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**The Aboriginal Population**  
**of the Great Basin**

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THE ABORIGINAL POPULATION OF THE GREAT BASIN

K. A. R. Kennedy

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## Preface

Robert F. Heizer

The present report by Kenneth Kennedy\* was written in 1954 in partial satisfaction for the requirements of the M.A. degree in Anthropology. The study was carried out under the chief direction of Professor T. D. McCown.

My interest in Kennedy's work derives from the fact that I have been engaged intermittently for the past twenty years with the ethnography and archaeology of the state of Nevada. Since July, 1957 I have been engaged in a special research project which aims at outlining the broad culture history of the western Great Basin. In the process of collecting evidence for such a study, it has become quite apparent that the physical anthropology of the Great Basin area badly needed some review of data and synthesis. Kennedy's thesis represents such a collection of data, and even though these data be scattered and of uneven reliability and completeness, taken as a whole they represent a necessary and useful first step in any attempt to correlate somatic and cultural data within the Great Basin area.

P. E. Goddard (The Cultural and Somatic Correlations of Uto-Aztekan. Amer. Anthropol. 22:244-47, 1920) and G. Neumann (On the Physical Types of the Shoshonean-Speaking Tribes. Proc. Indiana Acad. Sci. 55:26-28, 1946) have discussed the possibility of a Shoshonean physical and linguistic correlation, but lacking reliable somatic data such inquiries cannot get us very far. D. Shimkin (Shoshone-Comanche Origins and Migrations. Proc. Fifth Pacific Sci. Congr. 4:17-25, 1939) and S. M. Lamb (Linguistic Prehistory in the Great Basin. Internat. Journ. of Amer. Ling. 24:95-100, 1958) have provided us with proposals concerning the place and time of differentiation of the several Shoshonean languages. These reconstructions might be verified or disproved by archaeological and somatic data, but until we have managed to accumulate a comprehensive body of facts we simply cannot make any progress in determining the course of culture history in the Great Basin. And it is primarily toward the immediate aim of the collection and publication of a corpus of data that the present work is offered. The native peoples living in the Great Basin area could still be

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profitably studied by physical anthropologists, and it is to be hoped that this work will not be postponed until it is literally too late. More prehistoric skeletal material collected by proper methods is needed, and the archaeologists' duty is to effect this before the amateurs have destroyed the record to the point of insignificance.

It is already clear from Kennedy's data that there prevailed in the prehistoric past (almost all of the materials discussed by him fall well within the last three to four thousand years) regional variation in physical types. Our problem now is to correlate diachronically these local differences with the local types of culture and language.

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## Introduction

This report will examine the nature of the physical morphology of that group of North American aborigines living in the confines of the Great Basin. The investigation makes use of the published anthropometric data pertaining to this area and of an analysis made by the author on a cranial series from Nevada.

Six series have been compiled for adult male and female crania, three of the series consisting of non-living material and three consisting of living subjects. The data on the skeletal crania come from the published works of Hrdlicka (1927, pp. 92, 94-99) and Cressman (1942, pp. 141-143) and from the investigations by the author of the Great Basin crania now in the Museum of Anthropology at the University of California at Berkeley. The individual measurements of cranial and post-cranial material of the author's series are on record in the University of California Archaeological Survey at Berkeley.

To the author's series are added nine crania concerning which some data have been published: Hansen (1934, pp. 431-433), Hrdlicka (1907, p. 104), Putnam (1880, pp. 221-222), Smith (1950, pp. 65-68), Virchow (1892, Tafel 16). In this series, hereafter referred to as the Kennedy series, 85.11% of the specimens come from the western and central parts of the Great Basin; 70.37% of the material in the Hrdlicka series is from the eastern area. The Cressman series is derived from a single general region in southeastern Oregon that includes Blitzen Valley and Catlow Cave Number I.

With regard to the three series of living material, the largest is that compiled by Walter S. Shaw and T. L. Bolton, who worked under the sponsorship of Franz Boas (1899, pp. 751-758). Their data come from eastern Utah and western Colorado, an area on the periphery of the Great Basin. Edward W. Gifford (1926, pp. 281-282, 290-292) collected the anthropometric descriptions of the Northern Paiute, Washo, and Eastern Mono of eastern California. Boas (1895a, p. 264, Tables 3-5) worked south of this area among the Mission Indians. Michelson (1930, p. 856) recorded the cephalic index of male Shoshone on the Wind River Reservation in southwestern Wyoming.

