC 5 (N, 1; Catalina, 4 [1 figured: largest]). SC (N) specimen smallest, slightly concavo-convex with convex face only ground down.

DD3. Thin, flat ring of unidentified bone: 1. SC (Clemente), figured.

#### EE. Bead or Tube

EE. Bead or tube. These numerous artifacts present a problem as to use. Shortest ones seem clearly enough to be beads for stringing. Some of medium ones may have been gaming pieces. Longest ones, either ornamented or unornamented, may have been nose or ear sticks, or drinking tubes; or the unornamented ones may have been blanks which were to be made into whistles, or incised with decorative geometric pattern, or were to be cut into beads. Type EE1d suggests another use to which those of ca. 5 cm. length and from S California may have been put, viz., mouthpieces for tobacco pipes.

<sup>62</sup> Heye (pp. 111-113, figs. 20, 21) reports several hundred from San Miguel is.; he quotes (p. 176) James Burney's account of Cabrillo's voyage in 1542, in which it is stated that the islanders "made beads of the bones of fish, which served them as articles of exchange with people of the continent." Rogers (pl. 36) pictures at least 34 from Santa Rosa is.

<sup>63</sup> Figured by Kroeber in Handbook, fig. 14.

<sup>64</sup> Figured by Goddard, pl. 19, fig. 5.

EE1. Bead or tube, undecorated. These divide into bird (a) and mammal (b), with a third group (c) for those identified as tobacco-pipe mouthpieces by their presence in pipes.

EE1a. Bead or tube of undecorated bird bone: 643.<sup>65</sup> These are mostly wing bones, definitely cut at both ends; 2 leg bones identified. The intergradation is so complete as to make division according to size impracticable. SC 371 (M 10, 1; C 3, 4; C 83, 5; C 100, 164 [1 figured]; C 104, 1; R—, 7; R 12, 3; R 15, 40 [1 figured]; R 19, 19; R 30, 66; R 35, 5; N, 1; Tecolote, 55); DR 118 (80, 10; 81, 1; 82, 9; 83, 10; 107, 2; 138, 2; 141, 83; 142, 1); SV 15 (1, 7; 2, 8); BR 131 (76, 1; 259, 1; 283, 1; 295, 33 [1 figured]; 298, 4; 307, 1; 309, 87 [2 figured]; 328, 2; 387, 1); NR 4 (236, 3; Oakville, 1); HR 4 (67).

EE1b. Bead or tube of mammal bone, undecorated: 330.<sup>66</sup> SC 203 (M 1, 18; Los Osos, 1; Tecolote, 10; C 3, 6; C 83, 14; C 100, 115; C 138, 1; R—, 10 [2 figured]; R 35, 18; R 12, 2; R 19, 1; R 30, 4; R 32, 1; Catalina, 1); SJ 3 (15); DR 99 (141, 90; 80, 6 [1 figured]; 82, 2); SV 3 (1, 2; 2, 1); BR 12 (295, 2; 298, 1; 309, 5; 329, 4); NR 9 (236); HR 1 (67). Land mammals, especially deer long bones, preponderate; few coyote long bones distinguishable. Further identification difficult with the ends of bones missing. Intergradation is so complete as to make segregation into sharply defined types impossible. No doubt many of medium length and diameter were gambling bones for the hand game; e.g., figured DR (80), which closely matches ethnological pieces from the neighboring Miwok.<sup>67</sup> Several from SC (M 1) were found alternated with serpentine (?) tubes to form a belt. An artiodactyl long bone with cord-marked asphaltum is figured from SC (R). Three small tubes from SC (C) give evidence of complete covering with thread and asphaltum; possibly pipe mouthpieces.

EE1c. Mammal-bone bead or tube, median constriction, undecorated: 2. Their unusual form

<sup>65</sup> Schenck and Dawson (p. 352, pl. 78) mention "about 40" bone tubes, "usually bird," from Lodi, and the same number from Stockton. Heye (p. 101, pl. 66) shows 17 beads and tubes of bird bone from San Miguel is., but their frequency is only given as "many" (p. 106). Rogers illustrates a number of necklaces consisting, in part at least, of bone beads and tubes, but does not specify precise frequency or locality.

<sup>66</sup> J. P. Harrington (pl. 23) figures 1 from Burton md., Santa Barbara. Schenck and Dawson (p. 353) write of mammal-bone tubes in Lodi and Stockton regions: "Such pieces are relatively scarce but appeared from both regions and from the adjoining areas to the southwest and northwest. They would appear to have served some utilitarian purpose." Heye (p. 101, pl. 66) describes 29 tubes, almost all deer, and later (p. 106) gives their frequency on San Miguel is. as "many." Rogers, variously, throughout his book mentions and illustrates necklaces of these beads and tubes.

<sup>67</sup> Barrett and Gifford, pl. 57, figs. 9-14.

and worn inner surface suggest some utilitarian purpose. SC 2 (R—), 1 figured.

EE1d. Bird-bone mouthpiece for tobacco pipe: 9.<sup>68</sup> SC 9 (M 1, 5 [1 figured]; C 135, 1; C 138, 1; Catalina, 2). Figured SC (M 1) specimen is encircled with a conical packing of asphaltum which made tight the junction of the bone mouthpiece with the bowl of the pipe. Mouthpiece is 5 cm. long, but there is nothing to show whether bowl was of stone or pottery. Remaining pipes, with bird-bone mouthpieces in place, will be described in paper on polished stone artifacts.

EE1e. Inserted tube or bead: 4. Bird or small mammal. Smaller inserted into larger and apparently held in place without adhesive. SC 1 (R—), figured; BR 3 (309), 1 figured.

EE2. Incised bead or tube. Types a and b were probably related, the difference being principally in the type of incised decoration. Types c and d are obviously functionally different from a and b and from each other.

EE2a. Bead or tube with more or less encircling incisions: 11. SC 8 (R—, 3 [1 figured]; C 83, 1 [figured]; C 100, 3 [1 figured]; N, 1); SV 1 (2), figured; BR 1 (295); HR 1 (67). 10, small mammal and bird, 1, large mammal. All have partially or completely encircling striations or grooves. Some of deeper grooves may be cuts intended to section the bones into shorter beads; see figured SC (R) specimen. SV specimen, of mammal, is of much greater diameter than the others. Its length and median encircling marks suggest it may have been a hand-game bone with cord about the middle.

EE2b. Tube or bead with incised geometric decoration: 30.<sup>69</sup> Mostly bird or small mammal; 1 large mammal only, from SC (C). Designs chiefly crosshatched, zigzag, and checker. Function unknown: perhaps for hand game, nose sticks, ear sticks, drinking tubes, beads, etc. SC 13 (R 15, 3 [2 figured]; R 35, 3 [2 figured]; C 3, 1 [figured]; C 83, 3 [all figured]; C 100, 1 [figured]; C 159, 1 [figured]; N, 1); DR 7 (28, 4; 29, 1; 81, 1; 91, 1); SV 7 (2, 6; site upstream from Knights landing, 1); BR 2 (295, 1 [figured]; 328, 1); NR 1 (Oakville).

EE2c. Tube with encircling deep grooves near ends: 2.<sup>70</sup> Of artiodactyl long bone. Grooves show trace of asphaltum with cord impressions. SC 2 (R 11, 1; R 35, 1), both figured.

<sup>68</sup> Half of the tubular pipes figured by Putnam (pls. 7-9) from Dos Pueblos and La Patera, Santa Barbara co., have bone mouthpieces; the others have lost them.

<sup>69</sup> See Schenck and Dawson (pp. 253-256, pl. 78) for description and illustrations of DR specimens; Moorehead (p. 272, fig. 411) for 2 from Tulare co.

<sup>70</sup> Six from San Miguel is. (Heye, p. 104, pl. 62, b) are of deer bone and show no trace of asphaltum. It is entirely possible they once had asphalted shell decorations, in which case they would belong to type EE3b.

EE2d. Tube with encircling striations at 1 end, round asphaltum plug in other end: 1. Of artiodactyl long bone. With the plug, the object may have served as a container. SC 1 (R 4), figured.

EE3. Tube with beads attached with asphaltum. Except for 1 from BR, these are entirely SC.

EE3a. Tube not grooved, more or less covered with tiny Olivella-shell beads inlaid in asphaltum: 17.<sup>71</sup> With exception of figured SC (M 10) specimen all are probably artiodactyl. SC 17 (R 35, 5; M 1, 10 [2 figured]; M 10, 2 [1 figured]). SC (M 1) specimen (1-32129, figured) is completely encircled with bead inlay, but all others are not. Perhaps in some instances they have been lost (e.g., 1-6292), but in many others they seem not to have been completely covered. This seems to be true especially in the decurved pieces, the concave side being left blank; e.g., 1-32431, figured, from SC (M 1).

EE3b. Tube with 2 or 3 encircling grooves, inlaid with Olivella-disk beads in asphaltum: 6.<sup>72</sup> SC 6 (M 1), 1 figured: longest. Probably all artiodactyl long bones. Figured specimen has central encircling groove; others have only terminal encircling grooves. In some, the asphaltum and beads are laid over grooves as well as elsewhere, which seems to point to the purpose of the grooves being to give a firmer hold for the asphaltum. Presumably the median groove in the longest specimen served this purpose too, and was added because of the greater length of the object. In 2 or 3 specimens with enough inlay remaining there is indication that the bones were completely covered with inlay and not left partly bare as in most of type EE3a.

EE3c. Bird-bone bead or tube, with shell-bead inlay: 2. SC 1 (Tecolote); BR 1 (309); both figured. SC specimen has portion of rectangular Haliotis bead as well as Olivella-disk beads attached. BR specimen has 2 rather large concavo-convex Olivella-disk beads attached, presumably with asphaltum. Does not mean necessarily an imported specimen, since Olivella-disk beads are found cemented to edges of heavy stone mortars in the BR and these hardly could have been imported.

#### FF. Single-holed Whistle

FF. Whistle, single hole. Asphalted shell-bead decoration is a difficult criterion to uti-

lize, because of probable loss of decoration without leaving any trace in many instances.

FF1. Whistle of mammal bone, no incised decoration.

FF1a. Single-holed whistle, both ends cut off: 31. SC 18 (Tecolote, 1; M 1, 5 [1 figured]; R 4, 1; R 30, 2 [1 figured]; R 35, 2 [1 figured]; Catalina, 1; Clemente, 1; C 83, 1; C 100, 3; C 197, 1 [figured]); BR 11 (86c, 8 [1 figured]; 309, 2; 387, 1); NR 2 (237). Bones range from elk to rodent. Mostly exact identification difficult because both ends cut off. Some exceptions: from BR (86c), 6 of elk bone (5 tibiae, 1 femur), 1 of tibia of smaller artiodactyla, probably deer; from SC, 5 of tibiae of smaller artiodactyla, probably deer. Balance of specimens are other bones and most of them from much smaller mammals. BR (86c) figured specimen shows trace of Olivella-bead decoration. Many specimens show traces of asphaltum and were probably decorated with beads or other material (feathers possibly). Probably some others were decorated but all trace has been lost; as many more had end plugs of asphaltum (or pitch) and reeds of the same materials that are now revealed. Opening or stop varies from near one end to a median position, and from square to circular to elliptical in outline; large elk bones have most nearly circular holes. In some of smallest bones the cut at deepest point is nearly half through diameter of bone. Apparently no regional differences discernible in this respect.

FF1b. Whistle of deer tibia with distal end not cut off: 6. SC 6 (M 1, 4; C 100, 2 [1 figured]). All have stop near proximal end. Three have elliptical holes cut in face of bone: apparently are finished specimens, as each has asphaltum reed in place below stop. Other 3 have rather squarish holes made by cutting into bone for about 1/3-1/4 of its diameter. Apparently in latter the bone has been filed with abrasive stone. Two of these deeply notched ones have abundant traces of asphaltum with thread markings for greater part of length from stop to near distal end, and 1 of them has an adherent Olivella-disk bead near distal end. Both have bone grooved above and notched below where held in the mouth (see figured specimen).

FF1c. Whistle of deer tibia with proximal end not cut off: 10. SC 10 (M 1, 1; C 138, 1; Clemente, 1; Catalina, 7 [1 figured]). Stop in each is ca. 1 inch from cut-off distal end which forms mouthpiece. Stops are made in all but 1 instance by sawing across bone so as to make groove to depth of ca. 1/4-1/3 the diameter of bone. Exception (from SC [Catalina]) shows small drilled hole. On 6 of them a piece of Haliotis shell is attached with asphaltum on concave surface near proximal end (see figured specimen). Other 4 have asphaltum at this end and probably once had Haliotis attached. Most have asphaltum over greater part of surface but give no evidence of what was attached.

<sup>71</sup> Heye (pp. 93-94, pl. 59, c) describes from San Miguel is. a deer long bone covered with asphaltum and inlaid with small, perforated Olivella-disk beads. It was found in the left hand of a skeleton. J. P. Harrington (pl. 21, f) figures 1 from Burton md., Santa Barbara.

<sup>72</sup> J. P. Harrington (pl. 21, g, h) pictures 2 from Burton md., Santa Barbara.

FF2. Whistle of bird bone, not incised: 264.<sup>75</sup>  
 SC 48 (Catalina, 1; R 8, 2; R 11, 4 [1 figured];  
 R 19, 1; R 30, 10; R 35, 1; R —, 4; N, 9; C 100,  
 5; C 138, 6; C 197, 1; M 1, 4); SJ 2 (6, 1; 19,  
 1); DR 111 (6, 2; 80, 18; 82, 37; 83, 14; 86, 24;  
 91, 4; 107, 3; 109, 2; vicinity of Stockton, 7);  
 SV 7 (2); BR 90 (76, 1; 86c, 2; 123, 2 [1 fig-  
 ured]; 259, 13; 295, 14 [1 figured]; 298, 1; 309,  
 46; 329, 1; 356, 1; 372, 2; 387, 7); NR 5 (236,  
 2; 237, 3); HR 1 (67). Mostly bird ulnae. 3 BR  
 (295) and 1 BR (123) specimens have Olivella  
 beads attached, presumably with asphaltum. BR  
 (295) specimens have disk beads, BR (123) speci-  
 men rectangular beads. Some SC specimens have  
 asphaltum adhering, indicating they may have been  
 bead-decorated or bound together. Also occasional  
 1 has an asphaltum plug in distal end or as reed  
 at the stop. SC (Catalina) specimen gives un-  
 mistakable evidence of having been one of a pair  
 bound together. For DR, Schenck and Dawson<sup>74</sup>  
 mention only 1 occurrence of 2 bound together.  
 At BR (309) the double occurrences are frequent.<sup>75</sup>  
 Stops vary from longitudinally elliptical open-  
 ings to transverse slits. Position of the stop,  
 although not usually median, is much nearer me-  
 dian position than in large mammal-tibia whistles  
 of class FFL. Complete specimens vary from 40 to  
 234 mm. in length. In slightly bowed bones stop  
 is cut on concave side. Indicative of fortuitous  
 element entering into even most careful archaeo-  
 logical excavation is curious fact that the 46  
 whistles from BR (309) were obtained by Schenck  
 and not 1 by Uhle and other excavators. Ethno-  
 logical: 8 Yurok,<sup>76</sup> 1 Hupa, 4 Pomo, 1 Maidu, 6  
 Miwok, 2 Yuki, 1 W Mono of Tulare co. Yurok and  
 Hupa are single, but wrapped with Xerophyllum  
 tenax grass and buckskin strips; 4 have feathers  
 attached. Two Yurok (1-1031, 1-1032) are said to  
 be of eagle bone. Several of the central Cali-  
 fornian (Maidu, Miwok, Pomo) whistles are double,  
 being bound with sinew or string.

FF3. Whistle with incised decoration: 6. SC  
 3 (R 8, 1 [figured]; C 83, 2 [both figured]); DR  
 1 (vicinity of Stockton), figured; HR 2 (67),  
 both figured. Two mammal, 4 bird. DR specimen  
 is exception to the statement by Schenck and Daw-  
 son<sup>77</sup> that this type lacking in the DR. Ethno-  
 logical: 1 NE Maidu (1-21060, figured with archaeo-  
 logical types) is from tree cache in vicinity of  
 Quincy, Plumas co. It has checkered diamond pat-  
 tern and square stop cut on convex side.

<sup>75</sup>J. P. Harrington figures (pl. 21, b, c) 2  
 from Burton md., Santa Barbara. Putnam (pp. 235,  
 236, 238) and Heye (pp. 98, 99) discuss island  
 occurrences, particularly San Clemente, Santa  
 Catalina, and San Miguel.

<sup>74</sup>p. 356.

<sup>75</sup>Schenck, p. 224.

<sup>76</sup>T. T. Waterman, 1908, pictures Pomo and  
 Yurok; Barrett and Gifford, pl. 57, picture Mi-  
 wok.

<sup>77</sup>p. 350.

#### GG. Flute

GG. Flute: 4. SC 3 (N, 2 [1 figured]; M 1,  
 1 [figured]); SV 1 (2), figured. All fragmen-  
 tary, so that number of stops in complete instru-  
 ment undeterminable. Three bird (ulnae), 1 mam-  
 mal. Figured SC (M 1) specimen has asphaltum  
 reeds in place at the 2 stops. Its smooth dis-  
 tal end, although only 1/3 complete, suggests  
 that it never had more than 2 stops. Figured SC  
 (N) specimen had at least 3 stops. Figured SV  
 specimen has 2 apparently incomplete holes close  
 together and trace of a large stop at its broken  
 end; its mouth end<sup>78</sup> has series of transverse short  
 grooves as shown.

#### ANTLER

With the aid of Miss Fisher, Mr. Loud, and  
 others, an attempt has been made to discriminate  
 exactly between bone and antler. That no mis-  
 takes have been made should not be asserted. No  
 consistent attempt has been made to distinguish  
 elk from deer antler. Indeed, such distinction  
 is well nigh impossible except in large artifacts,  
 as wedges. The antler artifacts are embraced in  
 classification HH to PP inclusive, and constitute  
 17 types.

#### HH. Wedge or Chisel

HH. Wedge or chisel of elk and deer antler:  
 120.<sup>79</sup> While variation in size is great, all  
 specimens have a worked wedge-shaped tip. SC 5  
 (M 10, 4; C 154, 1); DR 5 (107, 1 [figured]; 80,  
 1; 82, 3); SV 9 (1, 6; 2, 3); BR 68 (3, 1; 76, 1;  
 86c, 1; 283, 1; 295, 3; 307, 14; 309, 35 [3 fig-  
 ured]; 328, 1; 329, 2; 356, 5; 372, 2; 387, 1;  
 407, 1); HR 31 (67, 29 [1 figured]; Orick, 1;  
 Humboldt bay, 1). Figured DR (107) specimen is  
 from the fork of an antler and because of its  
 shape was probably not a wedge to be hammered,  
 but a chisel used without hammering. Ethnologi-  
 cal: 3 Hupa, 28 Yurok. Largest is 16 in. long  
 and was used for splitting out redwood planks.  
 Two figured by Goddard,<sup>80</sup> reveal differences in  
 shape and curvature correlated with different  
 functions; one being for plank splitting,<sup>81</sup> the  
 other for forcing out chips in tree felling.<sup>82</sup>

<sup>78</sup>Putnam (p. 237, fig. 119) shows 4-holed ex-  
 ample from SC (C). Heye (p. 100, pl. 65) shows 2  
 from San Miguel is., 1 with 4 holes, other with 7  
 and a terminal plug of asphaltum.

<sup>79</sup>J. P. Harrington (pl. 21, 1-n) figures 3  
 from Burton md., Santa Barbara.

<sup>80</sup>Pl. 3, figs. 2, 7.

<sup>81</sup>Fig. 2 (1-2112).

<sup>82</sup>Fig. 7 (1-1154).

II. Biperforated Antler Tine

II. Biperforated antler tine: 2. Base of cut-off tine is hollowed conically and 2 holes drilled in opposite sides for either suspension or hafting. BR 2 (309), 1 figured.<sup>85</sup>

JJ. Antler-Base Handle

JJ. Antler-base handle (?): 3. If from a Swiss lake dwelling, would pass as handles or haftings for tools. Same cannot be asserted with assurance for these, even though modern Indians haft steel awls in antler handles for basketmaking. BR 3 (309), 1 figured.

KK. Elk-Antler Tube

KK. Tube of elk antler: 1. From antler of *Cervus nannodes*. SC 1 (C 3), figured.

LL. Shaft Wrench

LL. Shaft wrench or straightener: 2.<sup>84</sup> Beveling of sides of hole seems to indicate uses suggested, unless possibly it was a device through which a rope ran. DR 2 (109, 1; 51, 1 [figured]). Ethnological: 2 halves of elk or deer antler with 4 and 5 holes respectively; from Maidu of Butte co. Holes are cylindrically bored (probably with a steel tool) and are big enough only for an arrowshaft. Catalogued as arrowshaft scrapers. See ethnological figure 7.

MM. Barb or Blade for Fish Gig

MM. Blade or side barb for fish gig or toggle head. Short pieces of antler, either bipointed or unipointed; if former, 1 point was imbedded in the binding material in completed toggle head.

MM1. Bipointed barb for fish gig or toggle head. Ethnological examples point to differences between those of the Yurok, Hupa, Wailaki, and Lassik on the one hand, and those of the Yuki and Coast Yuki on the other hand. Interestingly enough, the 2 HR archaeological examples (MM1b) align with the latter.

MM1a. Bipointed side barb for fish gig or toggle head, rather flat or slightly rounded on 2 sides: 4.<sup>85</sup> Perhaps it is going too far to assume that objects of this type formed parts of toggle heads for fish harpoons. However, they resemble the succeeding type about which I feel more certain. BR 4 (309), 1 figured: largest.

MM1b. Bipointed barb for fish gig or toggle head, grooved on 1 side, flat on other: 2. HR 2 (67), 1 figured. Grooving is from both ends, with dividing ridge across middle. Differ markedly

from 3 modern Yurok toggle side barbs (described under ethnological antler types unrepresented in the archaeological collection). Resemble most 2 Yuki and 2 Coast Yuki modern toggle barbs in their flatness, which is in contradistinction to the triangular cross section of the tips of the Yurok barbs. Unfortunately, except for the 3 Yurok barbs just mentioned, detailed comparison is impossible because the ethnological examples are imbedded in covering materials; moreover the 4 Yuki and Coast Yuki examples have modern iron points combined with the antler barbs. See ethnological figure 8.

MM2. Square-based barb or blade. Edges are too thick to have served satisfactorily as knives. Points are not particularly acute either, but it seems more likely they were for piercing rather than cutting. Shouldered or tapered bases suggest hafting, a probability that is strengthened by apparent traces of adhesive and by discoloration in several of them. From 1/2-2/3 of the length was evidently covered by adhesive and perhaps string winding.

MM2a. "Blade" with base shouldered on face: 2. BR 2 (309), both figured. One has protruding transverse ridge midway its length. Other is very thick in distal third. Both show trace of adhesive for more than half length.

MM2b. "Blade" with base shouldered on side: 5.<sup>86</sup> BR 5 (309, 4 [1 figured]; 372, 1 [figured]).

MM2c. Barb or blade with tapered base: 2. DR 1 (107); BR 1 (309); both figured. BR specimen flat, thin, and parallel sided; has trace of adhesive and string winding toward its distal end. DR specimen thick and slightly broader toward tip than base.

NN. Harpoon Head

NN. Harpoon head. Primary division into unilaterally and bilaterally barbed types. This division apparently correlated with maritime and fluviatile uses respectively, or perhaps with marine mammals and fishes respectively.

NN1. Harpoon head, unilaterally barbed.

NN1a. Harpoon head, unilaterally single barbed: 3. HR 3 (67), 1 figured.<sup>87</sup> Ethnological: 1 Yurok single-barb sea-lion harpoon (ethnological fig. 21); 3/4-inch rawhide strip attached above base, also steel tip. Although there are slight differences in form of barb and base I consider it to belong essentially to type NN1a.

NN1b. Harpoon head with 2 barbs on one side: 1. BR 1 (309), figured. Fragmentary; possibly had additional barbs. Ethnological: 1 Tolowa

<sup>85</sup>Both pictured by Schenck, pl. 44, k, 1.

<sup>84</sup>Lillard and Purves, pl. 14, fig. 3, picture 1 from Booth md., near Sloughhouse, Sacramento co.

<sup>85</sup>Three of these are pictured by Schenck, 1926, pl. 43, s, t, v; also text-figure 5.

<sup>86</sup>Lillard and Purves (pl. 10, left edge of plate) picture 1 of "bone" from the Deer Creek-Cosumnes area, Sacramento co., which I roughly include in my DR. This occurrence makes the type common to both BR and DR.

<sup>87</sup>Pictured also by Loud, 1918, pl. 21, fig. 3.

sea-lion harpoon (ethnological fig. 23) with steel tip and rawhide line; ponderous.

NN2. Harpoon head, bilaterally barbed. 2 types according as whether barbs are symmetrically or asymmetrically placed. That this difference is of functional significance is open to doubt.

