

METAL WEAPONS OF THE EARLY AND MIDDLE BRONZE AGES IN THE LEVANT

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DOCTOR OF PHILOSOPHY

UNIVERSITY OF EDINBURGH

1988



VOLUME II

FIGURES, MAPS AND PLATES



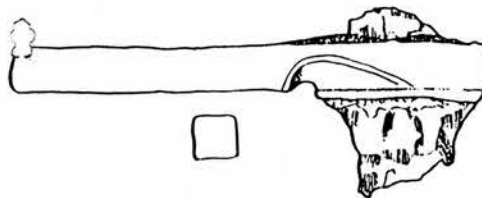
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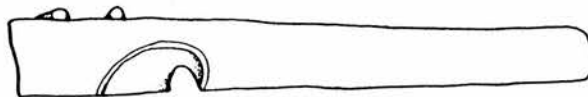
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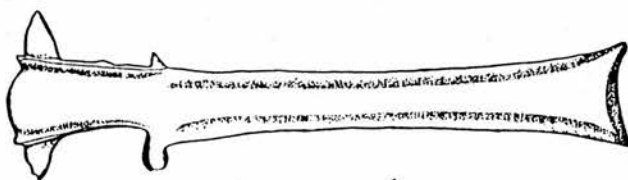
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404

Fig. 1

446



438



450



Fig. 2

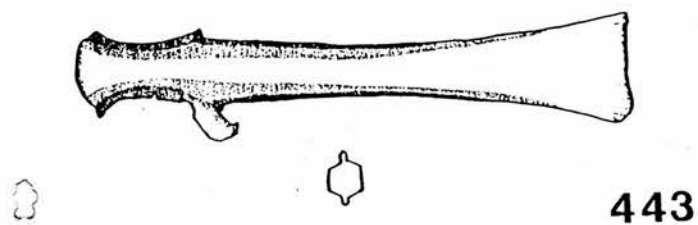
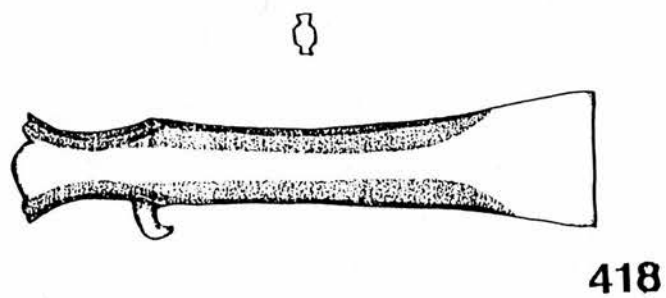
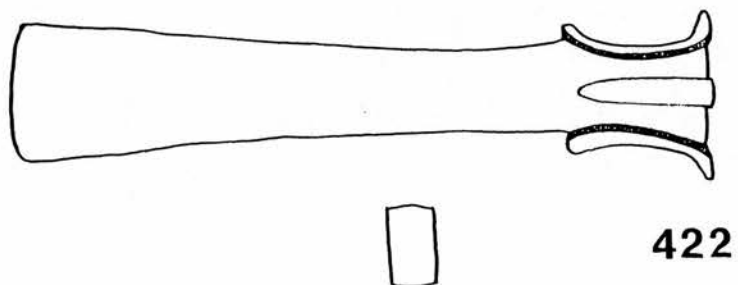
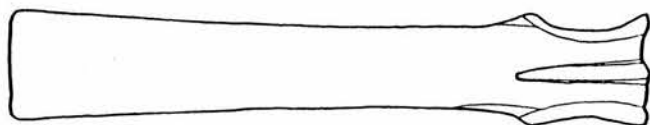


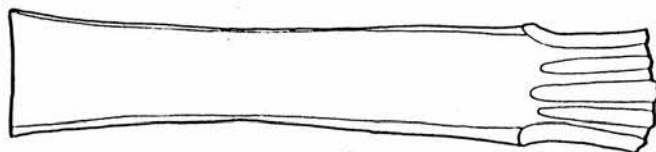
Fig. 3



422



417



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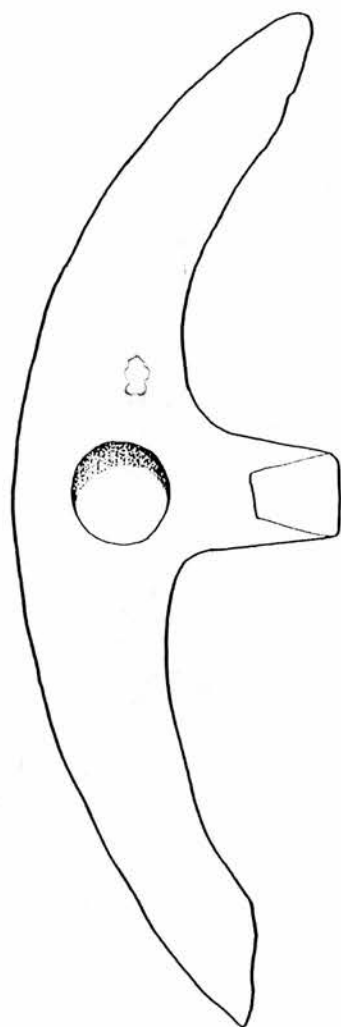


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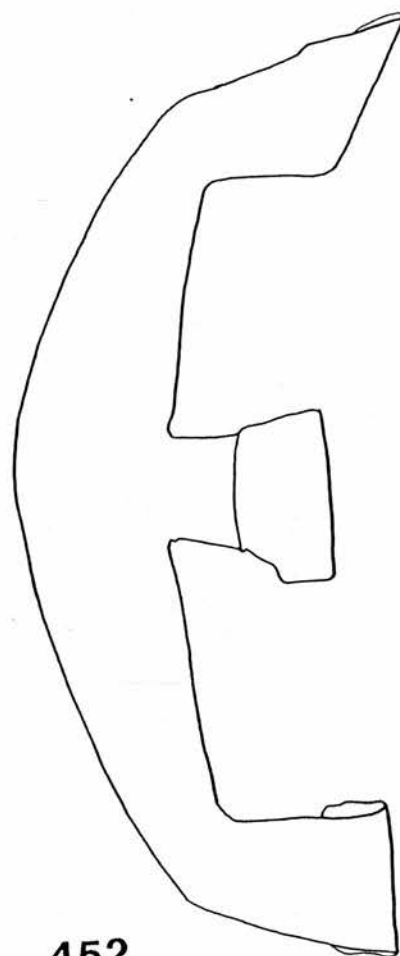


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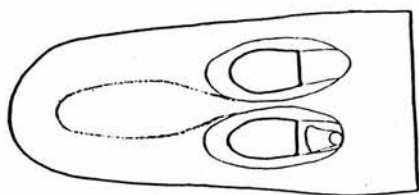


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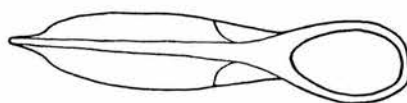
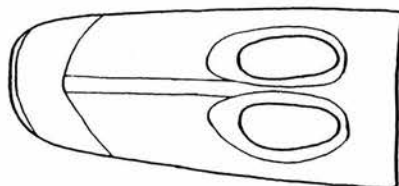
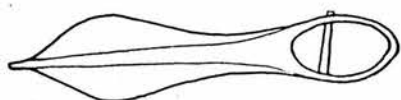


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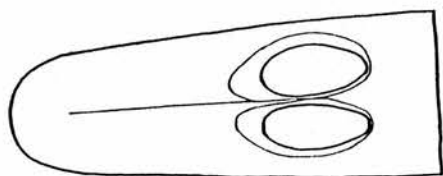
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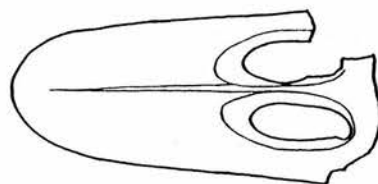
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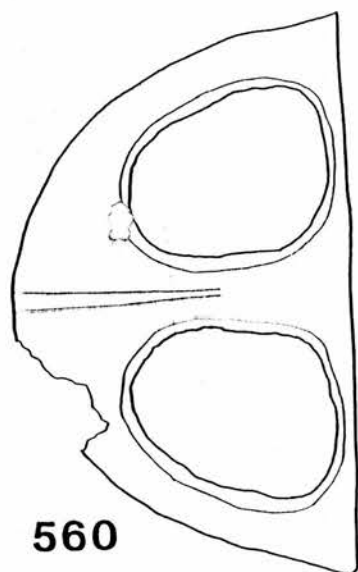


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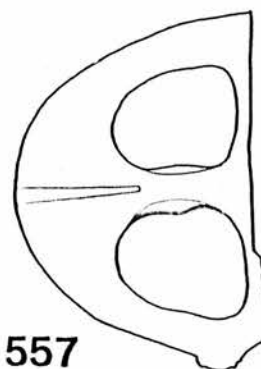


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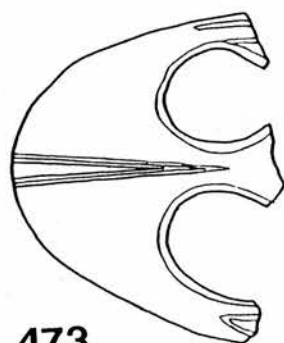
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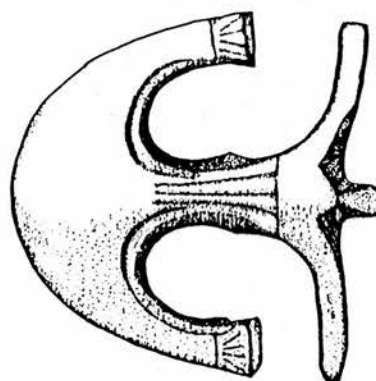
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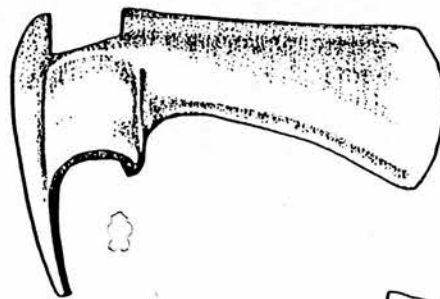


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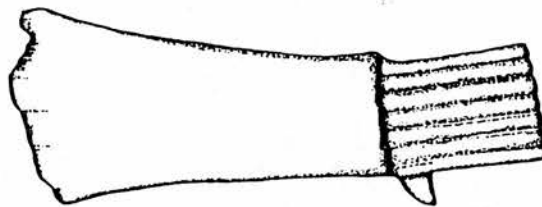
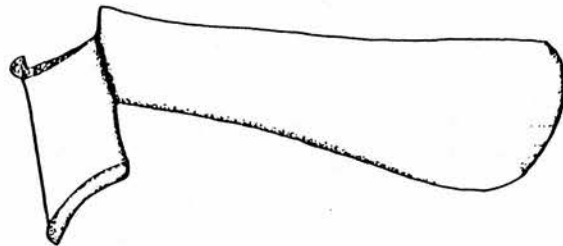
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Fig. 7

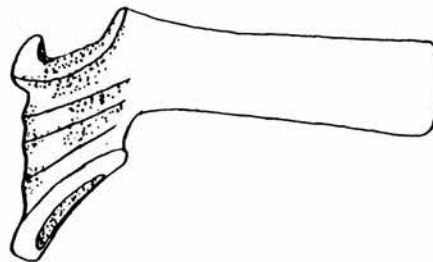


373

369



380



362

Fig. 8

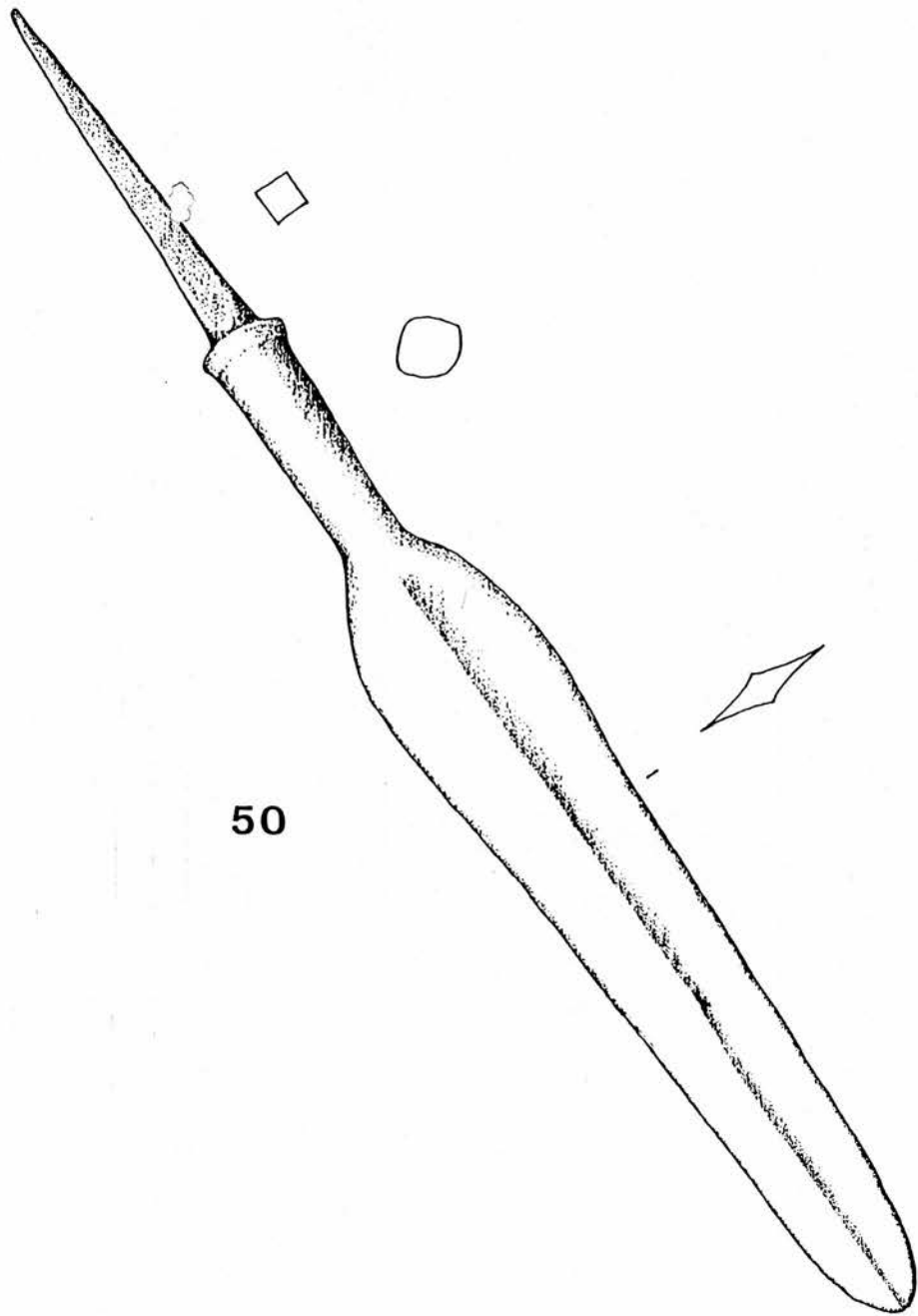


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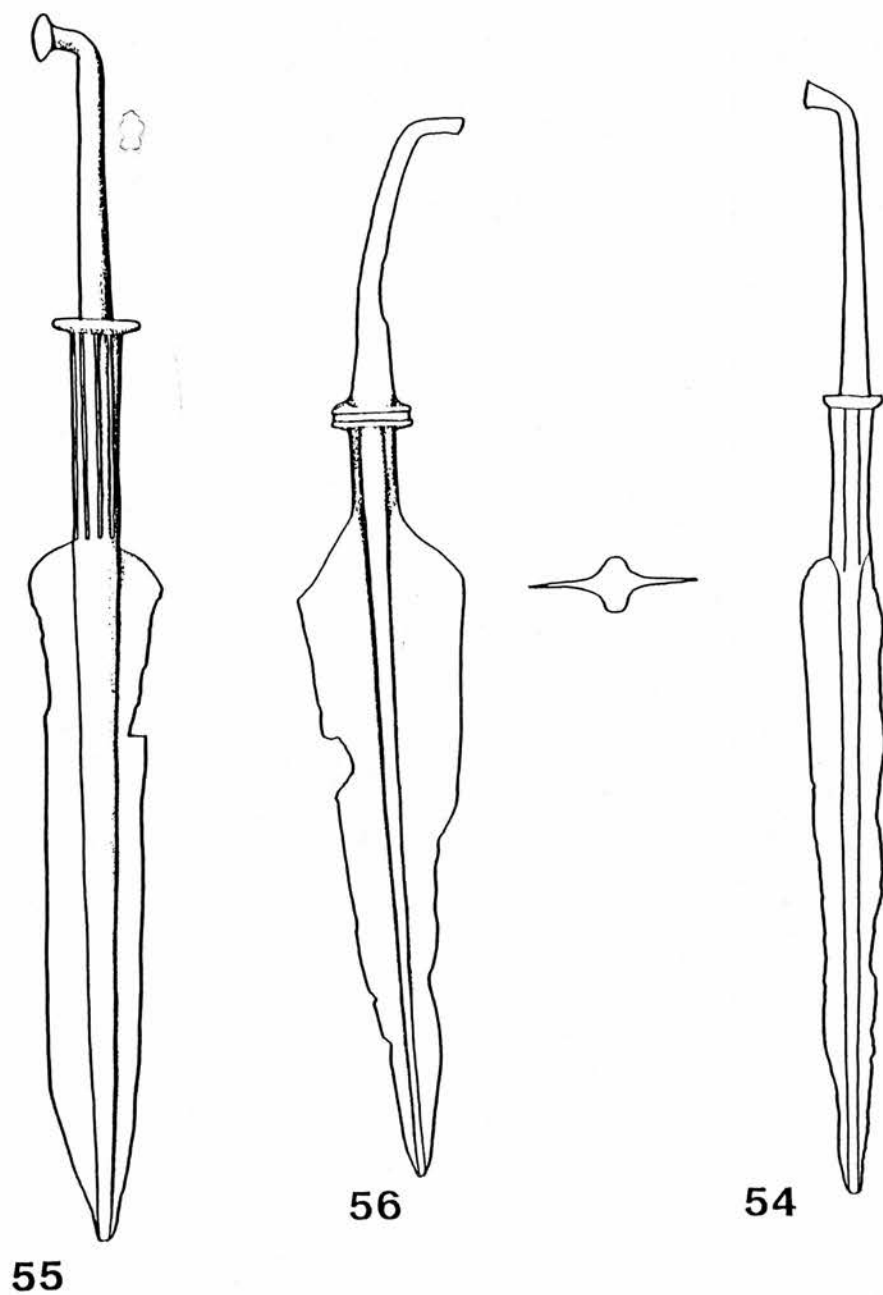


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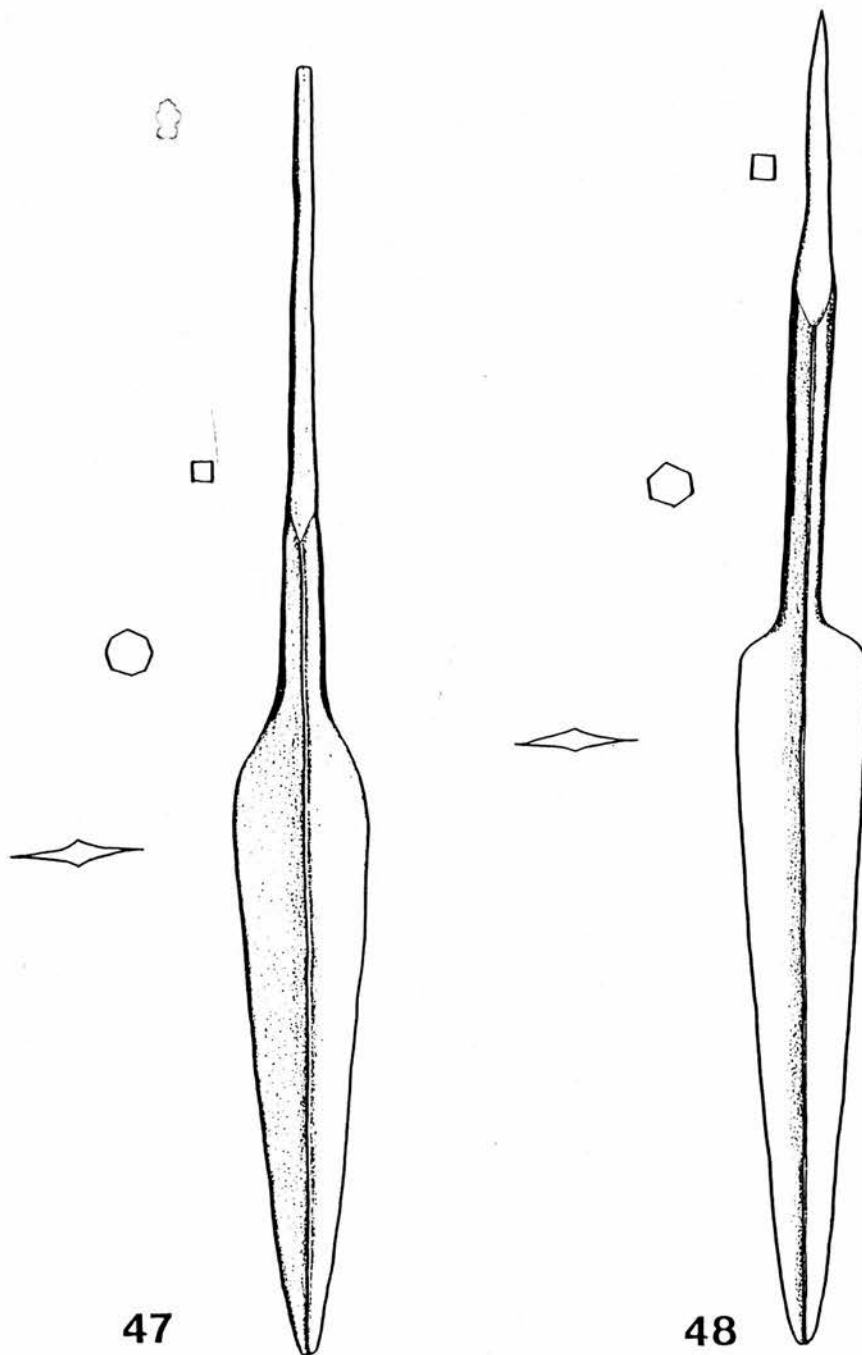


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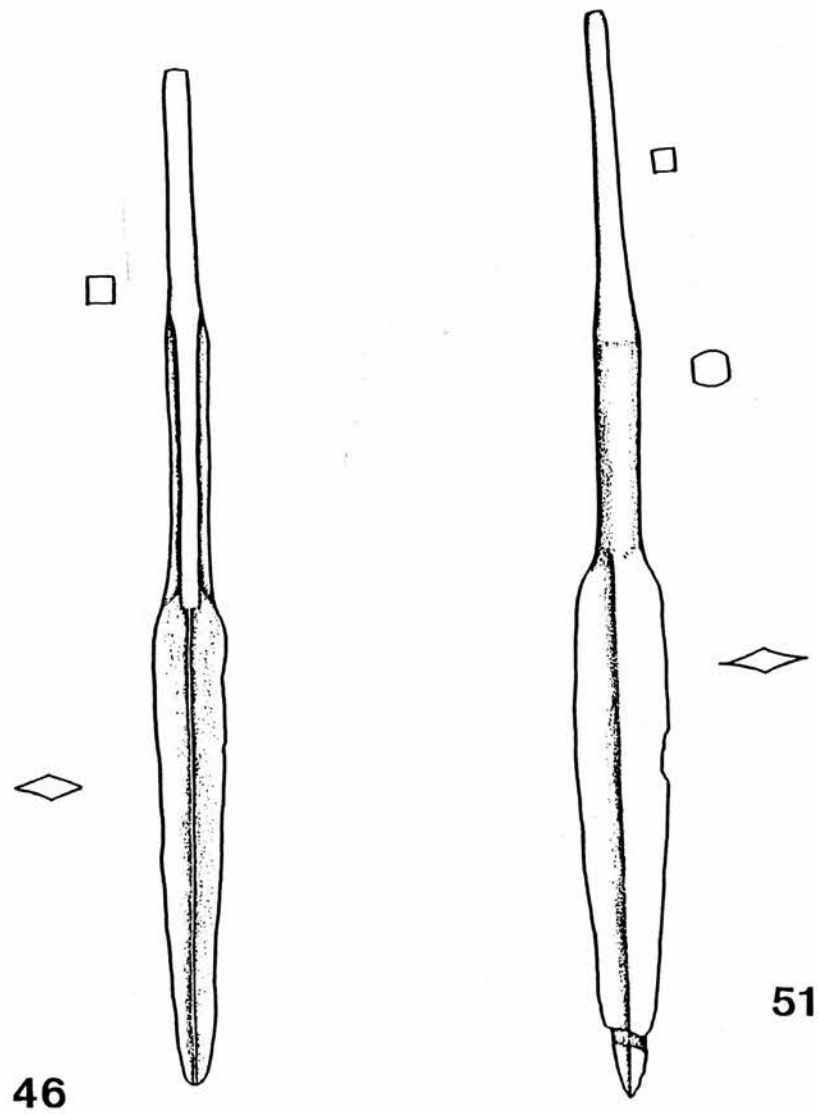


Fig. 12



6



32

Fig. 13



131



165



156

Fig. 14

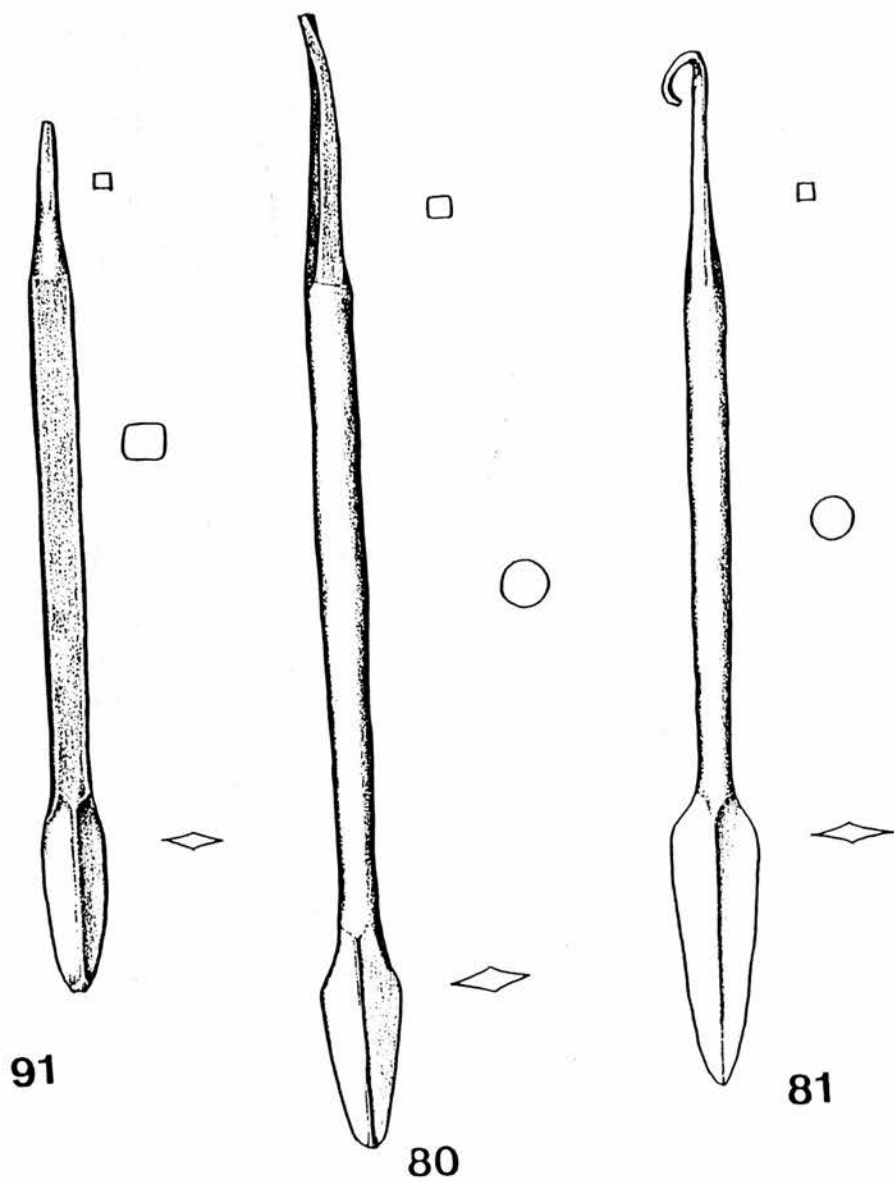


Fig. 15



88



25



27

Fig. 16



66



139

Fig. 17

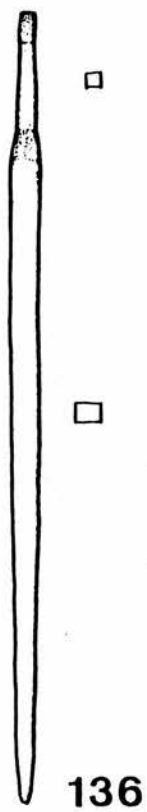
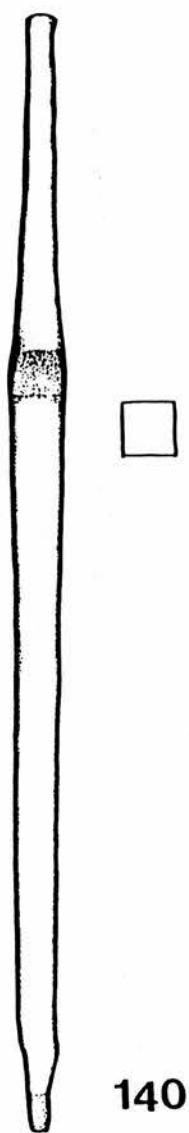
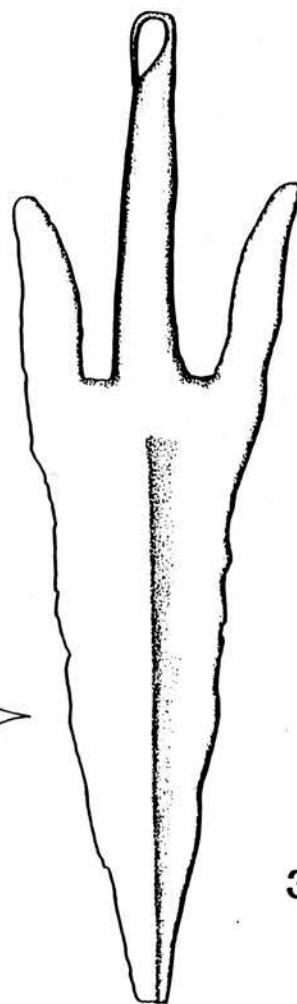
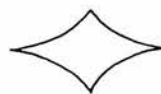


Fig. 18



38



311

Fig. 19

211

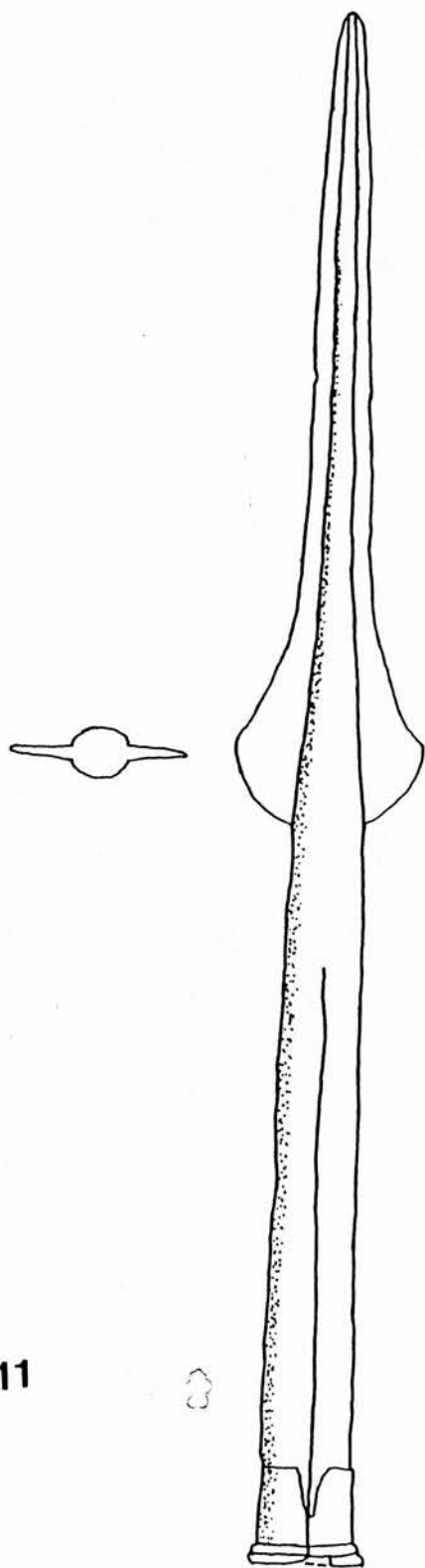
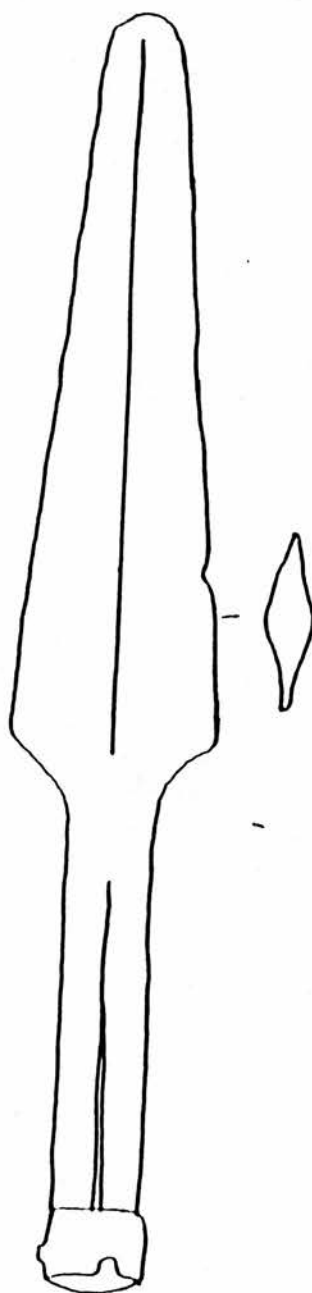


Fig. 20

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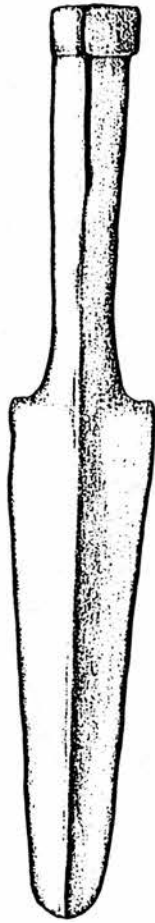




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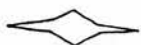


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214

Fig. 22



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331



180

Fig. 23



290



293



281

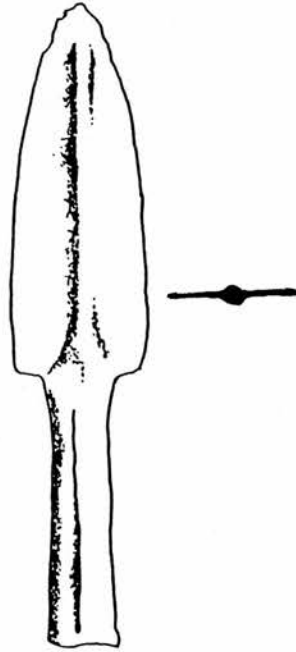


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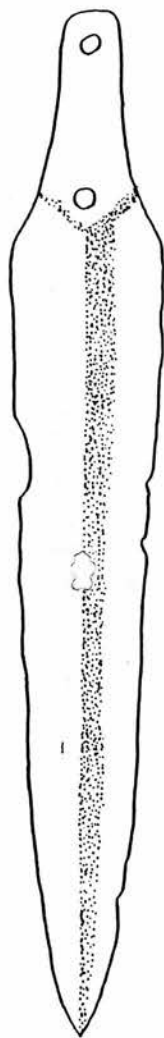


1428



310

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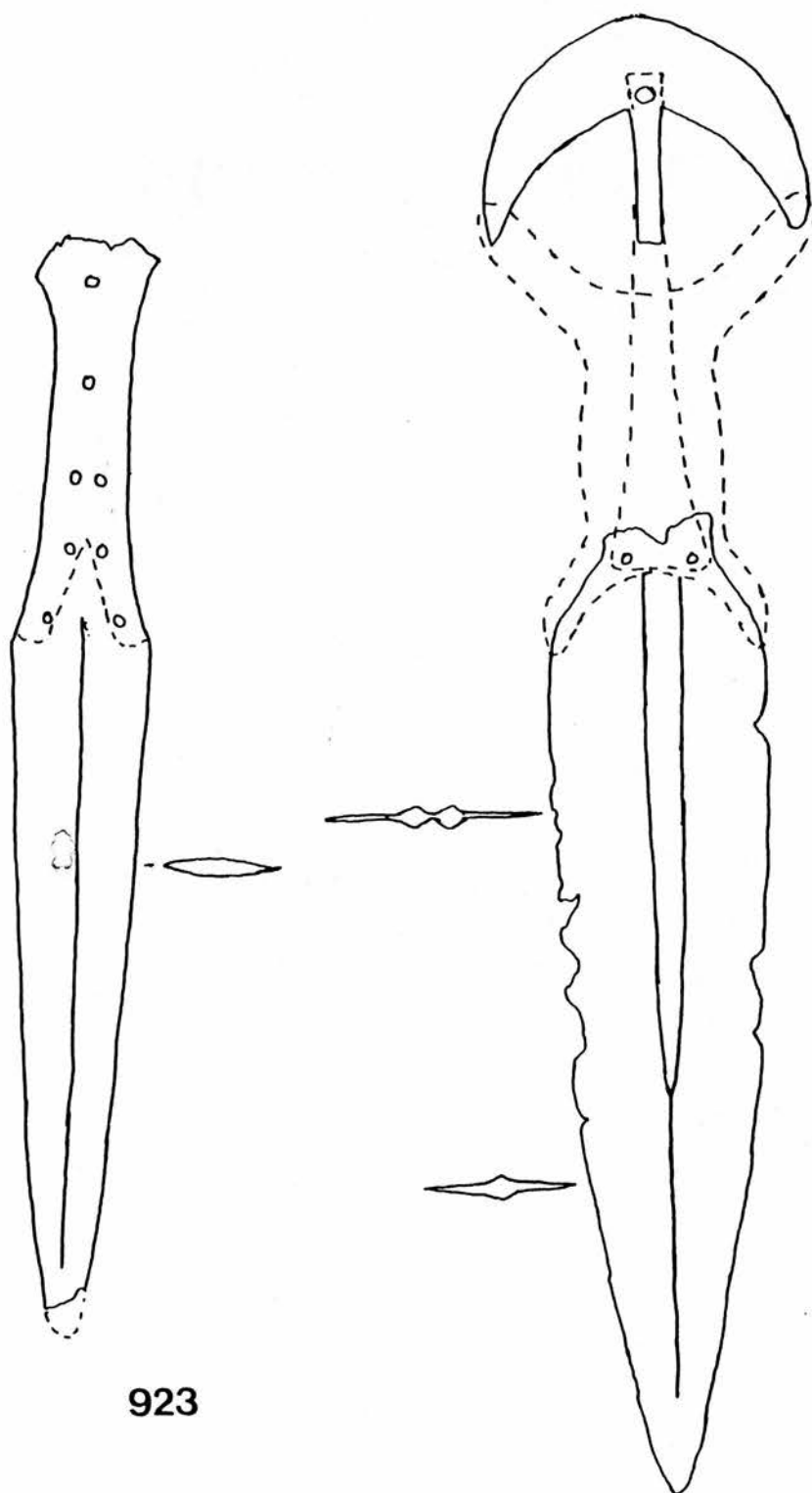


932



933

Fig. 26



923

Fig. 27

628

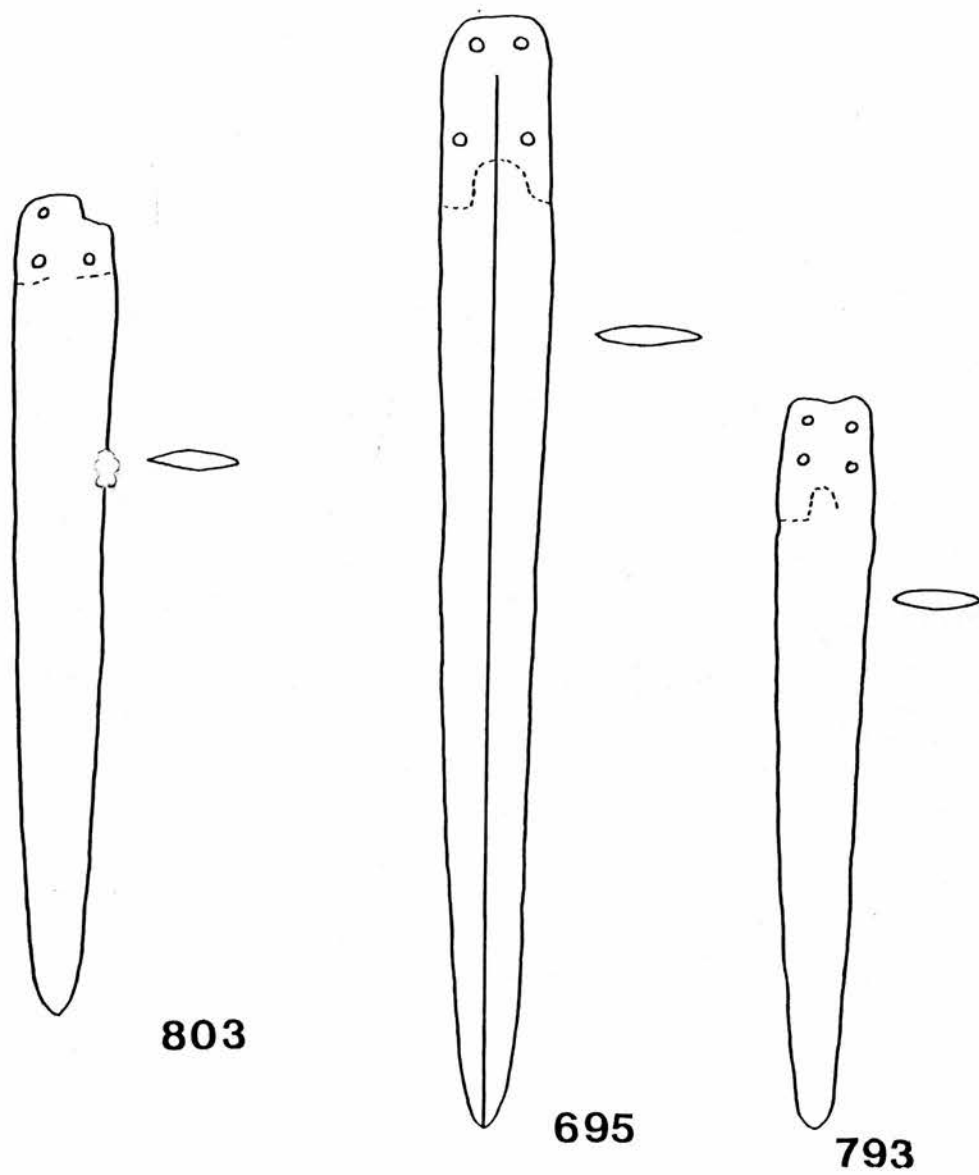
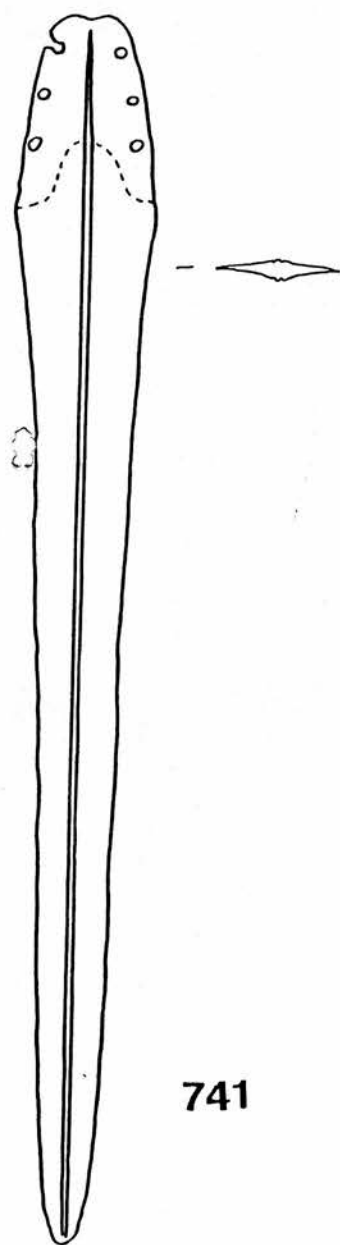
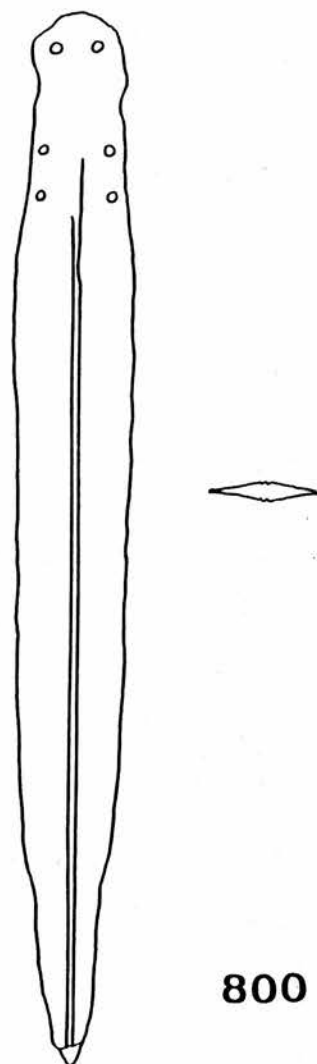


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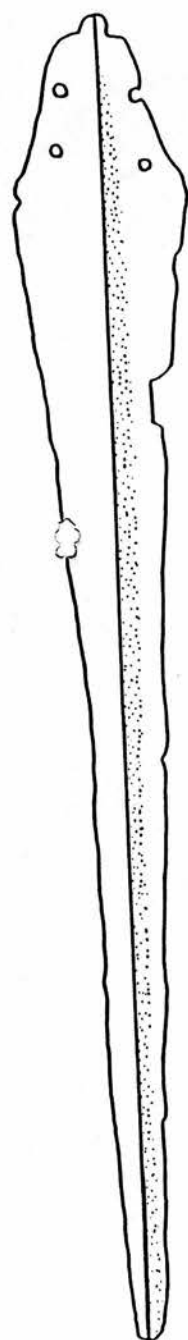


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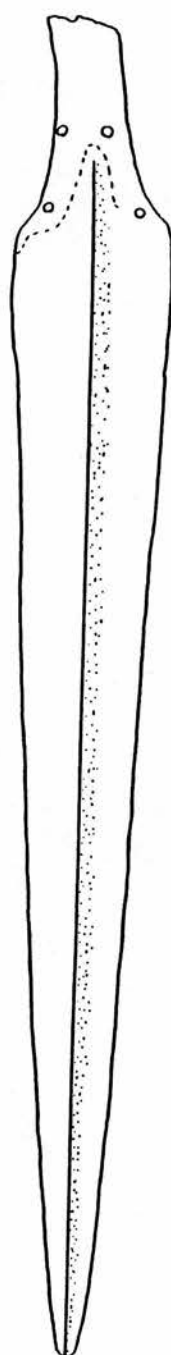


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Fig. 29



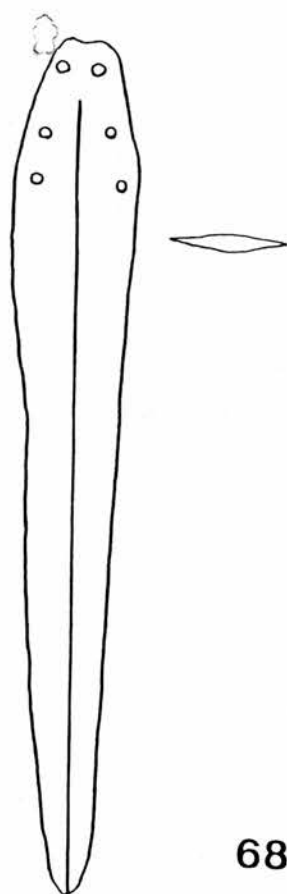
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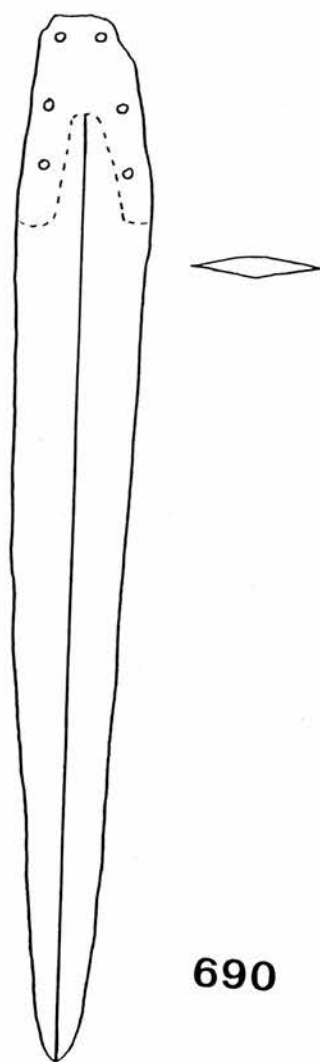
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Fig. 30



684



690

Fig. 31

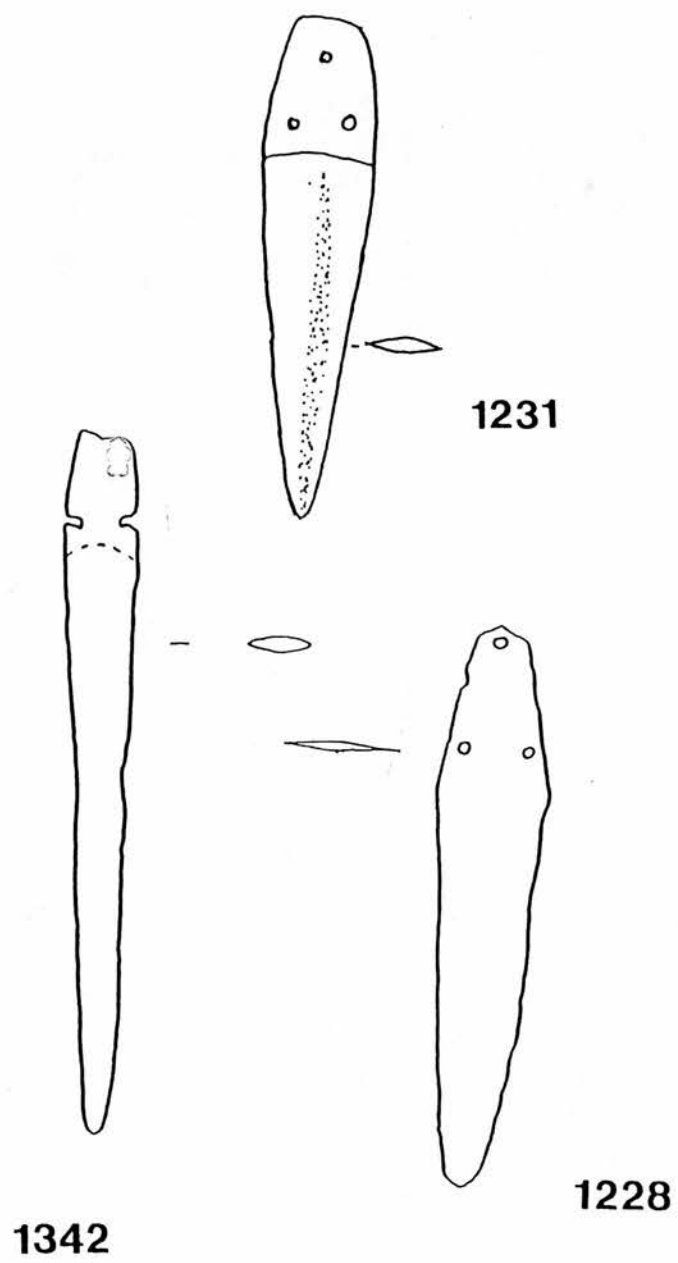
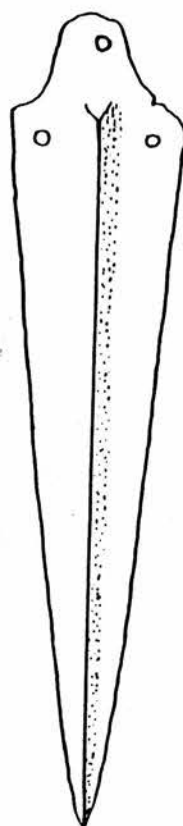


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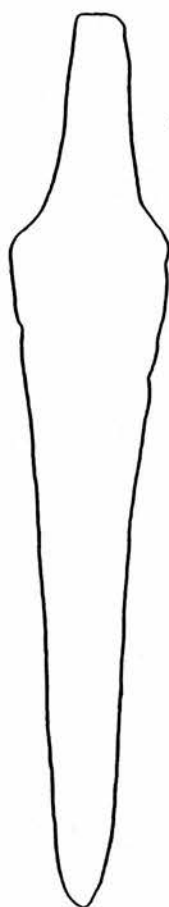


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1034

Fig. 33



1116



823

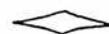
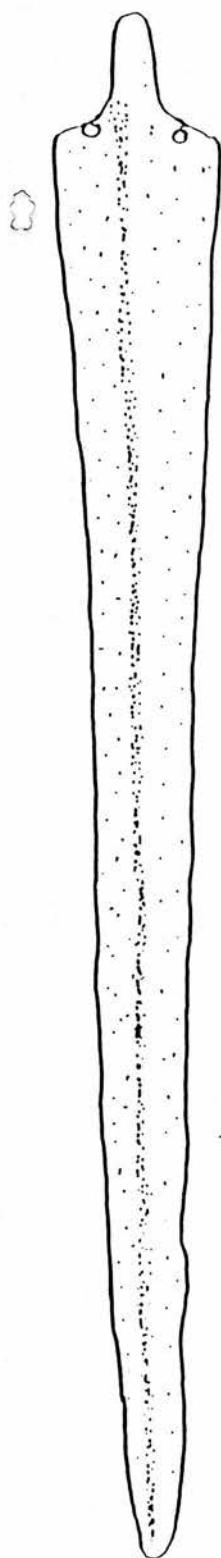


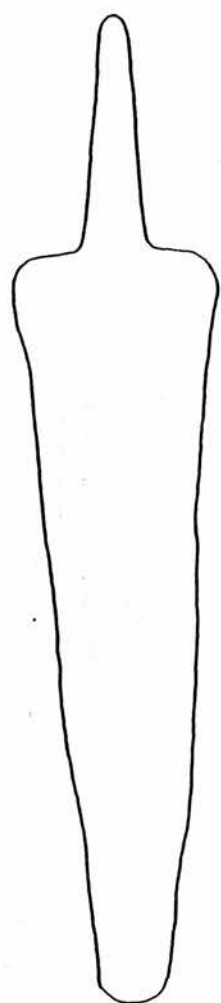
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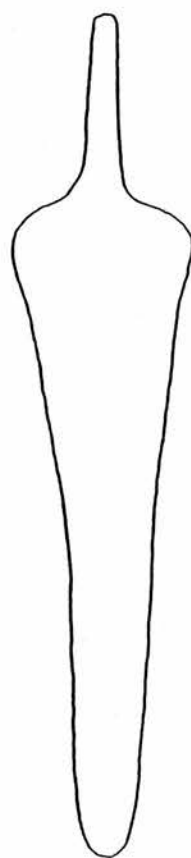
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Fig. 35



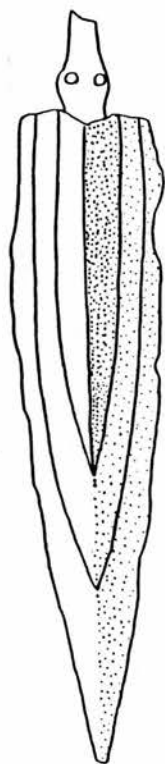
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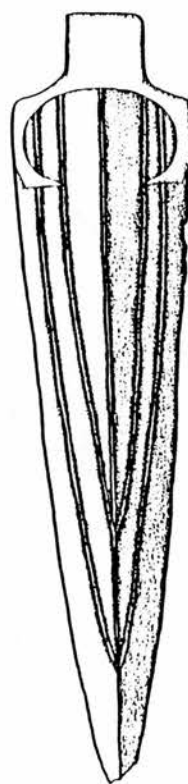
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Fig. 36

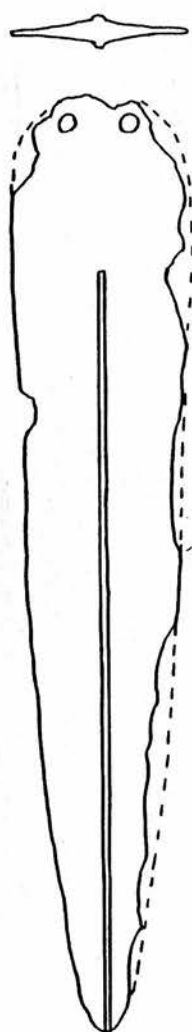


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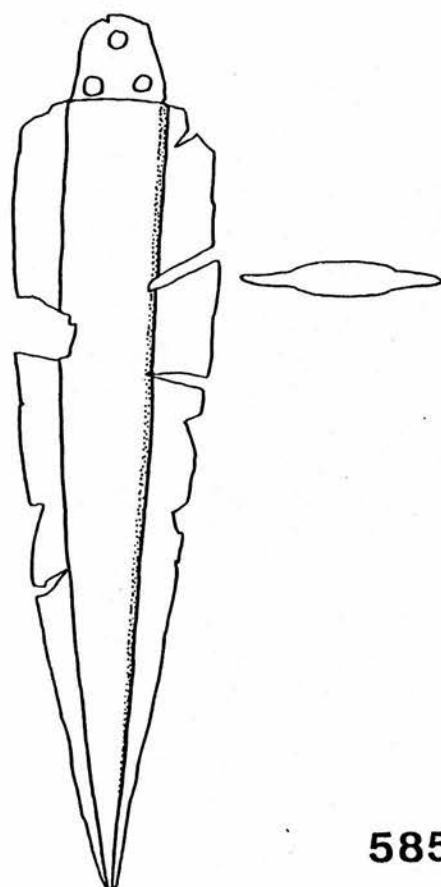


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Fig. 37



983



585

Fig. 38



592



577



660

Fig. 39

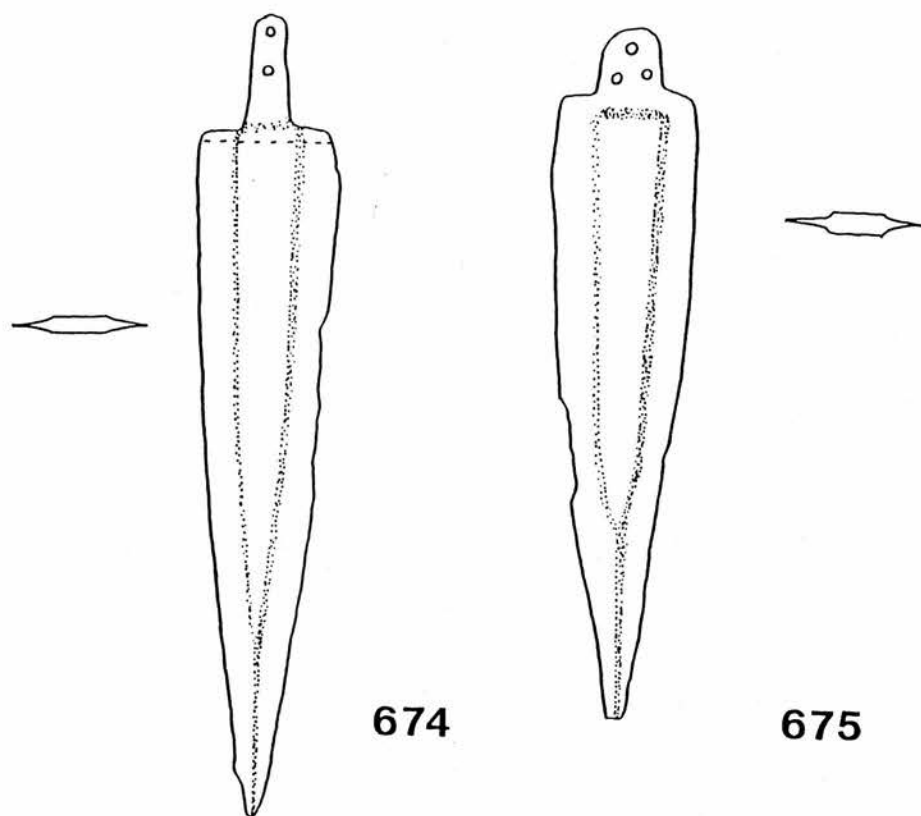
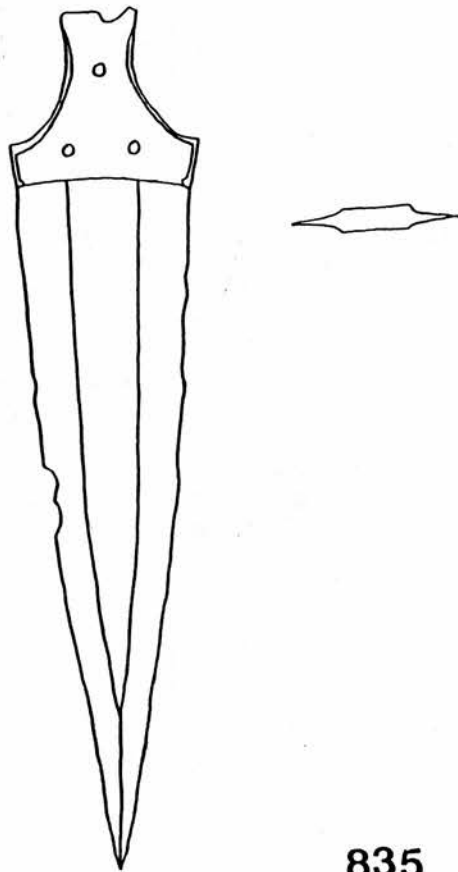
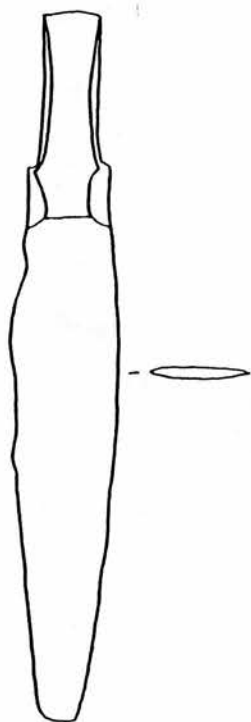


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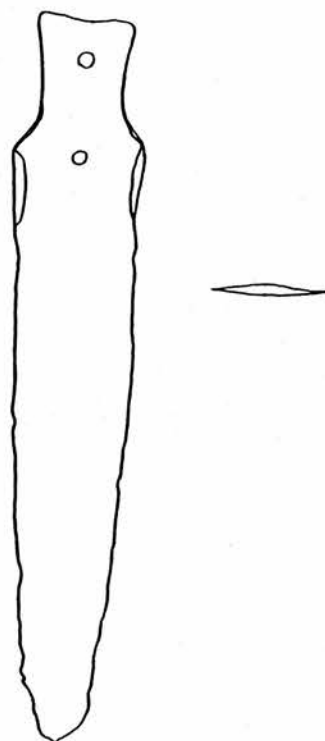


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Fig. 41



1429



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Fig. 42

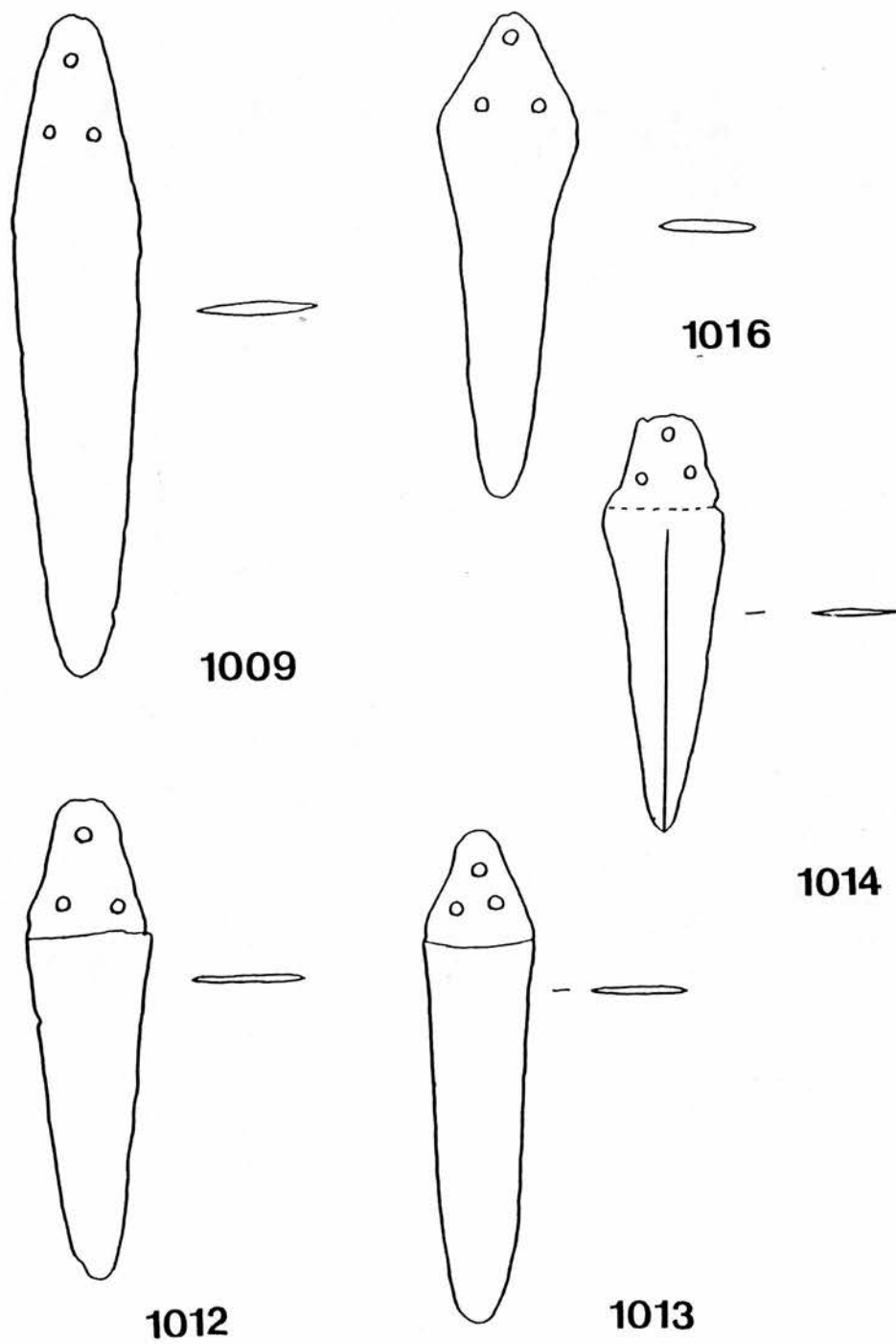
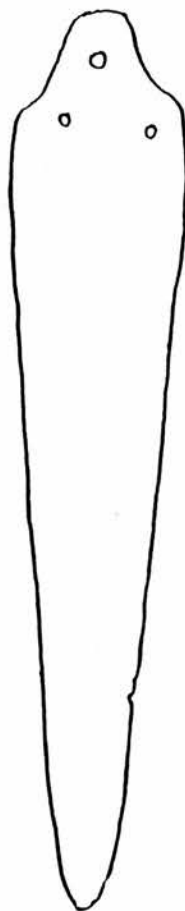


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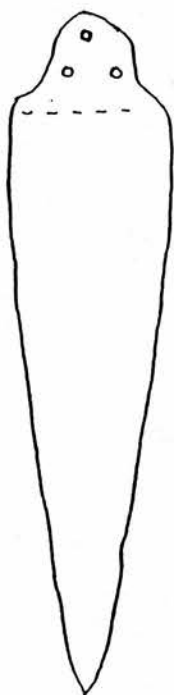


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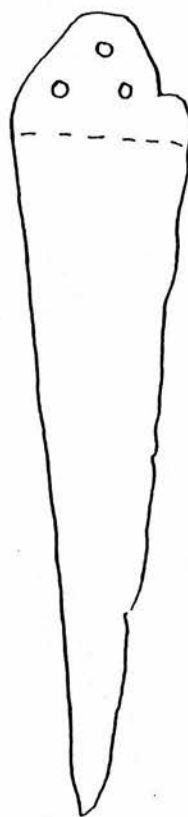


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Fig. 44



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Fig. 45

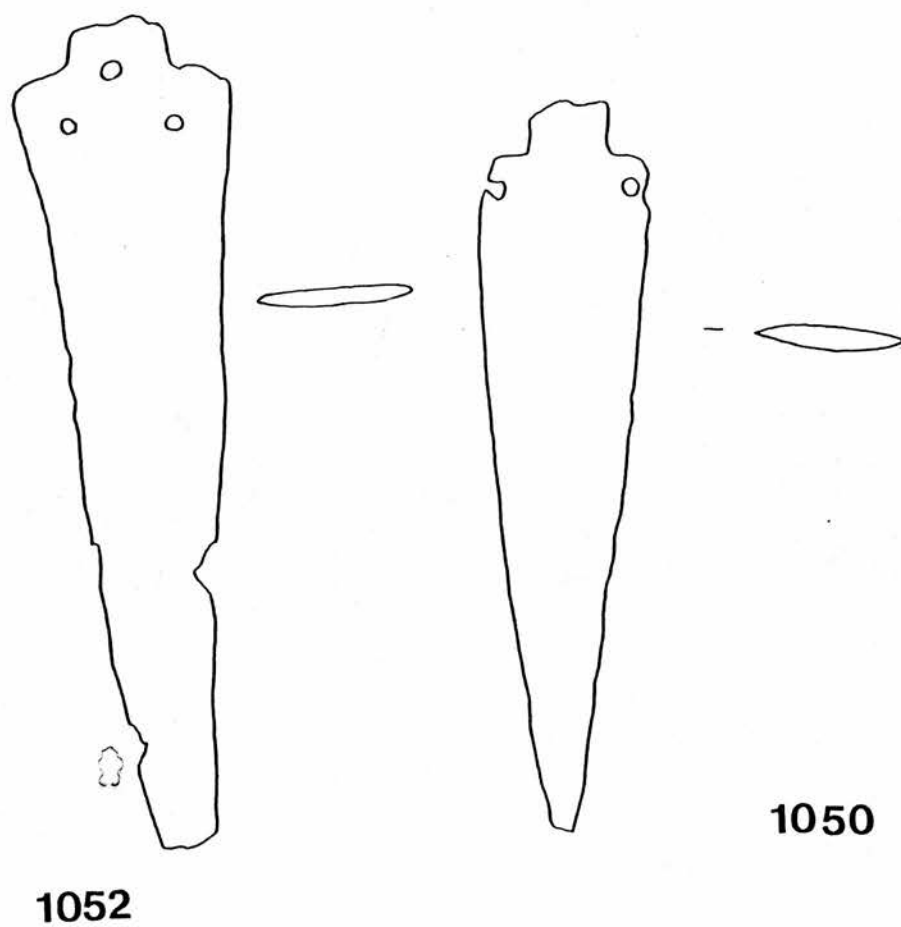


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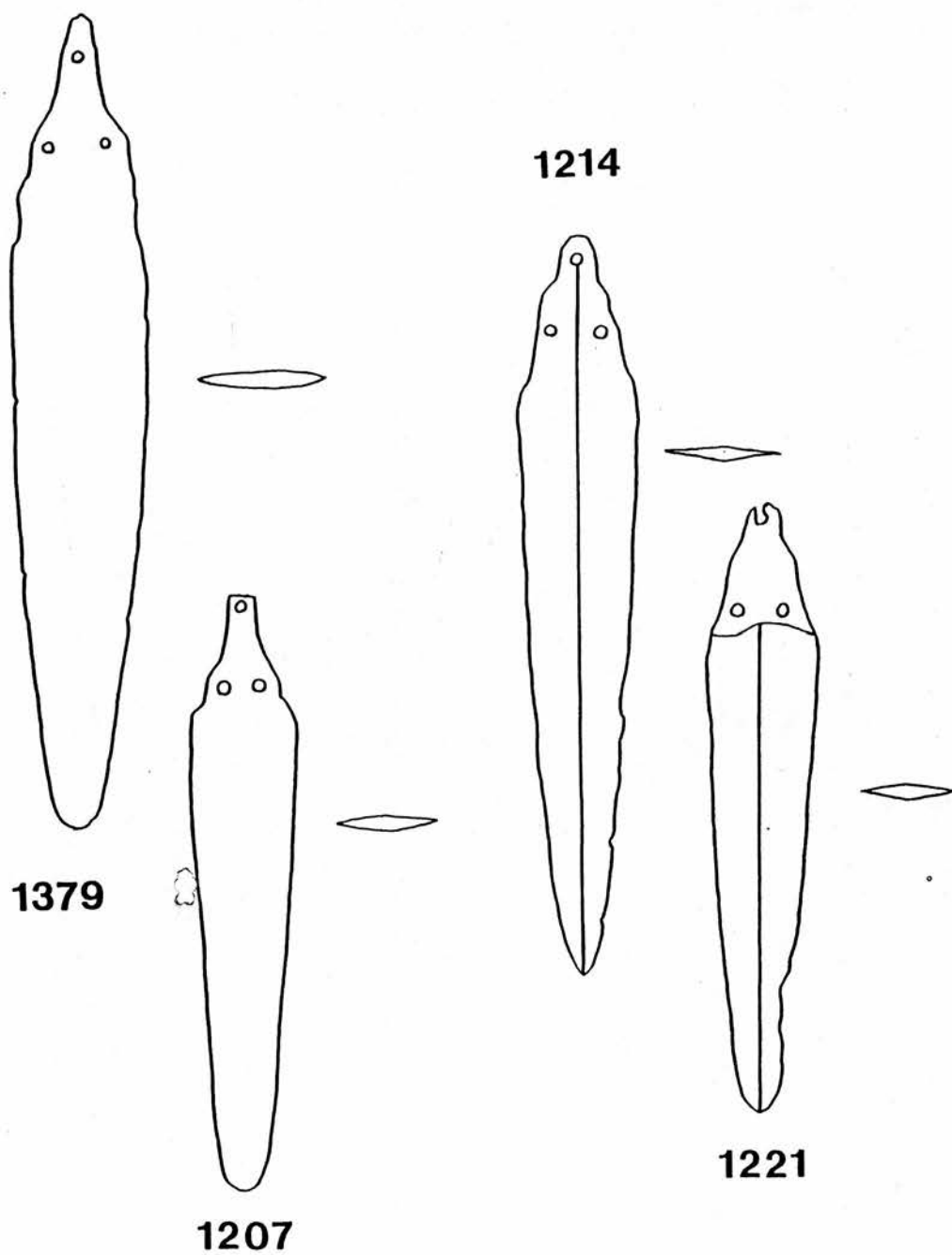
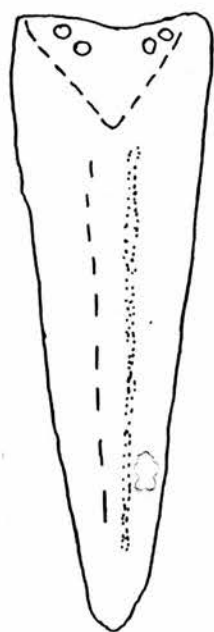
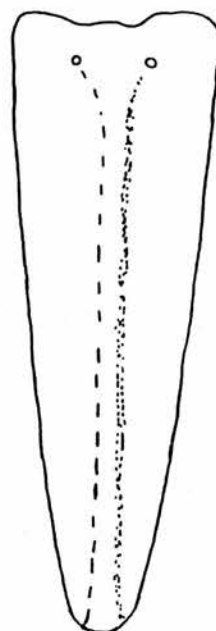
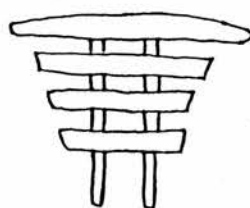


Fig. 47



1181



1186

Fig. 48

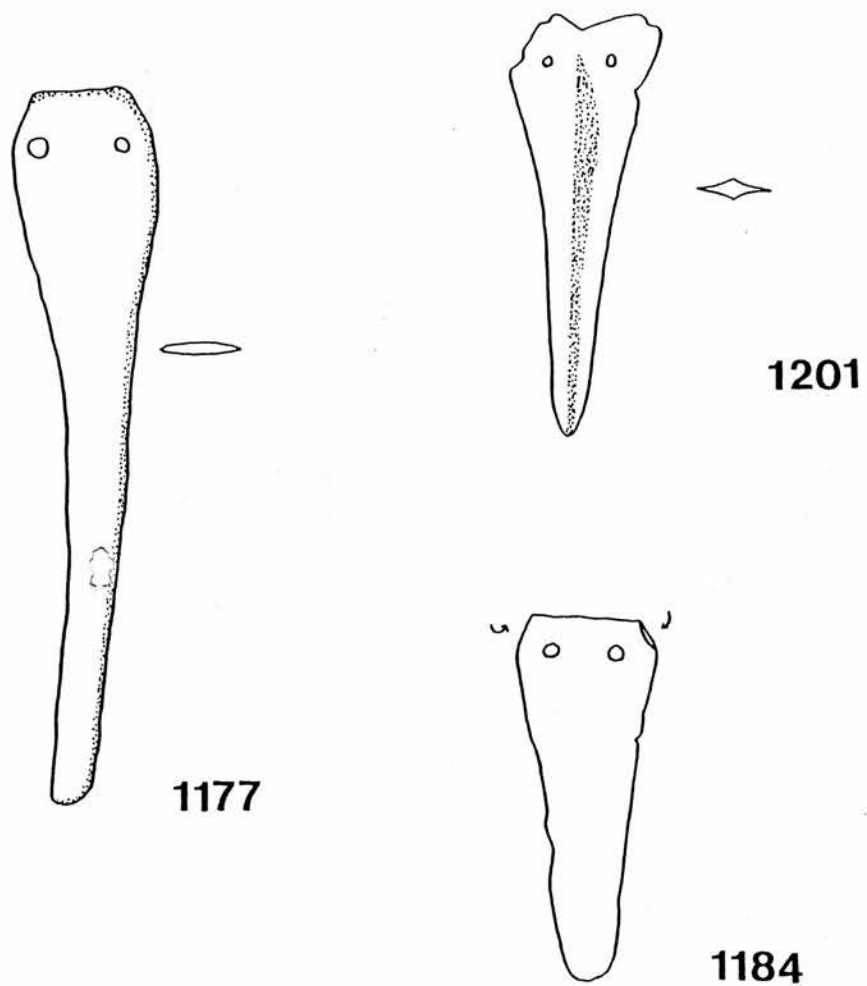
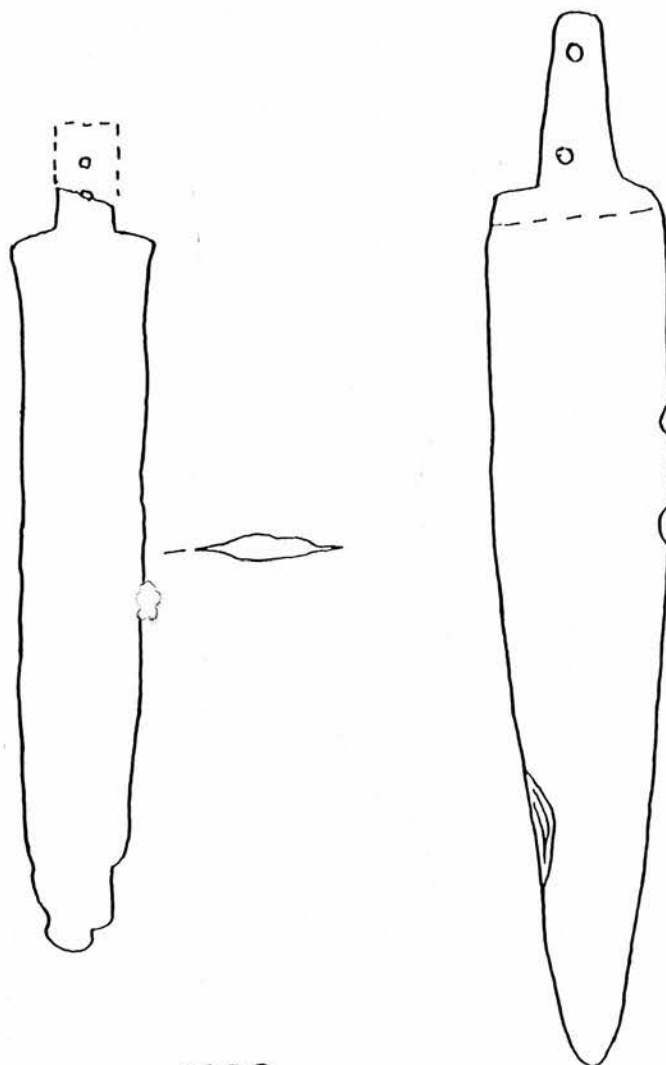