Post-cranial skeletal measurements for the inhabitants of the Great Basin are not recorded here, except for the investigations of the author on his own series. Such records do not appear in the literature for the area. The bulk of the author's material is fragmentary and in a very poor state of preservation. Shaw and Bolton, Gifford, and Boas supply data on stature for their series cited above. Included with their series of measurements is another sample compiled by Hrdlicka (1909, pp. 408-409) for the Indians of southeastern Utah. This region is peripheral to the Great Basin, but the inclusion of the data from here is judged important by the author for a clearer understanding of the more western Shoshoneans. The author reconstructed the stature of his small post-cranial collection on the basis of the long bones.

Children and hybrids have been excluded from each series, except from that of Shaw and Bolton. The youngest age for males and females is eighteen and sixteen respectively. Any specimen for which at least one accurate measurement can be made is included. Unless a particular measurement can be made upon five or more individuals, it is not analyzed statistically. The morphological observations are confined to individuals in the author's series. A breakdown of the total sample according to area and series is represented in Map 1 with its accompanying key.

The proportions of the total sample are as follows: 50 male and 33 female non-living crania, 183 male and 50 female living crania, 6 male and 1 female post-cranial skeletal parts, plus some 17 fragments of undetermined sex. In addition, 188 males and 70 females were measured for stature, but of these 55 males and 26 females are the same individuals as those included in the cranial series. This compilation of anthropometric data is believed by the author to be the largest and most complete to date for the Indians of the Great Basin.

#### Geography and Cultural History of the Great Basin

Included in the Intermontane Area of western North America are the Colorado Plateau in eastern and southern Utah, the Columbia Plateau in Idaho, and the Great Basin, which covers some 200,000 square miles between the Wasatch Mountains and the ranges of the Cascade and Sierra Nevada. This latter region is about 800 miles long from north to south and about 500 miles broad at its widest part in the north. The boundaries defined

by Steward (1940, pp. 446-47) are represented in Map 1. The region attains a general elevation of 5,000 feet in the east and drops down toward the west with one spot at 276 feet below sea level in southeastern California. The terrain reveals contrasts of mountain ranges, aggraded valleys, and uninhabitable deserts. The river valleys are most fertile. The average annual rainfall is about 11 inches in the north and about 3 inches in the south. At low elevations plant life is limited to greasewood (Sarcobatus) and to several varieties of sagebrush (Artemisia); at higher elevations herbaceous plants are common. This scantiness of ground cover has a restrictive effect upon the size and number of game animals. Oases are confined usually to the courses of the Humboldt and Snake rivers and their ephemeral tributaries, as well as to the streams having their origin in the Sierra Nevada range. The few permanent lakes are saline, but most of the drainage areas are of brief duration. The density of the aboriginal population in prehistoric times may have been as low as one person per thirty or thirty-five square miles (ibid., p. 449). The aridity of the region is favorable to the preservation of osseous remains. Antevs (1925, pp. 68, 77) finds evidence for three Pleistocene glaciations for the Great Basin. The earliest were represented by the Mono and Lahontan drainages at the foot of the Sierra Nevada range. These were followed later by the Bonneville drainage below the Wasatch and Uinta mountains. During the Pleistocene, according to Antevs (ibid., p. 71), there were over sixty-eight lakes with internal drainage systems in the Great Basin. A fluctuating balance of low evaporation and high precipitation, corresponding to the size of glacial deposits in the mountains, was reversed as one moved from north to south and also when the post-glacial period, with its drier climate, had commenced.

Culturally, the Great Basin presents traits derived from peoples living on its periphery, as well as from internal developments. A general outline of the cultural sequences reveals, for the earliest period, possible Pleistocene occupations (Cressman, 1951, pp. 297-304; Harrington, 1934, pp. 22-24; Heizer, 1951, p. 95). Scientific description of the skeletal material attributed to this period\* is restricted to the published accounts of Cressman (1938, 341-44) and Hansen (op. cit., p. 431). A subsequent horizon, showing influences from the Basketmaker culture of the Southwest, is represented most intensively along the southwestern periphery of the Great Basin, but traits decrease markedly in their frequency as one moves northward into Oregon. Later, cultural influences deriving from the Pueblo I, II, III phases superimposed themselves over the earlier Basketmaker II,

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\*For Pleistocene and postglacial chronology in the Great Basin area see Antevs (1948, 1952).