NN2a. Harpoon head, bilaterally barbed, barbs opposite one another, in 3 pairs: 5. DR 5 (141, 1; 82, 1 [figured: shortest]; 80, 1; 91, 2). DR (141) specimen has barbs pointing backward to much greater degree than figured example.

NN2b. Harpoon head, bilaterally barbed, barbs not opposite one another, more than 3 pairs: 3. DR 2 (138, 1; 139, 1); NR 1 (236), figured.

#### OO. Barb for Composite Fishhook

OO. Barb for composite fishhook (?). 2 types distinguished have certain points in common: (1) oblique base for attaching to shank of fishhook; (2) projecting "heel" at foot of oblique base, evidently for greater security in attachment.

OO1. Barb for composite fishhook (?), of unshouldered, thicker type: 6.<sup>88</sup> I incline to view that these were parts of fishhooks, similar to composite ones of North Pacific Coast.<sup>89</sup> The already mentioned heel on both this type and OO2 seems to indicate that the barb was not detachable, which perhaps strengthens fishhook theory. SV 2 (1); BR 4 (309, 1 [figured]; 329, 1; 356, 2 [1 figured]).

OO2. Barb for composite fishhook, of shouldered, thinner type: 37. Shoulder above barb and below point is characteristic of all. DR 37 (87, 31 [2 figured]; 140, 5; 141, 1).

#### Awl-like Pendant

PP. Awl-like pendant: 1. Biconically drilled. DR 1 (109), figured.

#### TOOTH

Only 19 artifacts of tooth in the archaeological collection, chiefly from SC and BR. Range from merely perforated teeth to extensively altered objects (QQ) of whales' teeth. No archaeological examples of the modern NW Californian sea-lion teeth used in headbands for dances.

#### QQ. Conical-headed, Shouldered Object

QQ. Conical-headed, shouldered object, with

<sup>88</sup> Schenck and Dawson (pl. 80, m-q) and Lillard and Purves (pl. 10) report this type for DR also.

<sup>89</sup> However, there are probably some exceptions, since Moorehead (p. 272) mentions a find near Stockton in which 2 barbs were "bound to a rod or staff, as if it has been used as a gig or spear." Schenck and Dawson (pl. 80) attempt a reconstruction along this line, which looks like a modern gig for frogs.

broad flat stem, perhaps of whale ivory. That objects of this type might be parts of atlatis suggests itself, the square-cut base of the cone affording the stop for the butt of the spear, and the whole being set into or onto a wooden handle. None has punctate ornamentation on the back to be hidden if inlaid in a wooden handle. Those with punctate designs seem to have had red pigment rubbed into the punctations.

QQ1. Plain conical-headed, shouldered object, with broad flat stem, of whale ivory (?), no incised dot decoration: 2. SC 2 (C 159), 1 figured: larger. Smaller specimen had end of flat portion missing. Both have smooth edges; both are nearly black, probably discolored.

QQ2. Conical-headed, shouldered object, with broad flat stem, punctate ornament, of whale ivory (?). Two types distinguishable: smooth edged, serrate edged; possibly of functional significance. Color buffish brown, not discolored black as QQ1.

QQ2a. Conical-headed, shouldered object, with broad flat stem, of whale ivory (?), punctate design, smooth edged: 2. SC 2 (C 83), both figured. One has punctate decoration on upper face of cone as well as on flat stem.

QQ2b. Conical-headed, shouldered object, with broad flat stem, of whale ivory (?), punctate design, serrate edged: 2. SC 2 (C 83), both figured.

#### RR. Beaver-Tooth Gouge

RR. Beaver-tooth gouge: 2. Made by slicing off gingival enamel surface of a beaver incisor. Cutting edge is natural edge of tooth. DR 2 (80, 1 [figured]; 141, 1). Figured specimen shows cut posterior with its longitudinal groove.

#### SS. Perforated Shark's Tooth

SS. Perforated shark's tooth. One uniperforated and 3 biperforated specimens, resembling Oceanian knife blades.

SS1. Uniperforated shark's tooth: 1. Lacks serrated edges. Perforation near base. SC 1 (R 6), figured.

SS2. Biperforated shark's tooth: 3. Drilled basally as though for rigid hafting by cords to some sort of handle. No indication of asphaltum used in hafting, if hafted they were. Natural serrations of the teeth seem largely unworn. SC 3 (M 1), 1 figured.

#### TT. Perforated Stingray Mouth Plate

TT. Perforated stingray mouth plate: 1. A triangular piece, drilled apparently as a pendant. SC 1 (R 19), figured.

#### UU. Perforated Mammal Tooth

UU. Perforated mammal tooth. These objects were likely used as pendants or beads.

UU1. Perforated human incisor: 1. Root drilled from side to side for stringing. SC 1 (C 138), figured.

UU2. "Perforated" deer (?) molar: 1. Strictly speaking, perforation is through an asphaltum coating over roots of tooth so that it might be strung either as bead or pendant. SC 1 (C 100), figured.

UU3. Perforated bear's tooth: 1. Biconically drilled near end, for stringing. BR 1 (309), figured.

UU4. Perforated carnivore canine tooth: 3. One specimen with tip, 2 with root, biconically

drilled for suspension: probably either coyote or wildcat. DR 1 (Rosebud ranch); BR 2 (328), 1 figured.

## CLAW

Only a single type in our collection, viz., drilled eagle claws. Doubtless in other collections there are drilled bear claws.

VV. Perforated eagle claw (terminal phalange): 9.<sup>90</sup> All basally drilled from side to side and evidently to be strung for necklace. SC 9 (M 10, 1; C 138, 8 [1 figured]).

## EXCLUSIVELY ETHNOLOGICAL TYPES

Below are briefly discussed UCMA specimens used by modern Indians which are unrepresented in the archaeological collection. Their absence in the archaeological collection does not necessarily indicate they are recent inventions. They may well be represented in archaeological deposits not yet excavated, especially in extreme northwestern California.

## BONE

Cannon-bone awl.—Handle formed by complete proximal head of cannon bone. 1 from the Hupa, 53 mm. long; 3 from the Yurok, 112-150 mm. Used for eel slitting.

Arrow point.—Two unforeshafted feathered arrows from the Tolowa (Athabaskan group in extreme northwestern California) have bilaterally barbed double heads (see ethnological fig. 9).

Deer-skull spoon.—Five examples from the Yurok have bowls of tablespoon size or slightly larger, but handles from 20-90 mm. long. These were women's spoons. One is figured by Kelly.<sup>91</sup>

Salmon-harpoon toggle head.—This has a rather flat awl-like blade or point, suggesting that some so-called archaeological awls may have served the same purpose. The barbs appear to be of cannon bone, the grooved part forming the inner surface against which the proximal portion of the blade fits. The archaeological collection yields no bone specimens like the barbs, although there are grooved horn specimens somewhat analogous. The figured specimen (ethnological fig. 13) is from the Wailaki of Hull's v., Lake co.

Whole deer tibia.—One from Yurok, used as tapper for basketry tray sifter. See archaeological type J.

Crocheting needle.—This Yurok instrument for making crocheted head nets is a bipointed, flat

object with median perforations in line, flanked by corresponding side notches, apparently to hold the iris-fiber thread in position. The specimen (ethnological fig. 2) is pictured as it would appear divested of the thread at present wound about it.

Bipointed flat hairpin.—This type of object is represented by 10 Yurok specimens, some of which have been illustrated in earlier publications.<sup>92</sup> Its nearest analogue, in form at least, in the archaeological collection is type Tld, which is limited to the SC, and which differs in showing more or less of the cancellous interior of the bone, whereas the Yurok hairpins are perfectly smooth on both surfaces.

Mesh measure.—Fully 99 per cent of the mesh measures of NW California are made of elk antler. Consequently, the two Yurok bone specimens figured are of unusual interest. One is of sea-mammal bone (probably whale), the other of elk scapula. (Ethnological figs. 5, 6.)

Flat net handle.—These are flat, perforated objects, each with a loop of string passing through two of the holes. They vary in shape as shown by ethnological figures 10-12, all from the Yurok. The one with four holes appears to have had the closer pair of holes drilled because the first pair was unevenly placed. The variety of forms (circular, rectangular, spindle) devoted to a single function is a warning to the archaeologist in the matter of assuming difference in form as necessarily correlated with difference in function.

Flanged net handle.—Two objects from the Yurok, serving the same purpose as the flat net handles, are made from deer scapulae. The ridge of the scapula has been cut off except for one small projecting flange, which is perforated for insertion of the cord. (Ethnological figs. 3, 4.)

<sup>90</sup>J. P. Harrington pictures (pl. 23, e-g) 3 from Burton md., Santa Barbara.

<sup>91</sup>Pl. 119, b.

<sup>92</sup>Loud, 1918, pl. 20, fig. 16; Kelly, fig. 6, also pl. 119, f, g.

Bird-bone and deer-hoof rattle.—A single specimen<sup>95</sup> from the lower Klamath River region, probably Yurok or Hupa, is of special interest as exemplifying a possible use to which cut lengths of large bird bones (EEl1a) may have been put in ancient times. It consists of a large humerus, 210 mm. long, wrapped centrally for 80 mm. with buckskin, to which 14 deer dewclaws are attached. With a buried specimen the buckskin and dewclaws would no doubt disintegrate, leaving only the bone.

#### ANTLER

Flint retoucher, etc.—In the archaeological collection are cut-off antler tines, which possibly were used for flint flakers, but because of doubt I am not counting them as an archaeological type. In the ethnological collection there is a retoucher of this type (ethnological fig. 19) from the Luiseño. Other ethnological retouchers are straight slender pieces of antler bound to long sticks: (1) Hupa,<sup>94</sup> (2) Pomo of Mendocino co. (ethnological fig. 22). The Pomo specimen consists of a piece of antler 260 mm. long bound on a slender stick 600 mm. long, so the working point of antler projects 10 mm. beyond the stick.<sup>95</sup>

Of quite different type is a whittled cigarette-shaped piece of antler from the Yahi (ethnological fig. 25),<sup>96</sup> 54 mm. long, used to hold endwise against a lump of obsidian and to take the force of the blow from the hammerstone; in other words, used like a nail set.

Three unworked slender antlers from yearling buck deer are 1-926, Yurok, "awl"; 1-1074, Yurok, eel splitter and pubescent girl's head scratcher; and 1-9968, N Miwok of Calaveras co., extractor of acorns stored singly by woodpeckers in holes in tree trunks.

Elkhorn purse.—This northwestern Californian type of object, made from a hollowed section of elk antler, has been thoroughly described and illustrated.<sup>97</sup>

Elkhorn spoon.—This type, used by men, has been described and pictured.<sup>98</sup> It is primarily northwestern Californian, although extending to the Coast Yuki in central California.

Elkhorn netting needle.—Another artifact characteristic of northwestern California.<sup>99</sup>

Elkhorn mesh measure.—Some few are made of bone and wood by the northwestern Californian

Elkhorn mesh measure.—Some few are made of bone and wood by northwestern Californian tribes, but the great majority are of elk antler.<sup>100</sup>

Crochet hook.—A single Yurok specimen (ethnological fig. 18), used in manufacture of crocheted head ornaments made of iris-fiber strings,

Elk-antler pipe bowl.—This unique piece (ethnological fig. 17) from the Yurok, appears to have a dewclaw inner bowl.

Barbed arrow foreshaft.—Four specimens from the Yurok have two barbs on each side. The distal end has a groove at right angle to the barbs for the insertion of a point or head, which is missing. One of the 4 is figured (ethnological fig. 20).

Side barb for toggle head of salmon harpoon.—If this were represented by archaeological specimens, we should classify it as "MMLc. Base forked." The museum has 3 specimens from the Yurok which fit this classification. All other Yurok and Hupa specimens are in complete toggle heads, so that their bases cannot be examined. However, assuming that these complete specimens have forked-base barbs, 2 of them are figured: ethnological figure 16 (Yurok), ethnological figure 15 (Hupa),<sup>101</sup> along with Yurok barb (ethnological fig. 14). Besides forked base, another diagnostic character of this type of barb is the tapering point which is triangular in transverse cross section. This holds for Yurok, Hupa, Wailaki, and Lassik specimens in the ethnological collection. A still further difference between northwestern and central Californian salmon harpoons is that the foreshafts of the former<sup>102</sup> are of unequal length, as with the similar harpoons of Middle Kingdom Egypt.<sup>103</sup>

#### TOOTH

Sea-lion-tooth headband.—This type of distinctive headband worn by the Yurok and their neighbors for dance regalia is unrepresented archaeologically. Kroeber<sup>104</sup> shows the character and use of these headbands. The teeth are cut away to the pulp cavity on the concave side, thus increasing the appearance of curvature. They are mounted in hide bindings and sewed to a buckskin band, which is worn tied around the head with the teeth pointing up in front. The museum possesses 3 with 6 teeth each, 1 with 7, 1 with 5. One 6-tooth band is Hupa, the others Yurok.

<sup>95</sup> Illustrated by Goddard, pl. 18, fig. 4.

<sup>94</sup> Goddard, pl. 12, fig. 3; Pope, pl. 27, fig. 1.

<sup>95</sup> Cf. M. R. Harrington, fig. 42, p. 135.

<sup>96</sup> Pope, pl. 27, fig. 5.

<sup>97</sup> Goddard, pl. 18, fig. 1; Kroeber, 1925, pl. 16; Kelly, pls. 113-117.

<sup>98</sup> Goddard, pl. 16, figs. 3-8; Kroeber, 1925, pl. 20; Kelly, pls. 103-108.

<sup>99</sup> Goddard, pl. 14, fig. 2; Kelly, pl. 119, a.

<sup>100</sup> Goddard, pl. 14, figs. 4-6; Kelly, pl. 119, c, d, e.

<sup>101</sup> Pictured also by Goddard, pl. 13, figs. 2, 4.

<sup>102</sup> See Goddard, pl. 13, fig. 3.

<sup>103</sup> Griffith, Beni Hasan, part 4, pl. 13, fig. 4.

<sup>104</sup> 1925, pl. 3, upper.

## DISTRIBUTION OF TYPES

The number of types occurring in each region is as follows: SC 138, SJ 4, DR 46, SV 28, BR 73, NR 18, HR 15. The archaeological types occurring in the highly variable collections from modern tribes are as follows: Central Californian culture area 20, Northwestern Californian culture area 16, Southern Californian culture area 4. Whether the dearth of archaeological types from Southern Californian tribes is due to incomplete collections or represents a true condition is not clear. However, Sparkman mentions only 3 types of bone and antler objects for the Luiseño, Kroeber none for the Cahuilla, Drucker 9 for 18 tribes investigated by him. The ethnological collections from southern California are all from interior groups, and it may well be that they share with the lower Colorado River tribes a neglect of bone and antler working. Unquestionably, access to marine mammals multiplies the number of bone types used on the coast and especially on the islands.

The order of abundance of types is due in part, first of all, to the amount of excavating done in the several regions. In the second place environment probably plays an important part. The SC and

veloped that has no exact parallel anywhere, though it reminds one of the Eskimo complex and in a limited sense of the North Pacific Coast culture." He might have added that there are also certain items suggesting Oceania, e.g., plank canoes, perforated shark's teeth, and circular shell fishhooks. In the department covered by the present paper there are 3 types distinctly paralleling Polynesian artifacts: type X, circular bone fishhook, which in form at least corresponds with circular shell hooks; types SS1 and SS2, perforated shark's teeth, like those used on some Polynesian knives. Olson<sup>106</sup> cautiously refers to possible Oceanic affiliations. In addition Olson<sup>107</sup> has presented the first indisputable evidence of typological sequence for the region.

In table 2 the interrelations of the 6 areas are set forth. The number of types or elements shared by the area at the head of each column with the area at the left side of the table is shown. Thus, DR shares 23 of its 46 types (50%) with SC. As shown in the SC horizontal line, DR possesses 17% of the SC types, while BR possesses 30% of the SC types. The averages at the

TABLE 2

### Types in Common in the Six Archaeological Areas

(Read across. Percentages in parentheses.)

	SC	DR	SV	BR	NR	HR	Average
SC:138.....		23 (17)	21 (15)	41 (30)	14 (10)	11 (8)	(16)
DR:46.....	23 (50)		20 (43)	29 (63)	14 (30)	7 (15)	(40)
SV:28.....	21 (75)	20 (71)		22 (78)	13 (46)	7 (25)	(59)
BR:73.....	41 (56)	29 (40)	22 (30)		16 (22)	9 (12)	(32)
NR:18.....	14 (78)	14 (78)	13 (72)	16 (89)		5 (28)	(69)
HR:15.....	11 (73)	7 (47)	7 (47)	9 (60)	5 (33)		(52)
Average .....	(66)	(50)	(41)	(64)	(28)	(18)	

BR peoples had access to marine mammals and water birds. DR, as well as SC and BR, was the haunt of innumerable waterfowl, but less frequently of marine mammals, hence perhaps the lesser frequency of bone work. Because of insufficient material, the SJ data will be largely omitted from discussion. The Key to Types gives the distribution of types and the number of specimens, together with indication of the occurrence of the archaeological types among modern Indians.

The number of types peculiar to single archaeological regions, disregarding modern ethnological occurrences, is as follows: SC 84, DR 6, SV 0, BR 16, NR 0, HR 2. Concerning the obvious specialization in the SC region, Nelson<sup>105</sup> writes: "Nevertheless, a combination of more or less highly specialized material traits was here de-

veloped that has no exact parallel anywhere, though it reminds one of the Eskimo complex and in a limited sense of the North Pacific Coast culture." He might have added that there are also certain items suggesting Oceania, e.g., plank canoes, perforated shark's teeth, and circular shell fishhooks. In the department covered by the present paper there are 3 types distinctly paralleling Polynesian artifacts: type X, circular bone fishhook, which in form at least corresponds with circular shell hooks; types SS1 and SS2, perforated shark's teeth, like those used on some Polynesian knives. Olson<sup>106</sup> cautiously refers to possible Oceanic affiliations. In addition Olson<sup>107</sup> has presented the first indisputable evidence of typological sequence for the region.

In table 2 the interrelations of the 6 areas are set forth. The number of types or elements shared by the area at the head of each column with the area at the left side of the table is shown. Thus, DR shares 23 of its 46 types (50%) with SC. As shown in the SC horizontal line, DR possesses 17% of the SC types, while BR possesses 30% of the SC types. The averages at the right side of the table show the average percentage shared with other areas by the area listed at the left. Thus, SC, richest and most specialized of the areas, shares on an average only 16% of its types. The averages at the bottom of the table show the average percentage that the other 5 regions share with the region named at the head of the column. Thus, 5 areas on the average share 66% of their types with SC; 5 areas share only 18% of their types with the HR. SC (66%) and BR (64%) have most in common with the other areas; DR (50%) and SV (41%) come next in order; then NR (28%) and HR (18%).

Table 3 attempts to express the interrelationship of each pair of areas by a single figure,

<sup>106</sup> 1930, 21.

<sup>107</sup> P. 10.

<sup>105</sup> 1936, 199.

which I have called a percentage index and which is the average of pairs of relationships expressed in percentages in table 2. This is Driver and Kroeber's formula A.<sup>108</sup> Thus, SC shares 14 of its 138 traits, or 10% of them, with NR, which shares 14 of its traits, or 78% of them, with SC. The percentage index for the interrelationship of the 2 areas is 10+78, divided by 2; roughly 44. The same scheme has been worked out for each of the other pairs. Table 3 shows the percentage indexes to range from 30 for NR-HR relations to 59 for SV-NR relations.

TABLE 3

Percentage Indexes of Interrelationships of Areas

	SC	DR	SV	BR	NR
DR.....	33				
SV.....	45	57			
BR.....	43	51	54		
NR.....	44	54	59	56	
HR.....	40	31	36	36	30

Types of archaeological artifacts used by modern tribes are shared with archaeological areas as shown in table 4.

By archaeological areas, the total order of frequency, of archaeological types used by modern tribes, is almost that of the amount of excavation in each archaeological area. Thus, in descending order, modern Central Californian tribes share 15 of their 20 types with SC, 13 with BR, 11 with DR, 10 with SV, 8 with NR, 2 with SJ. The high correlation with SC is in part attributable to the large number of types there,

also to an historic connection, very likely. The high correlations with BR and DR are expectable, since they lie within the modern Central Californian Indian culture area.

Emphasizing the pervading richness of SC culture is the fact that modern Northwestern Californian Indian culture shares 12 types therewith as against 11 types with the nearer BR. The influence of SC has certainly manifested itself in the recent cultures to the northward, but less so in the cultures of the remainder of Southern California if the testimony of the ethnological collections is trustworthy. Again, let me remind the reader that I am speaking only of the types of materials described in this paper.

The three SC islands from which the UCMA specimens are chiefly derived are San Nicolas (487 specimens), Santa Cruz (626 specimens), and Santa Rosa (291 specimens). The number of types into which these divide is San Nicolas 59, Santa Cruz 82, Santa Rosa 44. The four mainland sites (1, 6, 9, 10) yielded only 69 specimens, but these distribute among 31 types. The greater abundance of specimens and of types on the islands appears to be correlated with abundance of marine mammals and birds. As one proceeds from the islands to the mainland and then inland (as revealed by ethnography) there seems to be a progressive diminution of types and specimens.

An outer coast BR mound (407) at Half Moon bay, San Mateo co., is of interest as 3 of its 7 types are not found elsewhere in the BR, but are found in SC region. They are B1, B3, D6. Their presence may be environmentally determined rather than through diffusion; i.e., the coastal position of the site may be responsible.

TABLE 4

Types Shared by Modern and Ancient Cultures

	SC (138)	SJ (4)	DR (46)	SV (28)	BR (73)	NR (18)	HR (15)
Central (20).....	15	2	11	10	13	8	4
Northwestern (16).....	12	2	7	6	11	4	4
Southern (4).....	3	0	1	1	2	0	0
Total.....	30	4	19	17	26	12	8

## TEMPORAL RELATIONS

Materials from SC, DR, and BR alone seem abundant enough to essay any chronological interpretations. The following discussion refers only to artifacts of bone, antler, tooth, and claw—not to other materials. When it becomes possible to include artifacts of other materials, temporal relations may become clearer.

in making sites 1 and 10 more alike in bone content than either one is like site 6. Olson has adduced evidence<sup>110</sup> to show that mainland site 6 is older than site 10. The two are on opposite sides of Rincon Creek mouth, at the boundary of Santa Barbara and Ventura cos. Examination of distribution of types shows only 2 types (AlbII

### SOUTHERN COAST

On the whole, the distribution of types on the mainland of the SC agrees with Olson's findings<sup>109</sup>

<sup>108</sup> Pp. 217-219.

<sup>109</sup> 1930, p. 14.

<sup>110</sup> 1930, p. 10.

TABLE 5  
Types in Four Santa Cruz Island Sites

	Site 3	Site 83	Site 100	Site 138		Site 3	Site 83	Site 100	Site 138
AlaII.....	1				T1c.....		1		
AlaIII.....	10		1		T1d.....	1			
AlbI.....	1				T1g.....	2		1	
AlbII.....	1		1		T2a.....	1			
AlcI.....	1		1		T2bI.....			1	
AleI.....			1		T2bII.....			1	1
Alf.....				1	T2c.....			2	
A2.....	2		1		U1.....	2			
A4aI.....	1		1		U2.....			5	
A4aII.....				1	U3.....			2	
A4bI.....	1		3		X.....				1
A4bII.....	2				Z1.....	2			
B1.....	1				BB1.....			1	
B3.....	4				BB2.....			1	2
B6.....	5				BB3.....			1	
C5.....		1	17	3	CC2.....	2			
C8.....	1			1	CC3.....	1			
D6.....		1	1		CC4.....	2			
D7.....	1		1		CC5.....			1	
F.....			1		EE1a.....	1	5	215	
K1.....				2	EE1b.....	6	14	115	
K2.....			1		EE1d.....				1
L1.....		3			EE2a.....		1	3	
P1.....	6				EE2b.....	1	3	1	
P2a.....		1	1		FF1a.....		1	3	
P3a.....				1	FF1b.....			2	
P4.....			1		FF1c.....				1
Q2.....		1			FF2.....			5	6
Q4.....		1	1		FF3.....		2		
Q5.....		6			QQ2a.....		2		
Q6.....		13			QQ2b.....		2		
Q7.....		4			UU2.....			1	
Q8.....		2			VV.....				8
R.....	1				Specimens...	64	64	395	29
T1b.....	4		1		Types.....	28	19	34	13

and T1b) in site 6, as against 15 types in site 10 (AlaI, AlbI, AlbII, Alf, A4cII, A5b, Cl, C5, T2bII, U2, CC5, EE1a, EE3a, HH, VV). In site 6, the only peculiar type is T1b. Thus, the analysis shows types scarce in the mound Olson regards as earlier, numerous in the mound he regards as later. Granted the correctness of his findings, the types increased in number with the lapse of time. The materials described in this paper throw no light on the 3 Southern cultural periods described by David Banks Rogers<sup>111</sup> as the Oak Grove People, the Hunting People, and the Canalino, for the University's collection is virtually devoid of specimens from inland Santa Barbara co. sites.

