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88. THE DENTITION OF INDIAN CRANIA OF THE EARLY AND LATE
 ARCHAEOLOGICAL HORIZONS IN CENTRAL CALIFORNIA

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ABSTRACT

Dentitions of cranial specimens from two series of archaeological sites in the lower Sacramento Valley, differing in time by more than 1500 years, were subjected to measurement and observation in an attempt to discover distinct features or changes which could be attributed to different cultural practices pertaining to food between the two series. The oldest group consists of fifty skulls derived from sites of the Early Horizon (2500 B.C.-1500 B.C.); the more recent series comes from sites of the Late Horizon (300 A.D.-1700 A.D.).

Results of this investigation show that while certain morphological changes have been effected in the crania through time, specific dentitional features or changes have not occurred in such magnitude as to suggest, without further examination, that different dietary or culinary customs obtained between the early and late series.

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Introduction

This report will examine the nature of the dentition of crania from certain Early Horizon and Late Horizon archaeological sites in Central California.* Particular attention is directed to the discernment of differences in the two series selected for analysis with respect to the following observations:

1. Degree of wear of the teeth.
2. Frequency of teeth lost, ante-mortem.
3. Incidence of alveolo-dental disease.

That such an examination might suggest possible cultural factors responsible for modification of the dentition is the ultimate purpose of this study.

The two series treated here are selected from the skeletal collection of the Lowie Museum of Anthropology at the University of California. In both series--Early Horizon and Late Horizon--only adult male and female specimens have been included. Although the calvaria, palate, and mandible of a given specimen must be fairly complete to qualify as a unit of the series, the observer has attempted to provide as representative a sample of the macro-population as might be offered by a random selection of the specimens.

Data

The data of this report are summarized in Tables 1-4. The following comments are intended as explanatory additions to the tables.

Table 1: Frequency of the Sample by Site and Sex

The total sample consists of one hundred specimens of which half are from Early Horizon sites and half from Late Horizon sites. The earlier series is selected from four sites and the later series from seven sites. There is a slightly higher proportion of males than females in both series.

Table 2: Distribution by Age-Groups

Since the only criterion exercised in the selection of the cranial specimens was the state of preservation, a random distribution according to age-groups has resulted. The number of crania available for study from any given site was in most instances low, and selection on the basis of age-

*The sites from which Early Horizon specimens examined herein were recovered are thought to date from about 2500 B.C. to 1500 B.C., while the Late Horizon sites date from about 300 A.D. to 1700 A.D.

groups would have been impossible. For both the Early and Late Horizon series there is an equal number of specimens in the two age-groups of 21-35 years and 36-55 years. There are more "Old Adults" (56-75 years) in the present Early Horizon series than in the series for the Late Horizon. Neither in the sample population examined by the present writer nor in the larger population examined by Newman (1957) could any "Very Old Adults" (76-x years) be identified.

Table 3: Observations

A. Frequency of teeth lost ante-mortem. Over 50 per cent of the Early Horizon specimens show tooth loss during life. Of these 50 per cent, one-half of the specimens reveal severe loss, i.e., more than 5 teeth were missing ante-mortem. Contrasted to this is a lower incidence of tooth loss in the Late Horizon specimens (30 per cent) and a lower frequency of the total number of teeth missing, i.e., only 8 per cent of the specimens are lacking five teeth.¹

B. Degree of tooth wear. The Early Horizon series has a higher incidence of dental wear than the series from the Late Horizon. This factor is influenced only in part by the greater number of "Old Adults" in the former series. But if the degree of dental wear is examined according to the younger age-groups, it is still true that the specimens from the Early Horizon show the greater degree of wear. Examining the five categories of dental wear itemized in the table, it is observed that the Early Horizon series falls consistently one category below that of the Late Horizon series for slight, medium, and pronounced degree of wear. The degree of wear for each series is compared with their respective age-groups in Table 4B.

C. Frequency of caries. Caries are most prevalent in the Late Horizon series. For both series there is no significant difference in frequency between "Young Adults" and "Middle-Age Adults." As would be expected, the frequency of caries is high for "Old Adults" in the Early series where such specimens are available for study. In both series, the number of caries in given specimens does not, with a single exception, exceed four.