III horizons. These Pueblid cultures may have flourished around A.D. 500-1300 (Martin, Quimby and Collier, 1946, p. 224). There are no published records of skeletal finds from the Great Basin which are known to represent this period, save for two crania noted by Steward (op. cit., p. 471). The Promontory Culture was a local development in northern Utah circa A.D. 1200-1400 (Martin, Quimby and Collier, 1946, p. 226). It vanished with the early beginnings of a type of culture similar to that practiced by the Shoshonean peoples living in historic times. The skeletal record is more rewarding for this later period.

The Shoshonean people belong to the Uto-Aztecan linguistic stock, which is divided into three groups: the Northern Paiute or Mono-Bannock, the Shoshone, and the Ute-Chemehuevi or Ute and Southern Paiute (Steward, 1940, p. 474). This differentiation may have taken place before the Pueblid traits were acquired. It is uncertain whether all of the Pueblid horizons were occupied by Shoshonean people, since the amount of skeletal material for this era is very meager. What is known is that there is a cultural continuum between Pueblid and Shoshonean cultures in the Great Basin. Some Shoshoneans spread eastward to Wyoming or to the southern Plains and are represented here by the Comanche (Mooney, 1898, p. 161).

According to Steward (op. cit., p. 491) burial, cremation, or abandonment of the corpse in the house were the prevalent customs for disposing of the dead. Lowie (1923, p. 149) notes that placing the body in a rocky cleft was popular with the Lemhi and Wind River Shoshone. Tree burial was a less common practice (Lowie, 1909, p. 214). There were striking regional differences in the modes of disposing of the dead, but cave burials were most common.

#### Analytical Methods Used for the Series

Appendix A contains the tabulations of the cranial and post-cranial measurements and indices, which are followed by a tabulation of the morphological observations on the crania. A discussion in this paper of the post-cranial material is omitted, due to the scantiness and inferior condition of the bones. The measurements and indices of these bones have been made available here in the hope that they may be of value to another worker with a more complete sample.

For each class of measurements and indices where the sample is of sufficient size, is calculated the Arithmetic Mean (M) (Simpson and Roe, 1939, p. 87), the Standard Deviation (S.D.) (*ibid.*, p. 115), the Coefficient of Variability (V) (*ibid.*, p. 122), plus the Standard Error (S.E.) (*ibid.*, p. 154) for each of these constants. The Significant Difference Between the Means of Two Series ( $d/\sigma_d$ ) (*ibid.*, p. 192) is represented in the tabulations in the column bearing the initials of the investigators.

The measurements and indices for each class followed the methods favored by Hrdlicka (1939, pp. 119-186) and acquired by the author from instruction under Professor T. D. McCown, Department of Anthropology, University of California, Berkeley. Cranial capacity for skulls of the Kennedy series was calculated with the use of Pearson's formula (Hooton, 1946, p. 739), using Basion-Bregma Height instead of Auricular Height. For the post-cranial series, stature was estimated by the use of Trotter's formulae (Trotter and Gleser, 1952, p. 488) for the long bones, as these applied to White males.

#### Cranial Measurements and Observations

This section is concerned with a general description of the Great Basin population, based upon the mean values obtained by all six investigators as listed in Appendix A. Unless stated otherwise, these generalizations apply to both sexes in the series.

Cranium. The Cephalic Index for the Great Basin is in the mesocephalic range, exceptions occurring in the author's series of males, which are dilichocephalic, and in the brachycephalic females of the Gifford series. This predominant mesocephalic pattern has been long recognized for this region, but Dixon (1923, pp. 403, 421) believes the Shoshone and possibly the Paiute peoples to be brachycephalic. This claim is based on Dixon's observation of the Maidu, who are neighbors of the Shoshone in California. He lacks any Great Basin cranial data to confirm his assumption. Using the cranial records in Hrdlicka's "Catalogue of Human Crania in the U. S. National Museum," Cameron (1929, p. 175) found a consistently higher Cephalic Index for the females than for the males in a number of Indian tribes which included the Paiutes, Utes, and Gosh-Utes. Cameron's observation is confirmed in this report, but this is not the case among the Comanche, who are related to the Shoshoneans (Goldstein, 1934, p. 302). The Height-Length Index for either Basion-Bregma Height or Auricular Height is orthocranial; however,

