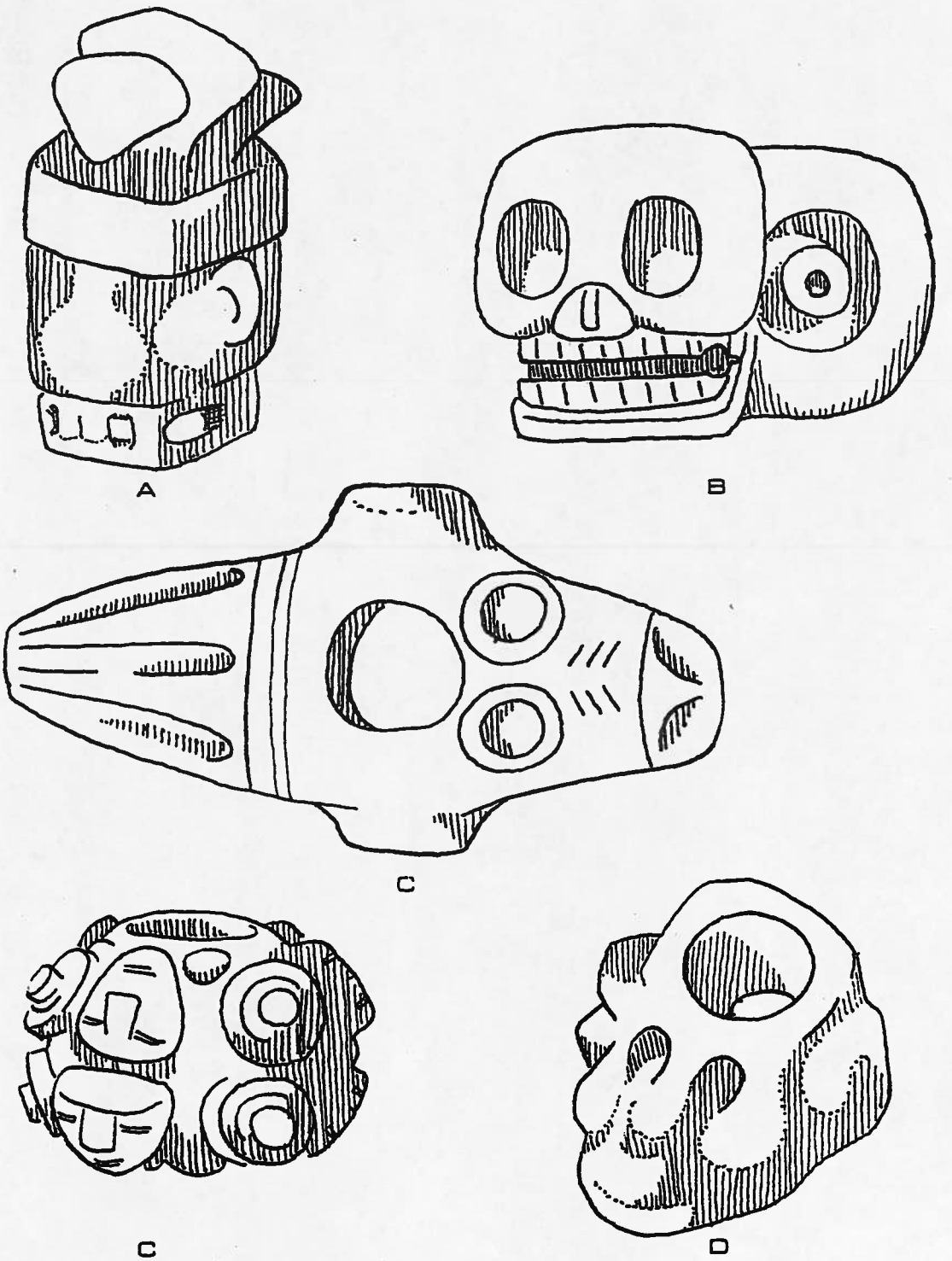


Figure 13: Mace heads: Miscellaneous zoomorphic forms. A. Alter-ego, Las Huacas, jade (Hartman 1907: 55, Pl. XXV, Fig. 3); B. Skull, Nicoya (Ferrero 1977); C. Alligator (Hartman 1907; Lothrop 1926; Strong 1948); D. Carved club head, Cartago (Mason 1945:216, Fig. 19); E. Human head, Cartago (Mason 1945, pl. 51).

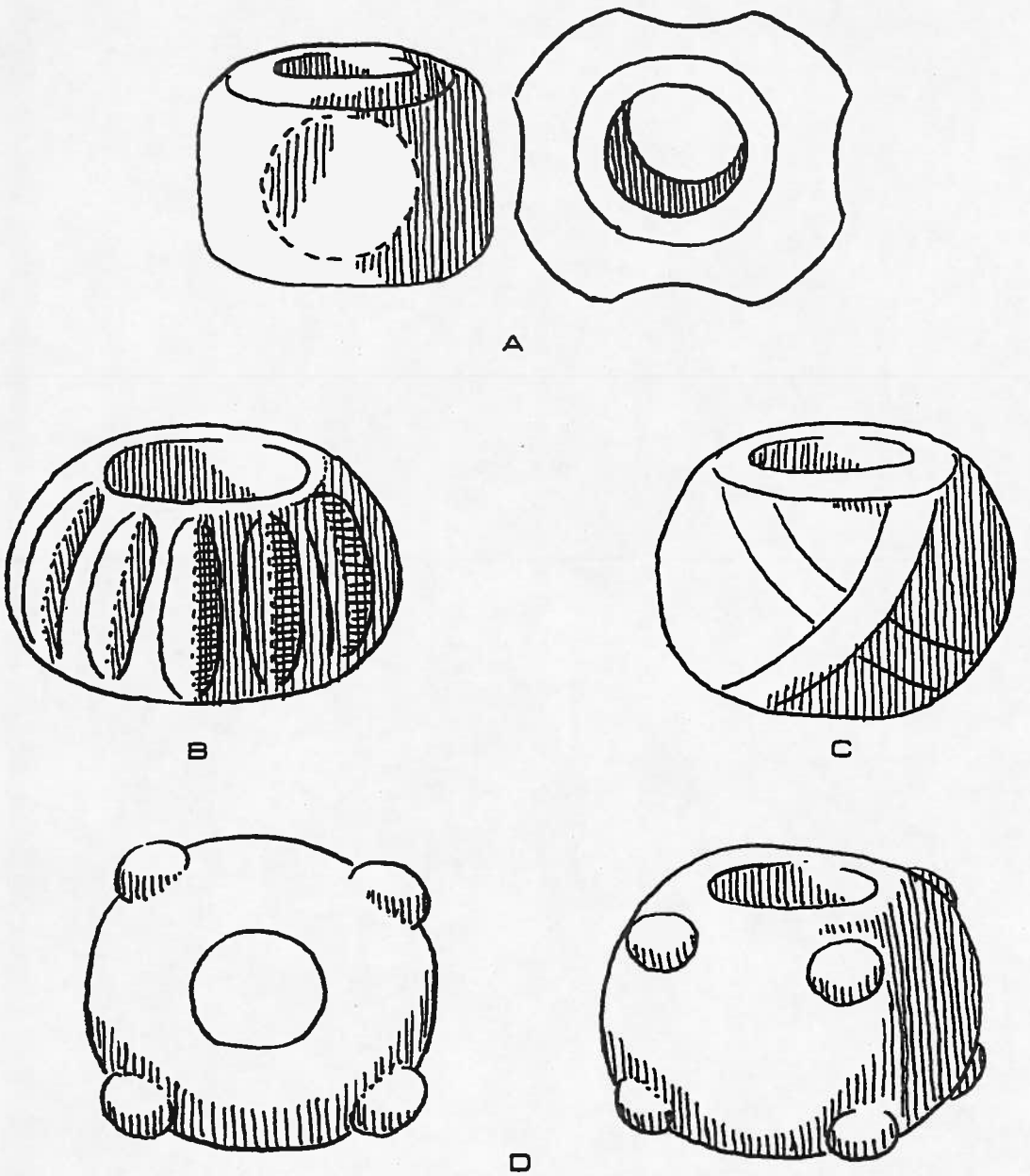


Figure 14: Mace heads: Miscellaneous non-zoomorphic forms in the study collection: A. Faceted, INS 532; B. Avote, Guanacaste, brecchia, INS 6110; C. Banded with criss-cross bands, INS 6162; D. Symmetrically knobbed, Guanacaste, diorite, INS 6099.