D. Frequency of alveolar abscess. The Early Horizon specimens have a higher frequency of alveolar abscess. However, in the Late Horizon crania, their presence more commonly exceeds four in number. As

1. Although Newman's series (*ibid.*) duplicates in part those specimens included in this report, his statement that there is a tendency for greater ante-mortem tooth loss in Late Horizon material is not supported by the evidence discussed in this paper. For all other observations, comparison of Newman's data with those of the author shows close agreement.

TABLE 1
Frequency of the Sample by Site and Sex

<u>Early</u>				
Site	Male	Female	Total	Per cent
SJo- 56*	5	5	10	20
SJo- 68	9	6	15	30
SJo-142	9	4	13	26
Sac-107	6	6	12	24
Total	29	21	50	

<u>Late</u>				
Sac- 56	7	3	10	20
Sac- 60	7	3	10	20
Sac- 85	1	1	2	4
Sac- 86	2	1	3	6
Sac-107	3	7	10	10
CCo-138	5	5	10	20
Col- 1	3	2	5	10
Total	28	22	50	

* SJo-, Sac-, CCo-, and Col- are symbols used by the University of California Archaeological Survey to denote archaeological sites located in San Joaquin, Sacramento, Contra Costa, and Colusa Counties, respectively. Locations of these sites may be found in Newman (ibid., Map 1).

TABLE 2

Distribution by Age-Groups

Age (years)	Early		Late	
	No. of crania	Percent of sample	No. of crania	Percent of sample
Young Adult (21-35)	21	42	24	48
Mid. Age Adult (36-55)	21	42	25	50
Old Adult (56-75)	6	12	1	2
Very Old Adult (76-x)	--	--	--	--
Undetermined	2	4	--	--

TABLE 3

Observations

	Early		Late	
	No. of crania	Per cent of sample	No. of crania	Per cent of sample
A. Frequency of tooth loss ante-mortem				
None	24	48	35	70
1-4	13	26	11	22
5-8	8	16	4	8
9-12	4	8	--	--
13-16	1	2	--	--
17-20	--	--	--	--
21-x	--	--	--	--
B. Degree of tooth wear				
None	--	--	--	--
Slight	4	8	11	22
Medium	11	22	23	46
Pronounced	23	46	14	28
Very pronounced	12	24	2	4
C. Frequency of caries				
None	35	70	28	56
1-4	15	30	21	42
5-8	--	--	1	2
8-16	--	--	--	--
17-x	--	--	--	--
D. Frequency of alveolar abscess				
None	21	42	26	52
1-3	21	42	12	24
4-x	7	14	12	24
E. Size of alveolar abscess				
Small	7	24.14	7	29.17
Medium	13	44.83	8	33.33
Large	9	31.03	9	37.50

TABLE 4

A. Distribution by Age-Groups and Tooth Loss, Caries, Abscess (per cent)

Age (years)	Tooth loss		Caries		Abscess	
	Early	Late	Early	Late	Early	Late
Young Adult (21-35)	23.81	12.50	23.81	50.00	38.10	33.33
Mid. Age Ad. (36-55)	66.66	44.00	25.71	40.00	61.90	60.00
Old Adult (56-75)	83.33	--	66.66	--	100.00	--

B. Distribution by Age-Groups and Four Degrees of Wear (per cent)

Age (years)	Slight		Medium		Pronounced		Very pronounced	
	Early	Late	Early	Late	Early	Late	Early	Late
Young Adult (21-35)	19.05	41.67	47.61	37.50	23.81	16.66	9.53	4.17
Mid. Age Ad. (36-55)	--	4.00	4.76	52.00	61.43	40.00	23.81	4.00
Old Adult (56-75)	--	100.00*	--	100.00*	50.00	100.00*	50.00	100.00*

C. Distribution by Age-Groups and Three Degrees of Abscess Size (per cent)

Age (years)	Small		Medium		Large	
	Early	Late	Early	Late	Early	Late
Young Adult (21-35)	37.50	62.50	50.00	25.00	12.50	12.50
Mid. Age Ad. (36-55)	7.69	13.33	53.85	40.00	38.46	46.67
Old Adult (56-75)	33.33	--	16.67	--	50.00	--

* Single cranium: no observations made.

with the frequency of caries, a comparison of this feature in both series is not statistically significant. But whereas caries appear evenly distributed in both of the younger age-groups, alveolar abscess is most prevalent among the "Middle Age Adults" of both Early and Late Horizon series. (See Table 4A.)