Dixon (op. cit., p. 21) regards it as chamaecephalic or hypsicephalic, depending upon how successfully a series conforms to his racial classifications for the Great Basin. The Height-Breadth Index is in the metriocranial range, but the males of the Cressman and Kennedy series are acrocranial. Gifford (1926, p. 248) regards an index of 100 (acrocranial) as typical for the Great Basin tribes and particularly for the Northern Paiute and Shoshone. Hrdlicka (1927, p. 101) sees a low to medium vault height as typical. For the Fronto-Parietal Index, the males are eurytopic and the females are metriometric.

With the exception of the eight crania in the Hrdlicka series which show varying degrees of occipital flattening, none of the specimens in the other series show any artificial deformation. The vault has a spheroid form. Large brow ridges are common for the males, this feature leading several investigators (see Hansen, op. cit., p. 433) to believe that certain Great Basin skulls must be ancient and primitivistic. The brow ridges have a median concentration, but divided and continuous ridges are not uncommon. The glabella is large for males and small for females. Both sexes share medium to low frontal regions with a medium slope and small frontal bosses. The median crests are small and the sagittal elevation is in the medium category. Parietal bosses are large and the temporals are full, the females showing slightly larger extensions for both traits. For the temporal crests and the supramastoid crests, the males show an increase in size away from the medium range. The occipital curve is medium, and the torus is small for females and medium for males. The mound slope is most common for the torus. The auditory meatus is oval and the tympanic plate is thin. The post-glenoid process is medium.

Face. The Total Facial Index shows great variation. It is euryprosopic for the males of the Gifford series, the Hrdlicka series, and the Shaw-Bolton series. The Kennedy series is mesoprosopic for both sexes. The females of the Hrdlicka series and the Shaw-Bolton series are hypereuryprosopic. The Upper Facial Index is mesene except in the Cressman series of euryene males. Hrdlicka (1927, p. 101) describes the Shoshoneans as people with medium-sized faces. The total facial angle and the mid-facial angle show higher values for females than for males; the males have a greater alveolar angle. Wissler (1931, pp. 1-33) made a study of the face and teeth of Indians living in the southwestern United States, and particularly California and parts of Oregon and Washington. His results are not applicable here, since they were made on children attending Indian schools and adults were not measured. However, his values for nasal bridge development are close to those for the non-living of the Kennedy series.

Observations of the malars show that those of the females are medium in size, while those of the males are larger. The malar anterior projection and the malar lateral projection are in the medium range, but those of the males often reach a greater size. The zygomatic process is medium for males and small for females. The sub-nasal grooves are more often pronounced in females than in males, who have them only to a moderate degree. Alveolar prognathism is pronounced for both sexes. Alveolar border absorption is slight or medium in intensity.

Nose. The classification of the Nasal Index is mesorrhine for all of the series except for the platyrrhine females of the Kennedy and Shaw-Bolton series. Hrdlicka (1927, p. 101) supports a mesorrhine category, but Dixon (op. cit., pp. 403, 421) believes that a broad-nosed type is typical for the Great Basin. Males have longer and broader noses than females in all cases, except in the Kennedy series, where the females have the broader noses.

The nasion depression is of medium size. The nasal root and the nasal bridge are both of medium height and breadth. The nasal profile is concavo-convex for most males and concave for most females. The nasal spine is small for females and medium for males.

Orbit. The classification of the Right Orbital Index is megaseme for all the series measured, save for the males of the Hrdlicka series who are in the mesoseme range. The Left Orbital Index is megaseme for all of the series measured. The dimensions of the orbits are greater for the males than for the females. The left orbit shows a slightly greater height than the right orbit, but the latter is broader than the right orbit in the case of the males.

The shape of the orbit is most commonly square, but the males often have oblong orbits, while the females often may have rhomboid-shaped orbits.

Palate. The Palatal Index is brachystaphaline for the males and mesostaphaline for the females. The length of the palate is greatest for females, and the males have the broader palates.