Another variation of the knobbed variety is illustrated by Hartman (1907:59, pl. 31, no. 1), which has four coned knobs, each adorned with three encircling incisions (Figure 15a). There is the unusual spoked mace head mentioned by Mason (1945), and the star or cogged mace heads mentioned by Hartman (1907), Mason (1945), and Stone (1966) (Figure 15b, c).

Thirteen miscellaneous types of mace heads in the study collection, coupled with variations noted from the literature, indicate a high degree of variability. Without seeing collections housed at other facilities, e.g., the American museums and the Museo Nacional de Costa Rica, it cannot be estimated the degree to which the miscellaneous mace heads discussed above represent singular variations or whether there are additional groups as yet unexplained.

Artistic Motifs

In order to assess the nature of the effigy forms evidenced on the mace heads, specifically with reference to the varieties of redundancy and visibility, it is necessary to have a broad overview of the iconographic elements which constitute the artistic repertoire in the past. R-redundancy, or repetitiveness, has the purpose of getting a message across with a minimum of error in the presence of interfering noise (Shannon and Weaver 1949). The underlying assumption in analysis of the artistic motifs across the broad spectrum of possible media

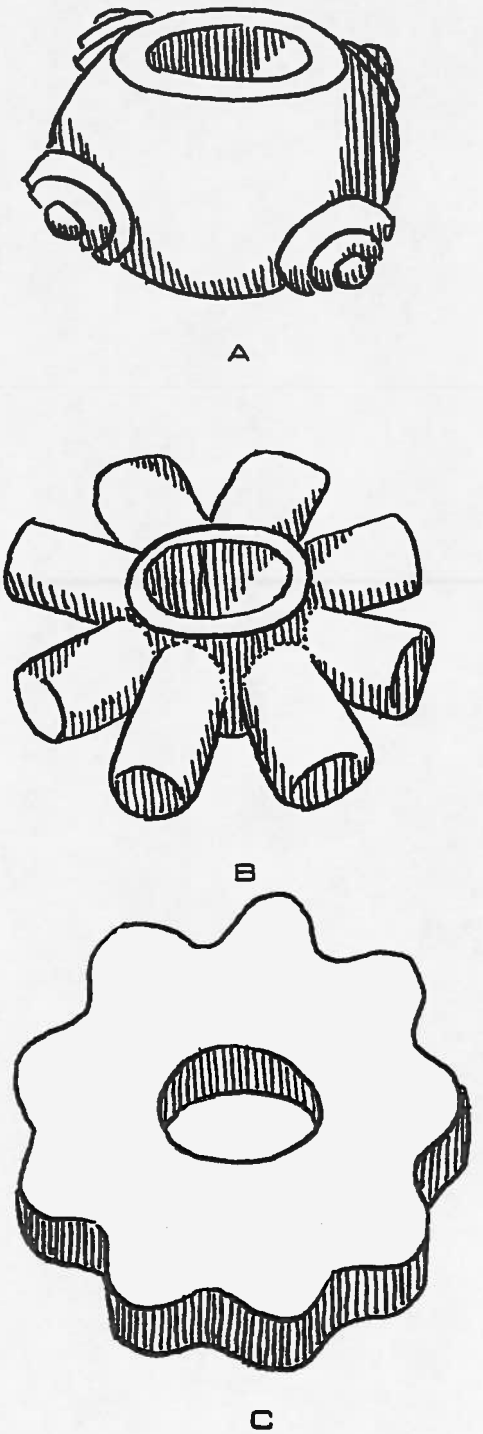


Figure 15: Mace heads: Miscellaneous non-zoomorphic forms from the literature: A. Cone-shaped knobs (Hartman 1907 pl. XXXI-1); B. Spoked, Buenos Aires (Mason 1945:289, fig. 39); C. Star-shaped (cogged) (Hartman 1907; Mason 1945; Stone 1966).

is that important (dominant) symbols will recur in various contexts. Context, in the present sense, refers to the various artistic media, e.g., bone, gold, clay, and other stone. The repitition of symbols in various contexts, given what we know about the apparent sole mortuary context of the mace heads, should increase the visibility, as the redundancy will increase the probability that important symbols will be seen. The purpose is to establish which motifs appearing on the mace heads are expressed in various media.

Motifs seem common to all three archaeological regions - Nicoya, Atlantic watershed, and southern Costa Rica - include the jaguar, alligator, monkey, armadillo, "birds," humans, and frogs. Nicoya and the Atlantic watershed share a total of eleven common elements, Nicoya and the south share nine, and the Atlantic watershed and the south share eight (Table II, Figure 16, Map 4).

It would be easy to resort to grand generalization and say that the greatest variety of artistic motifs is found in poly- and monochrome ceramics of both Nicoya and the Atlantic watershed. Where iconographic elements have been discussed, e.g., Lothrop (1926) and Strong (1948), it is usually with specific reference to ceramics. Nowhere did I locate a reference which discussed motifs in general. Studies may be characterized as special interest researches which produce, almost as an accidental by-product, descriptions of motifs in certain types of media,

Table II: Artistic Motifs of Costa Rica which Occur in Ceramics, Stone, Gold, and Bone.