On Santa Cruz is., 4 sites only (3, 83, 100, 138) seem to offer enough bone types for comparison. Olson<sup>112</sup> adjudges site 3 as Early, site 83 as Early and Intermediate to Late, sites 100 and 138 as Intermediate to Late. The 2 following tables present the types found in these 4 sites, and the number of specimens of each. Perhaps adverse to Olson's judgment as to 3 and 83 representing early culture is the disparity between

the two in bone-artifact inventory. Both yielded 64 classifiable specimens, which in site 3 comprise 28 types, in site 83 only 19 types. Table 5, however, reveals only 3 types shared. Thus, the typology apparently fails to substantiate the supposed contemporaneity. Twenty specimens from site 3 are awls, which are absent from site 83. Kroeber has kindly compiled in table 6 a rearrangement and consolidation of some of the types in my table 5. This, especially after deduction of EE beads (which vary from 3 per cent at site 138 to 85 per cent at site 100), shows the 4 sites grouping themselves in the sequence: 83, 138, 100, 3. This sequence apparently disagrees with Olson's estimated time classification by placing 83 and 3 farthest apart. Moreover, the peculiar types in site 83 and the absence from 83 of types found in one or more of the other 3 mounds would seem to contradict Olson's assertion that site 83 ranges in the time scale from Early and Intermediate to Late. Sites 3 and 100 (respectively Early, and Intermediate to Late in Olson's judgment) seem most alike in inventory of bone artifacts; 138 seems on the whole to go with them rather than with 83, which stands somewhat alone. It is obviously unlikely that all 4 mounds are chrono-

<sup>111</sup> 1929, pp. 342-419.

<sup>112</sup> Pp. 13-15.

TABLE 6  
Types in Four Santa Cruz Island Sites

	Site 83	Site 138	Site 100	Site 3
Total specimens .....	64	29	395	64
Beads, tubes, EE.....	23	1	334	20
Total residue, specimens.....	41	28	61	44
Flat pendants, Q.....	27	--	1	--
Spear beads, L.....	3	--	--	--
"Nails" of tooth, QQ.....	4	--	--	--
Eagle claws, VV.....	--	8	--	--
Whistles, FF.....	1	7	10	--
Whale dish, mortar, BB.....	--	2	3	--
Gouges, smoothers, C.....	1	4	17	1
Pointed toggles, U.....	--	--	7	2
Bipointed, not perforated, T.....	1	1	6	8
Awls, A.....	--	2	9	20
Needles, perforated daggers, P.....	1	1	2	6
Perforated spools, CC.....	--	--	1	5
Pins, daggers, B.....	--	--	--	10

logically identical. Consequently, some of their differences are perhaps temporal, others local.

Without stratification it is impossible to know if the considerable differences in artifact inventory are truly temporal or merely spatial or both. They may reflect in part local differences due to the idiosyncracies of individuals. Thus the 27 flat pendants (Q) from site 83 may be the work of one specialist; indeed more than half of them come from a single pit (L) at depth of 6 feet. It is not unreasonable to expect specializations by individual artisans in this rich culture and especially in the aesthetic, rather than the practical, phases of material culture. Schenck and Dawson<sup>113</sup> call attention to like probability in the DR. With such extremely localized developments, the problem of time sequence becomes increasingly difficult. Thus, Olson adjudges site 3 and the lower part of 83 as Early on the basis of his field observations and studies. Now, Kroeber and I, on the basis of bone-artifact inventory, point out the difference as to types, and suggest that these differences run counter to Olson's suggestion of contemporaneity. However, if the factor of individual specialties is given weight, it is not impossible that the two sites might have different bone types and still be contemporaneous, as Olson states. In short, the typological evidence is inadequate for rigorous proof of contemporaneity or the reverse. It is the old question of whether one should interpret local differences temporally as well as locally, when there is an absence of other considerations.

#### BAY REGION

With their depth of 30 or more ft., Ellis landing md. (no. 295) and Emeryville md. (no. 309) in

the BR offer opportunity to search for possible culture change in the time elapsed during their growth. The opportunity to perceive such change if it took place is limited for the present at least to a consideration of the artifacts of bone, antler, tooth, and claw described in this paper. Ninety-four specimens of 23 types from Ellis landing and 416 of 54 types from Emeryville have been utilized.

The 94 Ellis landing specimens (comprising 23 types) are from the upper 15 ft. of that mound. Nelson obtained the median portion of a bone awl at a depth of 18 ft. in the lower part of the mound; it is too fragmentary to include in this typology. Nelson's published figures for his small sampling seem to indicate no noticeable diminution of artifacts in general in the lower half, which he penetrated by means of a shaft. Thus; from the 560 cu. ft. of material removed from this shaft, he obtained 38 artifacts. From 5500 cu. ft. removed by means of a trench in the upper half of the mound he obtained 78 "determinable artifacts" and "many more of doubtful character."<sup>114</sup> Nelson's two sets of figures are not strictly comparable, since for the lower levels penetrated by the shaft he counts all artifacts no matter how fragmentary, whereas for the upper half of the mound from which he removed virtually 10 times as much mound material, he counts only "determinable artifacts." In addition, from following up grading operations Nelson obtained 265 artifacts from 67,500 cu. ft. of material. The 94 bone specimens utilized in this paper are only those sufficiently complete to be identified as to type, and embrace objects obtained both by trenching and from grading.

As stated, 23 types were found in the upper 15 ft. of Ellis landing md., whereas 24 types were found in the upper 12 ft. (Uhle's layers 1-5) and 50 types in the lower 19 ft. (Uhle's layers 6-10) of Emeryville md. Thus Emeryville

<sup>113</sup>P. 408.

<sup>114</sup>1910, pp. 372, 373.

TABLE 7

Types: Ellis Landing, Emeryville, and Ethnological

(x, no depth recorded; ( ), from literature)

Type	Ellis landing upper 15 ft.	Emeryville lower 19 ft. (13 to bottom) (Uhle's layers 6-10)	Emeryville upper 12 ft. (Uhle's layers 1-5)	Ethnol.
AlaI.....		20		NW, S
AlaII.....	4-8	23-27		NW, C
AlaV.....			4th	
AlbI.....	4 and 7	15	4th	C
AlbII.....	1 $\frac{1}{2}$ -6	From bottom	To top	NW, C
AlbIII.....		26		
AlbIV.....	8			
AlcI.....	2	x	x	
AlcII.....	3 and 4		4th	C
AlcIII.....		24		
AleI.....		8th	4th	C
AleII.....		28	2d	
Alg.....		26	2d	
A2.....		7th to 9th; 23-29		
A3.....	12	24		
A4aI.....	6	x	x	
A5a.....		7th		
A5b.....		26 and 28		
B2.....		15		
B8.....		x	x	
C1.....	7	13-30		NW
C2.....		12-25		
C4.....		9th		S
C6.....	2	27	4th	
D2.....		26		
D5.....		26		
F.....	10	22-24		
H1.....	1-4	13-20; 6th-8th	4-12; 2d to 5th	
H2.....		x	x	
H3.....	12-14	16-26		
I.....	2 and 4	x	x	
J.....		x	x	NW, C
M3.....		7th		
N2.....		22		
N5.....		22		
P3a.....		24-27	5th	NW, C
Q3.....		26		
Q4.....	x			
T1c.....		15 and 27		(C)
W1.....	4			C
Z3.....	12			
CC1.....		22-26		C
EE1a.....	2-15	6th-8th; 13-30	2d-5th	C
EE1b.....	1-5	7th		C
EE1e.....		7th and 27	5th	
EE2a.....	3			
EE2b.....	3			
EE3c.....		31		
FF1a.....		x	x	
FF2.....	3-11	13-28	12	NW, C
HH.....	5-8	13-30	12	NW
II.....		15		
JJ.....		24		
MM1a.....		24-30		
MM2a.....		22 and 8th		
MM2b.....		8th	5th	
MM2c.....		28th		
NN1b.....		15		NW
OO1.....			12	
UU3.....			5th	
Total types, 60.....	23	50	24	17

and Ellis landing present reverse pictures: Ellis landing has most of its types in the upper half, one in the lower half; Emeryville has twice as many types in its lower 3/5 as in its upper 2/5; and Emeryville as a whole has 54 types as against 23 of Ellis landing. In part this great difference may be the result of more extensive excavations at Emeryville. In part, however, it may represent a real difference. The situation at first glance suggests that Ellis landing md. may have largely attained its growth before Emeryville was begun. However, careful scrutiny of the data fails to definitely establish this. Certain counts of types bear on this matter: Ellis landing shares 17 of its 23 types with Emeryville; the other 6 have not been found in Emeryville. Ellis landing shares 15 of its types with lower Emeryville as against only 11 with upper Emeryville; or stating it from the standpoint of Emeryville, that mound shares with upper Ellis landing 30 per cent of its lower types and 40 per cent of its upper types, thus stultifying any hypothesis of chronological succession. The chances are double or triple for lower Emeryville sharing more with Ellis landing, since lower Emeryville has more than twice as many types as upper Emeryville and 144 specimens as against upper Emeryville 42 specimens. Yet the percentages do not fulfill the expectancy. Hence, the figures do not confirm the hypothesis that Emeryville was only beginning when Ellis landing was already old. Moreover, there were probably late residents on Ellis landing md., since Nelson found "several house-pits in a good state of preservation upon it when first examined."<sup>115</sup>

However one may regard the occurrence of 8 modern types in the upper part of Emeryville and 9 in upper Ellis landing, it comes as a shock to find that lower Emeryville has 15 such modern types, an increase in the same ratio as the total number of types (50), viz., double. Indeed, 15 of the 17 modern types found in the two mounds occur in the lower 3/5 of Emeryville. (One modern type, W1, occurs at Ellis landing only. Type AlcII is modern, upper Emeryville, and upper Ellis landing, but not lower Ellis landing or lower Emeryville.) Considering the precariousness of distribution in the mound and the chances of missing objects, we should probably regard the higher number of modern types in lower Emeryville as merely a correlate of the larger number of types and specimens found there, rather than indicating that modern Indian culture was more like early Emeryville culture than like later Emeryville. Of 16 Emeryville-modern types, 11 are found in the Central Californian culture area, 9 in the Northwestern, and 2 in the Southern.

The counts for Emeryville at least seem to bolster two tentative conclusions reached by Schenck<sup>116</sup> and Kroeber. The former estimates

that Emeryville md. might have accumulated in as little as a millennium. The presence of 50 lower types, 24 upper types, and only 4 of the upper types not found in lower levels, points in the direction of rapid growth with very little cultural change. This brings us to Kroeber's conclusion that "on this shore of the Pacific, civilization, such as it was, remained immutable in all fundamentals. Even as some measure of progress shall be determined by continued investigation, it is probable that this will prove to have been unusually slow and slight."<sup>117</sup> Neither is there anything about the findings of this typological study to warrant revision of the age estimate of 3000 to 4000 years for Ellis landing md.,<sup>118</sup> nor is there anything to confirm this estimate. The upshot of the typological findings is merely to have demonstrated the improbability of a time sequence for Ellis landing and Emeryville mounds. For the 17 modern types found in the two shell-mounds, 15 of them in lower Emeryville, it can only be said that most of them have virtually an antiquity as great as that of Emeryville md. itself.

Table 7 lists types and occurrences upon which the preceding discussion is based. No column is included for the lower 15 ft. of Ellis landing from which only 1 bone artifact, not definitely assignable to a type, was obtained. Cardinal numbers are for feet, ordinals for Uhle's layers in Emeryville md.

BR mounds 328 and 329 near Newark, Alameda co., are very close together. 328 yielded 16 specimens of 7 types, 329 yielded 29 of 9 types. The two mounds have only 2 types in common. Figures for artifacts of other materials are not available. Even if they were it still might be impossible to determine whether the differences are temporal or fortuitous. Depths seem to give no clue. Types in mound 328: AlbII, AlbIV, Alg, H1, EE1a, EE2b, UU4. Types in mound 329: AlaII, AlbII, C5, H1, H2, EE1b, FF2, HH, OOL.

#### DELTA REGION

In the last few years excavations in DR have been conducted by Sacramento Junior College and by University of California with an eye to possible cultural succession. Such was discovered by Sacramento Junior College (see Lillard and Purves) in Windmill md. near Elk Grove, Sacramento co. Windmill md. is composed of a black-soil accumulation overlying a yellowish or reddish clay substratum. Burials in the latter were made before the accumulation of the black-soil midden. Hence, it is reasonable to regard the differences in artifact inventory in these two levels as having chronological significance. R. F. Heizer, in as yet unpublished writings, has taken these differences as temporal criteria

<sup>115</sup> 1910, p. 401.

<sup>116</sup> 1926, p. 278.

<sup>117</sup> 1925, p. 930.

<sup>118</sup> Nelson, 1910, p. 401; Gifford, 1916, p. 13.

for assigning relative ages to other mounds which reveal one or the other of the complexes characterizing the lower and upper levels of Windmillier md. My tables 10 and 11 attempt the same thing.

Because of the elusiveness of temporal distinctions in Californian archaeology, I have included in this section specimens in Sacramento Junior College collection and in the collection of E. N. Johnson, of Concord, so as to make the series as extensive as possible for the five mounds exca-

Table 10 shows the distribution of the 23 Windmillier types by the 2 levels,<sup>119</sup> "red" substratum and "black" mound material, also 9 Windmillier types shared with Hotchkiss md. Only 21 of the 23 Windmillier types are definitely allocated to one level or the other. The table reveals 5 peculiar types in the "red clay" substratum, 14 peculiar types in the "black" mound material, 2 types in both, and 2 unallocated. It is clear that the bone-artifact inventories of the 2

TABLE 8

Types in Five Delta Mounds

(Excavated by Sacramento Junior College, University of California, and E. N. Johnson)

	6*	107	138	141	142		6*	107	138	141	142
AlaII.....		1				EE1a.....		1	11		
AlbII.....		2				EE1b.....		6	4	90	
AlcII.....		3				EE1c.....		1			
Ald.....	1					EE2b.....		4	7		
AleI.....		2		1		FF1a.....			2		
AleII.....		1				FF2.....	3	6	27		
A2.....		1				FF3.....			1		
A4aI.....		1	1			HH.....		2	1		
C2.....	1		1			MM2c.....		1			
D5.....		1				NN1b.....			1		
E2.....		1				NN2a.....		1	3		
H1.....		1	1			NN2b.....		2	5		
P3a.....		1				OO2.....				1	
P3b.....					5	RR.....			1	1	
T1a.....			8			UU4.....		8			
T1b.....			20	1		Specimens.....	6	50	94	95	7
T1c.....		2			1	Types.....	4	23	16	6	3
T1f.....				1	1						
T1g.....	1	1									

\*Mound names: 6, Johnson; 107, Windmillier; 138, Hotchkiss; 141, Orwood; 142, McGillivray.

TABLE 9

Types in Common in Five Delta Mounds

	6	107	138	141	142
6 (Johnson md.), 4 types.....		2	2	0	0
107 (Windmillier md.), 23 types.....	2		9	2	1
138 (Hotchkiss md.), 16 types.....	2	9		3	0
141 (Orwood md.), 6 types.....	0	2	3		1
142 (McGillivray md.), 3 types.....	0	1	0	1	

vated in part by Heizer for the University. Johnson's specimens are from Hotchkiss md. (no. 138) only. Table 8 presents the basic type material in the UCMA and the other two collections. Unfortunately, even with this supplementary material the series are small and only those from Windmillier md. (107) and Hotchkiss md. (138) seem sufficient for my purpose.

Table 9 shows Windmillier (107) and Hotchkiss (138) to have the most types in common among the 5 mounds under consideration. They share 9 types whereas the most shared by any other pair is 3.

levels are largely different. Of the 9 shared Hotchkiss types, all are shared with the Windmillier upper level, 2 also with the Windmillier substratum. These 2 are, of course, the 2 types common to the upper and lower levels of Windmillier. Obviously, therefore, Hotchkiss appears as

<sup>119</sup>As it was not possible to consult the Sacramento Junior College catalogue for Windmillier md. specimens, the allocation of individual specimens to upper or lower stratum was supplied by R. F. Heizer from memory.

TABLE 10  
Distribution of Types in Windmillier Mound

Type	Total W specimens	No depth	Lower ("red clay") substratum	Upper (black mound)	Hotchkiss mound
AlaII.....	1	1			
AlbII.....	2	1		1	
AlcII.....	3			3	
AleI.....	2	1		1	
AleII.....	1		1		
A2.....	1		1		
A4aI.....	1			1	1
D5.....	1	1			
E2.....	1			1	
H1.....	1			1	1
P3a.....	1			1	
Tlc.....	2		2		
Tlg.....	1			1	
EE1a.....	1			1	11
EE1b.....	6	2	3	1	4
EE1c.....	1			1	
EE2b.....	4			4	7
FF2.....	6	2	1	3	27
HH.....	2	1		1	1
MM2c.....	1		1		
NN2a.....	1			1	3
NN2b.....	2			2	5
UU4.....	8		8		
Total specimens.....	50	9	17	24	60
Total types.....	23	7	7	16	9

TABLE 11  
Age Indications on Basis of Windmillier Mound

Type	Windmillier substratum (1)	Windmillier "black" mound (2)	DR 80	DR 82	SV 1	SV 2
AlbII.....		1	1	1		19
AlcII.....		3	2	3	1	1
AleI.....		1				10
AleII.....	1					5
A2.....	1				2	1
A4aI.....		1				
E2.....		1				
H1.....		1				
P3a.....		1				
Tlc.....	2					
Tlg.....		1				
EE1a.....		1	8	10	7	8
EE1b.....	3	1	6	2	2	
EE1c.....		1				
EE2b.....		4				6
FF2.....	1	3	18	37		7
HH.....		1	1	3	6	3
MM2c.....	1					
NN2a.....		1	1			
NN2b.....		2				
UU4.....	8					
Total types.....	7	16	7	6	5	9
Types shared with (1).....		2	2	2	2	3
Types shared with (2).....	2		7	6	4	7

more or less contemporaneous with upper Windmiller and not with lower Windmiller. Table 9 shows negatively 14 types possessed by Windmiller and not by Hotchkiss, and 7 possessed by Hotchkiss and not by Windmiller. These may represent local developments or may be absences due to the fortunes of excavation. It does seem, however, that Windmiller md. with its stratification offers something of a criterion for the assignment of relative ages to such DR mounds as yield a sufficient inventory of types.

The evidence of type distribution points to the lower horizon of Windmiller connecting primarily with BR, the upper primarily with SC and secondarily with BR. None of the 5 distinctive lower Windmiller types is peculiar to the DR. The preponderance of connections (4 out of 5) is with BR. The extra-DR distribution of the 5 types is as follows:

AleII: SV, BR  
 A2: SC, SV, BR, NR  
 Tlc: SC, SV  
 MM2c: BR  
 UU4: BR

Of the 14 distinctive upper Windmiller types, 1 only (NN2a) is peculiar to the DR. The order of frequency of extra-DR connections of the other 13 types is as follows: SC 11, BR 9, NR 7, SV 6, HR 2. The details of distribution in extra-DR is as follows:

AlbII: SC, SV, BR, NR  
 AlcII: SC, SV, BR, NR  
 AleI: SC, SV, BR, NR  
 A4aI: SC, BR  
 E2: SC  
 H1: BR, NR  
 P3a: SC, BR  
 Tlg: SC  
 EE1a: SC, SV, BR, NR, HR  
 EE1c: SC  
 EE2b: SC, SV, BR, NR  
 HH: SC, SV, BR, HR  
 NN2b: NR

Table 11 attempts to apply the Windmiller criteria to 2 other DR mounds (80, 82) and to 2 SV mounds (1, 2). The results are not very satisfactory owing to the small number of Windmiller types present in these mounds. However, so far as they go, they do show greater affiliation with the upper part of Windmiller md. rather than with the substratum. Half of the 46 DR types are unrepresented in Windmiller md., thus rendering it a rather inadequate criterion for assigning other DR mounds to its respective cultural horizons.

The five types found in the "red clay" substratum of Windmiller md. and not in the "black" mound material are:

AleII, Awl from tibia splinter.  
 A2, Awl from mammal rib.  
 °Tlc, Bipointed, unperforated "pin."

MM2c, Square-based antler barb.  
 UU4, Perforated carnivore canine tooth.

One of these five types, Tlc, resembles the bone hairpins used by the Pomo for attaching ceremonial headgear. Fragments of other bone hairpins, together with shell ornaments, quartz crystals, a charmstone, and a California Condor's mandible, were found by Heizer associated with a burial in the "red clay" substratum. This assemblage suggests the possibility that the ancients had some form of bird cult such as has been described for modern Californian groups,<sup>120</sup> and that the condor's mandible was from a condor skin worn by a dancer with whose body it was buried together with other ceremonial objects. Duck Hawk and Bald Eagle bones from burials in McGillivray md. (142) strengthen the probability of the modern bird cult dating from the lower horizon of the Delta culture. Of significance in this matter is the Bald Eagle skull (UCMA 12-1738)<sup>121</sup> with *Haliotis* disk glued over one of its orbits, from SJ.

The 14 types found in the "black" mound material, and not in the "red clay" substratum, of Windmiller md. are listed below. Five used ethnologically are indicated.

°AlbII, Cannon-bone awl.  
 °AlcII, Cannon-bone awl.  
 °AleI, Cannon-bone-splinter awl.  
 A4aI, Bird-radius awl.  
 E2, Bowed knife or scraper.  
 H1, Serrate scapula.  
 °P3a, Eyed awl or needle.  
 Tlg, Bipointed "pin."  
 EE1a, Bird-bone bead or tube.  
 EE1c, Mammal-bone bead or tube.  
 EE2b, Incised-bone tube.  
 °HH, Antler wedge or chisel.  
 NN2a, Antler harpoon head.  
 NN2b, Antler harpoon head.

Although Windmiller md. offers a definite case of two cultural horizons with largely different inventories of bone types, the separation is not absolute since 2 types (EE1b, FF2) occur in both horizons. Moreover, the temporal significance of the differences is not apparent. It is not, for instance, clear whether centuries or only weeks elapsed between the end of the lower horizon and the beginning of the new horizon. Nor is there proof of great antiquity for the lower horizon. The hairpin and condor mandible suggest a connection with modern Indian culture. The burden of proof for great antiquity lies even more on the shoulders of its proponent than does the burden of proof for relative recency. On the whole, the difficulty of establishing either lies with the evidence, which is stubbornly difficult of clear temporal interpretation.

<sup>120</sup>Gifford, 1926.

<sup>121</sup>Gifford and Schenck, pl. 13.

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 PMM-B Public Museum of City of Milwaukee, Bulletin.  
 SWM-P Southwest Museum, Papers.  
 UC-AR University of California, Anthropological Records.  
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## ILLUSTRATED ARCHAEOLOGICAL SPECIMENS

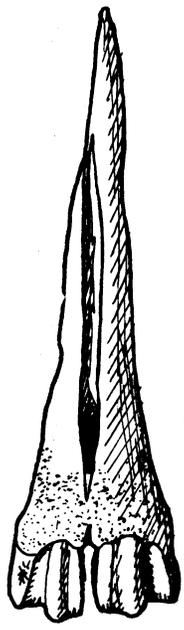
Illustrated specimens are listed by UCMA numbers and Barr-collection numbers (latter indicated by B-), reading from left to right. All illustrations show specimens 70% natural size, unless otherwise stated. On specimens all UCMA numbers preceded by 1-.