Fig. 49



1120

1330

Fig. 50

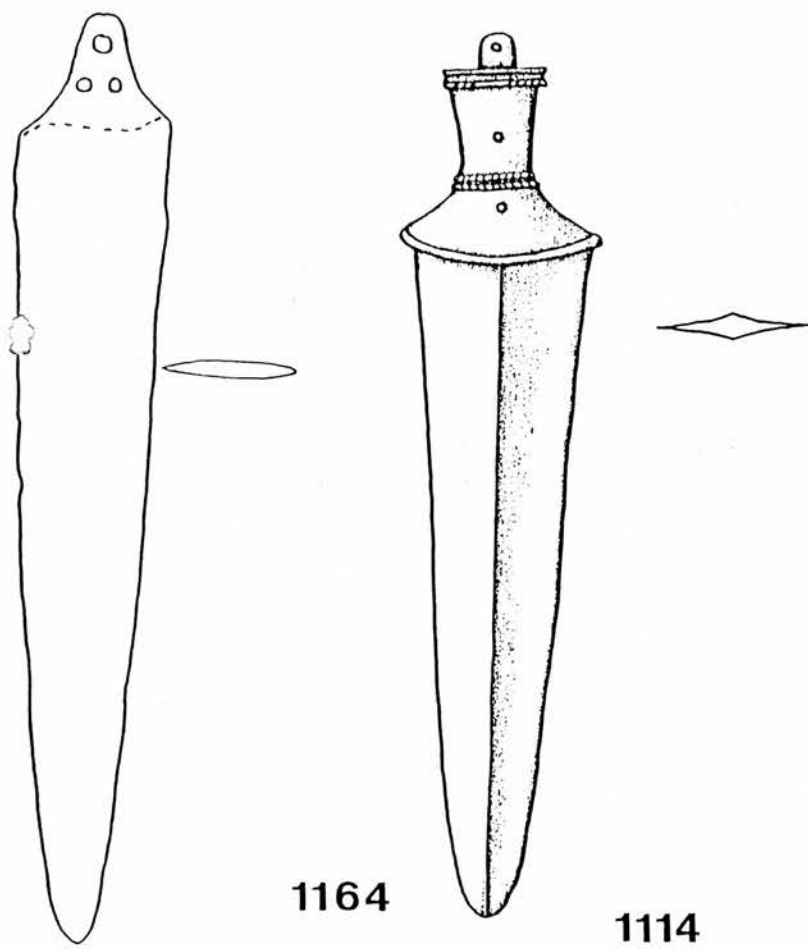
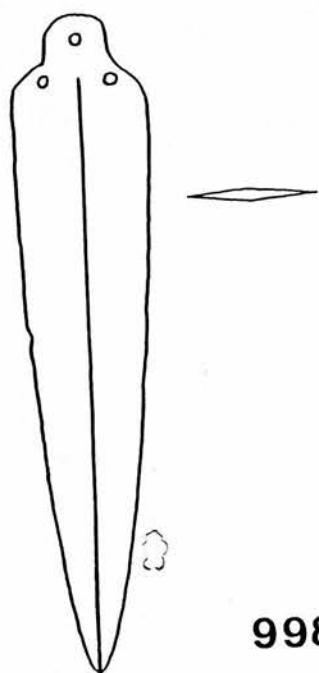
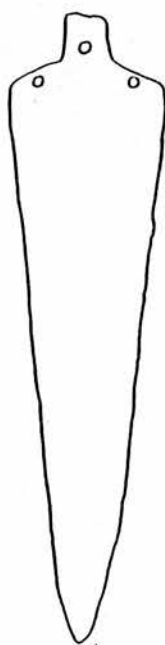


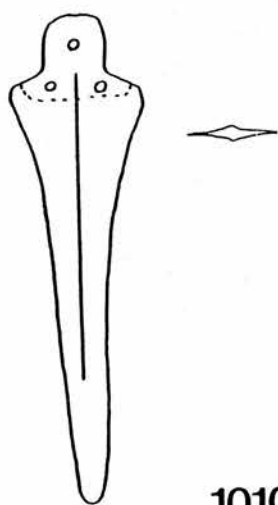
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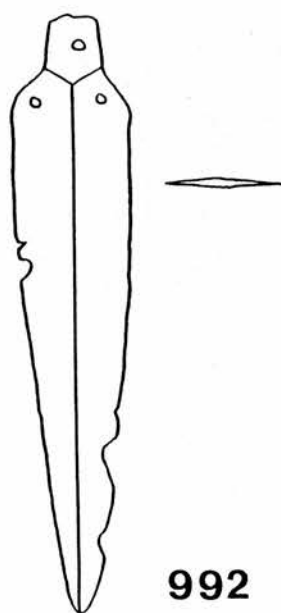
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980



1010



992

Fig. 52

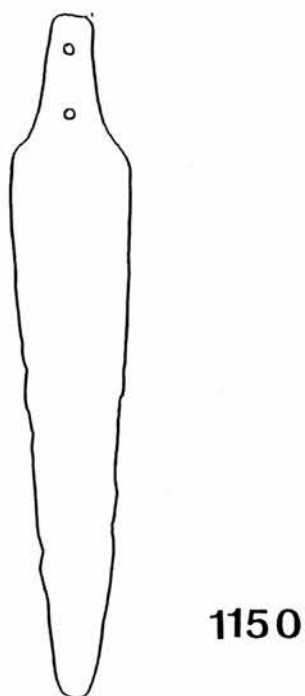
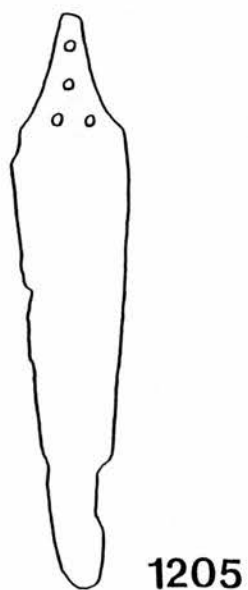
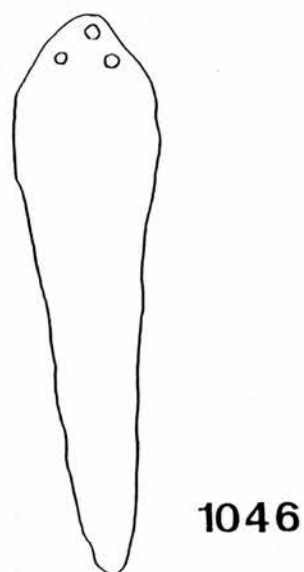
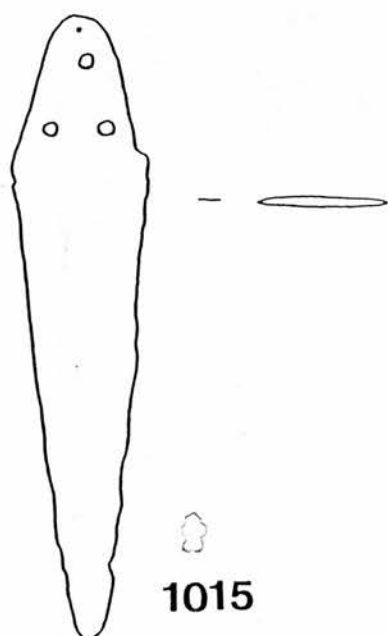


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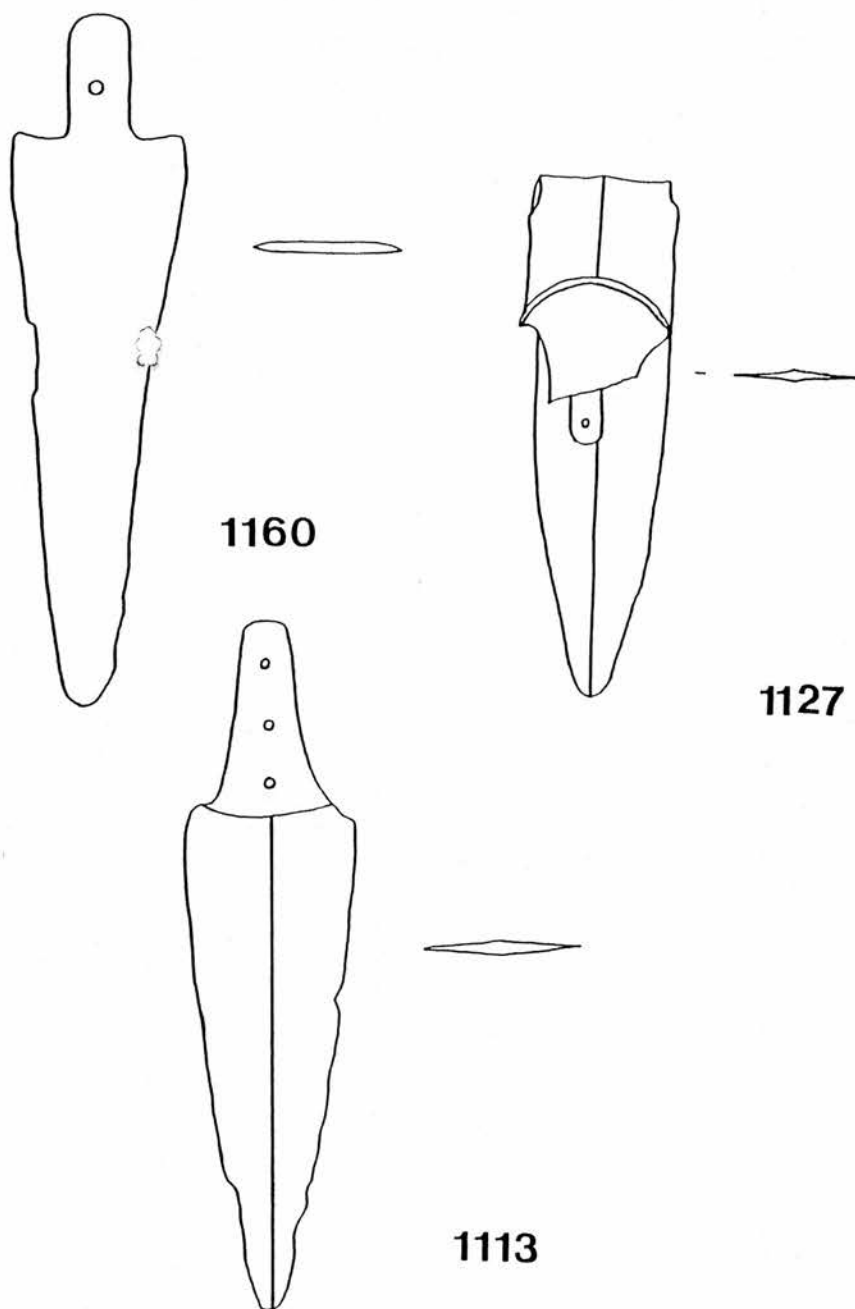
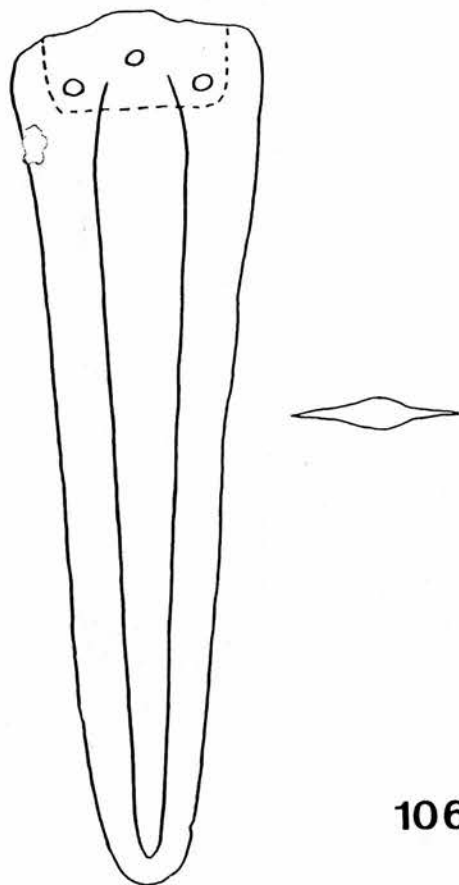


Fig. 54



1069

Fig. 55

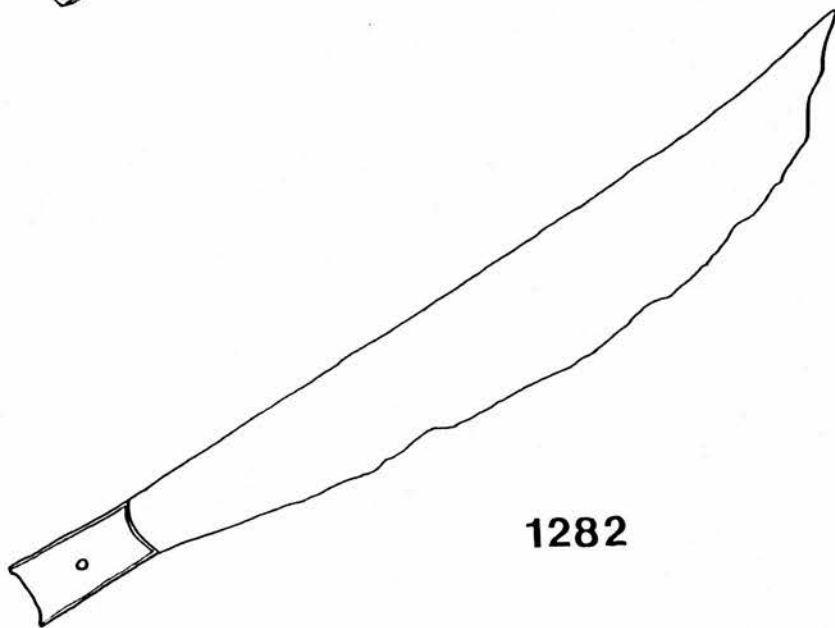
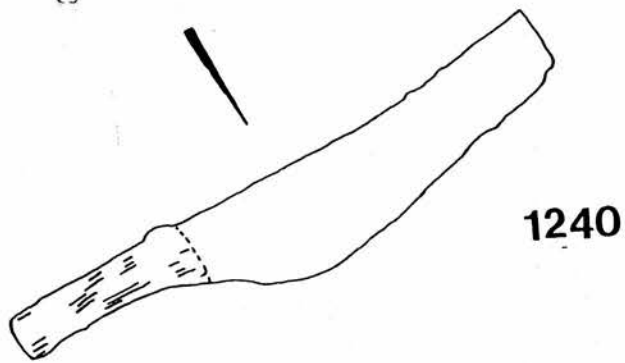


Fig. 56



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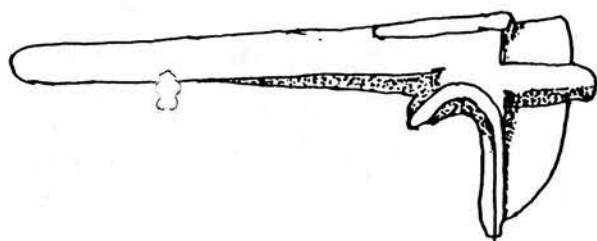


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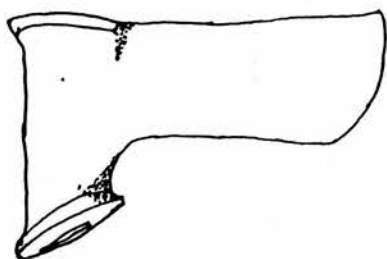


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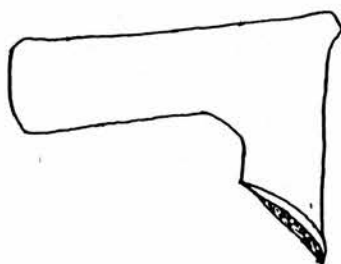
Fig. 57



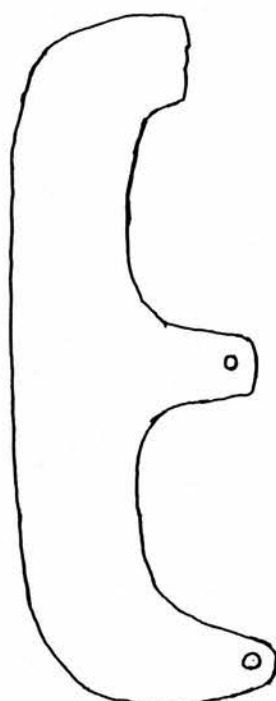
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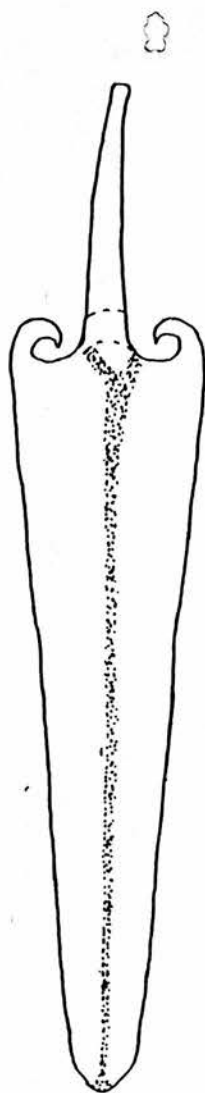
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451

Not to Scale

Fig. 58



Scale approx. 1:4.3

20

Fig. 59

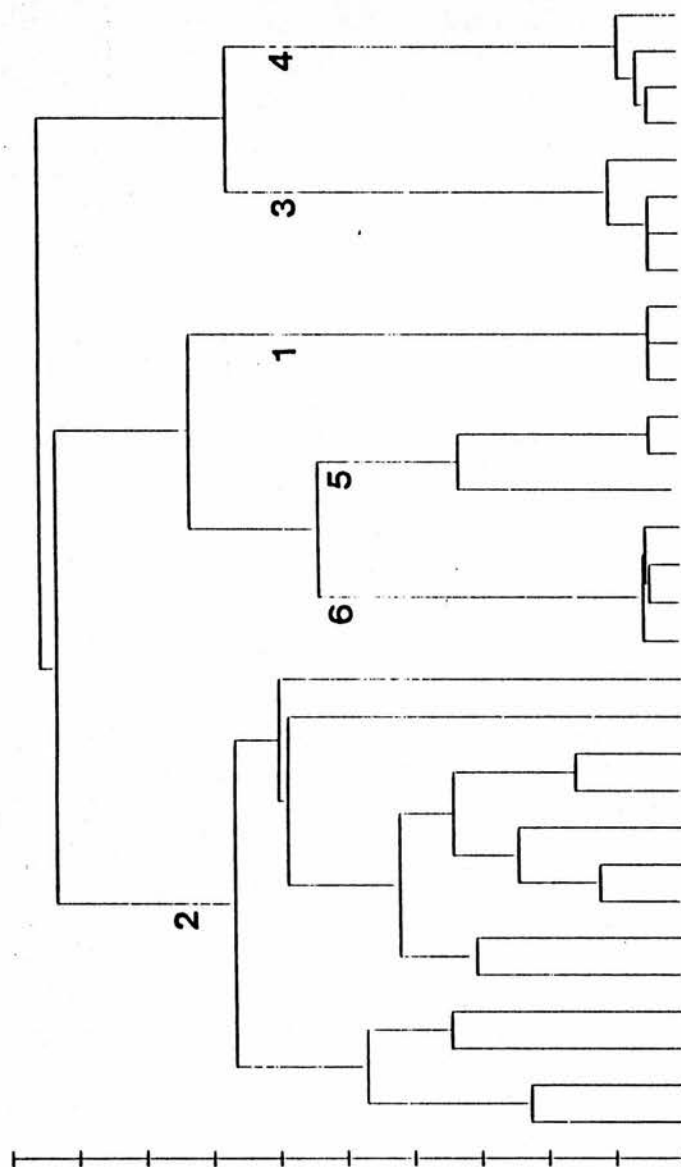


Fig. 61

CLUSTER ANALYSIS OF SHAFT-HOLE AXES. AVERAGE LINKAGE METHOD



Fig. 62

CLUSTER ANALYSIS OF TANGED SPEARHEADS, AVERAGE LINKAGE METHOD

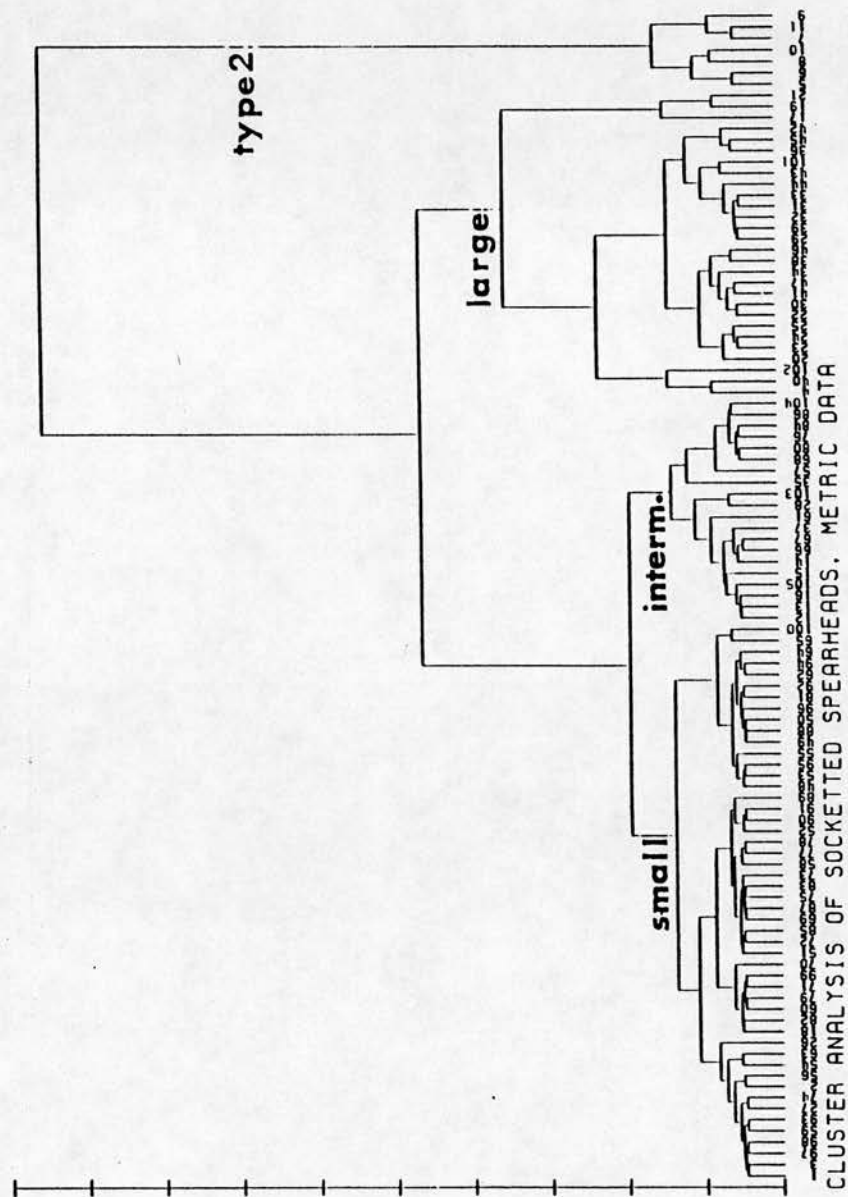
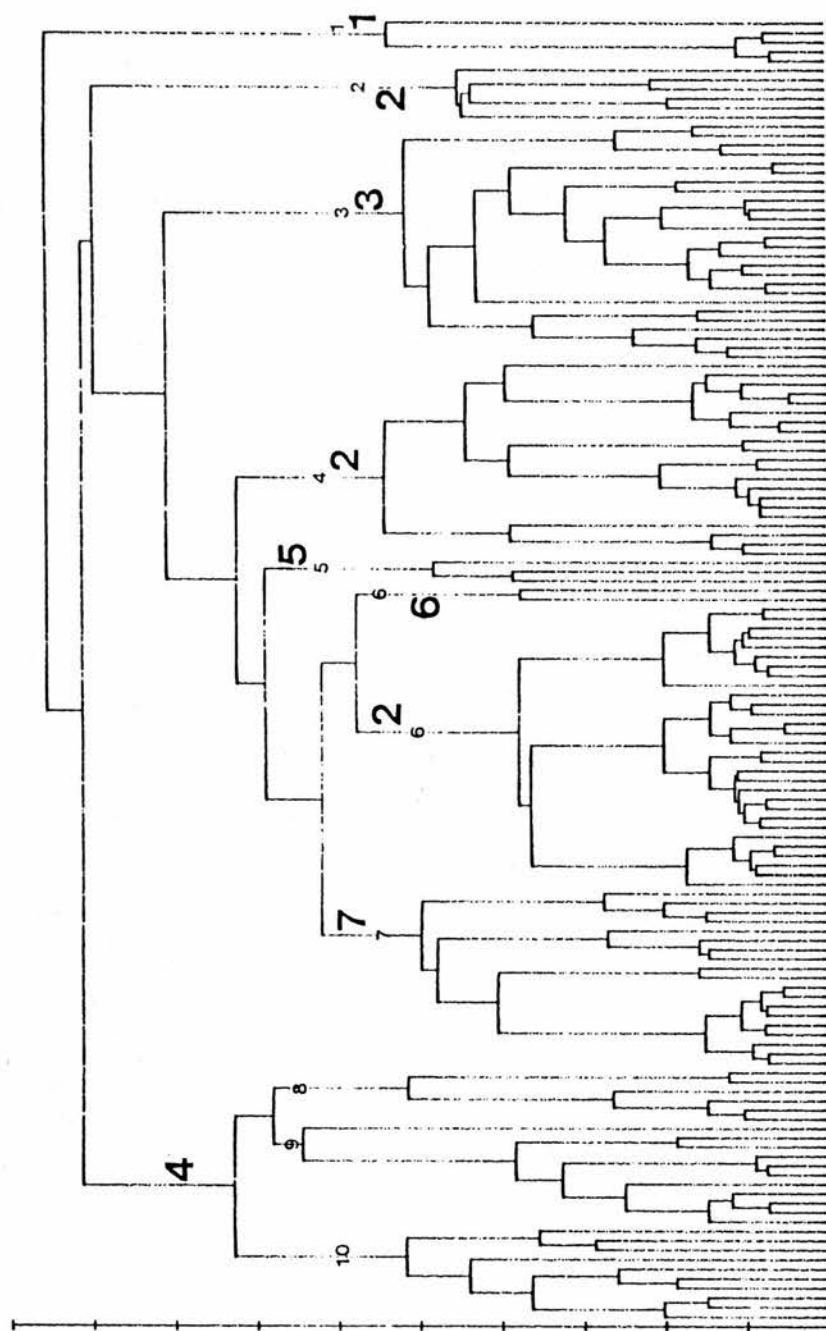


Fig. 63

CLUSTER ANALYSIS OF SOCKETED SPEARHEADS. METRIC DATA



Cluster Analysis of Narrow Daggers, Average Linkage Method

Fig. 64

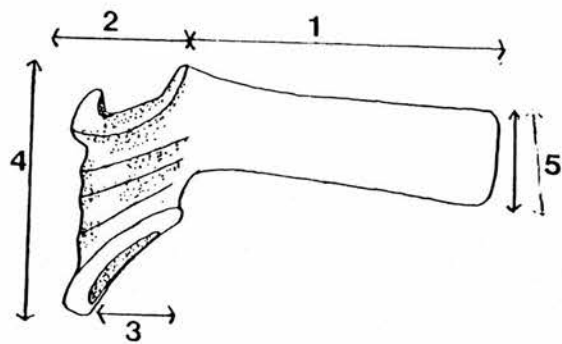
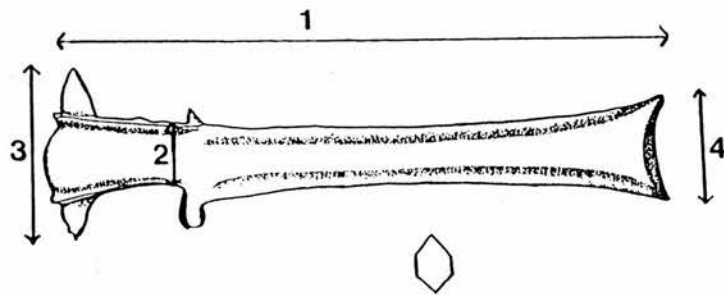


FIG.65

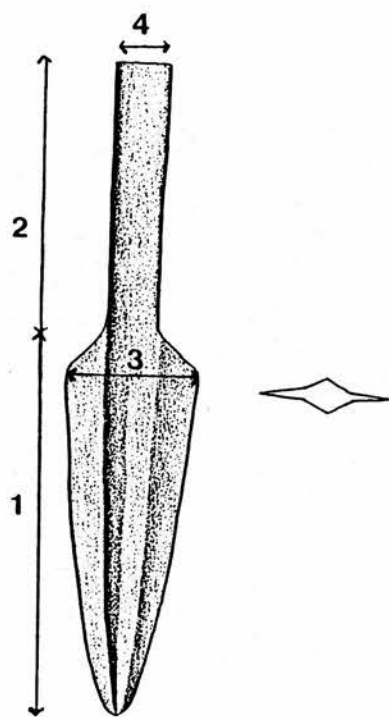
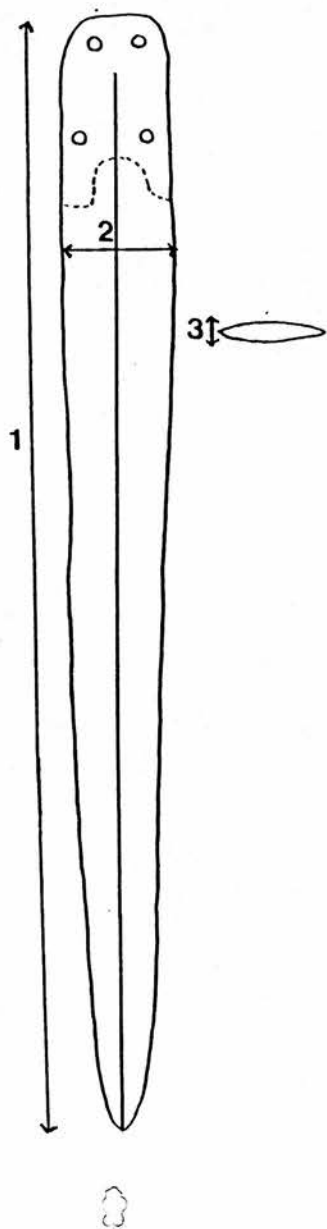


FIG. 66

NARROW-BLADED AXES
HISTOGRAM OF LENGTH (by Type)

Type 1 axes $N = 26$ $N^* = 1$

Midpoint	Count
100.0	0
110.0	3 ***
120.0	10 *****
130.0	6 *****
140.0	5 *****
150.0	2 **

Type 2 axes $N = 17$ $N^* = 2$

Midpoint	Count
100.0	0
110.0	0
120.0	0
130.0	1 *
140.0	3 ***
150.0	5 *****
160.0	7 *****
170.0	1 *

Type 3 axes $N = 6$

Midpoint	Count
100.0	0
110.0	0
120.0	0
130.0	1 *
140.0	2 **
150.0	2 **
160.0	1 *

Type 4 axes $N = 7$

Midpoint	Count
100.0	0
110.0	0
120.0	0
130.0	0
140.0	1 *
150.0	2 *
160.0	2 **
170.0	2 **
180.0	1 *

Type 1 axes tend to be shorter than the other types. Type 2 and Type 3 axes show a similar distribution, while Type 4 axes are clearly longer than the other types.

Fig. 67

NARROW-BLADED AXES

HEIGHT OF CUTTING EDGE Type 1 Axes N = 28

Midpoint	Count
10.00	1 *
12.00	2 **
14.00	5 *****
16.00	6 *****
18.00	7 *****
20.00	3 ***
22.00	3 ***
24.00	0
26.00	1 *

Type 2 Axes N = 19

Midpoint	Count
14.00	0
16.00	0
18.00	4 ****
20.00	4 ****
22.00	5 *****
24.00	3 ***
26.00	2 **
28.00	1 *

Type 3 Axes N = 6

Midpoint	Count
20.00	0
22.00	0
24.00	0
26.00	3 ***
28.00	2 **
30.00	0
32.00	0
34.00	1 *

Type 4 Axes N = 6

Midpoint	Count
18.00	0
20.00	0
22.00	1 *
24.00	0
26.00	0
28.00	4 ****
30.00	1 *
32.00	0
34.00	0
36.00	2 **

The cutting edges of each type cover a somewhat different range of sizes.
The metric data reinforces the evidence of the categorical variables.

Fig. 68

HARROW-BLADED AXES

INTERNAL LENGTH OF SOCKET / INTERNAL BREADTH OF SOCKET

Type 1 axes $N = 17$ $N^* = 11$

Midpoint	Count
1.000	0
1.200	0
1.400	1 *
1.600	1 *
1.800	0
2.000	1 *
2.200	6 *****
2.400	5 *****
2.600	0
3.000	0
3.200	0
3.400	1 *

Type 2 axes $N = 14$ $N^* = 5$

Midpoint	Count
1.000	0
1.200	0
1.400	2 **
1.600	6 *****
1.800	3 ***
2.000	1 *

Type 3 axes $N = 5$ $N^* = 1$

Midpoint	Count
1.000	1 *
1.200	0
1.400	3 ***
1.600	1 *

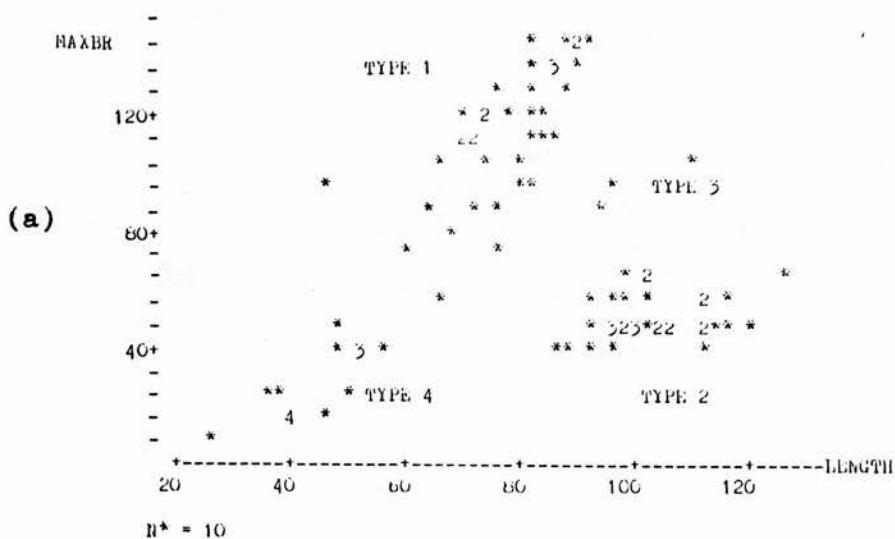
Type 4 axes $N = 6$ $N^* = 2$

Midpoint	Count
1.000	0
1.200	2 **
1.400	2 **
1.600	1 *
1.800	0
2.000	1 *

Although not used in the cluster analysis (too many missing values) the distribution of this variable confirms the basis of our typology. The sockets of Type 1 and 2 axes show markedly different shapes, the former being narrower than the latter. Both types have ovoid sockets but require hafts of slightly different section, reinforcing the notion of a difference between the types as suggested by their disparate values on major morphological variables. The limited data available for Type 3 axes suggests that they cover a similar range to that of axes of Type 2. Type 4 axes would seem to possess more circular sockets than the other types.

Fig. 69

PERFORATED AXES
Plot of MAXIMUM BREADTH against LENGTH



This plot clearly shows the separation of Types 1-4 on the basis of these two variables

PERFORATED AXES

Histogram of LENGTH $N = 93$ $R^* = 9$

(b)

Midpoint	Count
30	1 *
40	6 *****
50	8 *****
60	3 ***
70	12 *****
80	14 *****
90	16 *****
100	19 *****
110	10 *****
120	3 ***
130	1 *

Variable LENGTH shows a complex distribution

LENGTH/ MAX. BREADTH $N = 92$ $R^* = 10$

(c)

Midpoint	Count
0.4	4 ****
0.8	33 *****
1.2	12 *****
1.6	7 *****
2.0	17 *****
2.4	16 *****
2.8	2 **
3.2	0
3.6	1 *

This ratio seems to show a binodal distribution.

Fig. 70

FENESTRATED AXES

LENGTH OF FENESTRATIONS / BREADTH OF FENESTRATIONS

Type 1

Midpoint	Count
0.800	0
1.000	0
1.200	0
1.400	0
1.600	1 *
1.800	2 **
2.000	2 **
2.200	6 *****
2.400	5 *****
2.600	4 ****
2.800	4 ****
3.000	3 ***
3.200	2 **

Fenestrations are long and narrow

Type 2

Midpoint	Count
0.800	1 *
1.000	7 *****
1.200	10 *****
1.400	7 *****
1.600	2 **
1.800	0
2.000	1 *

Fenestrations are more circular; Length and Breadth nearly equal.

Type 3

Midpoint	Count
0.800	0
1.000	0
1.200	1 *
1.400	1 *
1.600	1 *
1.800	3 ***

Fenestrations lie between those of Types 1 and 2.

The shape of the fenestrations is determined by the overall shape of the dagger blade.



Fig. 71

Cross-classification of PROFILE OF BLADE by Type

- 1 = Flat blade
- 2 = Tapering
- 3 = Sinuous (i.e. bulge near cutting edge)

ROWS: PROFILE		COLUMNS: TYPE			
	1	2	3	4	ALL
1	0 20.16	37 21.96	7 4.15	10 7.71	54 54.00
2	11 5.23	0 5.69	0 1.00	3 2.00	14 14.00
3	23 8.59	0 9.35	0 1.77	0 3.29	23 23.00
ALL	34 34.00	37 37.00	7 7.00	13 13.00	91 91.00

- (a) The profiles of Types 2 and 3 are consistently flat, confirming the soundness of the divisions made on the basis of the plot of Length/Max.breadth. Type 1 axes show two different profiles.

Cross-classification of PRESENCE/ABSENCE OF FLANGE AROUND FENESTRATIONS, by Type

- 0 = Flange absent
- 1 = Flange present

ROWS: FLANGE		COLUMNS: TYPE			
	1	2	3	4	ALL
0	35 25.43	20 25.43	1 4.95	9 9.18	65 65.00
1	1 10.57	16 10.57	6 2.05	4 3.22	27 27.00
ALL	36 36.00	36 36.00	7 7.00	13 13.00	92 92.00

- (b) Although flanges are nearly always absent on axes of Type 1, the distribution of flanges throughout the other types is complex. 'Flange' comprises one element in a polythetic set of variables.

Fig. 72

FENESTRATED AXES

Cross-classification of SHAPE OF FENESTRATIONS, by Type

(the second line in all tables represents the expected frequency of a value for each type, according to the Chi-squared distribution.)

- 1 = Ovoid fenestrations
- 2 = Circular fenestrations

ROWS: FENSHAPE	COLUMNS: TYPE				
	1	2	3	4	ALL
1	35 21.36	5 21.36	3 3.56	13 7.71	54 54.00
2	1 14.64	33 14.64	3 2.44	0 5.29	37 37.00
ALL	36 36.00	36 36.00	6 6.00	13 13.00	91 91.00

- (a) This confirms the evidence of fig. 72 concerning the close connection between Shape of blade (in effect Type) and that of the fenestrations.

Cross-classification of FORM OF MIDRIB, by Type

- 0 = No midrib
- 1 = Sharp medial line
- 2 = Low humped midrib
- 3 = Blunt medial line
- 4 = Several radial lines

ROWS: NRIB	COLUMNS: TYPE				
	1	2	3	4	ALL
0	0 8.46	16 9.52	2 1.85	5 3.17	23 23.00
1	22 9.93	0 11.17	1 2.17	4 3.72	27 27.00
2	0 8.85	19 9.93	2 1.93	3 3.31	24 24.00
3	10 3.68	0 4.14	0 0.80	0 1.58	10 10.00
4	0 1.10	1 1.24	2 0.24	0 0.41	3 3.00
ALL	32 32.00	36 36.00	7 7.00	12 12.00	87 87.00

- (b) No type is restricted to any one form of midrib, although at least one form does not occur in every type.

Fig. 73

FENESTRATED AXES

Summary Table of main metric variables, Arranged by Type

ROWS: TYPE

	LENGTH	LENGTH	LENGTH	LAXER	HAXER	HAXER	HAXTH	HAXTH
	N	MEAN	STD DEV	N	MEAN	STD DEV	N	MEAN
1	35	102.51	9.37	34	49.32	7.66	21	16.667
2	37	77.41	9.76	39	115.03	20.05	8	6.625
3	5	88.00	17.48	7	89.00	14.99	1	11.000
4	14	43.50	8.31	14	27.71	12.42	2	3.000
ALL	91	82.43	22.35	94	76.02	38.45	32	13.125

	HAXTH	SOCKSHP	SOCKSHP	SOCKSHP	FENRATIO	FENRATIO	FENRATIO
	STD DEV	N	MEAN	STD DEV	N	MEAN	STD DEV
1	2.837	18	1.7264	0.2801	31	2.4397	0.4086
2	2.387	10	1.4846	0.1566	28	1.2342	0.2331
3	--	2	1.9698	0.2603	6	1.5844	0.2846
4	0.000	2	1.5722	0.1021	2	1.7179	0.0725
ALL	5.729	32	1.6450	0.2737	67	1.8578	0.6598

HAXTH = maximum thickness of blade

SOCKSHP = internal length of socket/Internal breadth of socket

FENRATIO = overall length /length of fenestrations

The differences between the types that can be seen in the last two variables are quite striking, and yet are not superficially obvious. SOCKSHP, rather implies that different handles would have been required for axes of Types 1 and 2, while FENRATIO shows clearly just how much of the overall length in Type 2 axes is taken up by the holes in the blade, i.e. how weak many such axes would have been in practice.

SHAFT-HOLE AXES
 SHAPE OF BLADE, Cross-tabulation by Type
 1= Square-section, sharp point
 2= Flat-section, parallel sides
 3= Flat-section, lobate
 4= Flat-section, flaring sides

ROWS: BLADFORM	COLUMNS: TYPE						
	1	2	3	4	5	6	ALL
1	3 0.44	0 1.78	0 0.59	0 0.59	0 0.44	1 0.15	4 4.00
2	0 0.69	6 3.56	0 1.19	0 1.19	0 0.89	0 0.50	6 6.00
3	0 0.33	3 1.33	0 0.44	0 0.44	0 0.33	0 0.11	3 3.00
4	0 1.33	1 5.33	4 1.78	4 1.78	3 1.33	0 0.44	12 12.00
ALL	3 3.00	12 12.00	4 4.00	4 4.00	3 3.00	1 1.00	27 27.00

(a) A clear concentration of certain forms of blade within certain types can be seen.

ANGLE OF BLADE, Crosstabulation by TYPE

1- blade lies horizontally when socket is vertical
 2- Blade tips downwards
 3- blade points slightly upwards

ROWS: BLADANGL	COLUMNS: TYPE						
	1	2	3	4	5	6	ALL
1	3 1.38	4 5.00	0 1.85	0 1.85	3 1.38	1 0.46	12 12.00
2	0 1.15	10 4.23	0 1.54	0 1.54	0 1.15	0 0.38	10 10.00
3	0 0.46	0 1.69	0 0.62	4 0.62	0 0.46	0 0.15	4 4.00
ALL	3 3.00	11 11.00	4 4.00	4 4.00	3 3.00	1 1.00	26 26.00

(b) Most types are restricted to a single blade angle, which may have implications for the mode of use.

Fig. 75

SHAFT-HOLE AXES

FORM OF SOCKET, Cross-tabulation by Type

- 1- Curved zone cut-away at bottom of socket
- 2- Upper margin of socket lies below top of blade
- 3- Plain, short, cylindrical socket
- 4- Plain, long, cylindrical socket
- 5- Upper margin of socket level with top of blade, angled lower margin
- 6- Both margins are slightly concave
- 7- Large cylindrical socket

ROWS: SOCKETFORM

COLUMNS: TYPE

	1	2	3	4	5	6	ALL
1	3 0.55	0 1.27	0 0.46	0 0.46	0 0.55	0 0.12	3 3.00
2	0 0.58	5 2.12	0 0.77	0 0.77	0 0.58	0 0.19	5 5.00
3	0 0.46	0 1.69	0 0.62	0 0.62	3 0.46	1 0.15	4 4.00
4	0 0.12	1 0.42	0 0.15	0 0.15	0 0.12	0 0.04	1 1.00
5	0 0.58 1	5 2.12 2	0 0.77 3	0 0.77 4	0 0.58 5	0 0.19 6	5 5.00 ALL
6	0 0.46	0 1.69	0 0.62	4 0.62	0 0.46	0 0.15	4 4.00
7	0 0.46	0 1.69	4 0.62	0 0.62	0 0.46	0 0.15	4 4.00
ALL	3 3.00	11 11.00	4 4.00	4 4.00	5 5.00	1 1.00	26 26.00

Note that certain types are restricted to a single form of socket, suggesting a clear association between form of blade and form of socket

Fig. 76

SHAFT-HOLE AXES

PRESENCE-ABSENCE OF STOP AHEAD OF SOCKET, Breakdown by TYPE

Coding for stop: 0- Absent
1- Short stop
2- Long stop

ROWS: STOP	COLUMNS: TYPE						ALL
	1	2	3	4	5	6	
0	3 2.00	11 6.00	0 2.67	0 2.67	3 2.00	1 0.67	18 18.00
1	0 0.44	1 1.78	3 0.59	0 0.59	0 0.44	0 0.19	4 4.00
2	0 0.56	0 2.22	1 0.74	4 0.74	0 0.56	0 0.19	5 5.00
ALL	3 3.00	12 12.00	4 4.00	4 4.00	3 3.00	1 1.00	27 27.00

Stops are common on axes of types 5 and 4 only.

Fig. 77

SOCKETED STEAKS, HISTOGRAM OF OF OVERALL LENGTH

Midpoint	Count
75.0	1 *
100.0	10 *****
125.0	27 *****
150.0	16 *****
175.0	17 *****
200.0	6 *****
225.0	4 *****
250.0	6 *****
275.0	12 *****
300.0	5 *****
325.0	2 **
350.0	0
375.0	2 **
400.0	0
425.0	1 *
450.0	3 ***
475.0	0
500.0	0
525.0	2 **
550.0	0
575.0	1 *
600.0	1 *

- a) The two end peaks visible suggest a complex distribution, implying that several different sizes of spear are present. This pattern is only made clear when the interval is set to 25mm, a rather lower value than would normally be used.

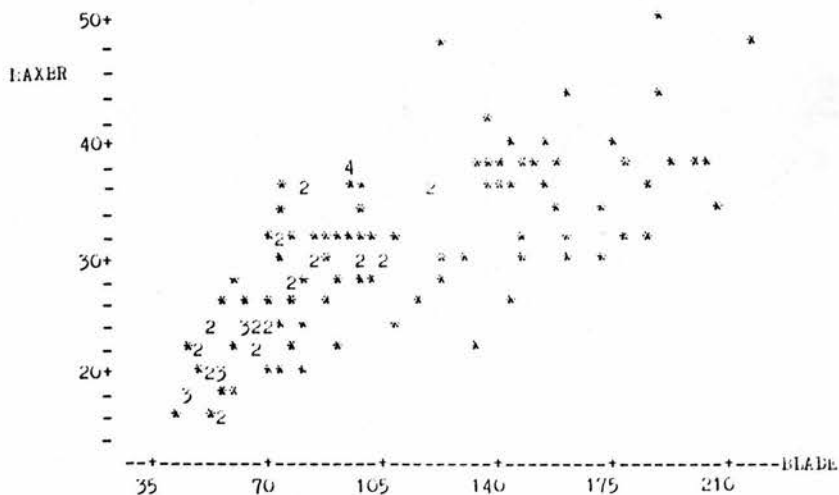
HISTOGRAM OF DIAMETER OF SOCKET

Midpoint	Count
8.00	1 *
9.00	3 *
10.00	6 *****
11.00	16 *****
12.00	12 *****
13.00	16 *****
14.00	8 *****
15.00	8 *****
16.00	10 *****
17.00	5 *****
18.00	5 *****
19.00	2 **
20.00	8 *****
21.00	6 *****
22.00	4 *****
23.00	2 **
24.00	1 *

- b) It is clear from the above that sockets of various diameters were used. Peaks can be seen at 11-13mm, 16mm and 20mm.

Fig. 78

Scatter Plot of maximum breadth v length of blade

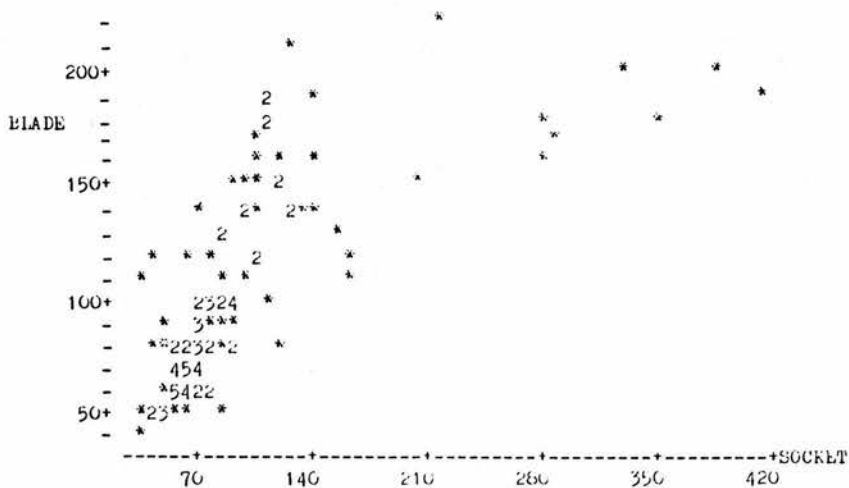


- a) A group of small spearheads can be distinguished (lower left). The cluster of larger spearheads (top right) seems rather less 'tight'



SOCKETTED SPEARHEADS

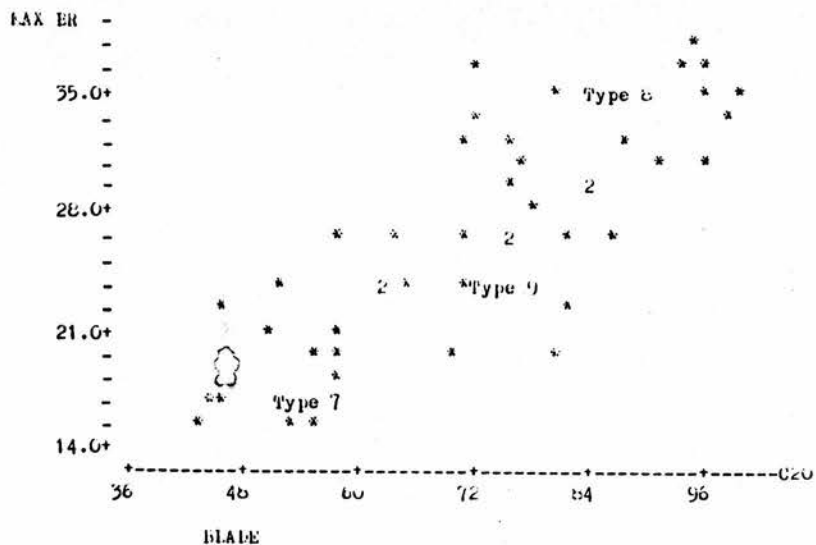
Scatter Plot of length of blade v length of socket



- b) Several possible clusters can be seen. A group with long sockets (Type 2) is easily visible. A tight cluster of small weapons (lower left) and a more diffuse scatter of larger ones can also be seen.

Fig. 79

Scatter Plot of length of blade v max. breadth
(types 7,8 and 9 only)



The three types can be seen to appear as distinct clusters,
within a 'continuum'.

Fig. 80

SOCKETTED STEERHEADS

Summary statistics for metric variables (Types 1-10)

ROWS: TYPE

	length of blade			length of socket			MAXBR H
	BLADE N	BLADE MEAN	BLADE STD DEV	SOCKET N	SOCKET MEAN	SOCKET STD DEV	
1	3	196.67	15.01	3	150.67	56.86	3
2	9	176.67	18.72	8	315.57	67.41	9
3	17	154.94	25.38	17	101.82	16.50	17
4	5	143.00	10.65	5	125.20	17.25	5
6	8	98.87	9.57	7	83.14	9.10	8
7	15	51.69	7.50	10	51.70	10.84	15
8	19	64.42	9.70	18	75.06	13.29	19
9	14	71.79	11.38	14	74.00	16.09	14
10	7	76.71	28.04	7	70.57	33.71	7

	max. breadth of blade			max. diameter of socket		
	MAXBR MEAN	MAXBR STD DEV	DIAETER H	DIAETER MEAN	DIAETER STD DEV	
1	47.333	3.055	3	25.000	1.000	
2	33.222	3.701	8	26.625	1.502	
3	35.529	2.787	15	19.400	2.473	
4	39.000	2.702	5	16.400	0.540	
6	29.625	3.159	7	16.266	0.951	
7	18.692	2.750	13	11.500	1.109	
8	32.737	3.195	18	12.944	1.790	
9	24.657	2.685	15	12.925	2.178	
10	21.429	1.272	5	14.200	0.447	

The different distribution of metric variables through the various types can be clearly seen.

Fig. 81

NARROW DAGGERS, TEN GROUPS SUGGESTED BY CLUSTER ANALYSIS
(summary of metric variables)

ROWS: GROUP

	length	length	length	rib	rib	rib	butt	butt
	N	MEAN	STD DEV	N	MEAN	STD DEV	N	MEAN
1	2	294.50	19.09	2	96.000	19.799	2	109.500
2	6	185.33	35.61	1	12.000	--	1	27.000
3	25	277.40	39.84	32	34.959	16.649	5	58.400
4	21	240.86	40.27	7	17.571	4.198	2	40.500
5	3	250.55	39.50	1	26.000	--	1	44.000
6	32	246.87	40.82	16	20.062	15.170	6	45.500
7	15	257.63	56.51	12	17.433	11.224	7	44.286
8	6	324.83	65.51	6	11.167	5.193	0	--
9	11	272.09	55.00	10	27.200	20.115	2	64.000
10	10	337.60	67.25	10	27.900	15.731	2	48.000
ALL	135	263.39	56.15	67	26.172	18.915	28	52.500

	butt	lastrivt	lastrivt	lastrivt	maxbr	maxbr	maxbr	LOCBR
	STD DEV		MEAN	STD DEV	N	MEAN	STD DEV	N
1	14.849	2	104.000	16.971	5	35.400	3.567	5
2	--	6	28.500	4.276	6	26.500	7.556	6
3	20.574	21	43.286	12.189	24	30.250	3.056	23
4	13.455	26	25.550	6.575	21	27.253	3.469	21
5	--	2	57.500	3.556	3	33.333	3.055	2
6	11.645	30	25.623	7.419	32	27.957	3.775	30
7	10.704	18	33.611	8.502	17	31.588	4.823	16
8	--	6	40.500	8.216	6	39.500	9.566	6
9	18.385	11	45.273	12.951	11	36.909	4.266	11
10	7.671	10	51.000	12.111	10	42.400	7.166	10
ALL	21.624	126	37.024	15.669	135	31.348	6.558	130

	locbr	locbr	maxth	maxth	maxth	lenbytr	lenbytr	lenbytr
	MEAN	STD DEV	N	MEAN	STD DEV	N	MEAN	STD DEV
1	182.40	9.76	5	4.0000	0.0507	2	8.845	0.737
2	149.67	32.94	3	4.5555	2.5160	6	7.408	1.991
3	223.09	33.86	25	5.1000	1.0077	23	9.225	1.472
4	204.57	37.89	13	5.6769	0.7596	21	8.641	0.902
5	202.00	45.08	2	5.5000	0.7071	3	7.450	0.641
6	207.73	31.20	21	5.9476	1.0235	32	8.522	1.533
7	207.69	57.08	17	5.2541	0.9156	17	8.259	2.034
8	275.00	60.44	6	6.8333	1.1691	6	8.364	1.232
9	219.45	48.27	9	5.5556	0.7265	11	7.376	1.168
10	275.60	67.06	10	7.0000	2.5906	10	8.022	1.246
ALL	215.51	49.56	111	5.4195	1.4203	131	8.548	1.537

rib = distance between end of midrib and butt-end of dagger

butt = Length of 'butt' of dagger

lastrivt = Distance of lowest rivet from butt-end of dagger

locbr = Location of point of maximum breadth, measured from point of dagger

lenbytr = Length / max. breadth

Fig. 82

NARROW DAGGERS, TEN GROUPS SUGGESTED BY CLUSTER ANALYSIS

Cross-tabulation of Shape of Butt by Group

21 = Square butt
22 = Trapezoidal butt
23 = Concave-sided butt
24 = Pointed butt
25 = Blunt butt
26 = Long butt

ROWS: BUTTSHP		COLUMNS: GROUP						
	1	2	3	4	5	6	7	8
21	0 1.21	0 1.45	3 4.84	11 4.84	0 0.72	13 7.02	4 4.36	0 1.45
22	0 1.60	0 1.92	0 6.41	7 6.41	0 0.96	10 9.29	10 5.77	6 1.92
23	0 1.05	0 1.27	4 4.22	0 4.22	3 0.63	6 6.12	0 3.66	0 1.27
24	0 0.55	6 0.66	0 2.19	2 2.19	0 0.55	6 3.17	0 1.97	0 0.66
25	0 0.39	0 0.47	5 1.56	0 1.56	0 0.39	6 2.27	4 1.41	0 0.47
26	5 0.20	0 0.25	0 0.78	0 0.78	0 0.12	0 1.13	0 0.70	0 0.25
ALL	5 5.00	6 6.00	20 20.00	20 20.00	3 3.00	29 29.00	18 18.00	6 6.00
	9	10	ALL					
21	0 2.66	0 2.42	31 31.00					
22	0 3.52	0 3.20	41 41.00					
23	10 2.32	10 2.11	27 27.00					
24	0 1.20	0 1.09	14 14.00					
25	1 0.66	0 0.78	10 10.00					
26	0 0.43	0 0.39	5 5.00					
ALL	11 11.00	10 10.00	128 128.00					

Fig. 83

NARROW DAGGERS, TEN GROUPS SUGGESTED BY CLUSTER ANALYSIS

Cross-tabulation of Section of Blade, by Group

		1 = Flat section 2 = Flat lozenge-shaped section 3 = Concave-lozenge-shaped section 4 = Flat section with marked central midrib 22 = Lentoid section 23 = Double groove down blade centreline.							
ROWS: SECTION		COLUMNS: GROUP							
	1	2	3	4	5	6	7	8	
1	0 0.04	1 0.04	0 0.19	0 0.19	0 0.02	0 0.23	0 0.13	0 0.04	
2	4 2.08	2 2.50	0 10.82	0 0.52	3 1.29	30 13.31	16 7.49	0 2.50	
3	1 0.69	1 0.83	0 3.61	0 2.77	0 0.42	2 4.44	0 2.50	4 0.83	
4	0 0.44	0 0.53	0 2.28	0 1.75	0 0.26	0 2.86	0 1.58	2 0.53	
22	0 0.80	2 0.96	0 4.18	20 9.21	0 0.42	0 5.14	0 2.89	0 0.96	
23	0 0.95	0 1.14	26 4.93	0 9.80	0 0.57	0 6.07	0 3.42	0 1.14	
ALL	5 5.00	6 6.00	26 26.00	20 20.00	3 3.00	32 32.00	18 18.00	6 6.00	
	9	10	ALL						
1	0 0.06	0 0.07	1 1.00						
2	0 4.58	0 4.16	57 57.00						
3	11 1.53	0 1.39	19 19.00						
4	0 0.96	10 0.88	12 12.00						
22	0 1.77	0 1.61	22 22.00						
23	0 2.09	0 1.90	26 26.00						
ALL	11 11.00	10 10.00	137 137.00						

Fig. 84

NARROW DAGGERS, TEN GROUPS SUGGESTED BY CLUSTER ANALYSIS

Cross-tabulation of Arrangement of Rivets, by Group

- 1 = Triangular layout, 3 rivets
- 2 = Square pattern, 4 rivets
- 3 = Two rows of 2 rivets
- 4 = Eight or more in two rows
- 5 = Two pairs of rivets plus one above
- 6 = One pair plus two in line above
- 7 = Several mainly in a linear arrangement

ROWS: RIVETPAT	COLUMNS: GROUP							
	1	2	3	4	5	6	7	8
1	0 0.50	0 0.01	0 2.25	3 1.50	0 0.50	0 3.25	2 1.00	0 0.01
2	0 1.77	0 2.55	4 9.75	15 6.75	1 1.27	32 15.50	0 7.59	0 2.53
3	0 0.50	0 1.97	12 7.22	1 0.50	0 0.50	0 10.50	10 5.91	6 1.97
4	0 0.07	0 0.14	0 0.52	0 0.47	0 0.07	0 0.75	0 0.42	0 0.14
5	0 0.26	0 0.52	0 1.19	1 1.72	1 0.16	0 2.75	0 1.55	0 0.52
	1	2	5	4	5	6	7	8
6	0 0.02	0 0.05	0 0.17	0 0.16	0 0.02	0 0.25	0 0.14	0 0.05
7	3 0.09	0 0.19	0 0.05	0 1.00	1 0.05	0 1.00	0 0.56	0 0.19
ALL	3 3.00	6 6.00	22 22.00	20 10.00	7 5.00	32 32.00	18 18.00	6 6.00
	9	10	ALL					
1	2 0.51	0 0.51	15 15.00					
2	2 3.00	0 3.00	54 54.00					
3	4 2.55	5 2.55	42 42.00					
4	0 0.21	5 0.21	5 5.00					
5	1 0.77	2 0.77	11 11.00					
6	0 0.07	1 0.07	1 1.00					
7	0 0.28	0 0.28	4 4.00					
ALL	9 9.00	9 9.00	128 128.00					

Fig. 85

NARROW DAGGERS, TYPES AS USED IN MAIN TEXT
 Summary statistics of main metric variables
 ROWS: TYPE

	LENGTH N	LENGTH MEAN	LENGTH STD DEV	MAXLN N	MAXLN MEAN	MAXLN STD DEV	MAXTH N
1	2	294.50	19.09	5	35.400	3.507	5
2	60	235.10	44.18	60	27.600	4.350	39
3	25	277.40	39.24	24	30.200	3.096	25
4	26	311.73	64.97	26	35.885	7.062	24
5	4	241.00	37.26	4	32.500	3.000	3
6	4	267.00	17.09	3	27.333	3.055	2
7	14	270.79	55.20	13	32.615	3.664	13
ALL	135	263.39	56.13	135	31.348	6.556	111

	MAXTH MEAN	MAXTH STD DEV
1	4.8000	0.8367
2	4.8462	1.0647
3	5.1600	1.0677
4	6.7500	1.9616
5	5.3333	0.9774
6	6.5000	0.7071
7	5.6154	0.9064
ALL	5.4595	1.4383

Fig. 86

NARROW DAGGERS, TYPES AS USED IN BALTIC TRAIT

Cross-tabulation of SHAPE OF BUTT by TYPE

ROWS: BUTTSHAP COLUMNS: TYPE

value codes as in Fig.

	1	2	3	4	5	6	7
21	0 1.21	24 13.56	3 4.84	0 0.00	0 0.97	2 0.75	2 3.39
22	0 1.60	18 17.94	8 6.41	6 0.33	0 1.28	1 0.96	8 4.48
23	0 1.05	0 11.81	4 4.22	19 5.40	4 0.84	0 0.63	0 2.95
24	0 0.55	14 6.12	0 2.19	0 2.64	0 0.44	0 0.33	0 1.55
25	0 0.39 1	0 4.37 2	5 1.56 3	1 2.09 4	0 0.51 5	0 0.25 6	4 1.09 7
26	5 0.20	0 2.19	0 0.78	0 1.02	0 0.16	0 0.12	0 0.55
ALL	5 5.00	56 56.00	20 20.00	20 20.00	4 4.00	3 3.00	14 14.00
ALL							
21	31 31.00						
22	41 41.00						
23	27 27.00						
24	14 14.00						
25	10 10.00						
26	5 5.00						
ALL	128 128.00						

Fig. 87

NARROW DAGGERS, TYPES AS USED IN BATH TEXT

Cross-tabulation of CROSS-SECTION OF BLADE, by TYPE

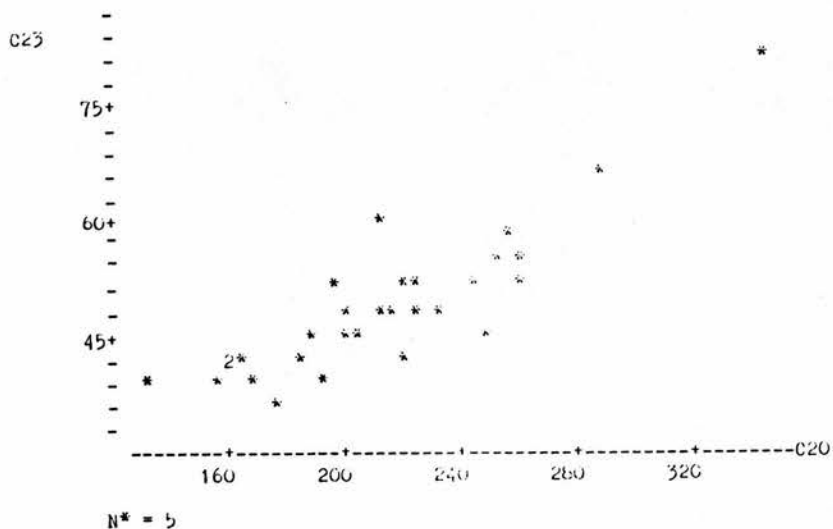
ROWS: SECTION

COLUMNS: TYPE

	1	2	3	4	5	6	7
1	0 0.04	1 0.43	0 0.19	0 0.19	0 0.03	0 0.03	0 0.09
2	4 2.06	35 24.55	0 10.82	0 10.82	3 1.66	2 1.66	13 5.41
3	1 0.69	1 8.18	0 3.61	14 3.61	1 0.55	2 0.55	0 1.80
4	0 0.44	0 5.17	0 2.78	12 2.28	0 0.35	0 0.35	0 1.14
22	0 0.80	22 9.47	0 4.18	0 4.18	0 0.64	0 0.64	0 2.09
23	0 0.95	0 11.20	26 4.53	0 4.53	0 0.76	0 0.76	0 2.47
ALL	5 5.00	59 59.00	26 26.00	26 26.00	4 4.00	4 4.00	13 13.00
ALL							
1	1 1.00						
2	57 57.00						
3	19 19.00						
4	12						
22	22 22.00						
23	26 26.00						
ALL	137 137.00						

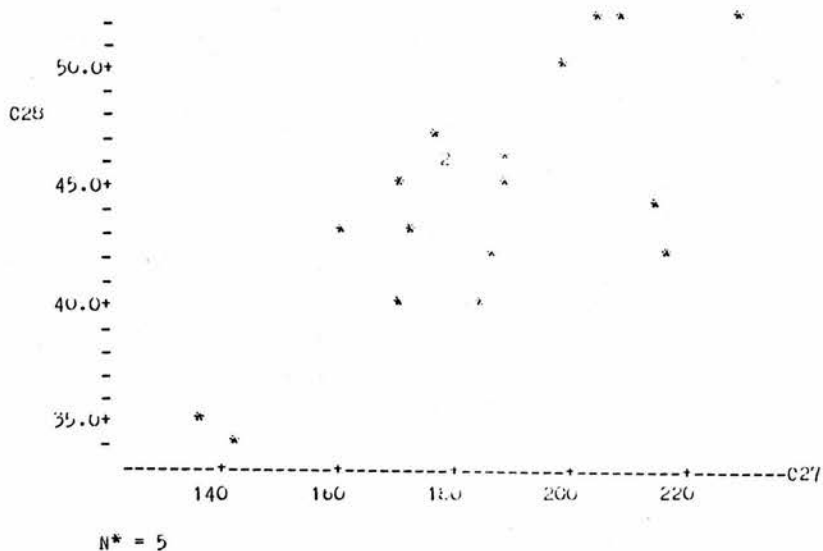
Fig. 88

Plot of length v max breadth, Dagger Type 12



- a) Correlation = 0.648
The high correlation suggests a deliberate attempt to maintain a particular 'shape' over a range of sizes.

Plot of length of blade v max breadth, Dagger Type 13



- b) Similar to Type 12 but the correlation is less marked.
Correlation = 0.730

Fig. 89

DAGGLERS WITH STYLED BLADES

Summary statistics for metric variables (all Types)

ROWS: TYPE

	LENGTH	LENGTH	LENGTH	TALG	TALG	TALG	BLADE	BLADE
	N	MEAN	STD DEV	N	MEAN	STD DEV	N	MEAN
12	30	212.50	44.77	5	25.333	2.309	5	190.80
13	22	205.64	27.90	20	25.450	13.953	22	182.86
15	5	173.00	79.33	5	26.333	20.551	3	190.00
16	5	253.60	69.00	4	26.250	14.245	2	212.00
17	16	215.67	25.46	16	26.667	7.190	18	187.94
18	2	215.50	4.95	2	36.000	5.657	2	179.50
19	2	215.00	0.00	2	49.500	2.121	2	165.50
ALL	82	211.55	42.23	50	26.580	12.324	54	186.00

	BLADE	RIVET	RIVET	RIVET	MAXBR	MAXBR	MAXBR	LOCBR
	STD DEV	N	MEAN	STD DEV	N	MEAN	STD DEV	N
12	50.84	23	17.652	4.000	31	48.710	9.166	26
13	22.13	0	--	--	21	45.648	5.324	22
15	36.66	3	29.000	17.660	4	28.250	10.112	4
16	36.77	3	21.333	6.058	5	47.200	21.510	5
17	22.01	1	29.000	--	18	36.278	3.878	17
18	10.61	0	--	--	2	29.000	1.414	2
19	2.12	2	43.500	0.707	2	40.500	2.121	2
ALL	25.97	32	21.031	9.000	63	43.337	10.343	78

	LOCBR	LOCBR	HAXTH	HAXTH	HAXTH
	MEAN	STD DEV	N	MEAN	STD DEV
12	185.35	35.31	10	6.0000	1.0997
13	173.00	22.54	14	7.0714	1.5424
15	118.75	55.56	4	5.7500	3.3040
16	212.00	53.46	0	--	--
17	179.59	22.95	17	6.0000	1.0000
18	171.50	19.09	0	--	--
19	165.00	2.85	2	6.5000	0.7071
ALL	178.03	34.66	47	6.3191	1.0031

Fig. 90

DAGGERS WITH STYLED BLADES

a) Cross-tabulation of SHAPE OF POINT by Type

- 1 = Sharp point
- 4 = Rhomboidal-section point
- 5 = Angled point

ROWS: TYPE	COLUMNS: POINT			
	1	4	5	ALL
12	24	2	0	26
13	16	7	0	23
15	4	0	0	4
16	2	1	1	4
17	1	16	0	17
18	1	1	0	2
19	0	2	0	2
ALL	48	29	1	78

DAGGERS WITH STYLED BLADES

b) Cross-tabulation of SHAPE OF BLADE, by Type

- 1 = Straight-tapering blade
- 3 = Concave-sided blade
- 7 = Convex-sided blade

ROWS: TYPE	COLUMNS: BLSHAPE			
	1	3	7	ALL
12	18	7	6	31
13	8	0	11	19
15	3	0	0	3
16	5	0	0	5
17	17	0	1	18
18	2	0	0	2
19	2	0	0	2
ALL	55	7	18	80

Fig. 91

DAGGERS WITH FLANGED-HILTS
Summary table of metric variables (all Types)

ROWS: TYPE

	LENGTH N	LENGTH MEAN	LENGTH STD DEV	TANG N	TANG MEAN	TANG STD DEV	BLADE N	BLADE MEAN
20	6	163.17	14.66	6	38.333	6.346	6	123.17
21	6	200.17	22.37	6	46.833	12.608	6	153.33
22	2	393.00	16.97	2	94.000	36.770	2	299.00
23	1	149.00	--	1	33.000	--	1	116.00
24	2	228.00	70.71	2	62.500	3.536	2	165.50
ALL	19	210.58	72.26	19	50.316	20.702	19	159.74
	BLADE STD DEV	RIVET N	RIVET MEAN	RIVET STD DEV	MAXBR N	MAXBR MEAN	MAXBR STD DEV	
20	14.66	1	35.000	--	6	24.833	3.817	
21	24.11	5	37.200	11.432	6	35.333	5.502	
22	53.74	2	81.000	39.596	2	45.500	0.707	
23	--	0	--	--	1	32.000	--	
24	67.18	1	54.000	--	2	33.000	7.071	
ALL	57.97	11	47.636	22.576	19	33.211	7.948	
	LOCBR N	LOCBR MEAN	LOCBR STD DEV	LAXTH N	LAXTH MEAN	LAXTH STD DEV		
20	6	102.00	31.67	2	3.0000	0.0000		
21	6	152.50	23.57	6	4.5000	0.8367		
22	2	296.50	55.86	1	8.0000	--		
23	1	114.00	--	1	5.0000	--		
24	2	197.00	111.72	2	3.0000	2.8284		
ALL	19	153.68	69.02	14	4.9286	1.6392		

The importance of metric variables in type-definition can be clearly seen here.