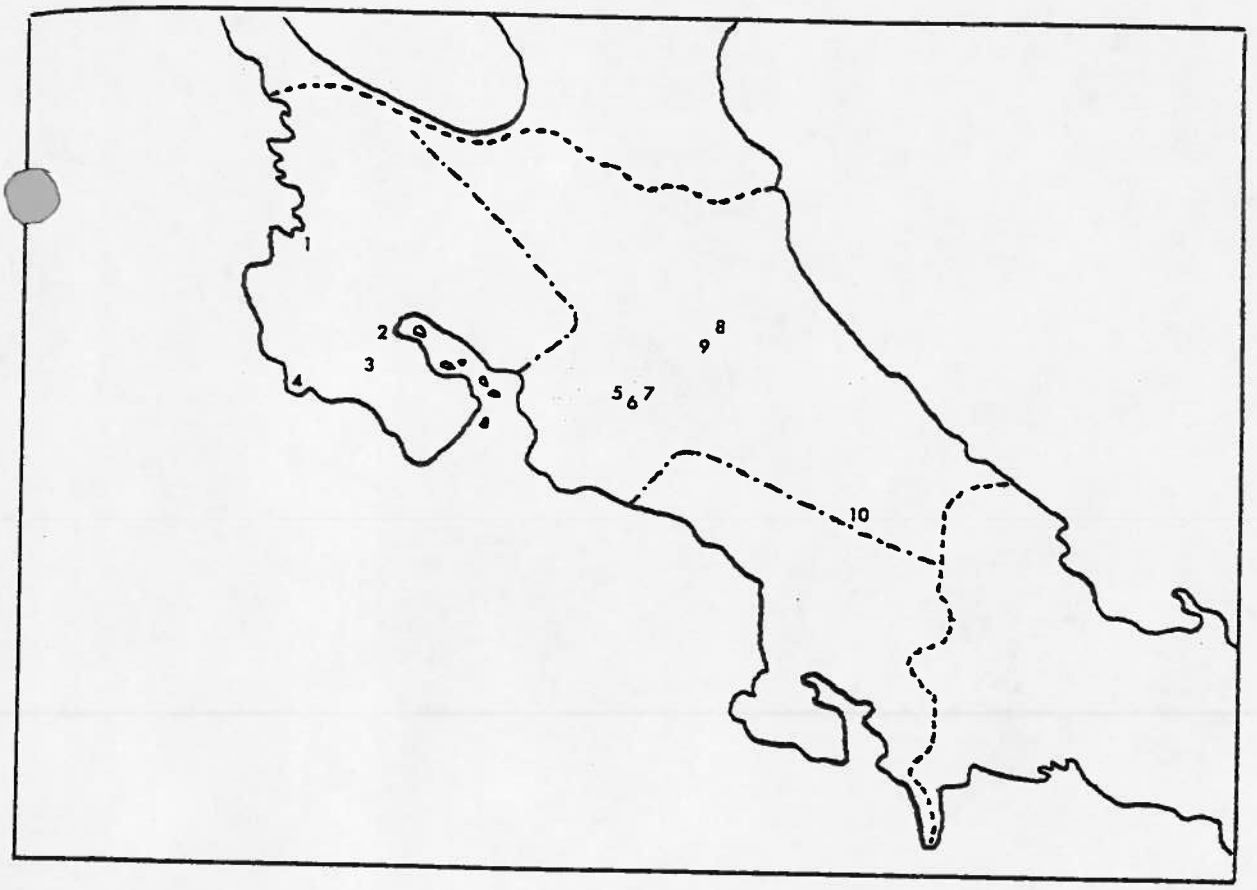
Motif	Nicoya	Atlantic Watershed	Southern Costa Rica
Jaguar	x	x	x
two-headed			x
jaguar god			x
Mexican serpent	x		
Plumed serpent	x	x	
two-headed dragon	x	x	
Bat	x		x
alligator	x	x	x
alligator god	x	x	
monkey	x	x	x
great horned owl	x	x	
fish	x		
armadillo	x	x	x
birds	x	x	x
eagle/eagle god			x
parrot			x
turkey	x		
macaw	x		
Humans	x	x	x
crab	x		
scorpion	x		
snake	x		
turtle	x		
tapir	x		
squash	x		
doughnut	x		
earth monster	x		
frog/toad	x	x	x
lizard	x		
reptiles		x	
geometric	x		x
feather pattern		x	
alligator-bird		x	
dog		x	
bells		x	x
spiders			x
medals			x
patines			x

Adapted from Lothrop 1926, 1963; Mason 1945; Strong 1948; Spiden 1925; Lines 1936; Lange 1971; Coe 1962; Stone 1963; Easby 1968; Balser 1974.

MACE HEAD TYPE	NORTHWESTERN COSTA RICA 1	2	3	4	5	6	7	ATLANTIC WATERSHED 8	9	10	11	12	13	
PLAIN (SENCILLA)	x													SENCILLA
PLAIN (DONA)		x	x		x	x		x	x	x	x			DONA
KNOBBED	x							x	x	x	x			KNOBBED
BANDED	x	x												BANDED
STAR		x	x					x		x		x		STAR
HUMAN HEAD		x	x					x	x	x		x		HUMAN HEAD
OWL	x	x	x		x	x		x	x	x				OWL
MACAW	x	x						x						MACAW
PARROT	x	x												PARROT
PREDATORY BIRD			x											PREDATORY BIRD
BIRD BEAK			x											PREDATORY BIRD
TURKEY	?	x												TURKEY
BAT	x	*						x		x				BAT
FELINE	x				x			x	x					FELINE
COYOTE								x	x					COYOTE
ALLIGATOR		x												ALLIGATOR
FISH				x										FISH
MONSTER	x	*												MONSTER
MONKEY		x			x									MONKEY
SKULL			x											SKULL

MACE HEAD TYPE	NORTHWESTERN COSTA RICA 1	2	3	4	5	6	7	ATLANTIC WATERSHED 8	9	10	11	12	13	
ZOOMORPH	x				x			x	x					ZOOMORPH
ANTHROPOMORPH	x													ANTHROPOMORPH
VARIATIONS	x			x		x	x	x					x	VARIATIONS

Figure 16. Distribution of mace heads by site. 1. Guanacaste Province, 2. Las Huacas, 3. Nicoya, 4. Filadelfia, 5. Buena Vists, 6. Nosara, 7. Buenos Aires, 8. Atlantic watershed, 9. Linea Vieja, 10. Guacimo, 11. Chircot, 12. Cartago, and 13. Mercedes.



Map 4

The spatial distribution of mace head motifs, based on published literature and study collection.

1. Filadelfia: fish (variation)
2. Nicoya: plain, star, human head, owl, skull
3. Las Huacas: alligator, monster, feline, owl, plain, star, human head, banded parrot, macaw.
4. Nosaro: plain, variation, owl
   Buena Vista: feline, zoomorph, owl
   Aguacaliente: "quadruped" head, plain, bird heads
5. Curridabat: star shapes, and unspecified others
6. Cartago: star shapes and unspecified others
7. Tibas: not specified
8. Guacimo: bird beak, knobbed, plain
9. Las Mercedes: variation (rosettes and human faces/masks)
10. Buenos Aires: variation (spoked)

such as Stone's (1963) study of cult traits in the Diquis from which I was able to generate a list. But this is not my purpose here.

In no instances in the literature were mace heads described in conjunction with discussions of iconography. Where mace heads were mentioned (e.g., Lothrop 1926; Mason 1945), categorizations offered by Hartman (1907) were cited and no additional information offered. Thus, I decided to compare the mace head motifs against motifs in other media (Table III).

As no mace heads have heretofore been described as recovered from the Diquis in southern Costa Rica, the comparison is made between Nicoya and the Atlantic watershed. Table II combines artistic motifs and mace heads. Discussion shall center only on those motifs which occur in both lists, and discuss the distribution in various media, such as ceramics, jade, and so forth.

Motifs which occur on mace heads and also occur in jade include the jaguar, bat, alligator, monkey, great horned owl, birds, and humans (in various representations). In Nicoya, motifs which occur on both mace heads and painted pottery include the jaguar, bat, alligator, monkey, fish, and humans; in modeled effigy forms, the jaguar, alligator, monkey, great horned owl, fish, squash, doughnut, and humans, as well as birds. Ceramic motifs in the highlands and Atlantic watershed, unspecified as to whether poly- or monochrome, include the jaguar, alligator,

Table III: Efficy Forms Occurring on Mace Heads Contrasted with Other Media

Mace head	Jade	Painted pottery	Modeled pottery	Stone	Metal
Jaguar	x	x	x	x	
Alligator	x	x	x		x
Bat	x	x	x		
Monkey	x	x	x	x	
Great horned owl	x		x		
Fish		x	x		
Parrot	x			x (rare)	
bird beak	x			x	
macaw		x	x		
turkey		x	x		
predatory bird	x				
human head	x	x	x	x	x
dog				x	
skull			x		
monster					
zoomorph	x	(ceramics)			
anthropomorph	x	(ceramics			

great horned owl, birds, humans, zoomorphs, and anthropomorphs, while in stone, four motifs cited include jaguars, monkeys, birds, and dogs (possibly coyotes), and in metal, alligators, birds, and humans. Turkeys are represented in effigy vessels of the Nicoya area. Two motifs not represented in other media include skulls and monsters from the Nicoya area. In referring to skulls, I am using the examples taken from the literature. They are distinguishable from the human heads of the study collection, which look to have flesh, while the skulls appear to represent the bone only. The motifs which recur in three or more media are the jaguar, alligator, bat, monkey, and humans. In all instances in the Nicoya Peninsula, mace heads were also repeated in modeled and/or effigy pottery.