E. Size of alveolar abscess. When present, the alveolar abscess is more frequently of medium or large size in the Early Horizon series. There seems to be no correlation of age-group with size of the abscess. (See Table 4C.)

Discussion

Although the calculations set forth above are limited to the dentition, further observation of the alveolar, palatal, and mandibular morphology reveals some possibly significant background data pertinent to dentitional phenomena. For example, it has been noted that from Early to Late Horizon times the gross size of the mandible decreased. This change was accompanied by a lowering of the palate height and a decrease in gonial eversion. The mandibular torus became smaller and the alveolar tooth-bearing portions of upper and lower jaws became more prognathous. The most obvious result of these morphological alterations was the greater crowding of the dentition in the Late Horizon series. A less positive result may be the higher frequency of dental pathology which Newman notes for this period in his discussion of arthritic and hyperostotic diseases.

A microscopic examination of the dentitions of ten crania from each series was undertaken by Dr. Albert A. Dahlberg in conjunction with the author's research. Photographs were taken macroscopically and microscopically of each specimen's dentition and of casts made from the teeth. An analysis of the wear patterns of these dentitions is now under way. A preliminary opinion is that there is some suggestion of difference in the quality and length of "scratches" between the Early Horizon and Late Horizon series.

Comparisons were made between several sites of a single horizon in order to estimate any perceptible differences in patterns of wear, teeth lost ante-mortem, and disease frequencies. It was tentatively assumed that specimens from site Sac-6 would show a lower incidence of dental wear than specimens from site CCo-138, since the former group is known to have used wooden mortars which might be supposed to cause less stone grit to be introduced into the food as a result of grinding seeds. Although the series from both sites are small, this preliminary examination does not show a lower

degree of dental wear for the Indians of site Sac-6. Indeed they show a 40 per cent increase in pronounced dental wear over the Indians from site CCo-138. Apart from other, possibly complex factors, this would indicate either that the utensils for food preparation are not a really significant factor in the cause of dental wear, or that a result opposite to that expected would occur when wooden instead of stone mortars were used.

Conclusion

The ultimate aim of this study of one hundred California Indian crania from Early and Late Horizon sites is to suggest to the archaeologist cultural factors that may be related to changes in the dentition, particularly with respect to the wear of the teeth. Toward this end, the author has described the morphological changes and incidence of disease for the dentitions of a random sample. The nature of the diet and culinary utensils are most frequently invoked as the causes for dental modifications. Investigation of the problem makes the author wary of suggesting a direct relationship between any particular cultural or dietary practice and a characteristic dental manifestation of the practice. The "occupational marks" attributed to teeth are less reliable than supposed. Therefore, that which has been attempted in this study is a preliminary outline of the characteristics of teeth from Early and Late Horizon sites. Continuation of the present research will aim at showing the relationship of dental conditions to cultural practices.

In summary, some forms of dental pathology, such as frequency of caries, large size of abscessed areas, and other factors leading to tooth loss, are most prevalent in Early Horizon Indians. However, abscesses were more frequent in Late Horizon populations, although smaller in size. A general shift in cranial morphology was effected by Late Horizon times, and the crowding of teeth in smaller mandibles and lower palates may be related to this increase in dental pathology. Tooth wear is greater in Early Horizon times than in Late, and this feature appears to be fairly consistent between series from sites of the same horizon. In Late Horizon times frequencies in this regard differ from site to site, but in a manner contrary to expectations if known cultural associations are correlated. Differences between the total Early and Late Horizon series are observable also on microscopic examination, but the significance of the differences is as yet unknown.

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