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|--|---|--|
| <p>AlaI. 25764.<br/>AlaII. 11177; B-1669; 29571.<br/>AlaIII. 15859; 15872; 30714.<br/>AlaIV. 4976; 37475.<br/>AlaV. 8686; 24627.<br/>AlbI. 25756; 34194; 37971;<br/>32030.<br/>AlbII. 29408; 16891; 17210;<br/>4530a.<br/>AlbIII. 26089; 15852.<br/>AlbIV. B-2057; B-563.<br/>AlcI. 30656; 25765.<br/>AlcII. B-1109; 25742; 13013;<br/>38085; 14835.<br/>AlcIII. B-1021; 26087.<br/>AlcIV. 29478; B-651<br/>Ald. 16326; 14866; 15885;<br/>15841.<br/>AleI. 29568.<br/>AleII. 25745; 29588; 26144.<br/>AleIII. 16619.<br/>Alf. 33893; 32028; 36984.<br/>Alg. 16887a.<br/>A2. 15547; 8901; 26113;<br/>15534.<br/>A3. 15824; 6548.<br/>A4aI. 15720; 15737 over<br/>15747.<br/>A4aII. 15724; 15731 over<br/>15755.<br/>A4aIII. 15750 over 18422.<br/>A4bI. 16905; 34422; 16325.<br/>A4bII. 15775; 30746.<br/>A4bIII. 15723; 15774.<br/>A4cI. 15733.<br/>A4cII. 6925; 15531; 15530.<br/>A5a. 26510.<br/>A5b. 15792; 15795; 6406.<br/>B1. 17209.<br/>B2a. 25789.<br/>B2b. 18431; 6718.<br/>B3. 30592; 17219; 16240.<br/>B4. B-1404; B-1369; B-847.<br/>B5. 6507.<br/>B6. 30639; 30635; 30637.<br/>B7. 35755; 35761; 35762.<br/>B8. 15882; 15966; 15970.<br/>B9. 6338.<br/>C1. 4996 over 8999; 26474;<br/>17204.<br/>C2. 25738; 14844 over 29275;<br/>28951.<br/>C3. 15874; 15873.<br/>C4. 17223; 6918; 15851; 8980.<br/>C5. 35713; 15801; 15835.<br/>C6. 8692; 19896<br/>C7. 15666; 15685; 15587.<br/>C8. 15655; 15703; 16247; 36895.<br/>D1. 15640; 16328; 15664.<br/>D2. 16249; 15552; 26118; 15660.<br/>D3. 15667; 15704; 15659.<br/>D4. B-1202.<br/>D5. 26203; 18446; 18451; 18473;<br/>18432.</p> | <p>D6. 36306; 17166; 16328 over<br/>15643.<br/>D7. 15575.<br/>E1. 15599; 15566; B-1646 (type<br/>F, placed here for convenience)<br/>E2. 15533; 15543; 15563.<br/>F. (B-1646 on preceding page,<br/>following 15566, type E1);<br/>15532; 15594; 26627; 11523.<br/>H1. See two lines below.<br/>H2. 16882; 25734.<br/>H3. 26688.<br/>H1. 25724.<br/>I. 25890.<br/>J. 25886.<br/>K1. 35759.<br/>K2. 35579.<br/>K3. 37082.<br/>K4. 37090.<br/>L1. 36299; 36592; 36300.<br/>L2. 32034.<br/>L3. 15890.<br/>M1. 6489.<br/>M2. 6488.<br/>M3. 8780.<br/>N1. 6137.<br/>N2. 26195.<br/>N3. 15986.<br/>N4. 15985.<br/>N5. 9667.<br/>O1. 15987.<br/>O2. 11172.<br/>P1. 30569.<br/>P2a. 36508; 34485; 31031.<br/>P2b. 6434.<br/>P3a. 8735; 26166; 36820;<br/>4531; 4532.<br/>P3b. 48789.<br/>P4. 18411; 34560.<br/>P5. 15968.<br/>P6. 16696.<br/>P7. 6523.<br/>Q1. 19903.<br/>Q2. B-1206; 15990; 36297.<br/>Q3. 26122.<br/>Q4. 10685; 8459; 36458.<br/>Q5. 36295; 36296; 36459;<br/>36465; 36465; 36460.<br/>Q6. 36461; 36463; 36294;<br/>36462; 36451; 36292; 6655;<br/>36453; 36448; 36457; 36450;<br/>36449; 36293; 36452.<br/>Q7. 36454; 36464; 36455.<br/>Q8. 36290; 36291.<br/>Q9. 32808.<br/>R. 30479; 8460.<br/>S. B-421; 37950.<br/>T1a. B-1191; 6523.<br/>T1b. 24583; 15891; 6572;<br/>33600.<br/>T1c. 25825; 48793.<br/>T1d. 15881; 15905.<br/>T1e. 15932; 15947.<br/>T1f. 38149; 37325; 37392; 37261.</p> | <p>T1g. 6718a; 6570; 35434; B-<br/>2158.<br/>T1h. 31268; 6718; 6718.<br/>T2a. 15946; 6718.<br/>T2bI. 35418; 6381.<br/>T2bII. 37159; 31152.<br/>T2c. 34796; 8419.<br/>U1. 38101; 6560.<br/>U2. 31149; 31149; 6560; 34410;<br/>35577.<br/>U3. 31895; 34656; 35199; 31268.<br/>W1. 15953; 11259; 15950; 29485;<br/>15954.<br/>W2. 15951.<br/>W3. 15955.<br/>X. 36940.<br/>Y. 6533.<br/>Z1. 7102; 30620; 16173.<br/>Z2. 15988.<br/>Z3. 6504; 11186; B-1039.<br/>AA. 16250.<br/>BB1. 4599.<br/>BB2. 5129; 37027; 35242.<br/>BB3. 34515a, b.<br/>CC1. 26457.<br/>CC2. 6767; 30290; 15992.<br/>CC3. 6677; 31682.<br/>CC4. 30907.<br/>CC5. 31157; 31157; 31217.<br/>DD1. 15993.<br/>DD2. 8033.<br/>DD3. 16251.<br/>EE1a. 25870; 13100; 26517;<br/>34817; 6408.<br/>EE1b. 35576a; B-633; 6463;<br/>6467.<br/>EE1c. 6812.<br/>EE1d. 32760.<br/>EE1e. 6476; 8743a.<br/>EE2a. 6476; 34584; 36500;<br/>29474.<br/>EE2b. 31461; 6722; 36286;<br/>6407; 6407; 30709; 35071;<br/>6720; 36302; 13052; 36285.<br/>EE2c. 6692; 6375.<br/>EE2d. 6215.<br/>EE3a. 34208; 32129; 32431.<br/>EE3b. 32129.<br/>EE3c. 26185 over 14342.<br/>FF1a. 14945; 32033 over 31269<br/>over 6552; 6712.<br/>FF1b. 34518.<br/>FF1c. 8022.<br/>FF2. 6342; 13218; 27089.<br/>FF3. 36287; 18400; 18401;<br/>21060; 6321; B-1391; 36288a.<br/>GG. 15974; 32037; 29898.<br/>HH. 26207; 46578; 9674; 18500<br/>over 8950.<br/>II. 26528.<br/>JJ. 26712.<br/>KK. 30896.<br/>LL. 28231.<br/>MM1a. 26173.</p> |
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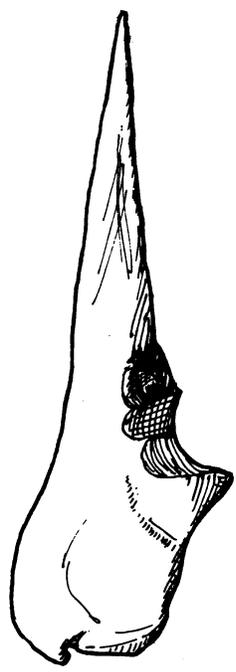
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MM2a. 8915; 26175.  
MM2b. 8868; 16698.  
MM2c. 46521; 26177.  
NN1a. 18428.  
NN1b. 25908.  
NN2a. 3364a, b.  
NN2b. 22307.

OO1. 16909; 25907.  
OO2. B-2253; B-2262.  
PP. 46976.  
QQ1. 31472.  
QQ2a. 36302a; 36473.  
QQ2b. 36301; 36302b.  
RR. B-392.  
SS1. 6281.

SS2. 32372.  
TT. 6430.  
UU1. 36941.  
UU2. 35119.  
UU3. 8736.  
UU4. 37452.  
VV. 36872.



*A1aI*



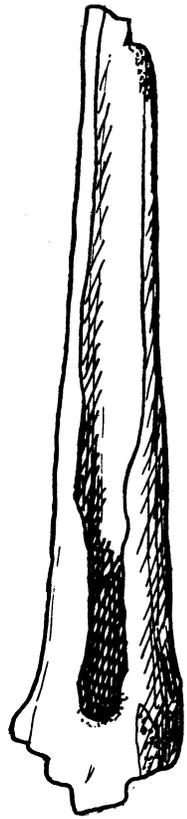
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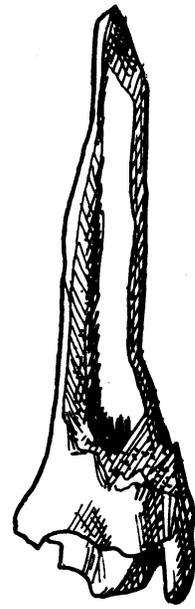
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*A1aIII*

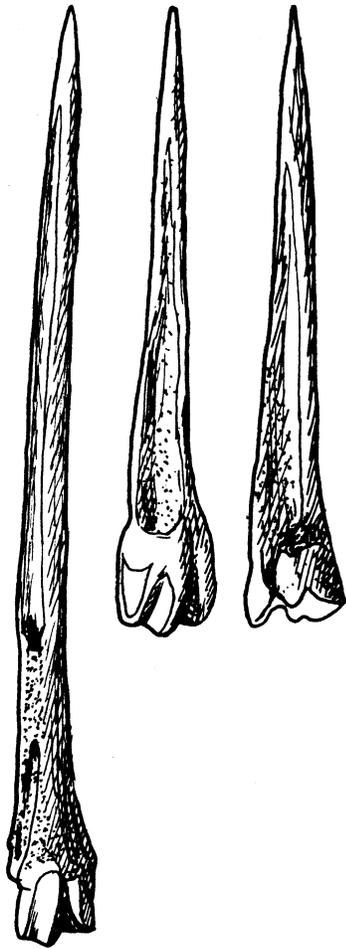


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*A1aV*

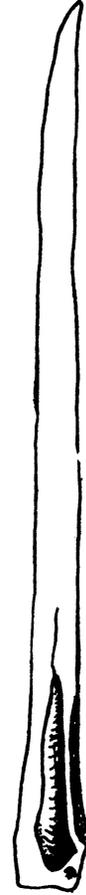




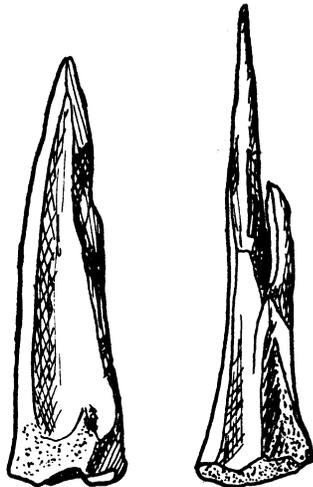
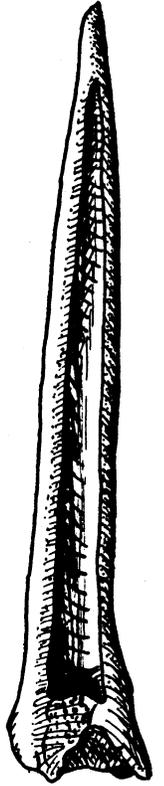
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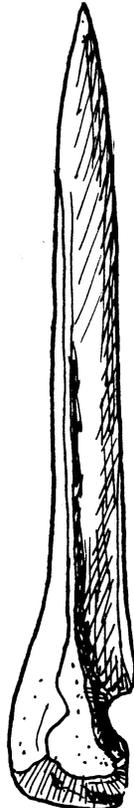
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*A1bII*



*A1bIII*

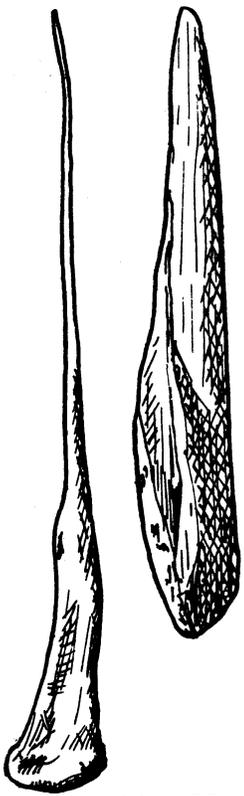


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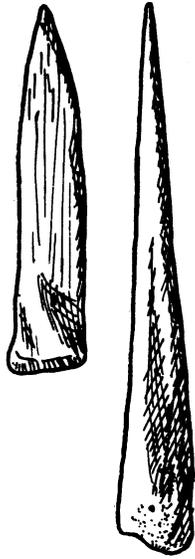


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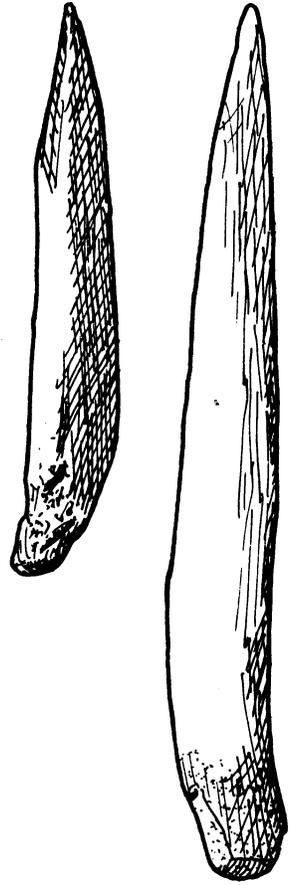




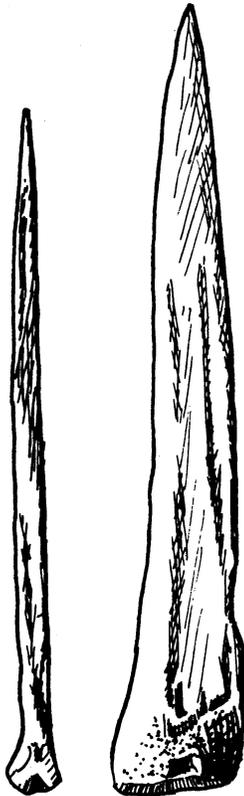
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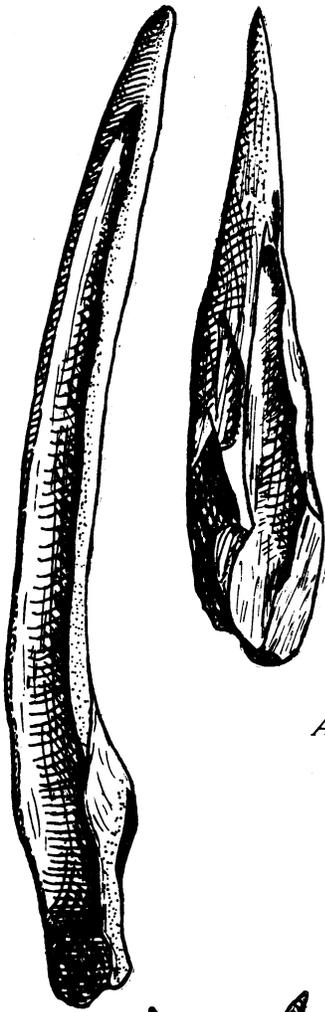
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*A1d*



*A1eI*



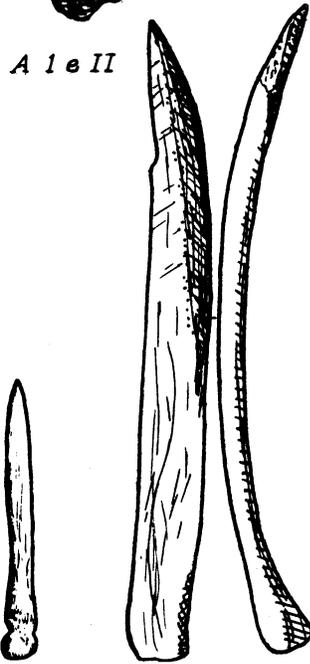
A1 e II



A1 e III



A1 f



A1 e II

A1 g

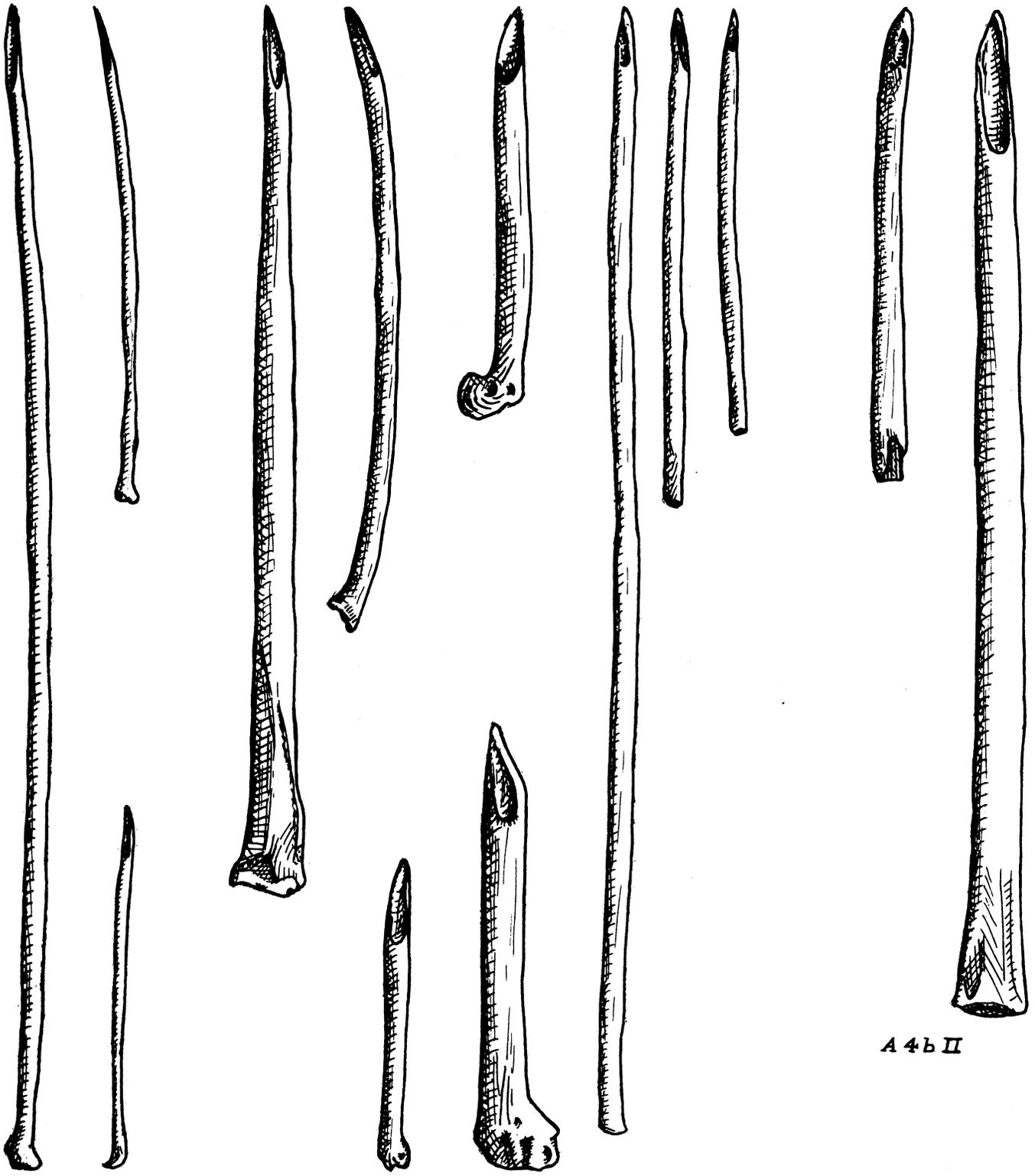


A2



A3





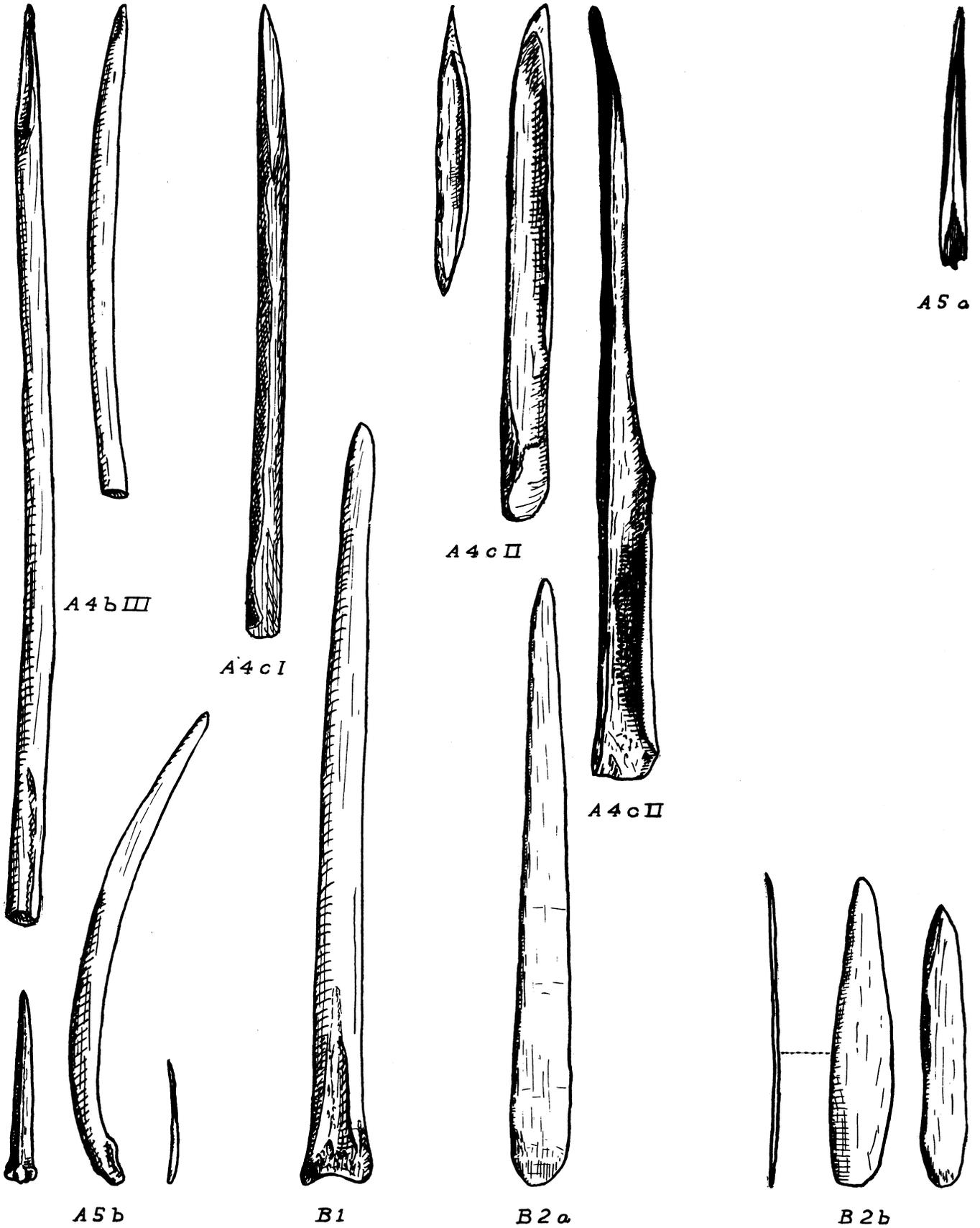
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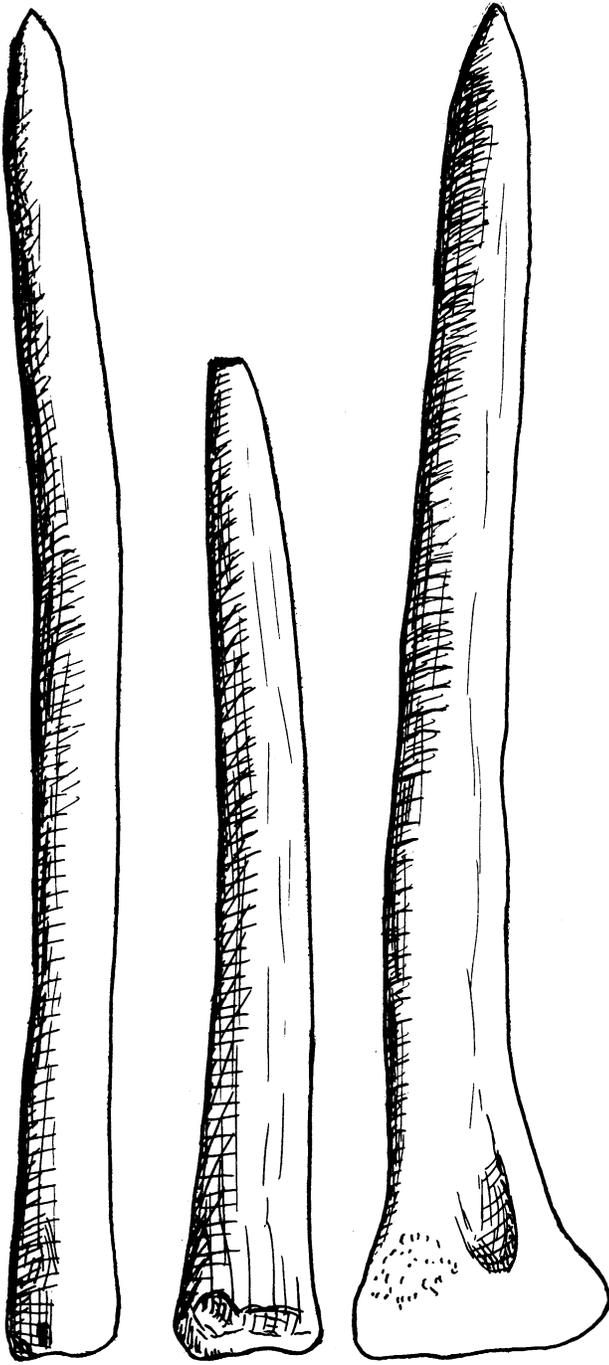
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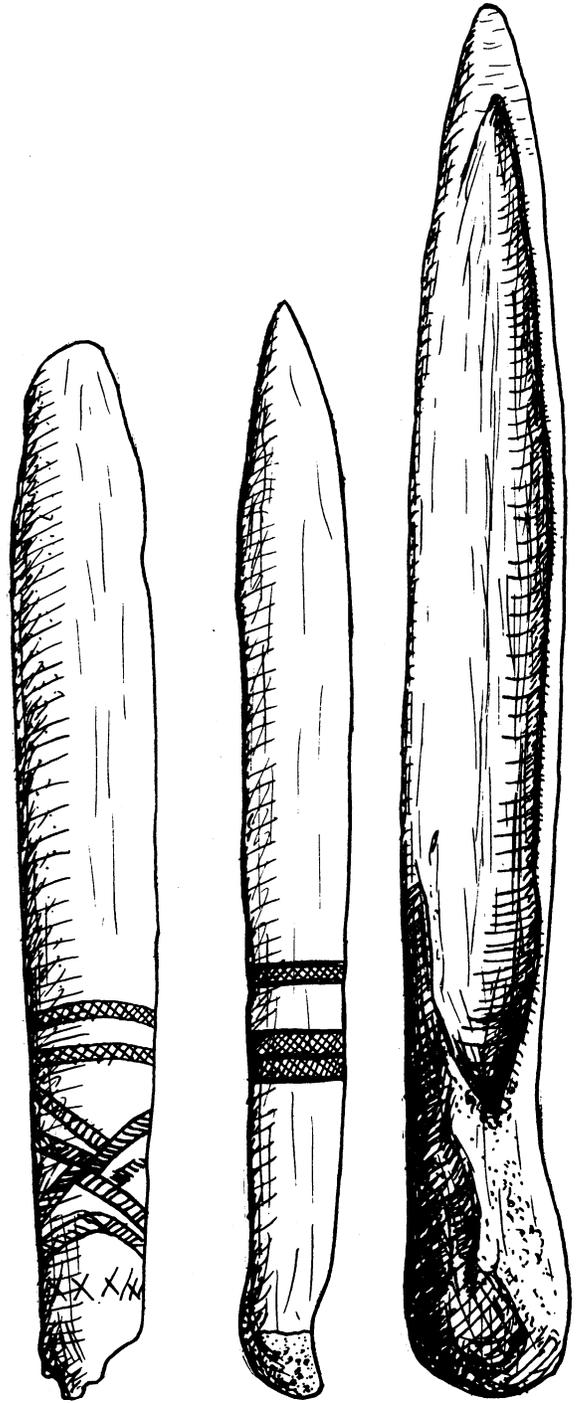
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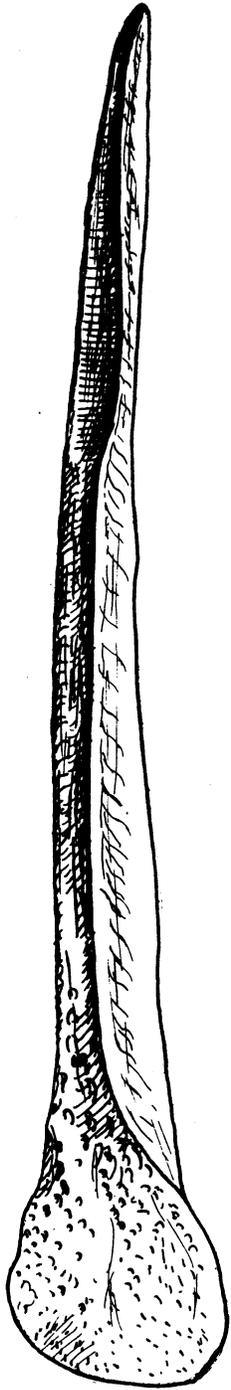