Fig. 92

b)

List of narrow-bladed axes from grave contexts, by Type

ITEMID	MABTYPE	SITENAME	CONTEXT
400	1	El-Gib	T 31-31A
399	1	Ginsoar	T 1
397	1	Ginsoar	T 2/3
396	1	Ginsoar	T 2/3
395	1	Khirbet Kufin	T 3 Ch 3-4 upper str
390	1	Khirbet Kufin	T 3 Ch 3-4 upper str
387	1	Khirbet Kufin	T 912D
386	1	Mejiddo	T 911A1
385	1	Mejiddo	T 911D into floor
384	1	Mejiddo	T 911D into floor
401	1	Rosa	T 3168
400	1	Na'an	Cave 2
436	1	Ruweise	T 33
407	1	Ruweise	T 57
406	1	Ruweise	T 57
411	1	Ruweise	T 56
403	1	Ruweise	T 74
392	1	Ruweise	T 74
393	1	Safad	Tomb
402	1	Safad	Coll Grave
405	1	Tell Sukas	A/II-1/12 Gr 5
404	1	Tell ed-Bab'a	F/II-q/23 Gr 1
406	1	Tell ed-Bab'a	T 1015
424	2	El-Git	T 45
426	2	Jericho	T J3 corpse
428	2	Jericho	T J3 other
429	2	Jericho	T J3 other
425	2	Jericho	T A134
413	2	Khirbet Kufin	T 3 Ch 6-7 upper str
432	2	Mejiddo	T 4110
446	2	Tell ed-Bab'a	From destroyed tomb
444	2	Tell ed-Bab'a	A/II-1/12 Gr 2 b2
445	2	Tell ed-Bab'a	A/I-6/3 Gr 1
446	2	Tell ed-Bab'a	A/I-6/3 Gr 1
447	2	Tell ed-Bab'a	A/I-6/3 Gr 1
441	2	Tell ed-Bab'a	A/II-m/10 Gr 8 b1
440	2	Tell ed-Bab'a	A/II-m/15 Gr 1 b5
439	2	Tell ed-Bab'a	A/II-m/15 Gr 1 b5
450	2	Tell ed-Bab'a	A/II-9/21 Gr 7
427	3	Jericho	T 9
418	3	Ras Shamra	T LVI
414	3	Ras Shamra	T LVI
435	3	Tel Aviv Harbour	T 6
443	3	Tell ed-Bab'a	A/II-1/14 Gr 5
420	4	Ras Shamra	T LVI
421	4	Ras Shamra	T LVI
423	4	Ras Shamra	T LVI
417	4	Ras Shamra	T LVI
422	4	Ras Shamra	HB tomb Area A
449	5	Tell el-AjJul	T 1750

a)

List of fenestrated axes from grave contexts, by Type

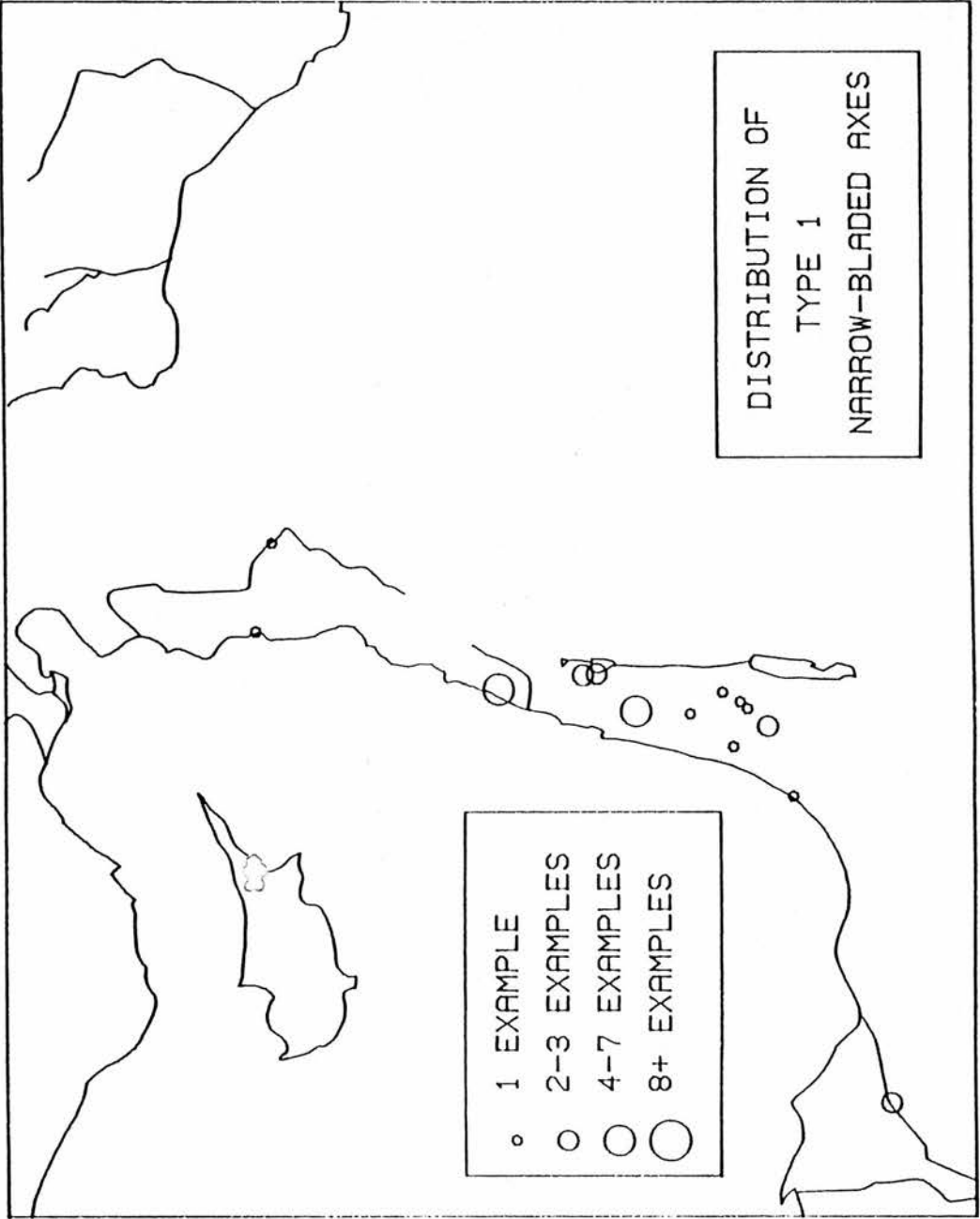
ITEMID	FENTYPE	SITENAME	CONTEXT
488	1	Asrit	T 4
489	1	Asrit	T 4
486	1	Asrit	N F D
487	1	Asrit	N F D
491	1	Asrit	N F D
661	1	Bagrouz	Z 96
662	1	Bagrouz	Z 102
483	1	Bagrouz	Z 121
484	1	Bagrouz	Z 123
485	1	Bagrouz	Z 143
486	1	Bagrouz	Z 305
459	1	Beth Shan	T 92
514	1	Byblos	T de Partic III
515	1	Byblos	T de Partic III
495	1	Esh-Shejara	Tomb
485	1	Hama	T C 1
486	1	Hama	T C 1
1214	1	Kurduken	Tomb
485	1	Lebea	T 1 Ch a
538	1	Ras Shamra	T 3480 in Necr III
539	1	Ras Shamra	Necr I
541	1	Ras Shamra	Charnier bwn C of 2
545	1	Ras Shamra	Charnier bwn T of 2
553	1	Ras Shamra	Charnier bwn T of 3
470	1	Ruweise	Charnier bwn T of 5
495	1	Safad	Tomb
492	1	Sin el-Fil	Tomb
493	1	Tel Rehov	T 2
496	1	Tell Dan	Rampart
471	1	Tell Hardikih	Hyp B
478	1	Tell et-Tin	Tomb
479	1	Tell et-Tin	Tomb
480	1	Tell et-Tin	Tomb
481	1	Tell et-Tin	Tomb
483	1	Tell et-Tin	Tomb
484	1	Tell et-Tin	Tomb
494	1	Tell et-Tin	Tomb
490	2	Yabrud	N F D
487	2	Asrit	T 7 Layer 4
488	2	Hama	T G VI
489	2	Hama	T G VI
496	2	Mejiddo	T 6
502	2	Ras Shamra	T 3480 in Necr III
557	2	Ras Shamra	T 3480 in Necr III
561	2	Ras Shamra	T 3480 in Necr III
562	2	Ras Shamra	T 3480 in Necr III
560	2	Ras Shamra	Necr III
546	2	Ras Shamra	Graves of 'Porteurs'
547	2	Ras Shamra	Graves of 'Porteurs'
485	2	Tell et-Tin	Tomb
472	3	Tell Hardikih	Hyp B
473	3	Tell Hardikih	Hyp C
462	4	Bagrouz	Z 103bis
1427	6	Near Dara'a	Tumulus

Fig. 93

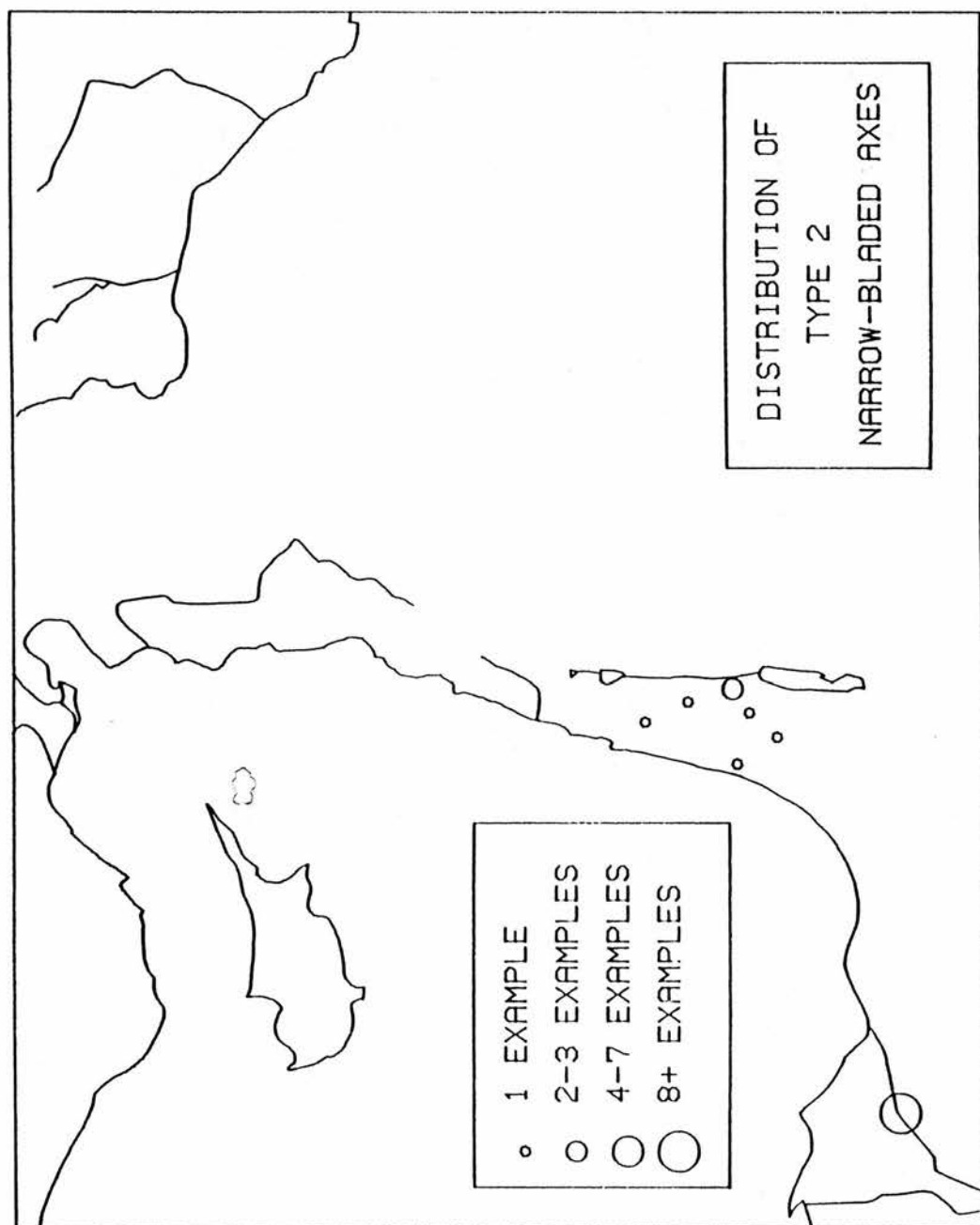
Absolute Chronology (Palestine; adapted from Weinstein 1984)

E.B.I	3400-3100
E.B.II	3100-2750/2700
E.B.III	2750/2700-2350/2300
E.B.-M.B	2350/2300- 2000/1950 (possible regional differences)
M.B.I	2000/1950-1750
M.B.II	1750-c1550