The average palate is parabolic in shape. Among males, the palate is high, but in the females it is medium. The palatine torus is lump-shaped and is of medium size.

Mandible. The Mandibular and Ramus Indices are higher for the males than for the females, but the latter have the greater mean angle of the lower jaw. Mandibles are largest for the males, the size for the females being medium or small. Both the median and bilateral chin forms are present. Chin projection is medium, but the females tend to have the smaller projections. There is a slight degree of alveolar mandibular prognathism. The genial tubercles are small in the females, larger in the males. The mylo-hyoid ridge is slight. The eversion of the gonion is small for the females and medium for the males. The mandibular torus is medium, but tends to be smaller in some of the females. A medium to pronounced overbite occurs in all of the females, but the males show absence or a slight occurrence of this trait.

In brief, sexual and regional differences for particular traits can be demonstrated for the Great Basin. The degree to which the nature of these variations renders the population under consideration homogeneous or heterogeneous will be investigated in the succeeding sections of the report.

#### Types of Variation in the Series

An analysis of the Arithmetic Means reveals that the majority of the highest absolute mean values for all measurements and indices, where comparison of the series is possible, is to be found for the Indians of the western Great Basin, i.e., in the Kennedy series for the non-living material and in the Gifford and Boas series for the living material.

The chart below presents for each of the given series, the frequency of classes with the highest M in the entire sample. It also expresses this frequency as a percentage of the total number of classes included in each series. The Cressman series is not included here; for, as a result of the paucity of the measurements recorded by Cressman, it was possible to compare them with the other series of males for only seven of the classes. To have included these measurements and indices would have meant reducing the number of classes for which the other series can be compared. An examination of these seven classes shows, however, that four of them were closest in their M to the values attained by the author for his series.

Series	Males			Females		
	Frequency of			Frequency of		
	Classes Compared	Highest Mean	Percent	Classes Compared	Highest Mean	Percent
Kennedy	20	12	60.00	20	18	90.00
Hrdlicka	20	8	40.00	20	2	10.00
Shaw-Bolton	20	0	0	10	1	10.00
Gifford	10	6	60.00	10	6	60.00
Boas	10	4	40.00	10	3	30.00

The preceding analysis was concerned with a comparison of the absolute differences between values of M for the entire series. The chart below shows the degree of differences between the M of each series. The total number of differences for both non-living and living crania for each  $d/\sigma d$  unit is expressed as a percent. The Cressman series was included here.

$d/\sigma d$	Males				Females			
	No. Non-Living	No. Living	Sum	Per-cent	No. Non-Living	No. Living	Sum	Per-cent
0-1	12	4	16	37.20	5	8	13	33.33
1-2	10	2	12	27.90	6	6	12	30.15
2-3	7	0	7	16.28	3	4	7	17.96
3-x	6	2	8	18.61	2	5	7	17.96
Total			43				39	

A closer examination of the series which contains a  $d/\sigma d$  of 3 or larger, as recorded in the chart below, reveals two facts: (1) the significant differences lie in comparisons of series from the western sector of the Great Basin with series from the eastern area, rather than between series that are close together geographically; (2) the nature of the physical traits showing a high degree of variation can be identified. It is important to note that the percents of  $d/\sigma d$  are greater for the smaller degrees of difference than for the larger ones--81.38% in contrast to 18.61% for males, and 81.44% in contrast to 17.96% for females.

Series *	Males			Females		
	Frequency of			Frequency of		
	Classes Compared	$d/\sigma d$ of 3 or over	Percent	Classes Compared	$d/\sigma d$ of 3 or over	Percent
K-H	6	4	66.67	4	2	50.00
K-C	6	2	33.33			
H-C	6	0	0			
S-B-G	2	1	50.00	5	2	40.00
S-B-B	2	1	50.00	5	2	40.00
G-B	2	0	0	5	2	20.00

A comparison of the Standard Deviations is obviously unrewarding, since the number of individuals is not constant for all classes of measurements and indices. It is significant, however, that in a listing of classes for which the S.D. is 7 or above, the values showing the greatest dispersion away from the M pertain to the regions of the vault, face, nose, and palate.

The Coefficient of Variability is most suitable for a comparison of these metrical values. The average V for the entire series is as follows:

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\* K = Kennedy; H = Hrdlicka; C = Cressman; S-B = Shaw-Bolton; G = Gifford; B = Boas.