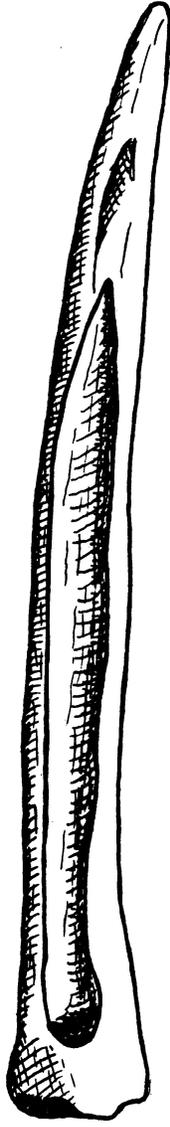
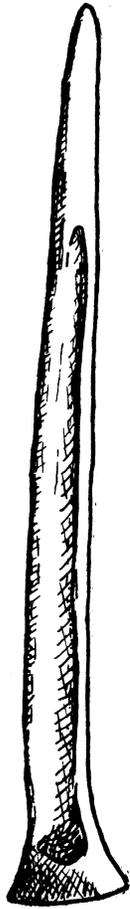
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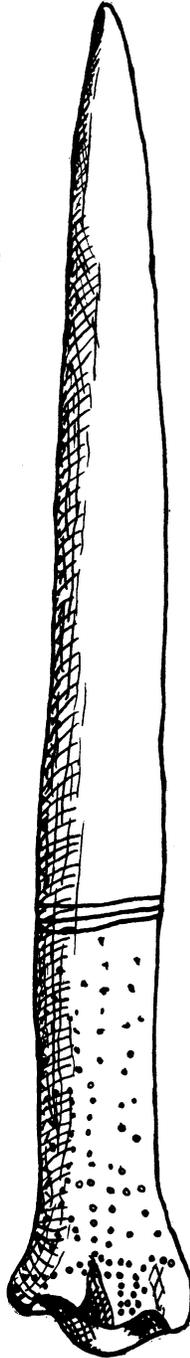
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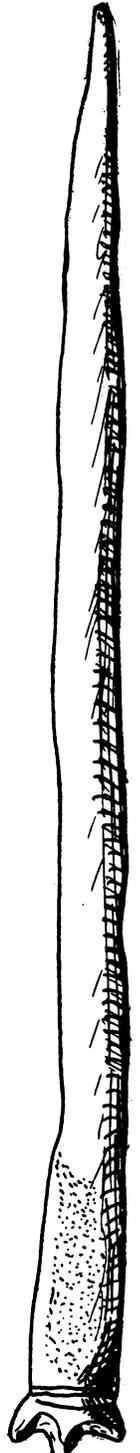
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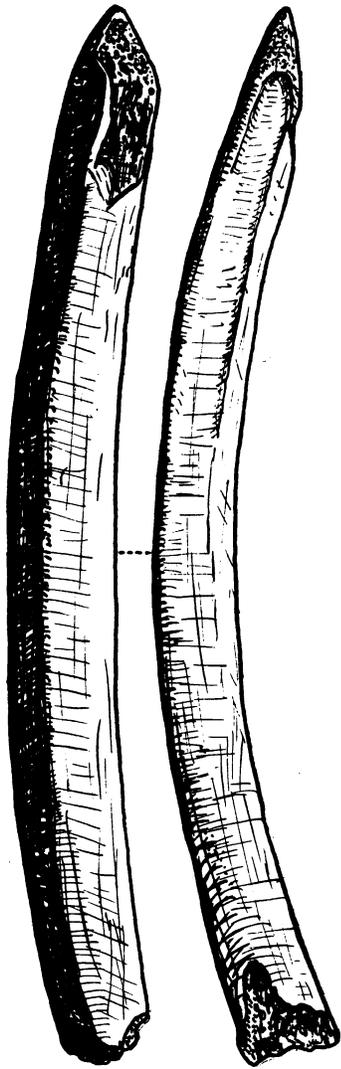
B 6



B 7







C 5



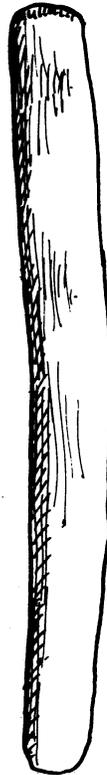
C 5



C 5

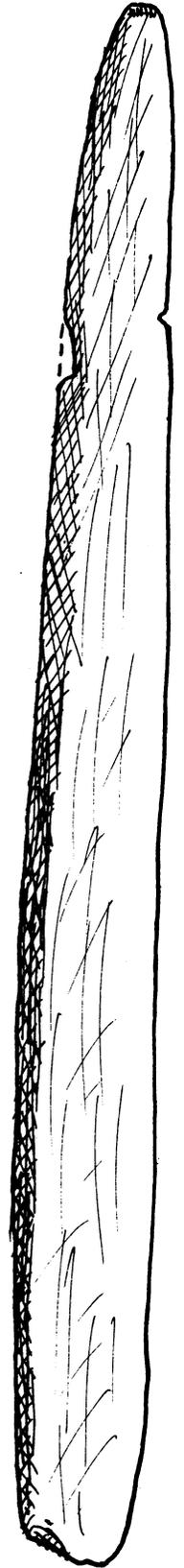
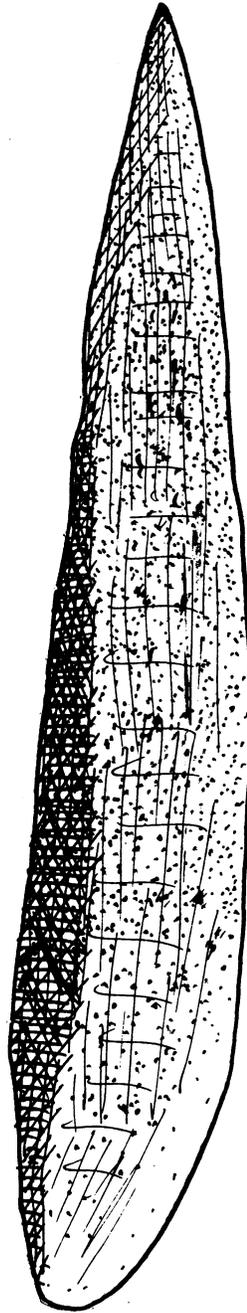
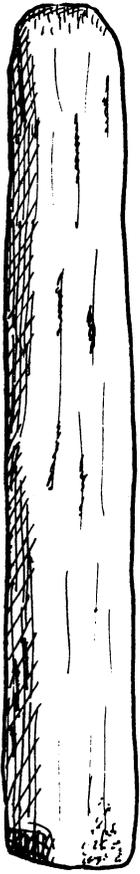


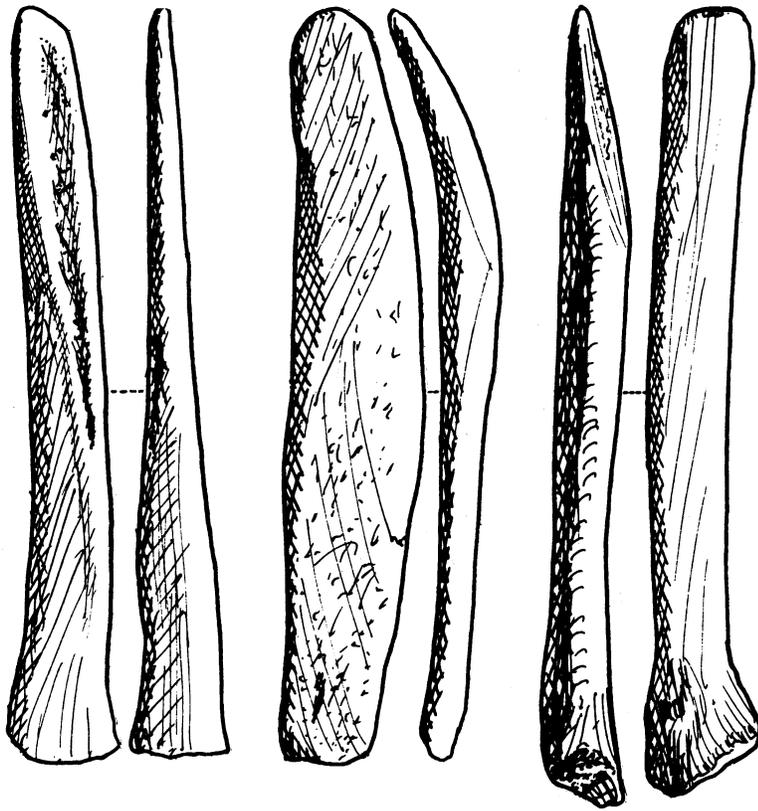
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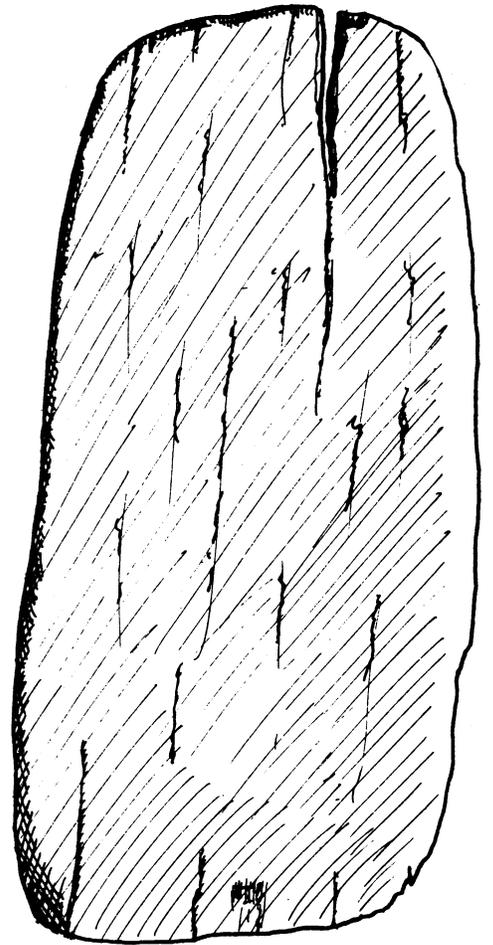
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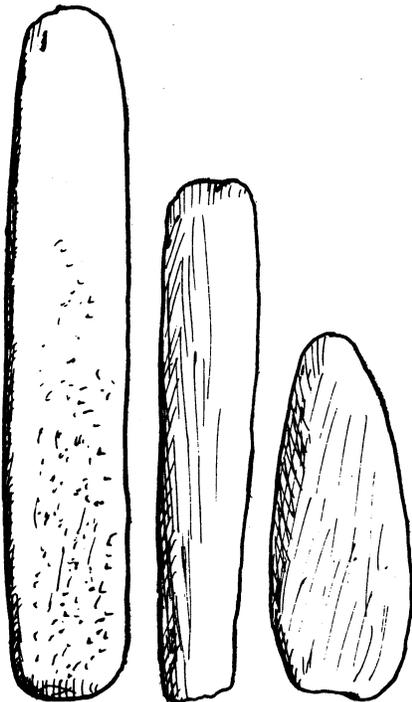




D 1



D 2



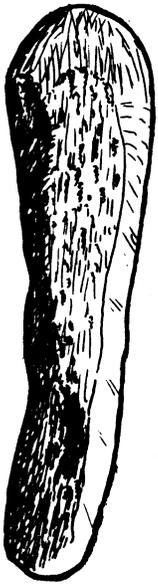
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D 3



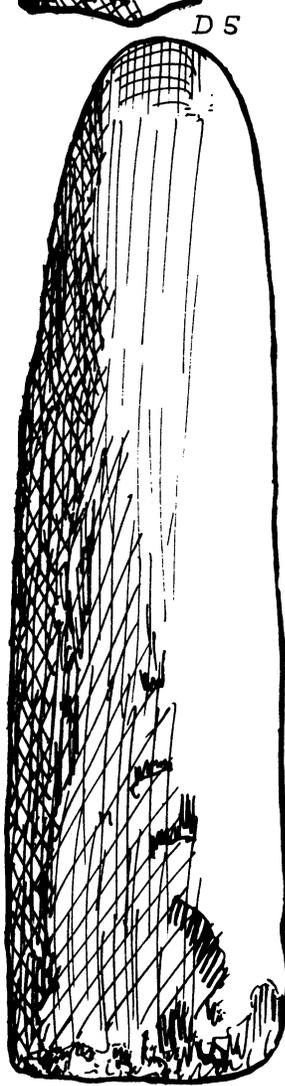
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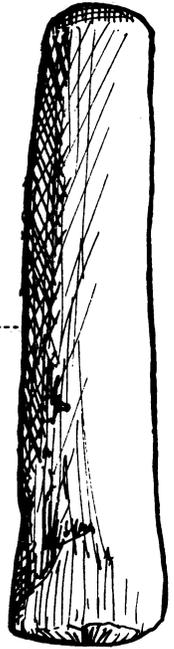
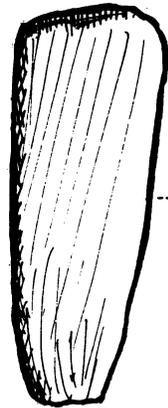
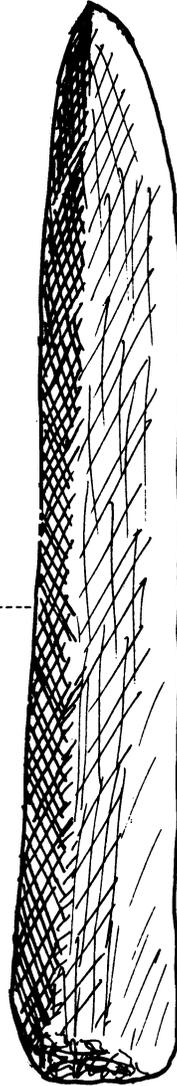
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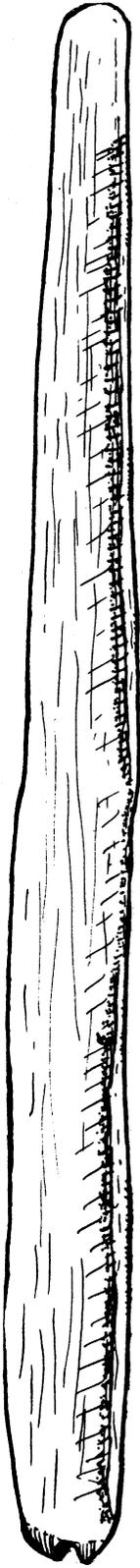
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D 5



D 6

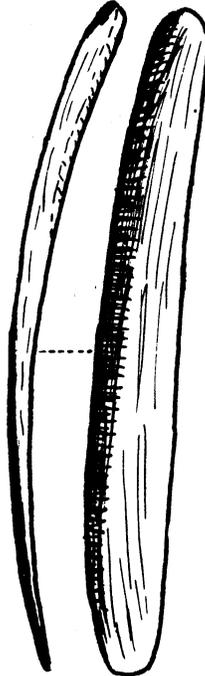
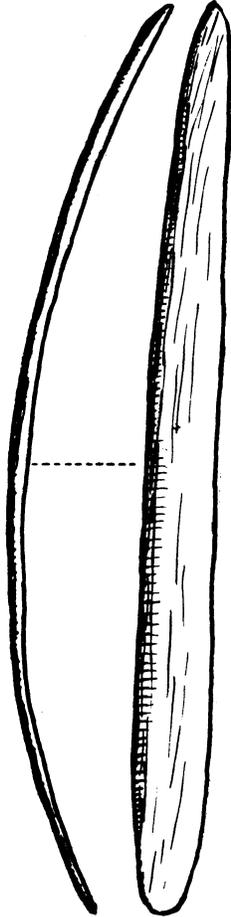




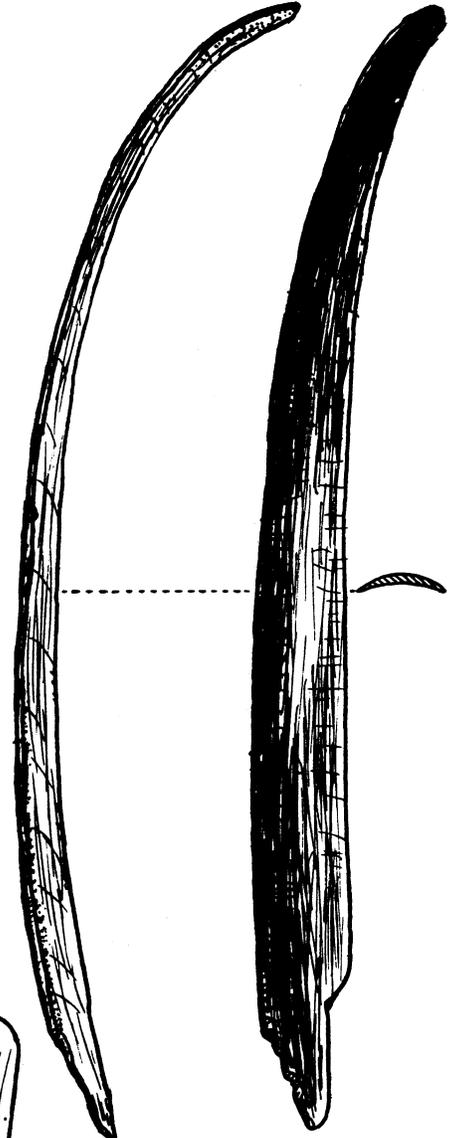
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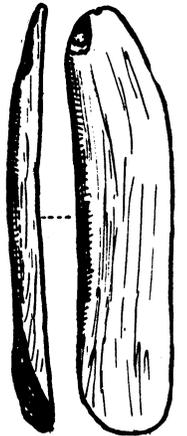
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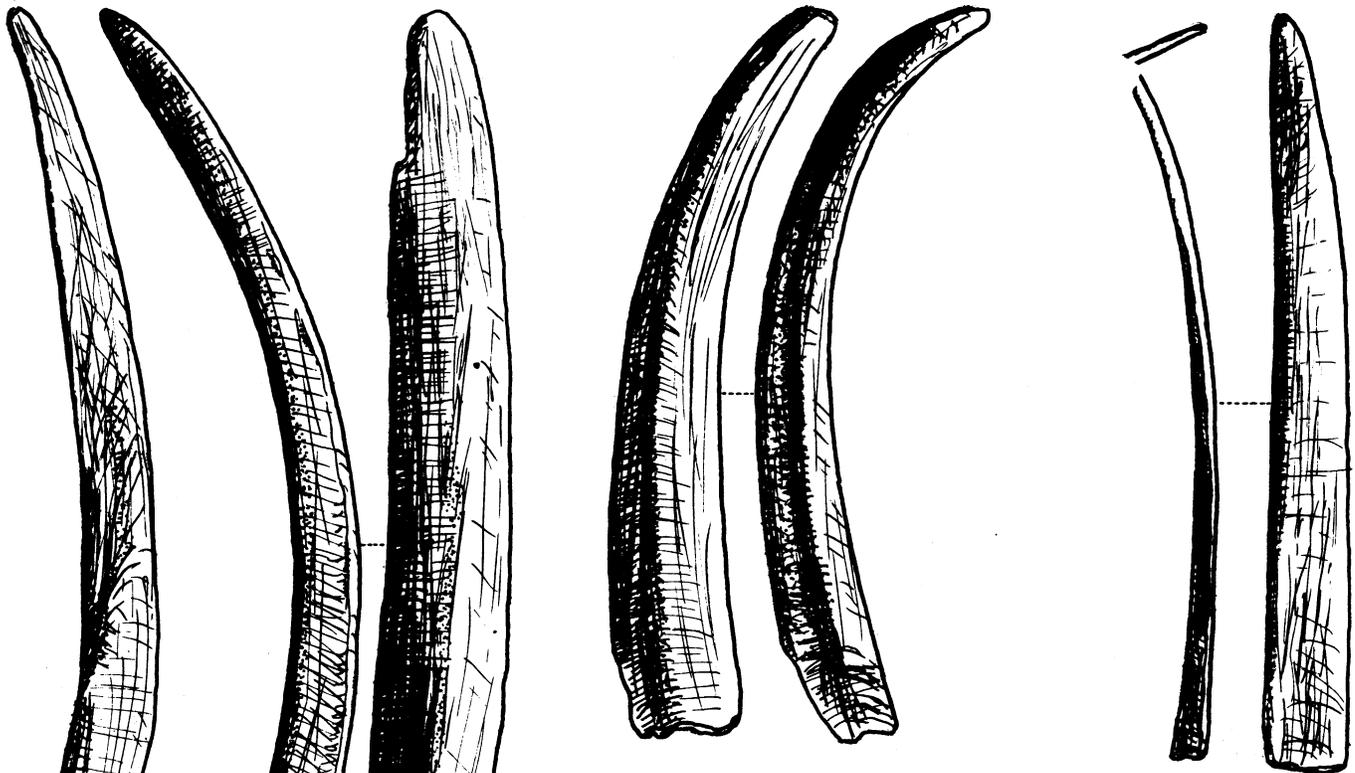