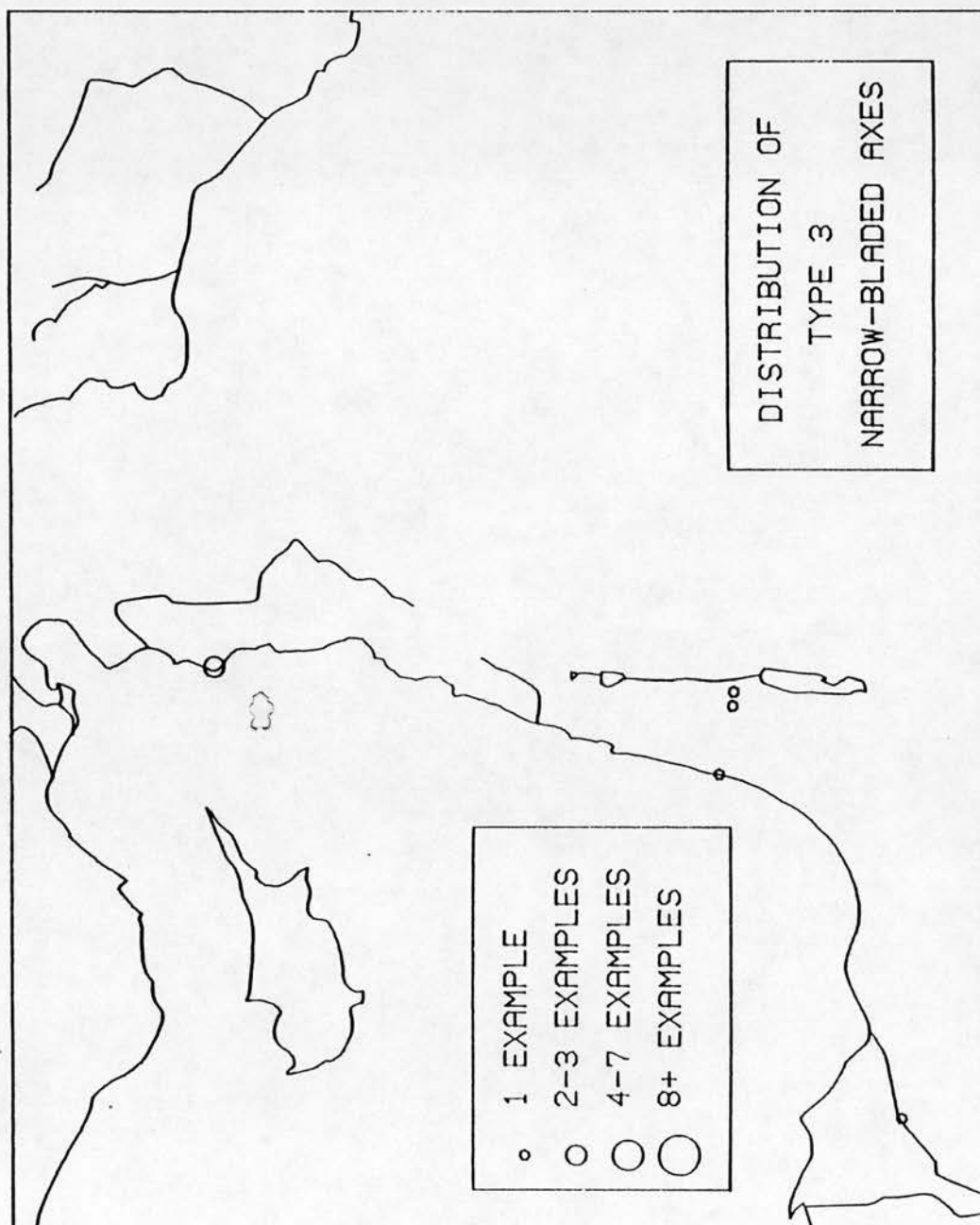
Fig. 96



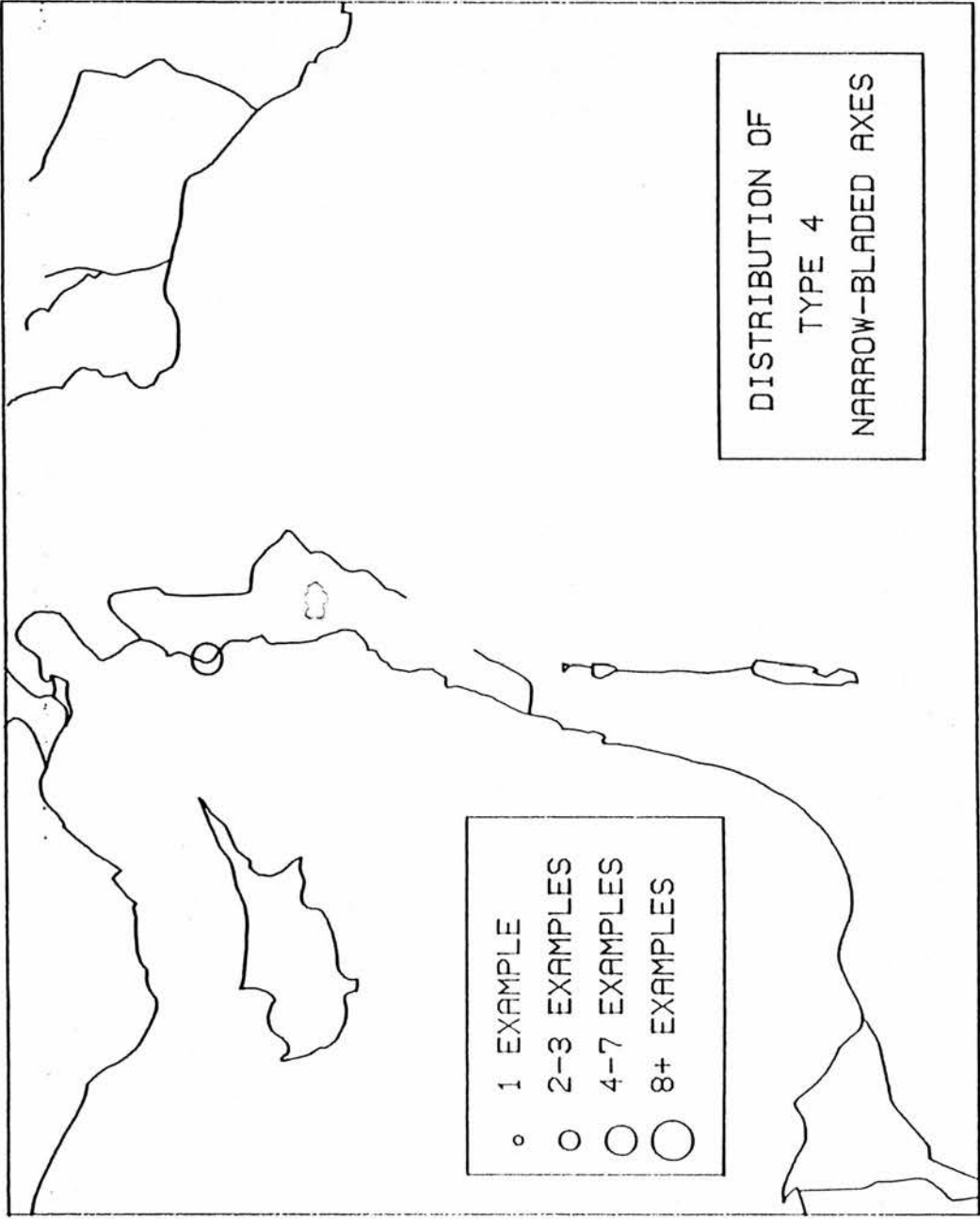
Map 1



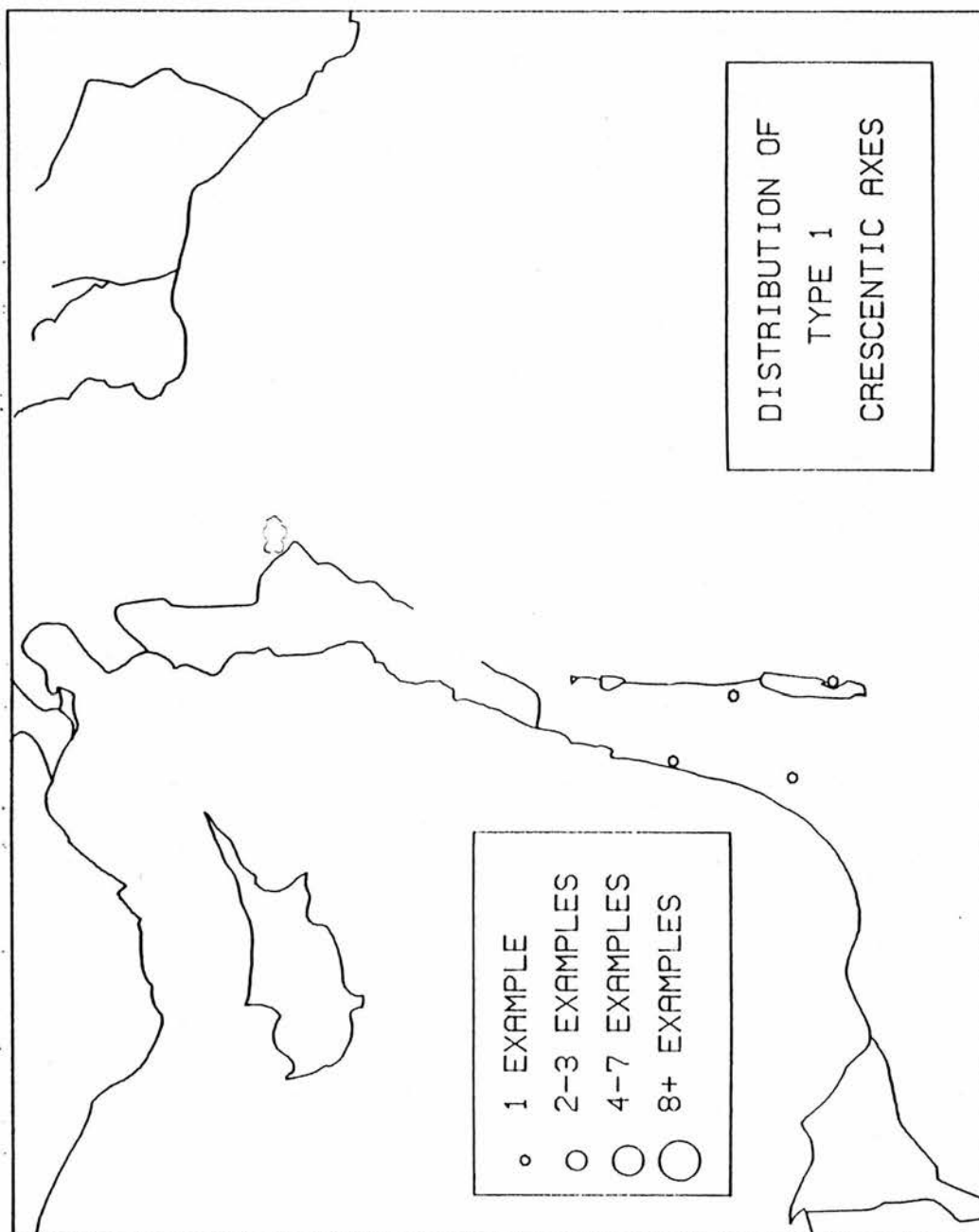
Map 2



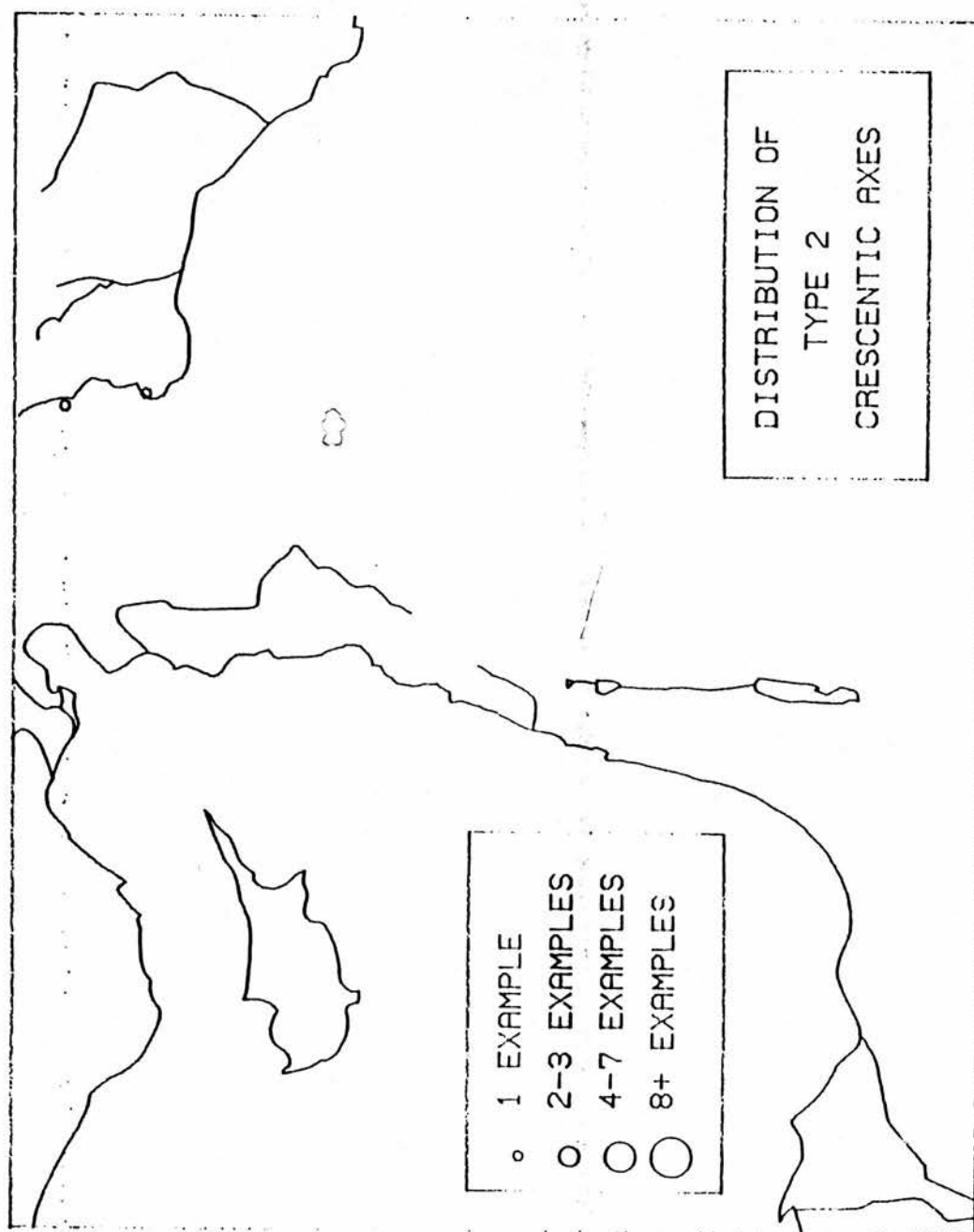
Map 3



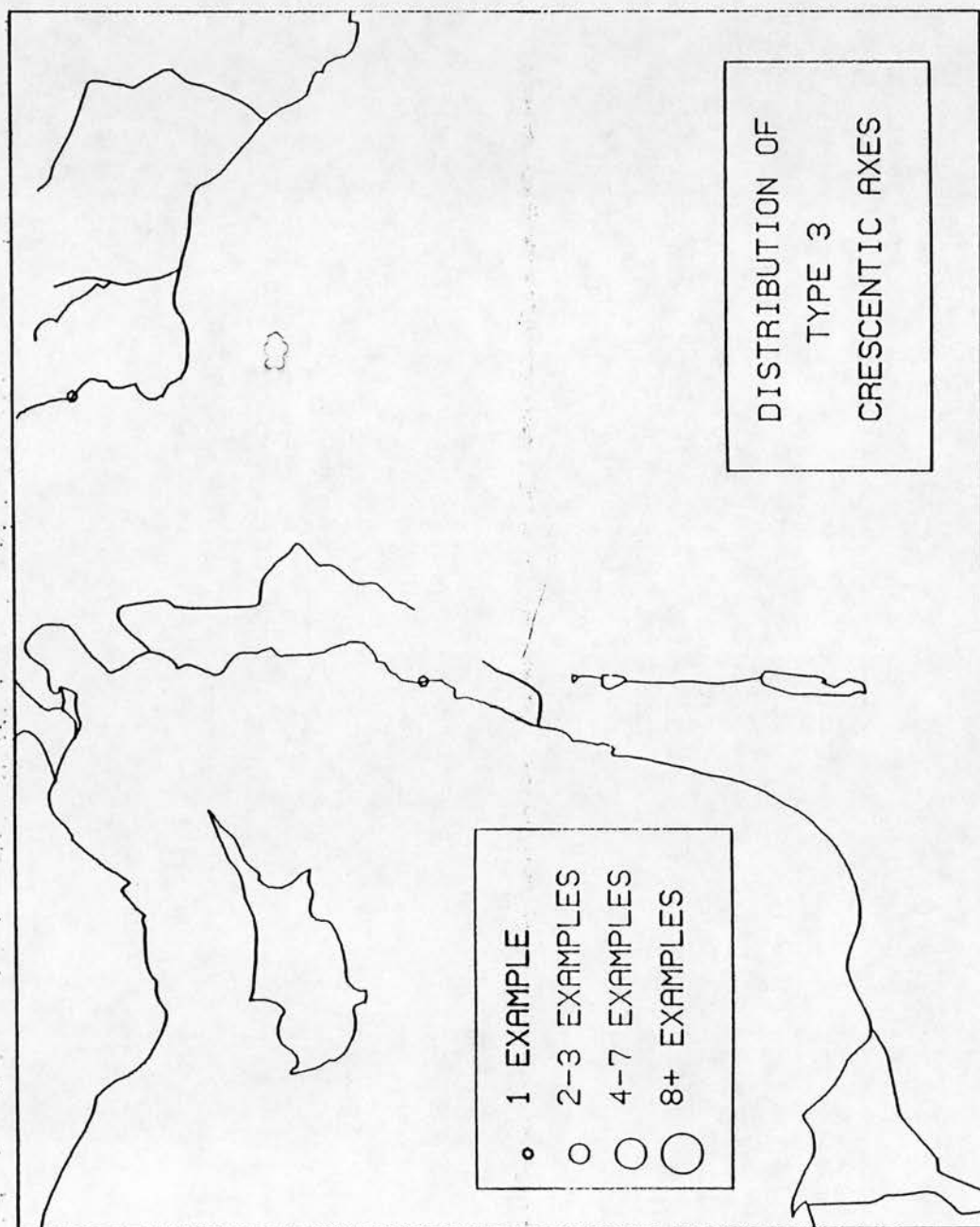
Map 4



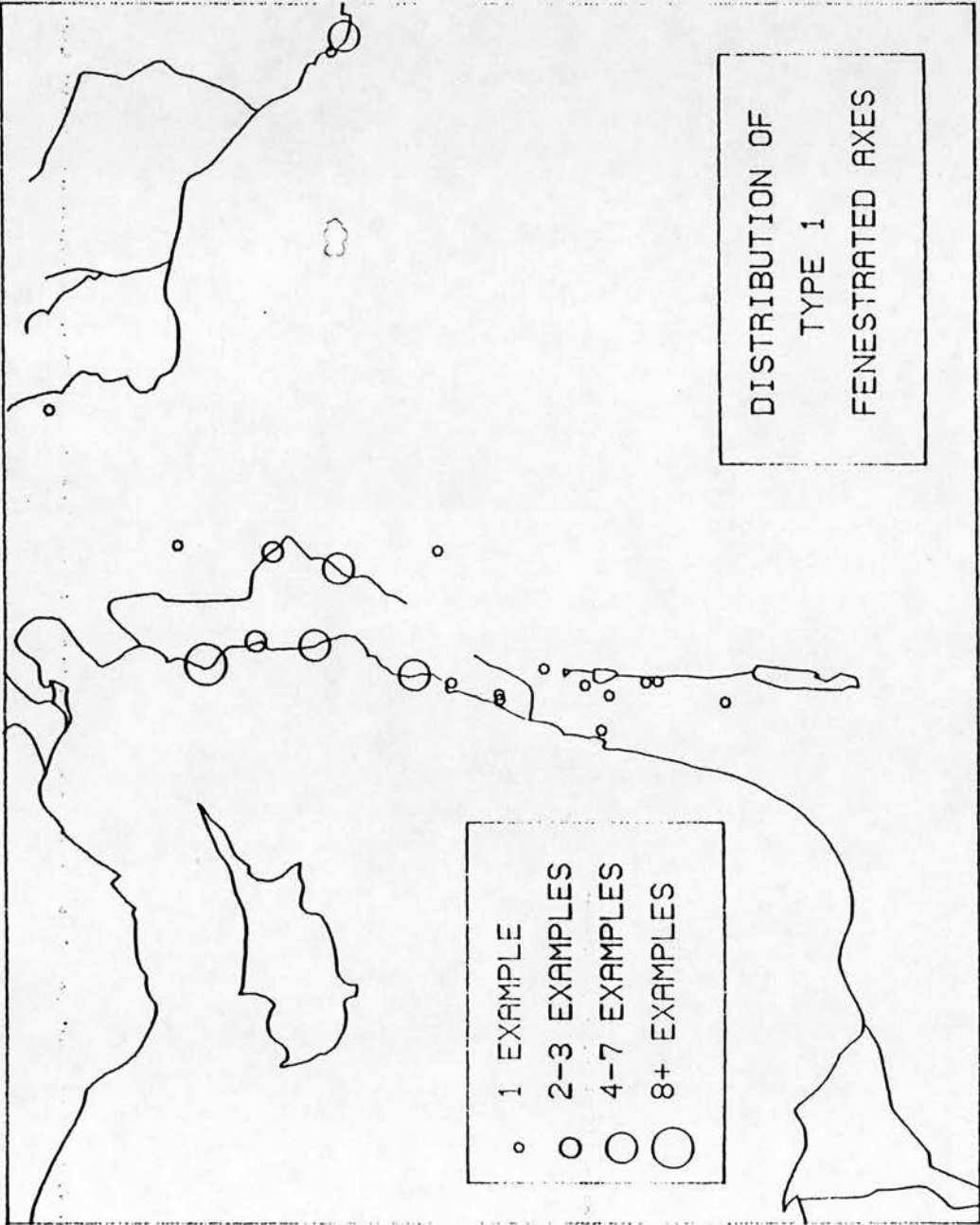
Map 5



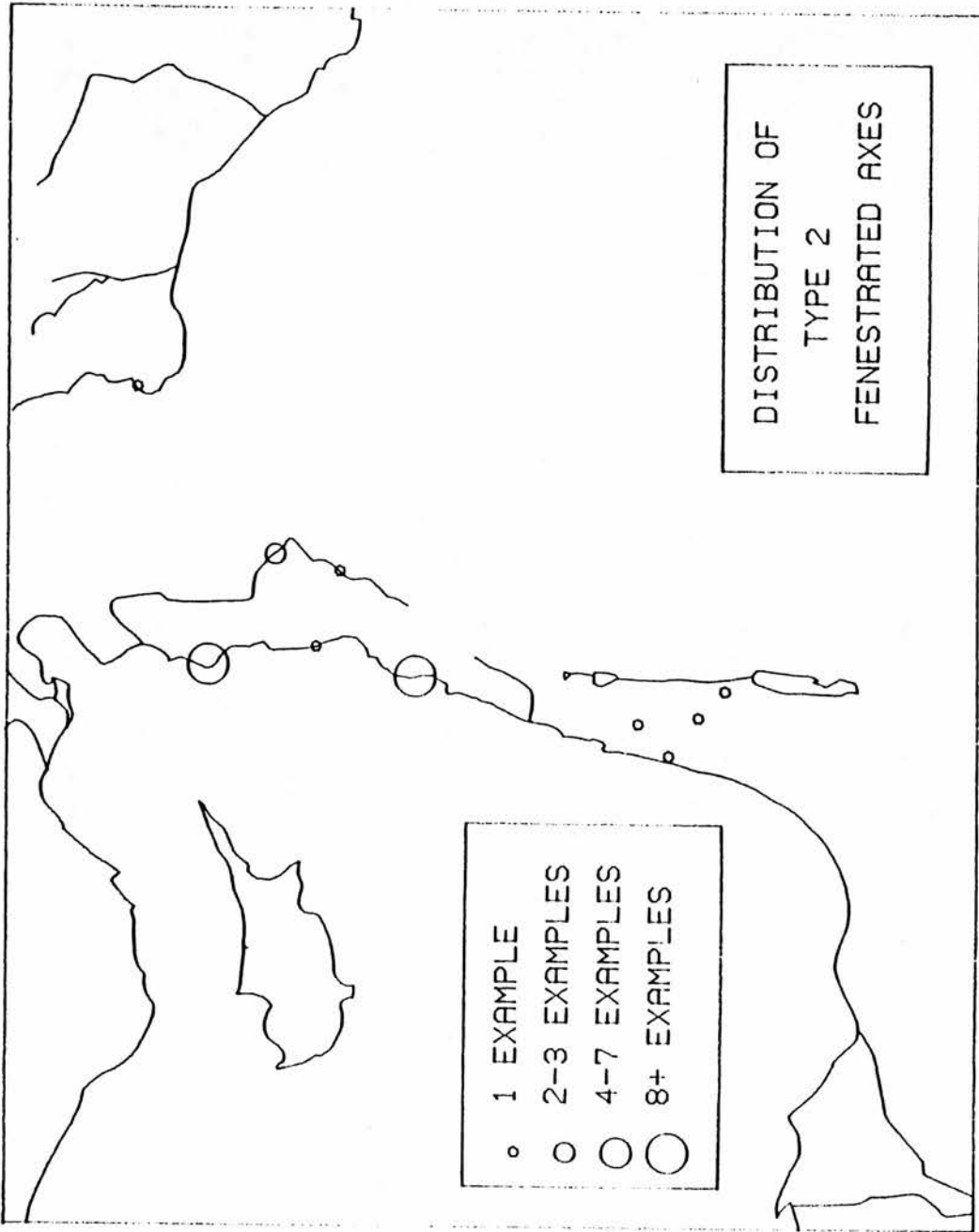
Map 6



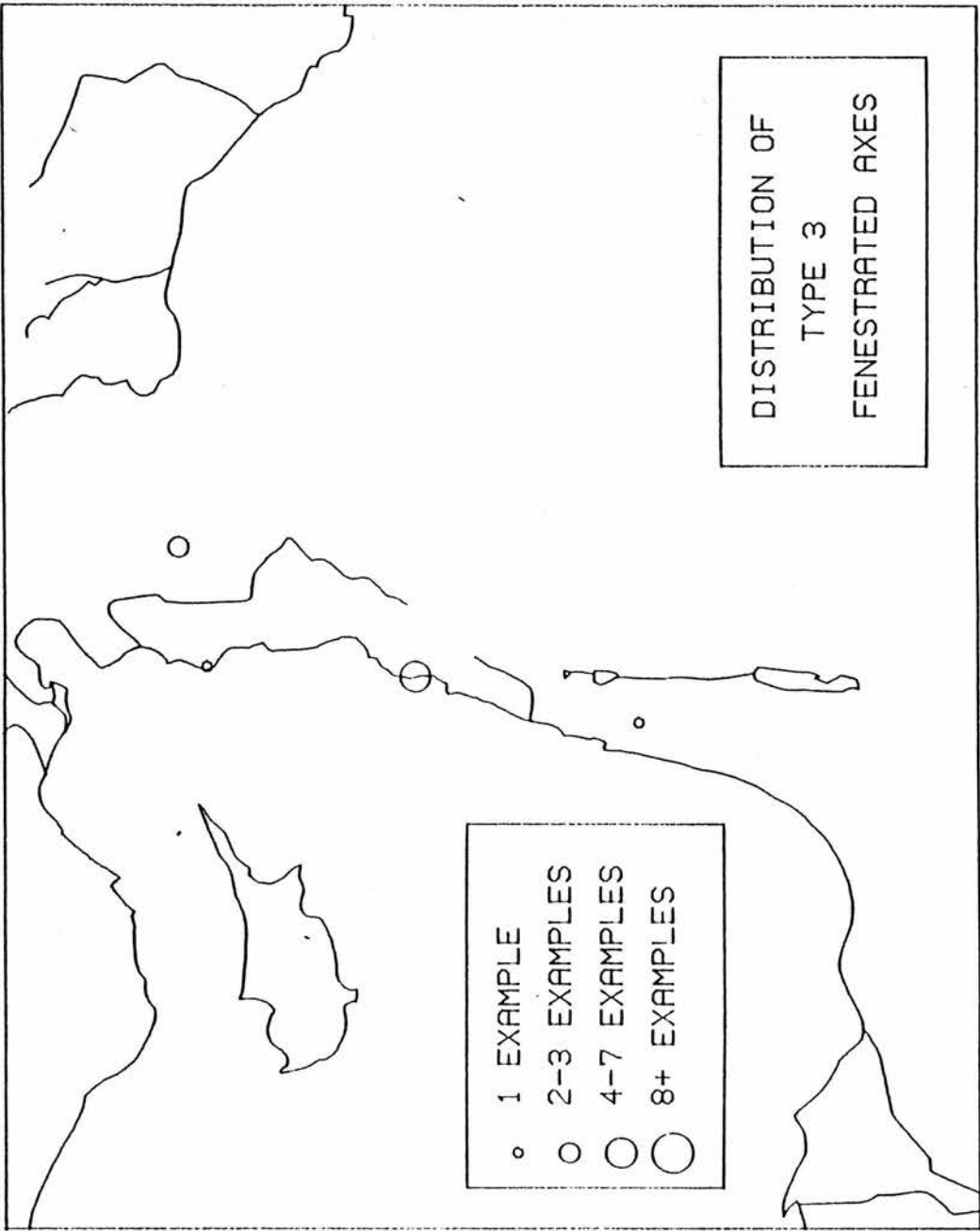
Map 7



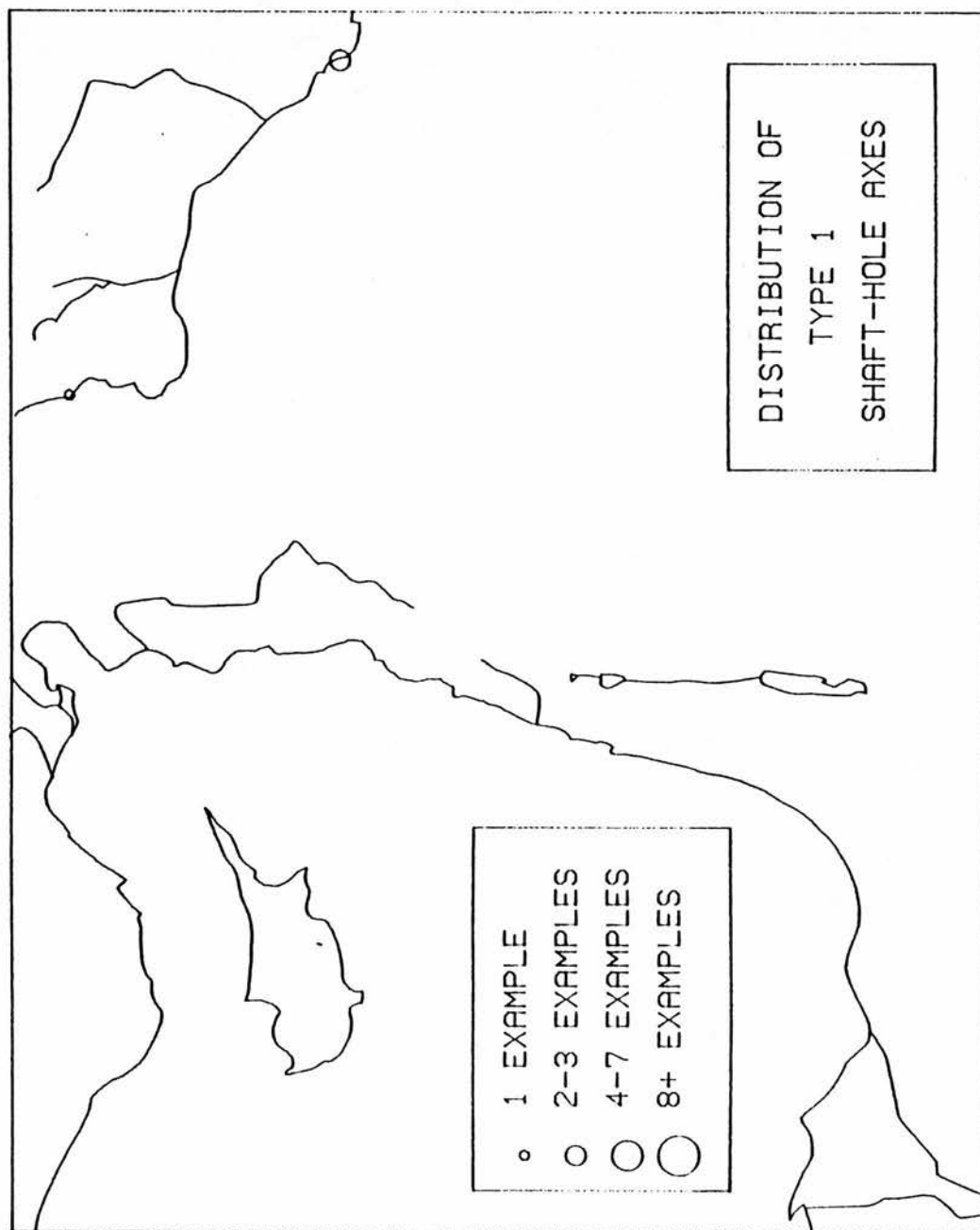
Map 8



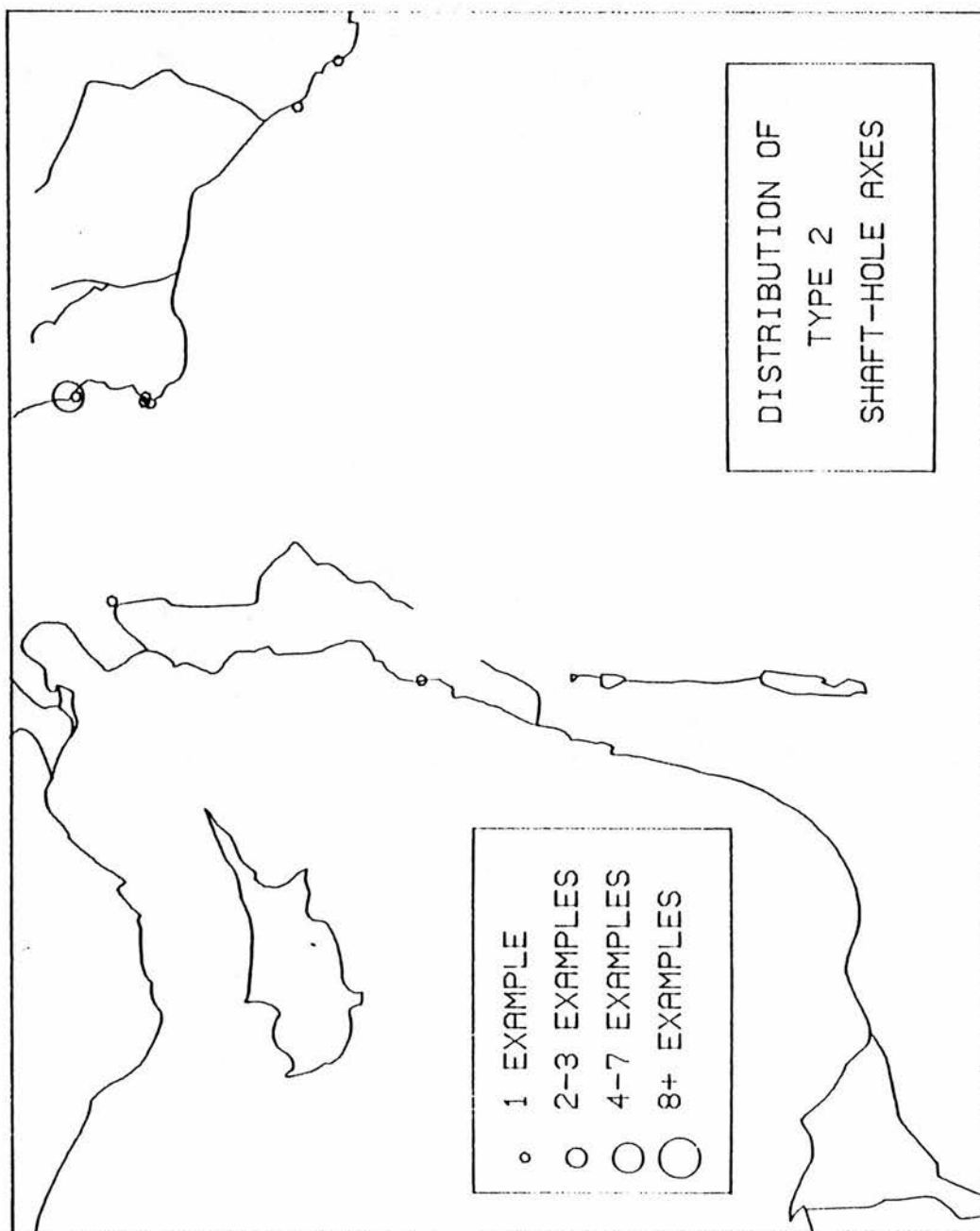
Map 9



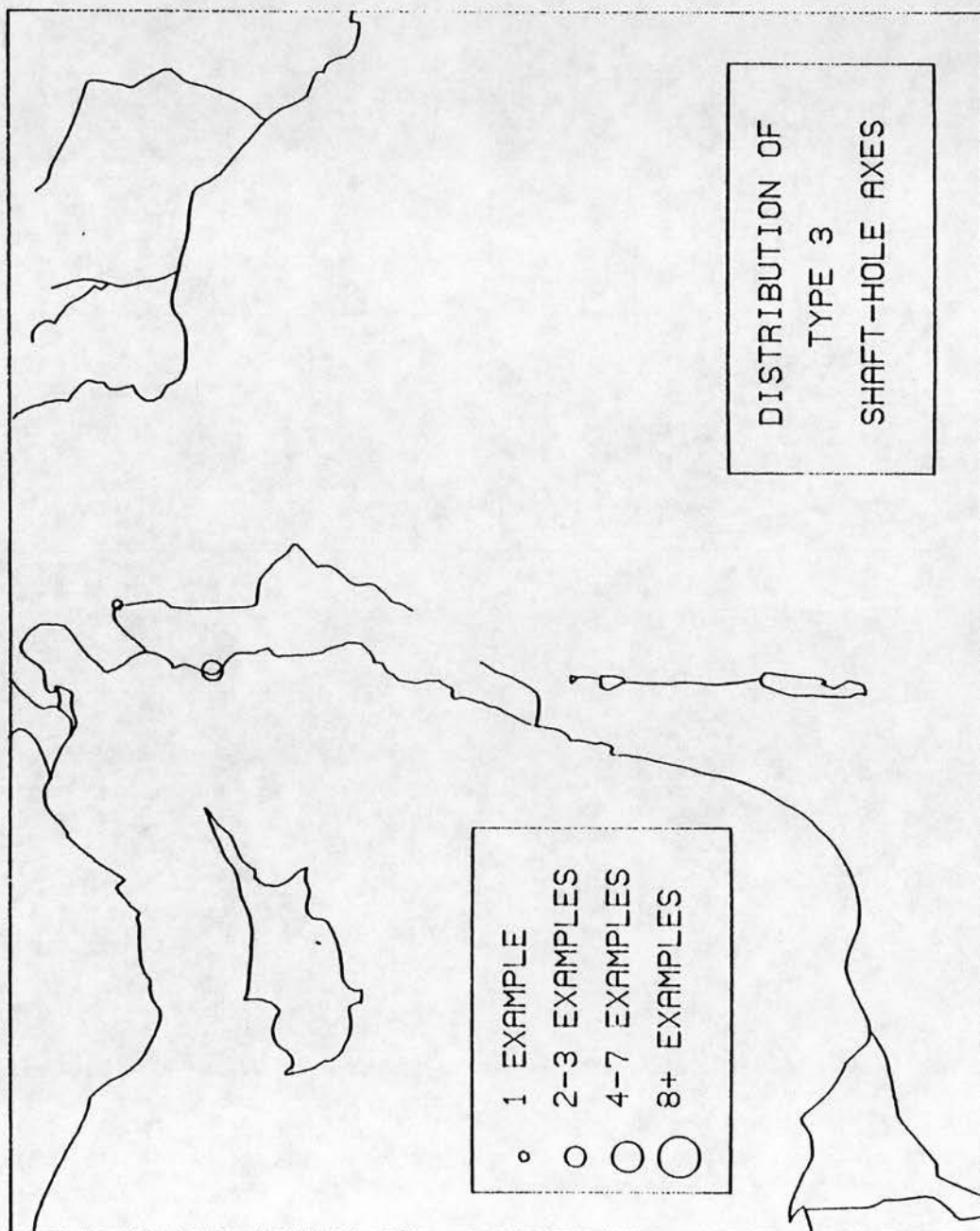
Map 10



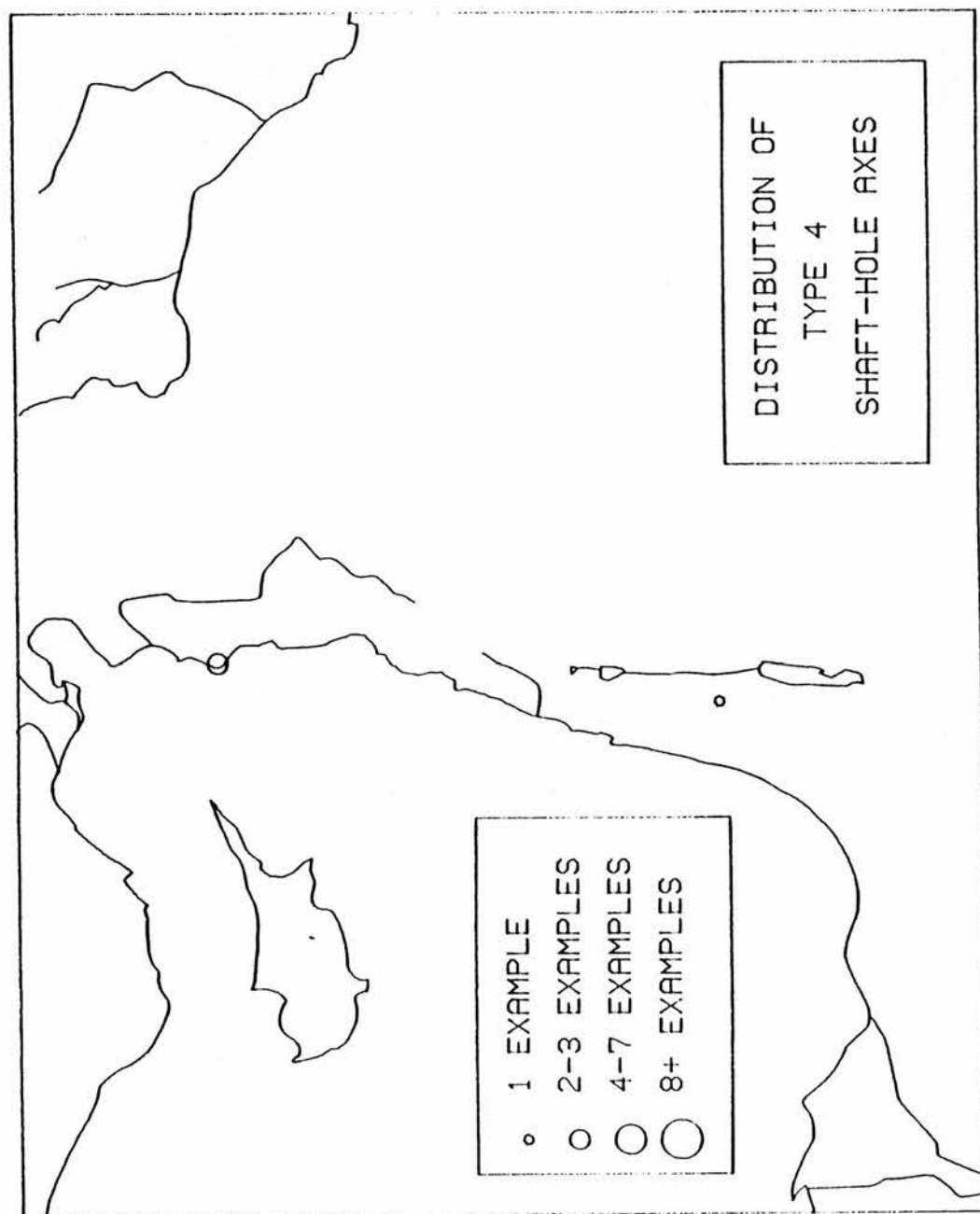
Map 11



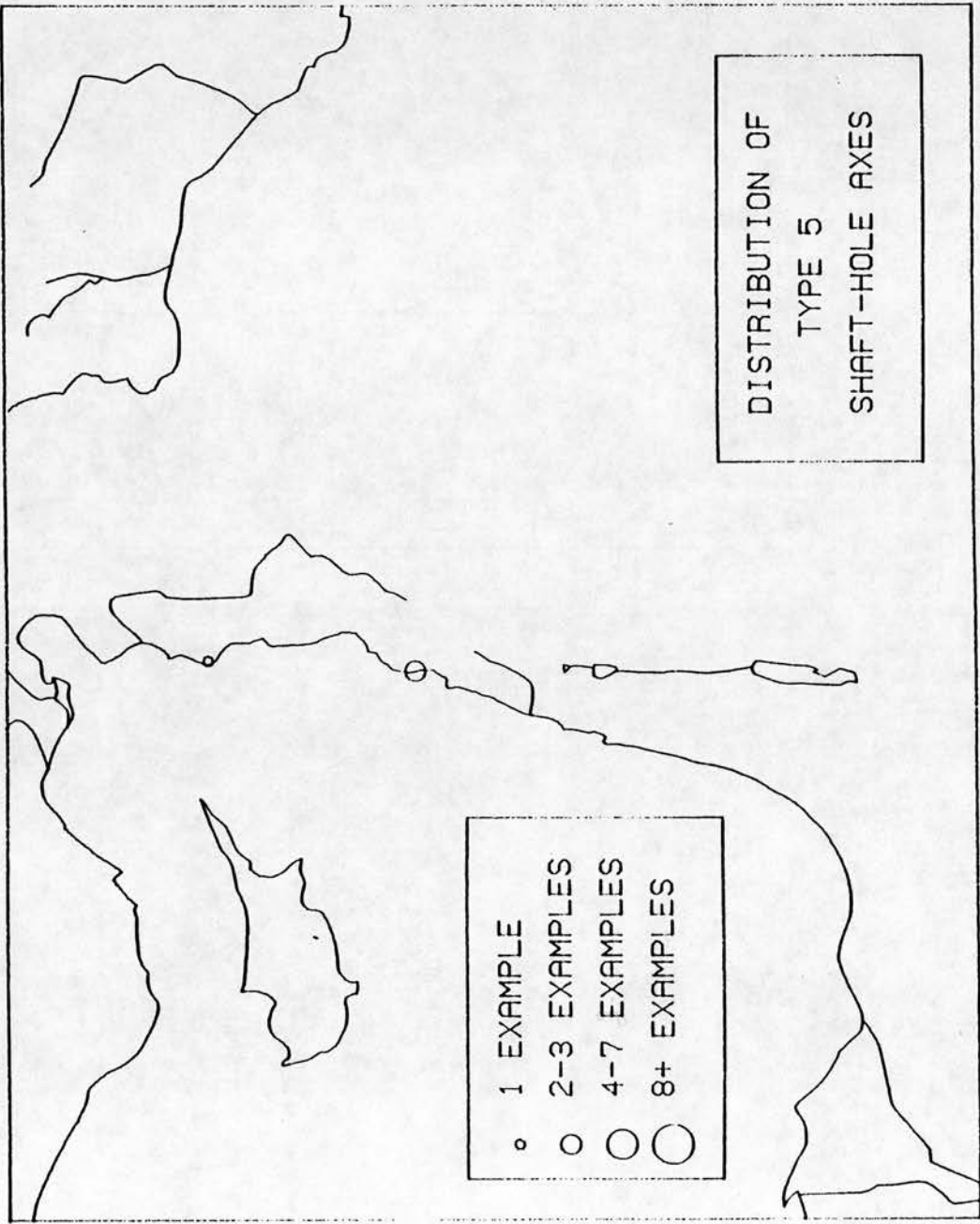
Map 12



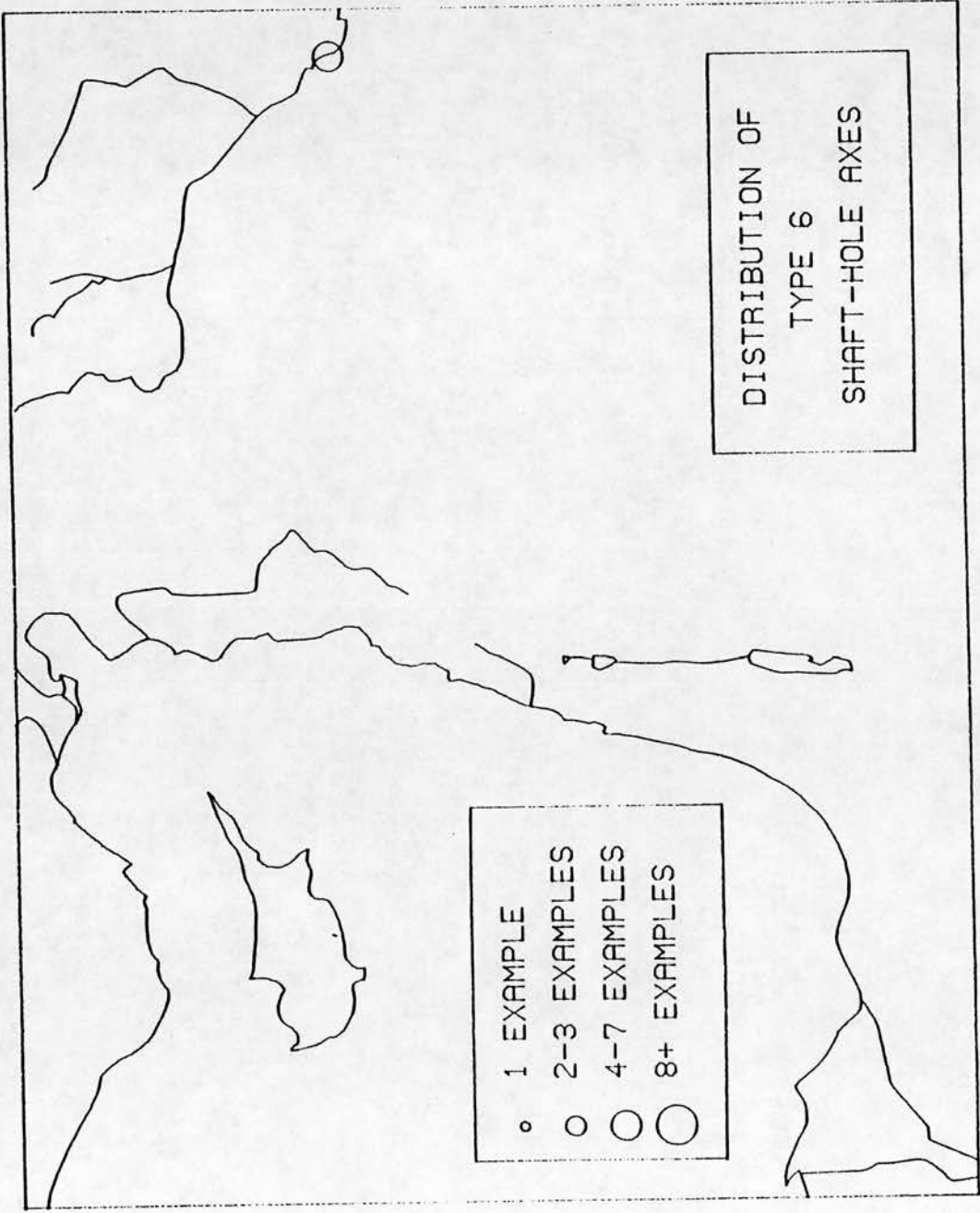
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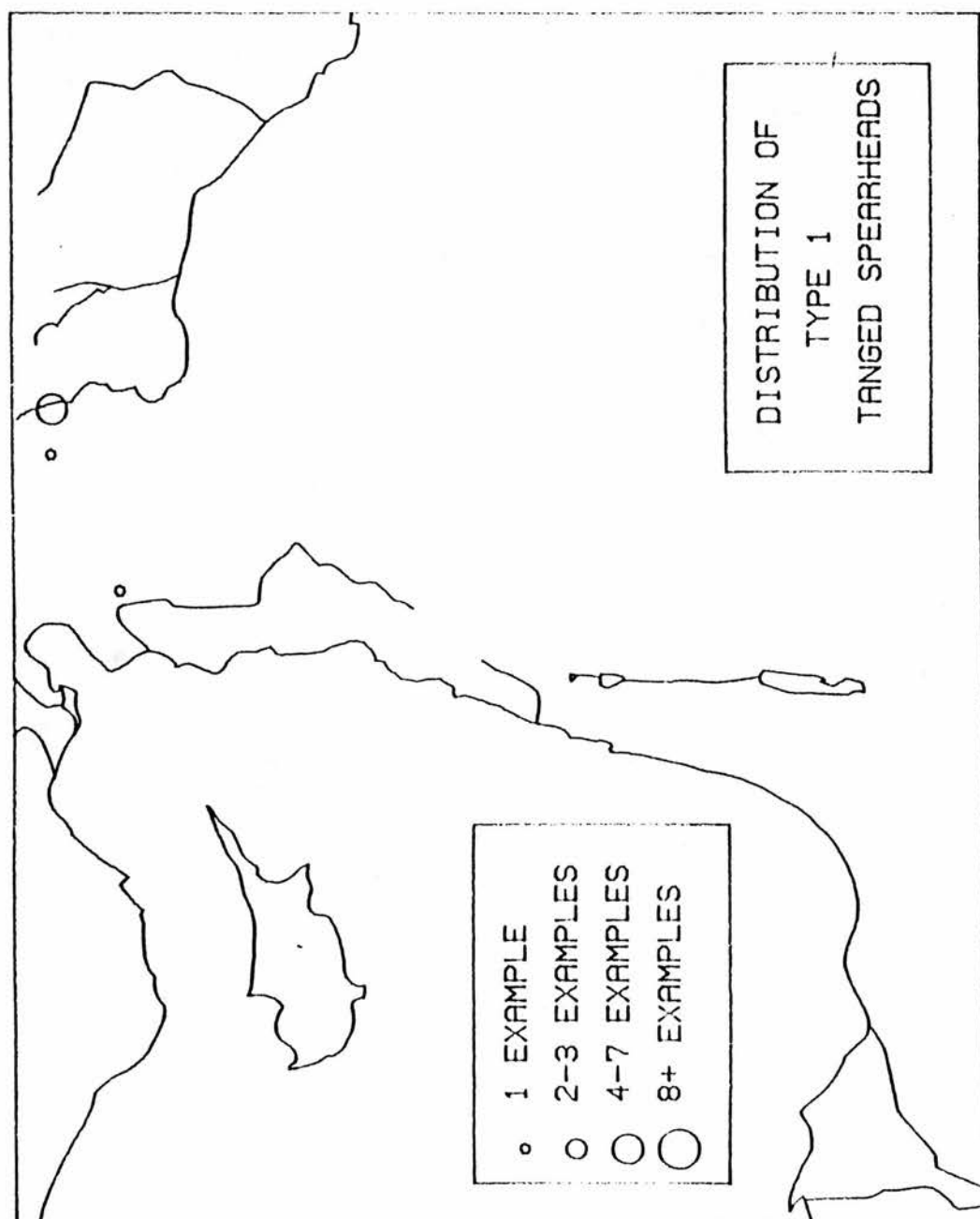
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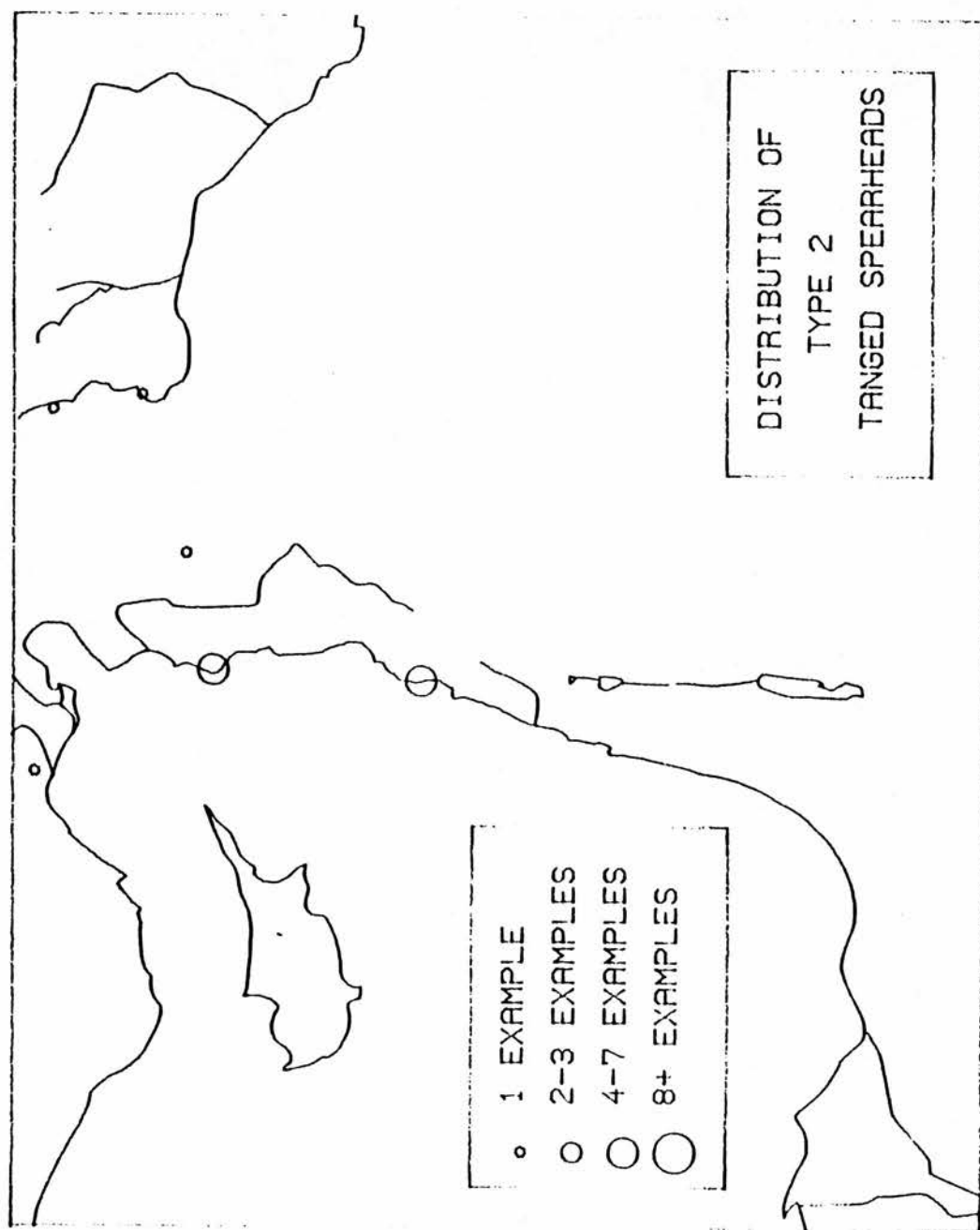
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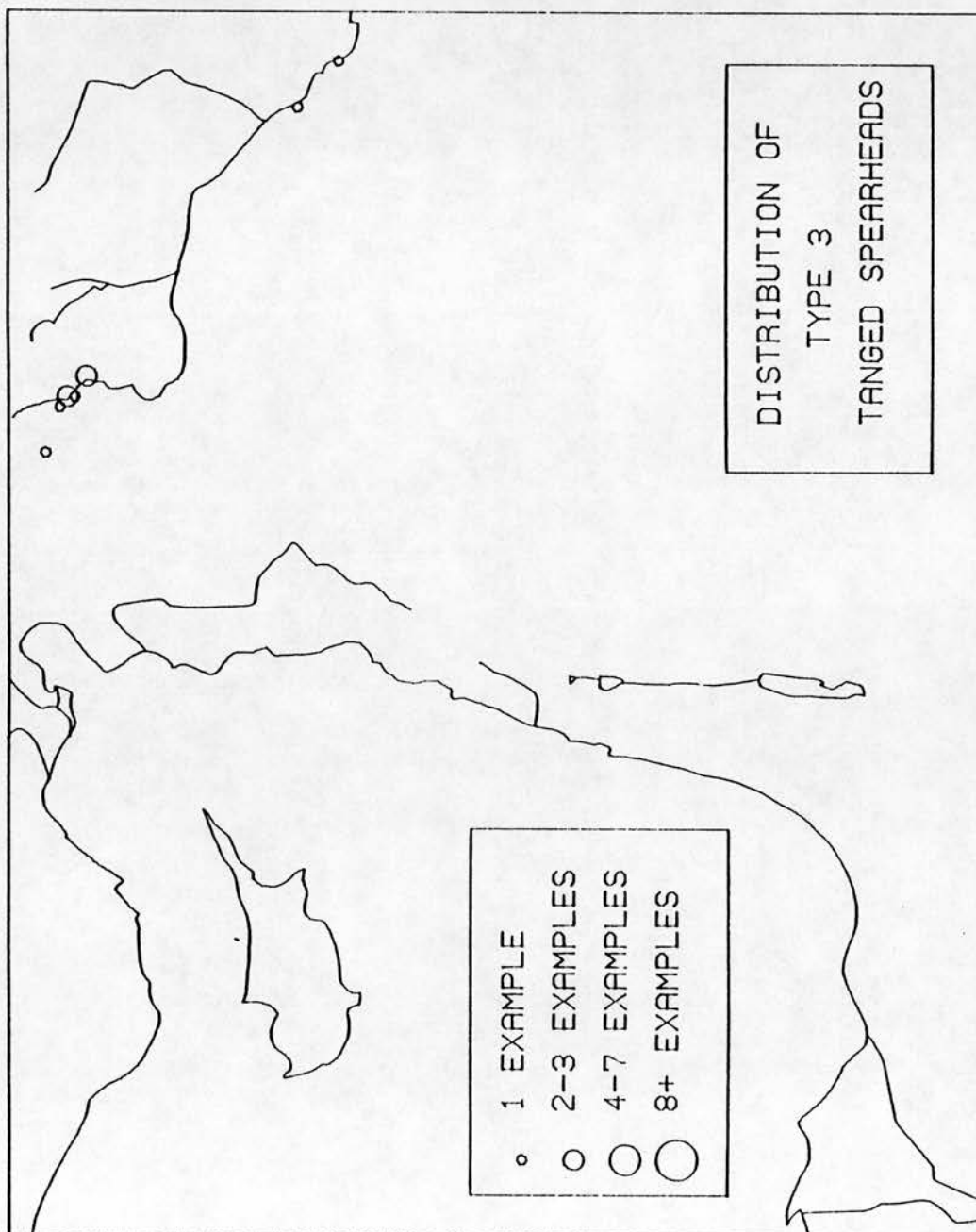
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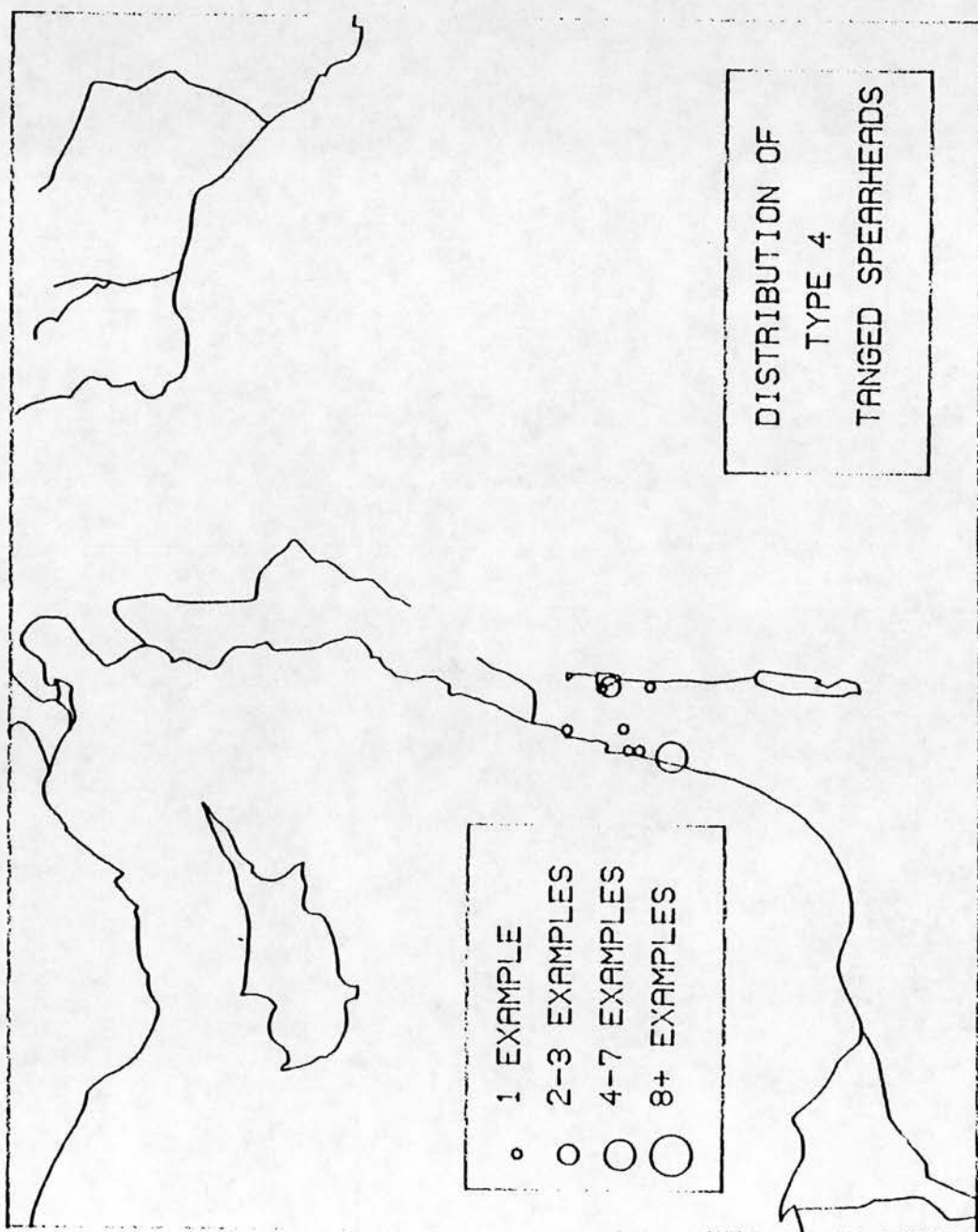
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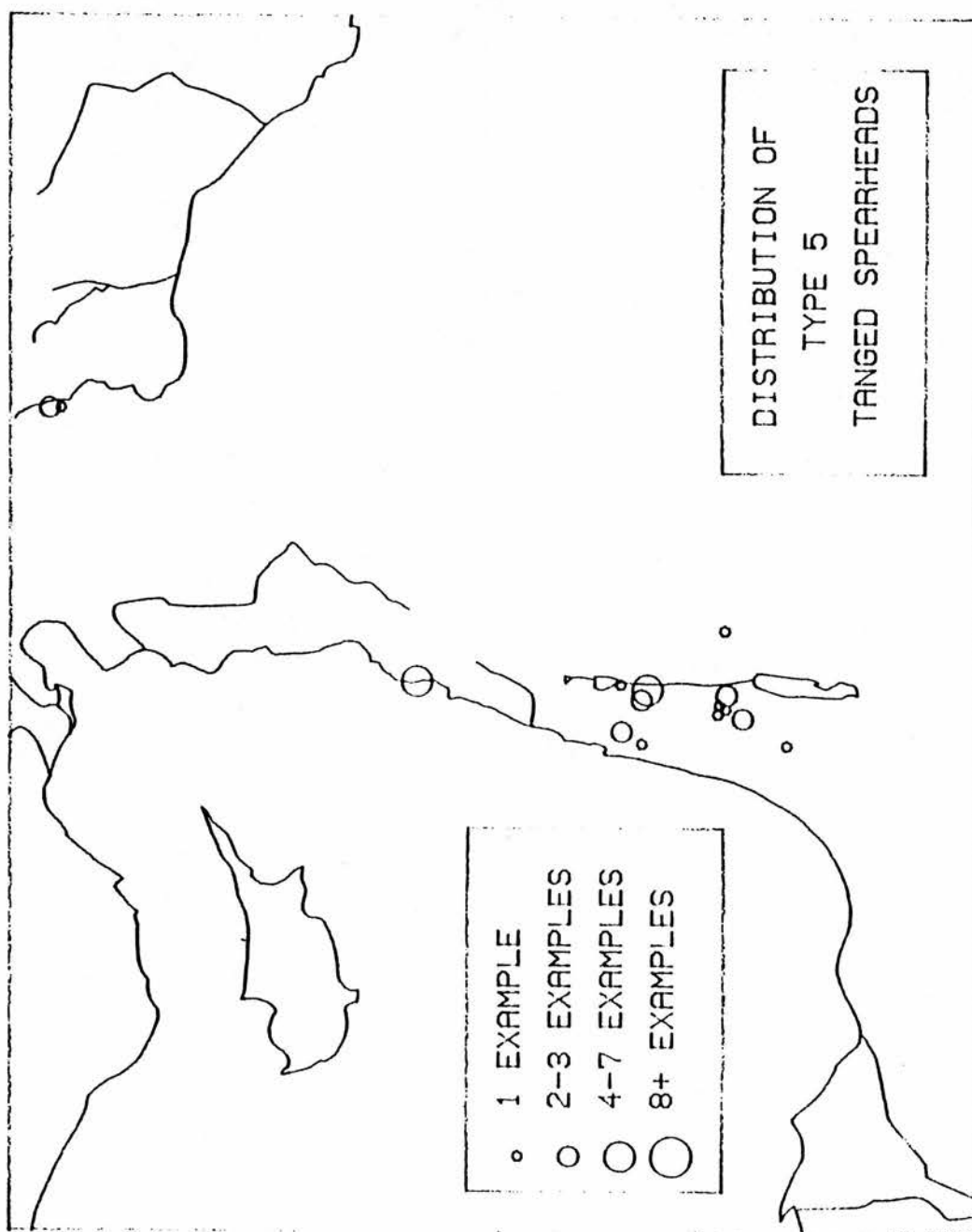
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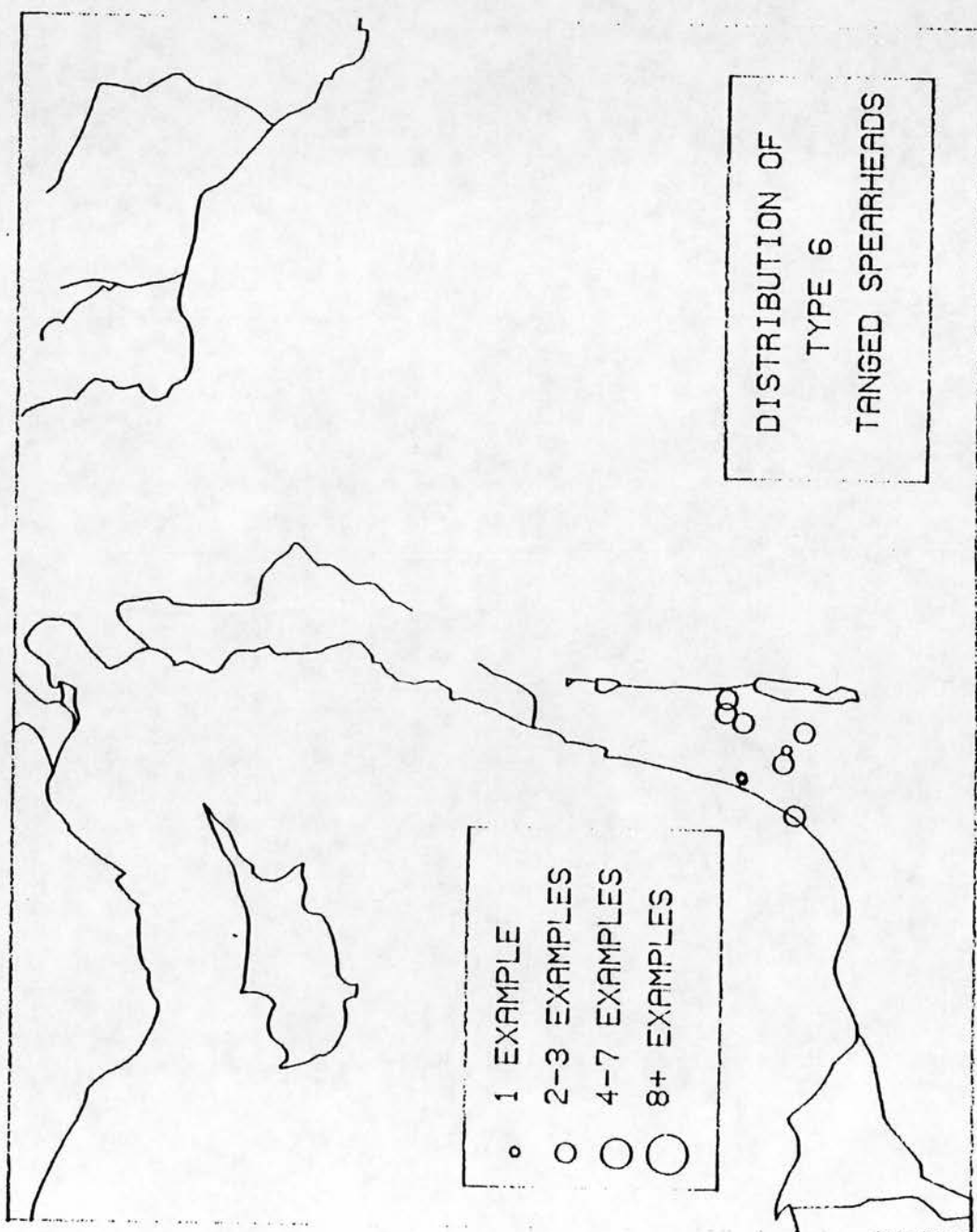
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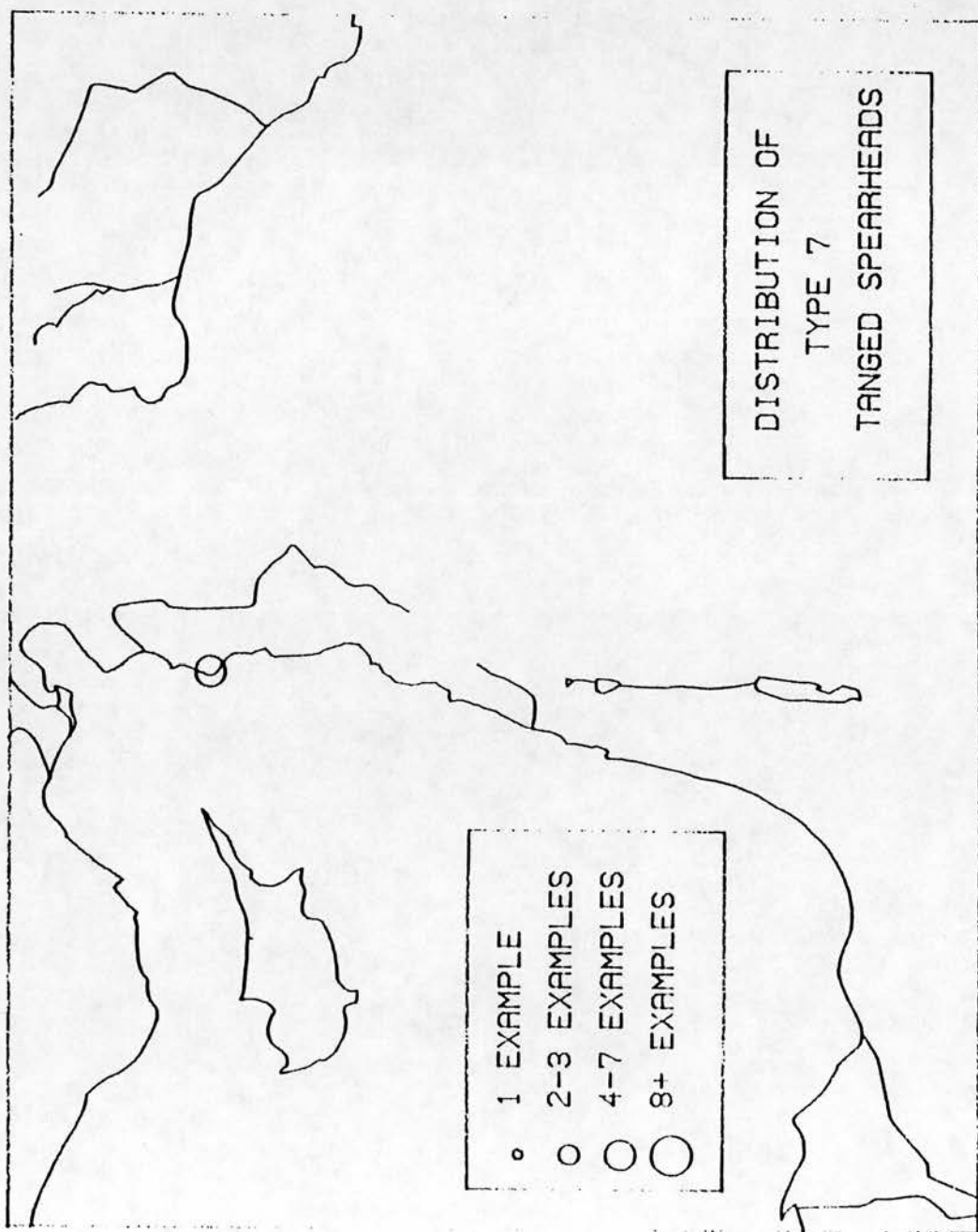
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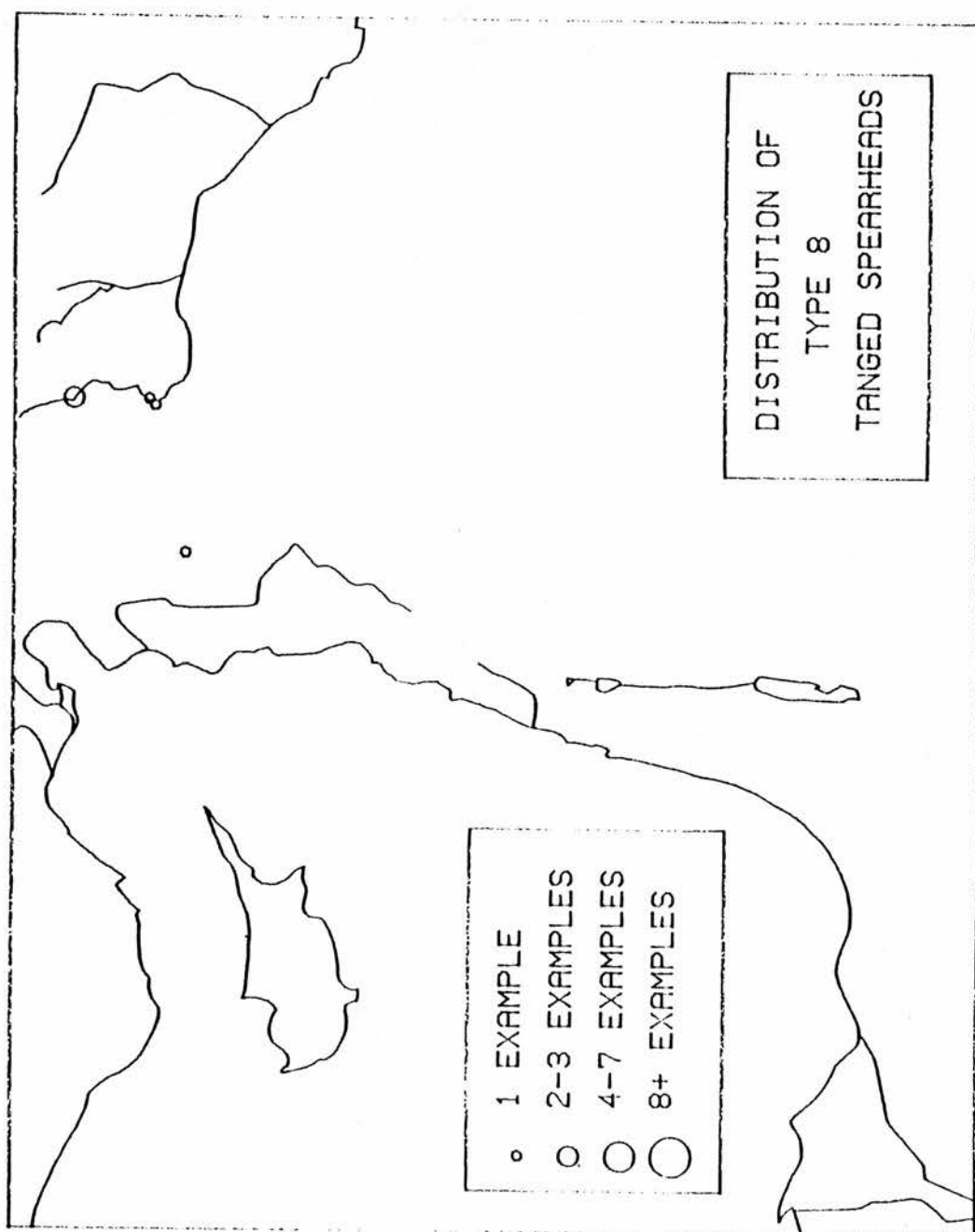
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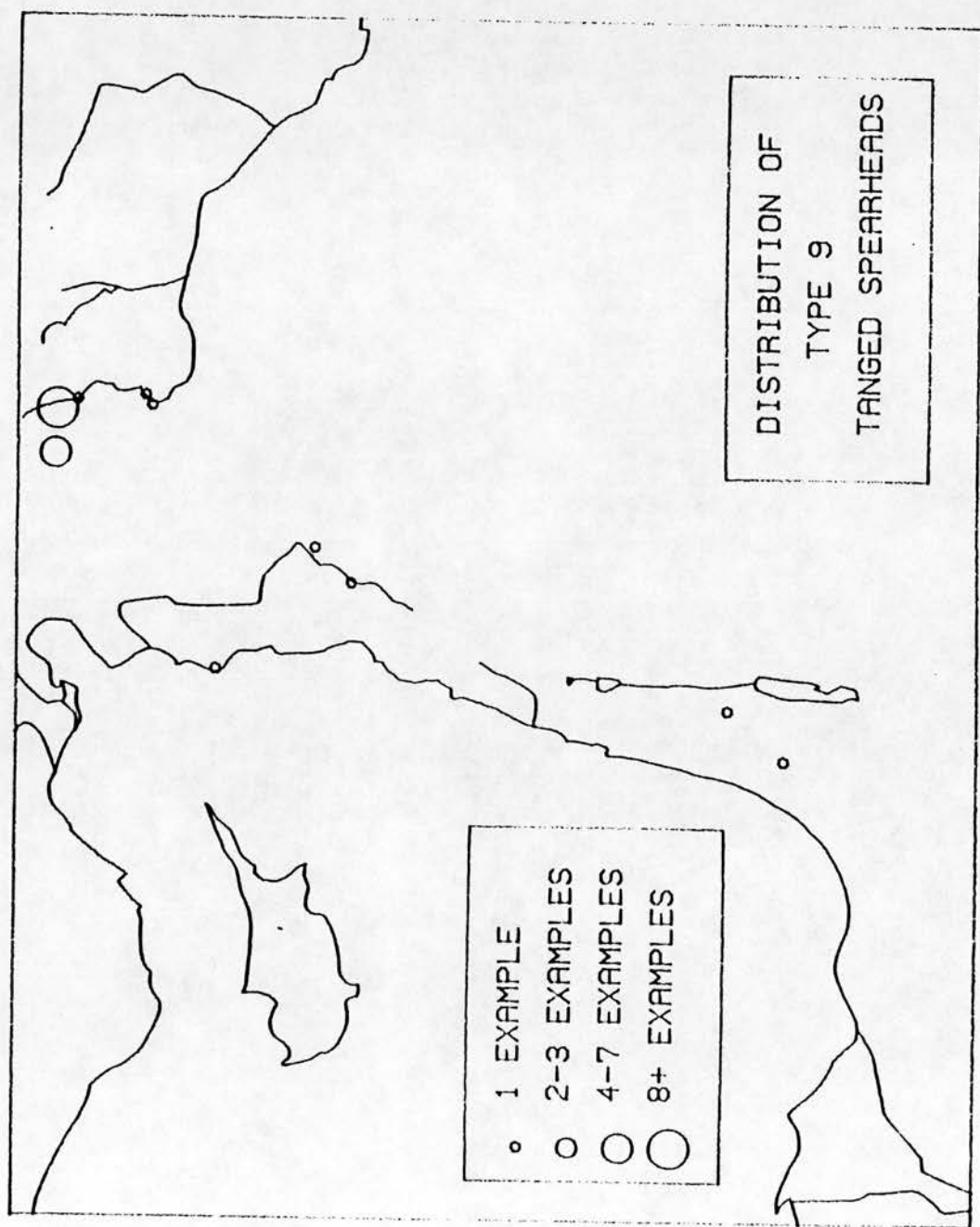
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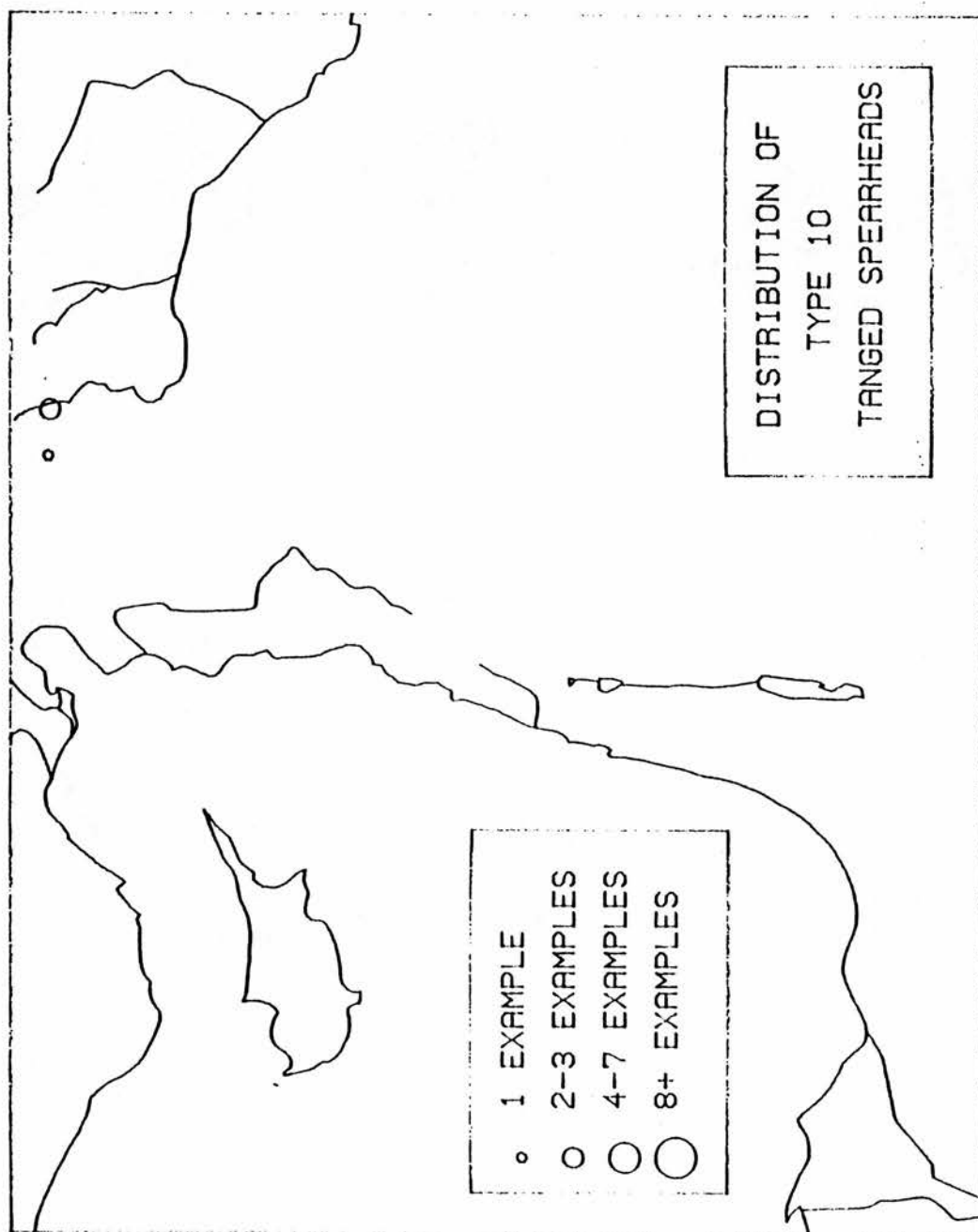
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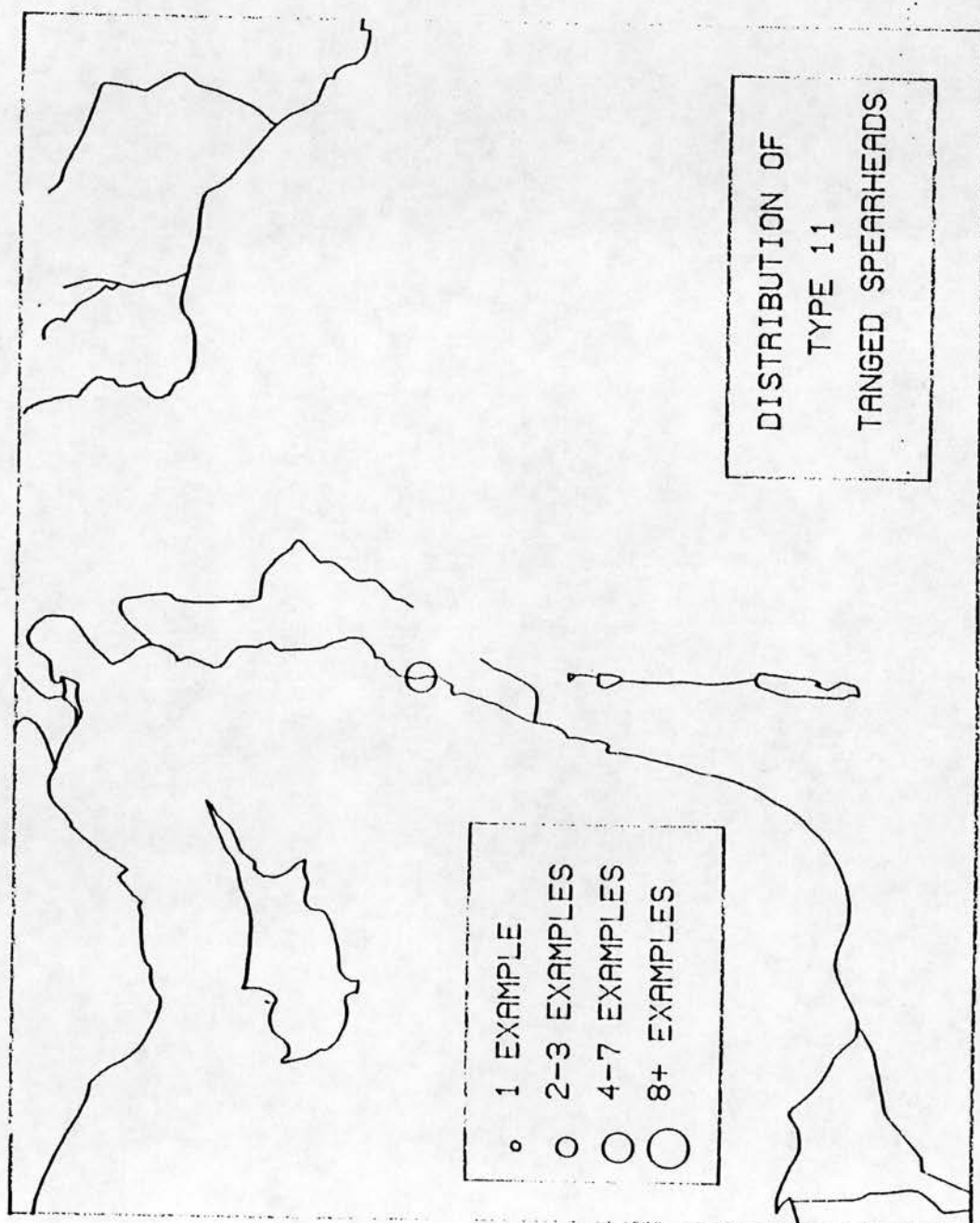
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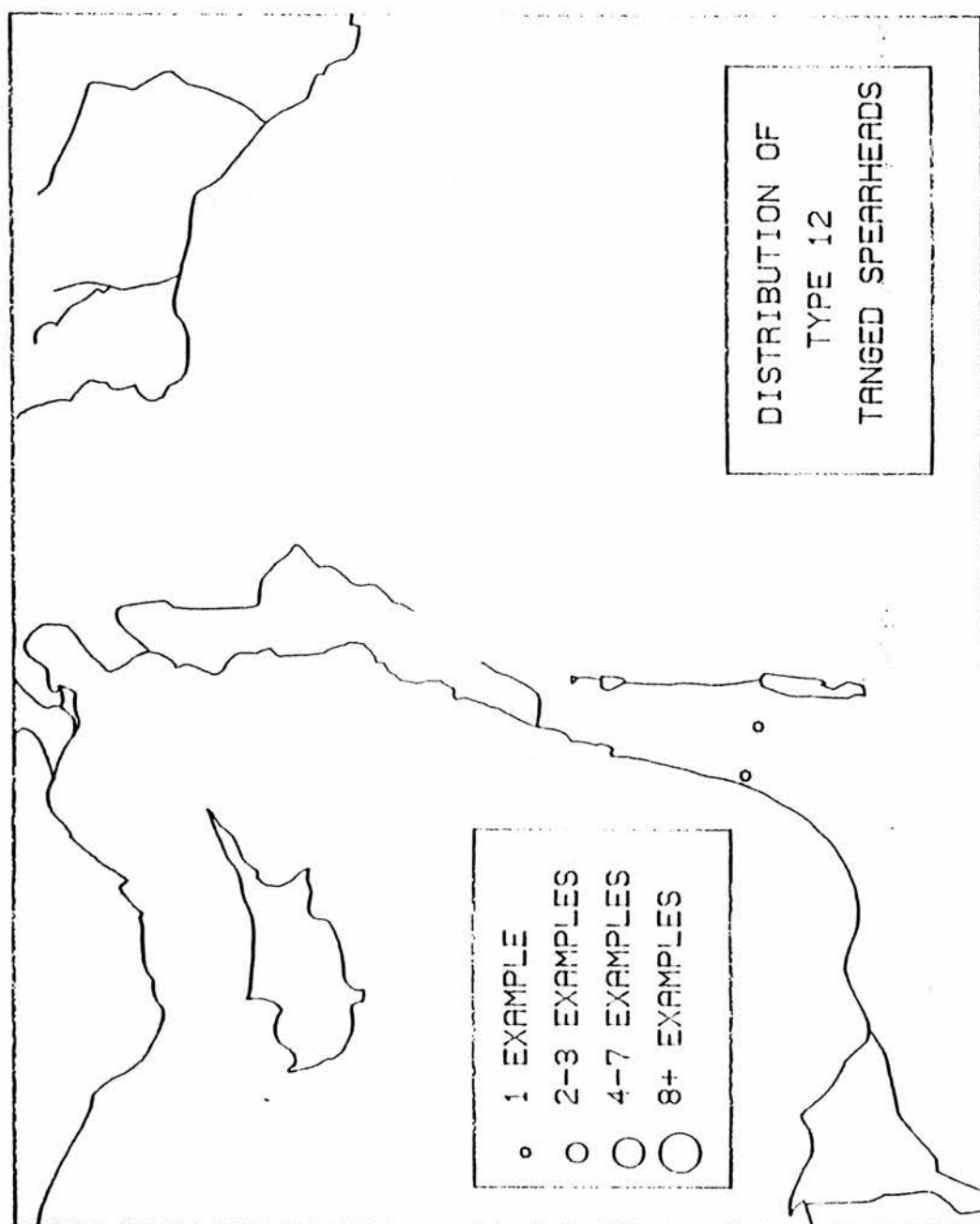
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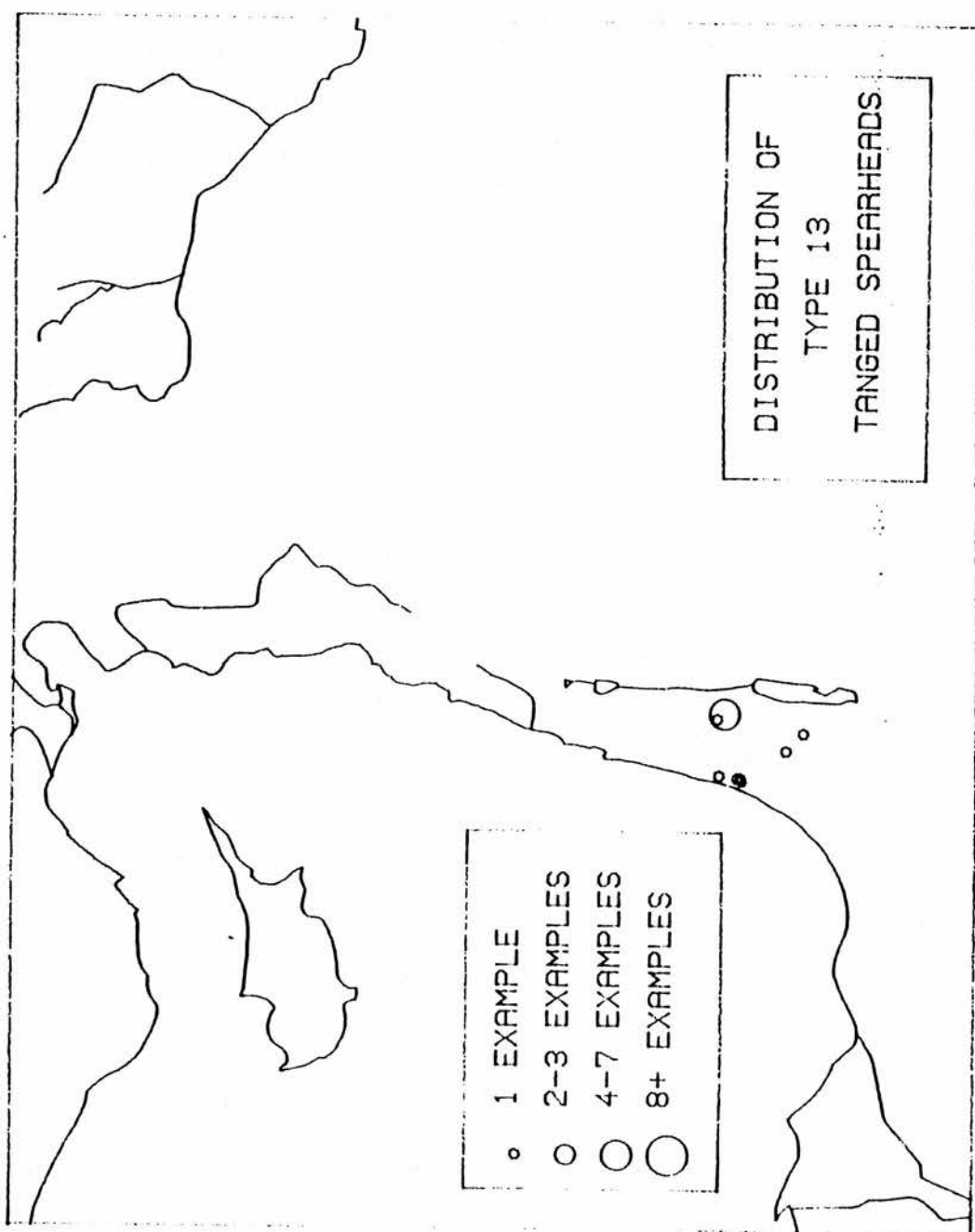
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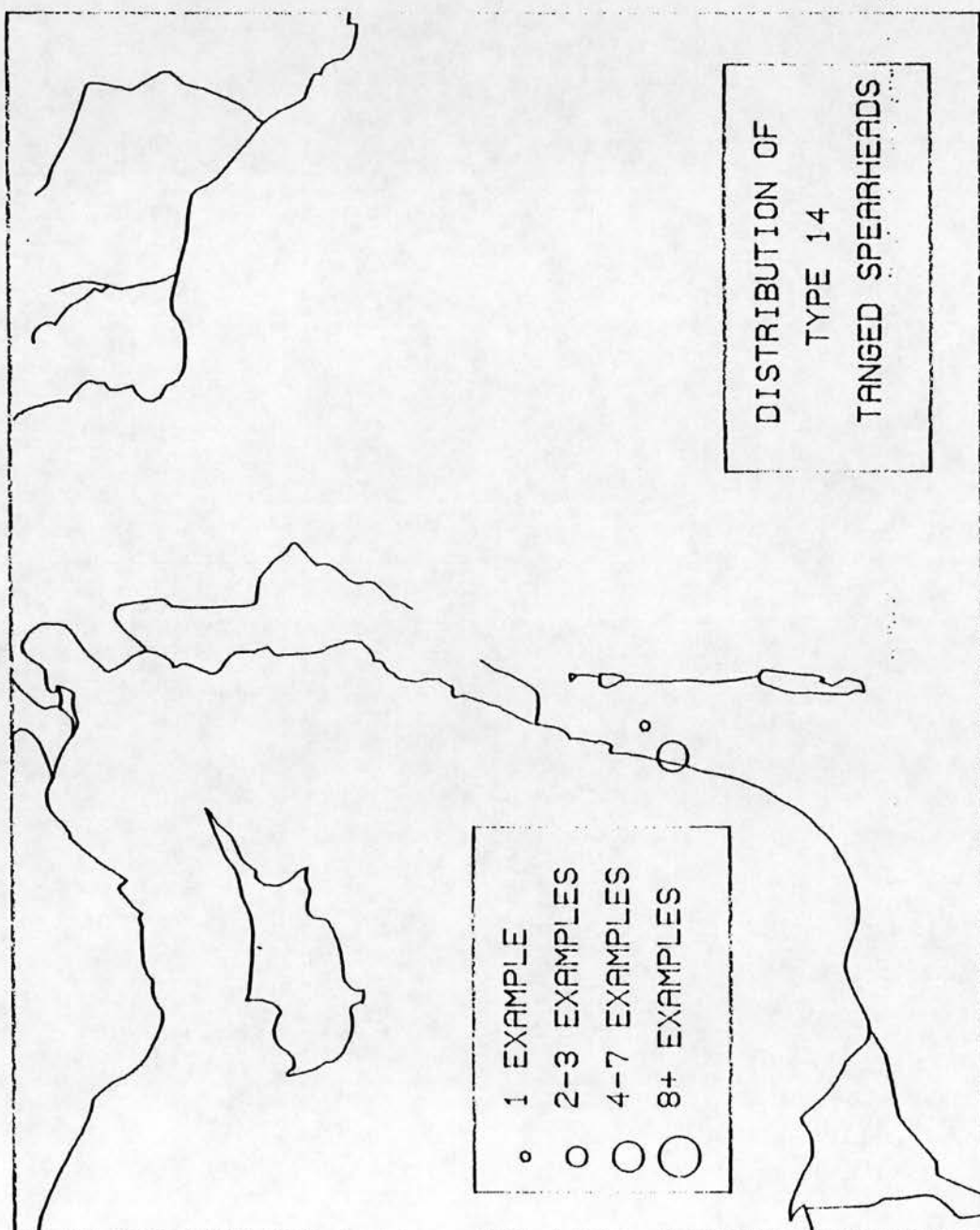
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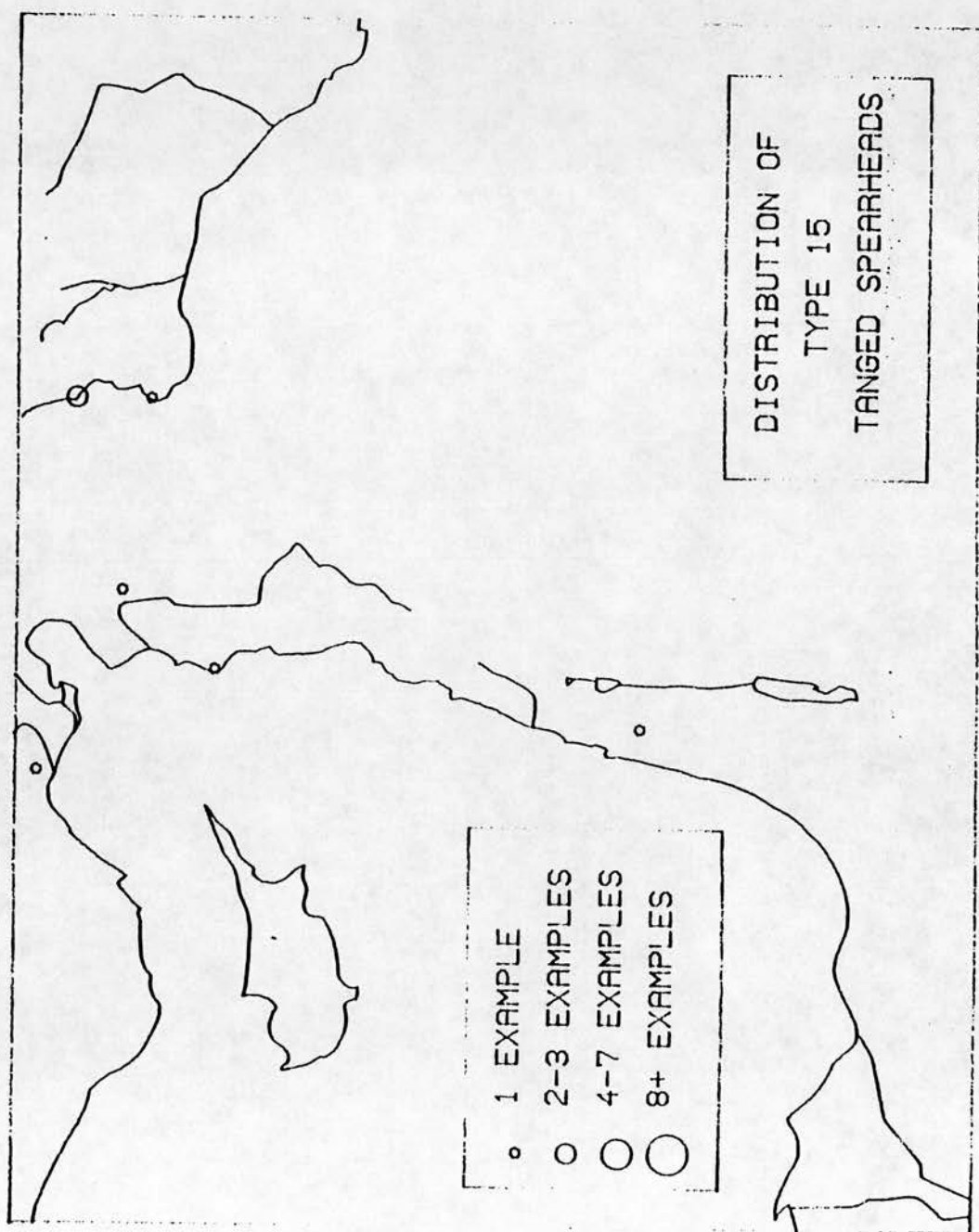
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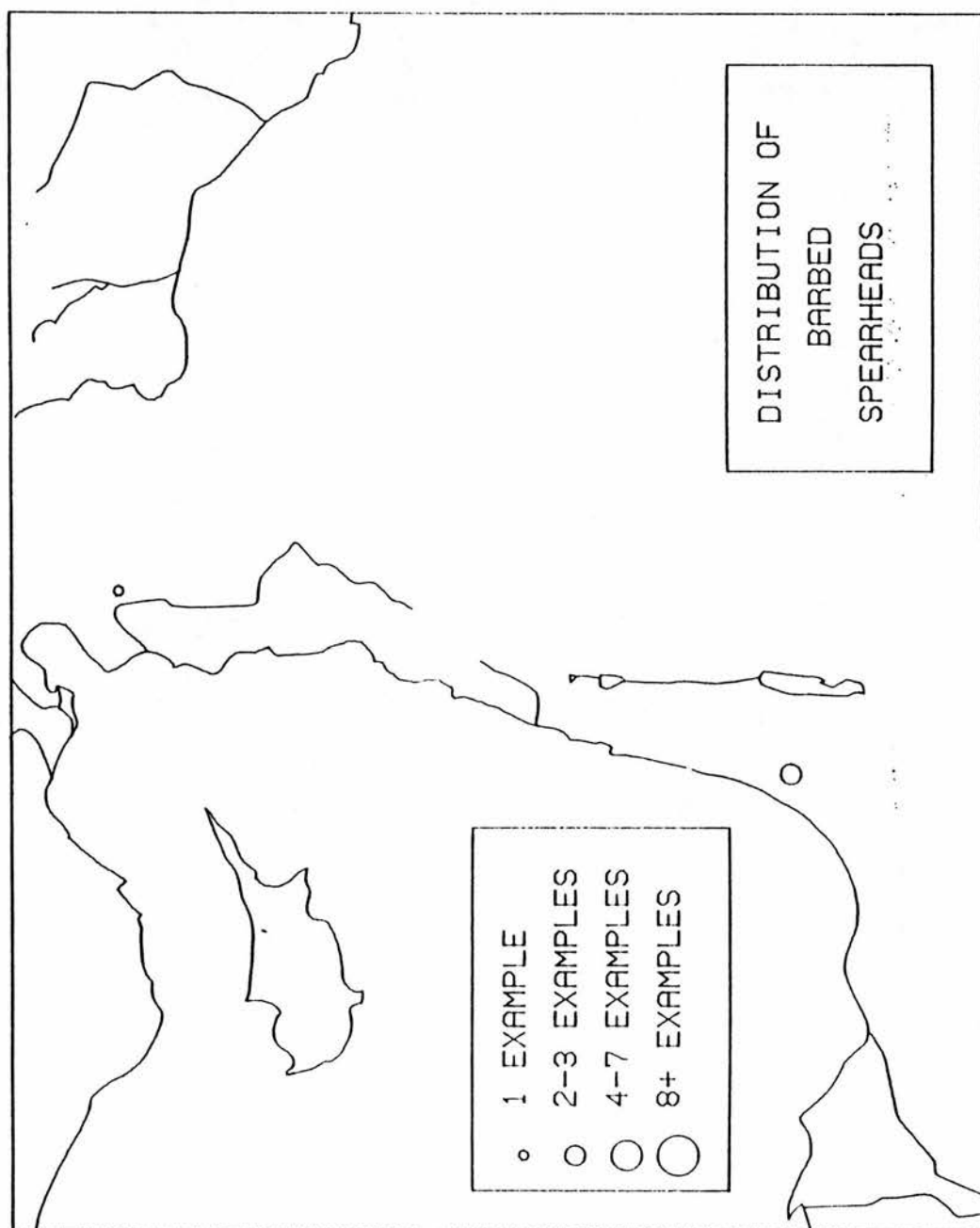
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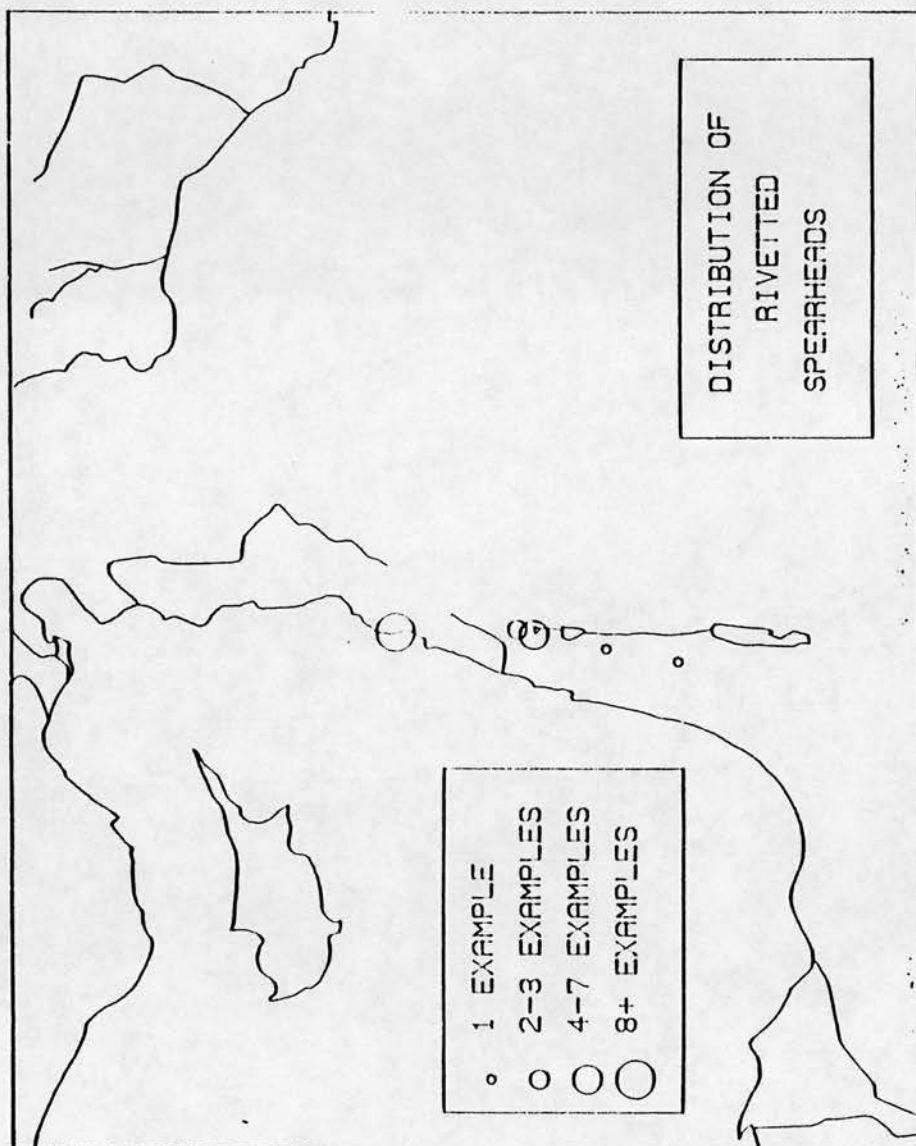
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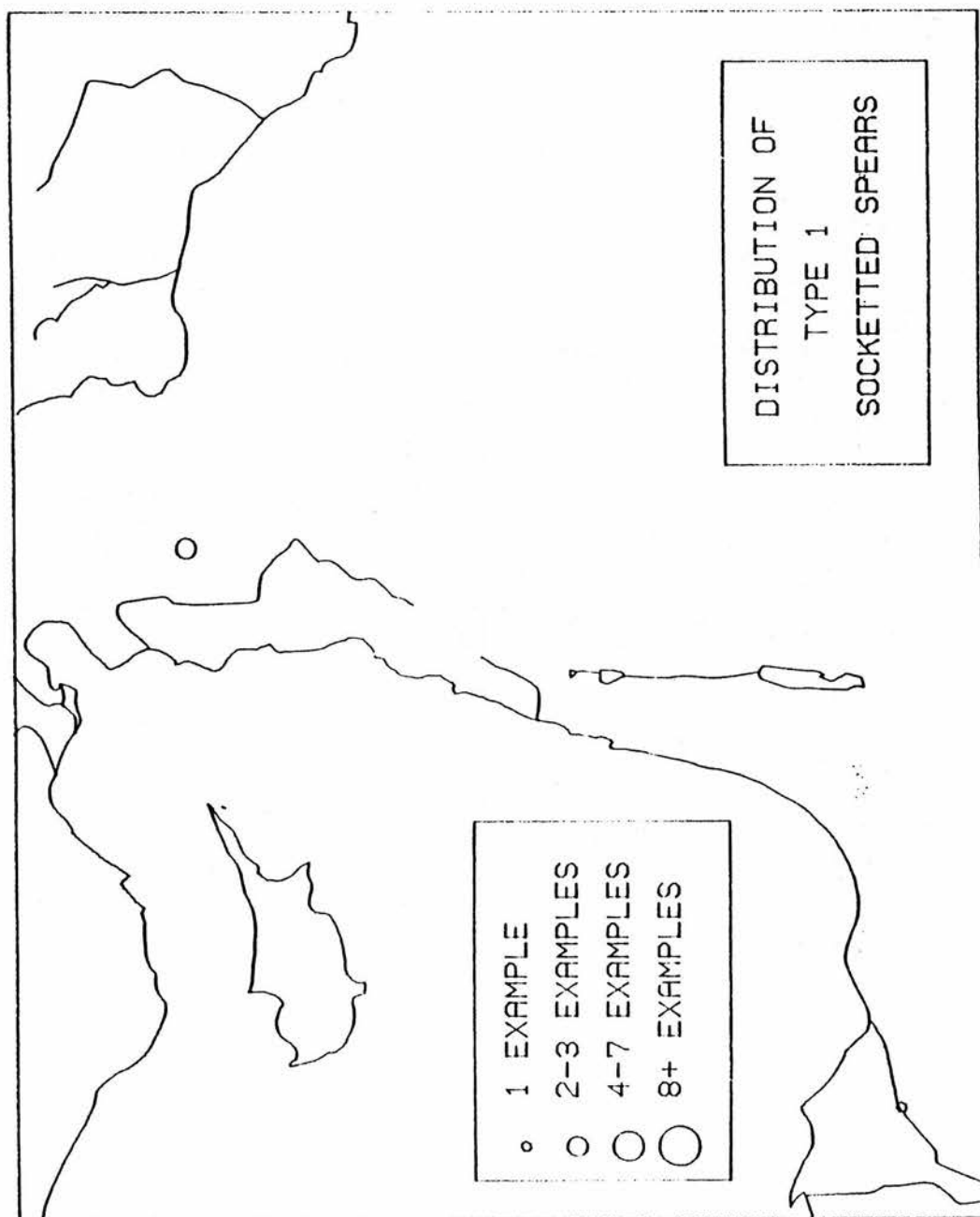
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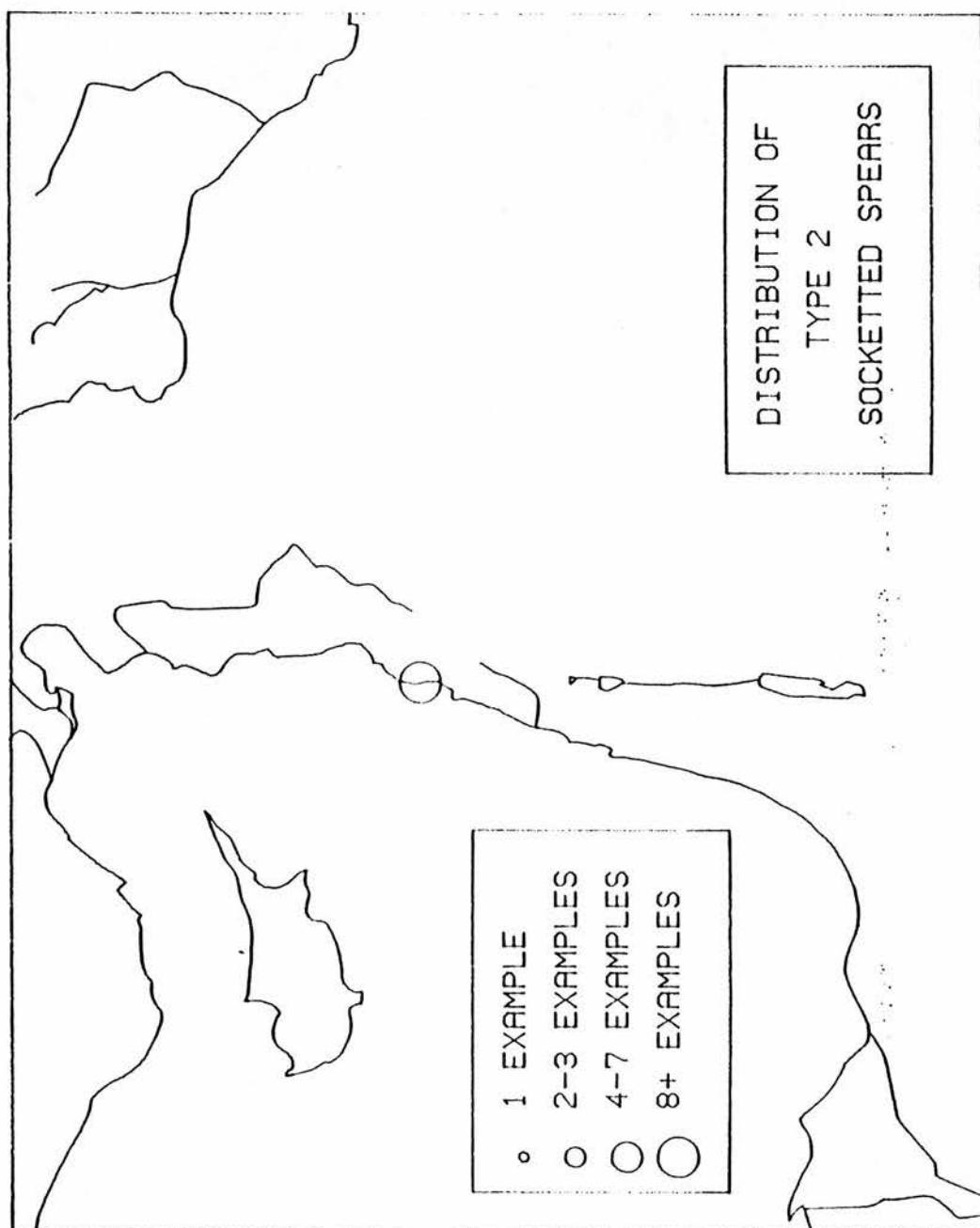
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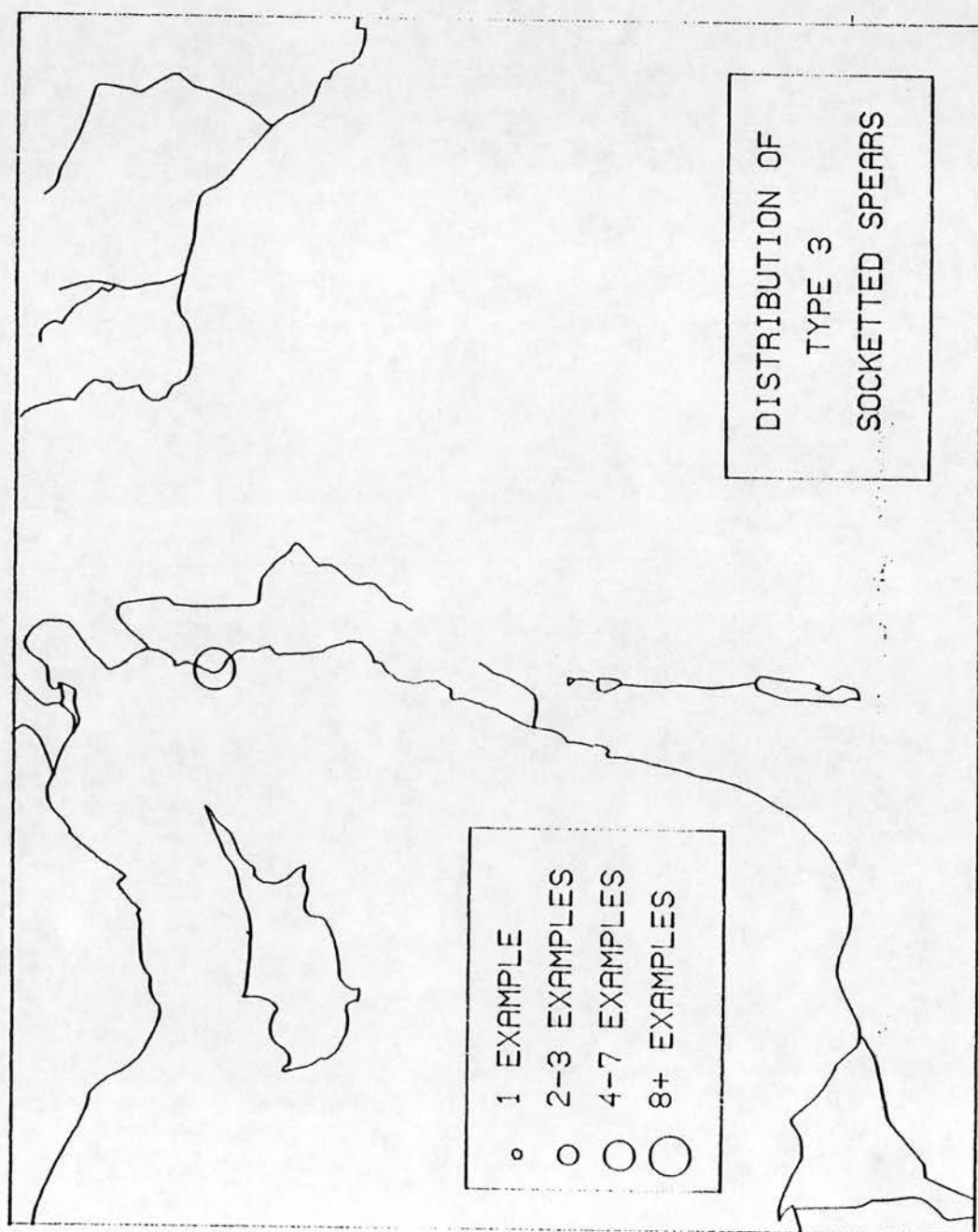
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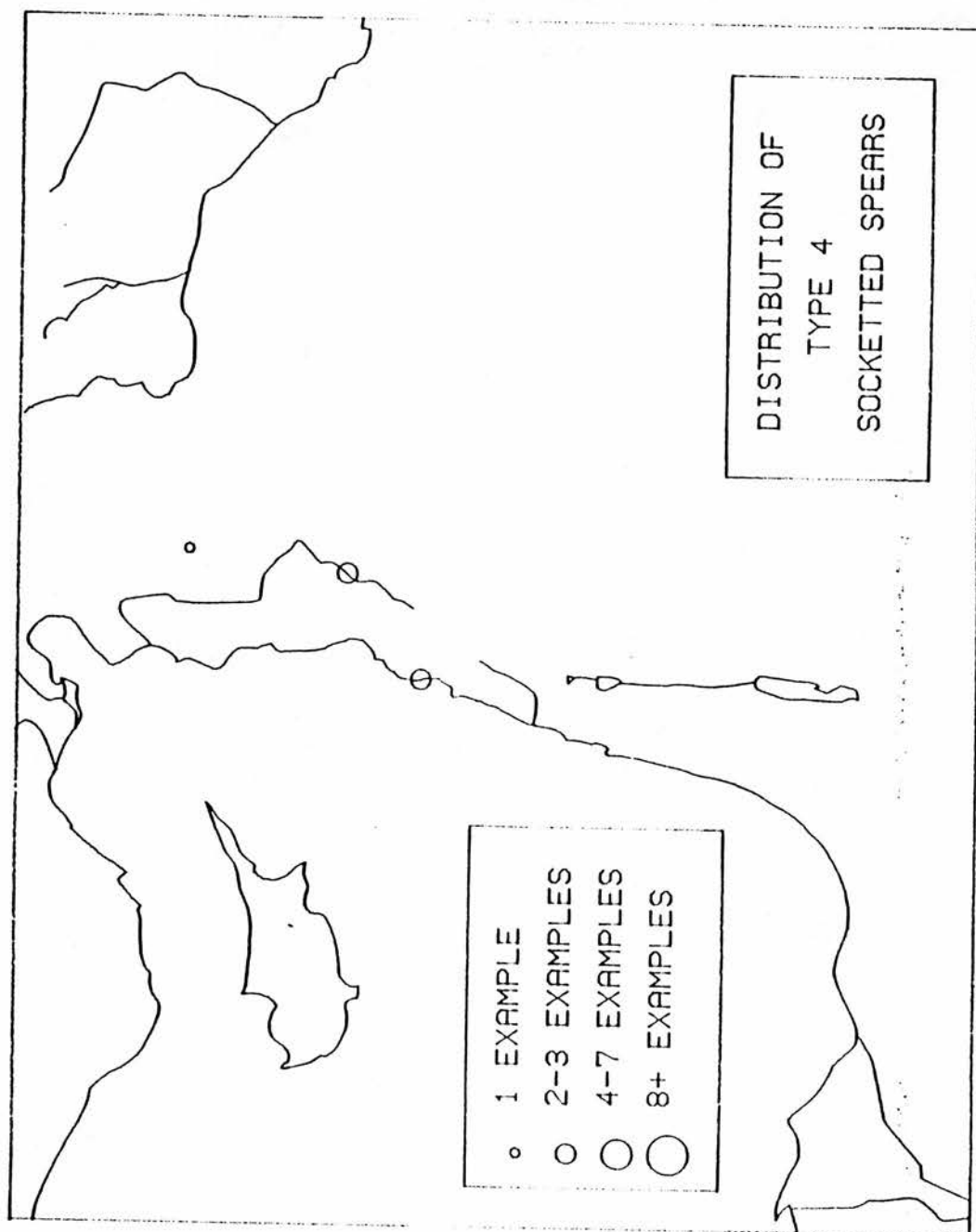
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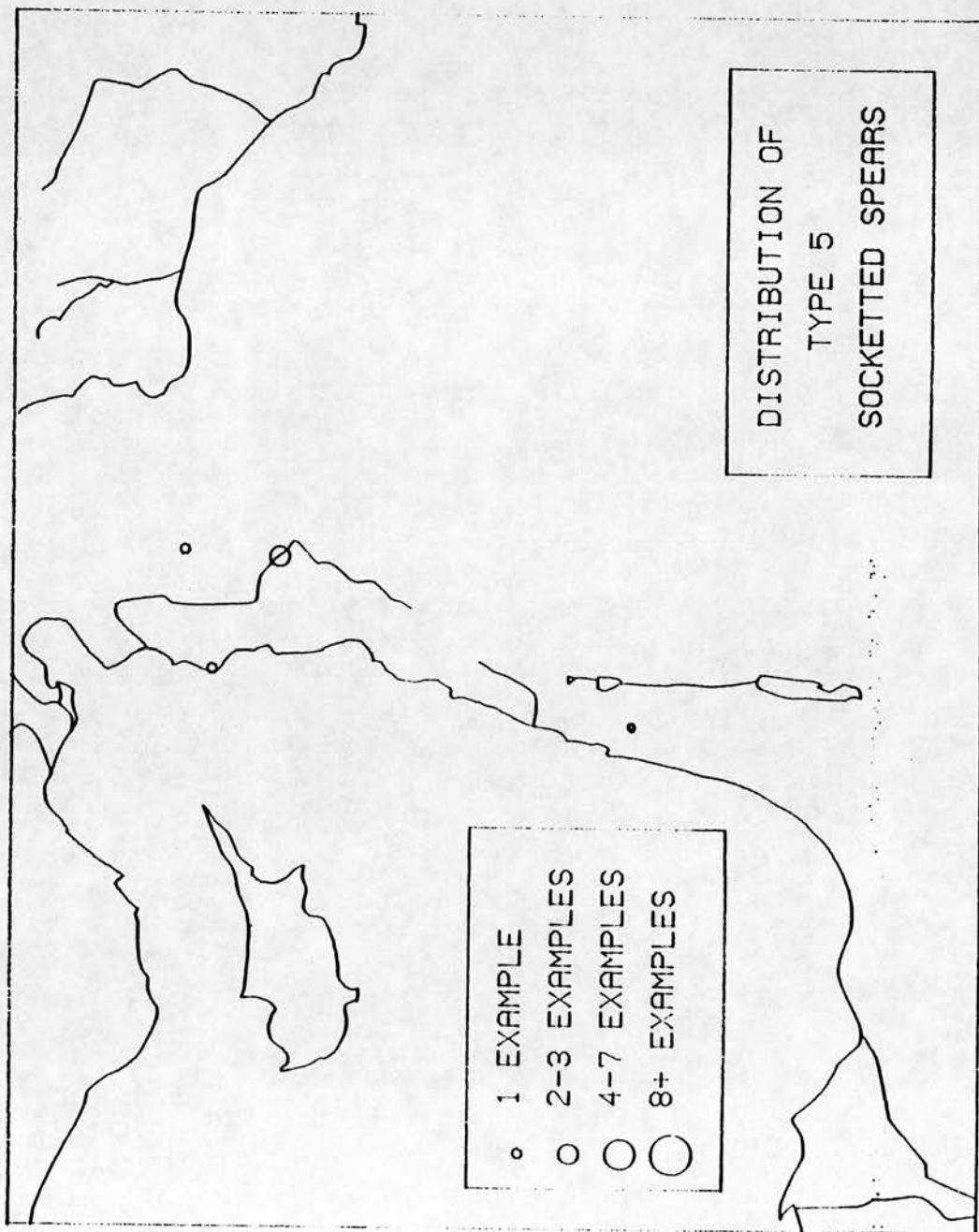
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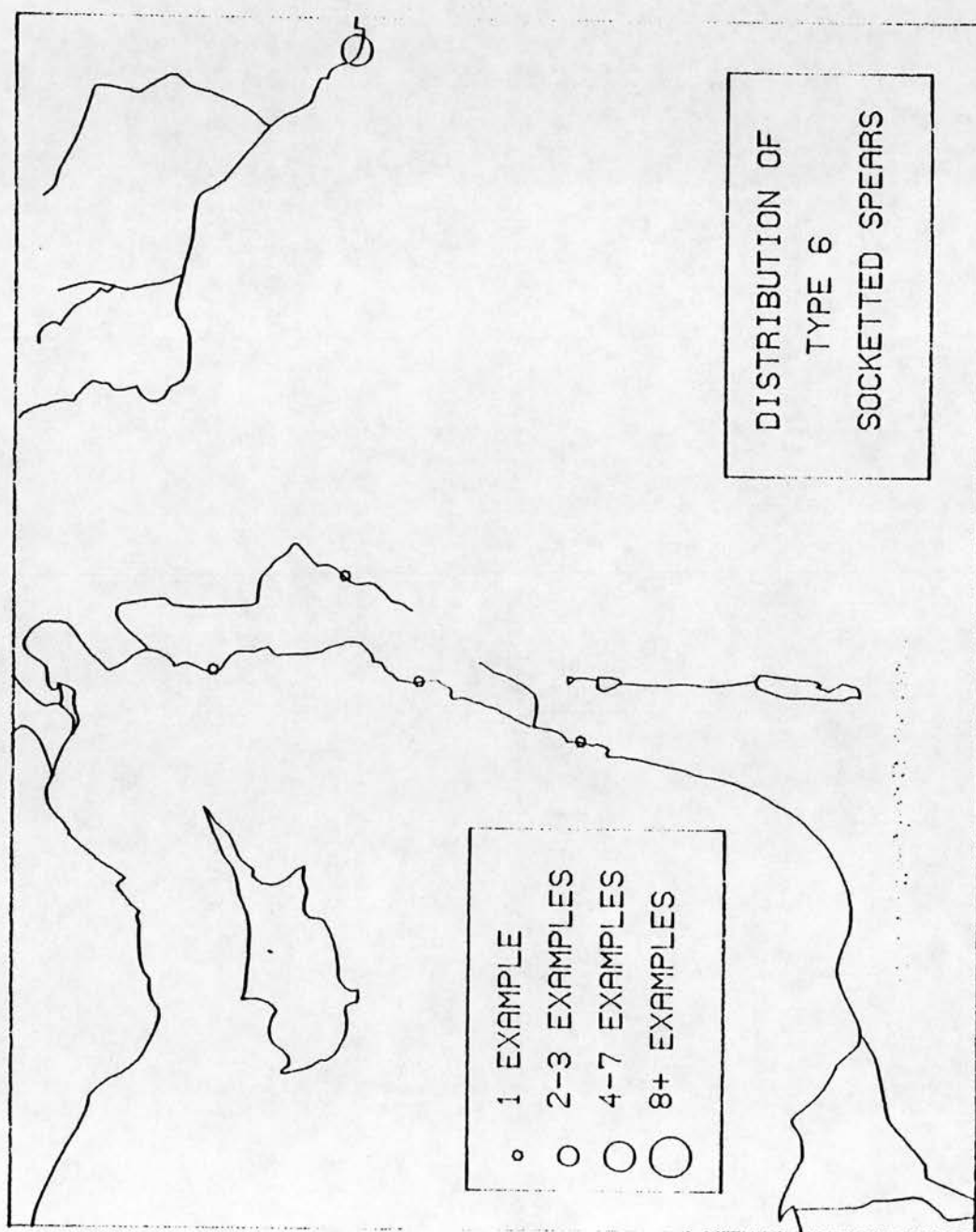
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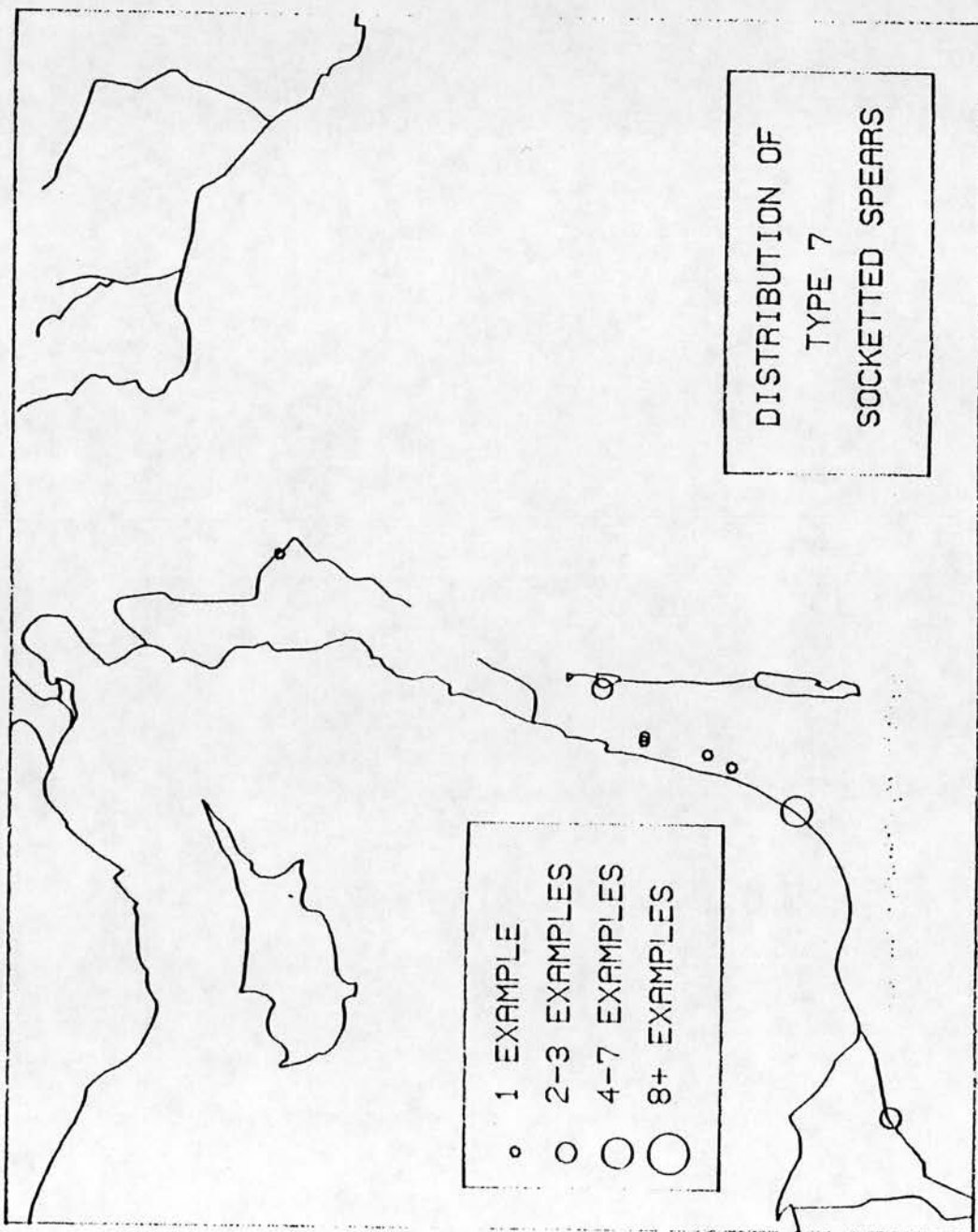
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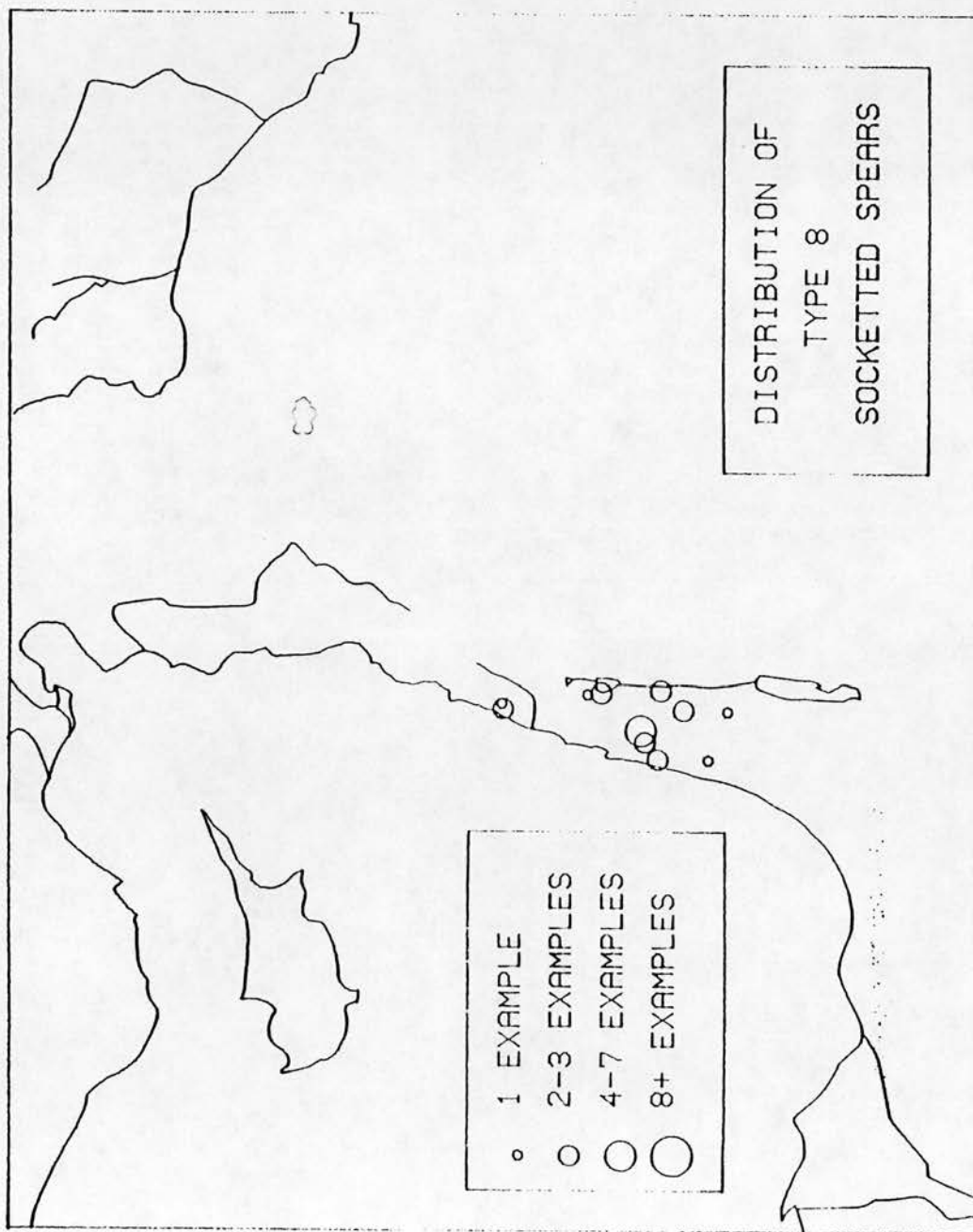
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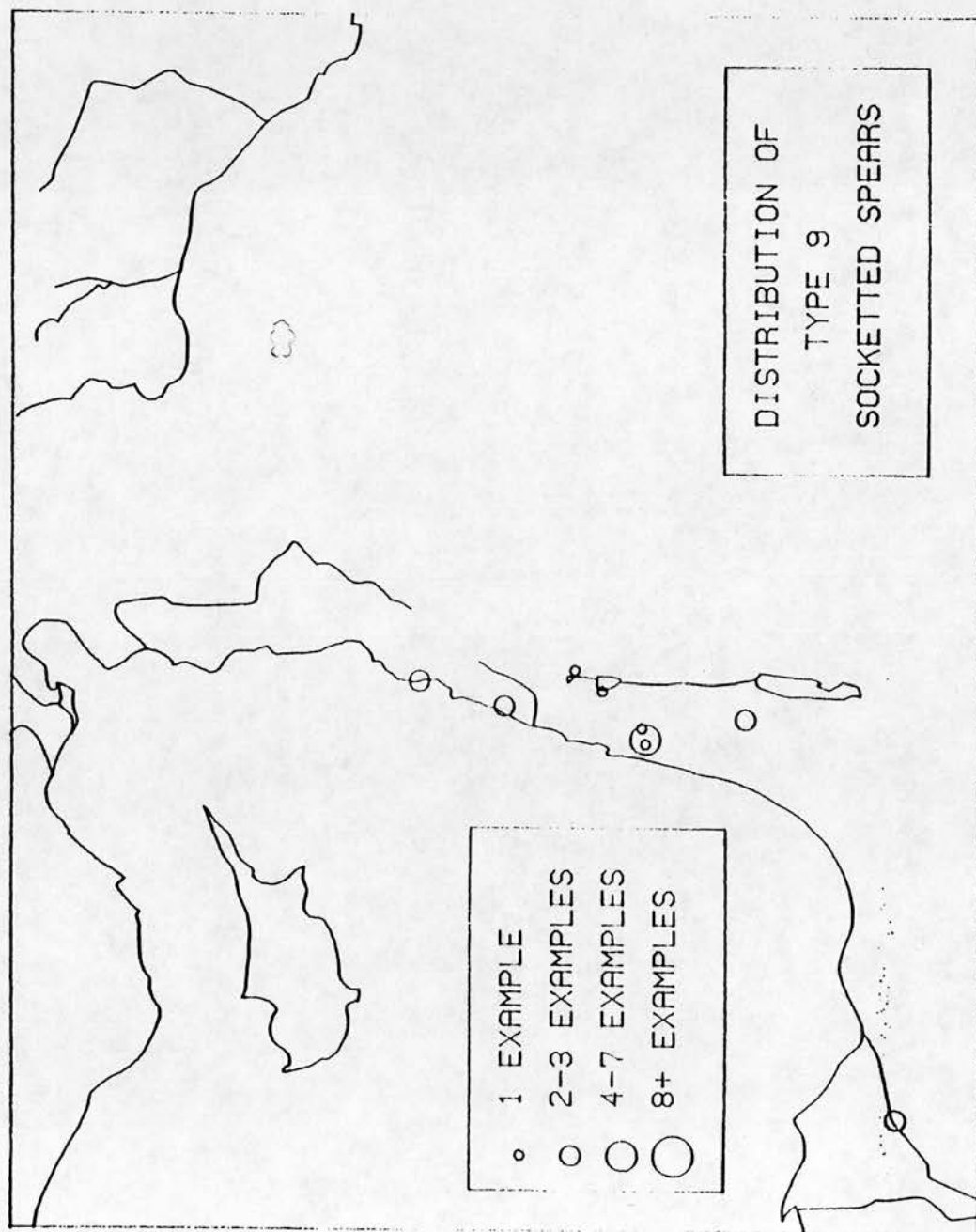
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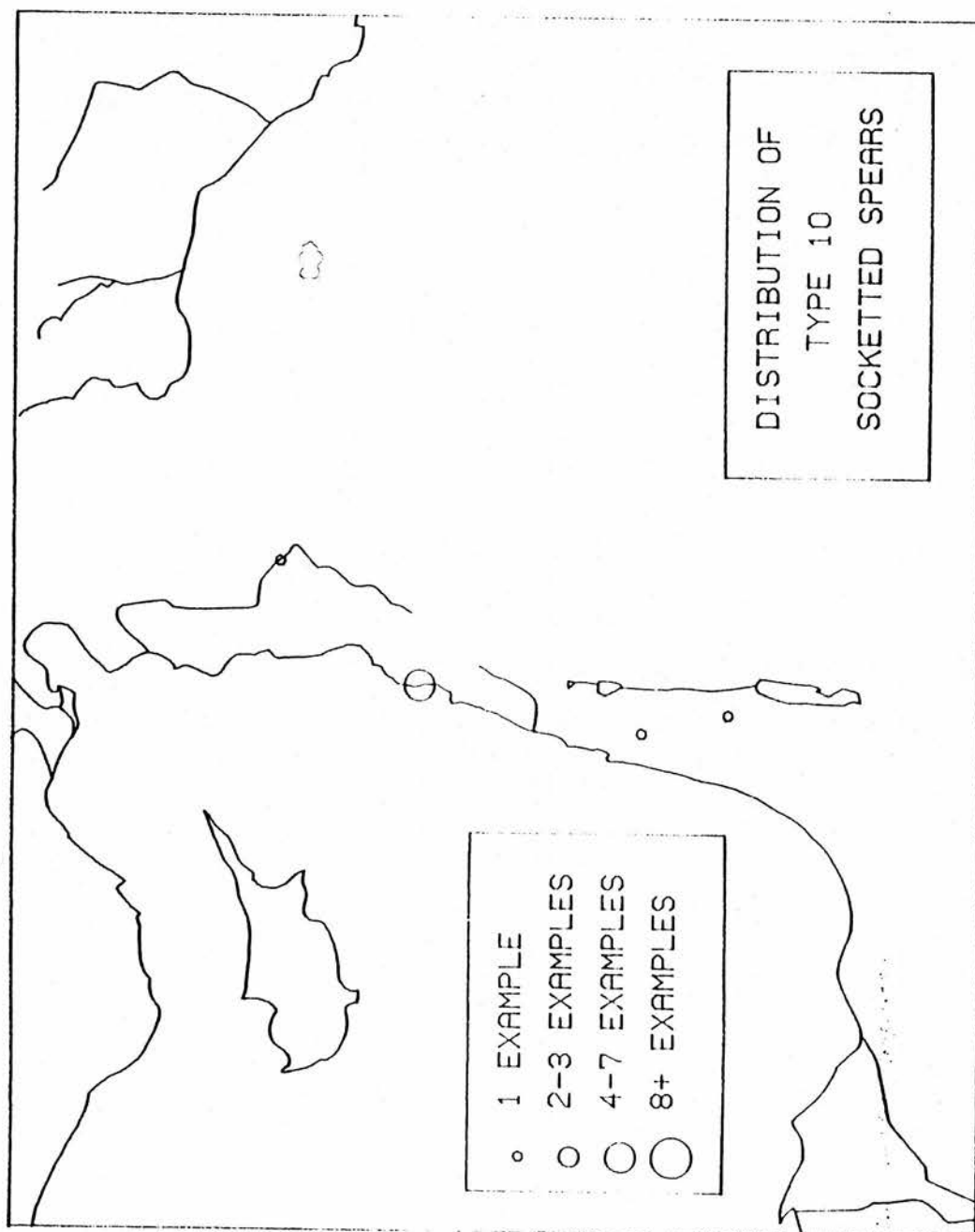
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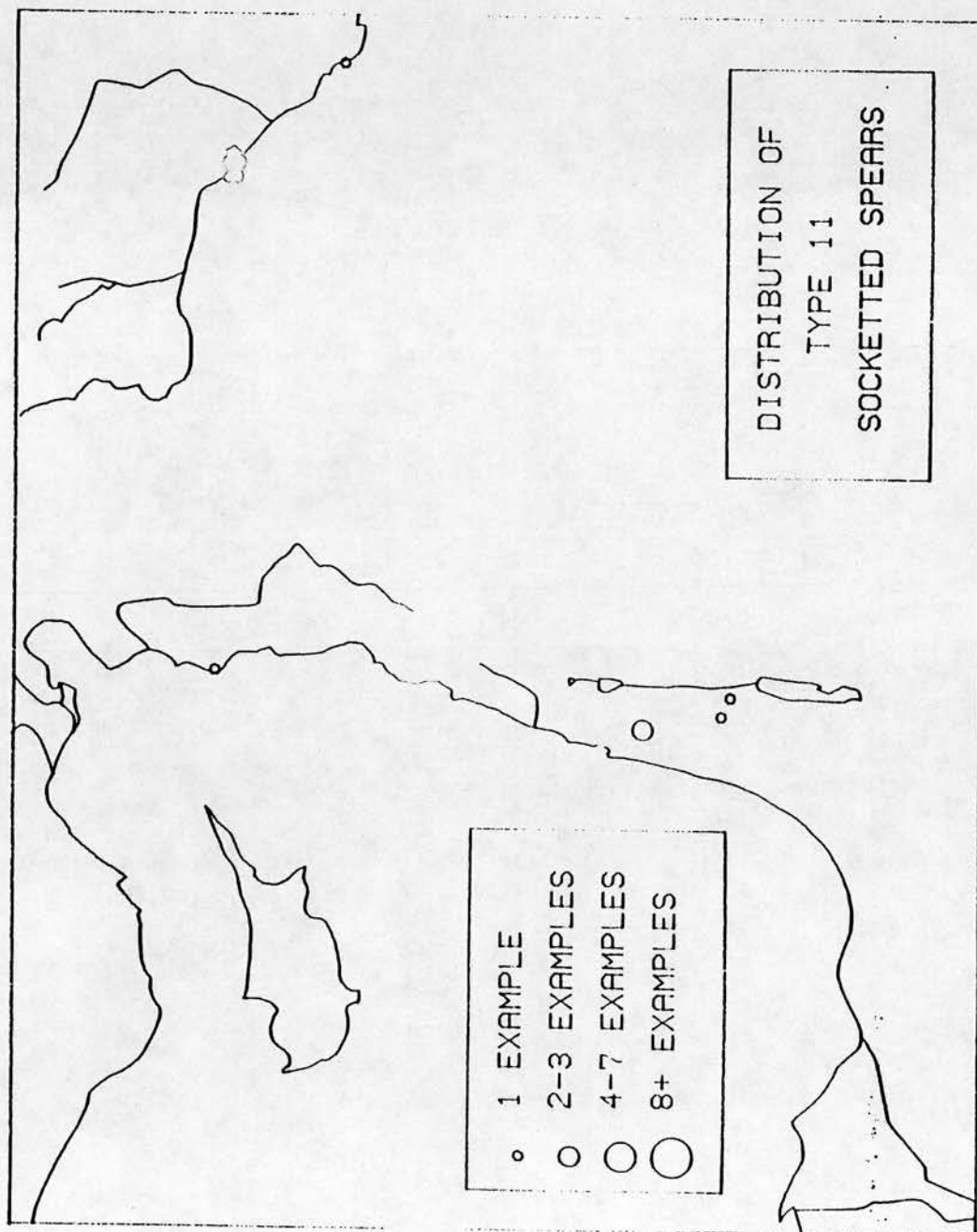
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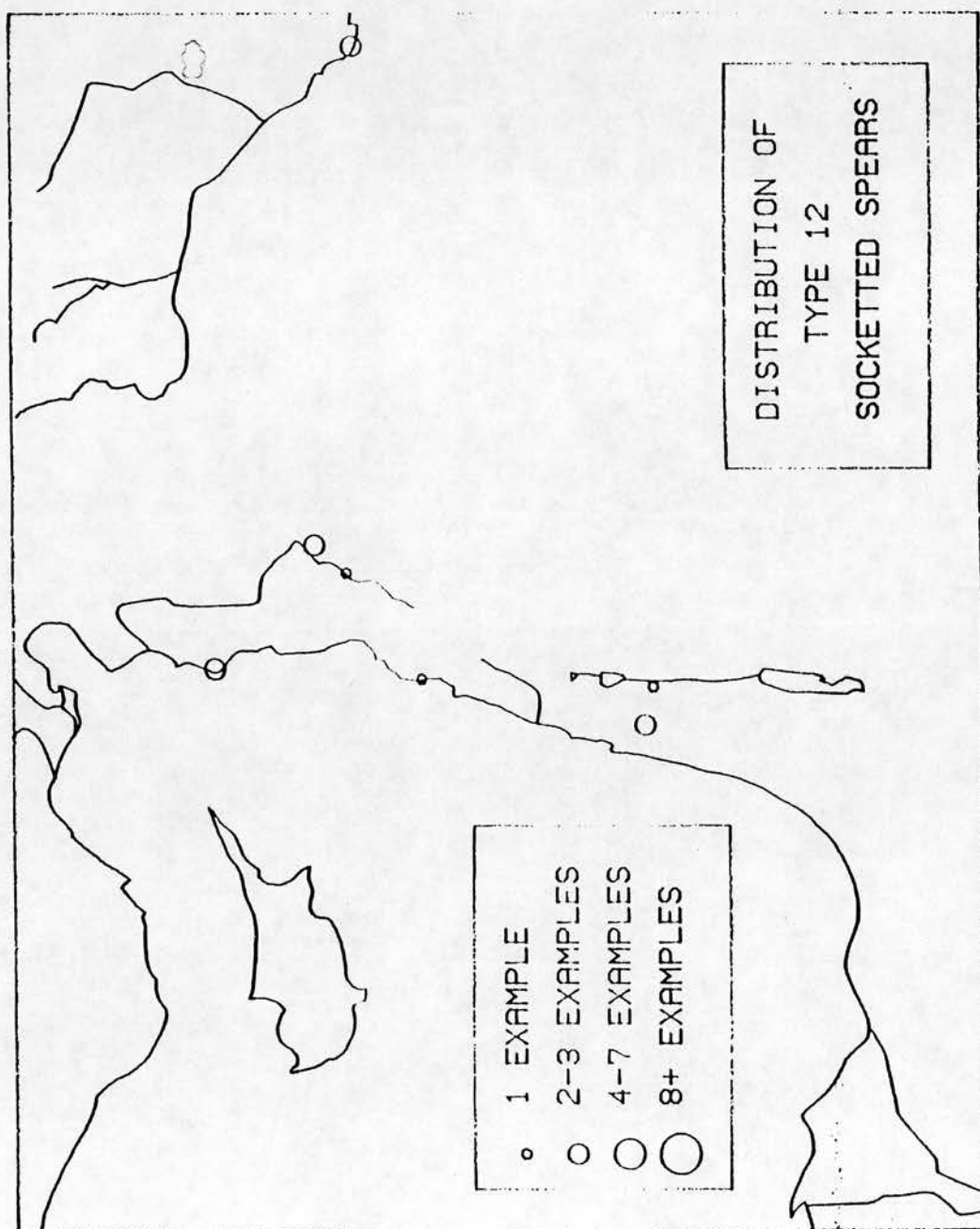
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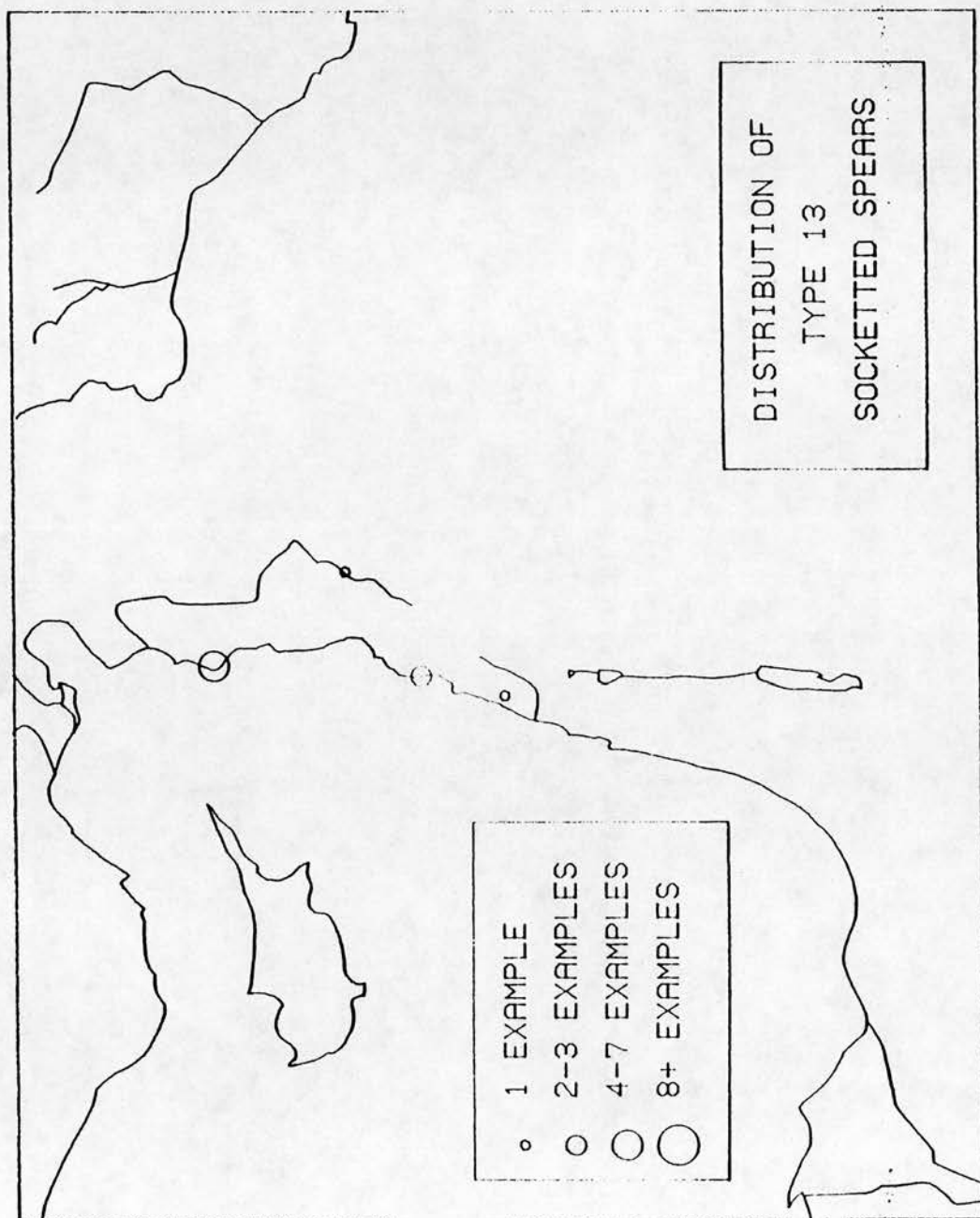
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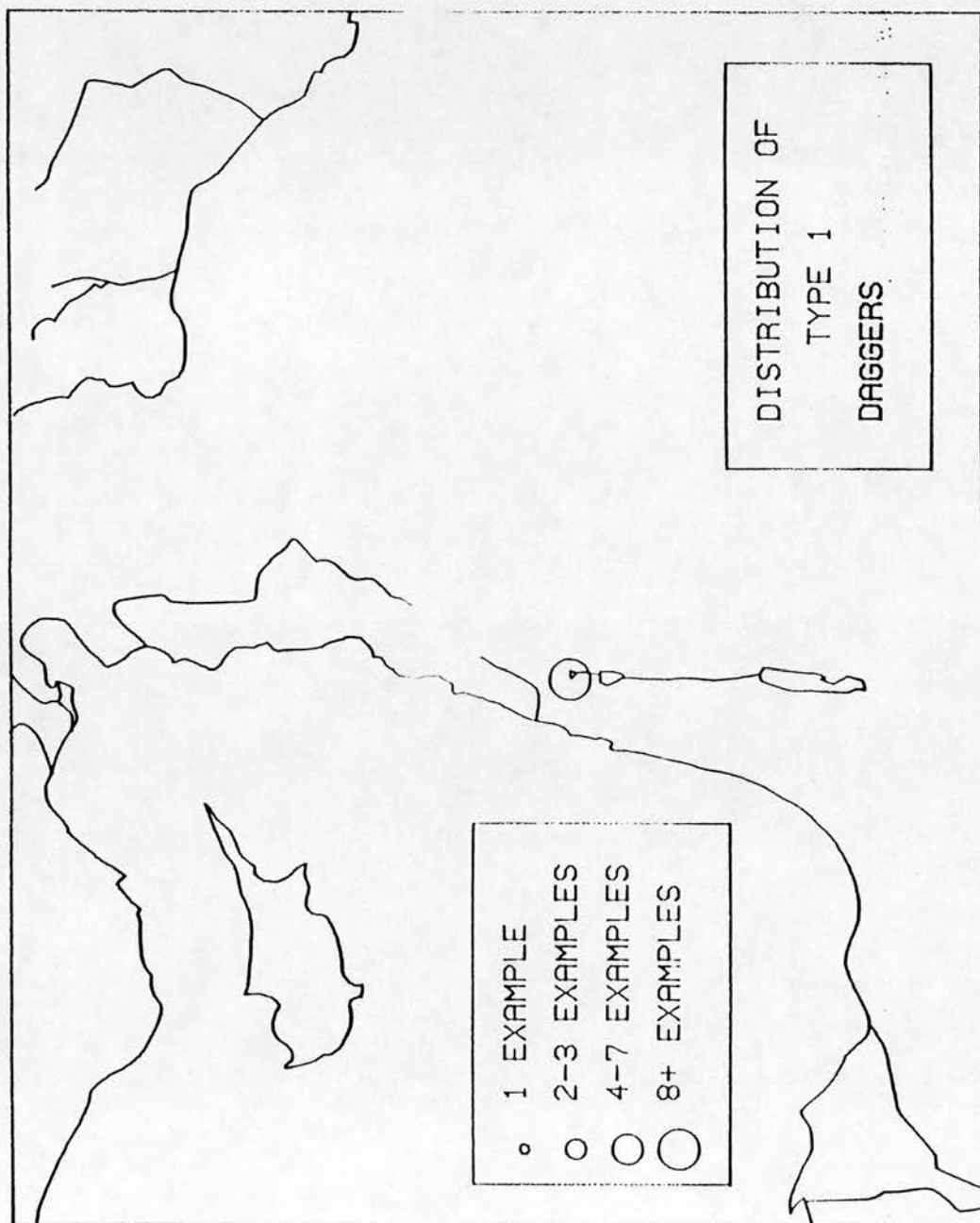
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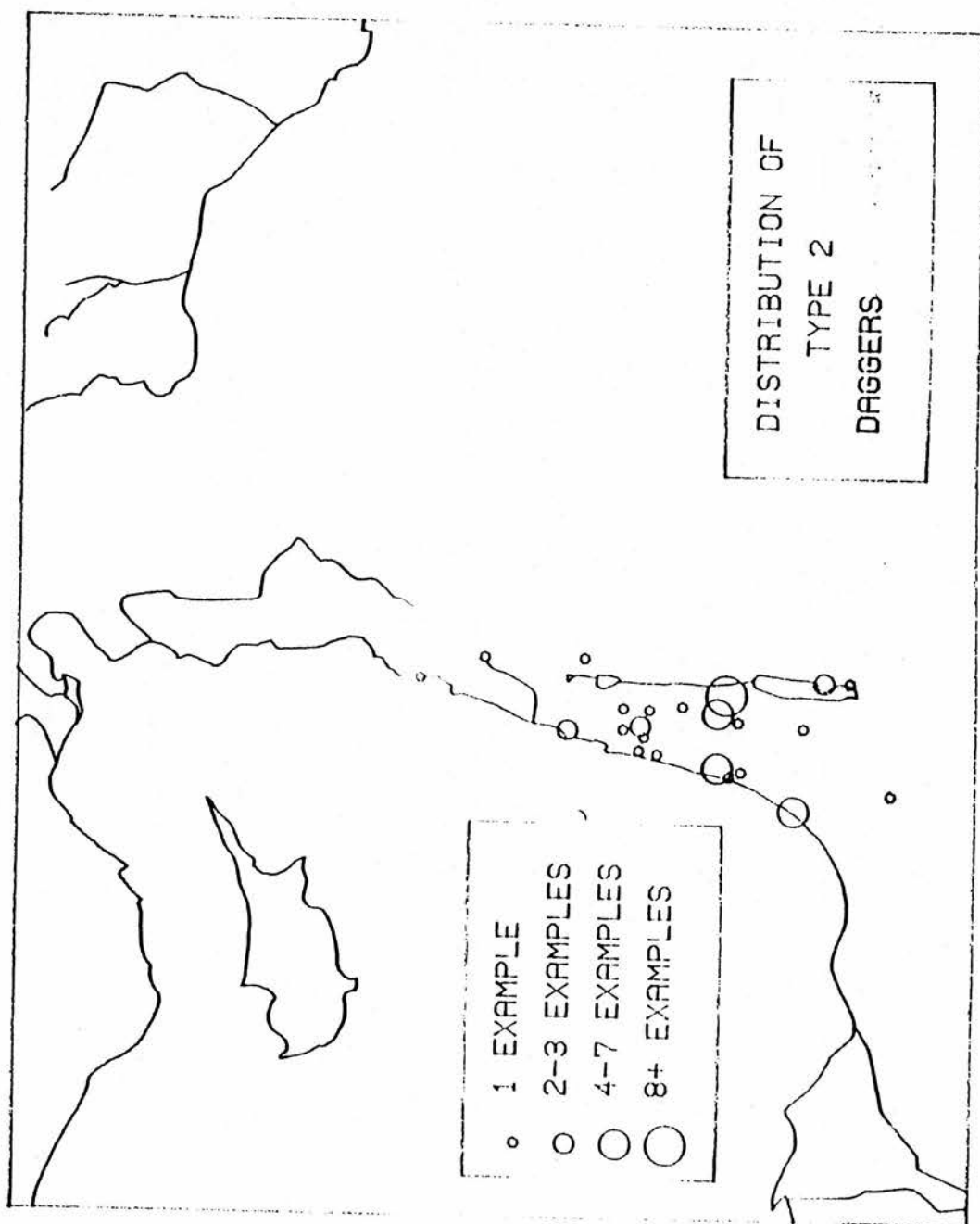
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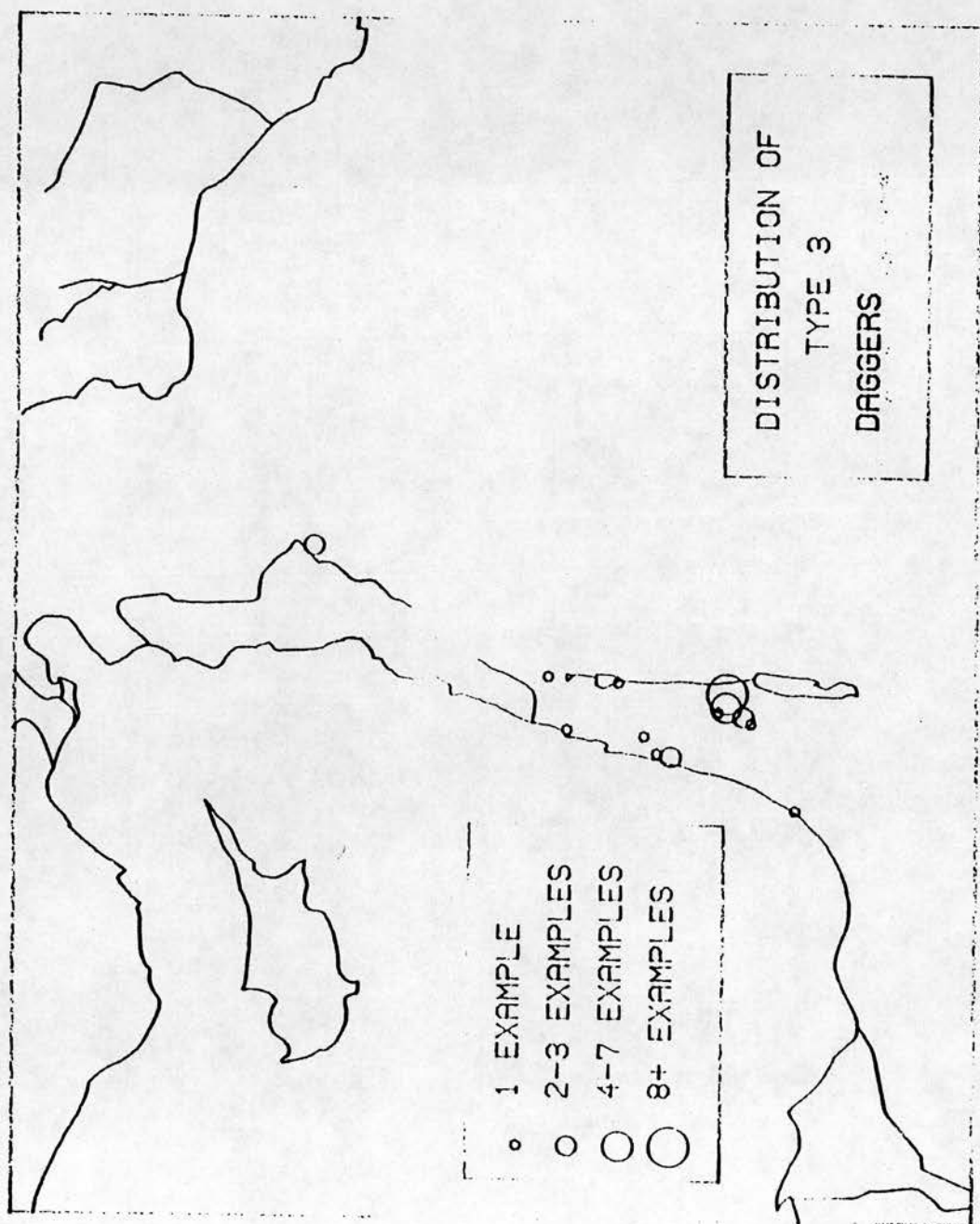
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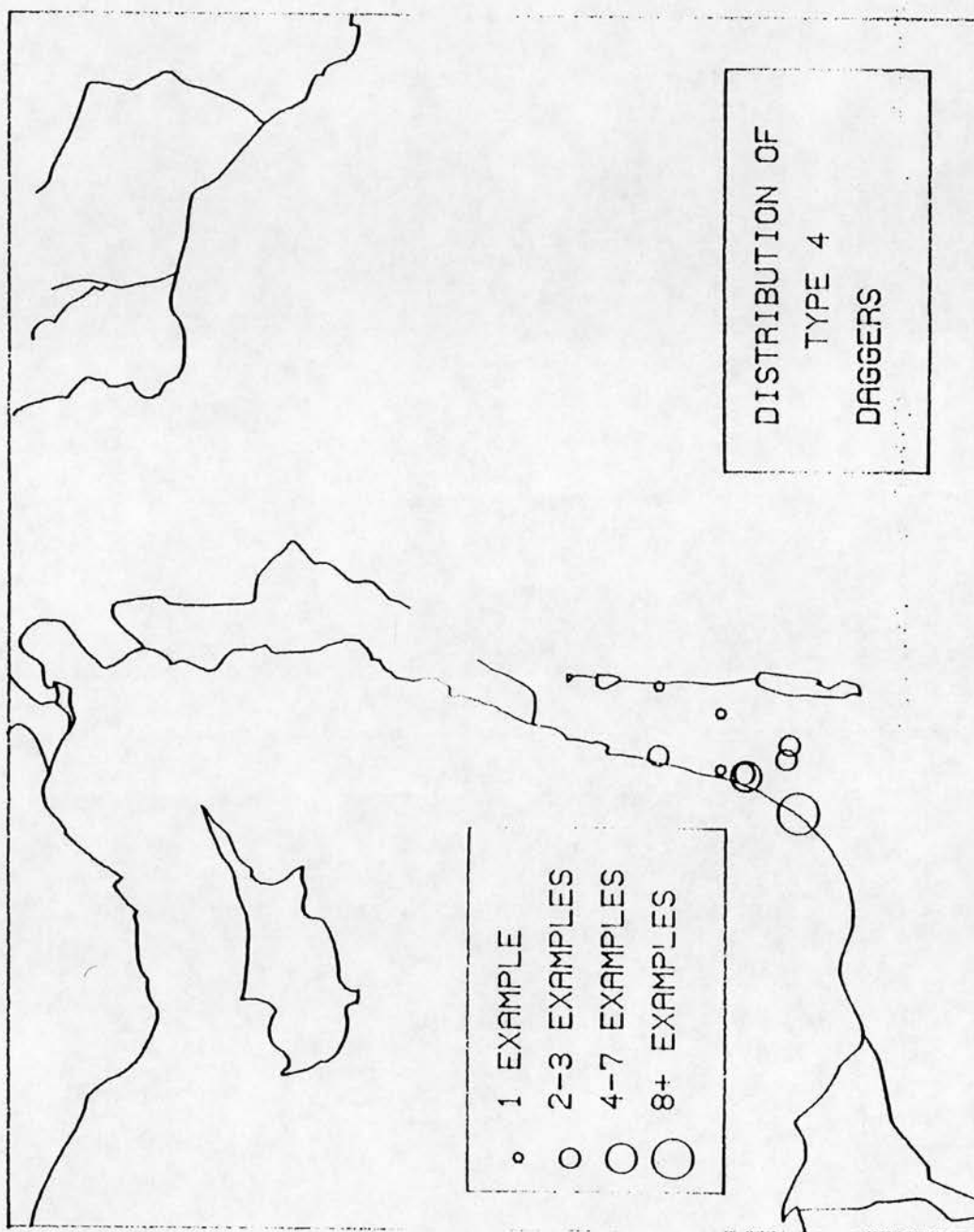
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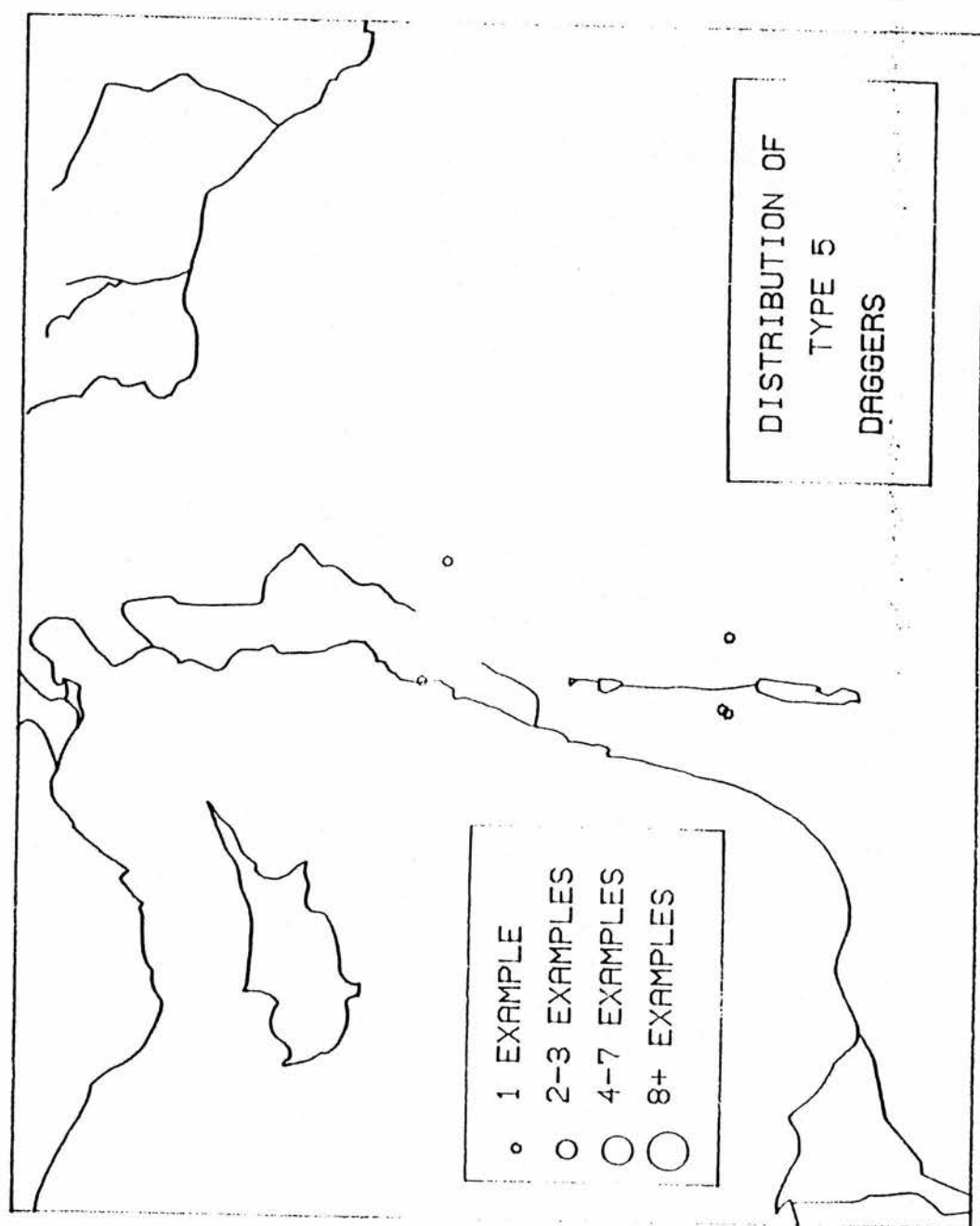