Measurement of the Mace Heads

It was suggested that standardization of measurements could be detected by computing length-width and height-length ratios. In working with height-length measurements I used total body height and total body length where available. Lacking these, I substituted head height, or body height, in that order, for total height, and body length for total body length. Lange (personal communication) has assured me that the above represent equivalent measurements, which, for the sake of expediency, were recorded only once (see Appendix I).

Comparison of the indices by type revealed no

standardization with respect to individual categories, e.g., owls, macaw, feline, and so forth, nor were ranges discernible by which to differentiate regions. The assumption here was that artisans operating independently of each other might produce mace heads in sizes either slightly bigger and/or smaller than those of the other and thus be discernible in this manner. Plotting the height-length ratios on a graph showed the distribution to be approximately Normal.

In order to assess the degree of standardization in measurements, a sample was drawn from Hartman (1907) and the study collection to distinguish whether ranges of measurements were specific to categories of mace heads. The data suggest that standardization in terms of finished-product size was not an overriding concern in the manufacture of the mace heads. For example, length measurements overlapped among Hartman's two-legged monsters and his parrot mace heads: 9.0 to 12.3 centimeters, and 10.3 to 17.3 centimeters, respectively. Macaw mace heads of the study collection, which are the same as Hartman's parrot forms, ranged from 8.65 centimeters to 21.5 centimeters. Measurements of relative heights likewise produced overlapping results.

Statistical measures were also applied to test standardization in the sizes of the mace heads (Table IV). Means, ranges, variances, and standard deviations were handworked for the sample populations, as were the standard

Table IV: Statistical Measurements of the Mace Heads

Parrot		Height (X)	Length (Y)
Hartman (1907),	Pl. XXVII, 1	6.70 cms.	15.10 cms.
	Pl. XXVIII, 2	6.10	14.70
	Pl. XXVIII, 3-4	8.00	17.30
	Pl. XXVIII, 5	6.70	14.30
	Pl. XXVIII, 6	7.20	17.00
	Pl. XXIX, 5	6.50	10.30
		41.20	88.70
	Mean	6.86	14.78
	Range	1.90	7.00
	Variance	.35	5.27
	Standard deviation	.59	2.29
	Standard error of prediction	2.59	
	Standard error of estimate		3.18
	Correlation coefficient	+0.59	

Two-legged Monster		Height (X)	Length (Y)
Hartman (1907),	Pl. XXIX, 1	8.40 cms.	12.30 cms.
	Pl. XXIX, 2	5.00	9.00
	Pl. XXIX, 3	7.40	11.50
	Pl. XXIX, 4	6.40	10.30
	Pl. XXIX, 6	6.40	10.20
		33.60	53.30
	Mean	6.72	10.66
	Range	3.40	3.30
	Variance	1.30	1.29
	Standard deviation	1.14	1.13
	Standard error of prediction	1.13	
	Standard error of estimate		1.46
	Correlation coefficient	0.00	

Guacamaya (Study Collection)	Height (X)	Length (Y)
INS 483	5.10 cms.	8.65 cms.
INS 488	8.00	14.30
INS 516	9.30	15.50
INS 517	7.85	18.50
INS 518	6.50	21.50

Guacamaya (Study Collection) con't	Height (X)	Length (Y)
INS 519	8.20	17.10
INS 2574	8.50	17.00
INS 3024	3.70	13.80
INS 6060	6.20	14.25
INS 6061	5.10	15.30
INS 6062	10.00	19.00
INS 6080	4.85	10.30
INS 6089	4.25	9.20
INS 6415	4.15	14.30
	91.70	208.70
Mean	6.55	14.90
Range	6.30	12.85
Variation	4.01	12.44
Standard deviation	2.00	3.52
Standard error of prediction	3.89	
Standard error of estimate		4.20
Correlation coefficient	+0.37	

Human heads (Study Collection)	Height (X)	Length (Y)
INS 521	8.50 cms.	8.35 cms.
INS 526	5.55	6.45
INS 529	4.00	5.95
INS 541	6.25	9.80
INS 6097	4.45	6.65
INS 6410	6.55	9.50
INS 520	5.30	6.95
INS 6090	5.60	7.70
INS 6091	4.70	7.65
INS 6092	4.10	6.35
INS 6094	5.70	7.25
INS 6096	5.00	7.30
INS 6098	5.10	7.40
INS 6124	9.95	11.30
INS 6130	7.60	5.80
INS 6133	8.30	6.10
INS 143	5.70	6.20
INS 478	4.40	9.40
INS 492	5.50	8.00
INS 6412	6.30	8.25
INS 6418	4.90	7.10
INS 509	6.70	7.50
INS 525	5.65	7.30
	133.75	167.30
Mean	5.90	7.27
Range	5.95	5.50
Variance	2.13	1.89

Human heads (Study Collection) con't

Standard deviation	1.45	1.37
Standard error of prediction	1.74	
Standard error of estimate		1.82
Correlation coefficient	+0.56	

Owls (Study Collection)	/ Height (X)	Length (Y)
INS 6030	6.85 cms.	9.70 cms.
INS 6031	5.90	8.75
INS 6032	7.00	8.20
INS 6033	6.65	7.90
INS 6034	6.30	7.70
INS 6035	6.50	7.85
INS 6037	4.70	7.45
INS 6040a	3.25	5.30
INS 6040b	6.30	6.90
INS 6041	4.30	6.70
INS 6042	4.45	6.45
INS 6059	6.00	9.00
INS 6125	9.75	11.00
INS 481	7.00	8.10
INS 482	4.60	7.80
INS 515	6.65	7.70
INS 522	5.65	6.90
INS 524	7.00	8.80
INS 527	5.40	7.00
INS 540	6.35	9.60
INS 542	5.00	7.00
INS 553	4.10	6.50
INS 6036	6.90	7.35
INS 145	5.65	7.90
INS 501	5.20	8.10
INS 6077	4.00	6.15
INS 6418	4.90	7.10
INS 500	5.30	7.75
INS 6045	5.30	7.40
INS 6046	4.95	7.95
INS 6047	5.35	8.90
INS 6048	4.20	8.60
INS 6050	4.45	6.90
INS 6049	5.40	7.70
INS 6082	5.80	9.80
INS 6161	4.60	6.70
	279.90	210.70
Mean	5.60	7.77
Range	6.50	5.70
Variance	6.09	6.02

Standard deviation	2.46	2.45
Standard error of prediction	1.20	
Standard error of estimate		1.23
Correlation coefficient	+0.68	

Knobbed (Study Collection)	Height (X)	Length (Y)
INS 504	5.10 cms.	8.65 cms.
INS 531	4.40	6.00
INS 3316	3.75	7.35
INS 3653	5.25	8.65
INS 6106	3.70	8.00
INS 6109	3.95	6.60
INS 6112	5.50	7.10
INS 6114	4.70	6.75
INS 6120	5.10	8.45
INS 6121	6.00	7.95
	45.85	75.50
Mean	4.78	7.55
Range	2.30	2.65
Variance	.58	.77
Standard deviation	.76	.87
Standard error of prediction	.93	
Standard error of estimate		1.04
Correlation coefficient	+0.83	

Plain (Study Collection)	Height (X)	Length (Y)
INS 552	4.05 cms.	8.10 cms.
INS 6108	4.10	7.35
INS 6155	4.00	6.45
INS 6156	4.20	6.90
INS 503	5.90	7.50
INS 502	4.80	7.00
INS 506	3.10	5.30
INS 507	4.75	5.90
INS 6111	4.15	6.15
INS 6116	4.15	6.45
MNCR 3.321	3.70	5.50
MNCR 8948	4.40	5.65
	51.30	78.25
Mean	4.27	6.52
Range	2.80	2.80
Variance	.40	.69