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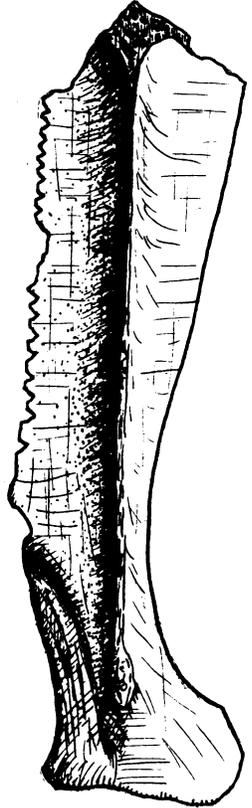




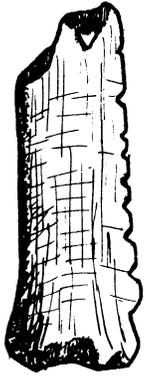
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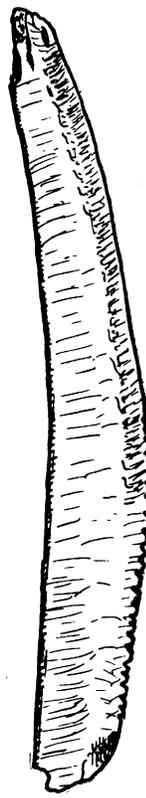
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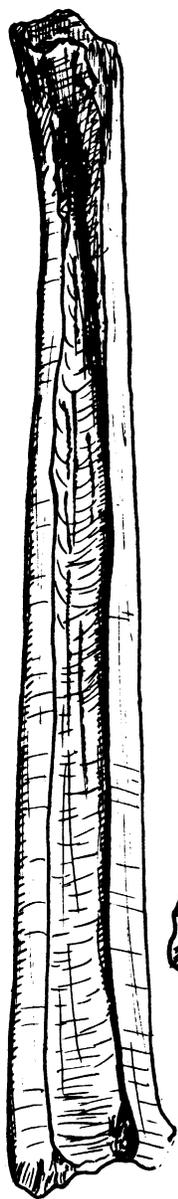
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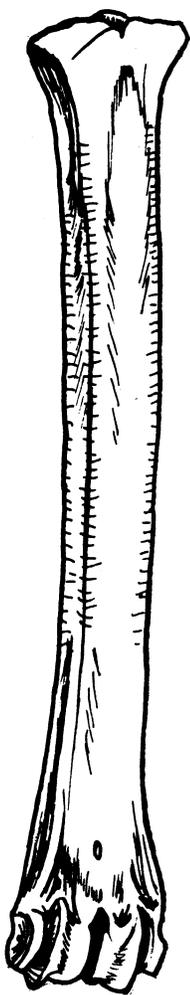
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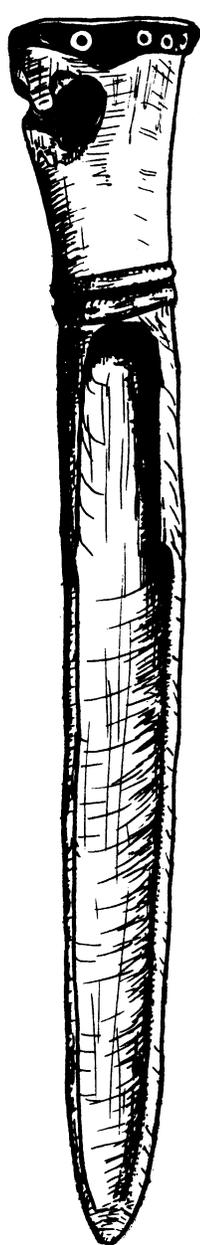
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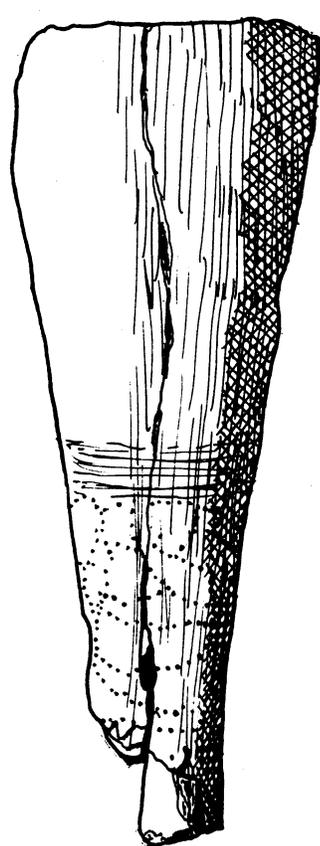
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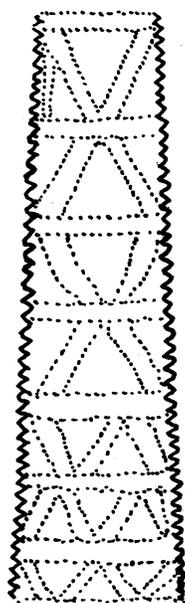
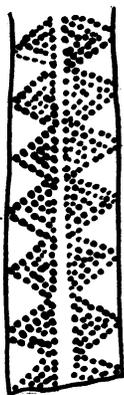
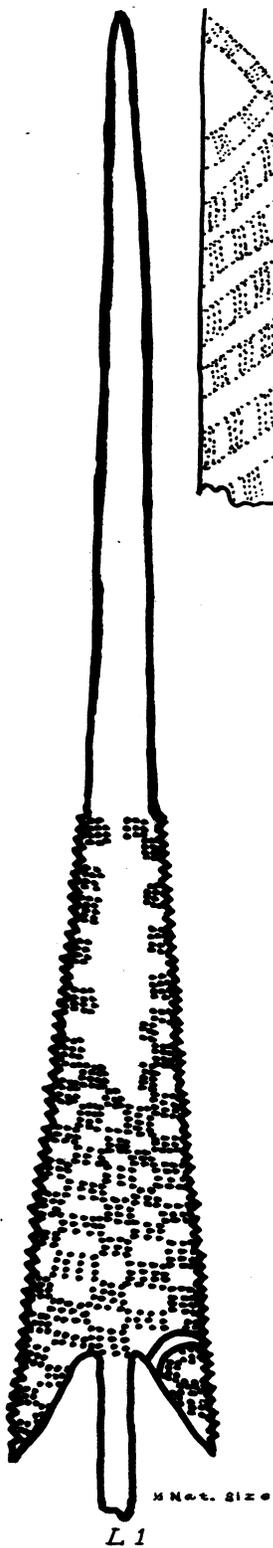
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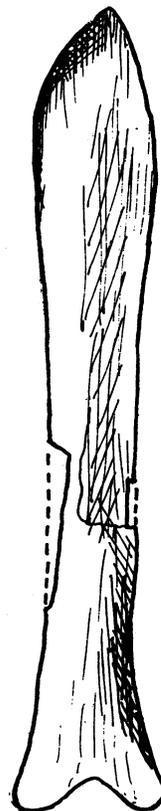
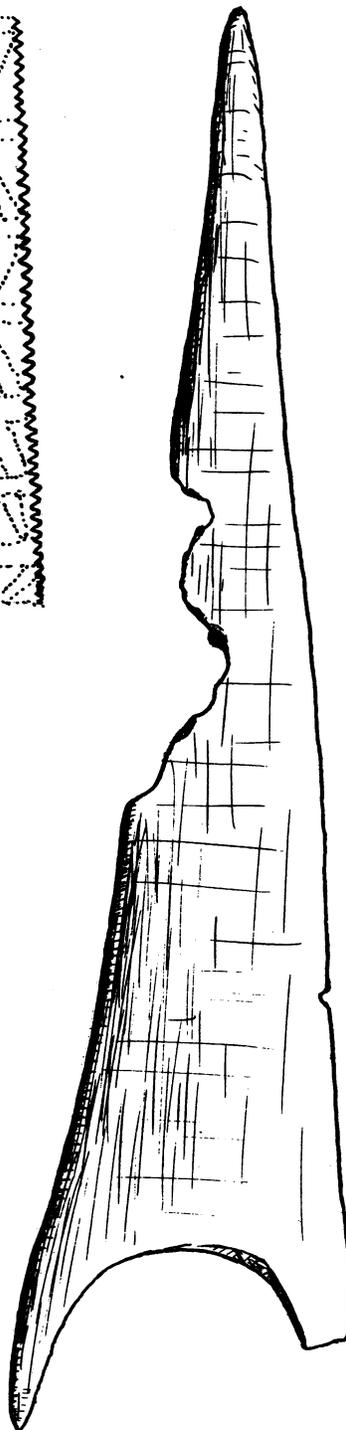
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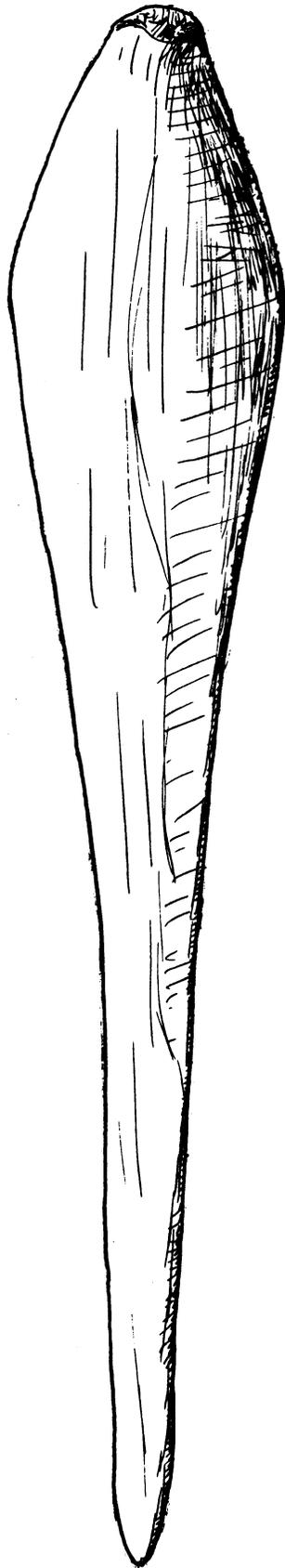


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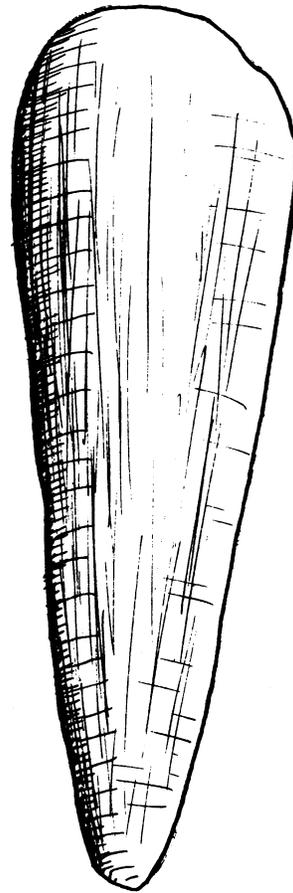




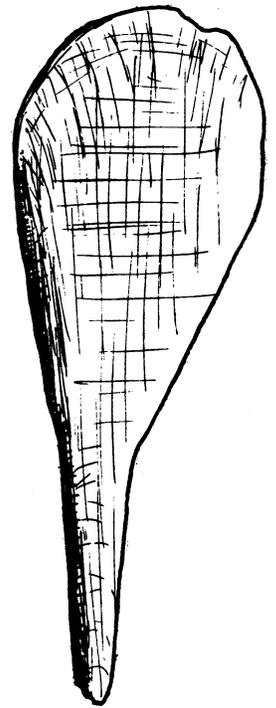
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1/2 Nat. Size



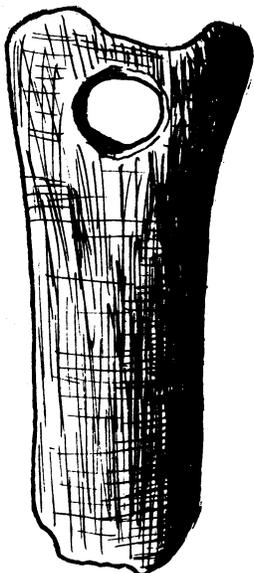
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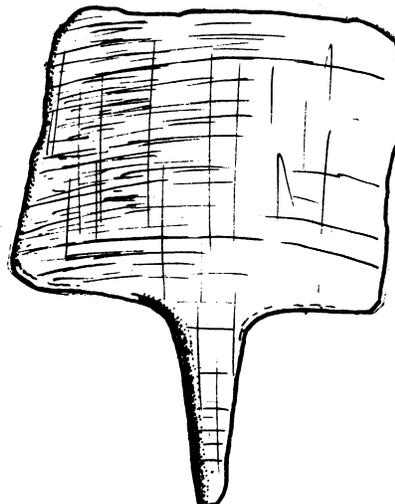
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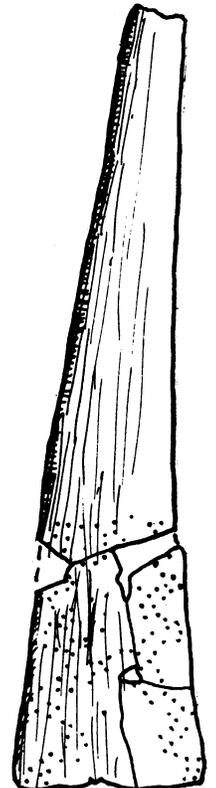
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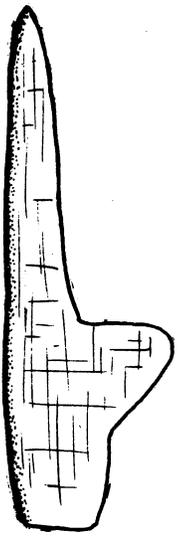
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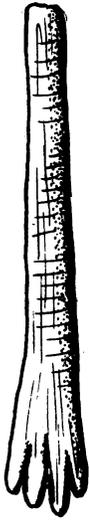
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N5



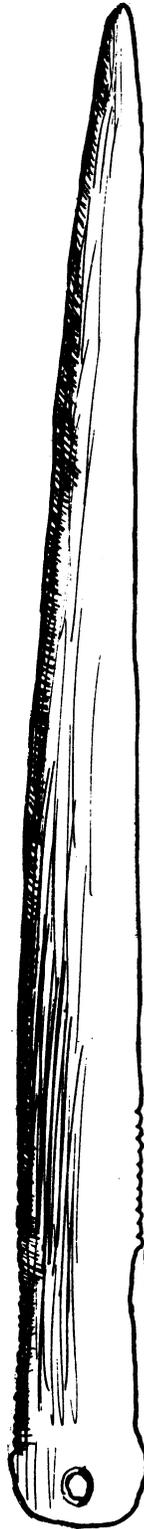
01



02



P1



P2a



P2b



P3a



P3a





P 3b



P 4



P 5



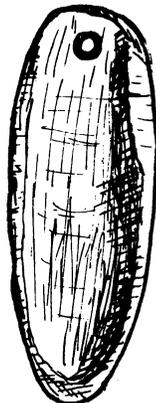
P 6



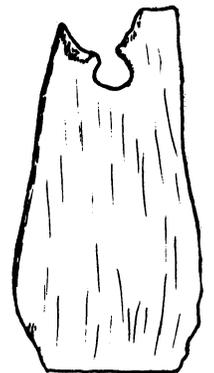
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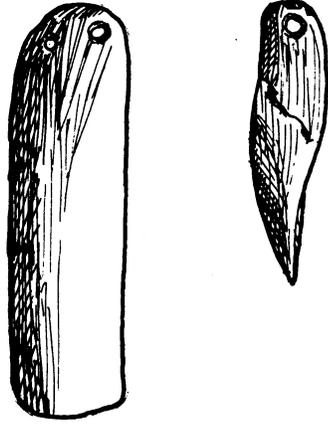
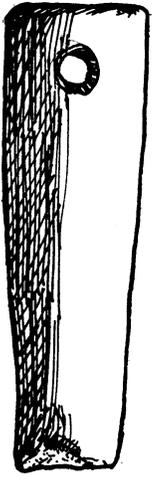
Q 1



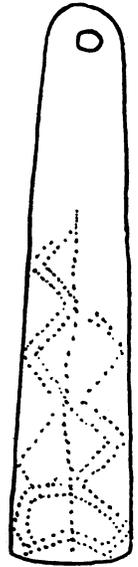
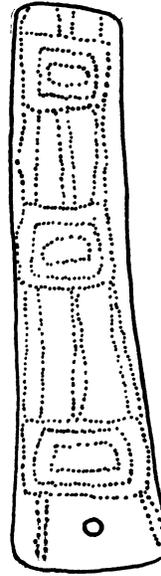
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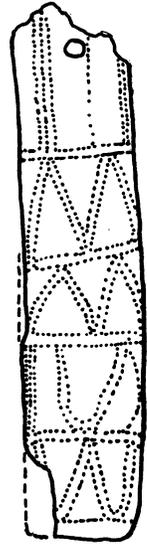
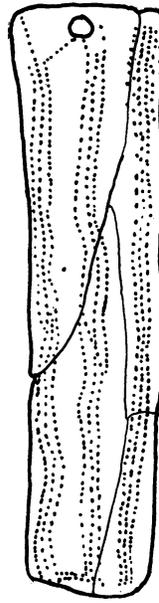
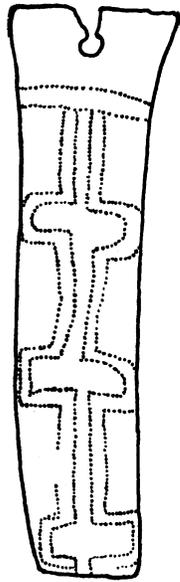
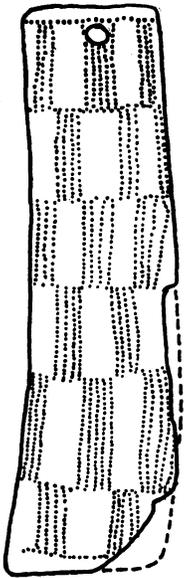
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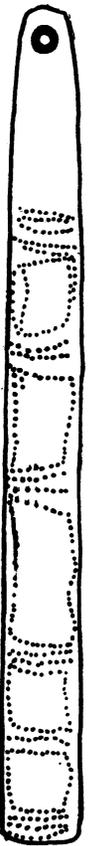
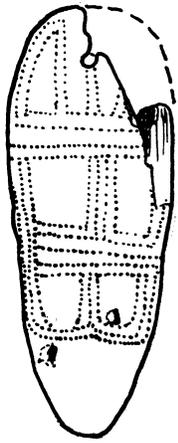
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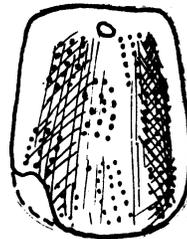
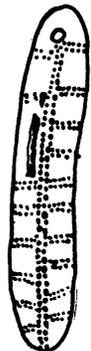
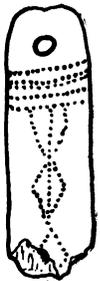
Q 5



Q 5



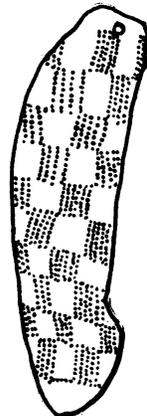
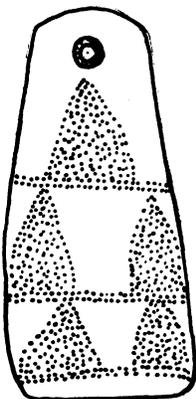
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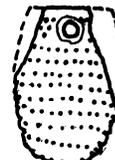
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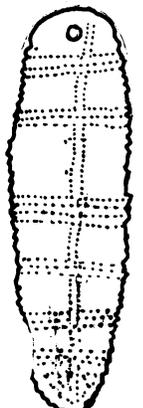
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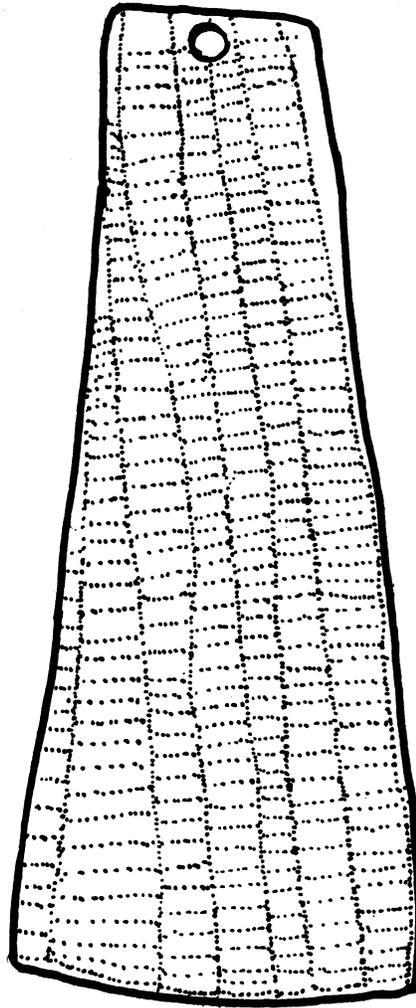
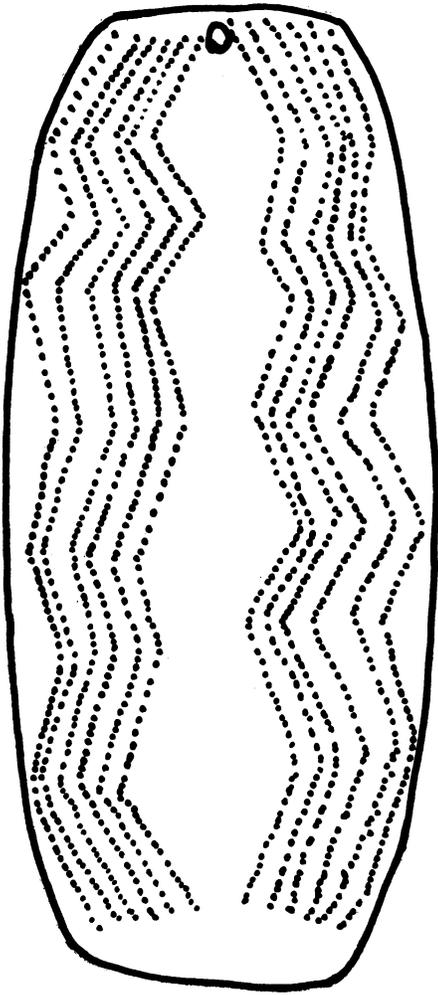


Q 6



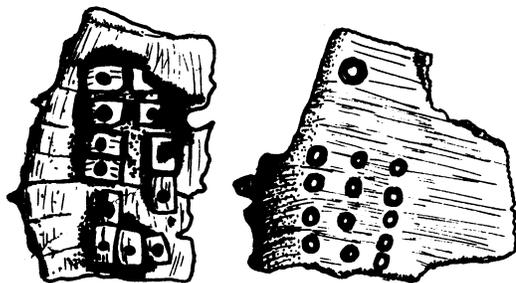
Q 7





Q 9

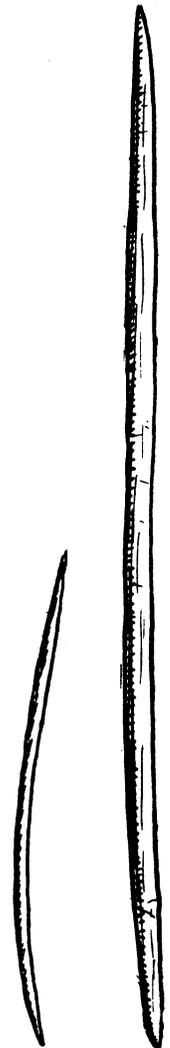
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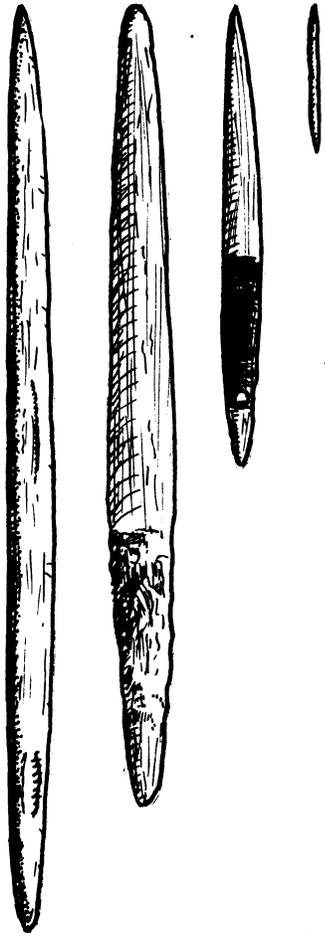
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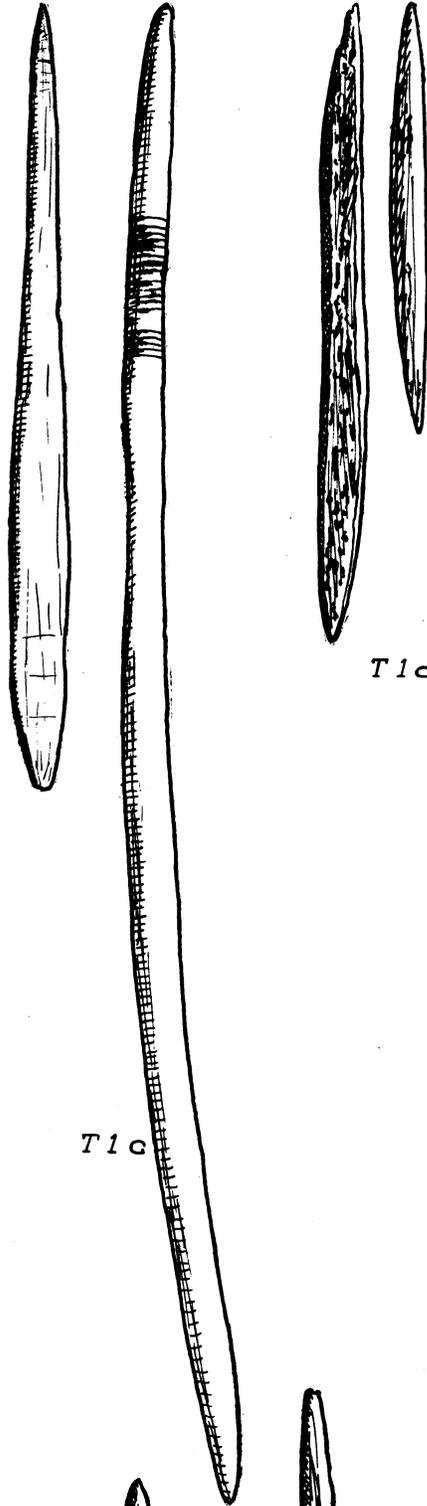
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T 1 a