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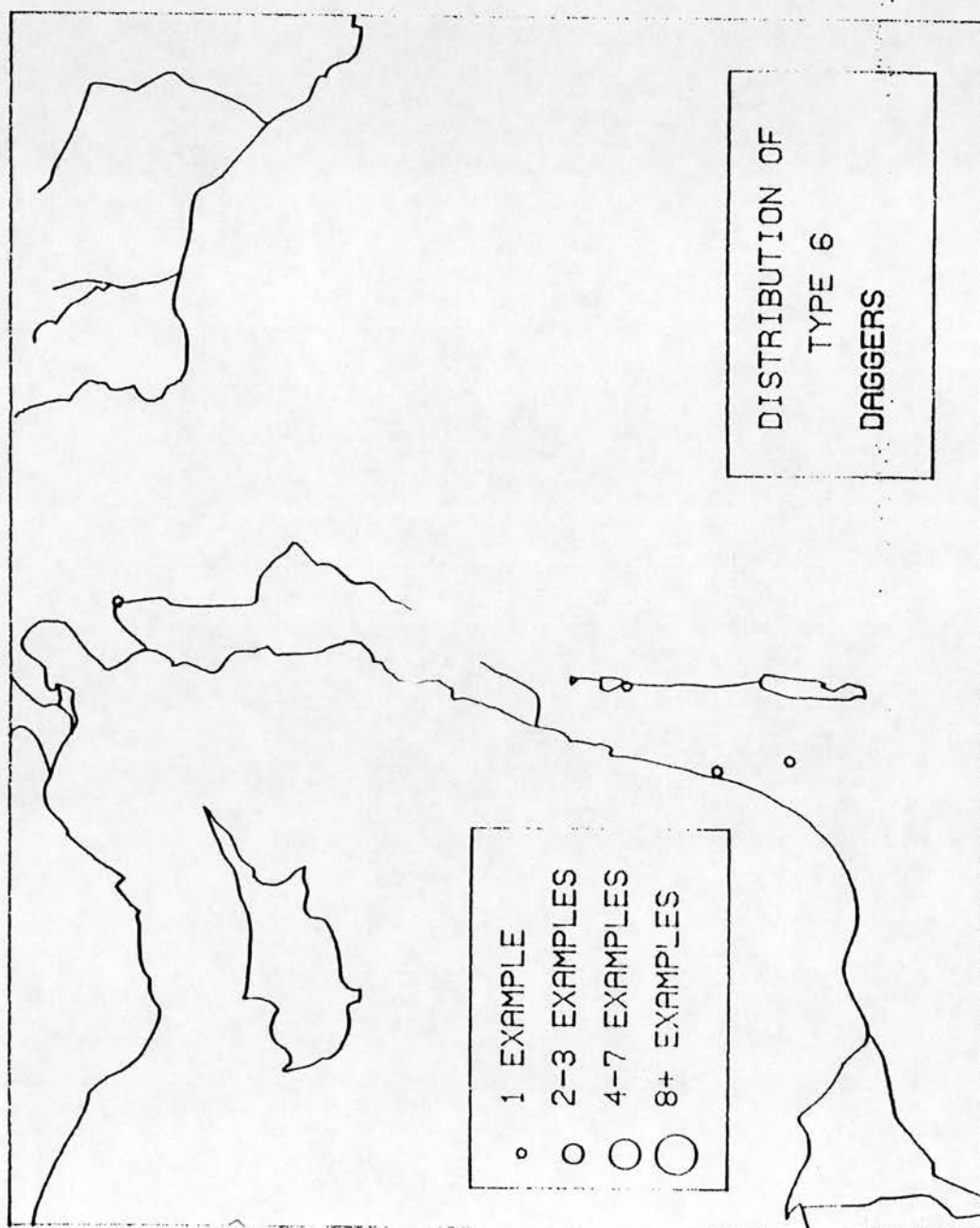


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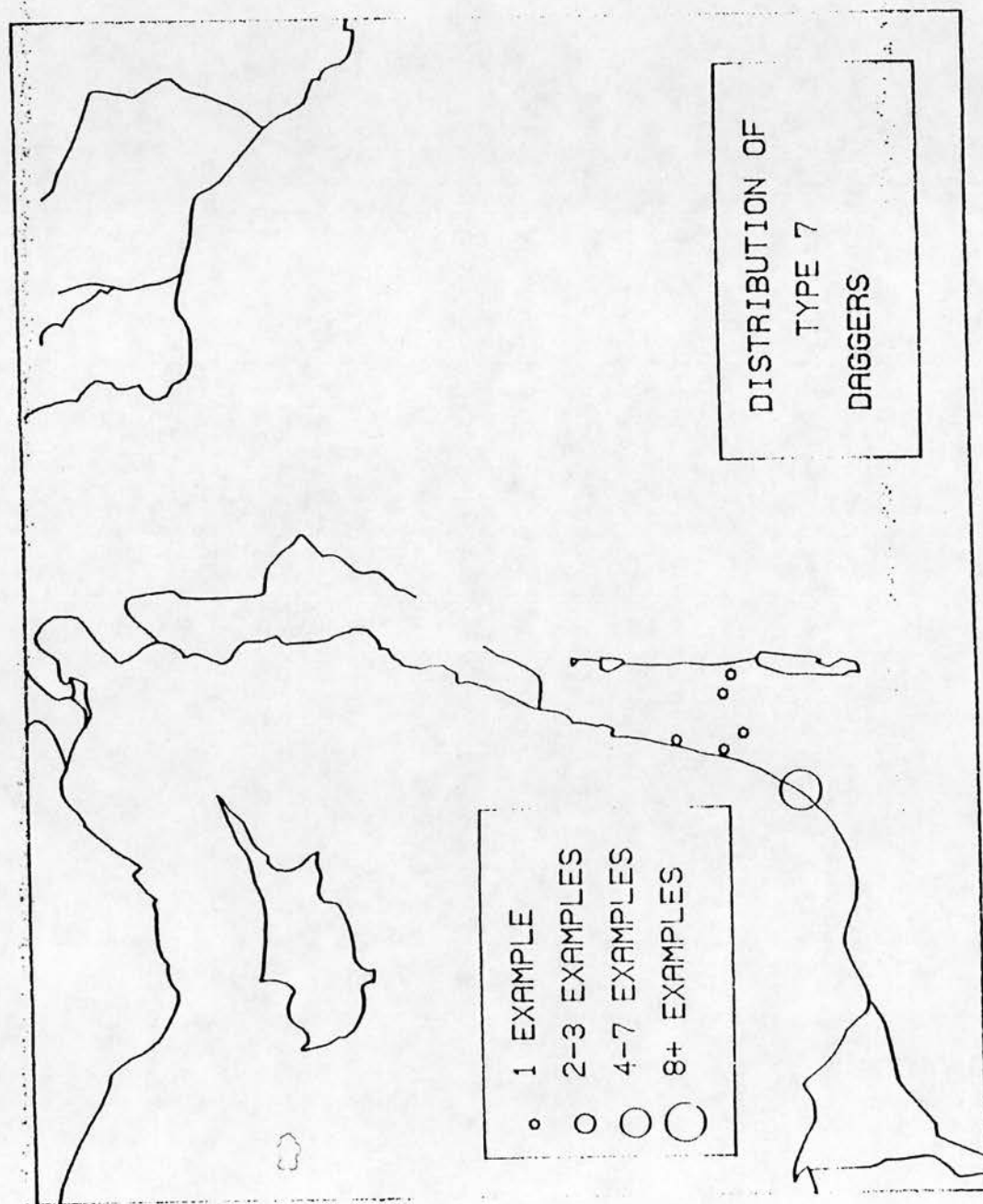