Standard deviation	.63	.83
Standard error of prediction	.76	
Standard error of estimate		.70
Correlation coefficient	+0.49	

Banded (Study Collection)	Height (X)	Length (Y)
INS 498	5.35	7.50
INS 512	4.75	6.60
INS 598	4.70	6.25
INS 6100	4.70	6.85
INS 6101	5.00	7.15
INS 6102	4.95	6.50
INS 6103	4.95	6.65
INS 6104	5.35	7.65
INS 6105	5.40	7.75
INS 6115	3.70	5.25
INS 6417	5.50	8.30
MNCR 8947	4.60	6.90
MNCR 9088	3.50	5.80
MNCR 18665	6.00	7.50
	68.45	96.65
Mean	4.88	6.90
Range	2.50	3.05
Variance	.41	.62
Standard deviation	.64	.78
Standard error of prediction	.97	
Standard error of estimate		1.04
Correlation coefficient	+0.90	

error of prediction, the standard error of estimate, and the correlation coefficient (rho). Means, ranges, variance, and standard deviations describe central tendencies of the sample population. If the means, using height (x) and length (y) as coordinates, and ranges, indicated by straight lines extending along the cartesian axes, are plotted, the resulting overlap confirms observations made above, that is, there are not measurements which are specific to any one kind of mace head.

The standard error of prediction and the standard error of estimate are concerned with the ability of x, height, to predict y, length. It is not known which is the independent variable, that is, whether height determines length, or vice versa. The resulting score only tells the magnitude of the error between the actual score on the dependent variable and the predicted score on the independent variable. For this reason, the error of estimate is computed, so that we have, in effect, the standard deviation of the errors of prediction. Essentially it tests the linearity of the relationship. A large standard error warns that the relationship is only weakly linear. All of the standard errors of prediction and estimate were over 1.00 in value, indicating a weak relationship between height and length of the mace heads.

The correlation coefficient measures the strength of relationship, here the ability to predict height from length, and vice versa. Large absolute values indicate a

close relationship between two variables, while smaller values indicate that x and y are weakly related. Values range from -1.oo, indicating a perfect negative relationship, to +1.oo, indicating a perfect positive relationship. All correlation coefficients in the sample varied between zero and +1.00. The values obtained, summarized and enclosed in parentheses here, are: Hartman's two-legged monsters (0), study collection macaws (0.37), study collections plain (0.49), study collection human heads (0.56), Hartman's parrots (0.59), study collection owls (0.68), study collection knobbed (0.83), and study collection banded (0.90). The relatively high scores obtained for the owls, knobbed, and banded mace heads are not surprising as these forms tend to be round in profile, and would be expected to have similar height and length measurements as a consequence of being more round. Plain mace heads of the study collection scored lower than anticipated, and it is suspected that the predominance of <u>dona</u> forms, more elliptical in profile, account for the low score. Macaw forms of the study collection scored low (0.37) in contrast to Hartman's parrot mace heads (0.59), which are equivalent categories. This variation is probably due to the inclusion of macaws from many localities in the case of the study collection, and the parrots, all derived from Las Huacas, in Hartman's case. Even so, the score obtained fro the Las Huacas parrot mace heads exhibits less relationship than would be expected, given the

assumption that all mace heads of this type were produced by a single individual.

Material of Manufacture

The mace heads are manufactured from materials ranging from porous rock to hard granite, chacedony, serpentine, diorite, and jadeite (Ferrero 1977:281). In order to ascertain the preference in stone regionally, should such exist, the type of stone was classified per region and the number of objects manufactured from each type of stone tabulated. Results are presented in Table V. Among the study collection, chalcedony predominates, followed by andesite. Specific to the northwestern area are jade, conglomerate, granite, diorite, green slate, and green talc, while tuff, tomsonite, quartz, and black slate appear exclusively from Linea Vieja collections. Regional preference in stone may be reflected by diorite in the Nicoya area, where eleven objects were collected, and by tuff in the Atlantic watershed, where sixteen objects were recorded. Mason (1945), it should be remembered, mentioned a seemingly similar preference for the Cartago mace heads.

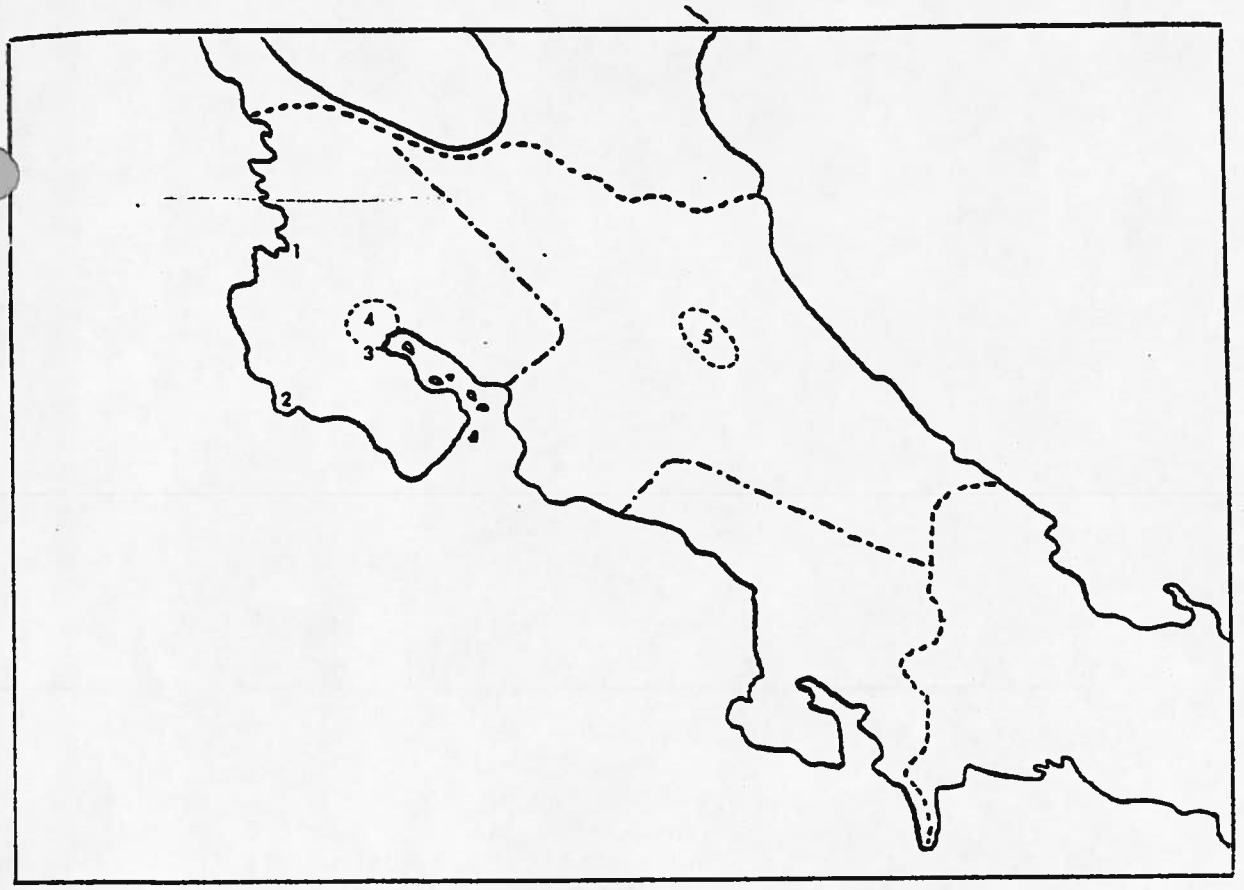
Spatial Distribution of the Mace Heads

The spatial distribution, here based upon provenience given on cataloguing sheets, is shown on Map 5. Seventy-one of eighty-five mace heads from northwestern Costa Rica were simply recorded as derived from Guanacaste Province. In addition, four were provenienced from Nicoya,

Table V: Raw Materials Used in Mace Head Manufacture. Distribution is Made by Known Provenience as well as Unknown Provenience Where This Information Was Available.