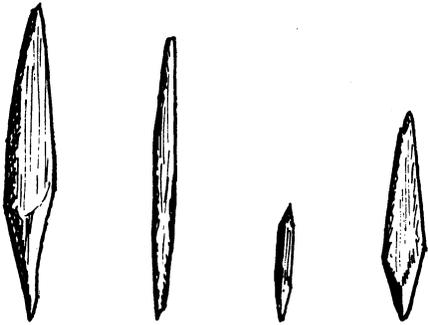
T1b



T1d

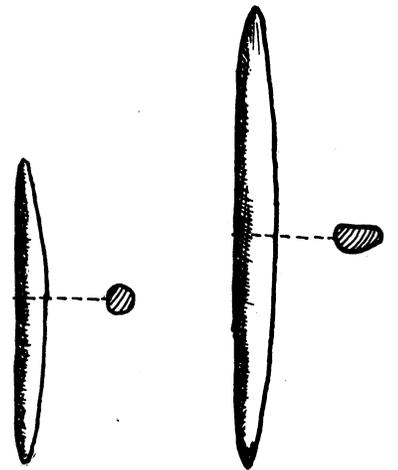
T1e

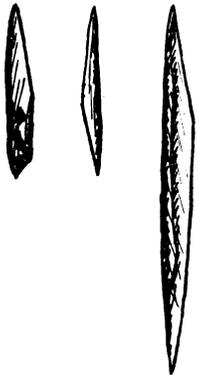
T1c



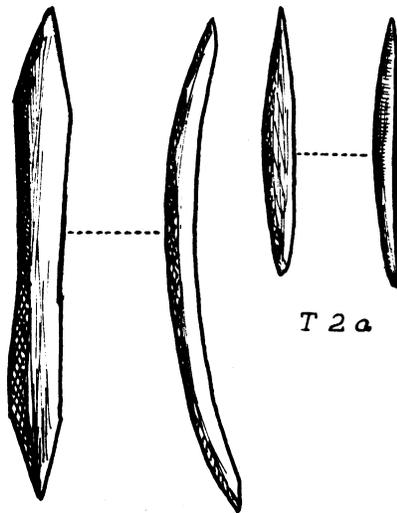
T1f

T1g

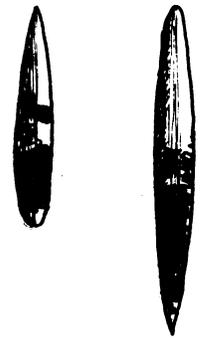




T1h



T2a



T2b1

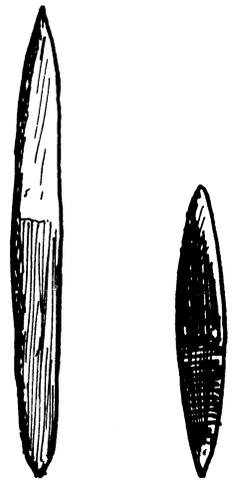
T2a



T2bII



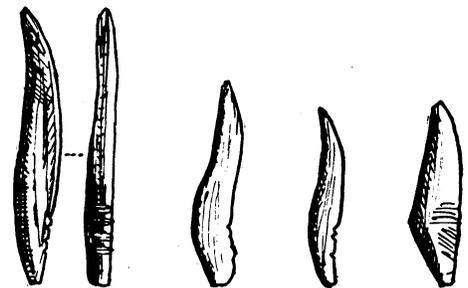
T2c



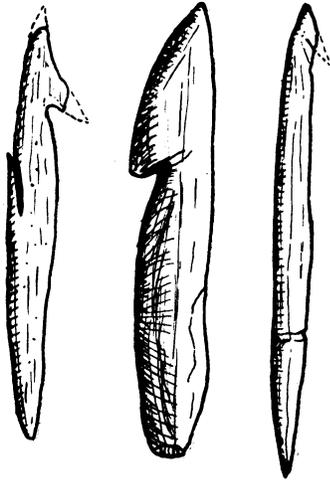
U1



U2



U3



W 1



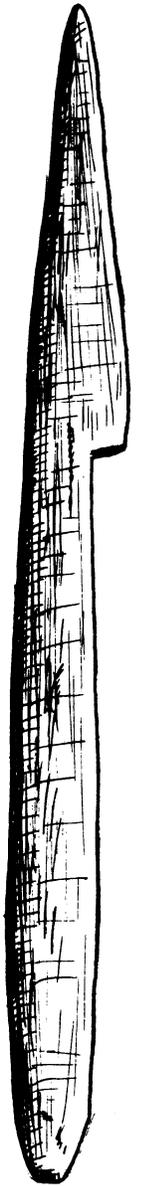
W 1



W 2



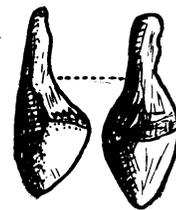
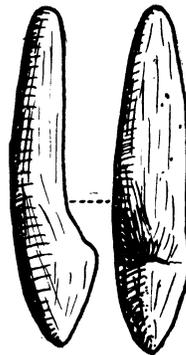
Y



W 3

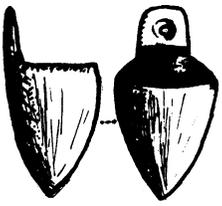


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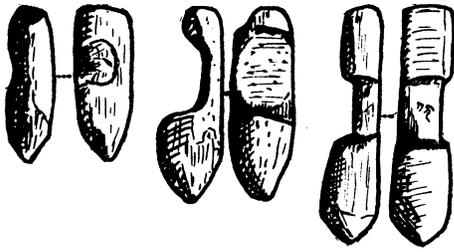


Z 1

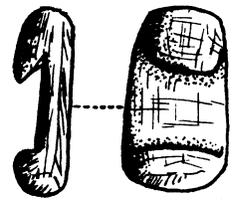




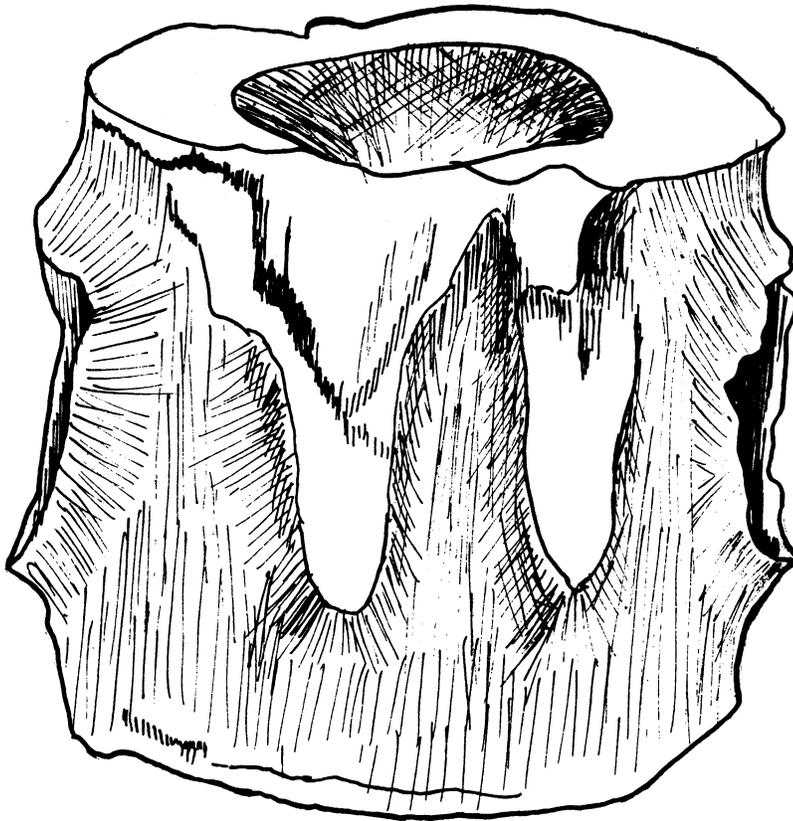
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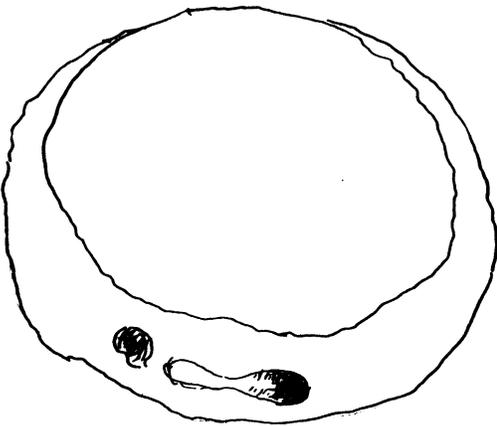
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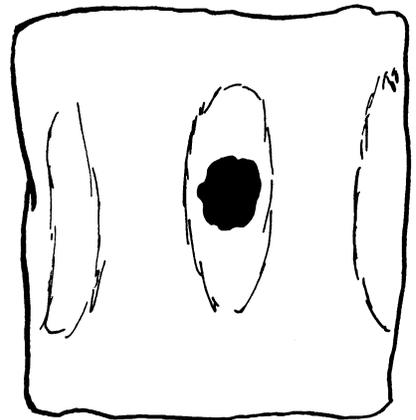
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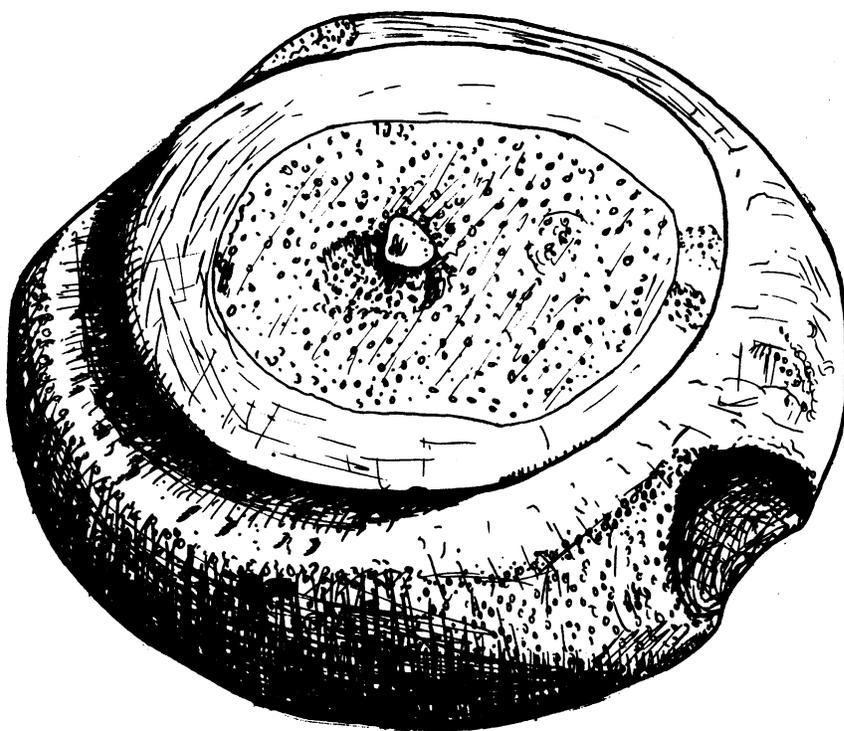


BB 1



BB 2

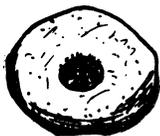




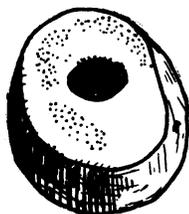
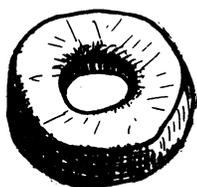
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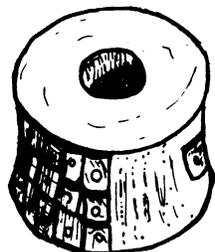
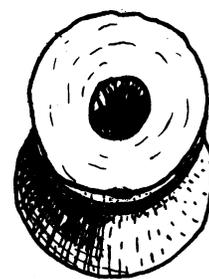
CC 1



CC 2



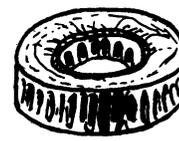
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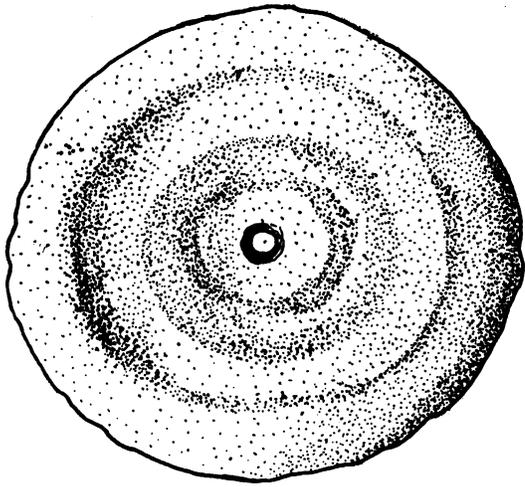


CC 4

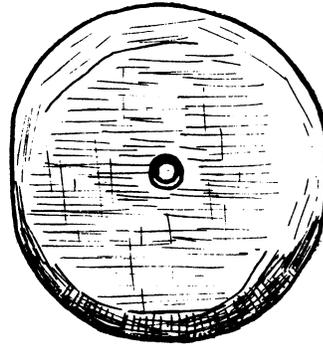


CC 5

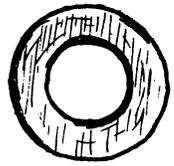




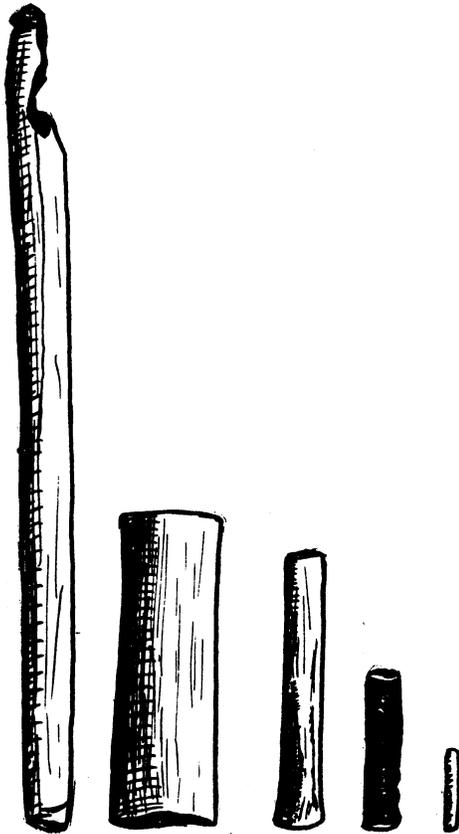
DD 1



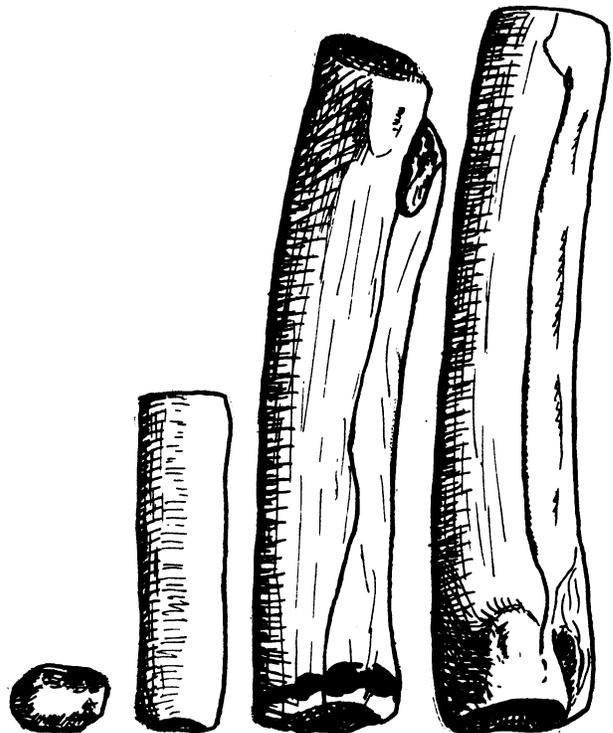
DD 2



DD 3



EE 1a



EE 1b



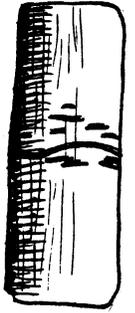
EE 1 c



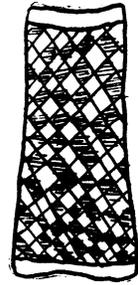
EE 1 d



EE 1 e



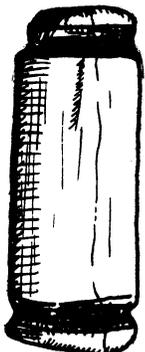
EE 2 a



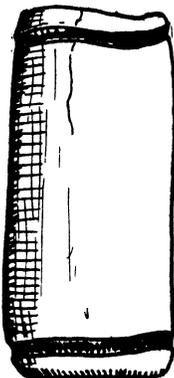
EE 2 b



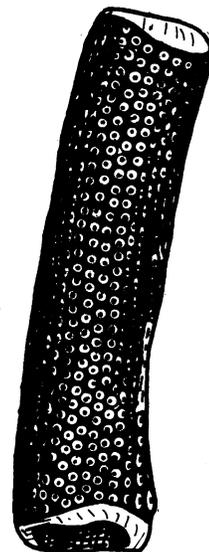
EE 2 b



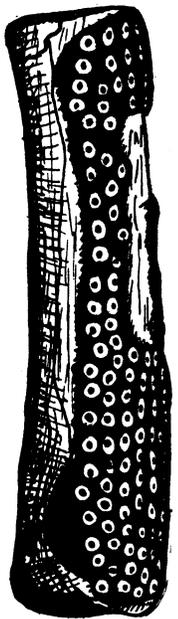
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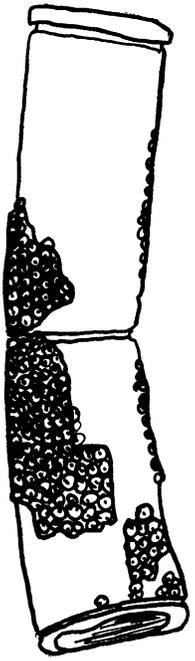