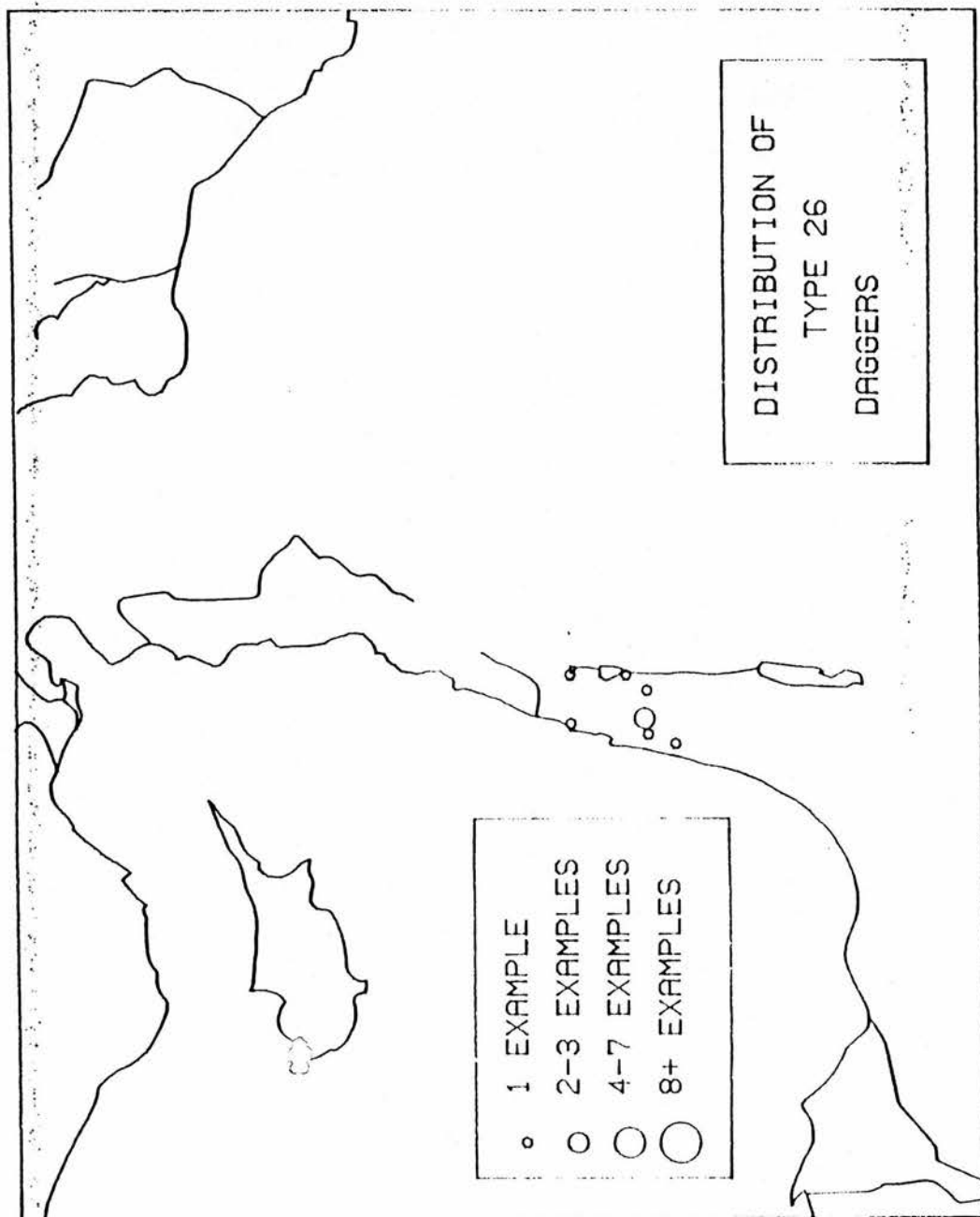
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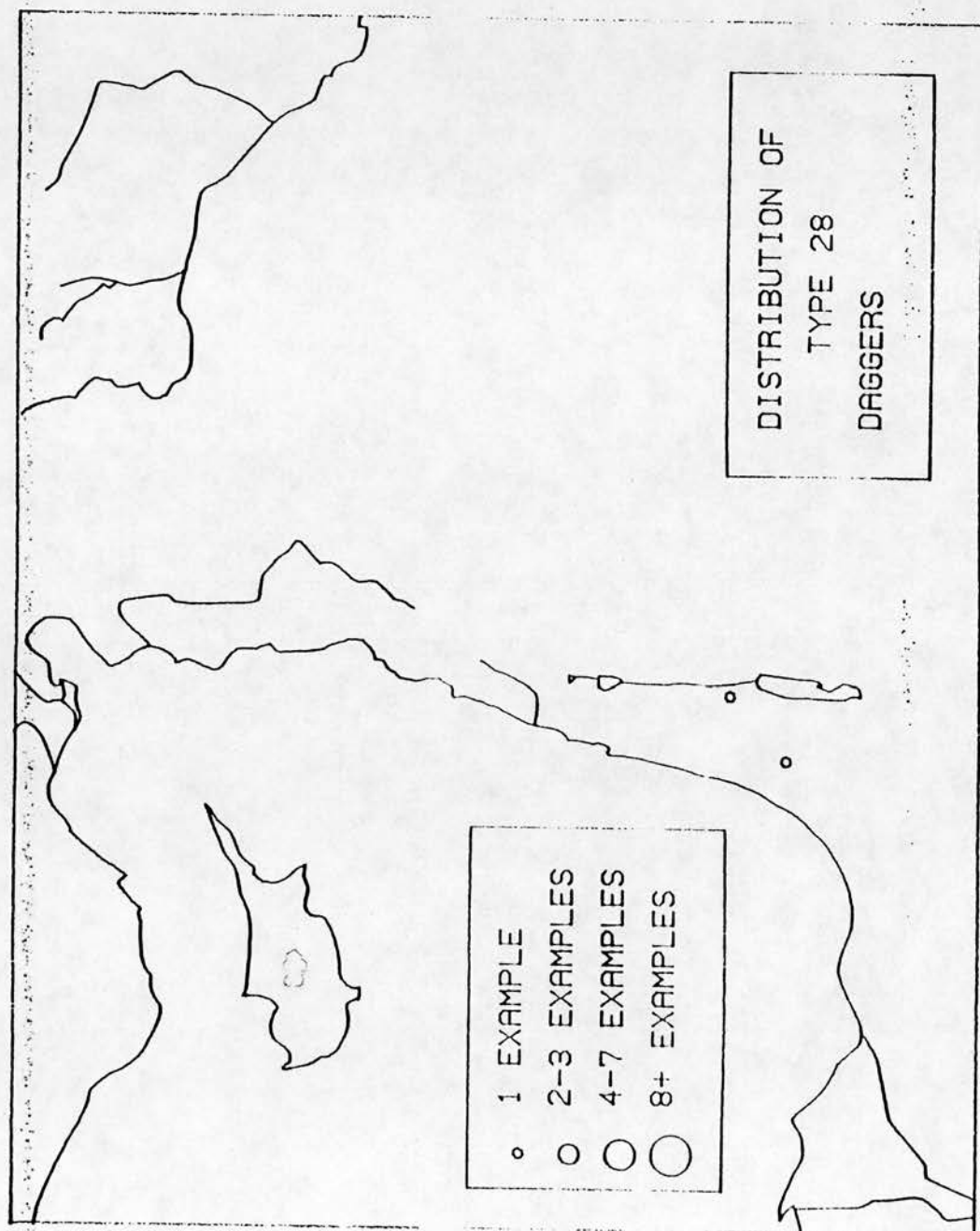
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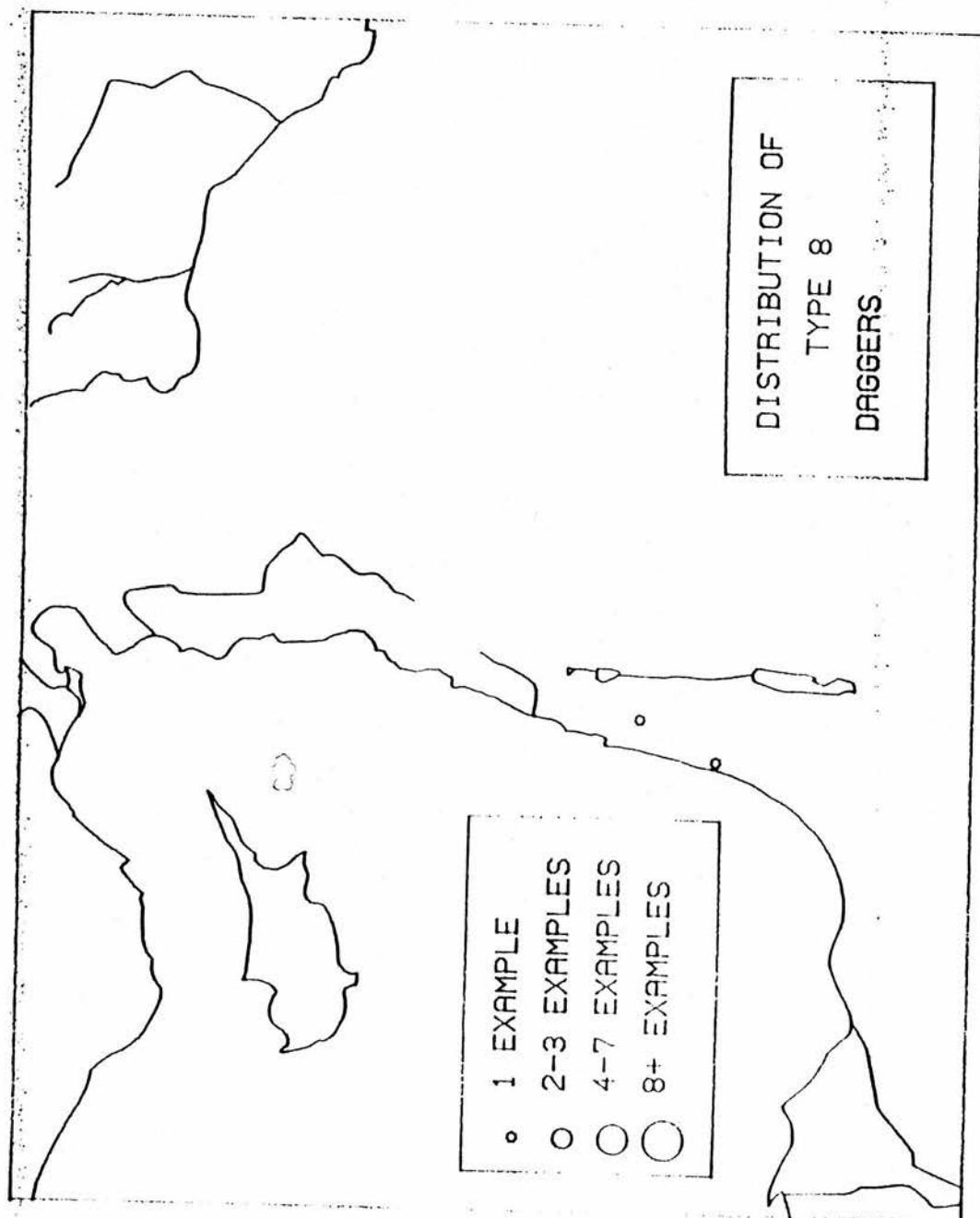
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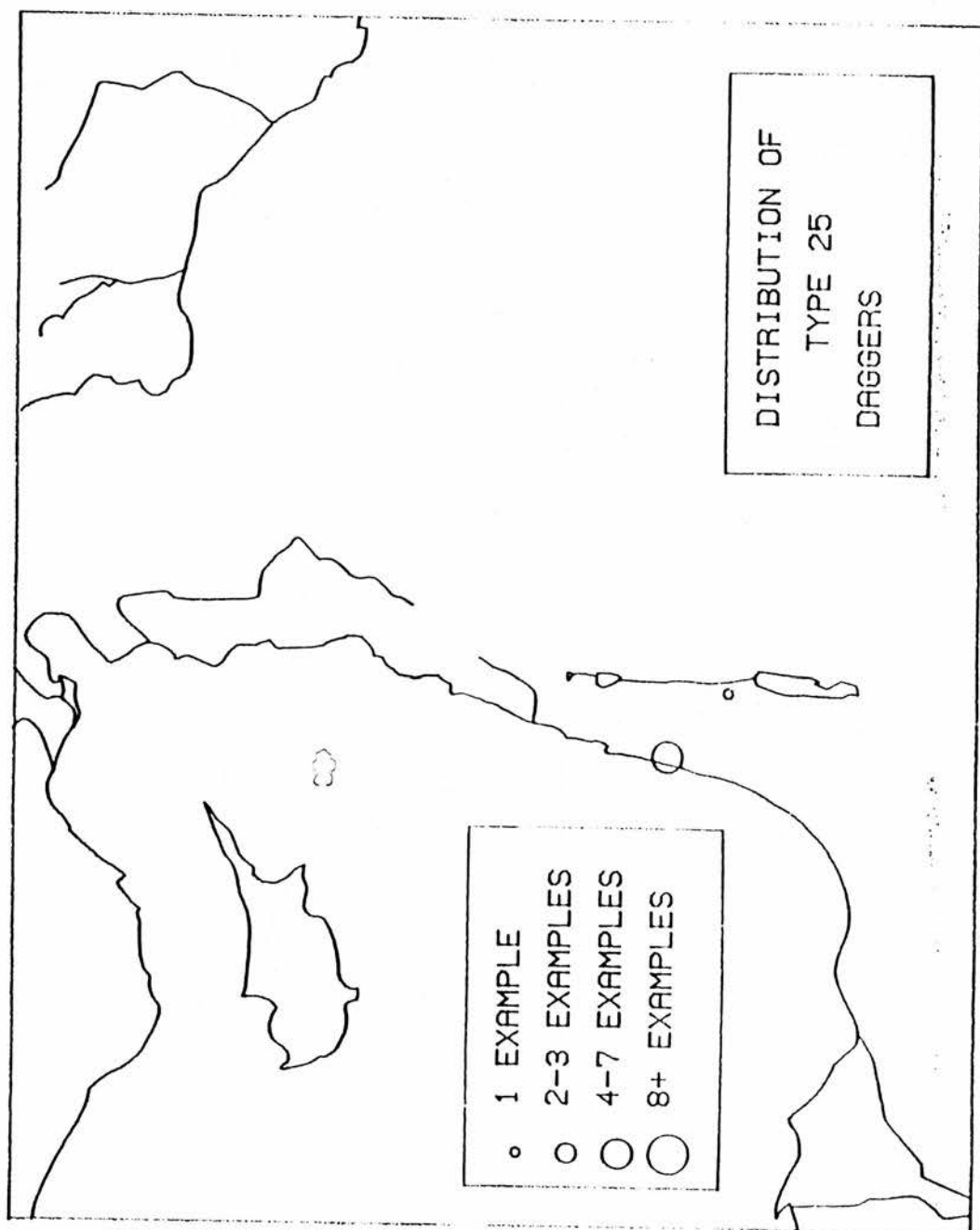
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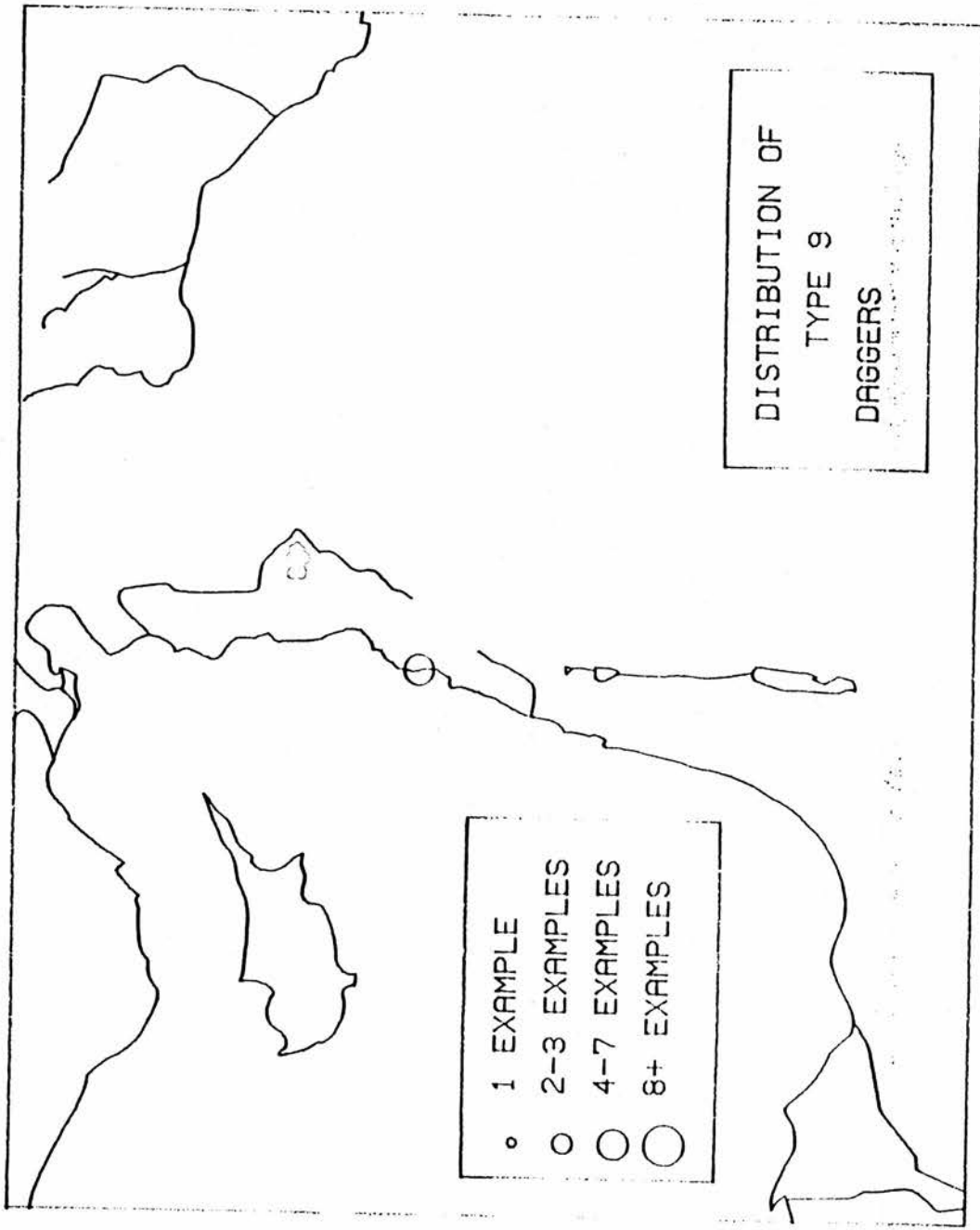
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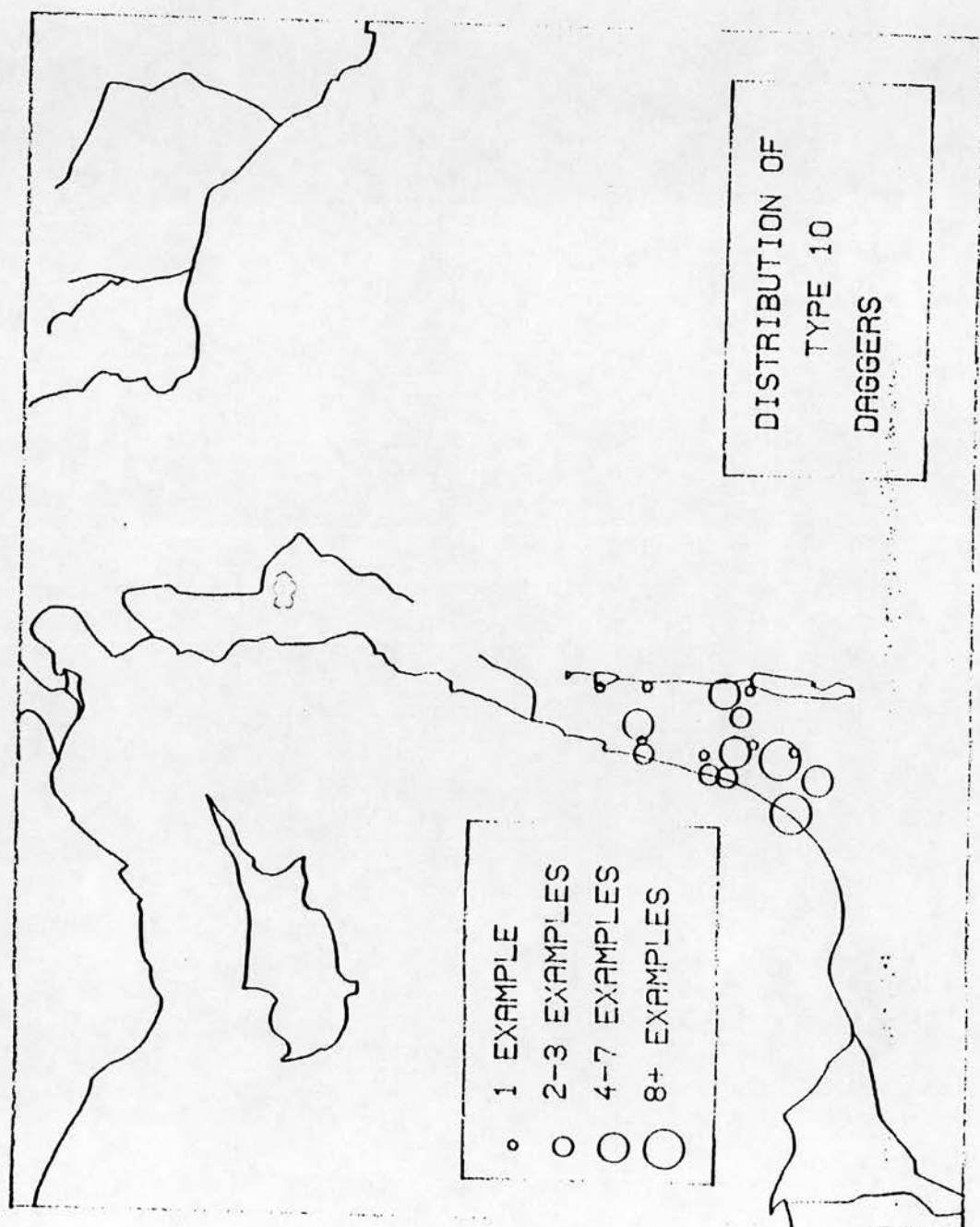
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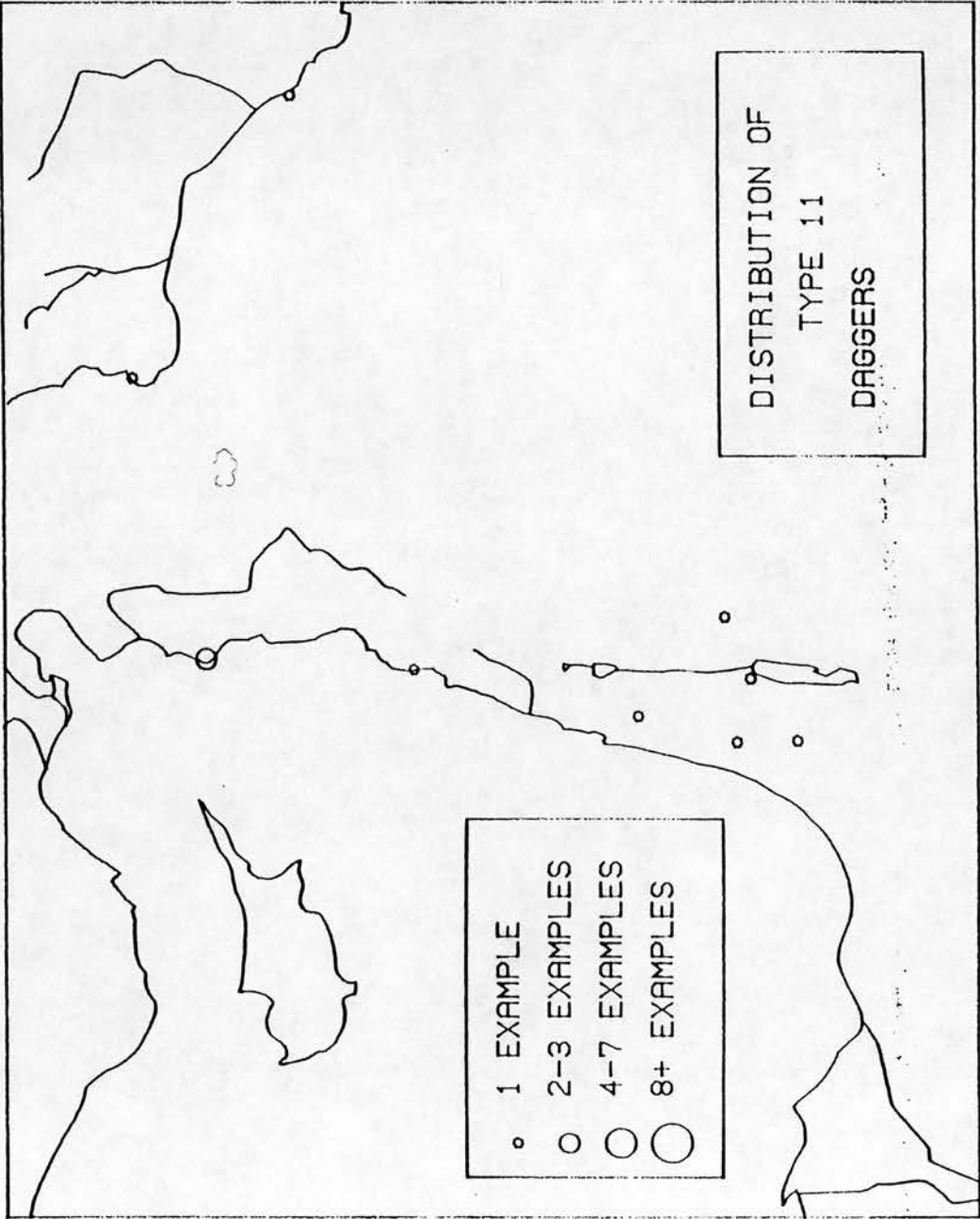
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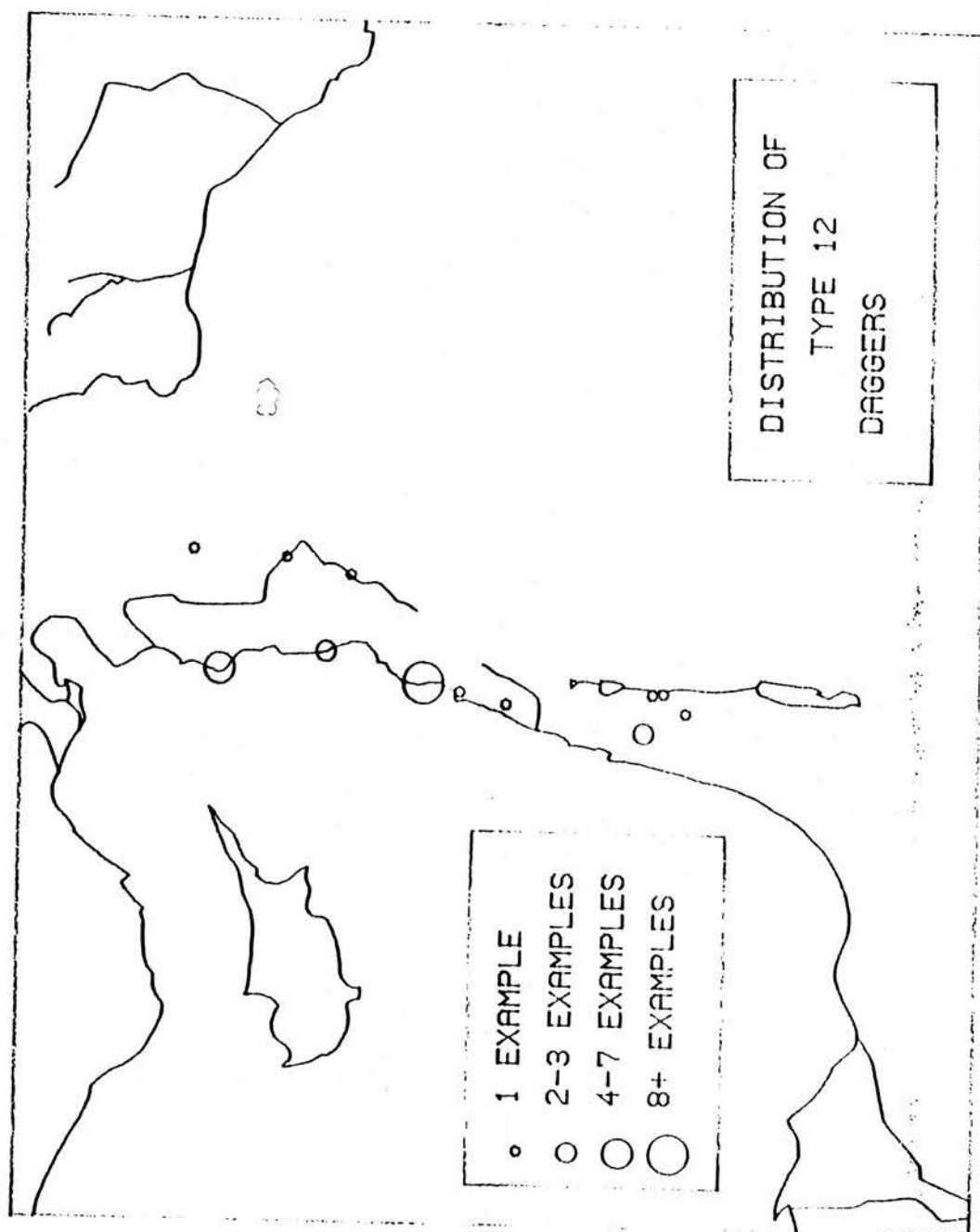
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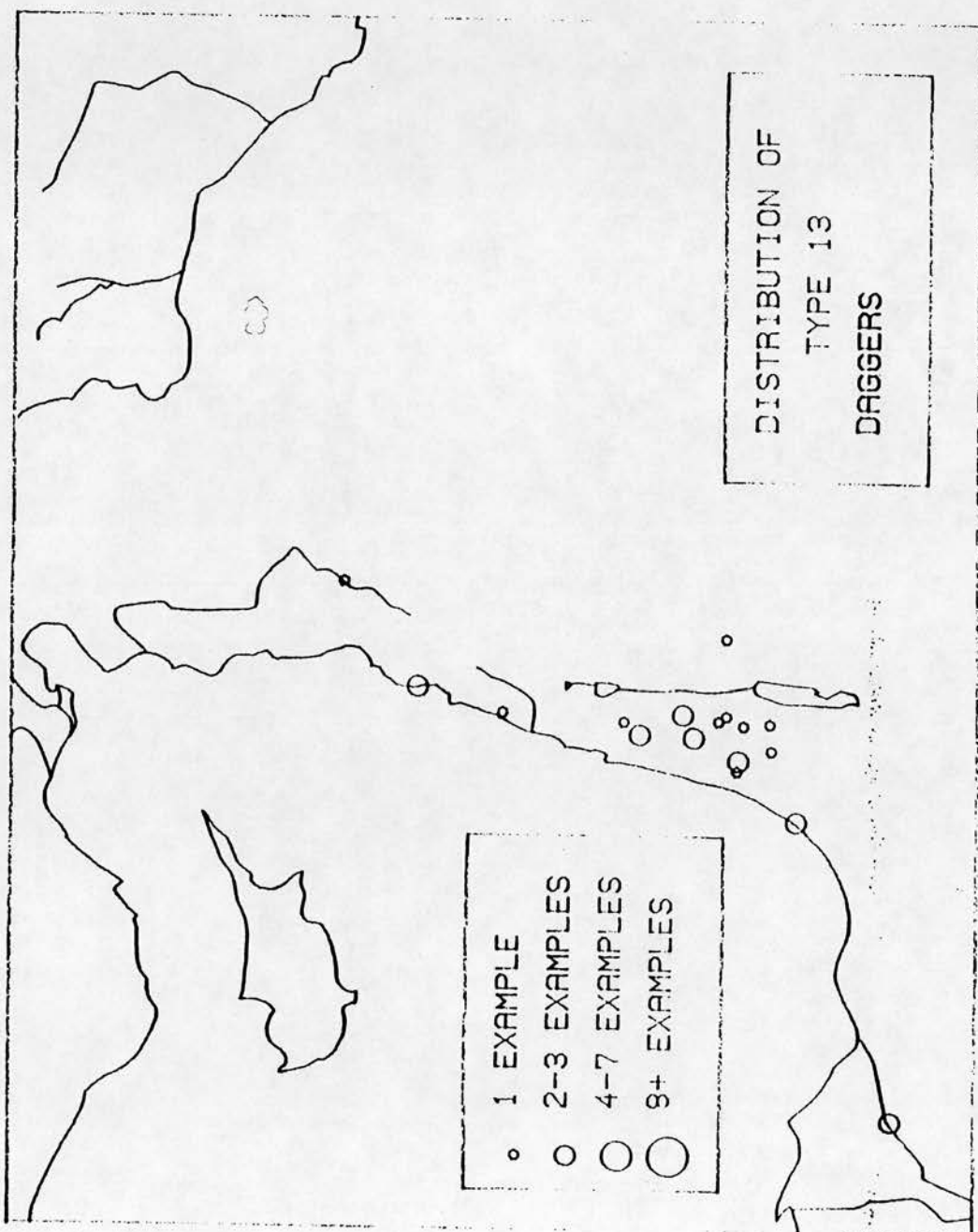
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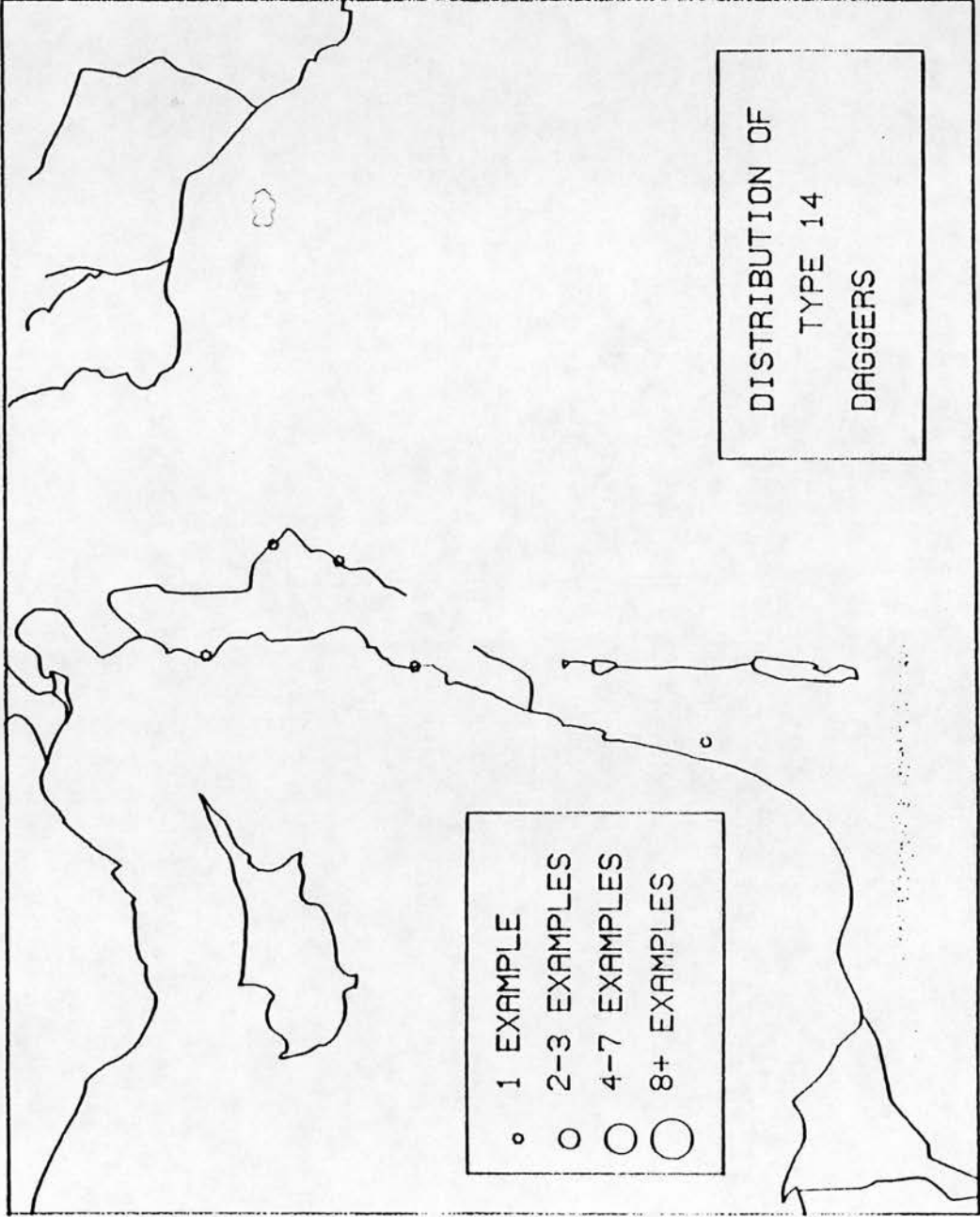
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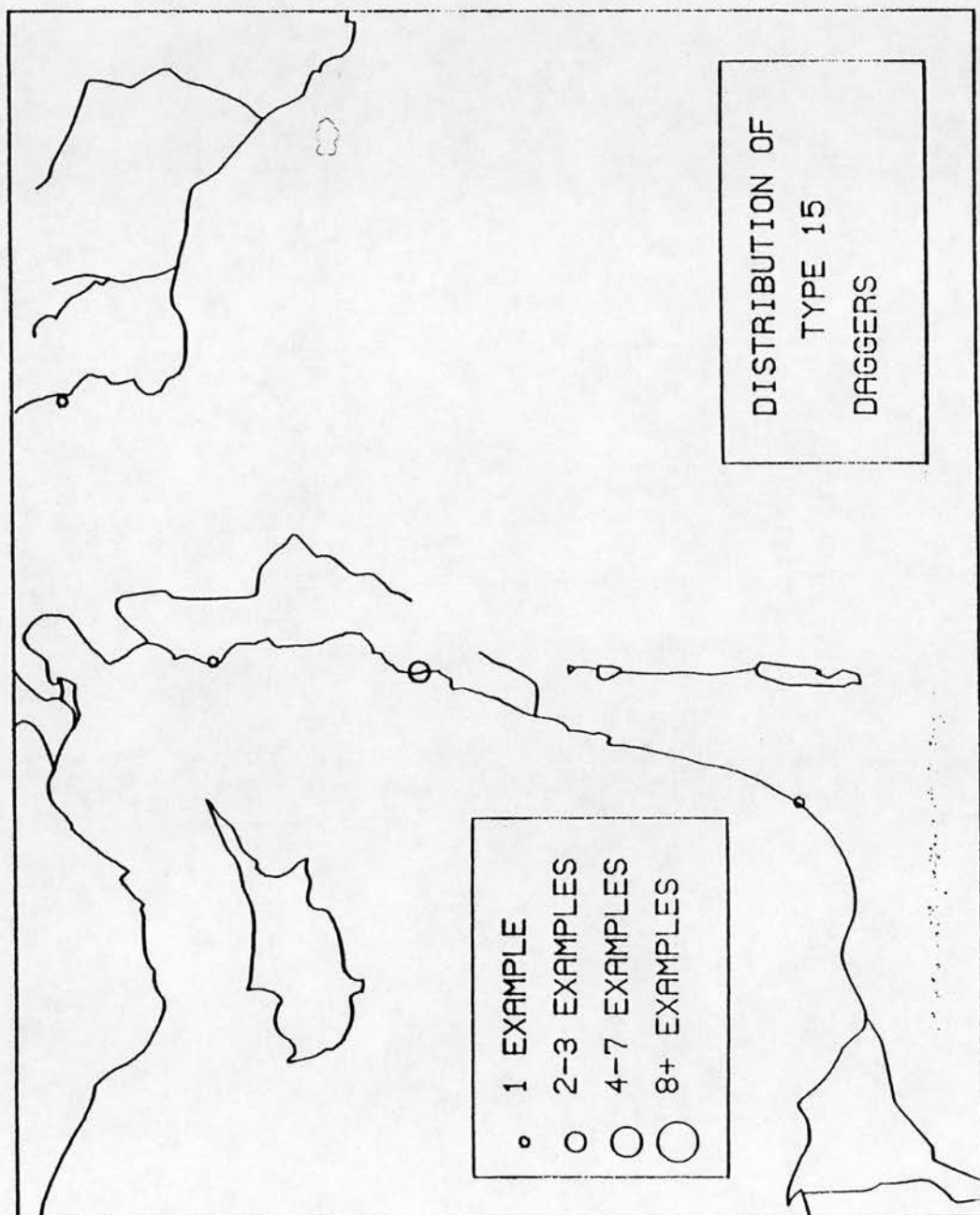
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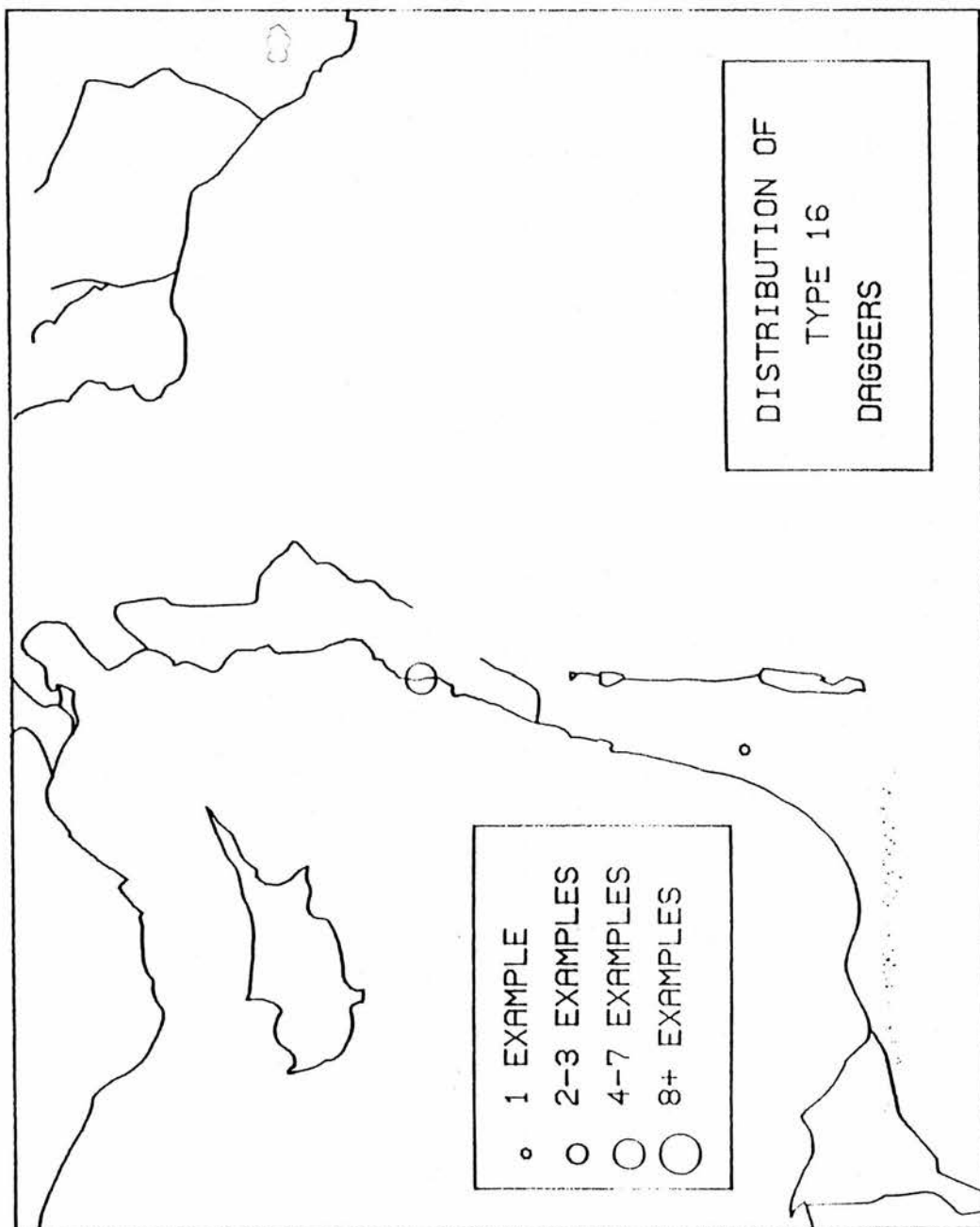
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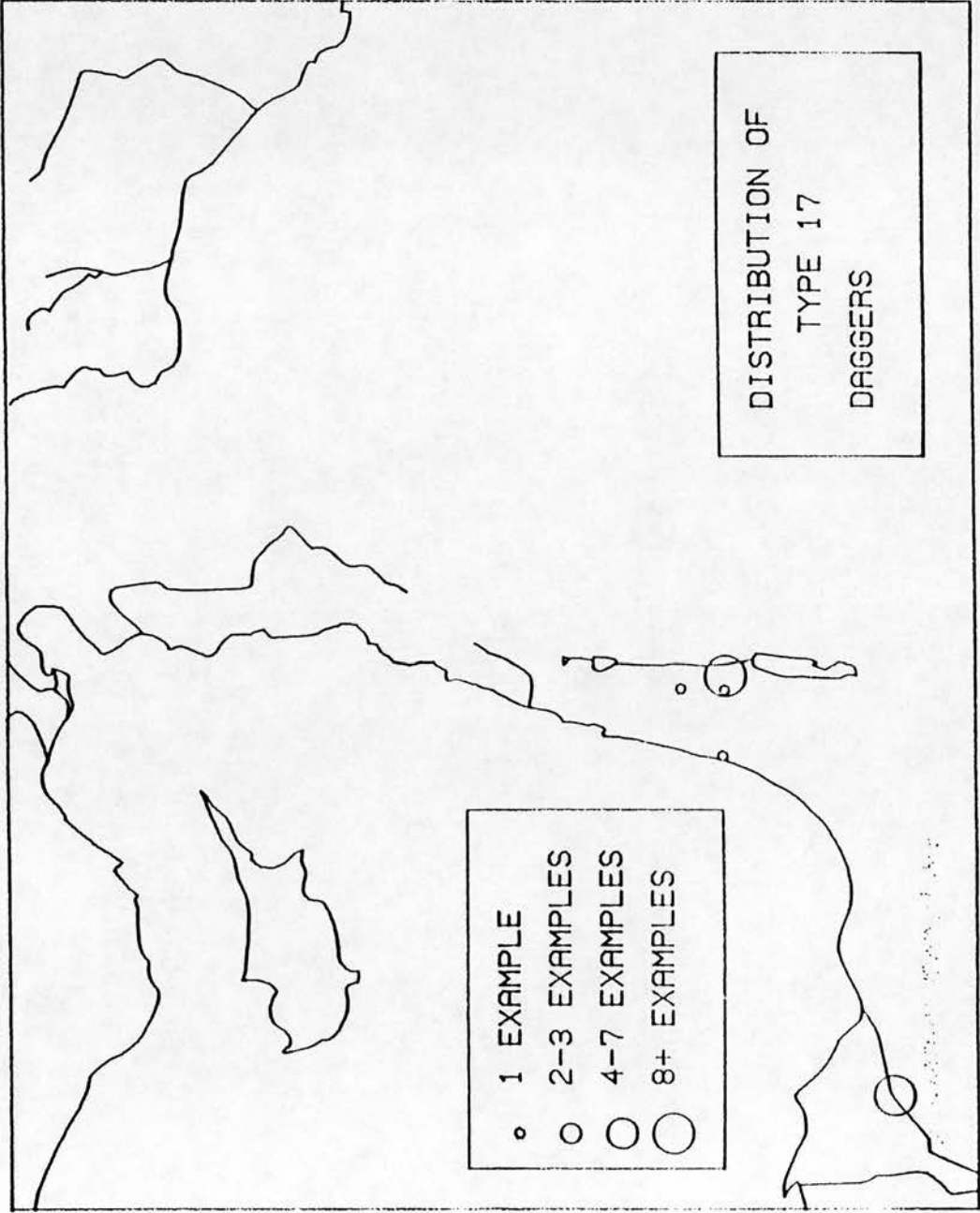
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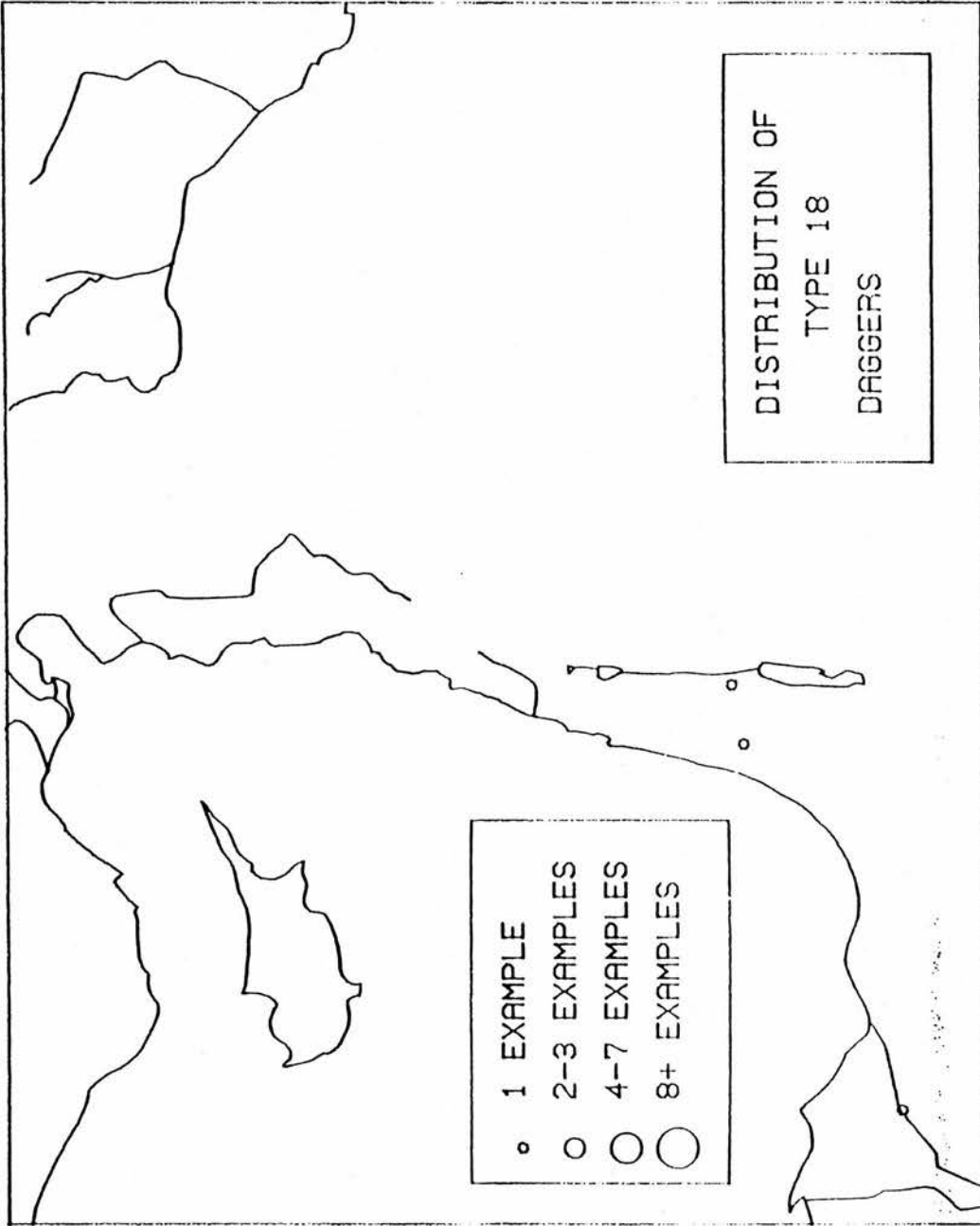
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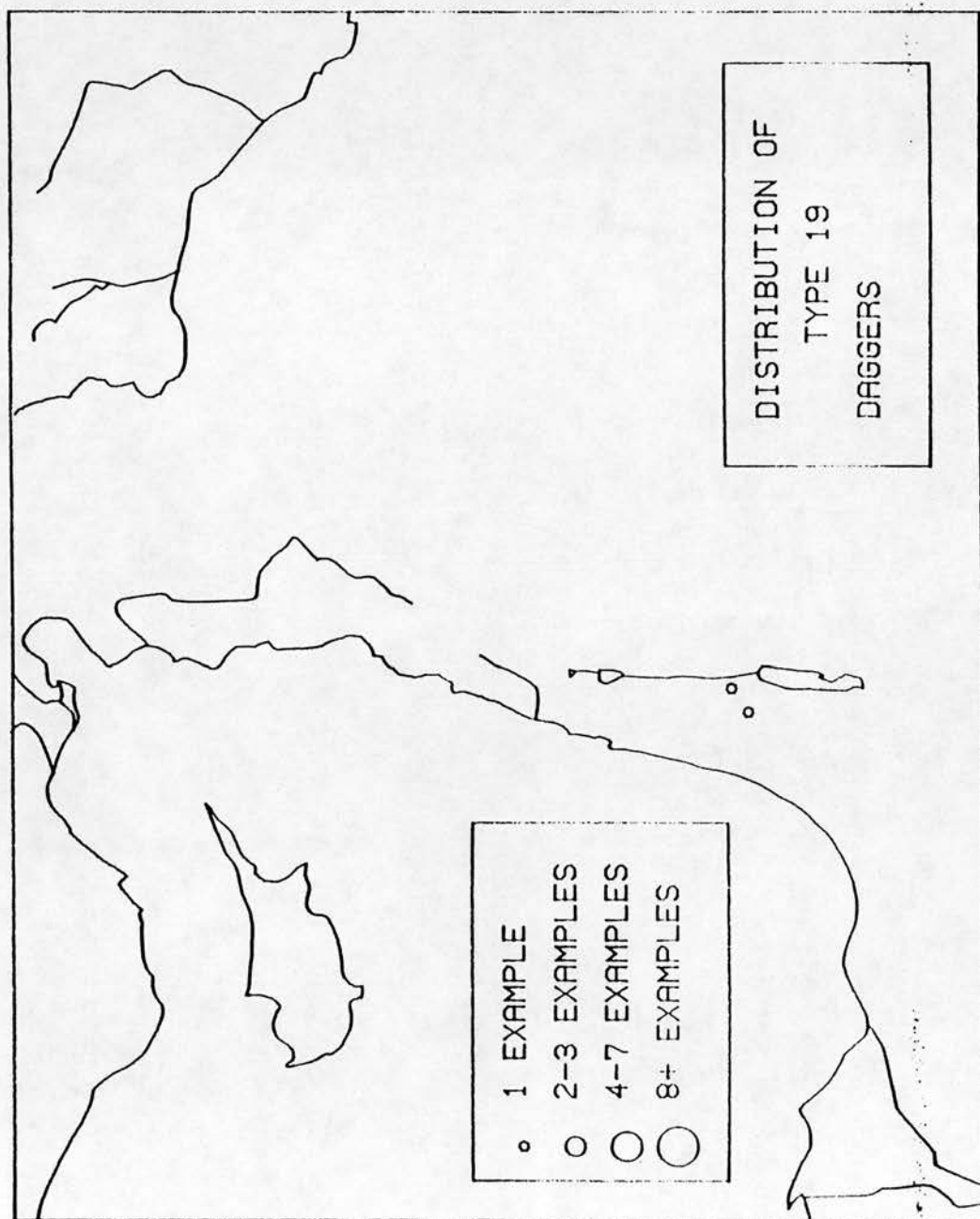
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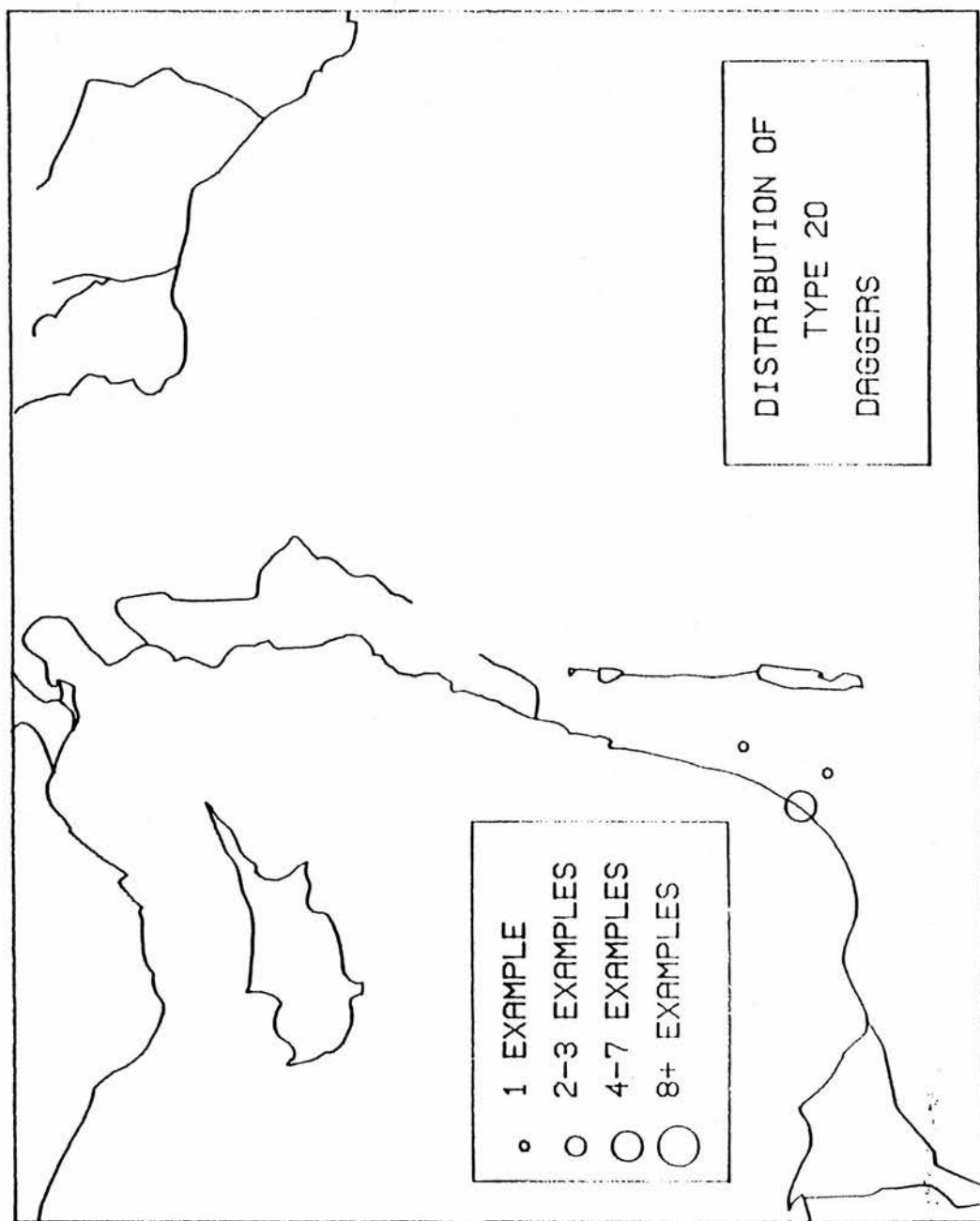
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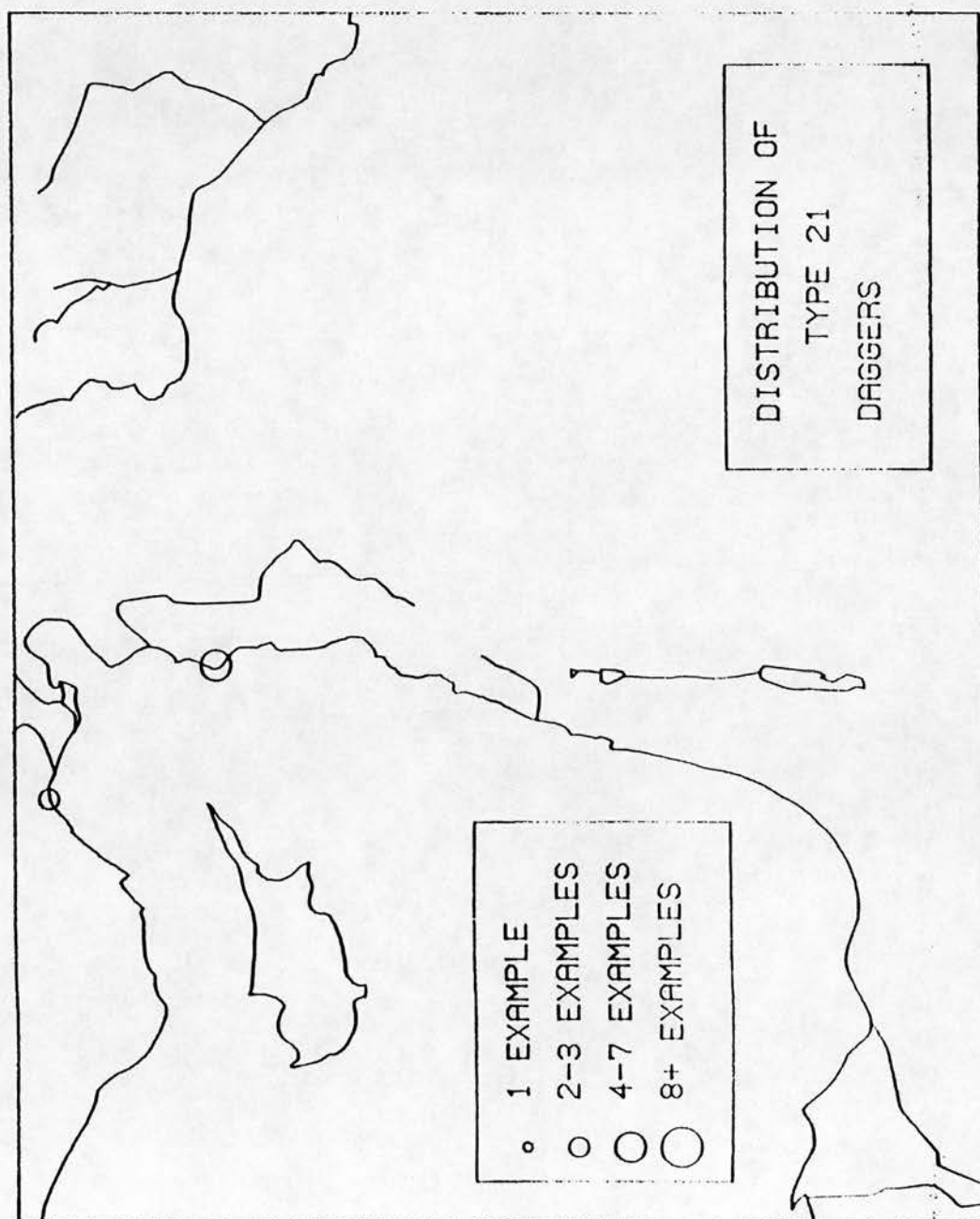
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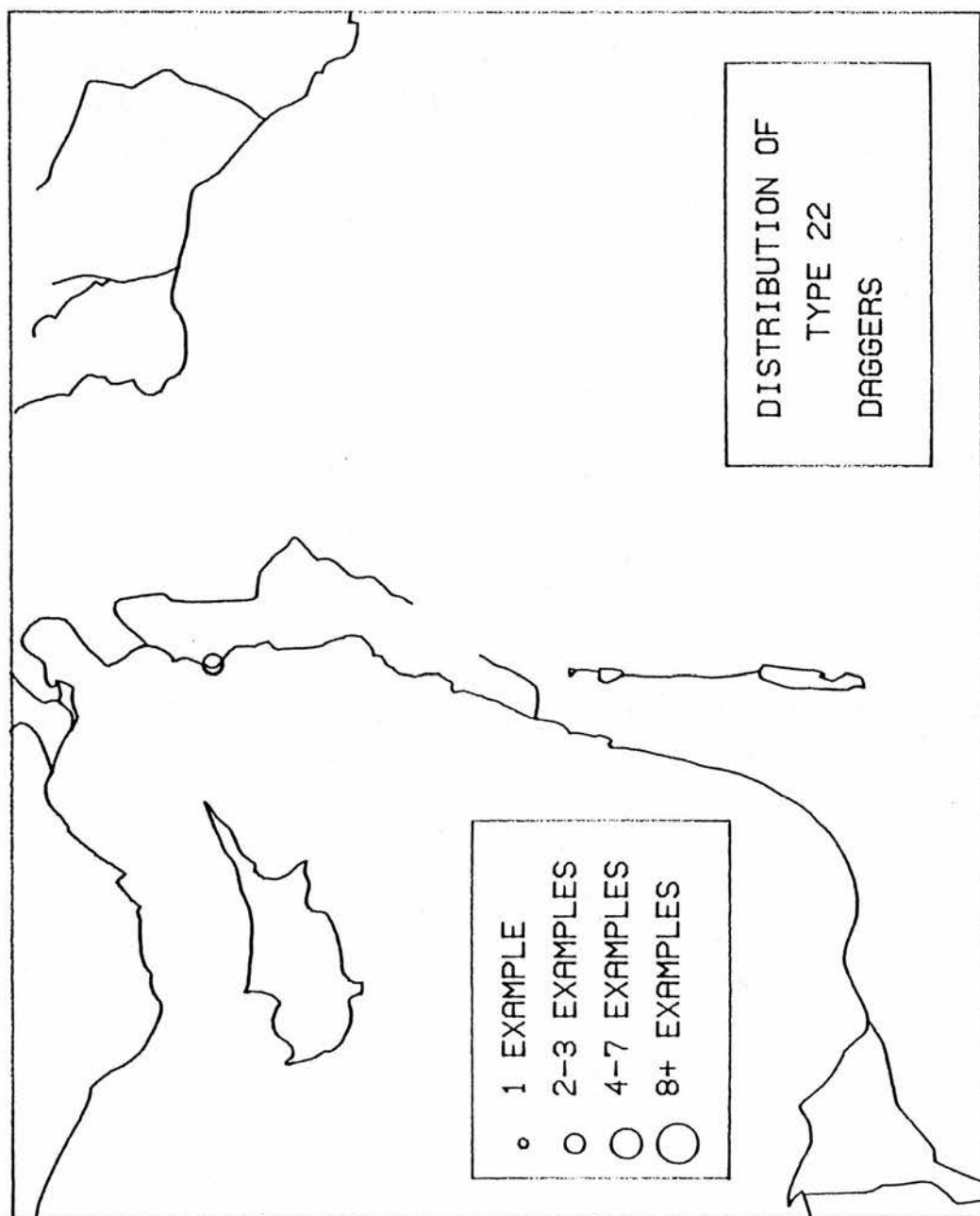
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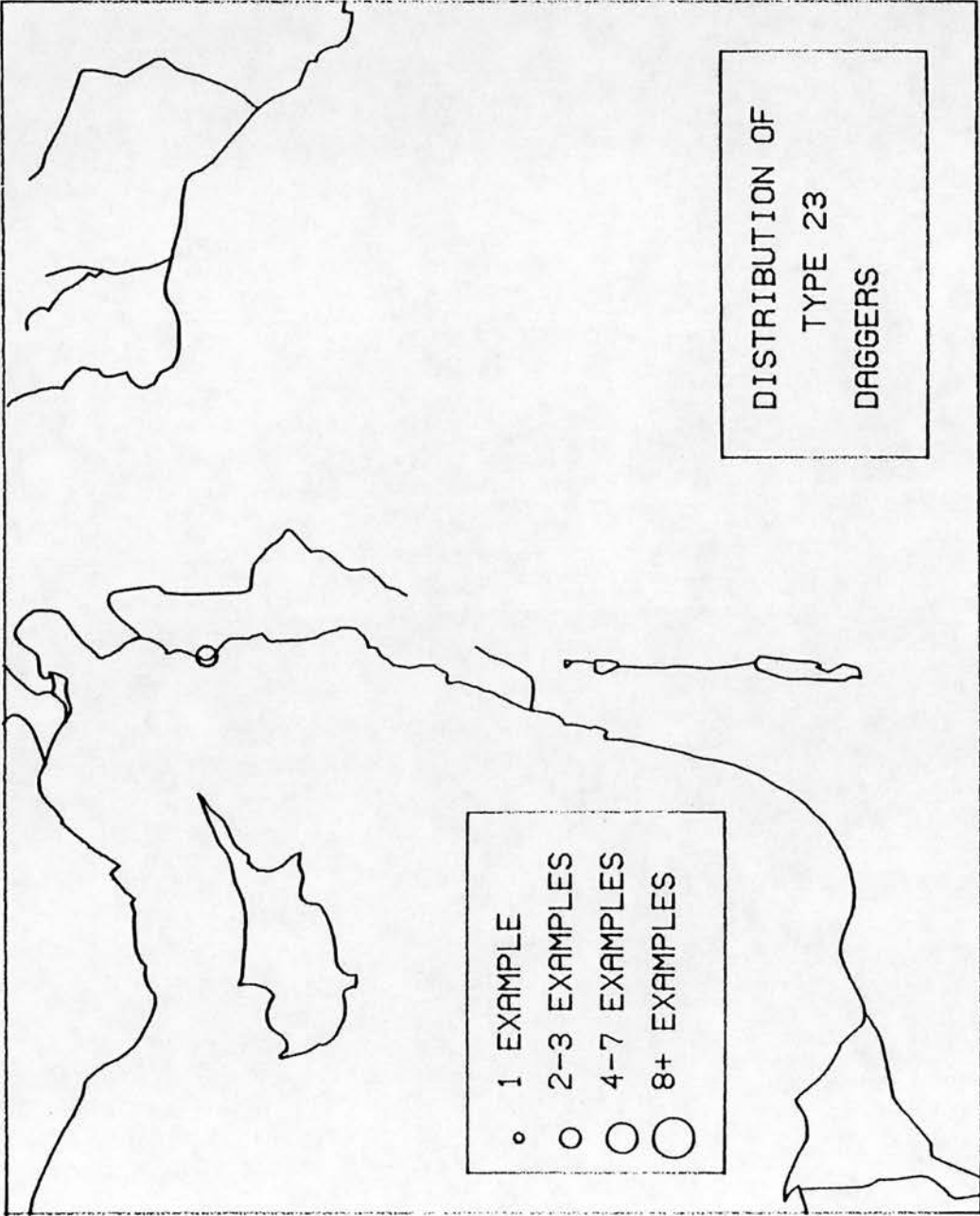
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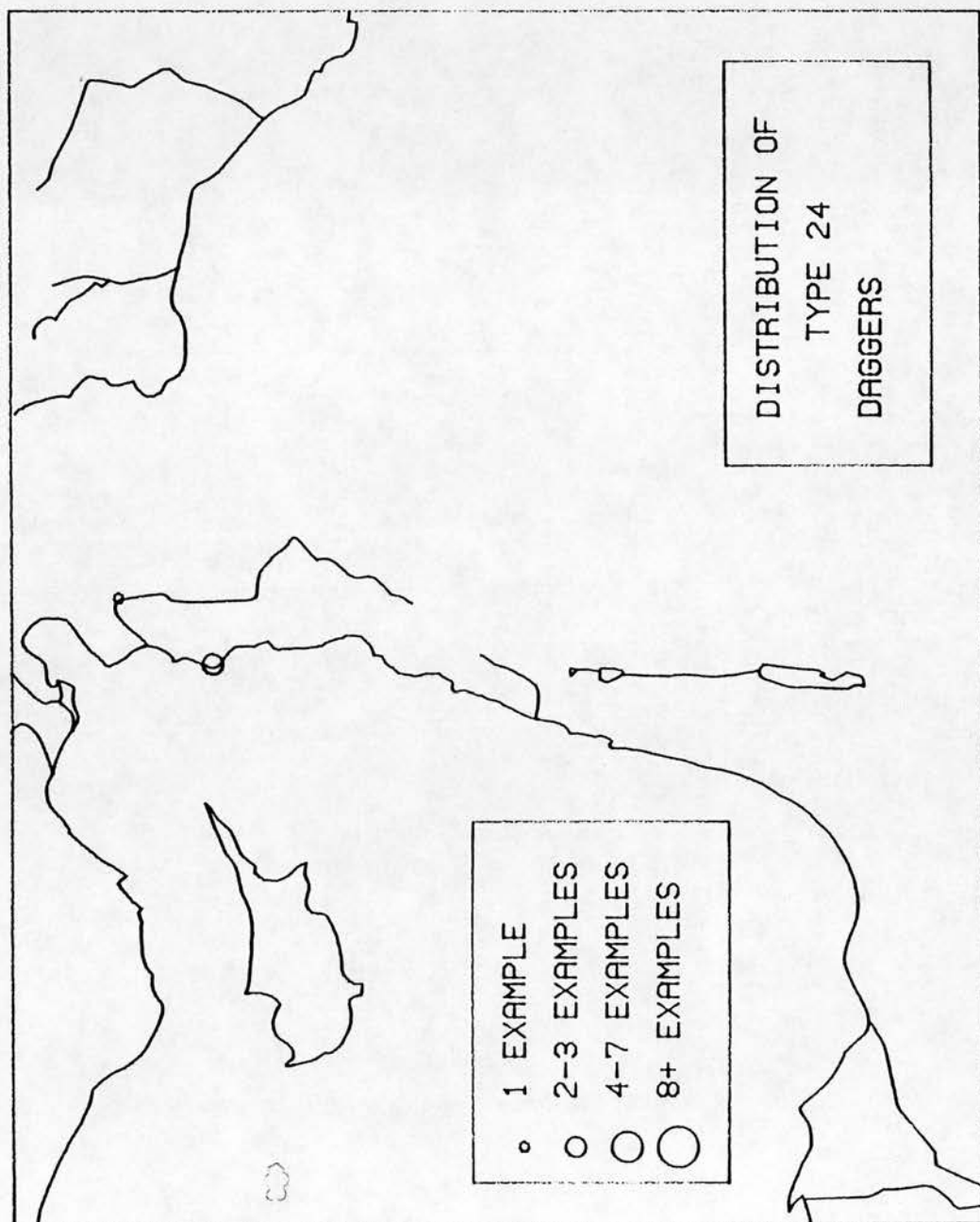
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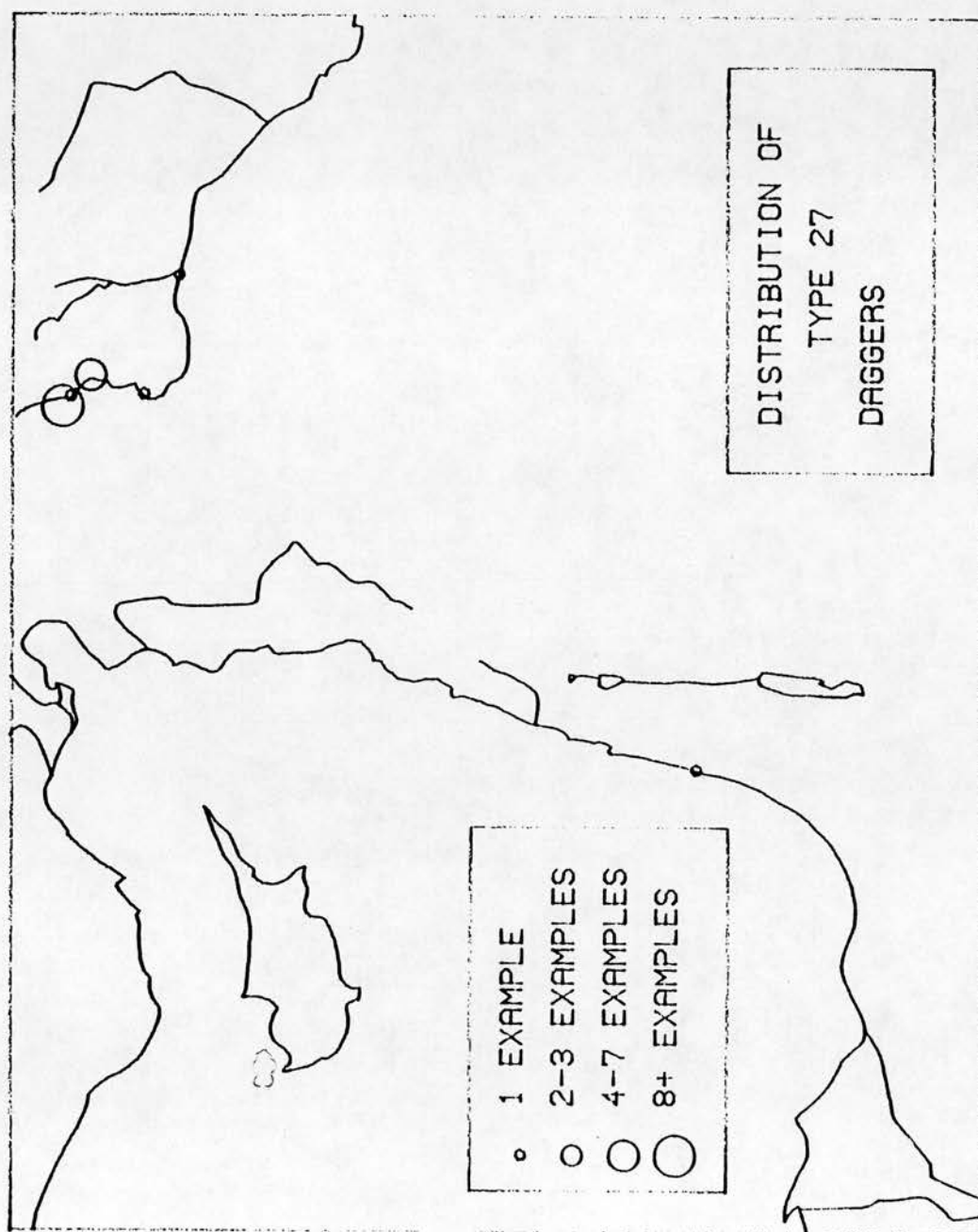
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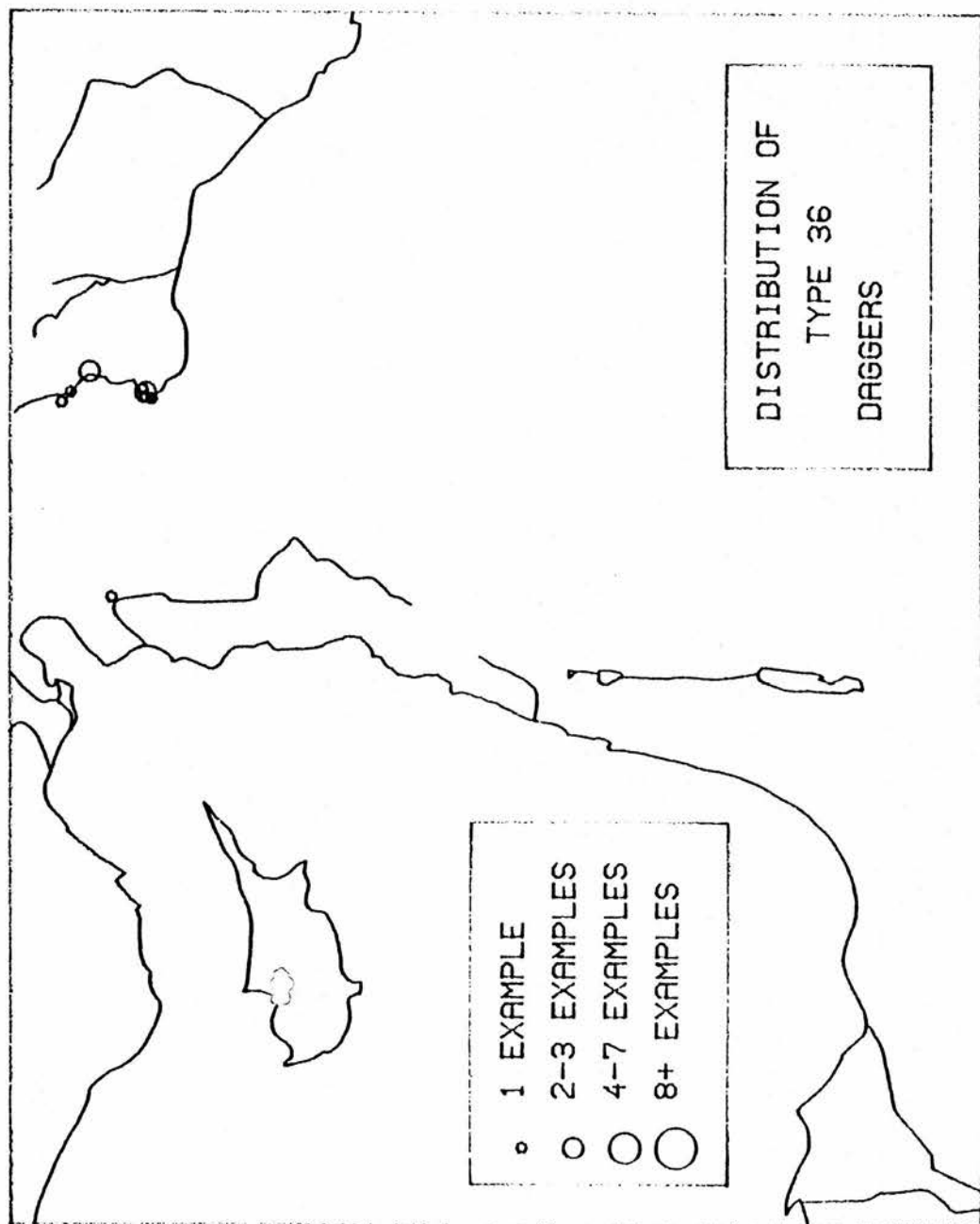
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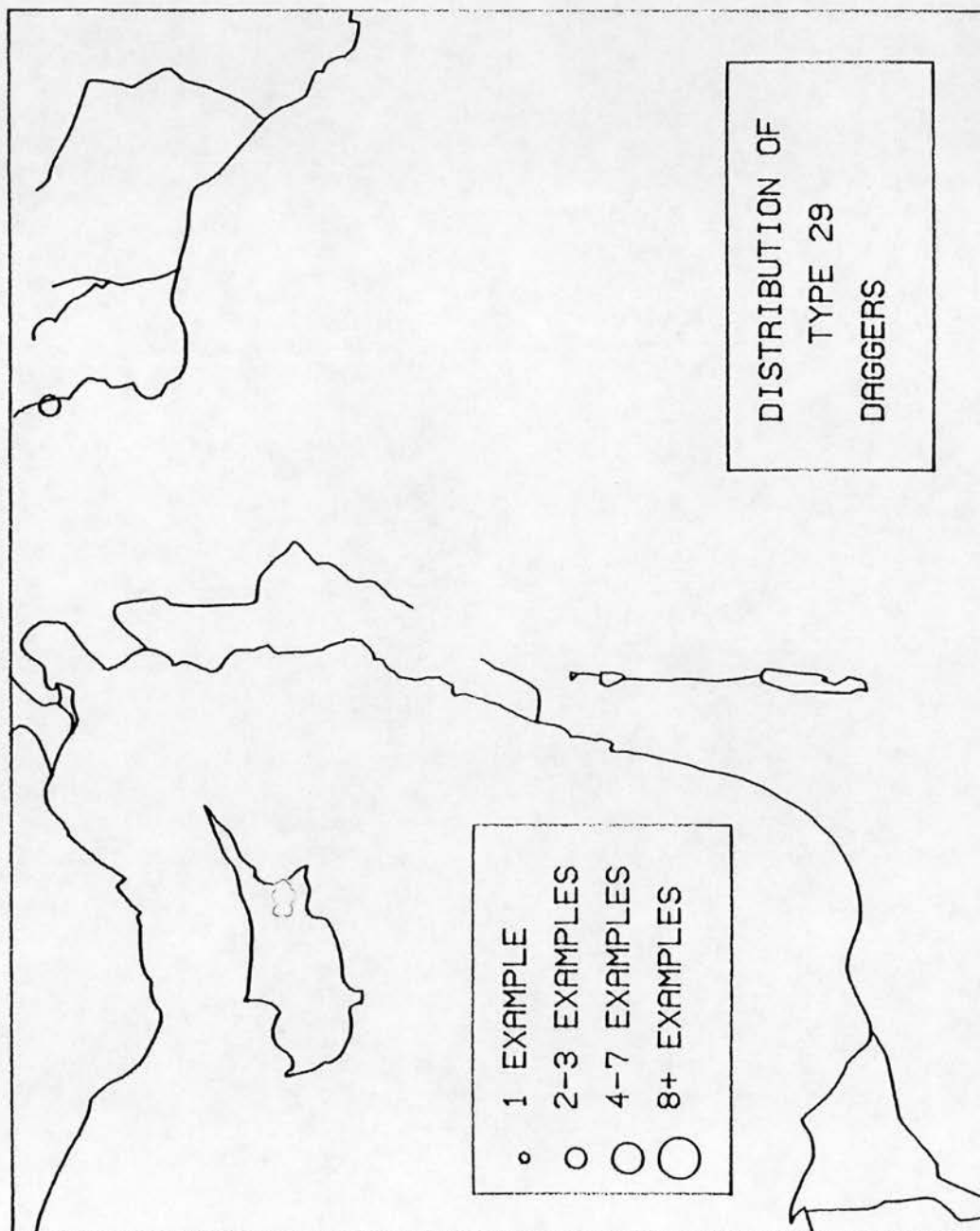
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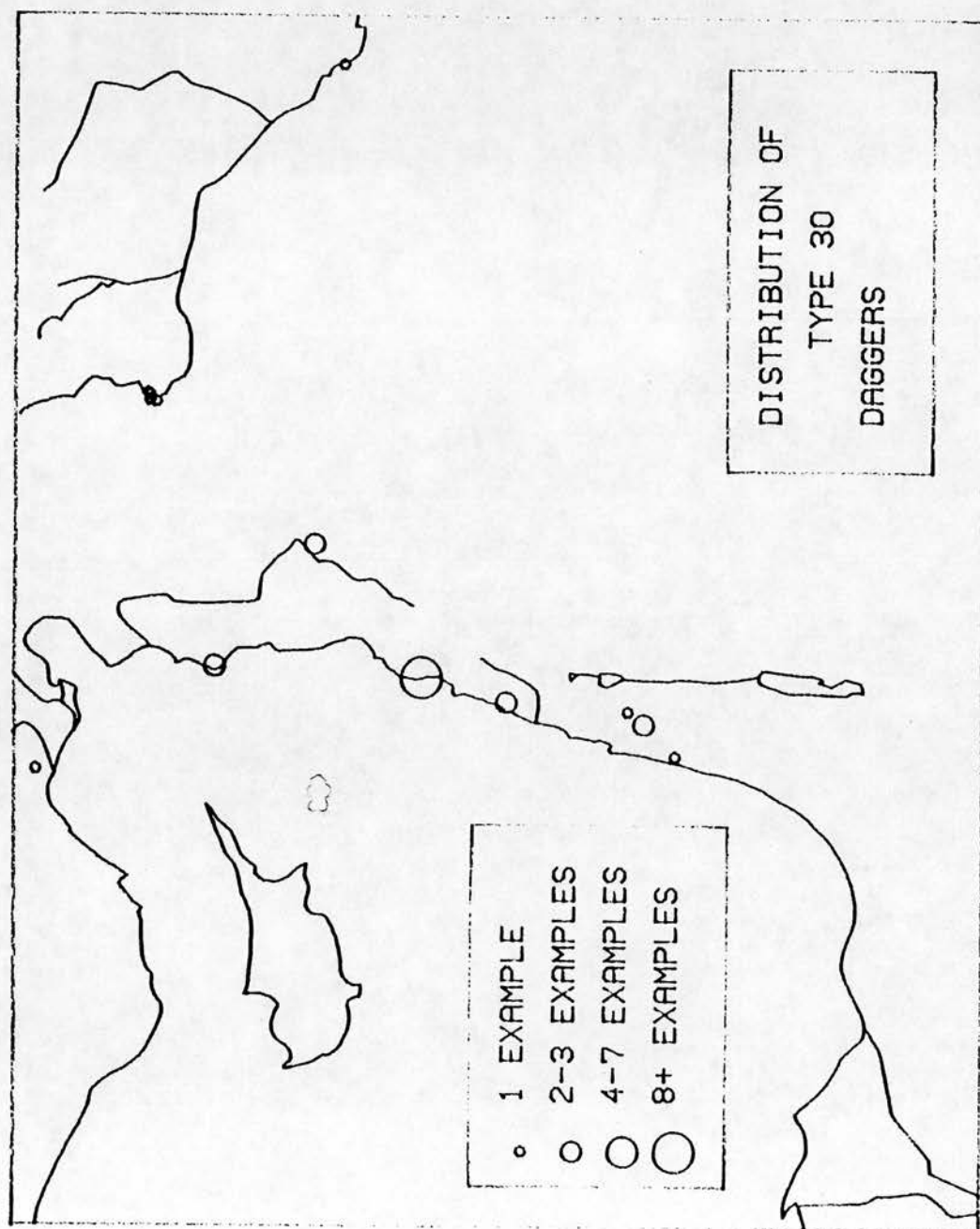
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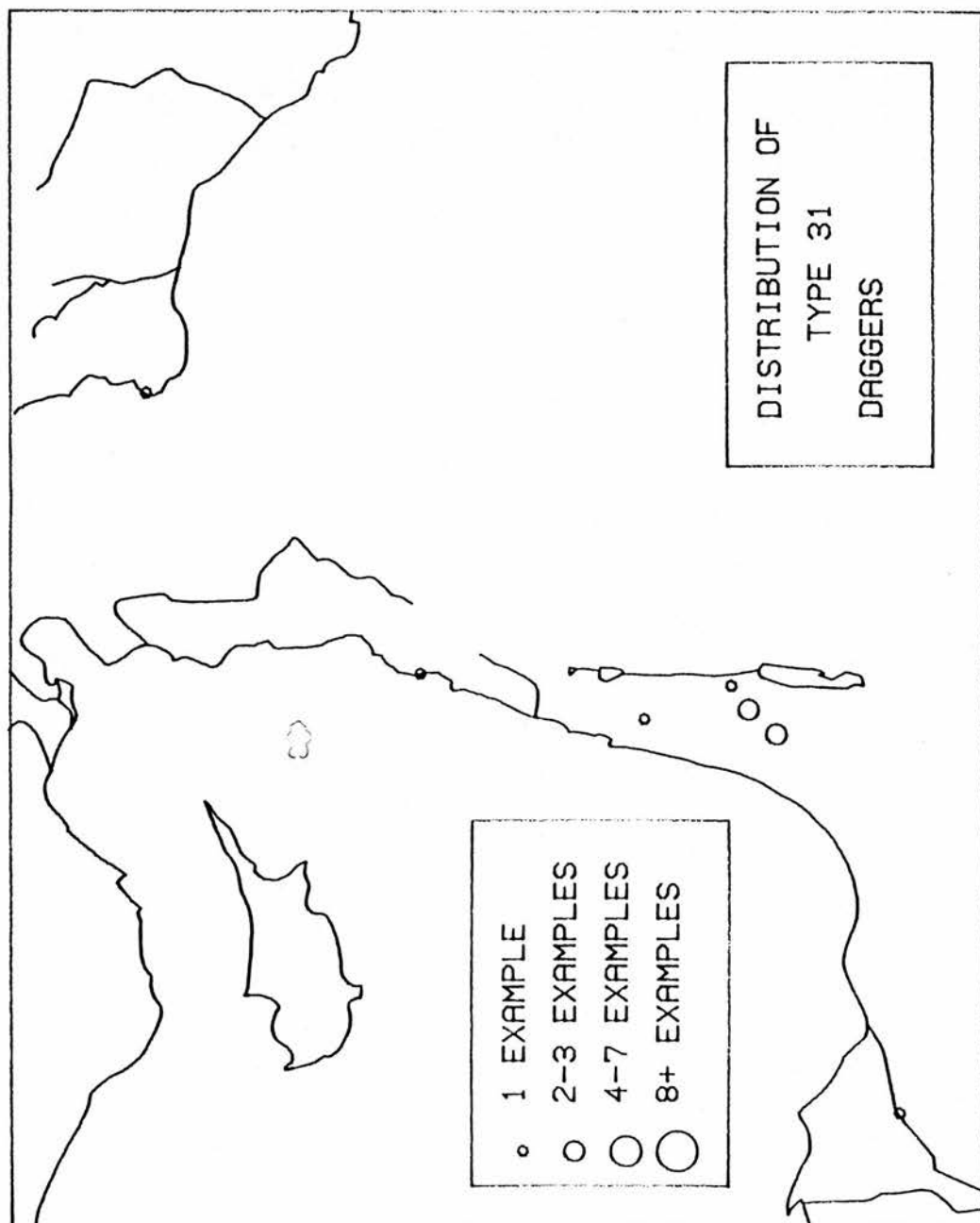
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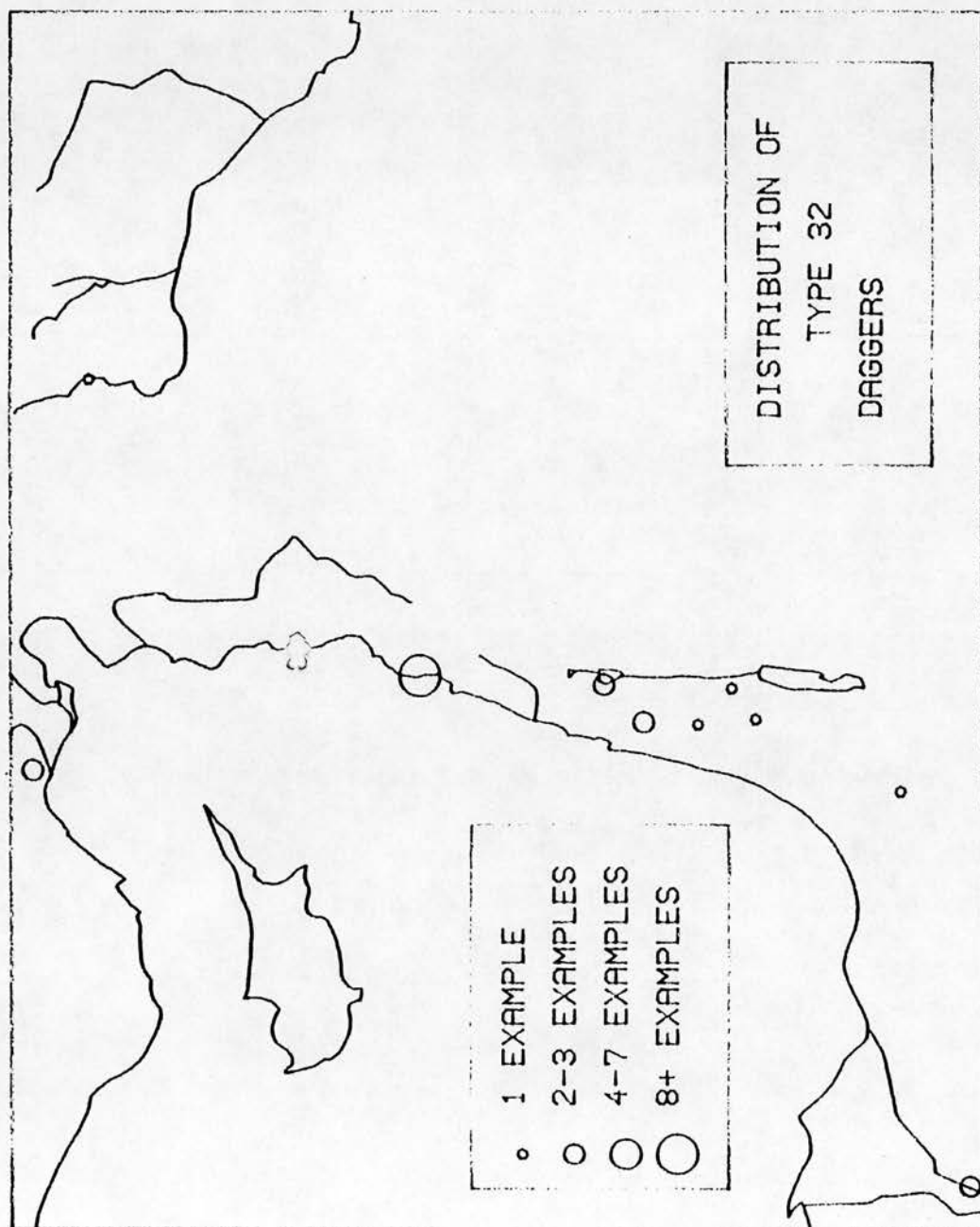
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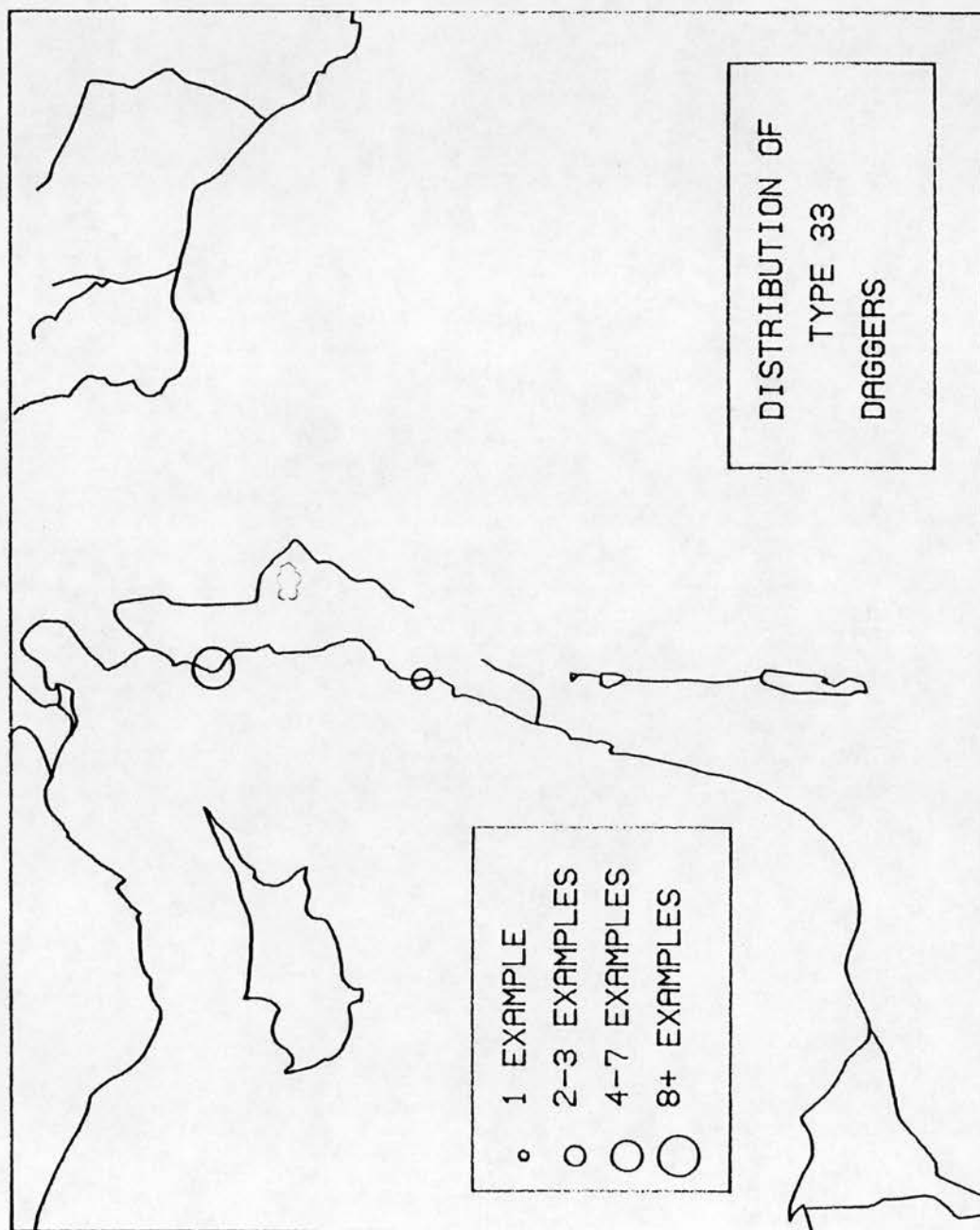
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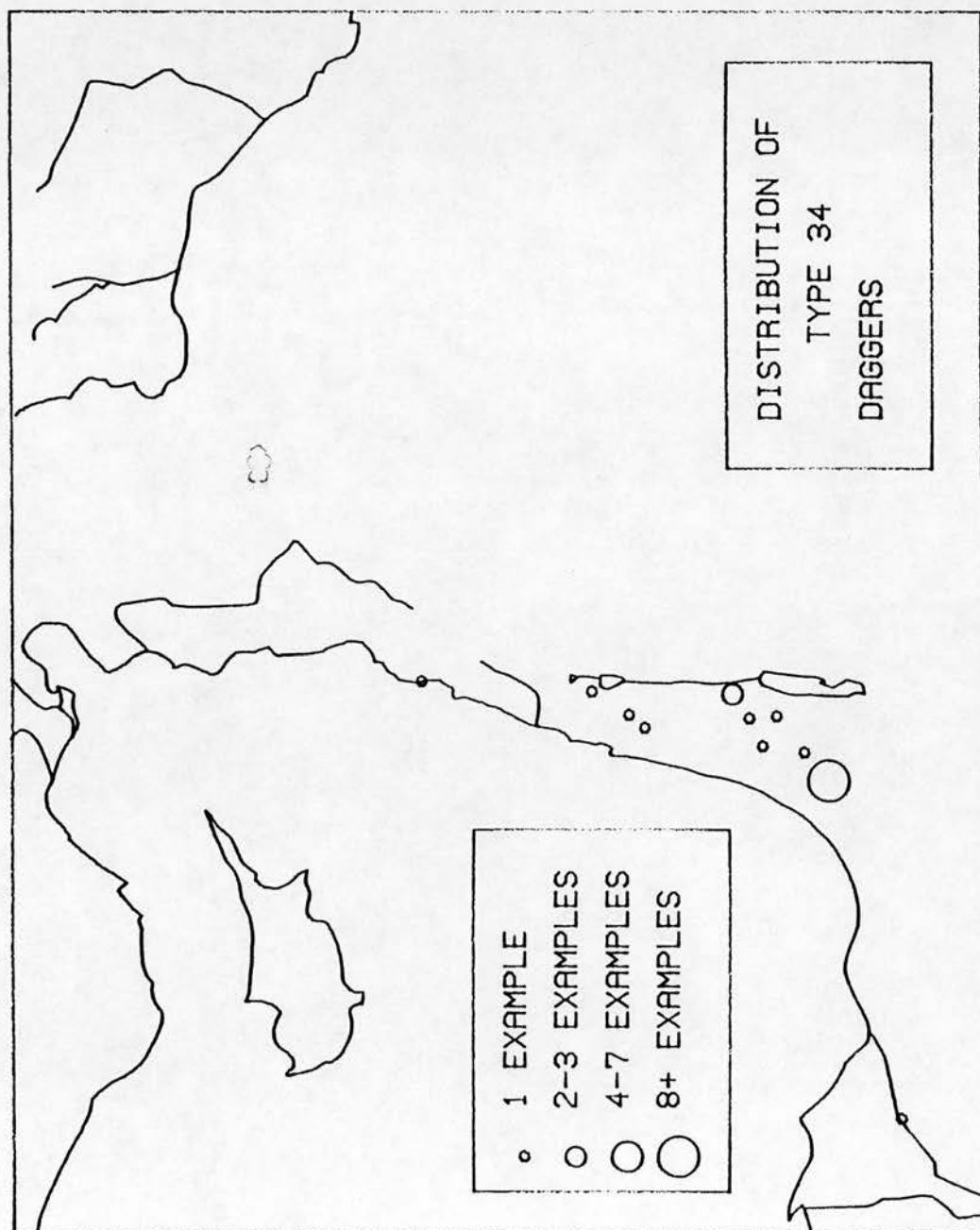
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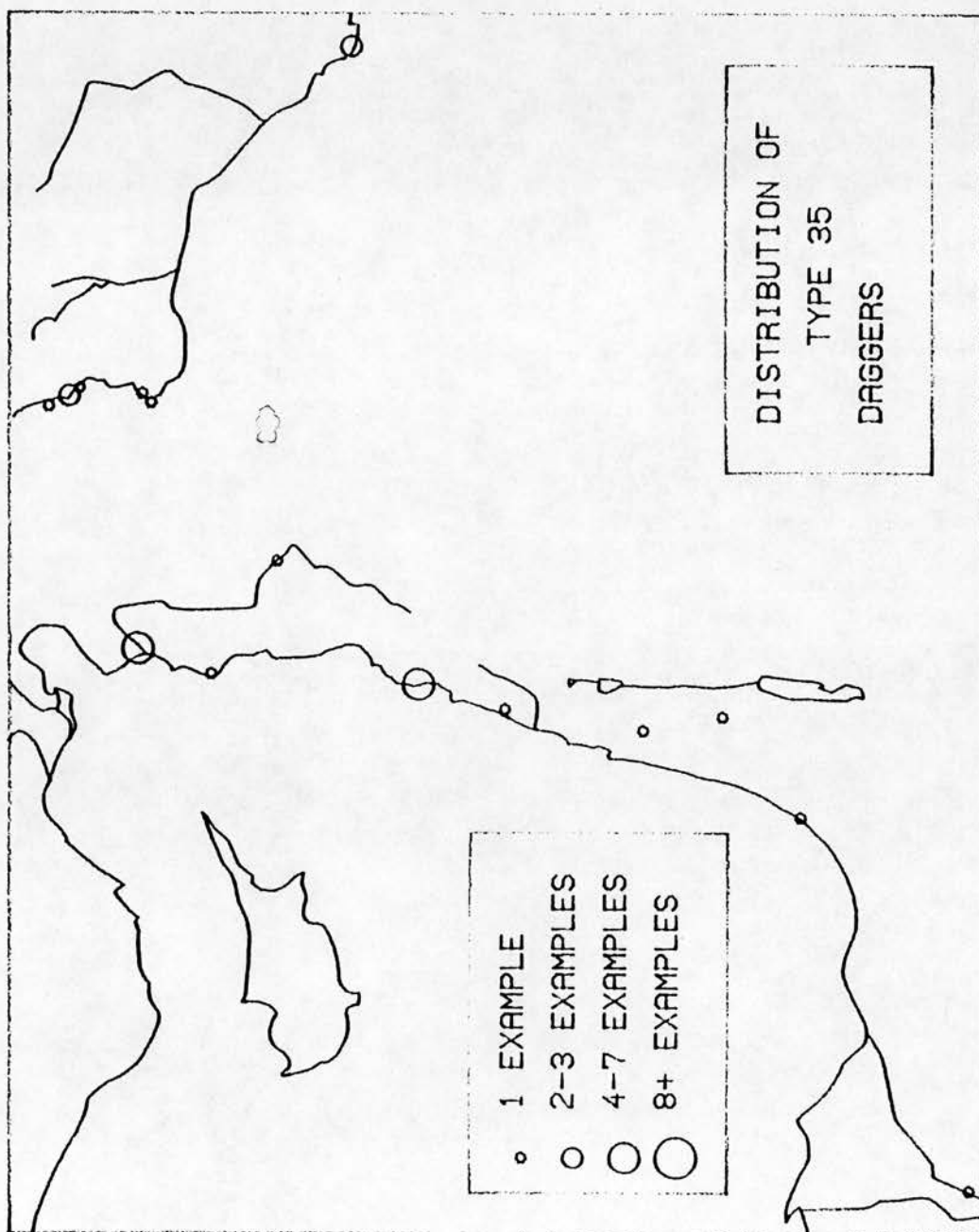
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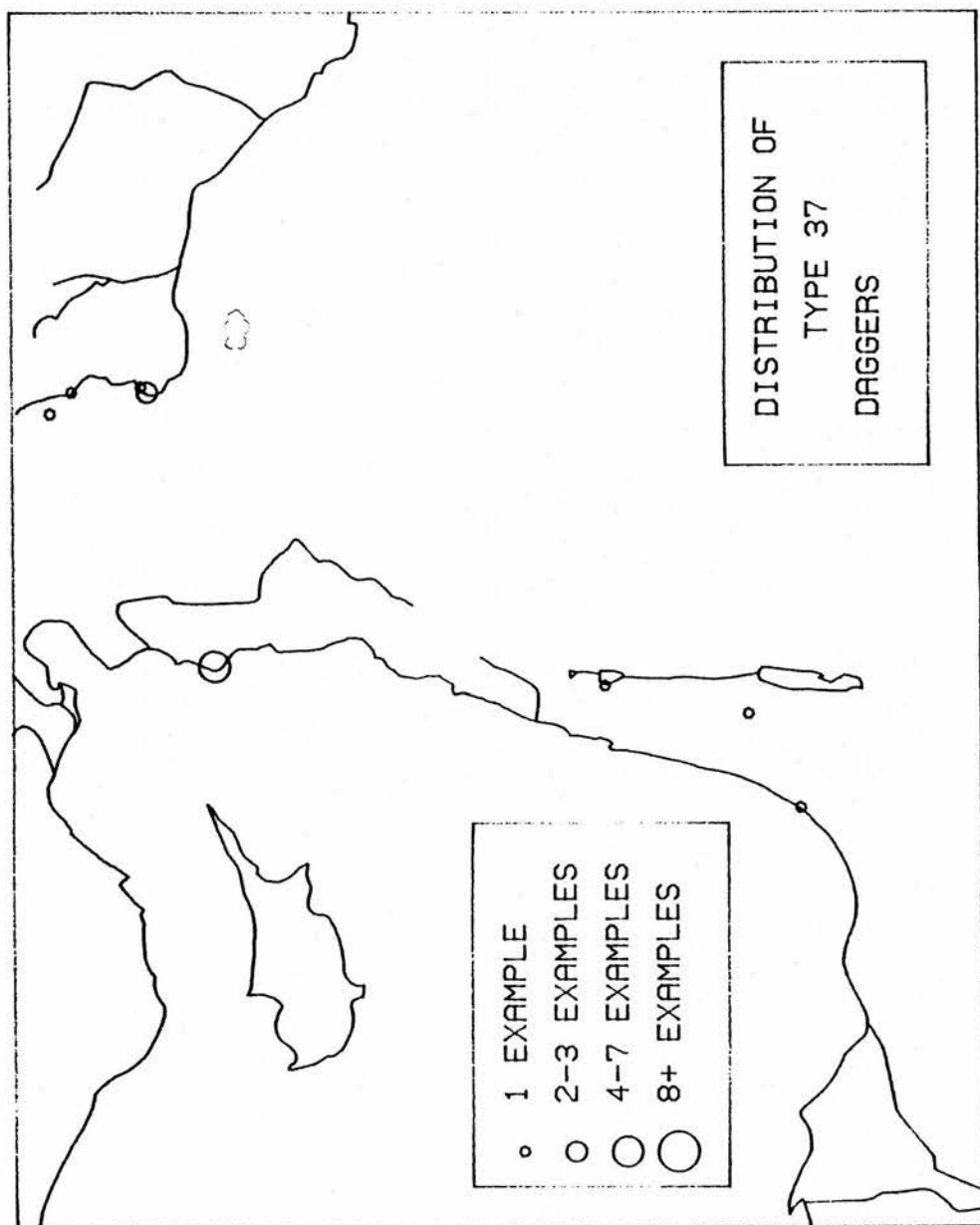
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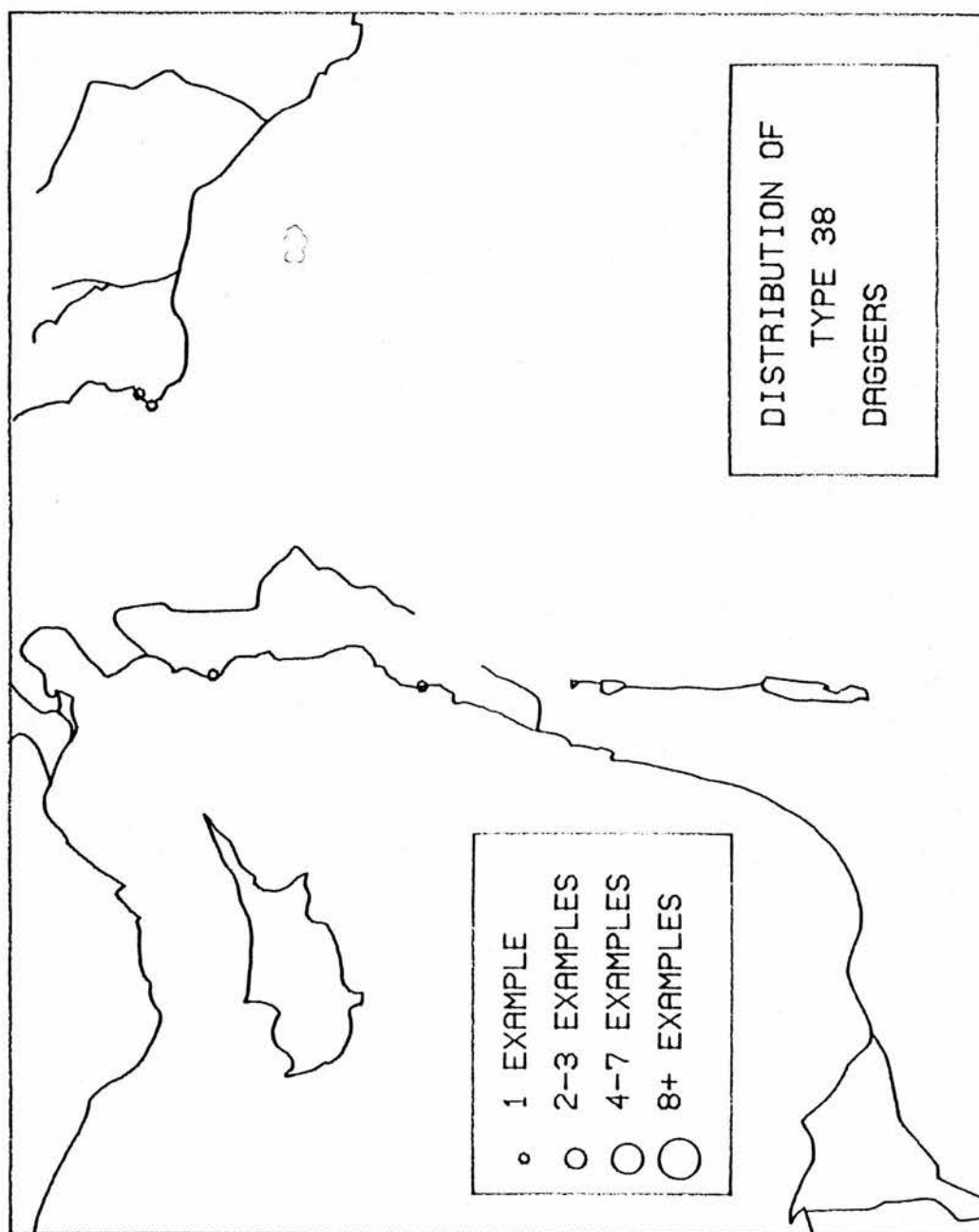
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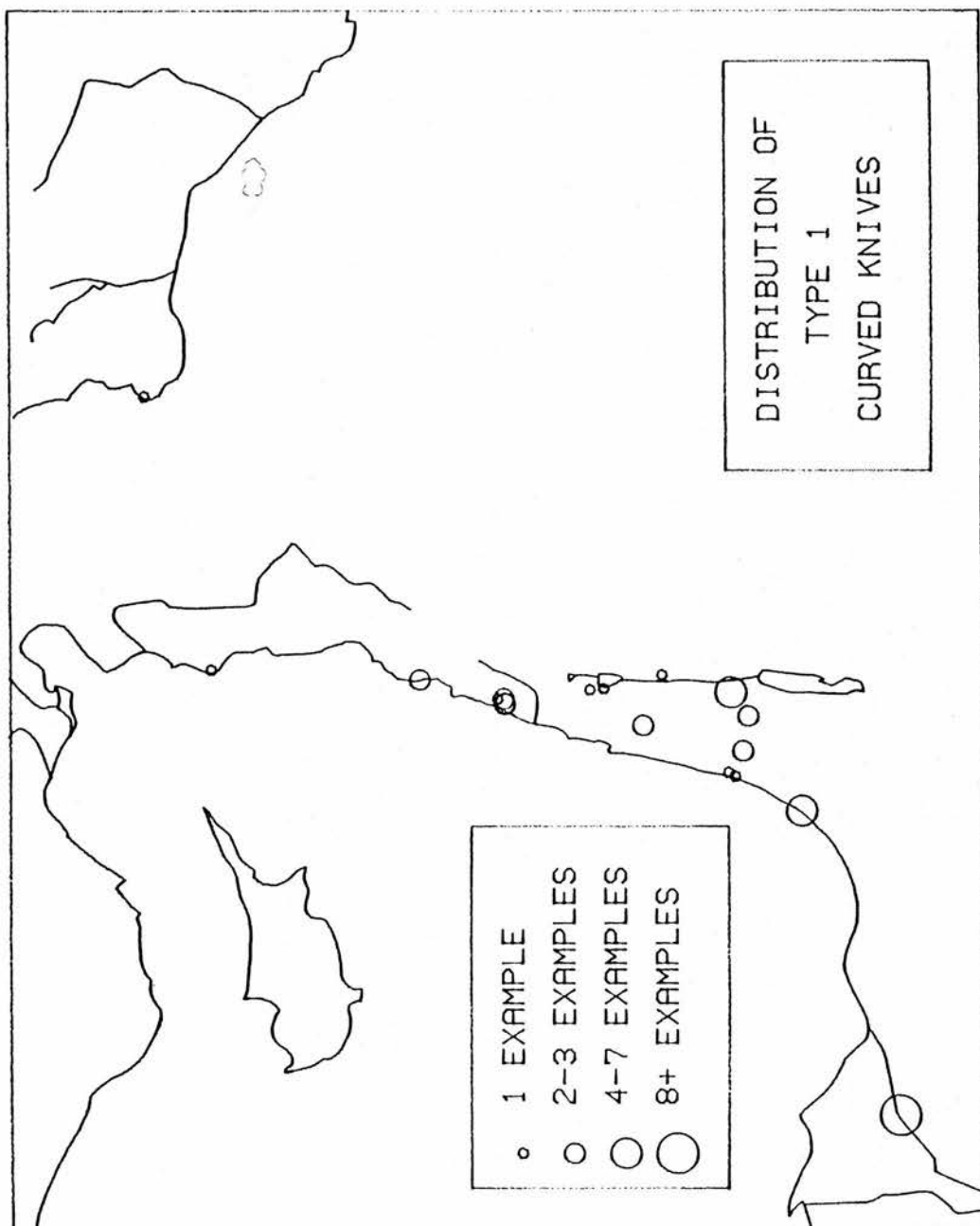
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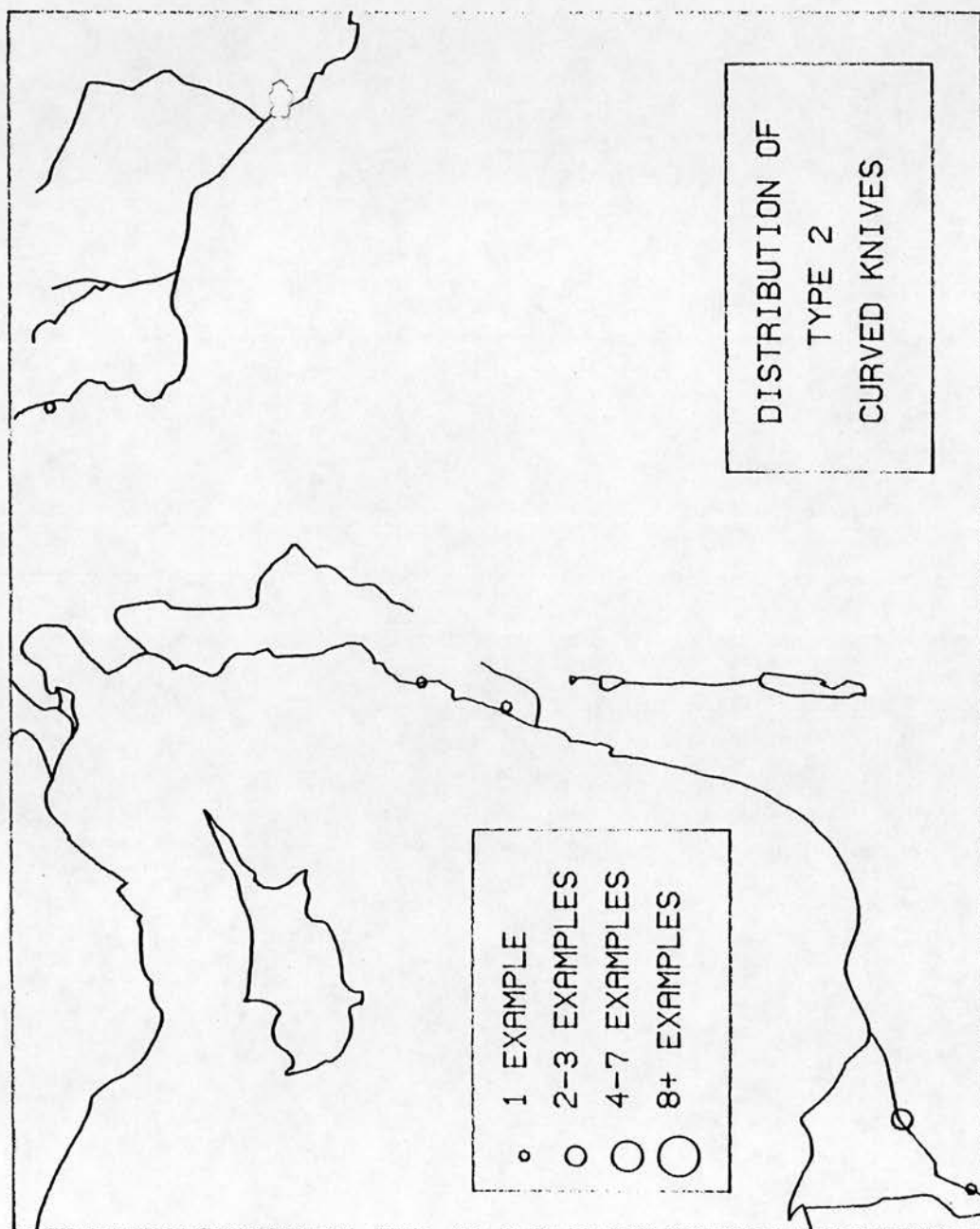
Map 83