Material	Northwest	Atlantic W.	Unknown	Total
andesite	9	5		14
basalt	4	1		5
black slate		2		2
brecchia	2			2
calcite	1	1*	1	3
chalcedony	12	9	1	22
conglomerate	4			4
diorite	11			11
feldspar	1	1		2
granite	4			4
green slate	1*			1
green talc	1*			1
jade	2			2
jade, calcinate	2			2
jadeite	1*			1
jasper	7	1	1	9
lava	2	5		7
quartz		1		1
serpentine	1	1		2
tomsonite		1		1
tuff		16		16

*published sources



Map 5

Distribution of the study collection.

Northwestern Costa Rica
1. Filadelfia
2. Nosara
3. Nicoya
4. Guanacaste Province
   Buena Vista (not shown)

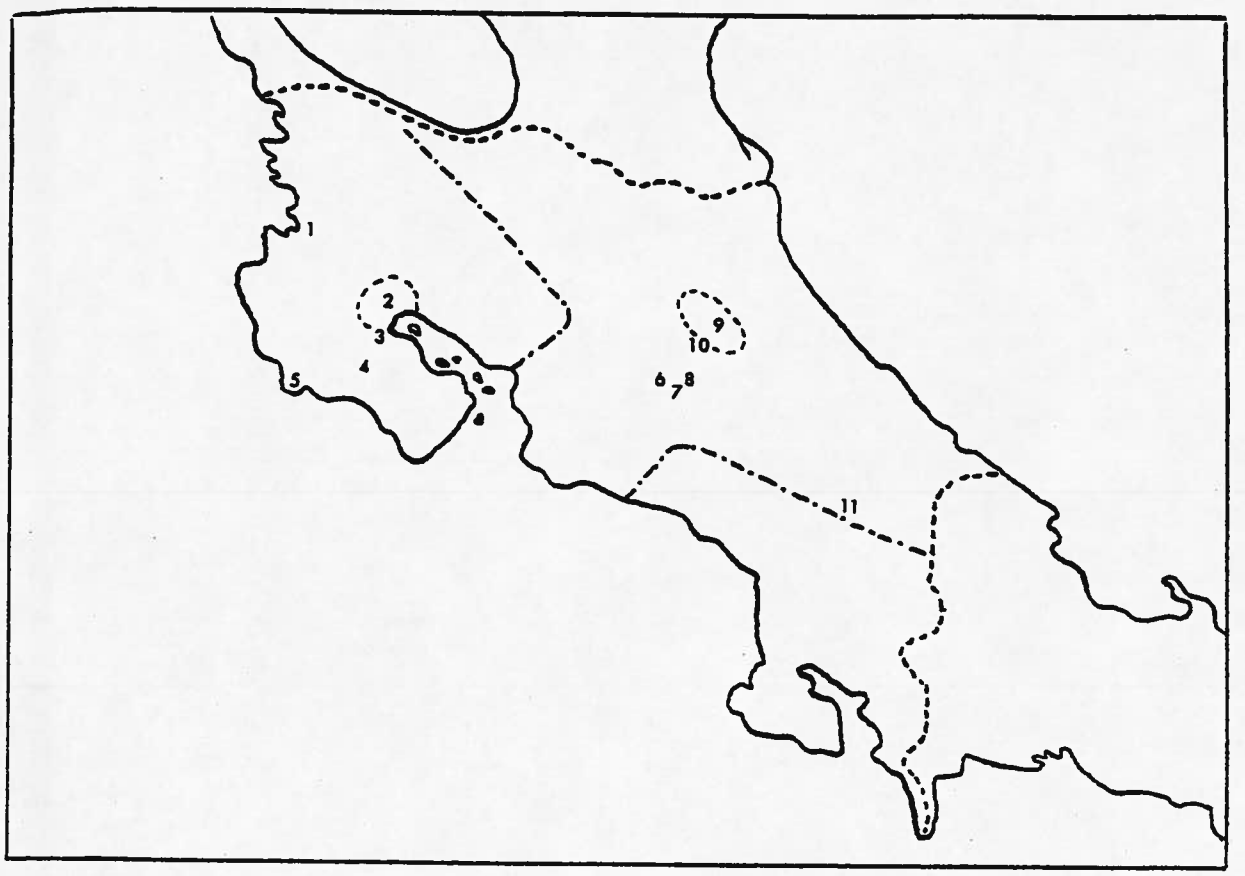
Atlantic Watershed
5. Linea Vieja Region

five from Nosara, one from Filadelfia, and four from Buena Vista. The fifty specimens from the Atlantic watershed, in contrast, are all assigned to the Linea Vieja region. Finally, fifty-eight specimens which lacked provenience data were not used in determinations.

Results

In order to assess the distribution of the mace heads, data from the literature on sites having mace heads were combined with sites derived from the cataloguing sheets of the study collection (Map 6), and plotted against sites which lack mace heads (Map 7). The sites fall within the A.D. 300 to 500 time span suggested by Lange (1980). Fourteen sites have mace heads, and fifteen do not. Where the archaeological context is known, that is, Tibas, Guacimo, and to a lesser degree, Las Huacas and Nosara, data indeed suggest a mortuary context for the mace heads. Nine of the sites lacking mace heads are habitation and other-use sites, but five of the sites, Zapandi, Hacienda Jericho, Bolson cemetery, Hacienda Mojica, Guayabo de Bagaces, and Carrizal, either have burials or are actual cemeteries.

The distribution pattern of the mace heads suggests that social signaling within a geographic region, e.g., the middle Tempisque River Valley of northwestern Costa Rica, involves the transmission of qualitative (yes-no) information (e.g., Rappoport 1971:64-65). It can be relatively safely assumed that habitation sites do not