EE 2 d



EE 3 a





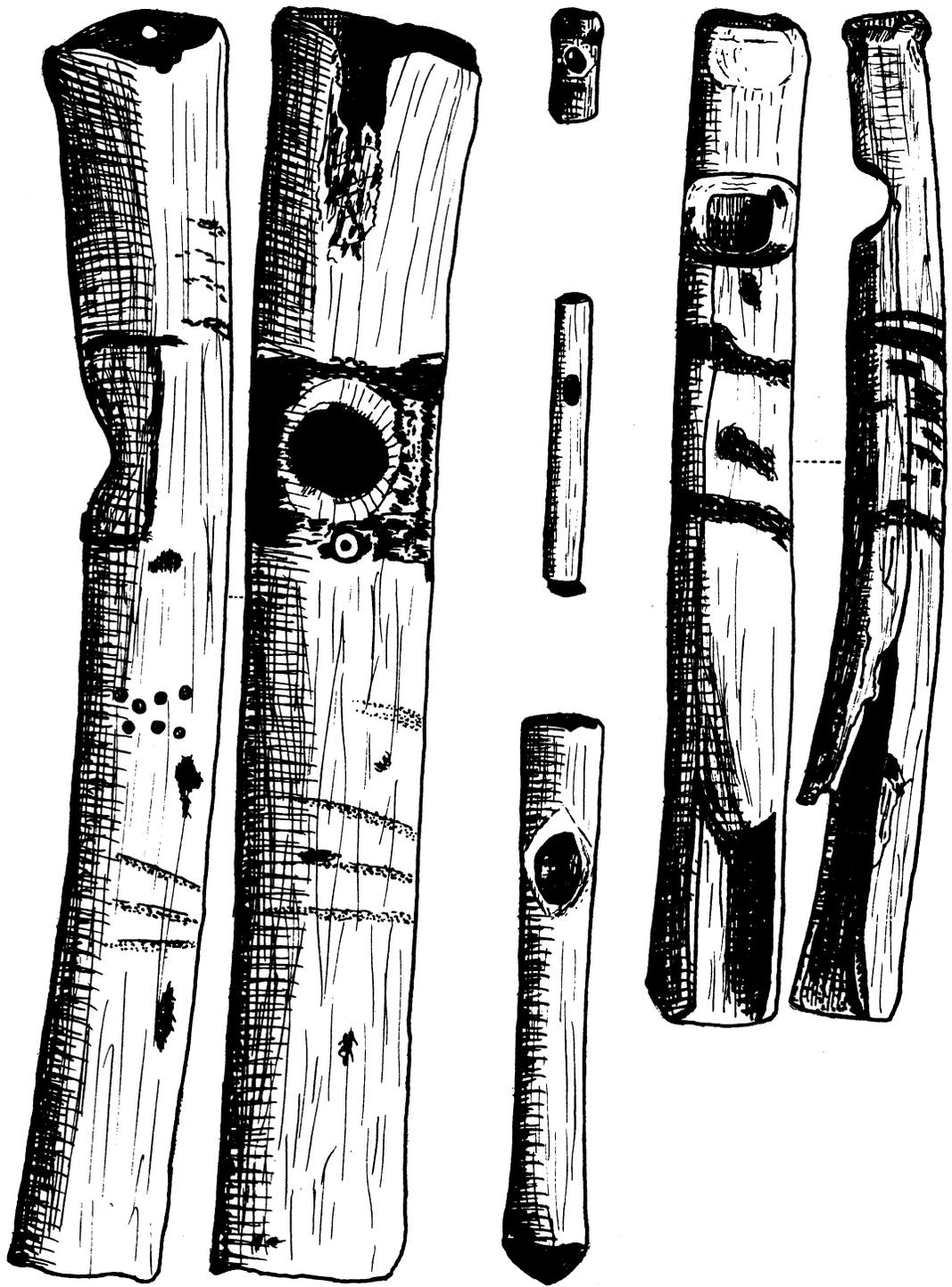
EE 3b



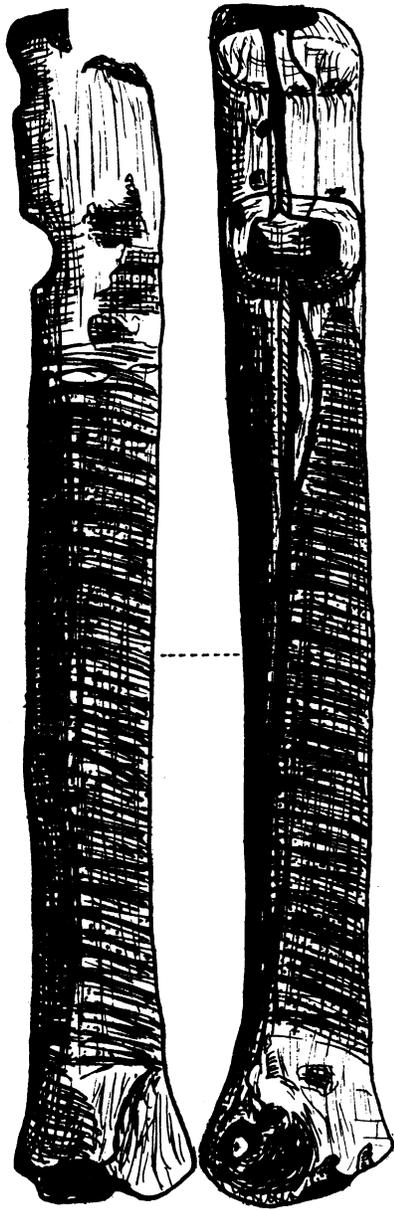
EE 3c



EE 3c



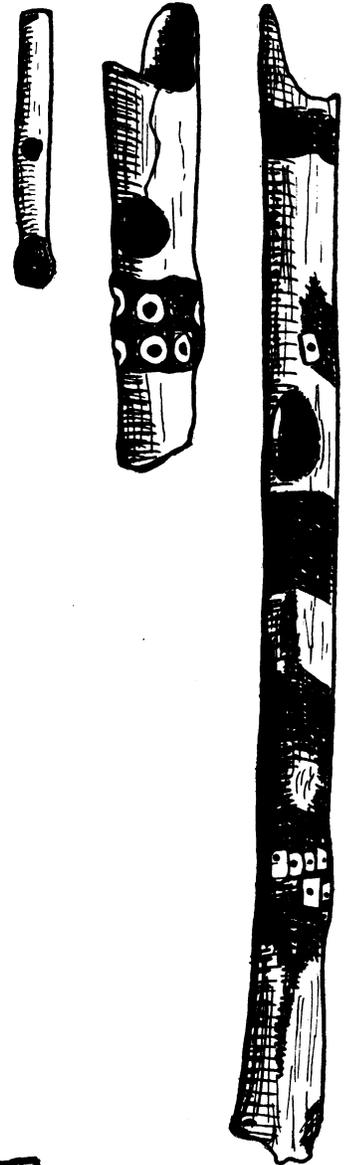
FF1a



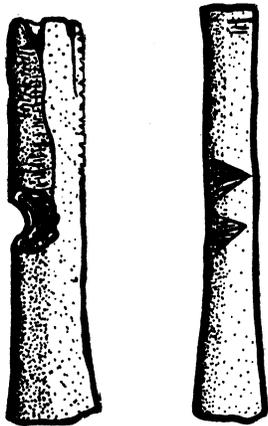
FF 1 b



FF 1 c



FF 2

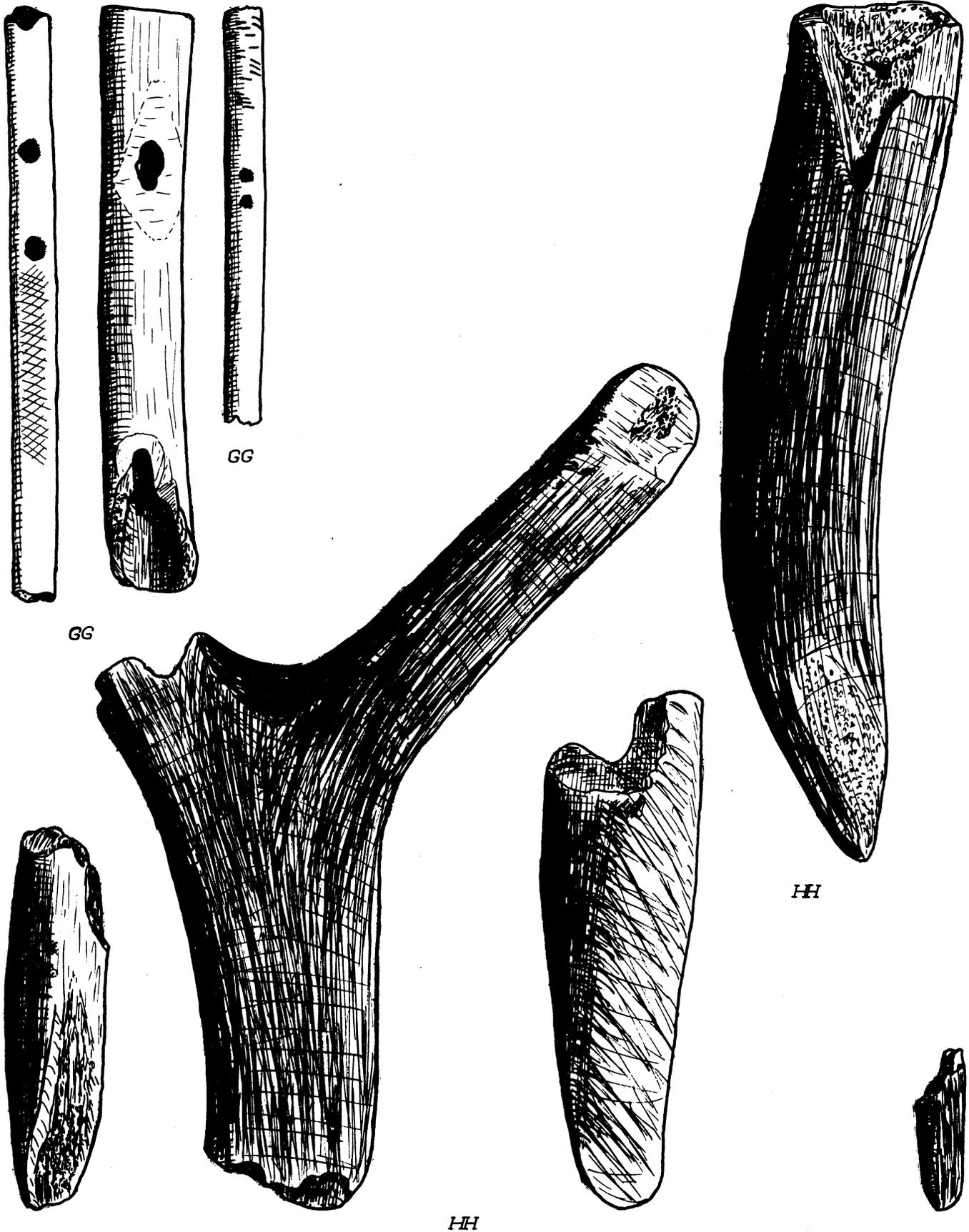


FF 3



FF 3



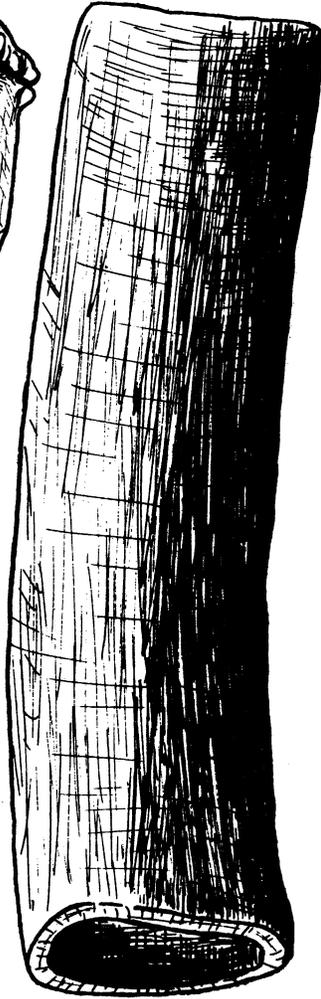




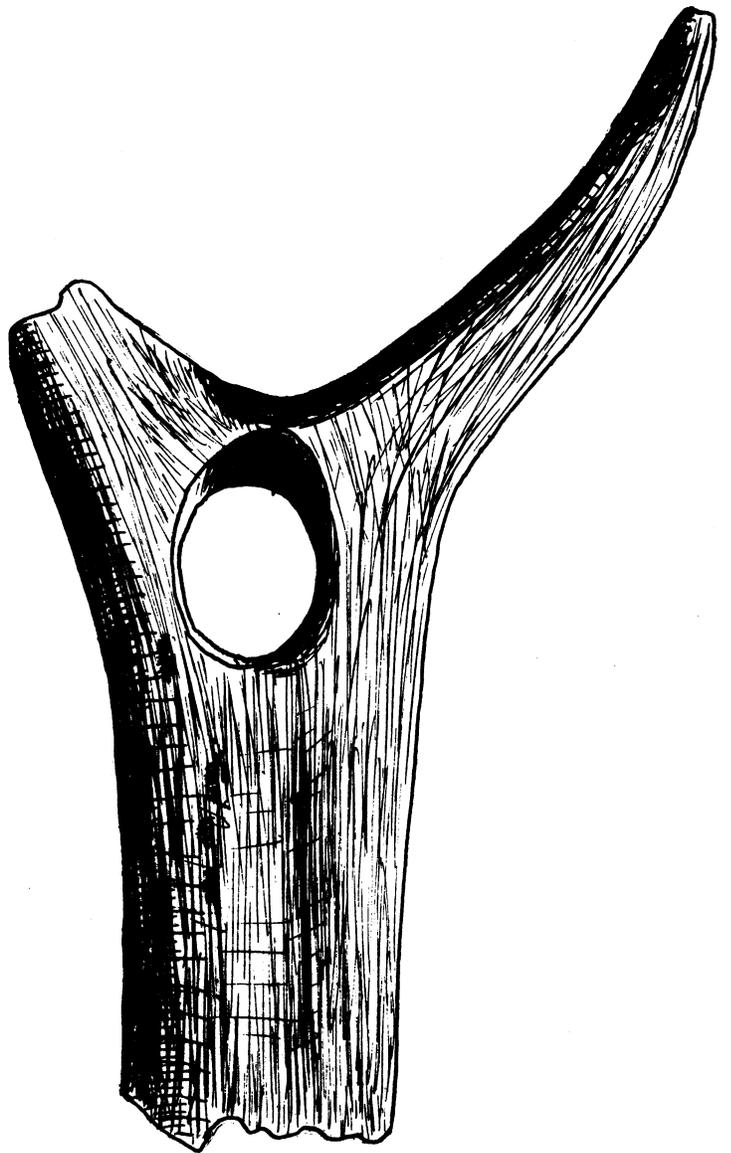
II



JJ



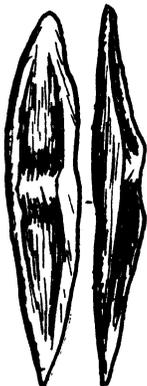
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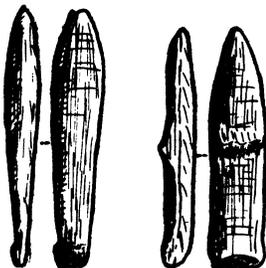
LL



MM1a



MM1b



MM2a

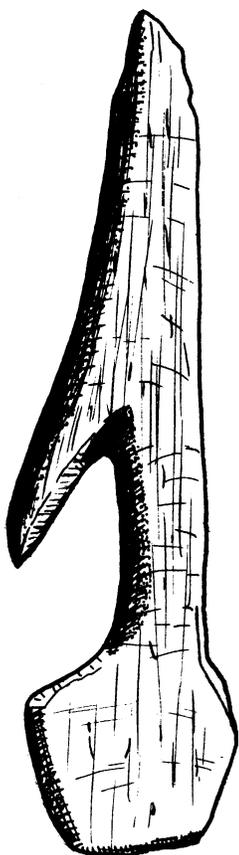


MM2b



MM2c





NN1a



NN1b



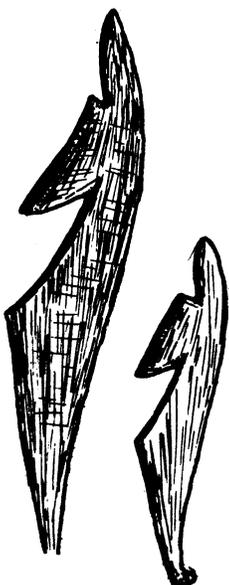
NN2a



NN2b



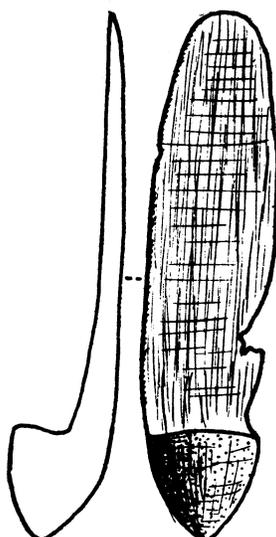
OO1



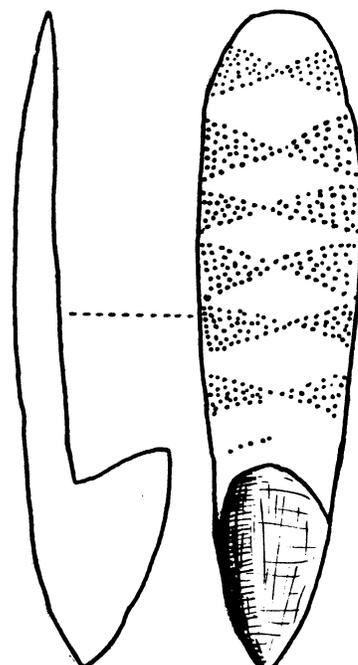
OO2



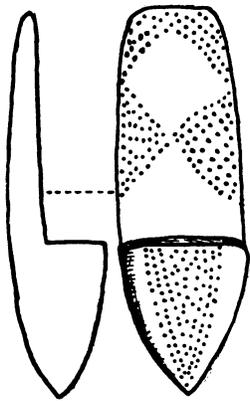
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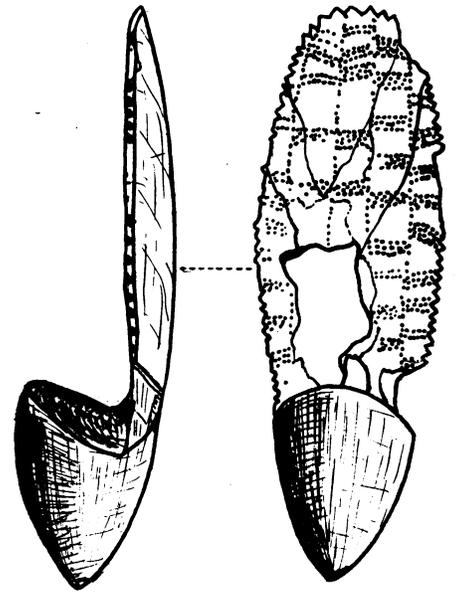
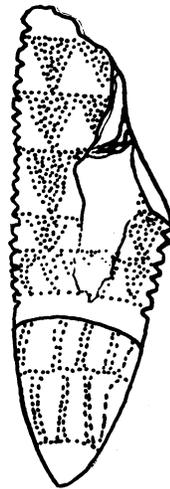
QQ1



QQ2a



QQ 2 a



QQ 2 b



RR



SS 1



SS 2



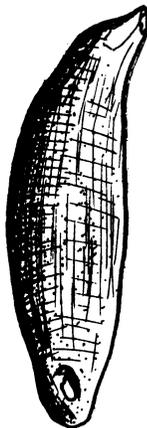
TT



UU 1



UU 2



UU 3



UU 4

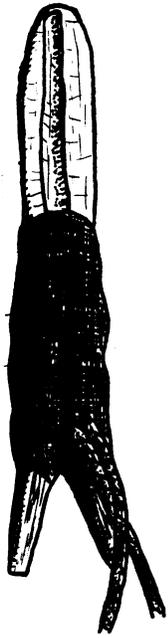


VV

## ILLUSTRATED ETHNOLOGICAL SPECIMENS

All UCMA specimens. On specimens all numbers preceded by 1-.

1, 9302 (C1).	10, 9352.	18, 1090.
2, 1529.	11, 2012.	19, 9219.
3, 1906.	12, 1066.	20, 1142.
4, 9353.	13, 718.	21, 2290 (NN1a).
5, 1067.	14, 1655.	22, 13974.
6, 1452.	15, 994b.	23, 2444 (NN1b).
7, 7454.	16, 9357b.	24, 19448 (W1).
8, 27125 (MM1b).	17, 1152.	25, 19449.
9, 2522j.		



1 (C D)



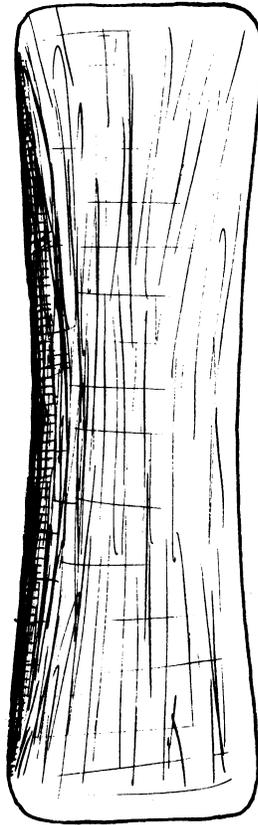
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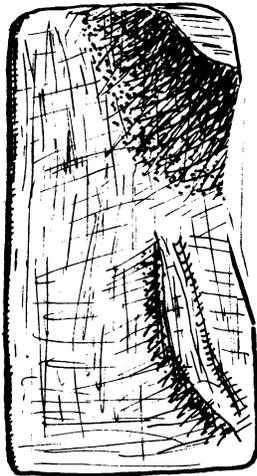
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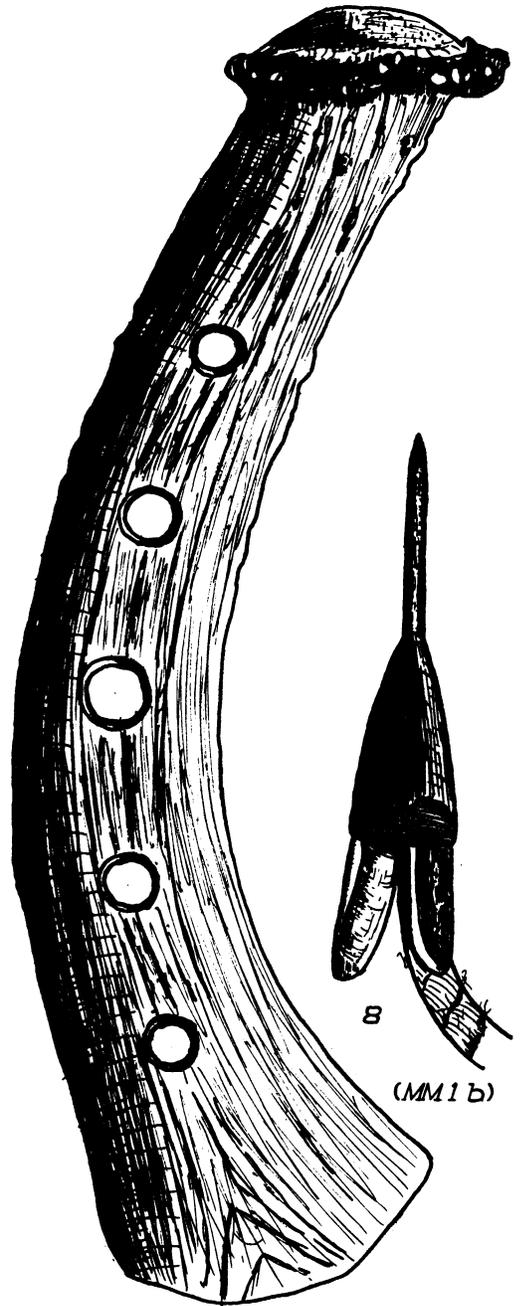
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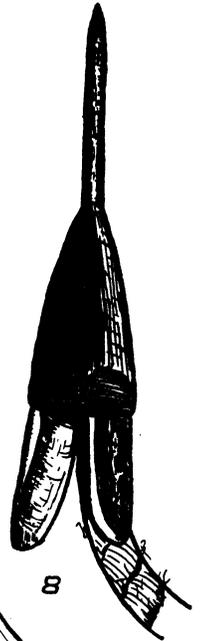
6



5



7 (L L)



8

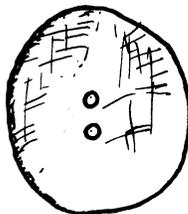
(M M 1 b)



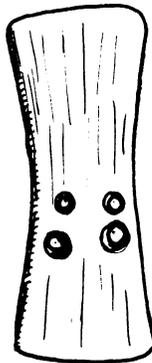
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10



11



12



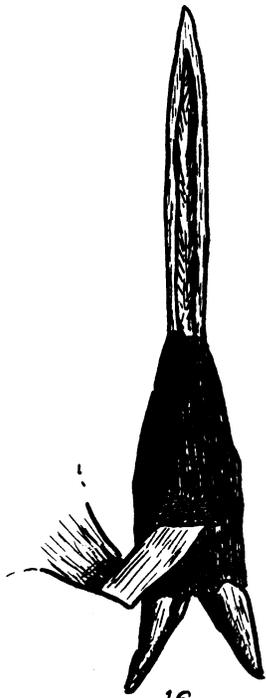
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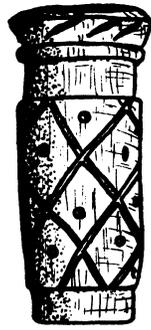
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15



16



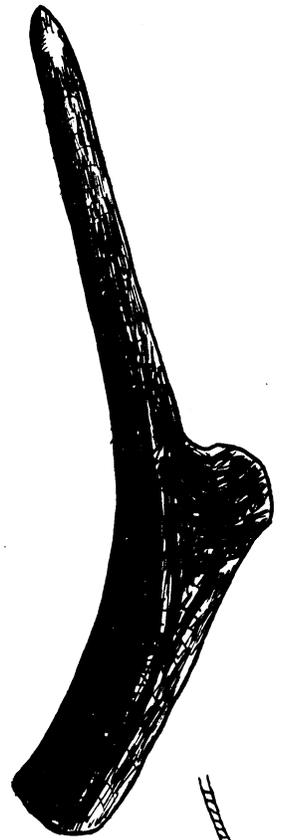
17



18



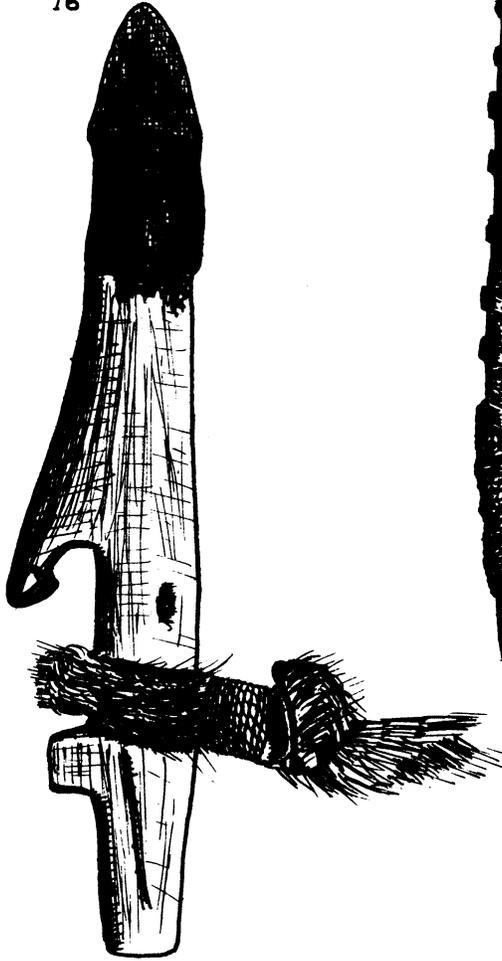
22



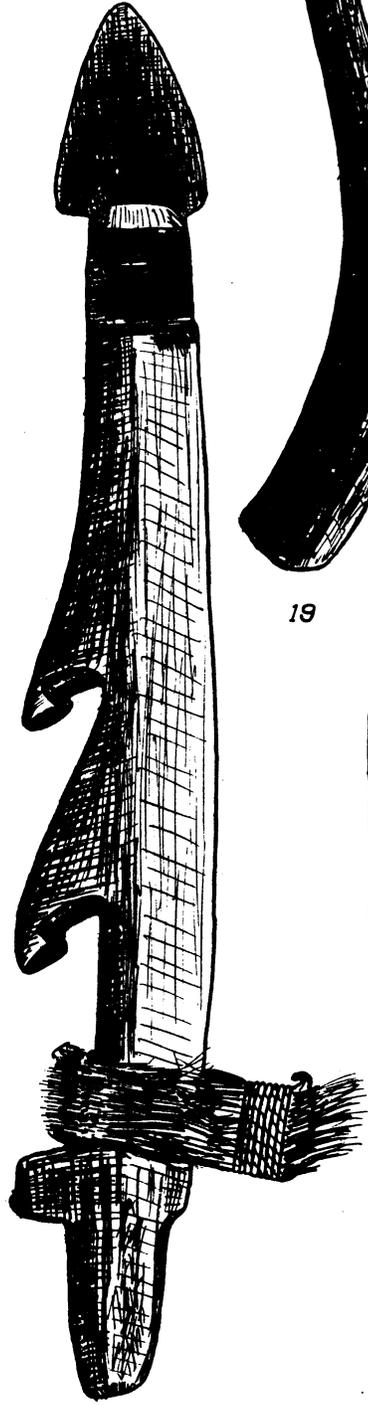
19



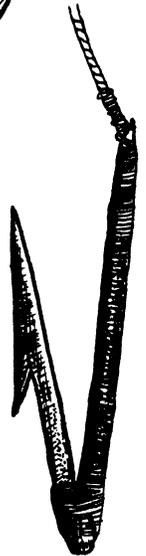
20



21 (NN1 a)



23 (NN1b)



24 (W 1)



25