Map 84



Map 85



Map 86



Plate 1

4199

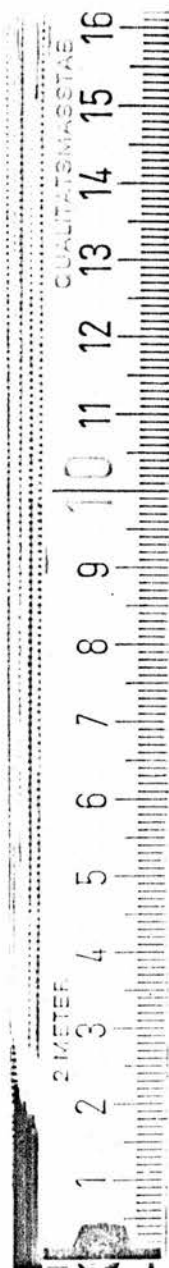
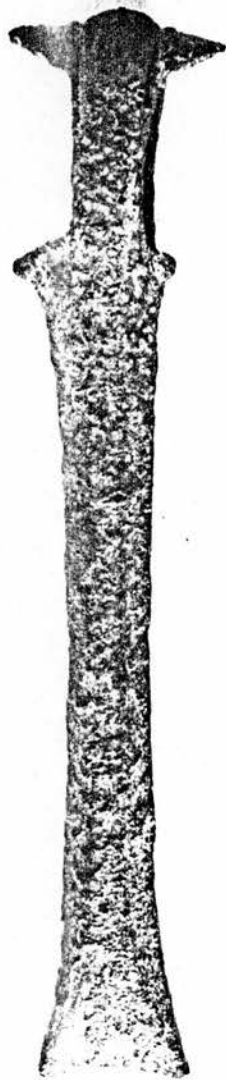


Plate 2

4148

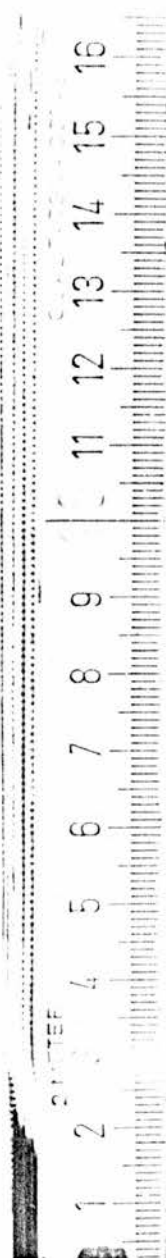
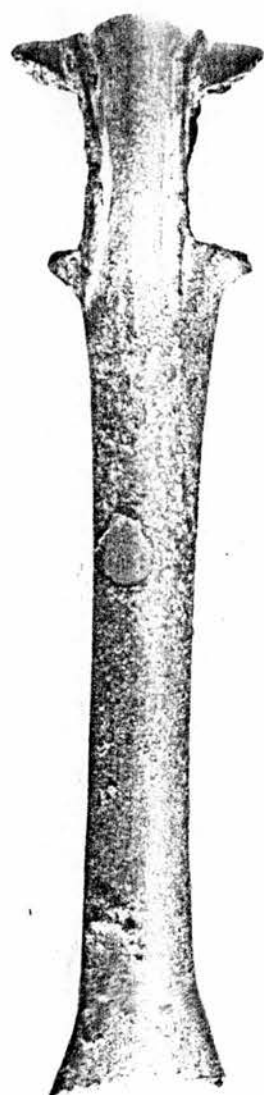


Plate 3

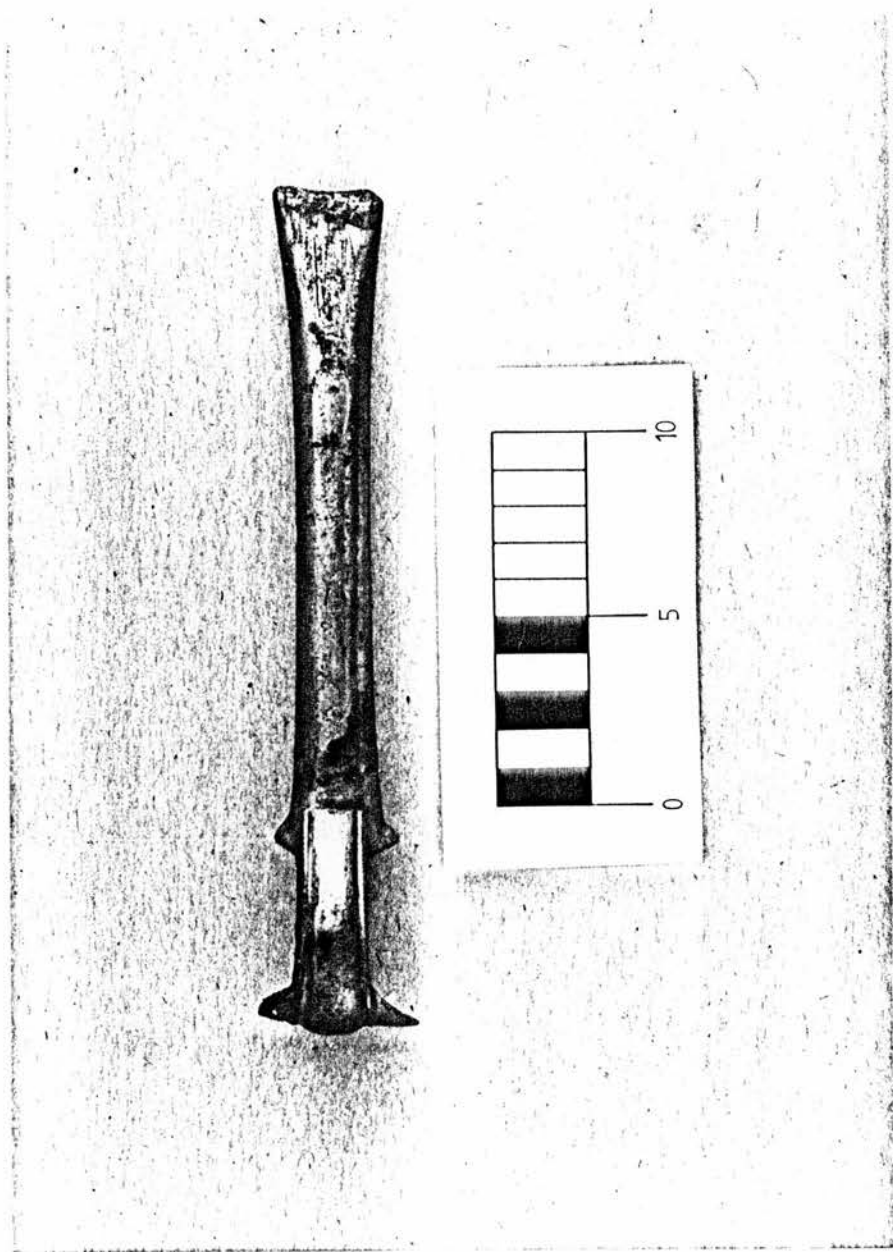


Plate 4

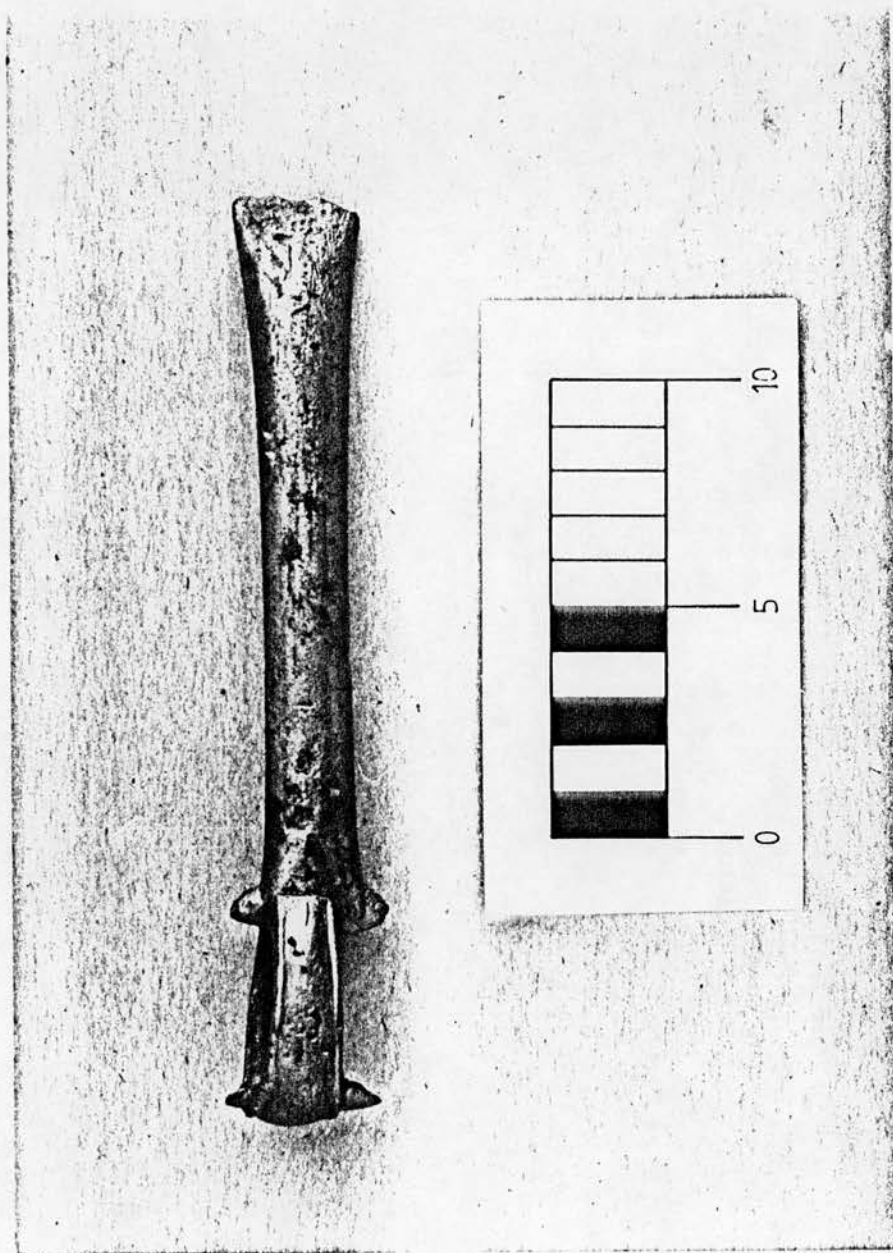


Plate 5

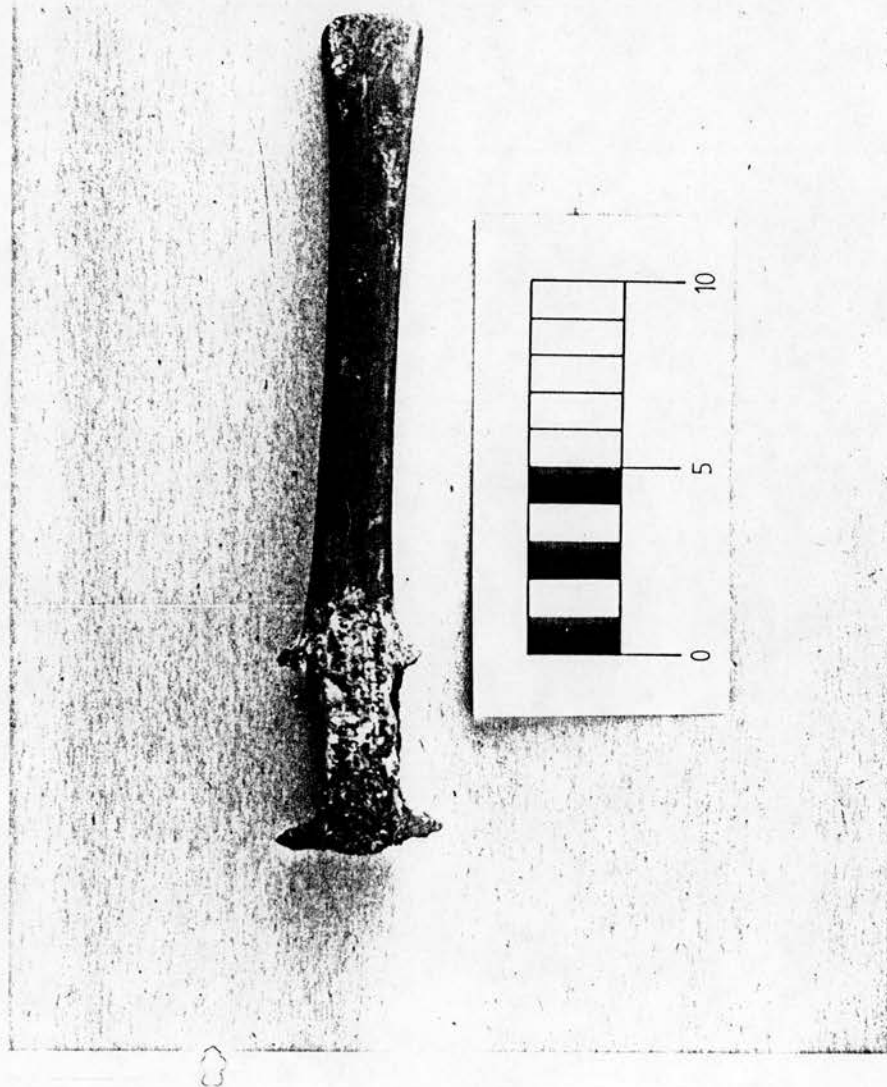


Plate 6

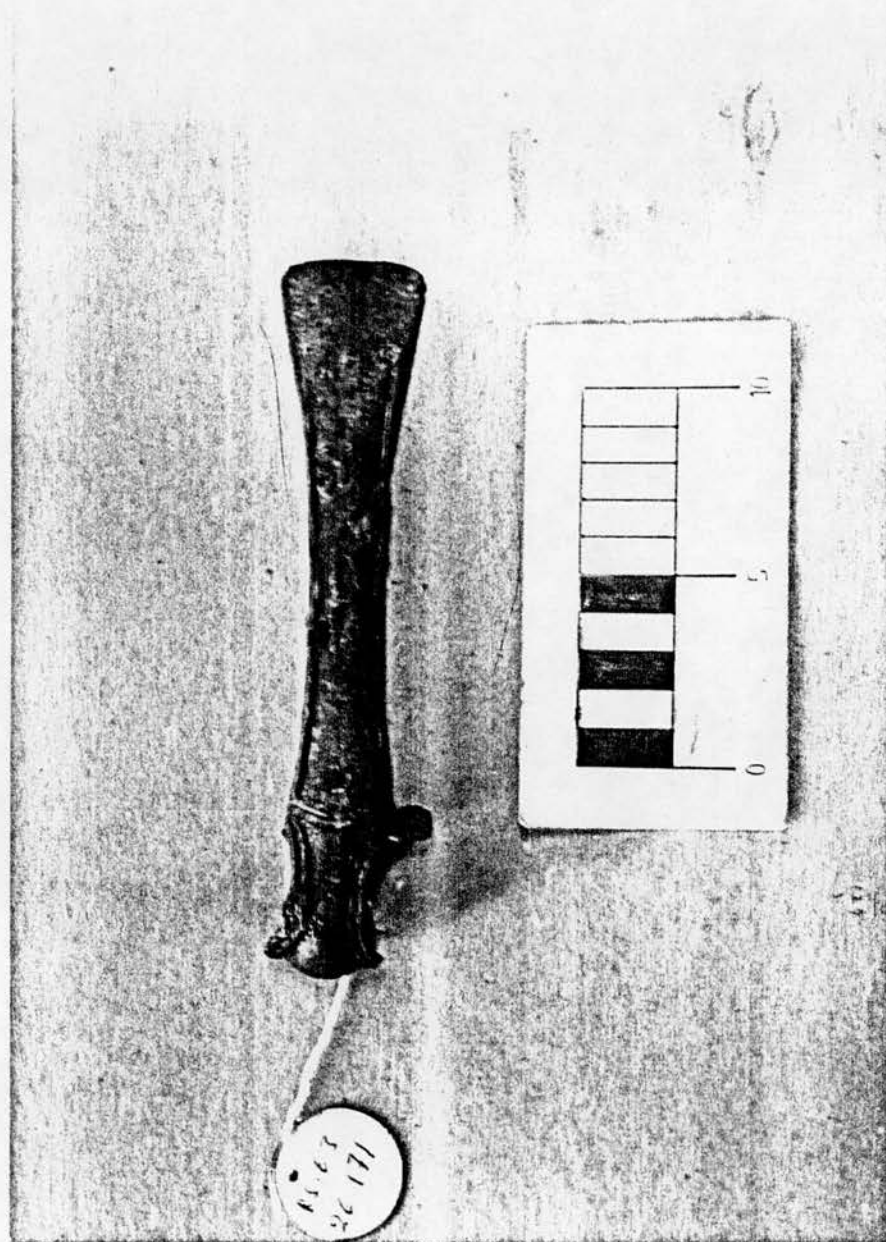


Plate 7

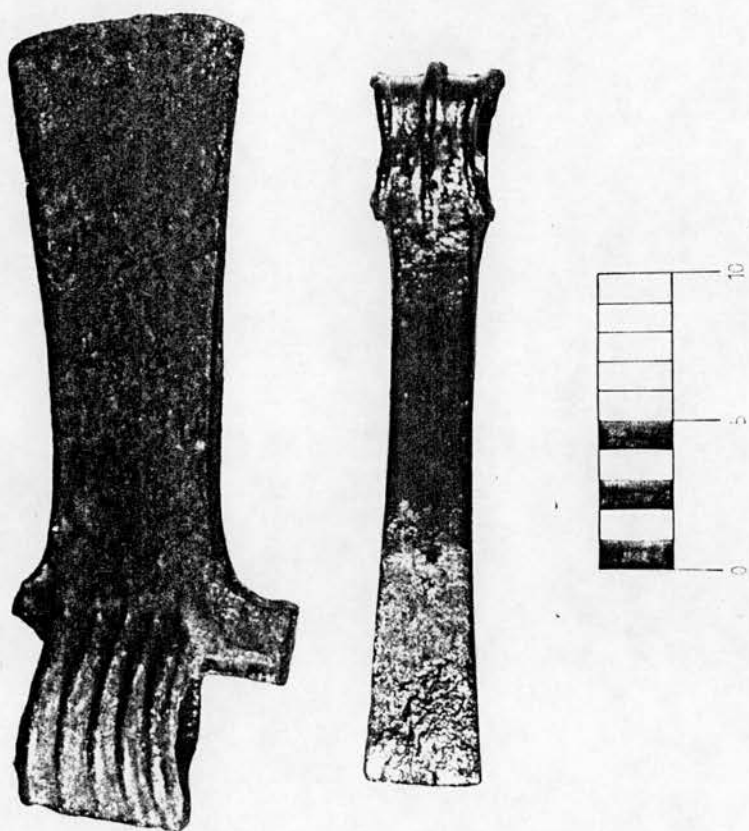


Plate 8

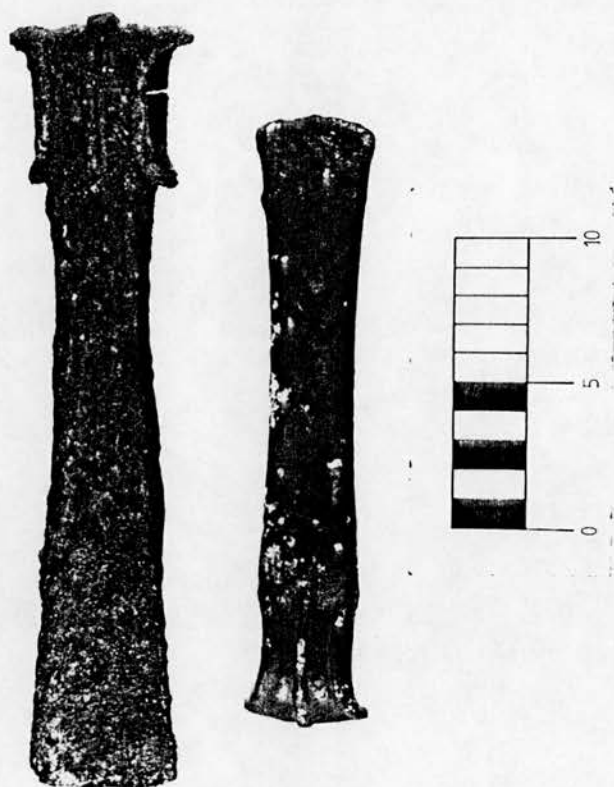


Plate 9

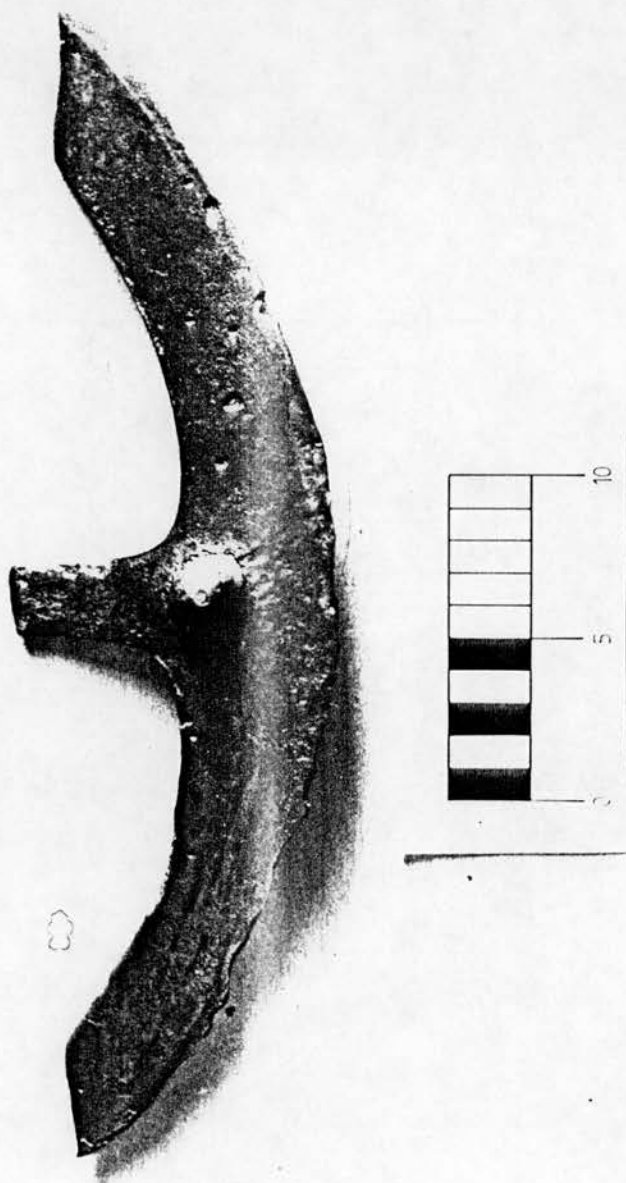


Plate 10



Plate 11

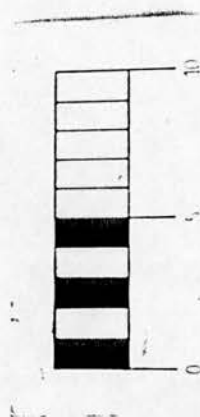


Plate 12



Plate 13



Plate 14

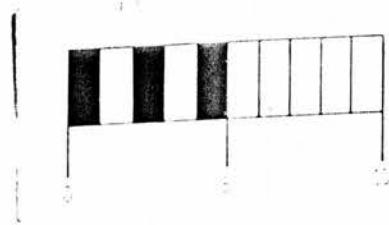


Plate 15

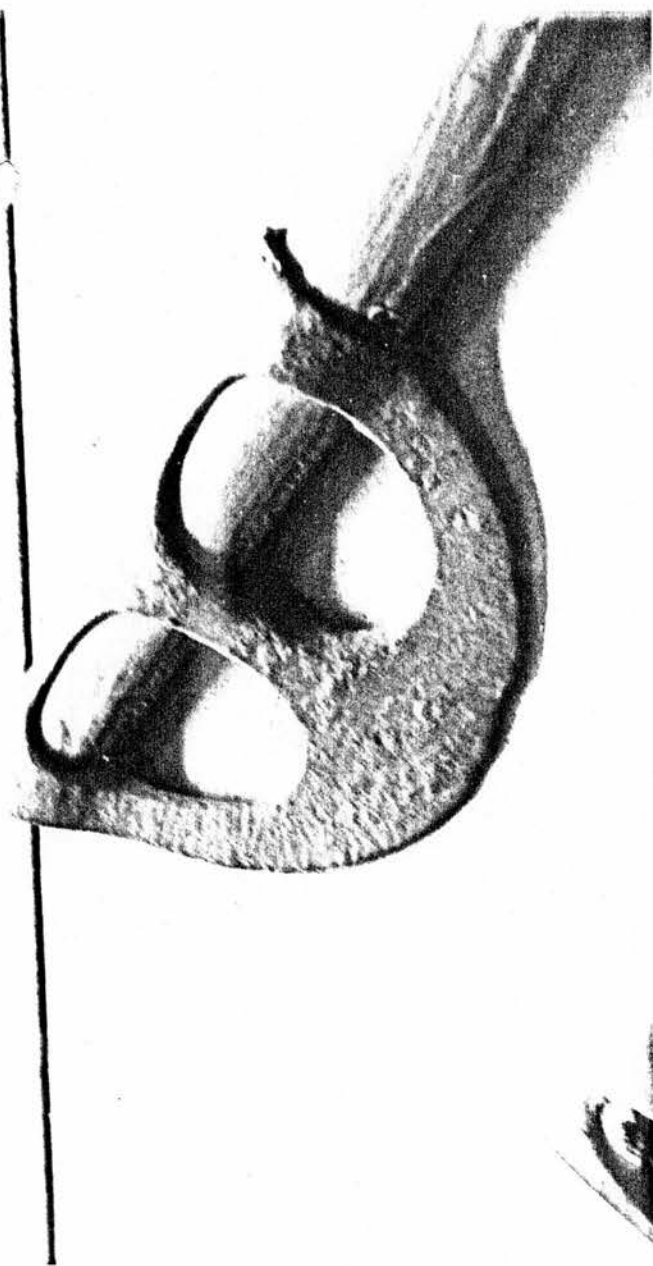


Plate 16



Plate 17

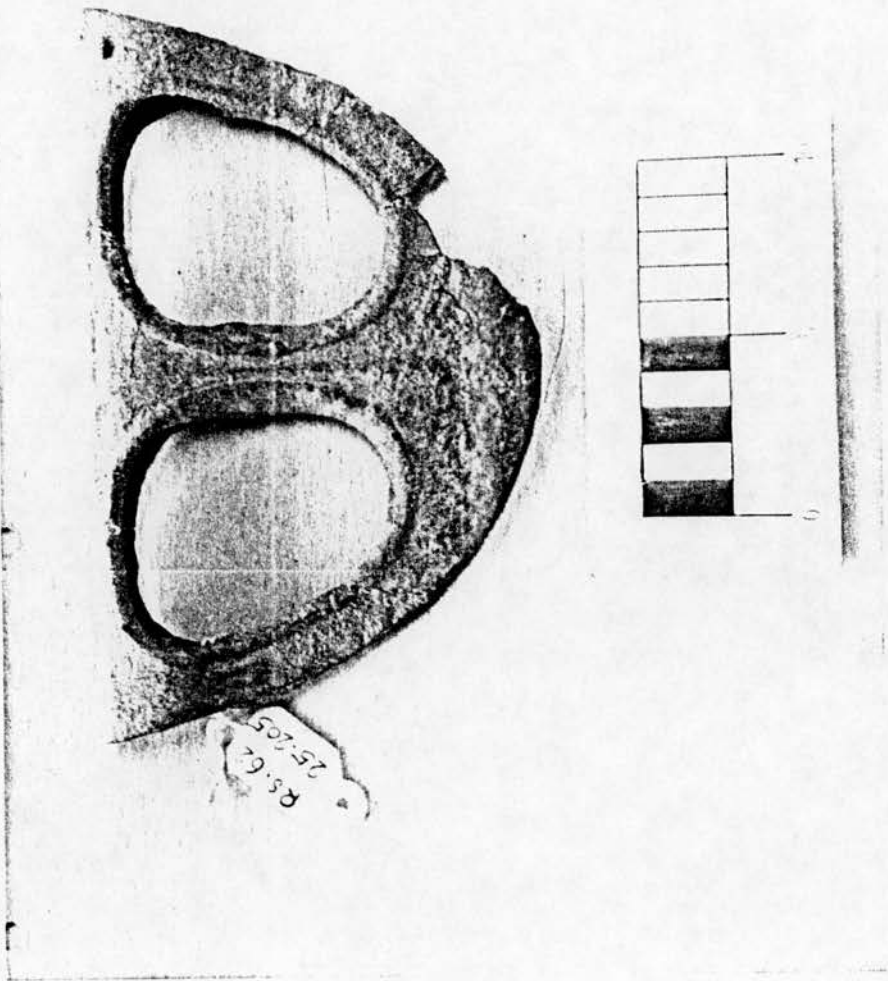


Plate 18

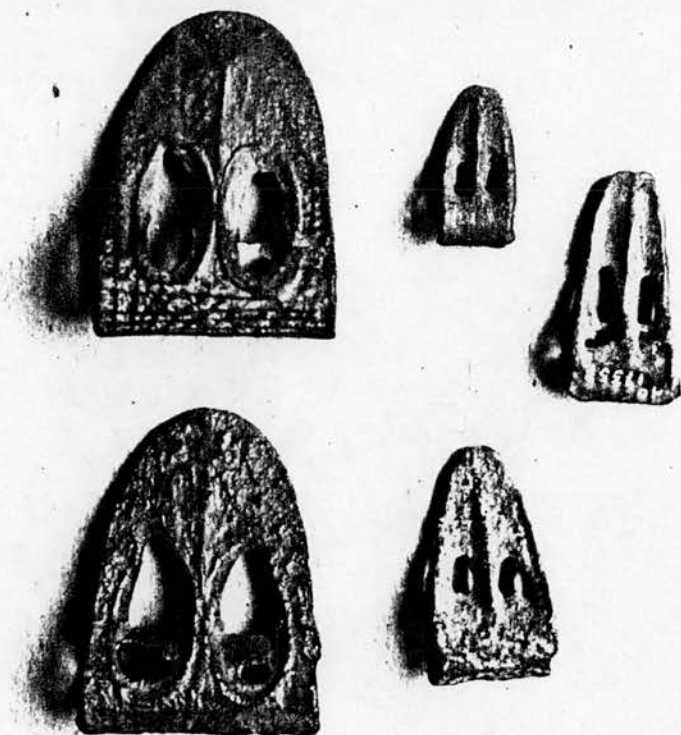


Plate 19

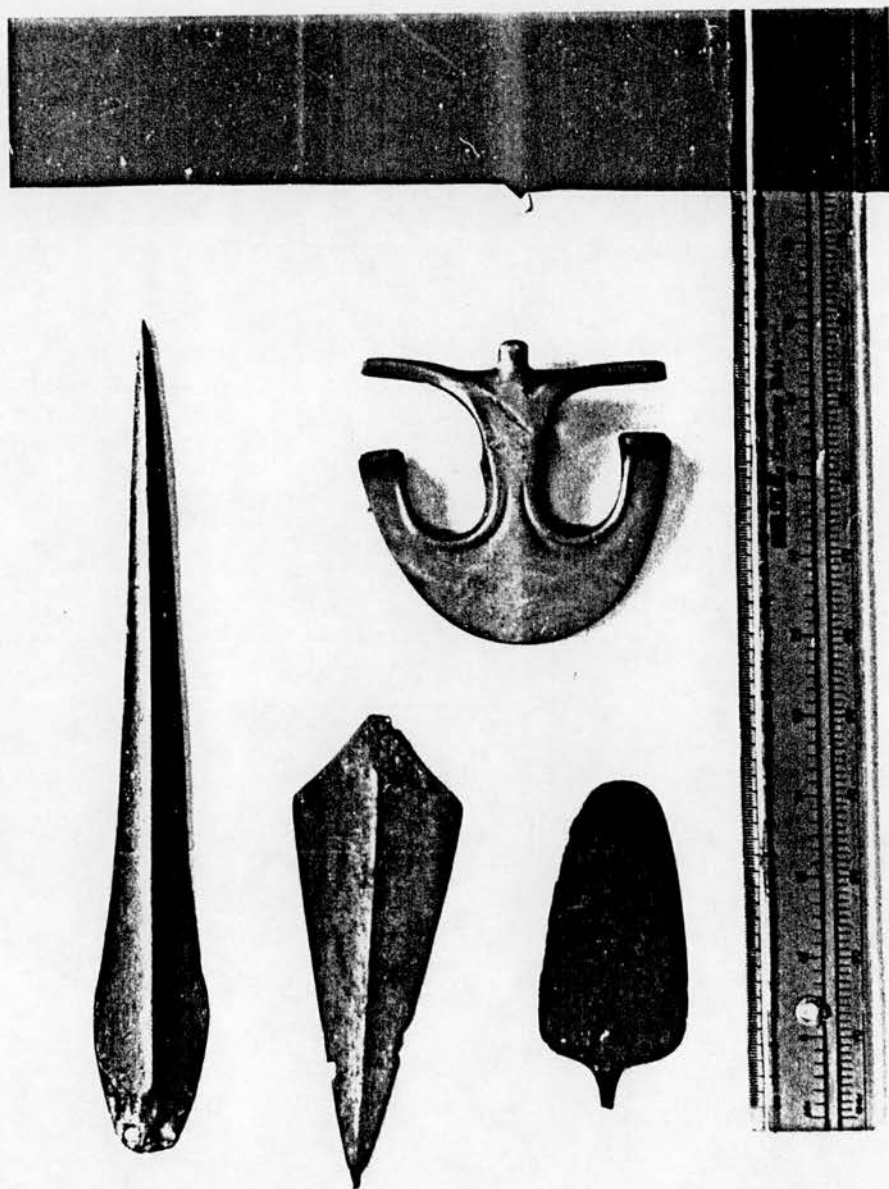


Plate 20

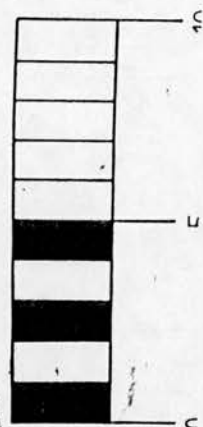


Plate 21

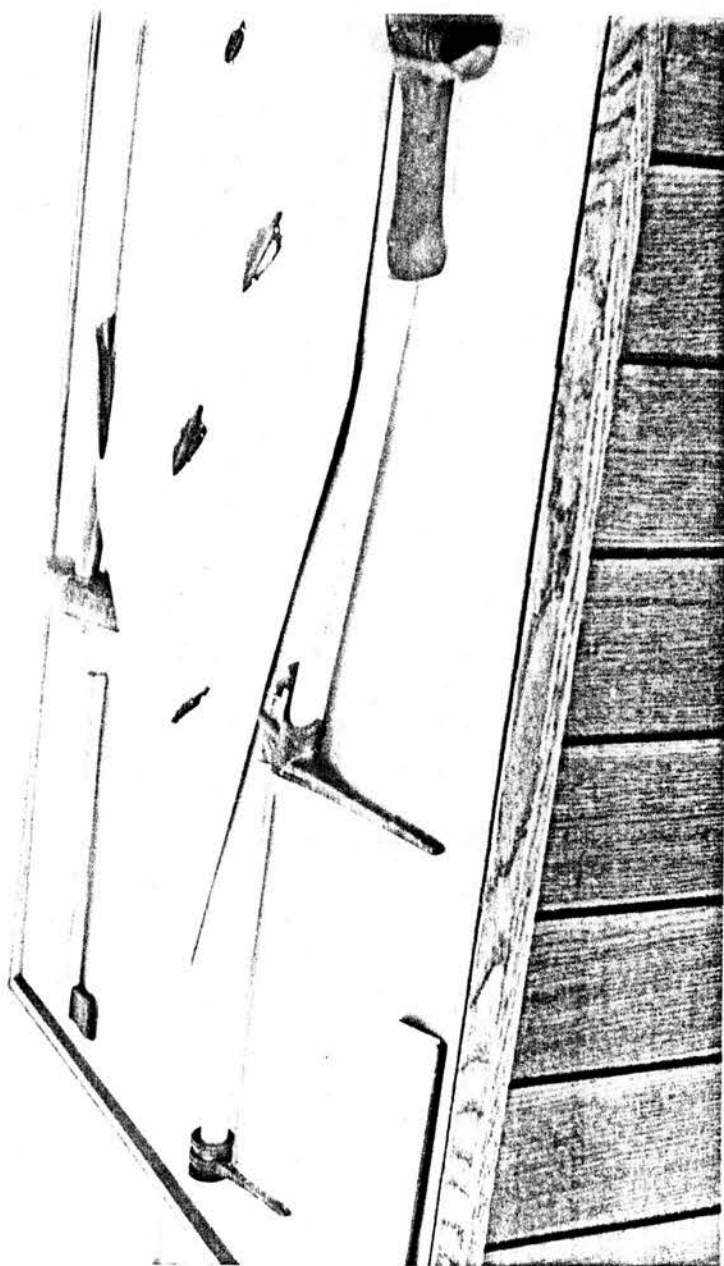


Plate 22

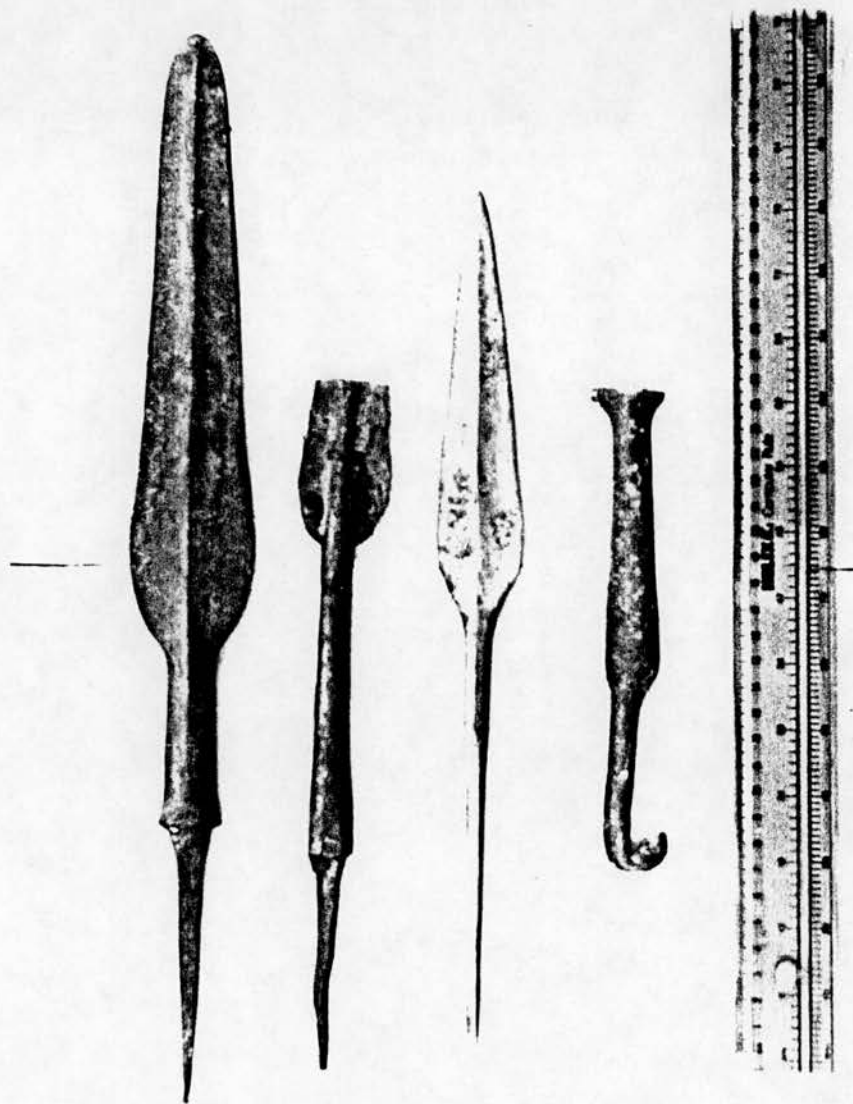


Plate 24

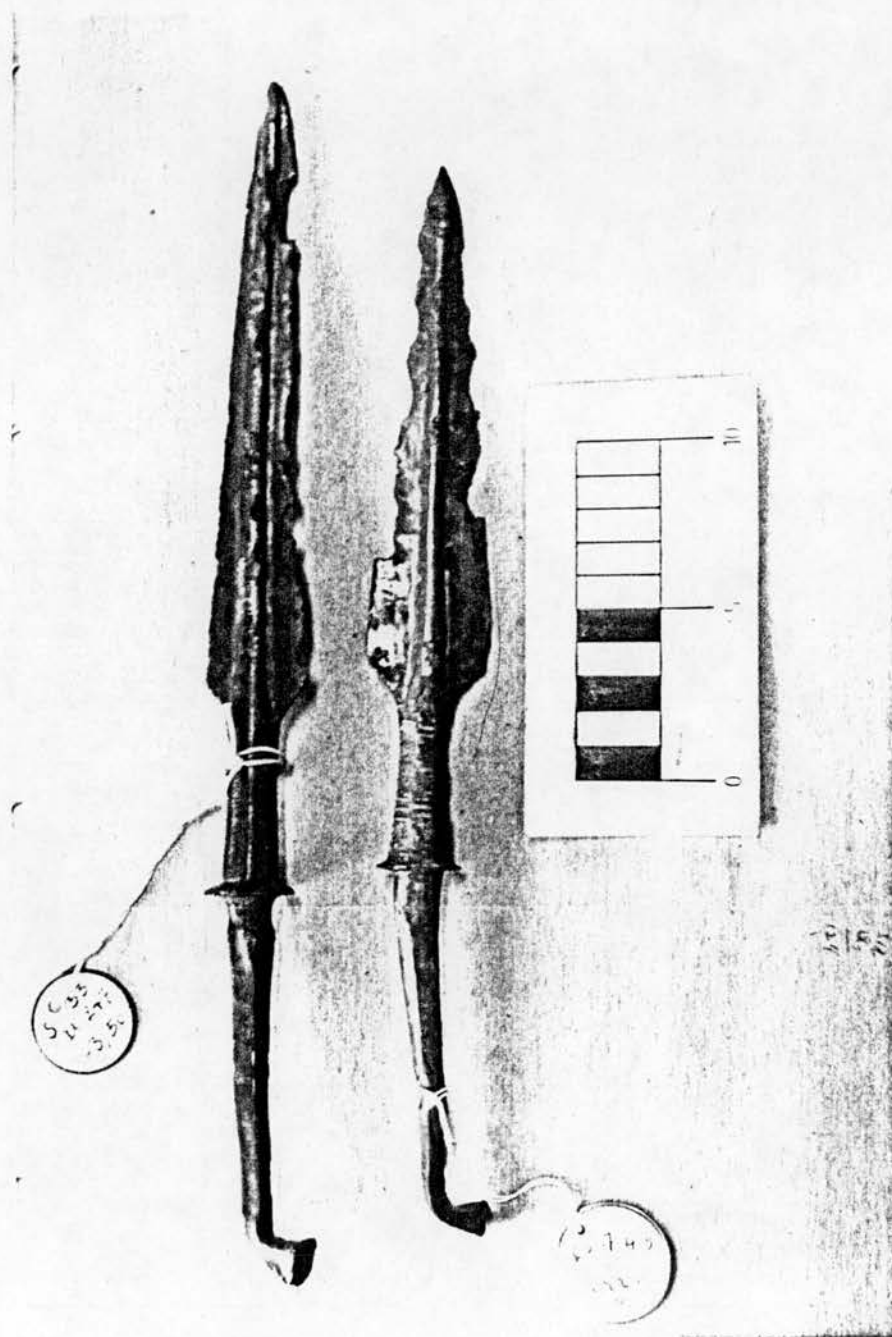


Plate 25

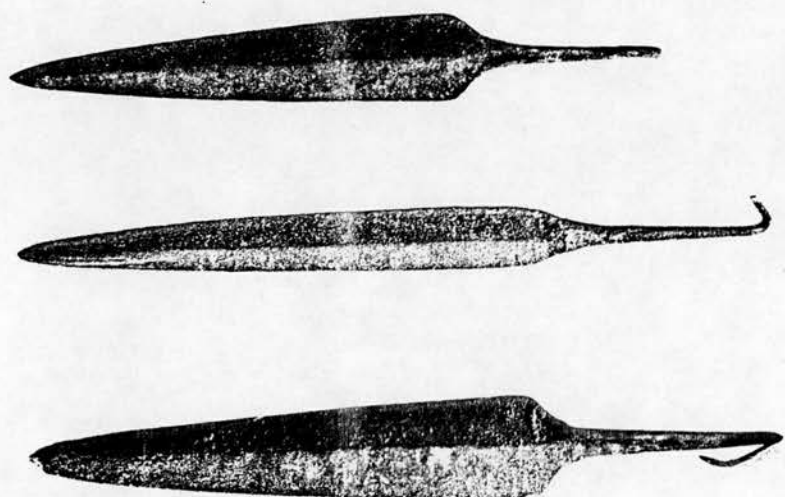
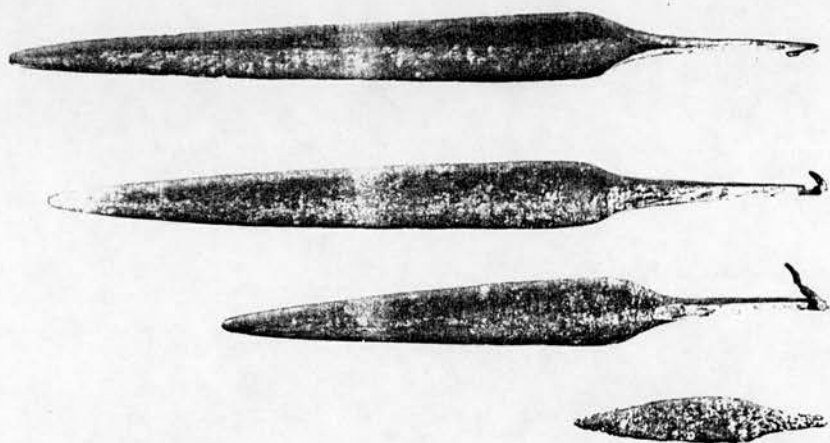


Plate 26

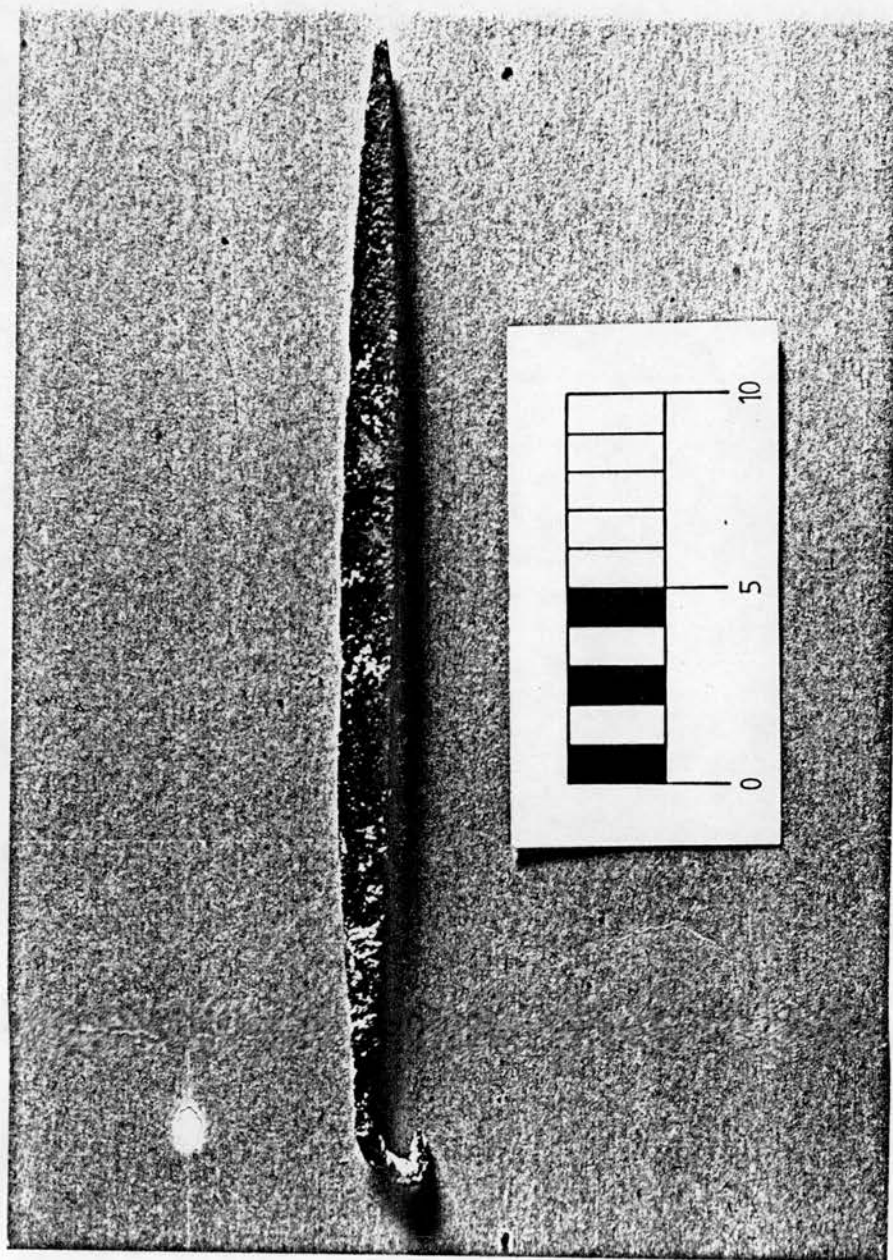


Plate 27

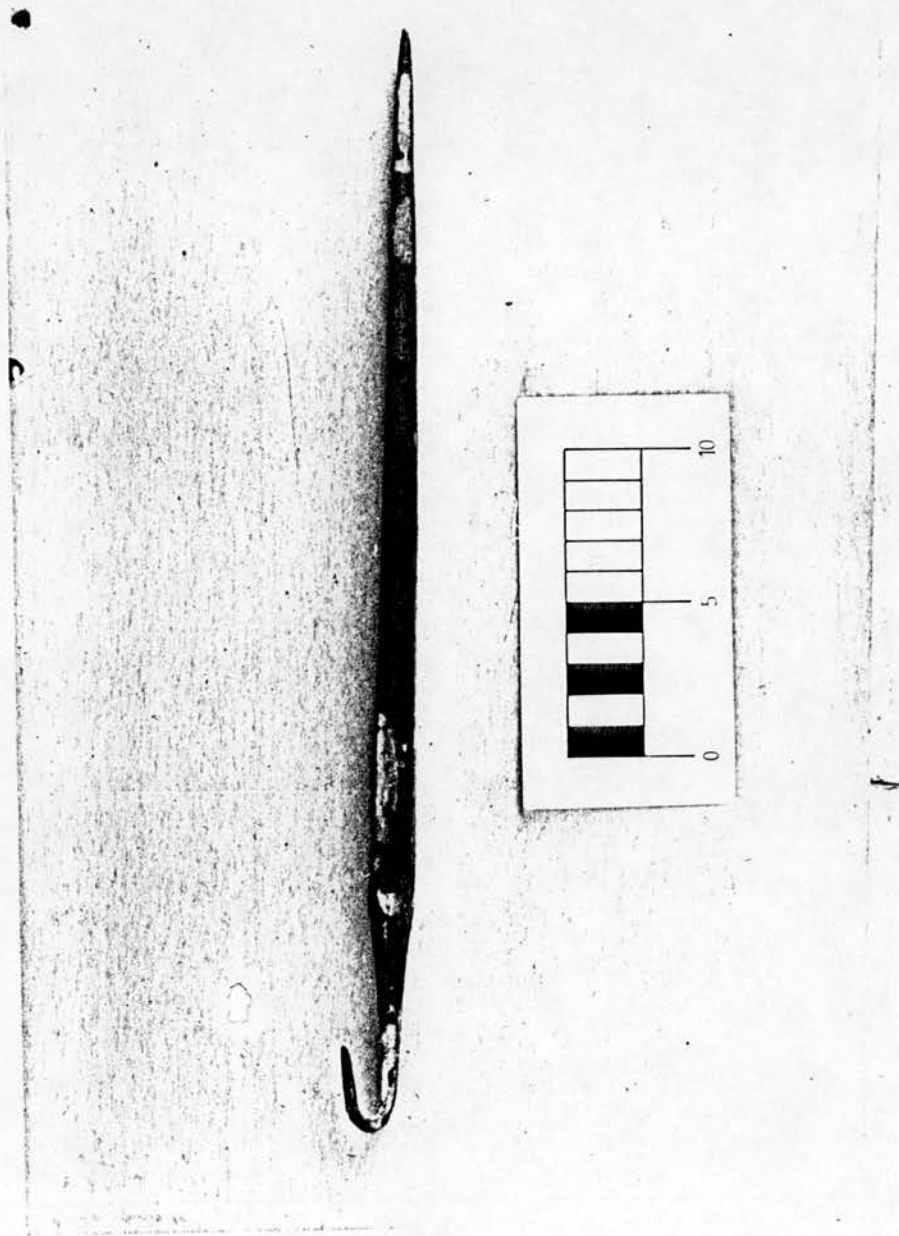


Plate 28



Plate 29

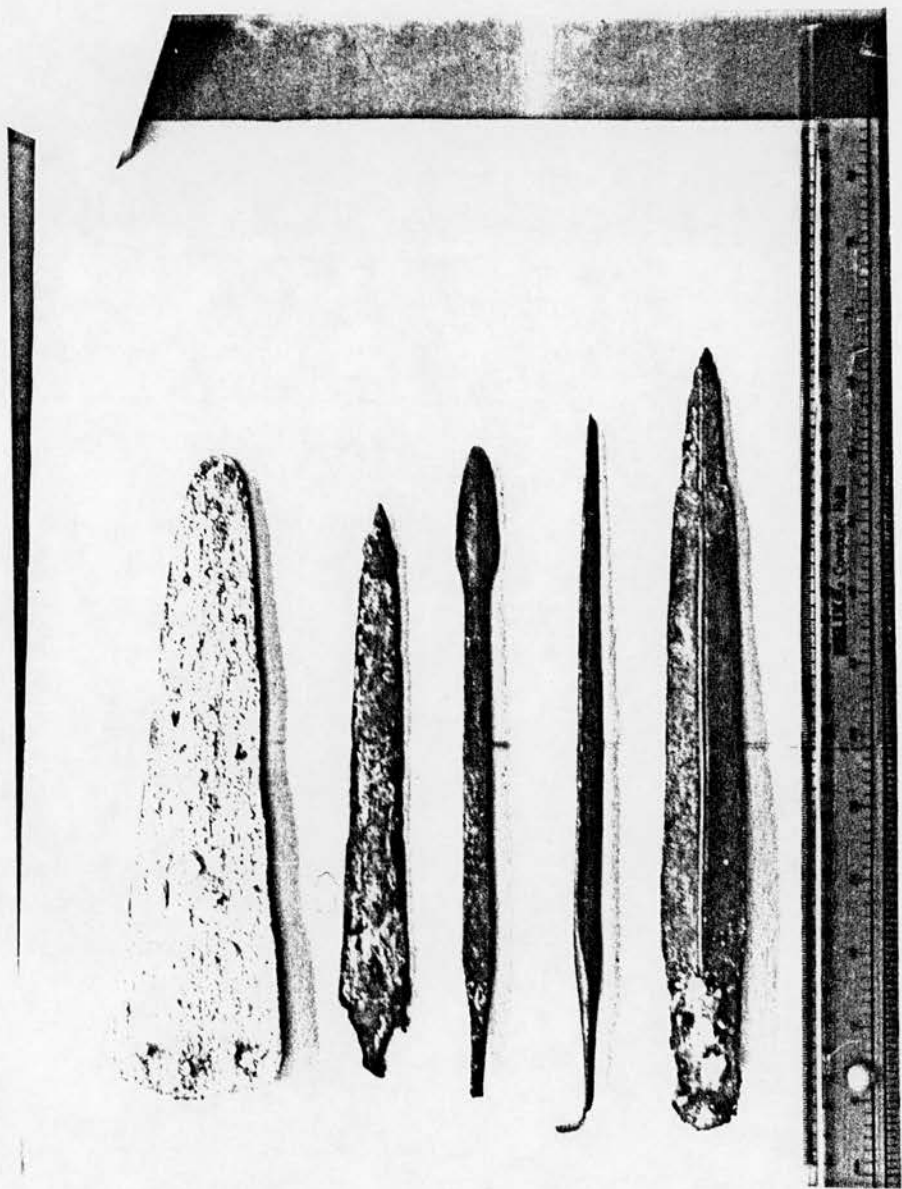


Plate 30

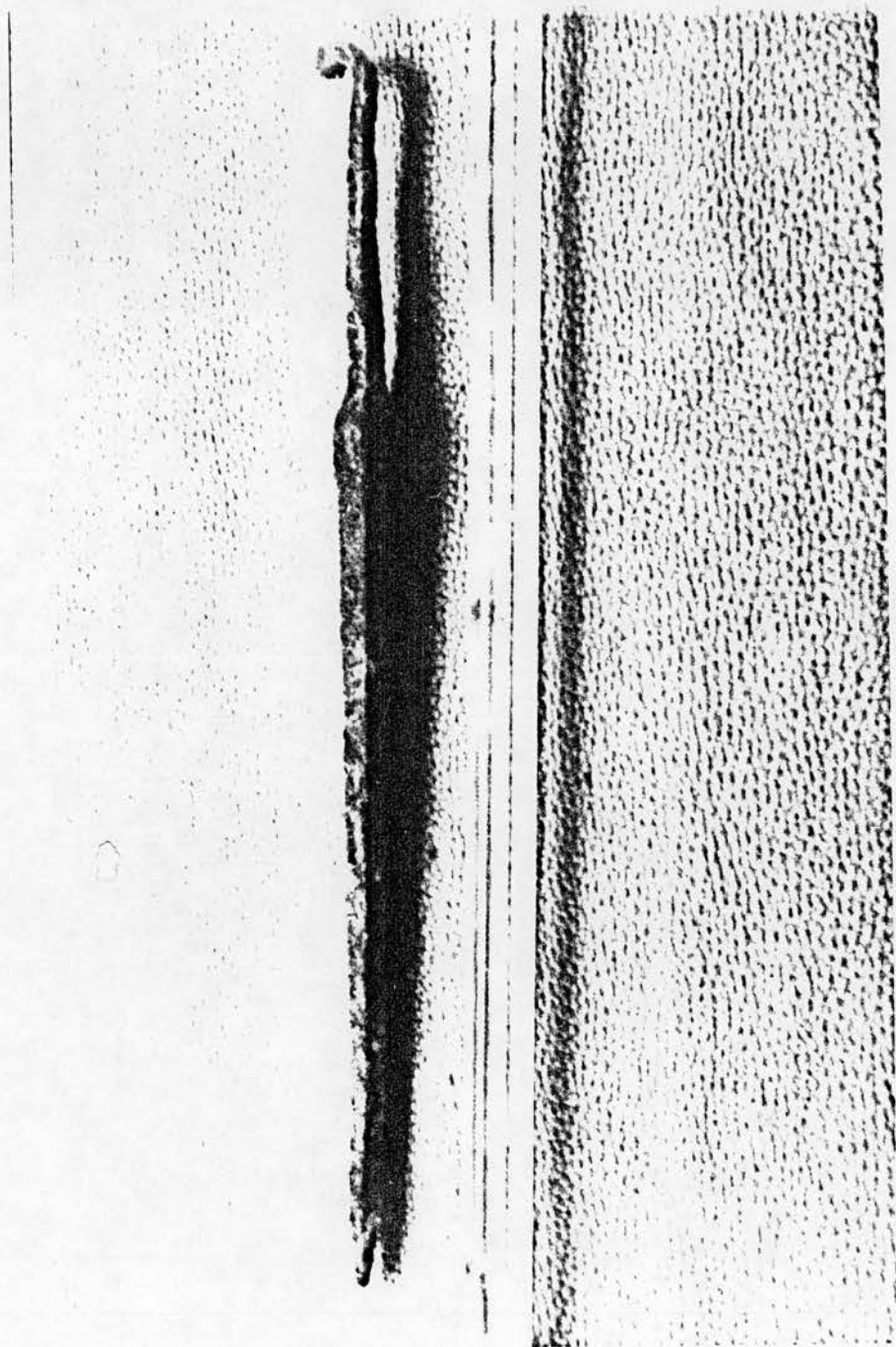


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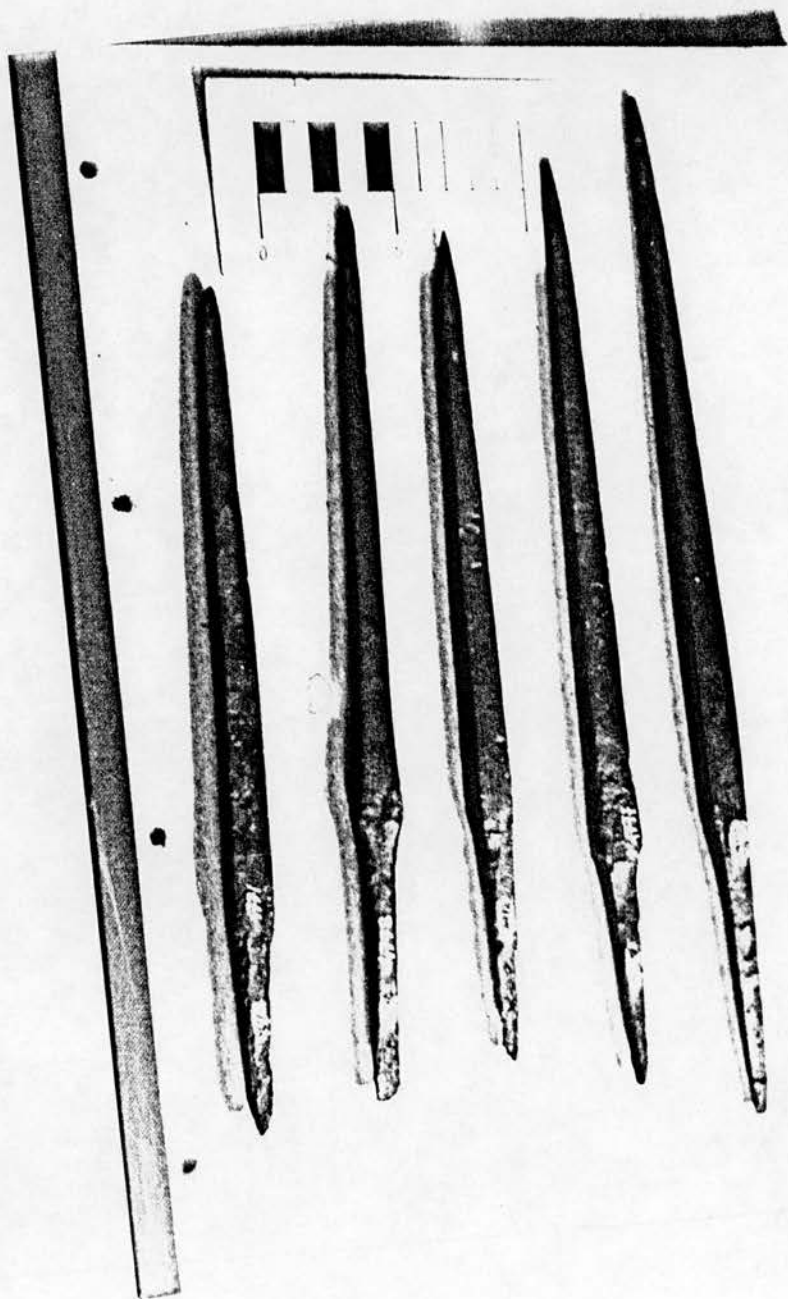


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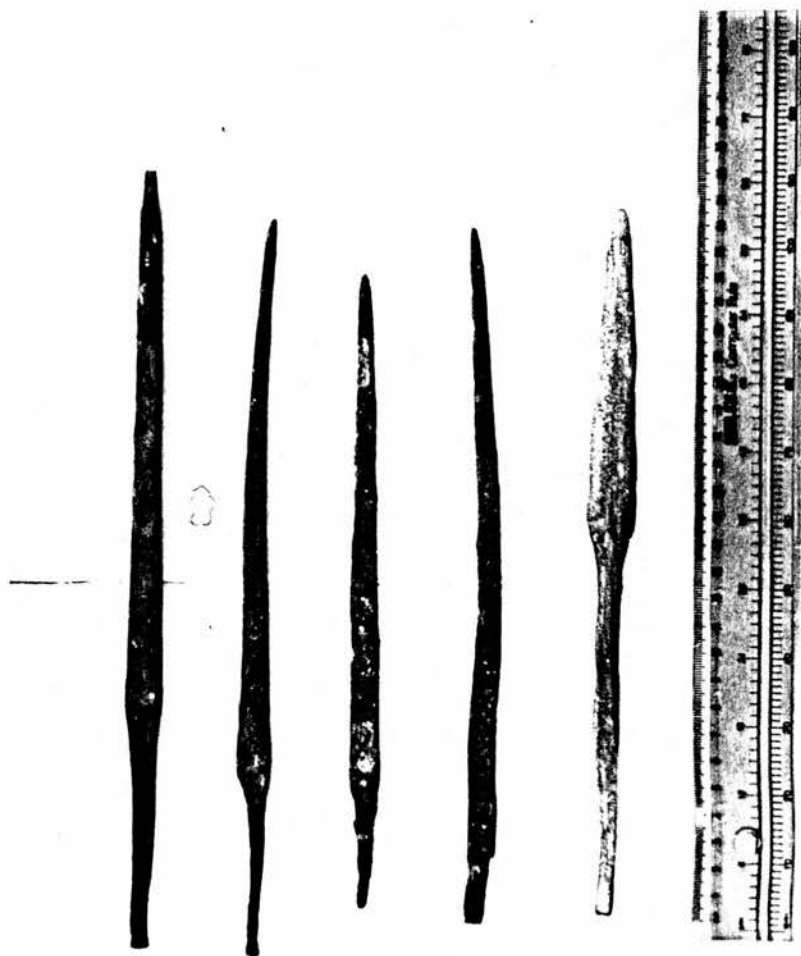


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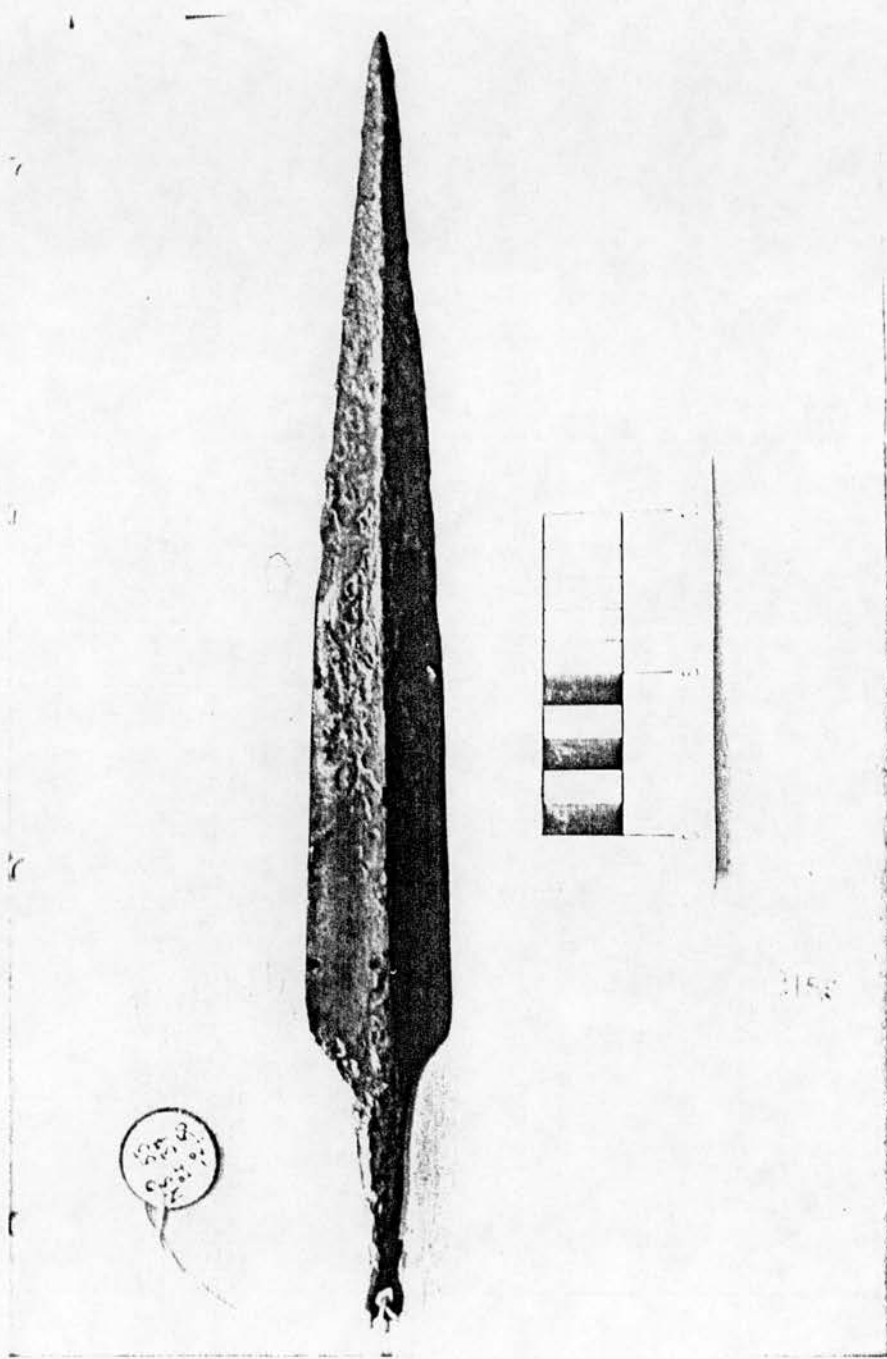


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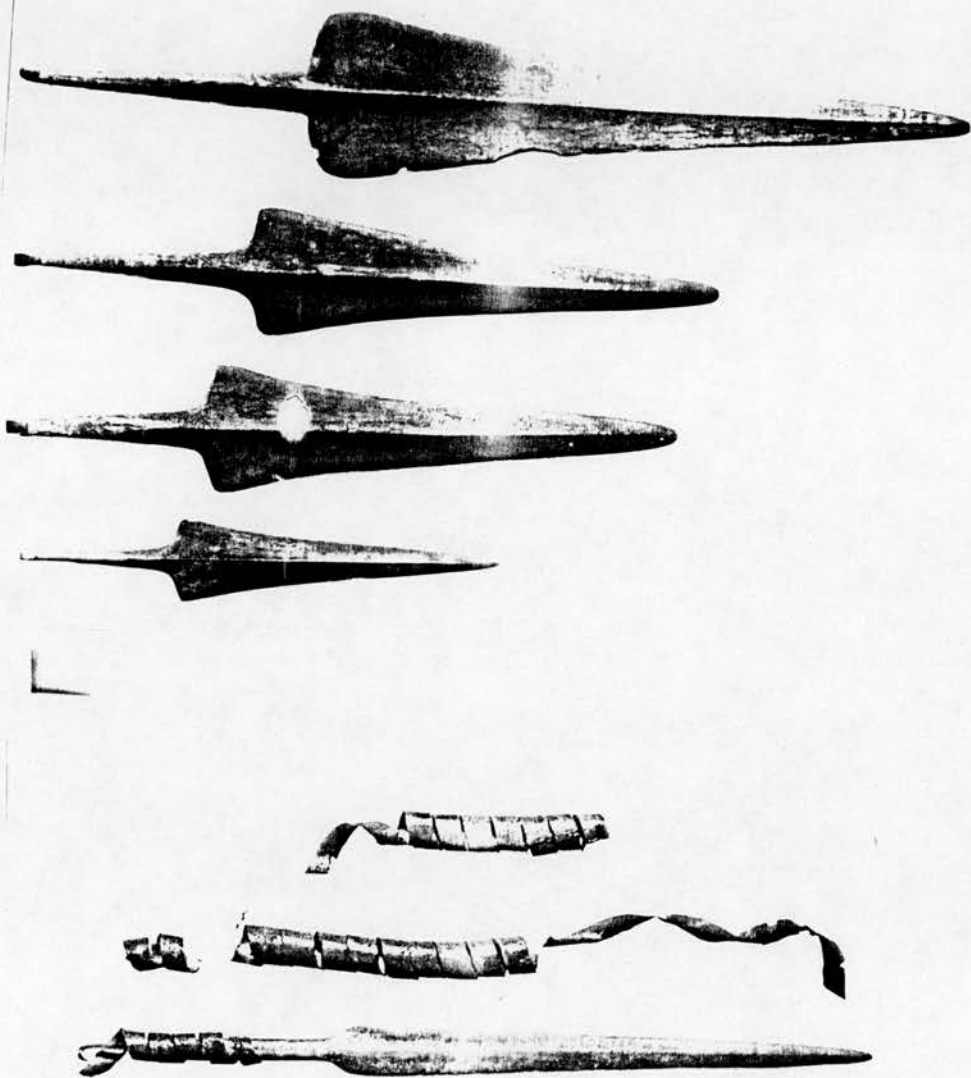


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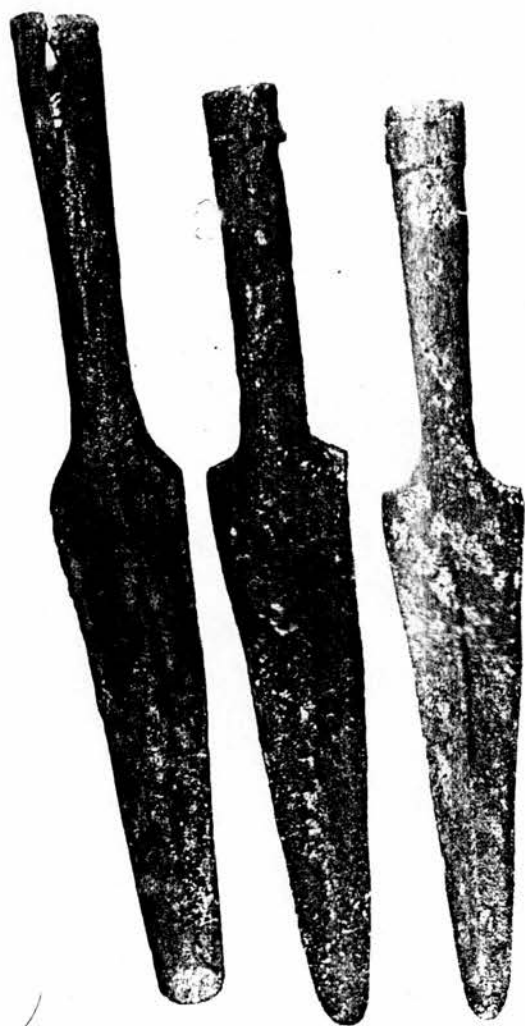


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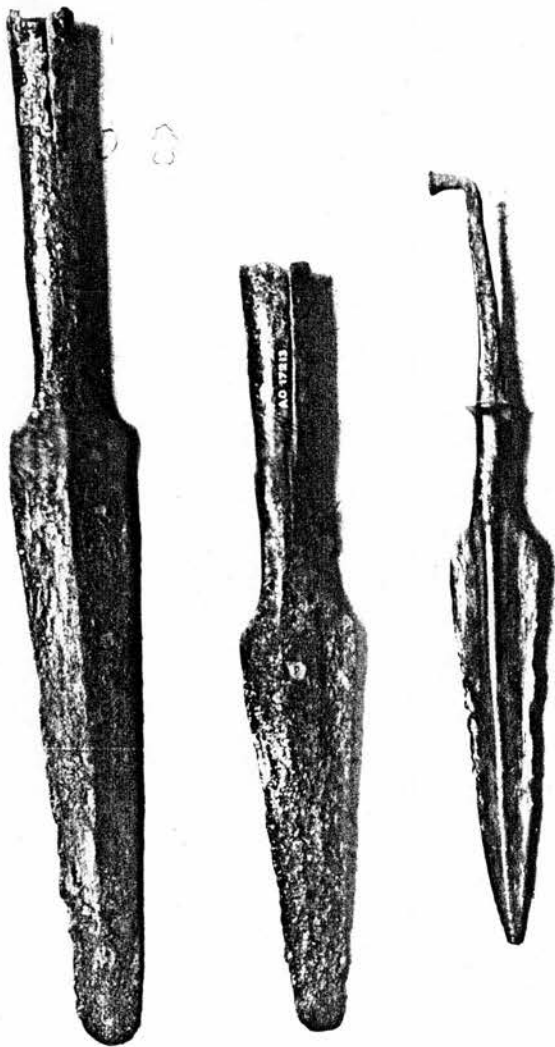


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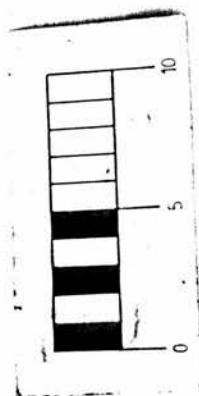


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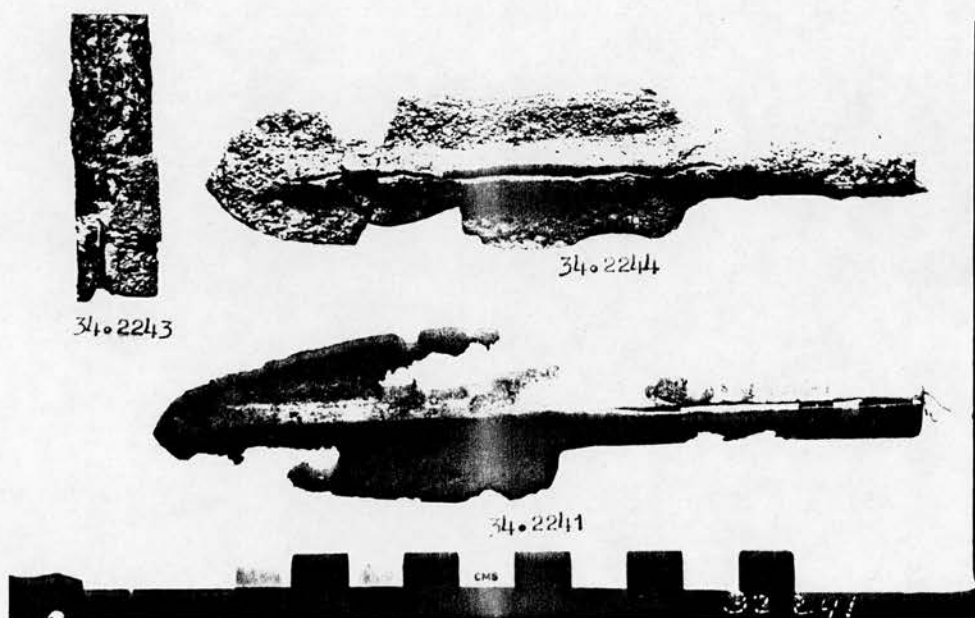