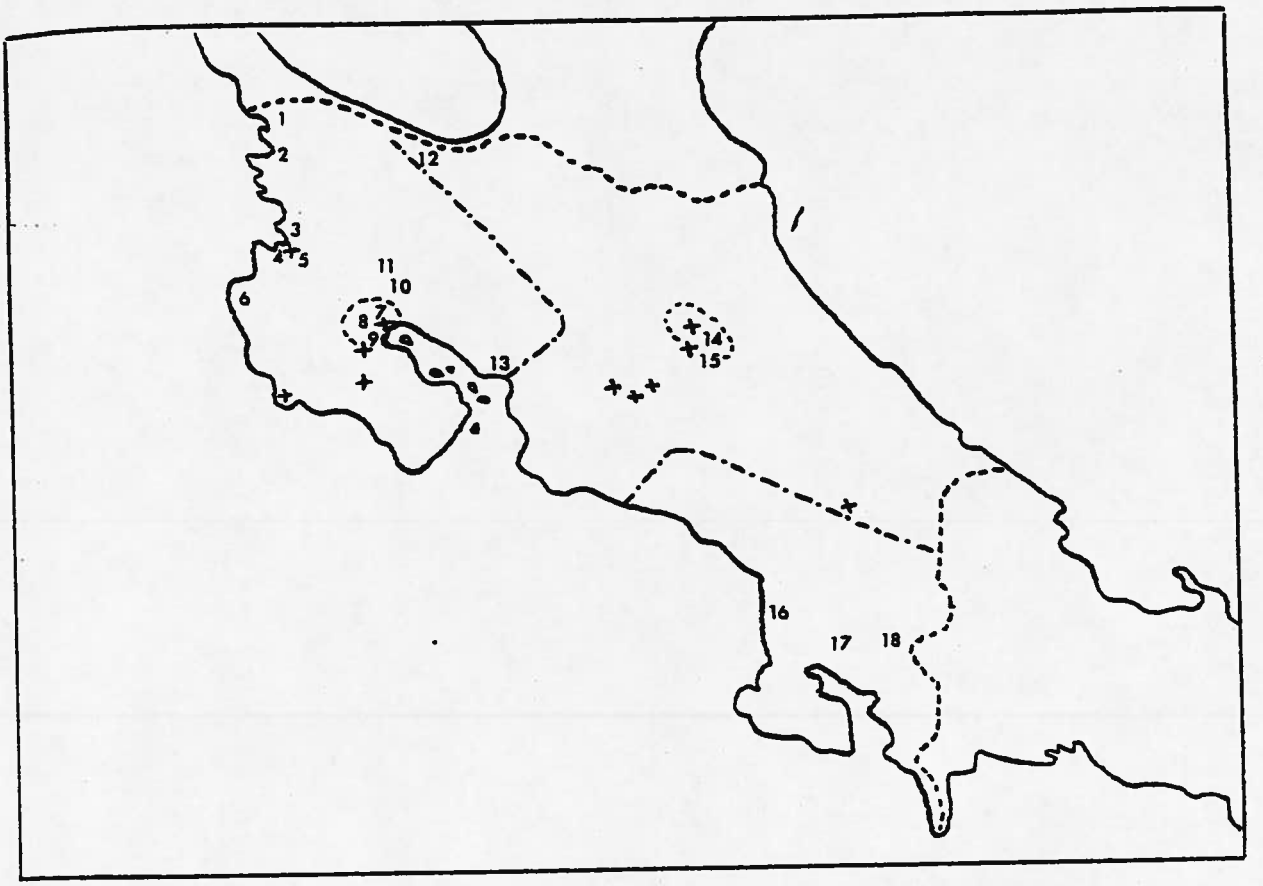
Map 6

Composite map showing the distribution of mace heads in the study collection and mace heads noted in the published literature.

Northwestern Costa Rica
1. Filadelfia
2. Guanacaste Province
3. Nicoya
4. Las Huacas
5. Nosara
   Buena Vista
   Aguacaliente

Atlantic Watershed and Highlands
6. Curridabat
7. Cartago
8. Tibas
9. Guacimo
10. Las Mercedes

Diquis Region
11. Buenos Aires



Map 7

Comparative distribution between sites having mace heads (indicated by +) and sites lacking mace heads (numbered and identified).

Northwestern Costa Rica

1. Sapoa River Valley
2. Chahuite Escondido
3. Papagayo
4. Zapandi
5. Vidor
6. Tamarindo Area
7. Middle Tempisque River
8. Bolson Cemetery
9. Hacienda Mojica
10. Guayabo de Bagaces
11. Hacienda Jericho
12. Montercristo
13. Carrizal

Atlantic Watershed and Highlands

14. Finca Patricia
15. Severo Ledesma

Diquis Region

16. Farm 4
17. Jalaca
18. Aguas Buenas

have mace heads and can thus be excluded; in the middle Tempisque River Valley this would exclude the habitation sites of La Guinea, La Bocana, and Ortega. Also excluded, since specific site information is lacking, is Guanacaste Province. What remains are the cemeteries of Nicoya, Bolson, and Hacienda Mojica, of which Nicoya is the only site having mace heads as part of the grave goods. Qualitative information exchange is expressed by the presence/absence of mace heads as grave goods.

A similar qualitative signal pattern appears to be repeated at the cluster of sites in northwestern Costa Rica, which includes Zapandi, Papagayo, Vidor, and Filadelfia, and, in the Atlantic watershed, at the cluster of sites including Finca Patricia, Severo Ledesma, Guacimo, and Los Mercedes. In both instances, sites with mace heads are interspersed with sites without mace heads. The distribution suggests that social signaling involved the transmission of qualitative information.

At yet a higher level, remaining within the same region, information exchange among those persons having mace heads as stylistic signaling devices (mace heads) might be expected to signal social boundaries as demonstrated in variations in depictions of certain subjects, or in maintaining a preference for one form over another. The variety in depictions of the human head within the northwest illustrates my first point. Effigies were divided into two groups principally based on the

treatment of the ears and noses. Other features, e.g., eyes and mouth as well as additional embellishment were free to vary, yet ears and noses remain consistent. Skulls may represent yet another variation of/the human head effigy which served to distinguish one social group from another. The data are not such that statements can be made with great confidence. Similarly, owl depictions in the Atlantic watershed, specifically the great horned owl, are distinguishable by beak treatment and the presence or absence of facial discs.

The notion of preference for certain forms over others is derived from Mason (1945) and Stone and Balser (1965). In describing collections from Cartago and Curridabat, Mason suggested there was a predominance of circular and star-shaped mace heads at those sites. This is an interesting phenomenon, since, going under the assumption that different social groups would resort to variations in depicting certain subjects, the preference for star and circular shapes at these two sites might imply close interconnections of these groups. The data are scant from Mason, yet Stone's and Balser's (1965) descriptions of objects recovered at Guacimo suggest a similar pattern of preference.

Assuming the artifacts recovered by Stone and Balser (1965) represent the activities of a single human group from the site of Guacimo, the data suggest a preference for the bird beak motif, which was repeated on both the

flying panels of metates and maceheads. Grave i contained twelve stone club heads, two knobbed, three plain, and the remaining seven adorned with a bird having a long beak; Grave 2 yielded two club heads, one plain, and the other having a bird's head that holds a human head in its beak. This latter has been called bird beak with trophy head (referring to the trophy head carried in the beak).

A third level of information exchange may be said to occur between regions, that is, between the northwest and the Atlantic watershed. This is evidenced in the variation existing in forms common to both areas. Human heads represent the most obvious contrast, i.e., those of the northwest generally are more realistic relative to those of the conventionalized, almost cubistic, heads of the Atlantic watershed. The situation is similar to that defined for the second level of information exchange described above. Similarly, regional exclusivity of forms is not unlike a predominance of certain forms over others. Two examples which may be cited include the coyote from the Atlantic watershed and the macaw from the northwest. Birds, generally, exhibit greater variety and are characteristic of the northwest - parrots, predatory birds, the trukey, etc. - while the Atlantic watershed uses the bird beak motif exclusively.

CHAPTER IV: SUMMARY AND CONCLUSIONS

This thesis has analyzed attributes of Costa Rican mace heads in order to establish their symbolic significance. This was accomplished by establishing a context for the mace heads, and by comparing symbolic forms appearing on the mace heads with those occurring in other artistic media. Combining this information with spatial distribution for the mace heads allowed definition of the role of the mace head as a channel of symbolic information exchange.

Summary of the Results

There is a distinct class of artifacts, called mace heads, which are sculpted in zoomorphic and non-zoomorphic character; zoomorphic forms predominate. While it cannot be categorically stated that mace heads are only found in mortuary context, at sites where they do occur they are known only from burials. Within the mortuary context mace heads seem to occur as part of a complex which generally includes metates, mace heads, and jades. The three artifact classes do not always seem to occur together (e.g., at Las Huacas) and suggests some subsets within the mortuary complex defined by Lange (1980).

Although there are ethnohistorical hints that mace

heads may have continued in use up to the time of the Spanish Conquest, the vast majority that have been found date to the first five or six centuries of the Christian era. The problem of chronological control is due to scarce and/or not up-to-date chronometric data (particularly in the Atlantic watershed and southern Costa Rica), or to dating that pertains to the entire site, rather than to contextual data.