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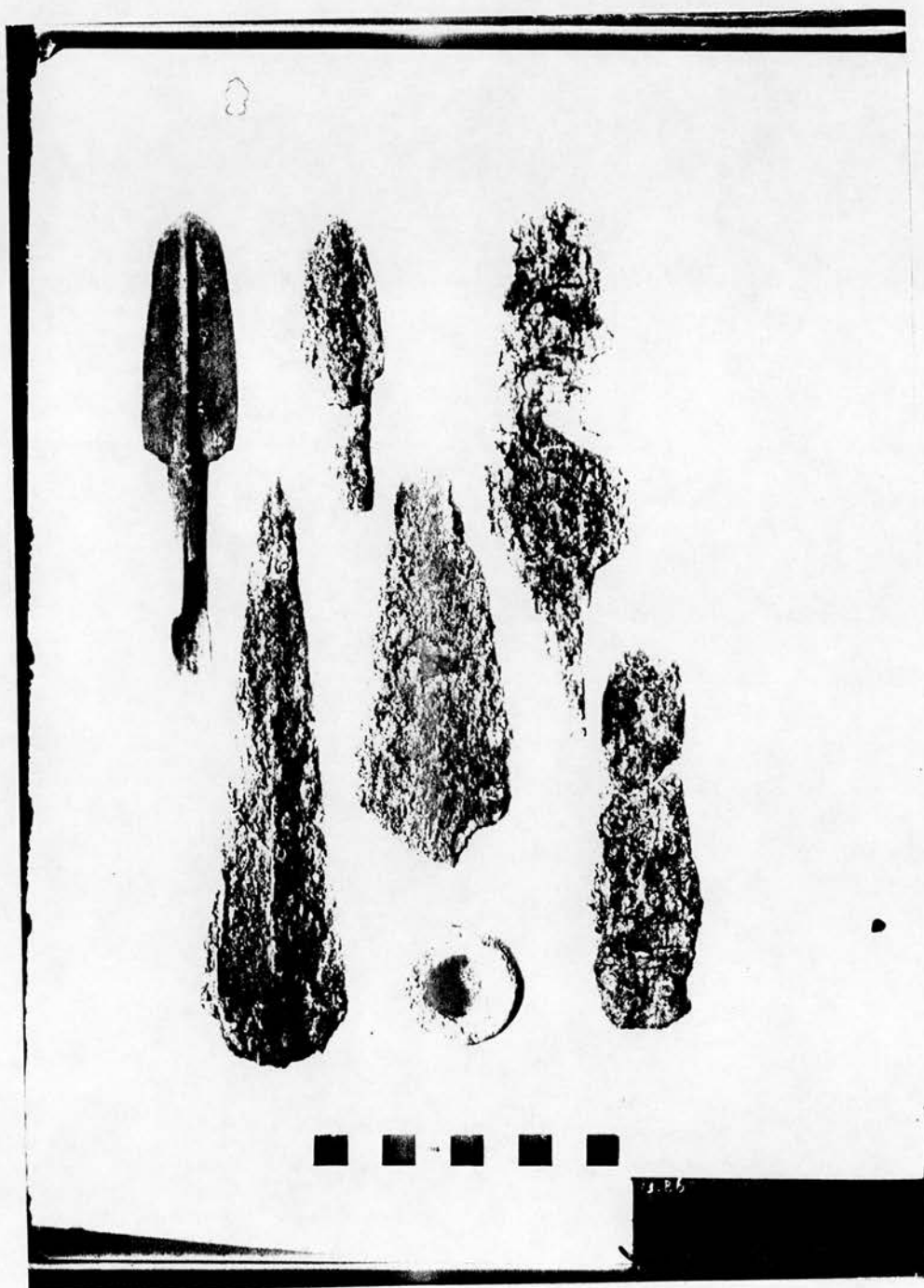


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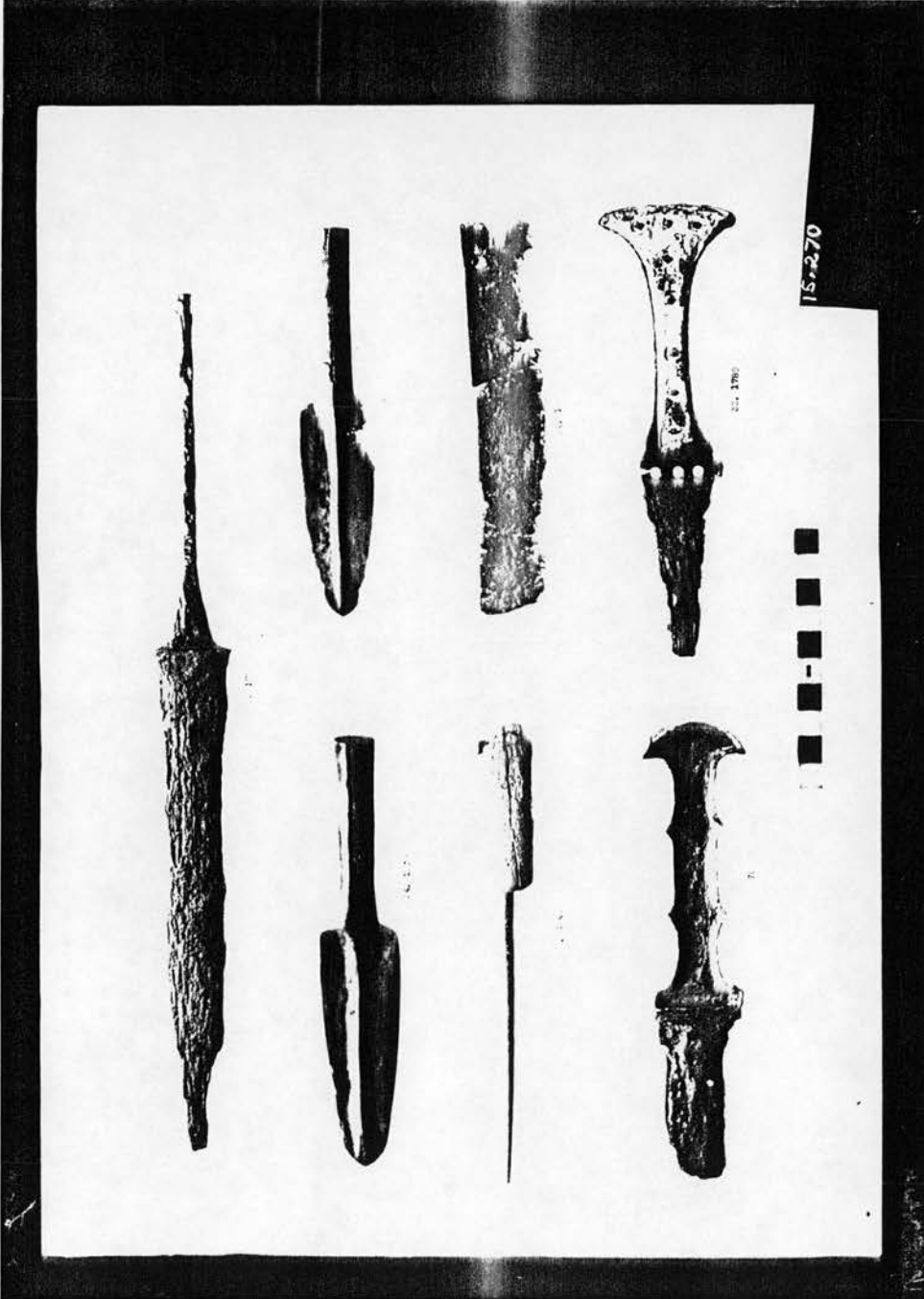


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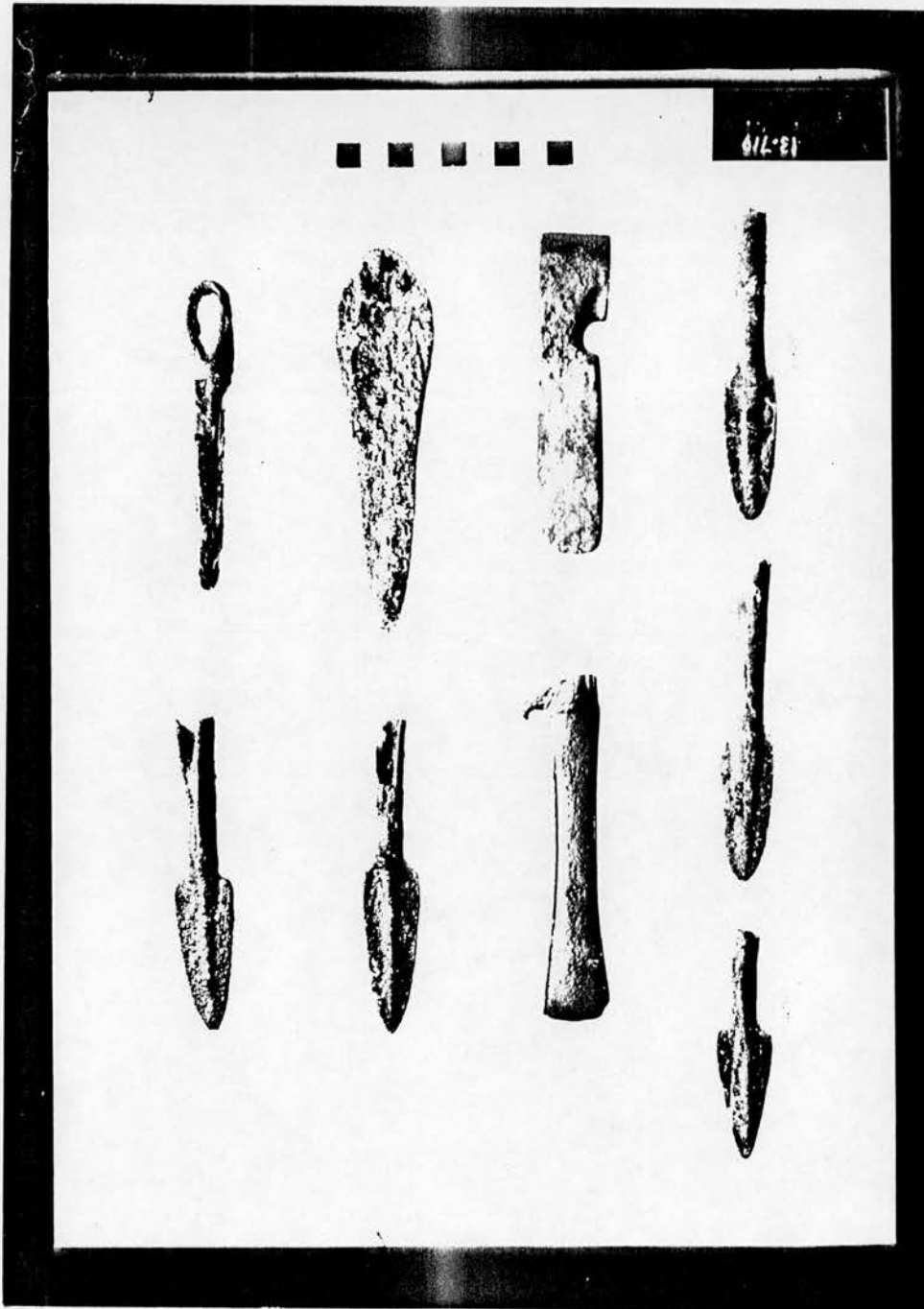


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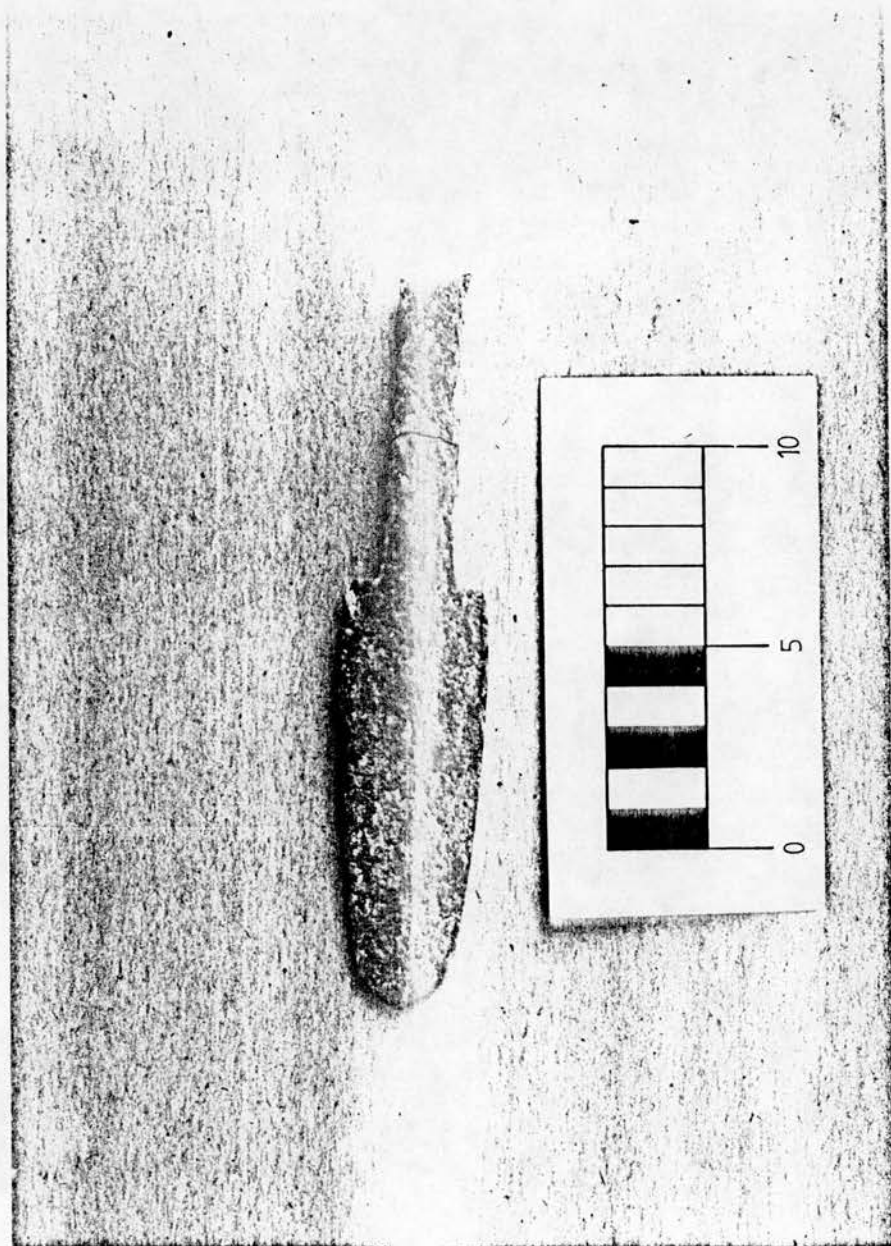


Plate 43

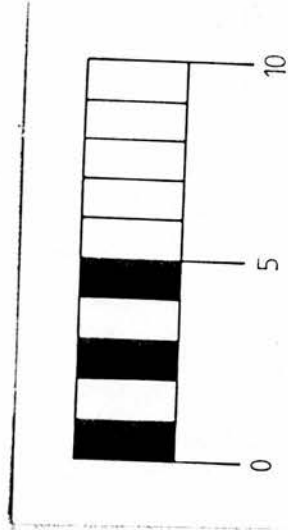


Plate 44

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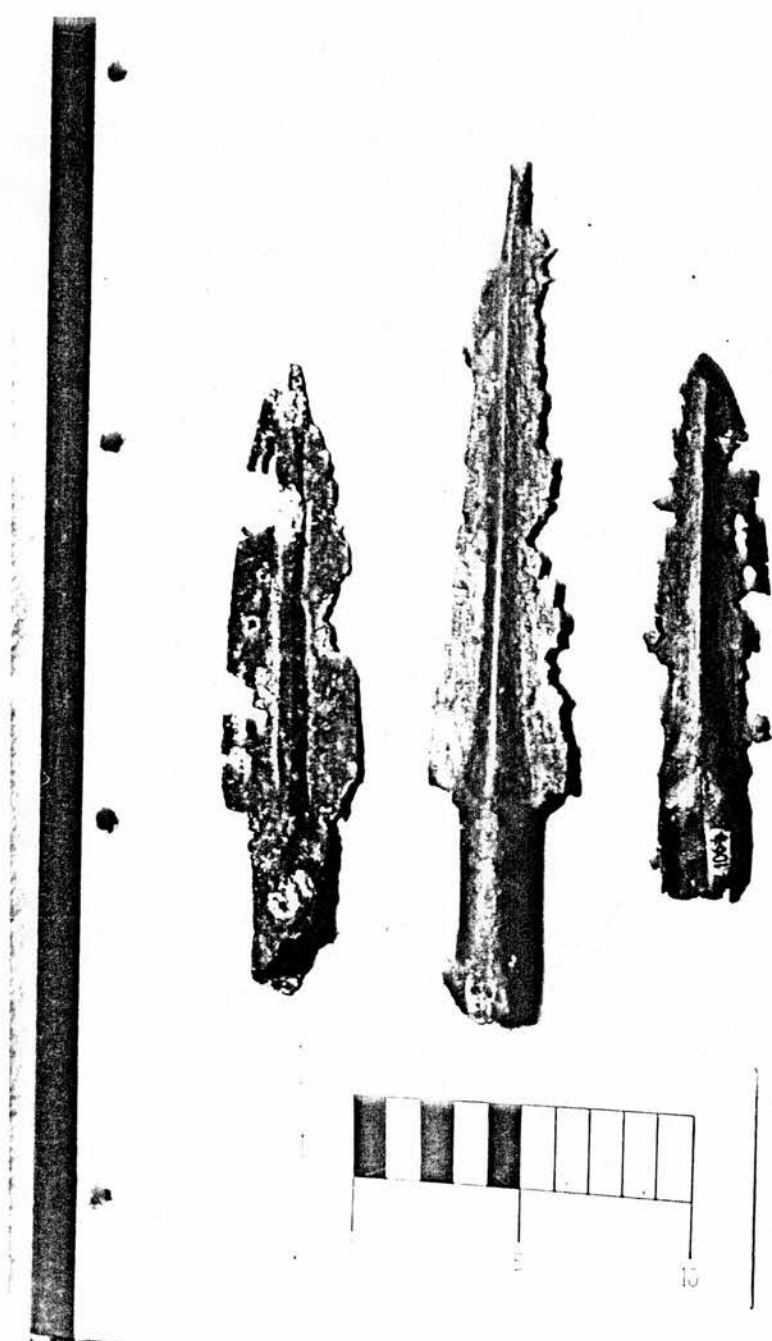
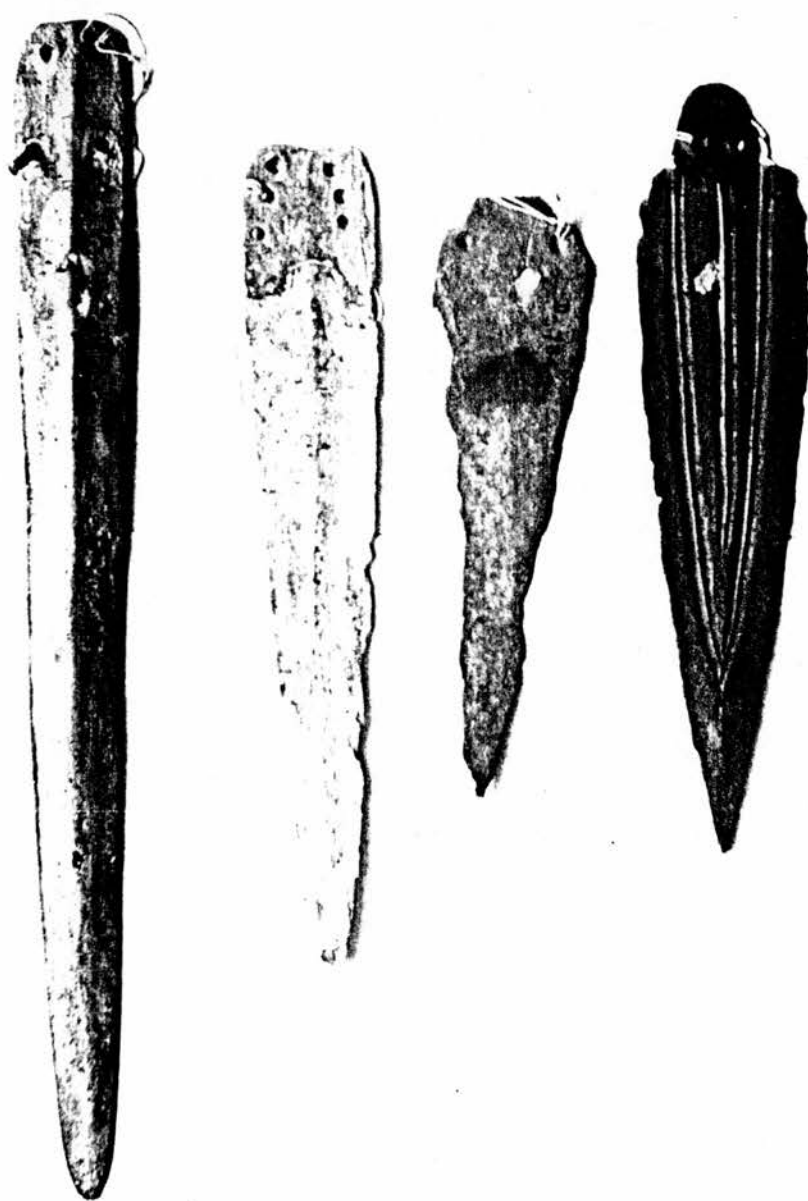


Plate 46



Plato 47

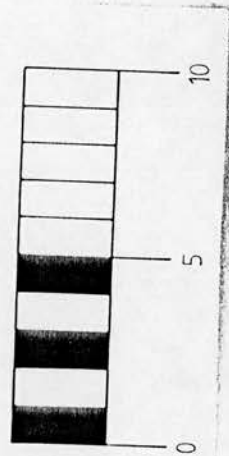


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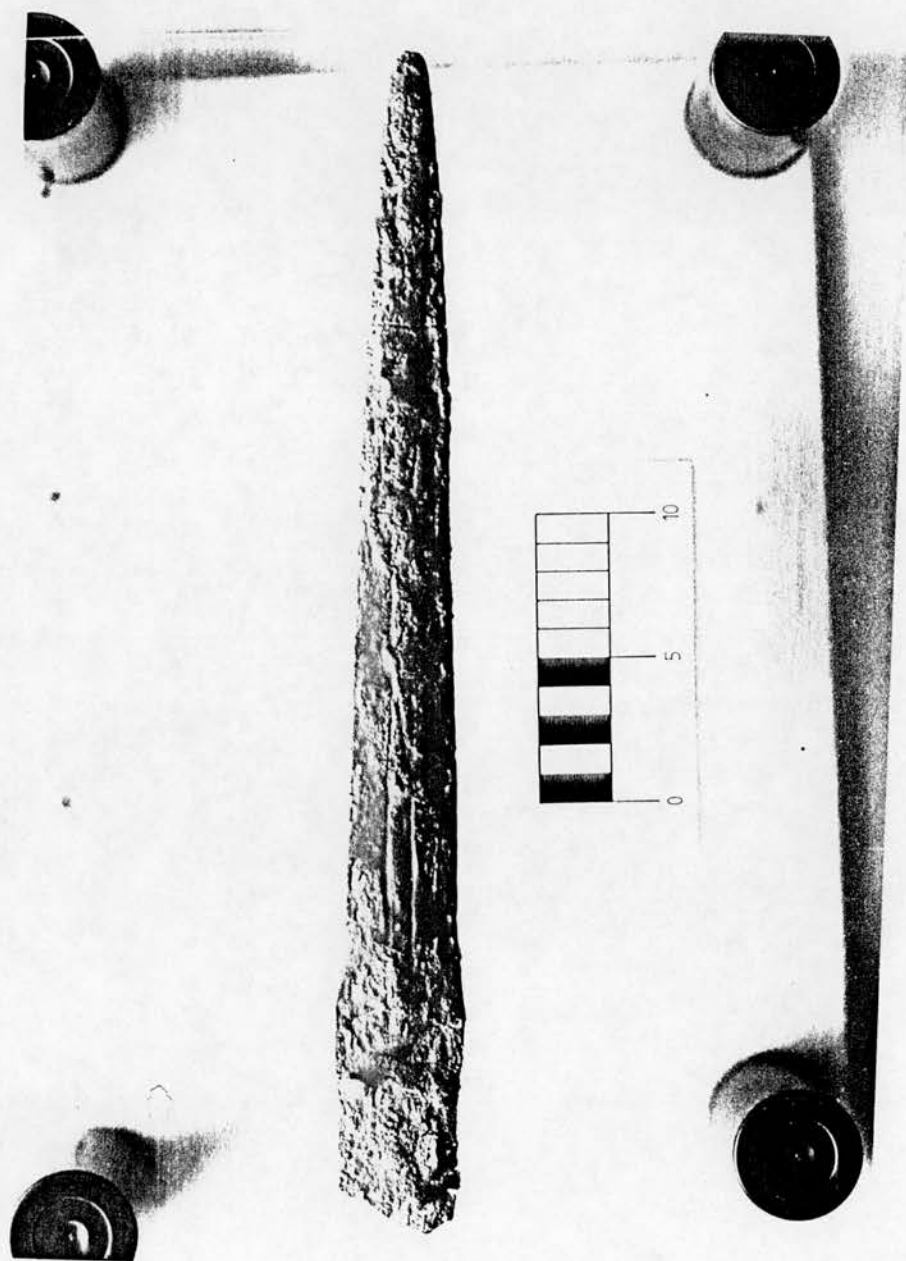


Plate 49

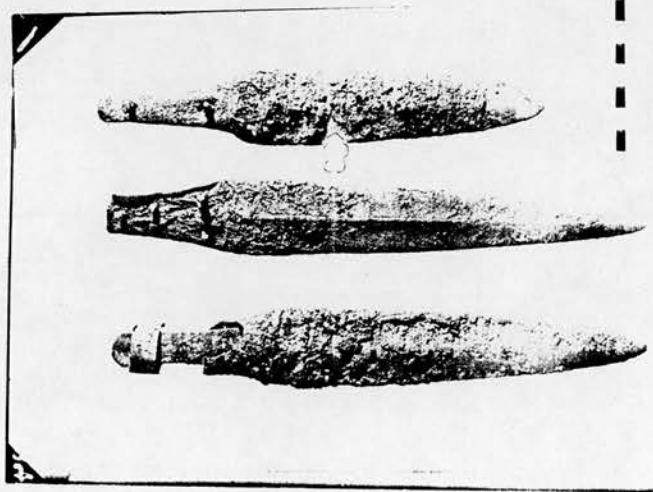


Plate 50

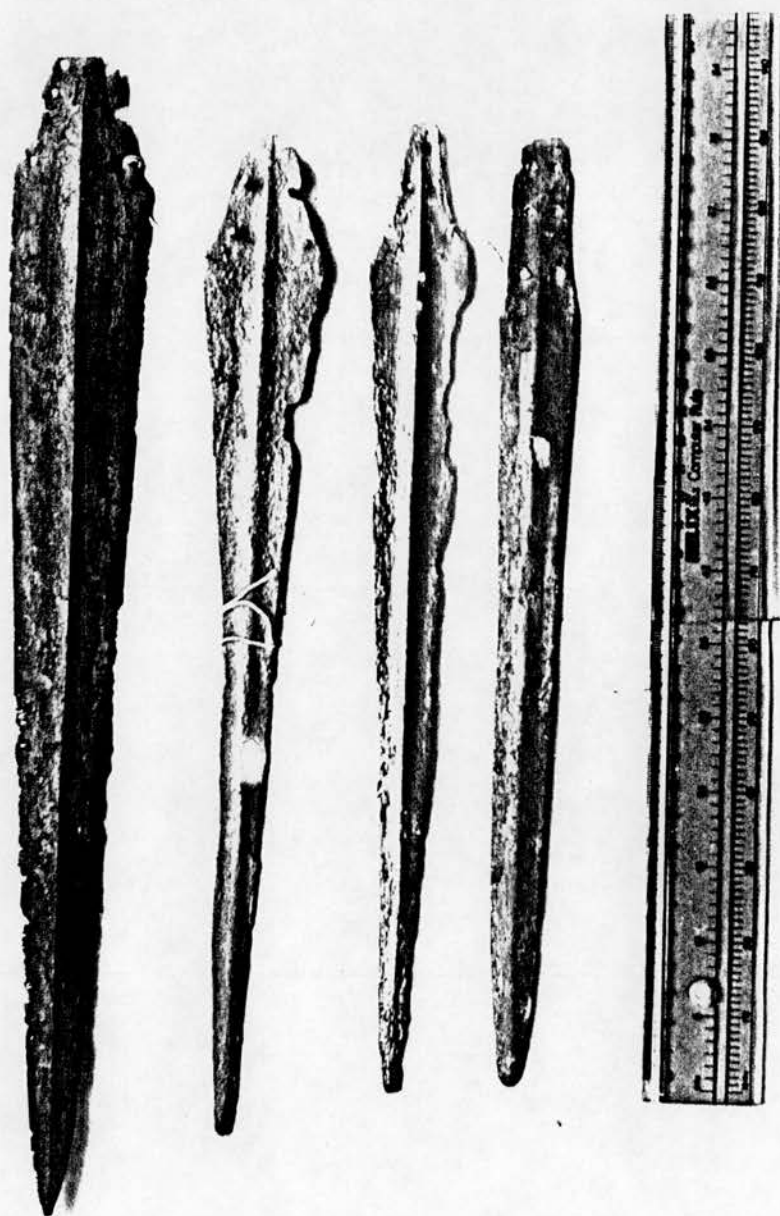


Plate 51

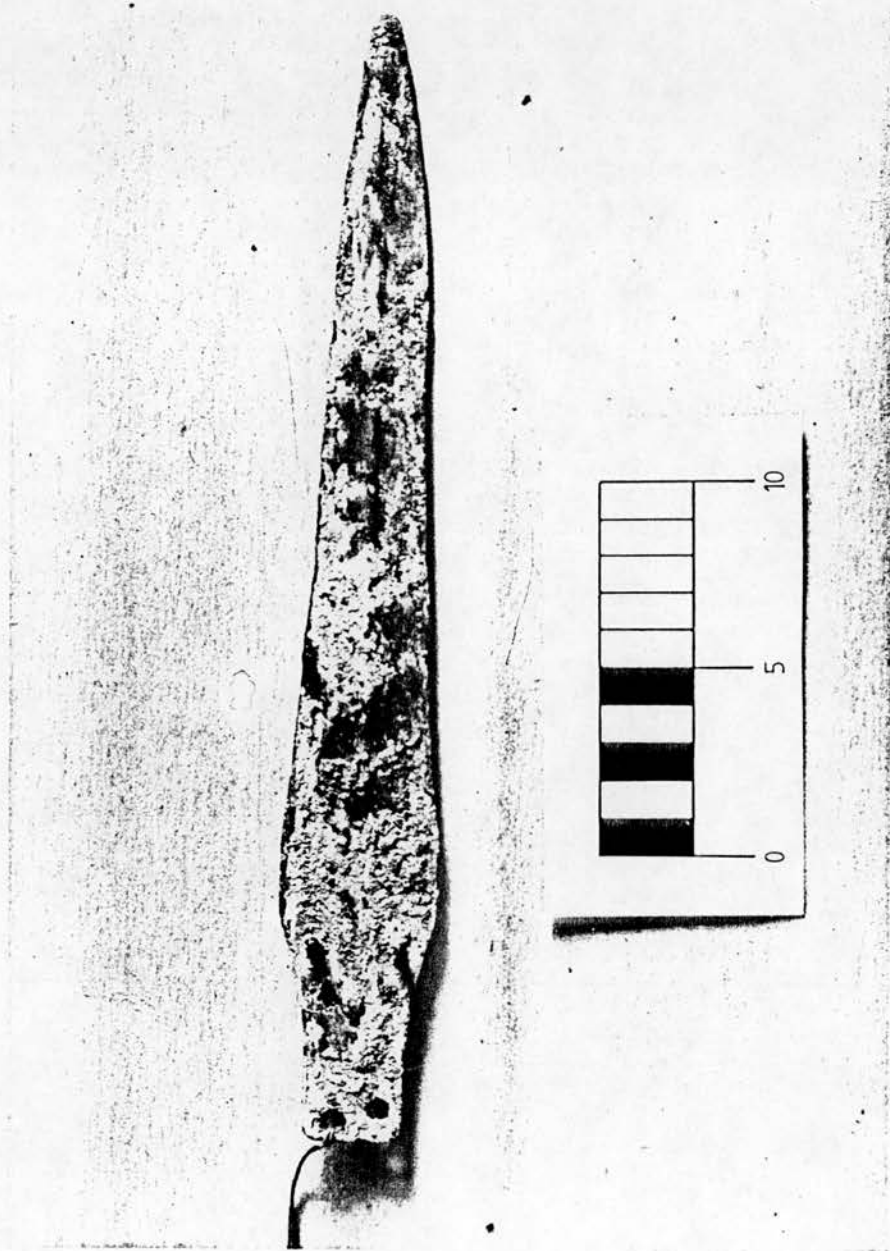


Plate 52

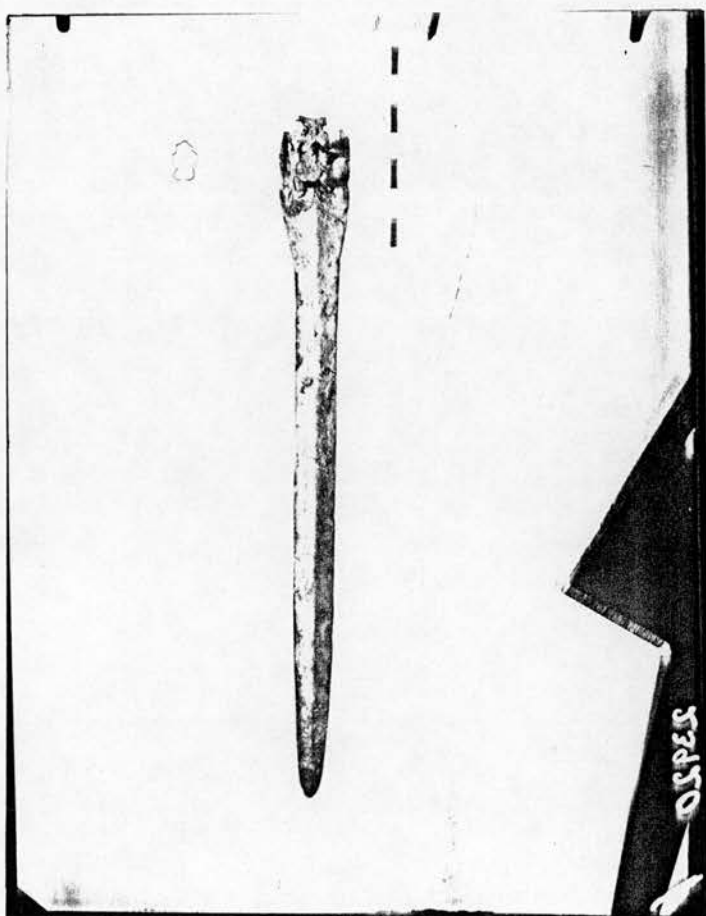


Plate 53



Plate 54



Plate 55

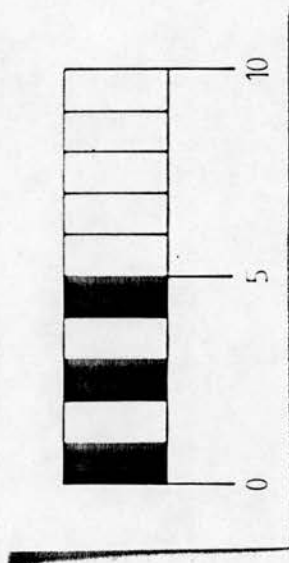


Plate 56

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Plate 57

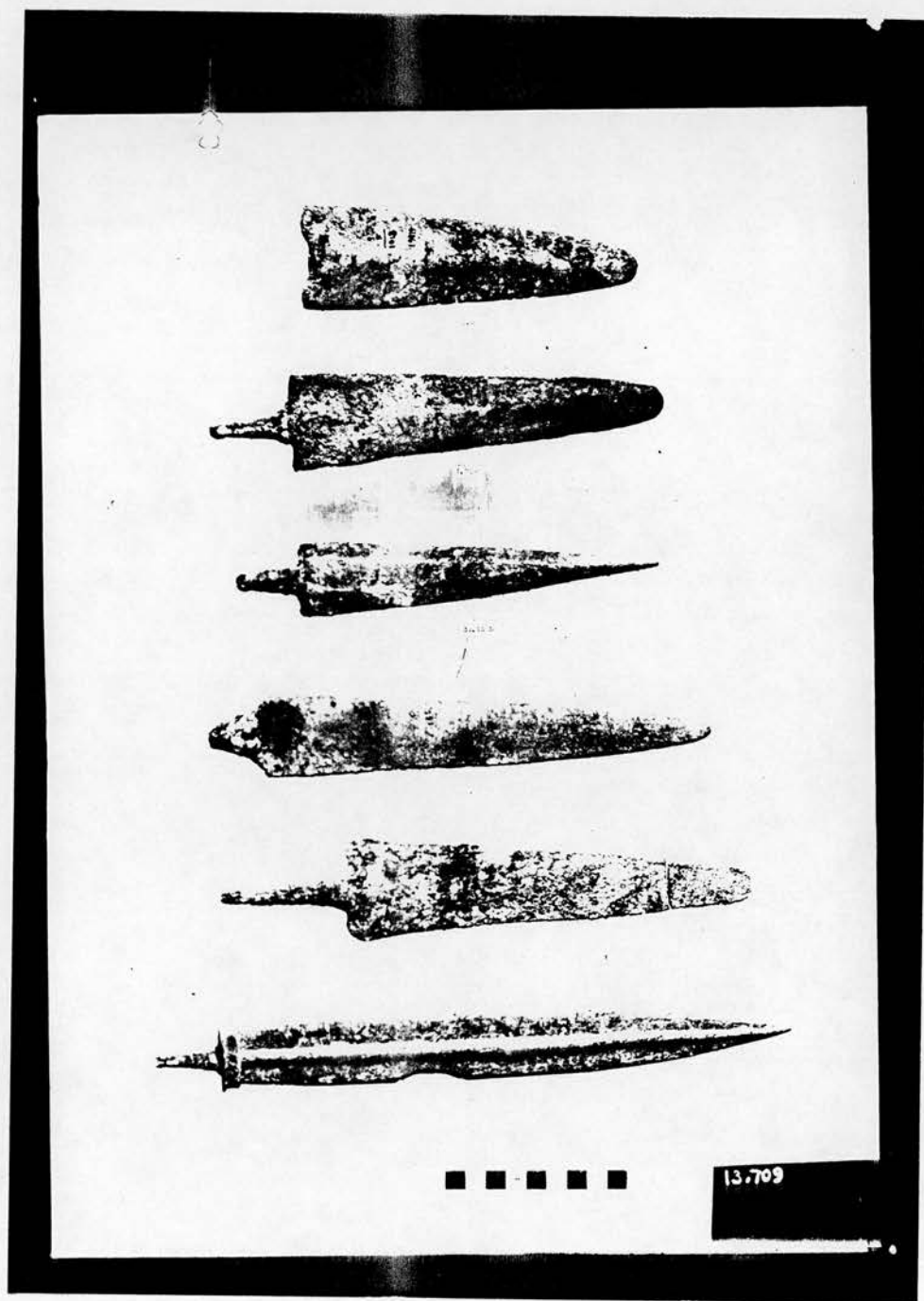


Plate 58



Plate 59

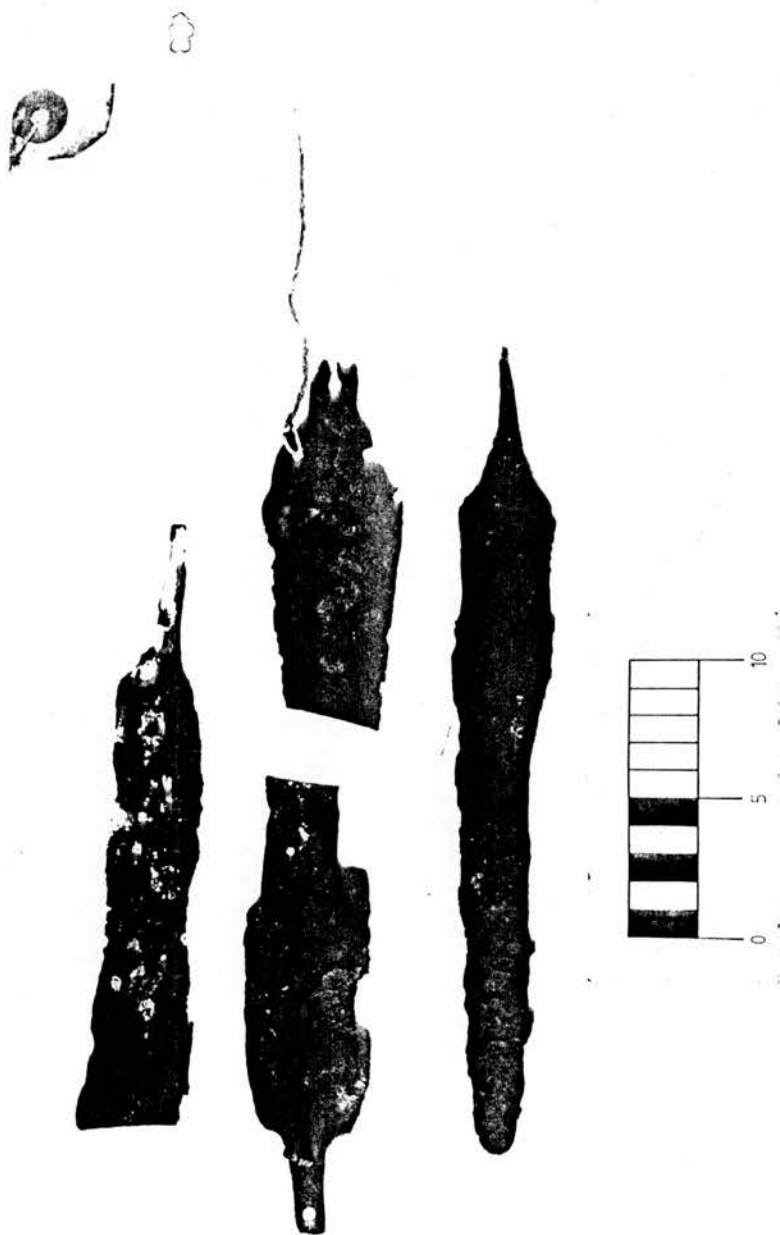


Plate 60

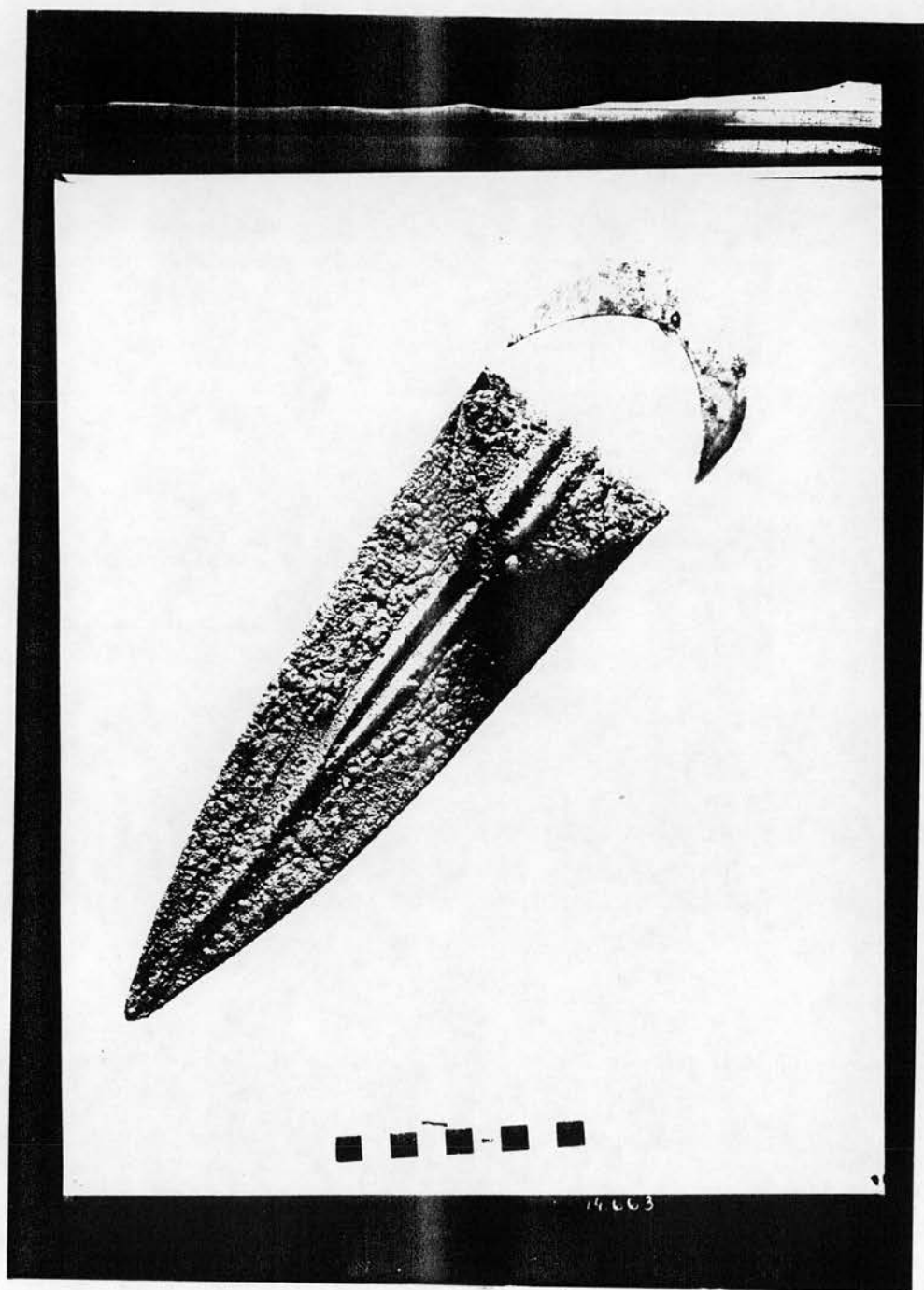


Plate 61

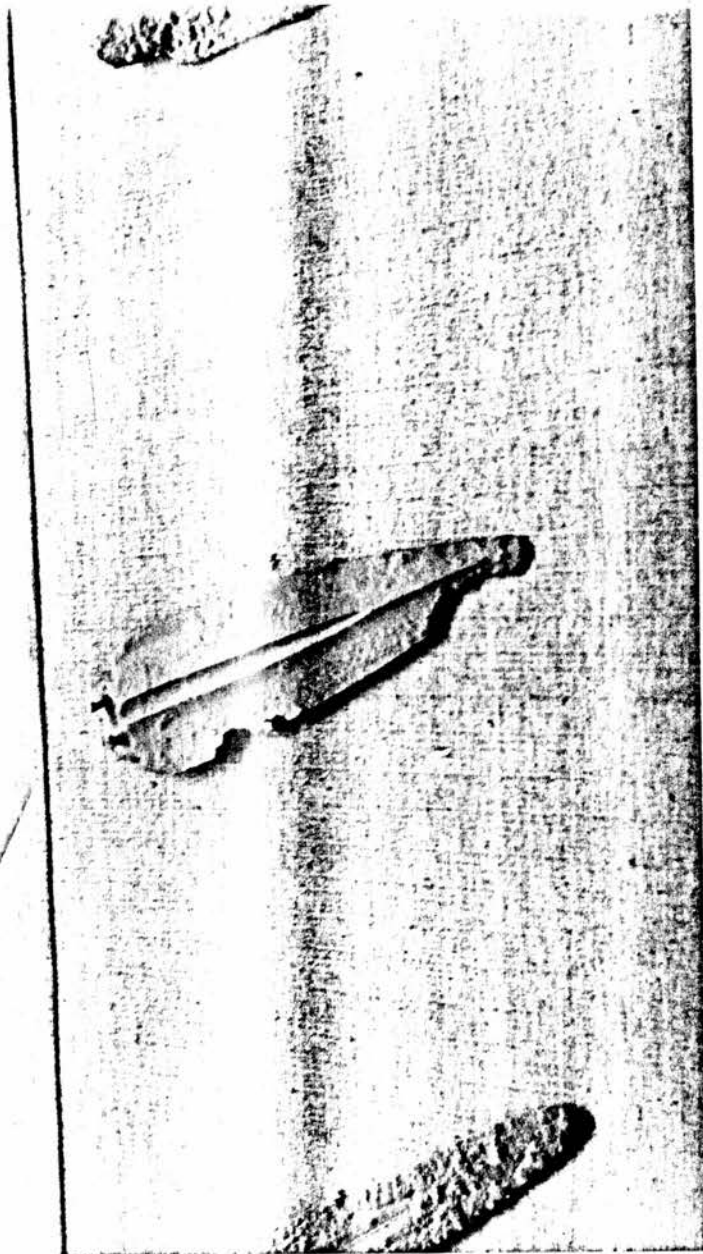


Plate 62

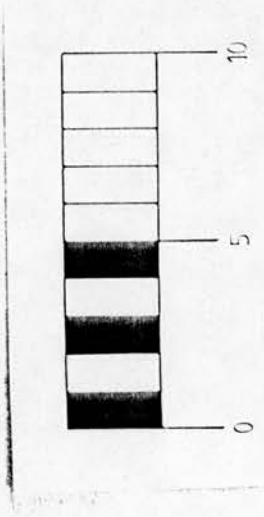
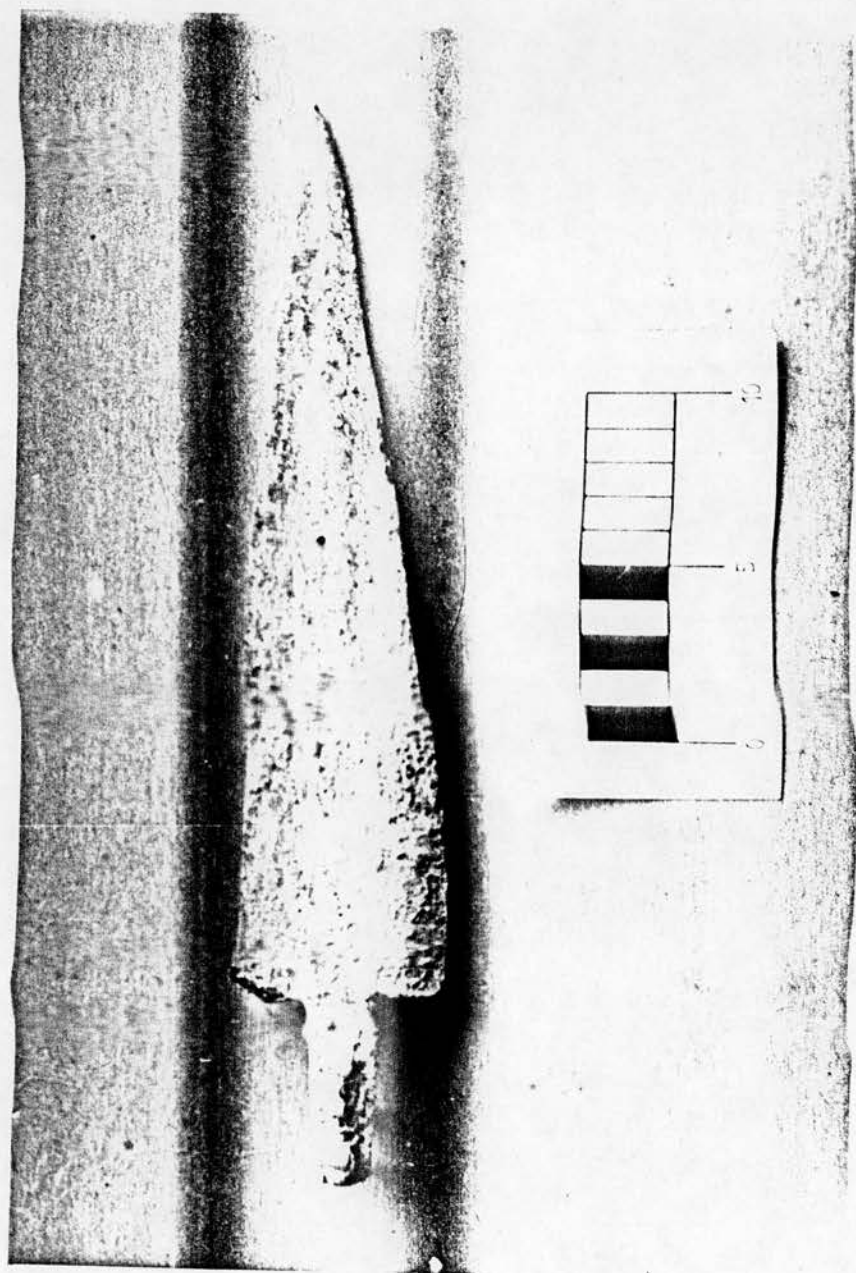


Plate 63



Plate 64



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Plate 65

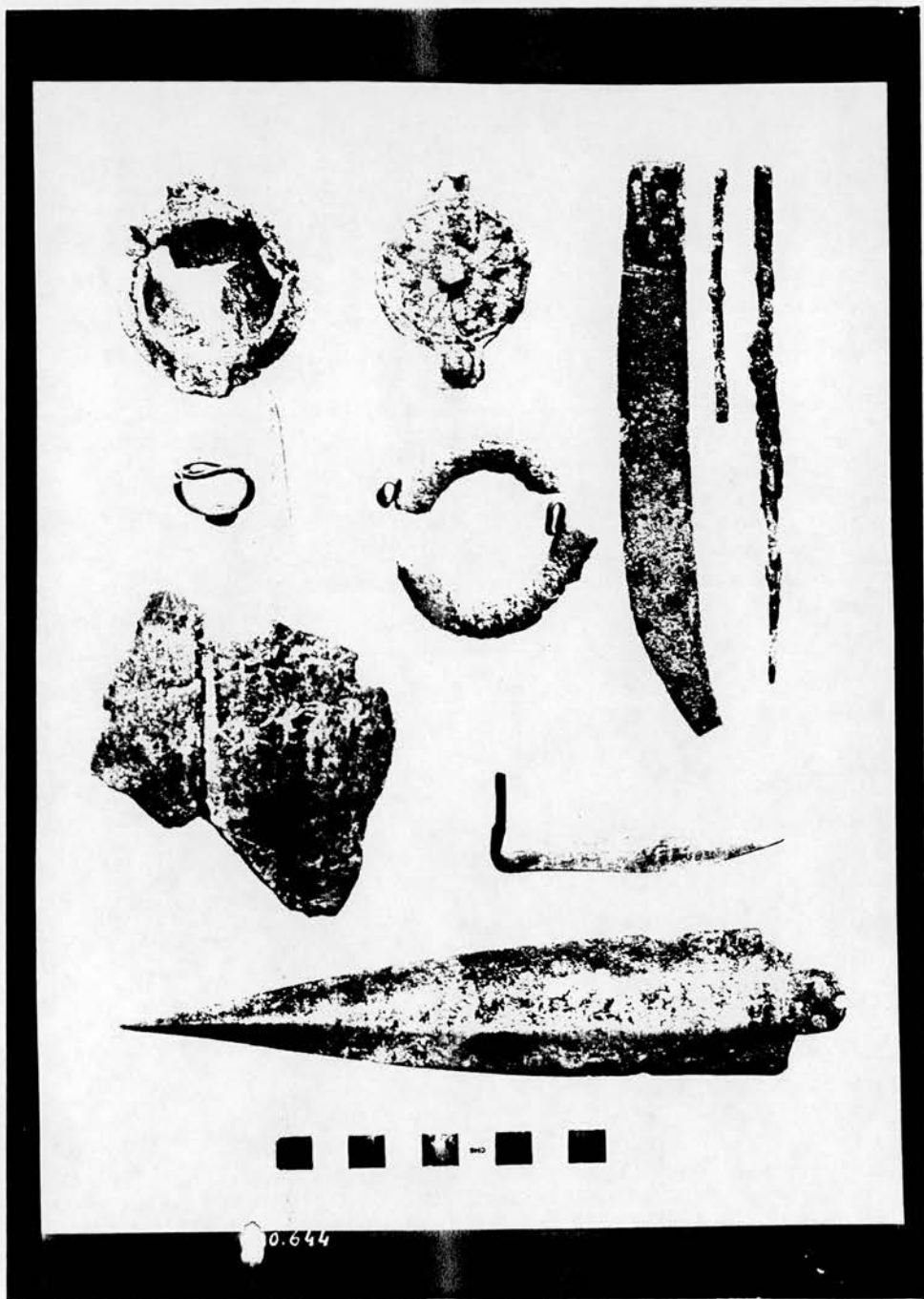


Plate 66

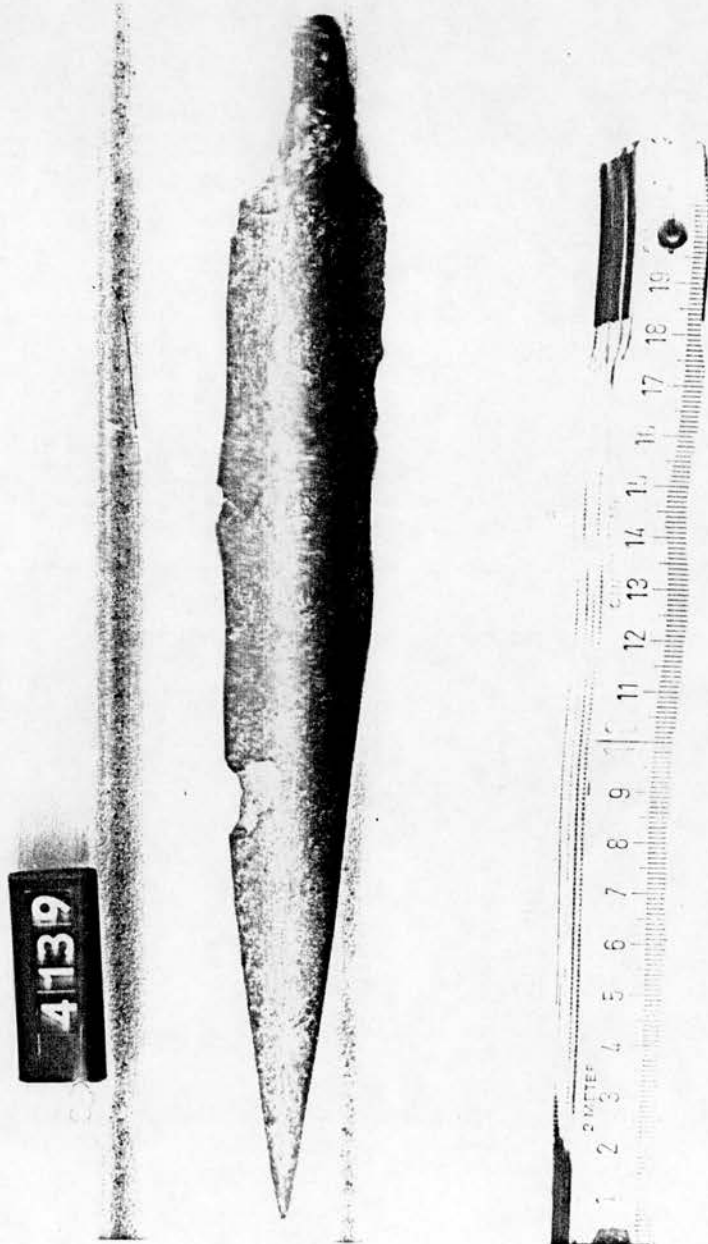


Plate 67

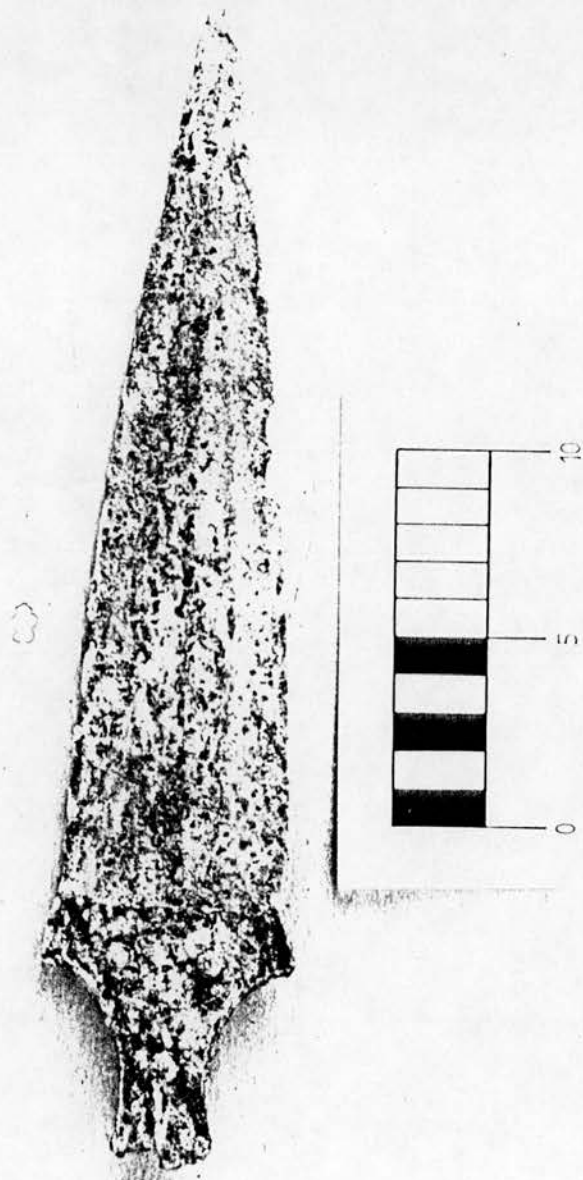


Plate 68

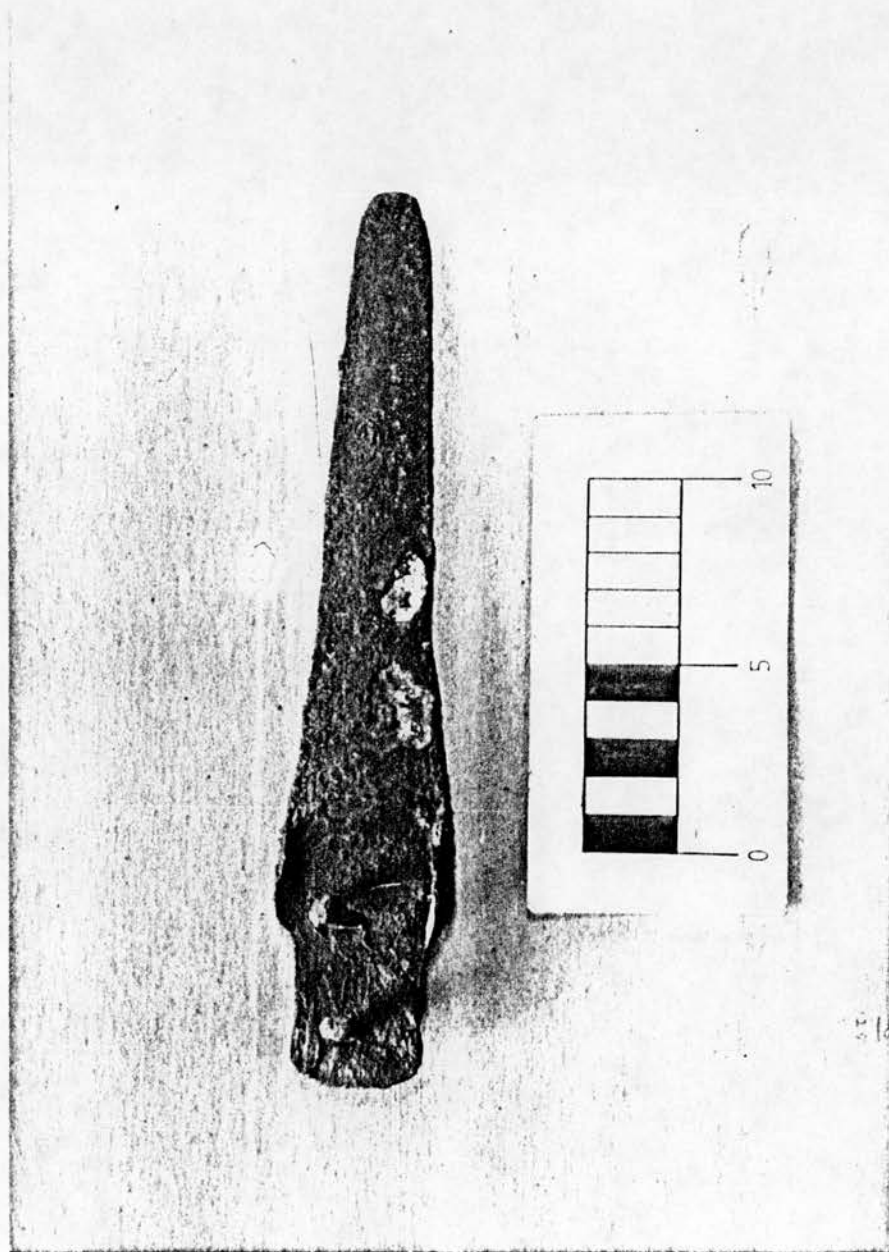


Plate 69

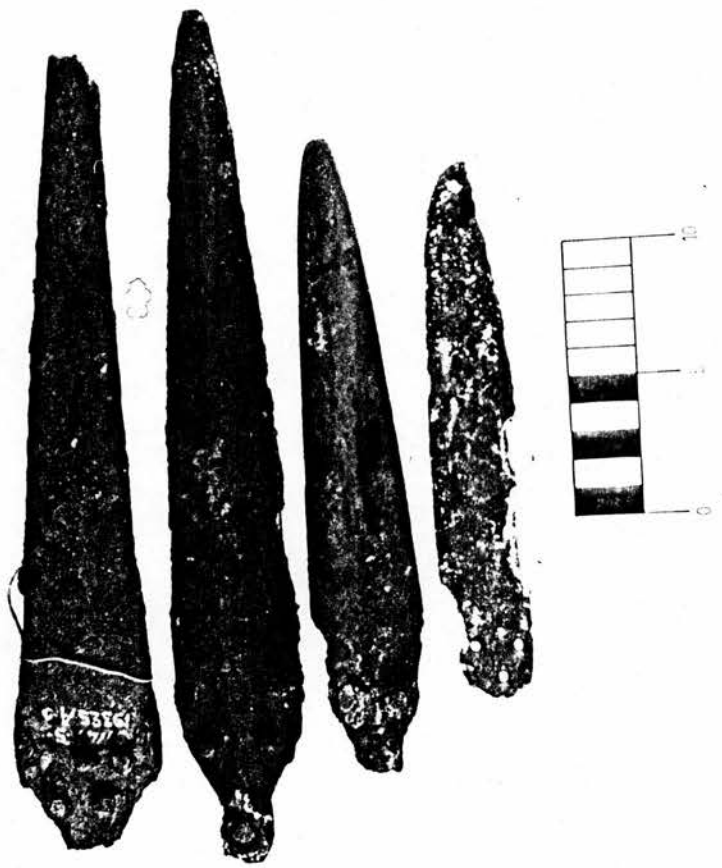


Plate 70



Plate 71

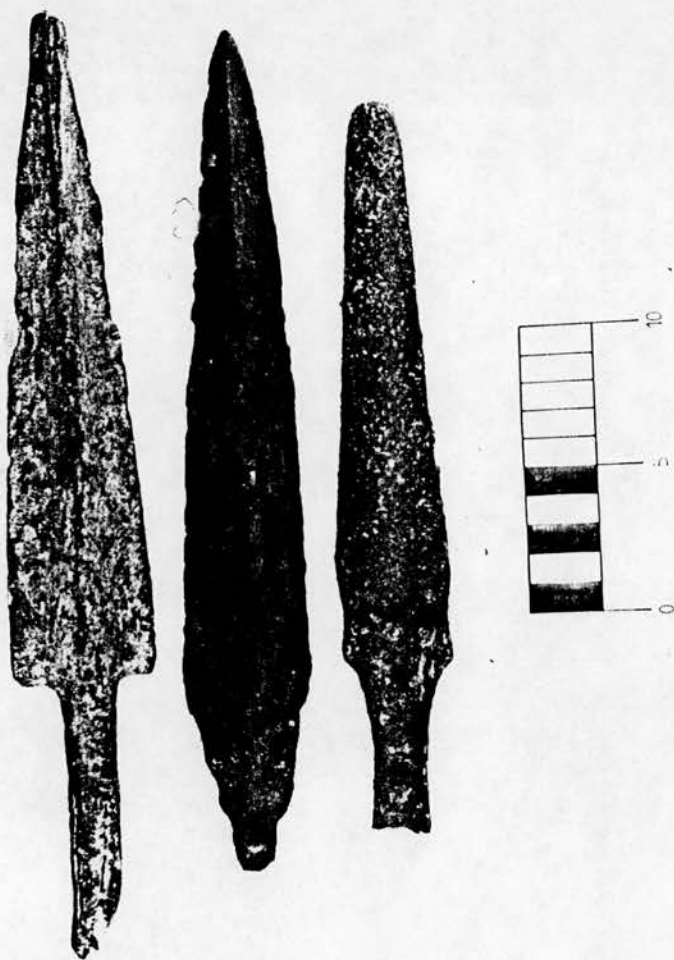


Plate 72

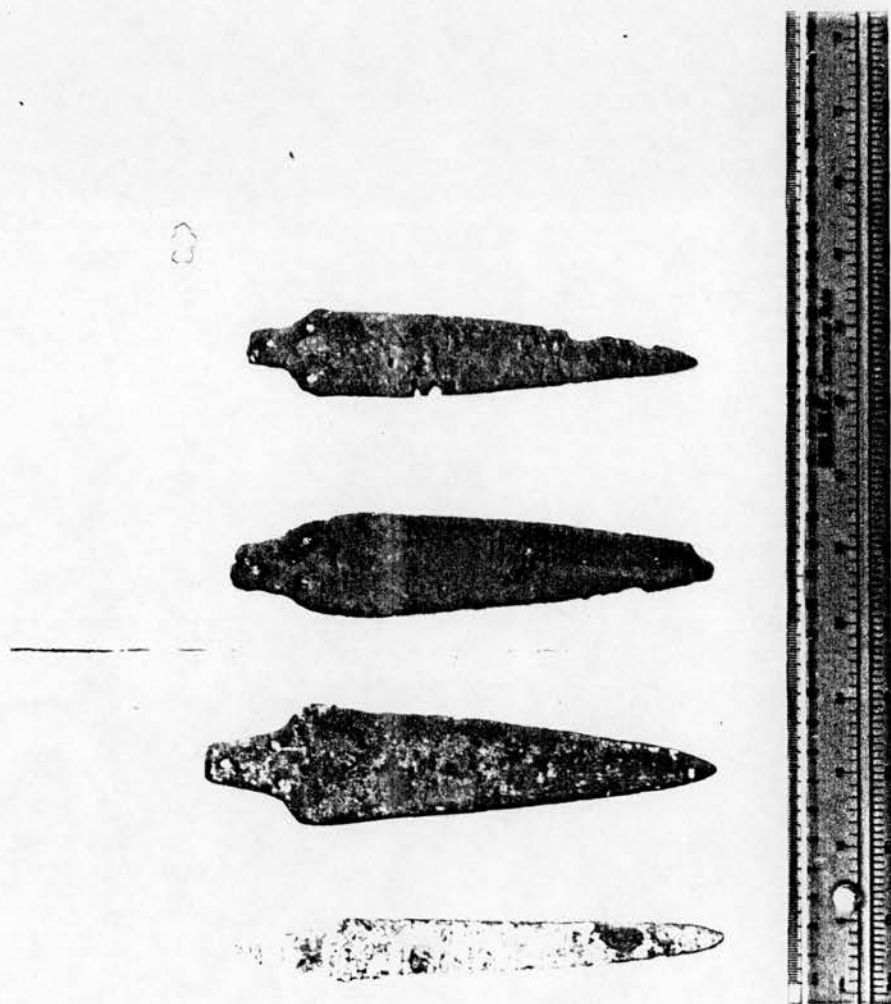


Plate 73

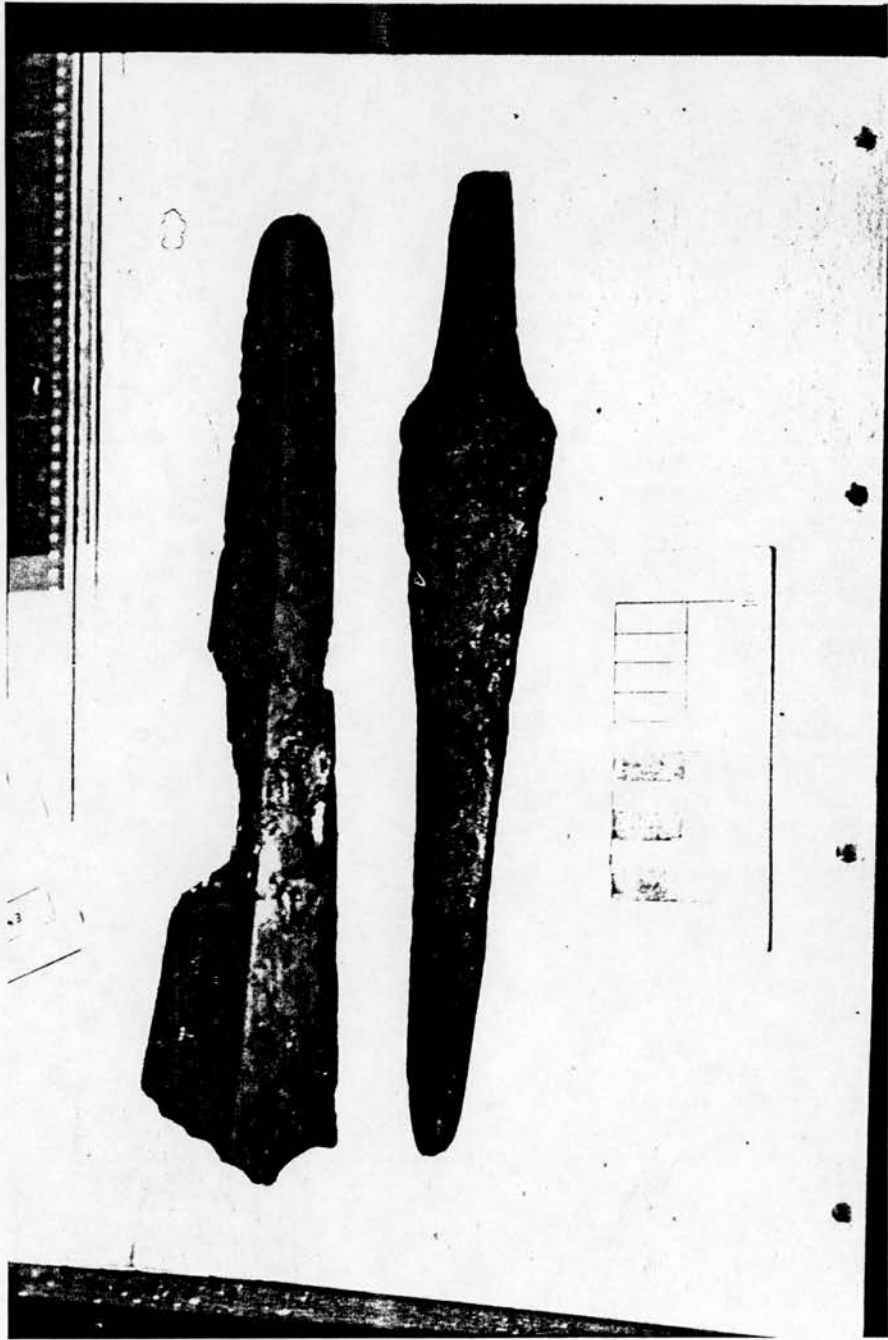


Plate 74

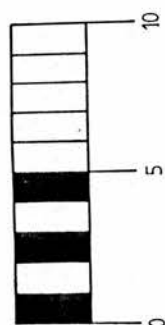
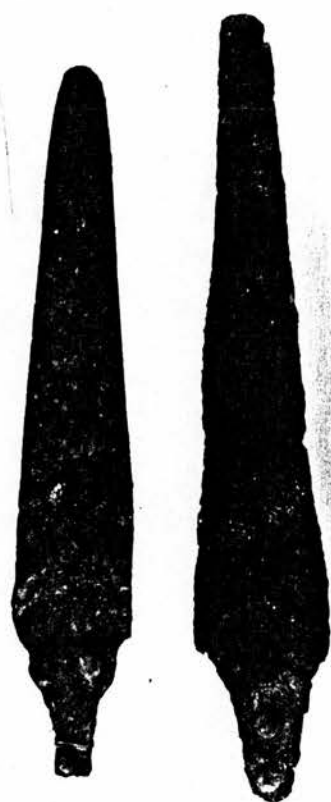


Plate 75

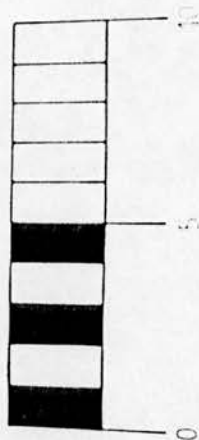


Plate 76

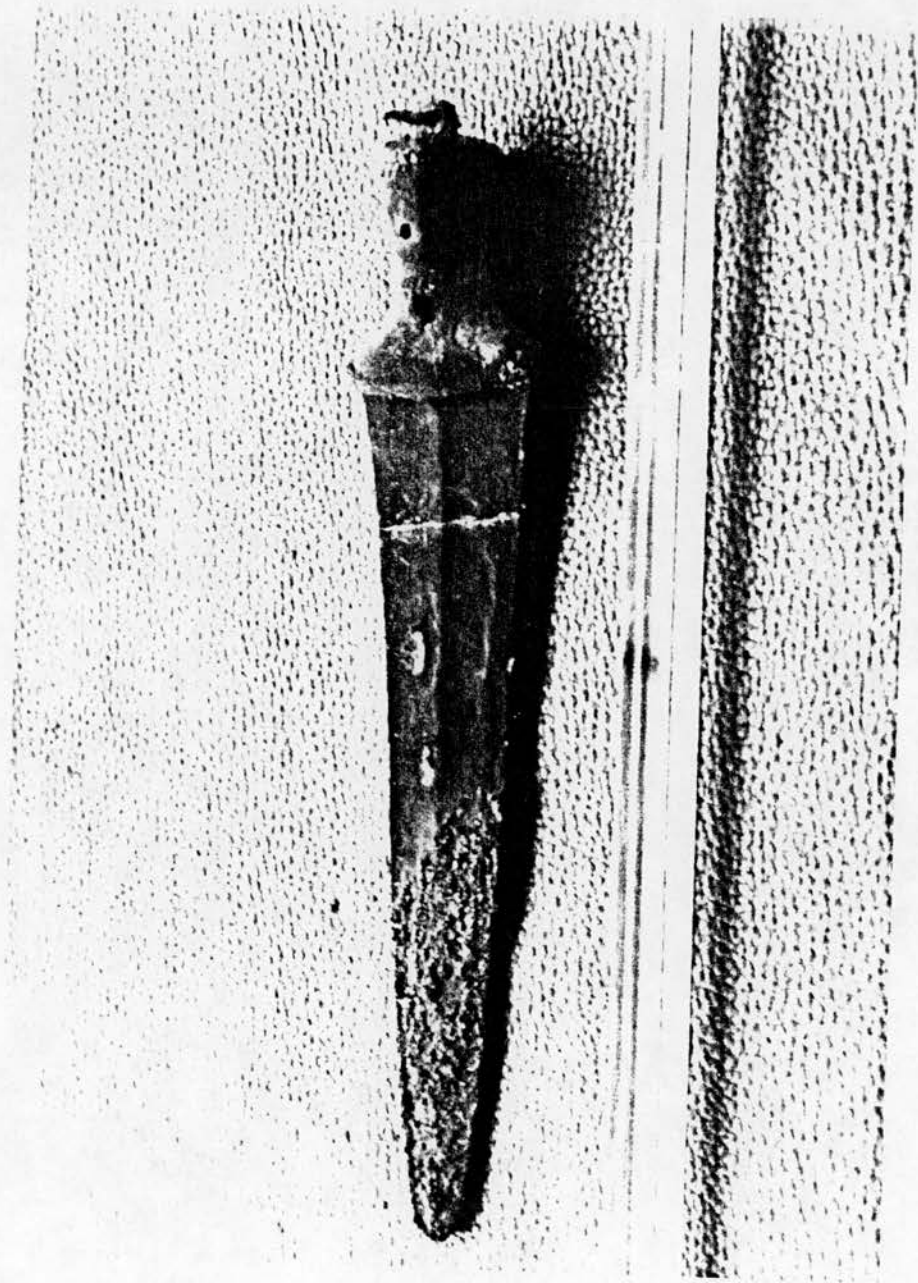


Plate 77



Plate 78



Plate 79