The northwest and Atlantic watershed share in common the following forms: plain (sencilla/dona), knobbed, human heads, felines, bats, birds, and owls. These are further distinguishable by region on the basis of stylistic attributes. As such, the data conform to statements made by Leach (1976), Binford (1972), Wilmsen (1973), and Sackett (1977), that is, variations in decoration of artifacts serve to signal social distance to other social groups.

If plain and knobbed forms are compared as a group relative to sculpted effigy forms, it becomes possible to begin discussing symbolic communication. The plain variety, which have been labelled sencilla and dona, indicate no significant differences in visual inspections, comparison of measurements, and so forth to warrant the definition of two categories. Similarly, knobbed specimens, labelled dos filas picos and granada mano, exhibit little difference other than that which might be reasonably attributable to the nature of the raw materials

(andesite versus lava), technology of production, or individual creativity (e.g., Binford 1962; Sackett 1977; Wilmsen 1973). These two groups may be thought of as functional objects, not involved in social signaling, and thus the need to make them unique by means of certain decoration is not felt (e.g., Sackett 1977).

Measurement and considerations of raw materials provided little information by which to distinguish objects. Plotting height-length ratios showed the distribution to be approximately Normal for all regions. Similarly, ranges in height and length showed overlap, thus discounting the notion that each type of object had a specific range of measurements. Correlation coefficients were high only for those mace heads that were round in profile, and thus did not produce unexpected results.

While there appears to be a regional preference for certain raw materials, e.g., diorite in the northwest and tuff in the Atlantic watershed, this might also be attributable to availability of raw materials and exchange networks which involved the importation of exotic raw materials. Further work along these lines would be fruitful. If exotic raw materials were imported into Costa Rica and traded interregionally, would the archaeological manifestation be in the form of raw materials or preforms? Among preforms in the study collection, where material of manufacture is known, Guanacaste mace heads were made from conglomerate and brecchia, and, in

the Linea Vieja region, from chalcedony, jasper, and calcite.

Interpretation

Despite the lack of chronological control, spatial data, albeit sometimes rather general, allowed the definition of three levels of signaling, or information exchange, based upon the presence or absence of the mace heads as the critical determining variable. At its simplest, signaling involves the transmission of qualitative, yes-no, information. This is evidenced in the pattern where localities in a given area, such as the middle Tempisque River Valley, may or may not have mace heads. An intermediate level of signaling involves localities within the same area as suggested above, where variations in the portrayal of certain subjects or the preference of certain forms over others symbols to other groups using/having mace heads a difference in social group affiliation. At the third level, signaling between regions involves distinct stylistic differences in portrayal of the same subjects, such as human heads, and/or regionally specific motifs, e.g., the coyote in the Atlantic watershed and the macaw forms in the northwest.

The above fits within expectations suggested by Wobst (1977:329), that is, there will be standardization among all members of a group where a social group might encounter a given stylistic message, as well as where the message enters into contexts of boundary maintenance (so that it

will be maintained in contrast to similar signals of surrounding social groups). As was suggested, some categories formulated exhibited a greater degree of "standardization" than others, e.g., macaw versus parrot forms. It was suggested that variability within categories represented degrees of freedom tolerated by the social group. It was also noted that there are characteristics which maintain particular groups distinct from others.

Turner (1968) has stated that important (dominant) symbols will recur in various contexts. The repetitiveness, or redundancy, operates to eliminate ambiguity latent in the symbolic condensation of cultural information. The Guacimo burials excavated by Stone and Balser (1965) provided insight into the repetition of symbols in various contexts. The predominant motif, the bird-beak, was repeated on the mace heads and the flying panels of fifty-eight grinding stones. It is a motif also found in jade amulets (Easby 1968).

The motifs repeated in various contexts would, according to Turner, represent the major symbols. If such is the case, the major elements of the symbolic code include the jaguar, alligator, and human figures; which occurred in jade, painted decoration, modeled (effigy) form, and gold. Secondary symbols, which appeared in two or fewer additional media, would include the bat, great horned owl, coyote (dog?), and turkey. Other forms noted in Chapter III, e.g., the Various bird

forms, and the numerous miscellaneous forms, are considered to represent configurational variety in the symbolic system. When combined with considerations of the relatively samll sizes of the mace heads, the variety indicates that, while groups may have desired to maintain a distinctiveness from other groups, symboling parties were quite familiar with one another.

The state of information exchange as it is known exhibits a high level of entropy, that is, there is a high degree of randomness in the symbols, and therefore unpredictability. This is indicated by the variety of mace heads (which, when miscellaneous forms are taken into account, becomes considerable), as well as by the variability within individual categories. The data suggest that quite a bit of variability was allowed within categories as long as they remained distinguishable from other groups, e.g., parrots. Parrot forms generally resemble the macaw forms, yet lack the protruding tails; the similarity is largely in manner of representation of the head. Yet parrot forms may have tufts of feathers portrayed or a comb-like feature atop their heads. In one instance the beak was portrayed realistically, in others it is portrayed stylistically. Parrots lack the facial disc, tufts, and eye depictions of the owls, and do not have heads which protrude on thin necks sporting a beak which curves down and back on itself like the pradatory birds. Standardization, or uniformity of depiction of single

subjects (e.g., parrots, macaws, and so forth), seems not to rest on the identical replication of these forms, but on the maintenance of certain broad characteristics; thus allowing for individual freedom of expression while maintaining a distinctiveness from other forms.

The mortuary complex, as a whole, is still not well-understood, but mace heads do seem to have played a role. The criteria of definition must be clarified, else all cemeteries must be classified as having the mortuary complex. La Fortuna, for example, had in addition to other objects metates and jades, but lacked mace heads (Stone and Balser 1965). Artifacts recovered from Las Huacas (Hartman 1907) suggest that mace heads, metates, and jades do not always occur together, though all three were recorded there. By extension, are we also to classify as having the mortuary complex those sites which meet only one criterion as specified above? If the exclusion of mace heads as a minimal criterion is accepted, the implication is that, while the mace head may have been involved in social signaling, it did not constitute the major signal. The mace head, in other words, functioned as an ancillary symbol for signifying social identities. Comparative studies which involve the inventory of grave goods for all cemeteries would serve the dual purposes of establishing the spatial and temporal extent for sites having metates and jades, sites with all three objects, and sites having one of the objects, which should, in

turn, provide information which would allow the assessment of the criticalness of the mace head for signaling social boundaries. The analysis presented here has implicitly assumed the mace head to be the critical variable, i.e., sites with or without mace heads have been contrasted to one another to gauge the role of the mace head as a channel of communication.

Suggestions for Future Research

Further study of mace heads housed at various museums in the United States, at the Museo Nacional and in private collections in Costa Rica would clarify categories formulated here as well as provide information on the variability in subject matter. It was noted that there are thirteen miscellaneous mace heads in the study collection alone that could not be incorporated into categories formulated. It was also noted that additional froms were gleaned from the literature. Without knowing the full extent of the variability present, it is difficult to assess the level of entropy, or randomness. In other words, it is suggested that knowledge of the other mace head collections may lead to a reformulation of categories which may, in turn, result in an assessment of lower entropy than indicated at present.

Work in the field should include regional sampling of a heirarchy of sites with testing of burial grounds. Research, of course, would have to be undertaken in an area where mace heads might be expected to occur. Results

of the sampling procedures should provide evidence which would support or falsify a mortuary context for the mace heads. Testing of the burial grounds would: (1) provide further *in situ* contextual data for the mace heads; (2) allow further classification of the metate-mace head-jade mortuary complex; and (3) provide further evidence concerning the patterning of qualitative information exchange, as suggested for the middle Tempisque River Valley, the Zapandi-Vidor-Papagayo-Filidelfia sites, and the Linea Vieja region.