	Non-Living	Living
Male Crania	6.35	5.01
Female Crania	7.61	4.70

The higher V for the non-living series is to be expected, considering that the individuals of which each series is composed came from no single location, save for crania of the Cressman series, but were collected at random over a vast area. Below is a chart in which a graduated rating of V is recorded:

V	Males				Females			
	No. Non-Living	No. Living	Sum	Per-cent	No. Non-Living	No. Living	Sum	Per-cent
0-2	2	0	2	1.87	1	1	2	1.98
2-4	20	8	28	26.17	15	10	25	24.75
4-6	34	6	40	37.38	26	7	33	32.67
6-8	12	2	14	13.08	14	3	17	16.83
8-10	7	1	8	7.48	6	4	10	9.90
10-x	14	1	15	14.02	14	0	14	13.87
Total			107				101	

The values of two or below for V may be the result of poor sampling. For V of 10 or greater, the following percentages are obtained for their frequency in each series.



Series	Males			Females		
	Frequency of			Frequency of		
	Classes Compared	V of 10 or over	Percent	Classes Compared	V of 10 or over	Percent
Kennedy	20	16	80.00	18	14	78.78
Cressman	20	0	0	18	0	0
Hrdlicka	20	4	20.00	18	4	22.22
Shaw-Bolton	8	4	50.00	10	4	40.00
Gifford	8	4	50.00	10	5	50.00
Boas	8	0	0	10	1	10.00

The greatest degree of variability is found in the western series. It should be noted that of the sixteen values for V in the Kennedy series, some nine of them were the highest for all series compared. In addition, the Kennedy series contains twenty classes with a V of ten or greater, which are not accompanied by comparative measurements of other investigators. This total of twenty-nine classes with a large V is unusually large (50.00%) when it is considered that only fifty-nine classes are involved for the cranial measurements for the total series. The explanation lies in the fact that often small numbers of specimens were measured which have come from widely separated points over an immense area. For these, the V tends to be larger than would be the case if a larger sample had been gathered.

#### Areal Distribution of Morphological Types

An analysis of the values obtained for the respective series, with the use of the statistical methods cited above, reveals two considerations: (1) the Great Basin population is seen to have certain regional differences in its physical morphology; (2) the physical traits manifesting these dif-

ferences pertain to the vault, face, nose, and palate. Sexual differences were noted in a preceding section of the paper. It must always be borne in mind that often the values of a series which seem strikingly different are the result of inadequate sampling or statistical error. Caution is used here in assigning certain physical traits to particular regions of the Great Basin, and a flexible classification is favored in place of a rigid one.

Each investigator whose series is included here has derived his population from some general area in the Great Basin. Cressman is concerned with the northern area south of the Columbia Plateau; Gifford has derived his data from California, where the Basin comes in contact with the Sierra Nevada; Boas' sample extends to the southern limit of the area; the author's series includes western and southern Nevada; Hrdlicka measured material from the eastern boundary where the Great Basin and the mountains of central Utah join, and from here, southward, into the periphery. Shaw and Bolton conducted their research in the eastern periphery; Michelson worked in the northeastern periphery. Ideally, the series would consist of both living and non-living material from each region. When comparisons are made which cross-cut the living and non-living material, adjustments for the measurements have been made by the author whenever possible (Trotter and Gleser, op. cit., p. 488; Boas, 1895b, p. 395). Since the author was not able to examine the specimens included in the series other than his own, the categories decided upon are based entirely on considerations of the measurements, indices, and observations recorded in Appendix A.

The Northern Area (southeastern Oregon) has a mesocephalic and acrocranial population with broad, short faces. The Upper Facial Index is euryene. Hrdlicka (Cressman, 1942, p. 141-43) examined the single specimen from Catlow Cave Number I and believed it to be similar to a West Coast type, but Hooton and Woodbury (ibid., p. 143) classified it as a Basket-maker type. It stands apart from the Blitzen Valley crania on the basis of its low Cephalic Index, among other features.

The Western Area (California from the Oregon line to the southern periphery of the Great Basin) contains people with broader heads than are to be found in the Northern Area, and brachycephaly is common for the females. The faces are euryprosopic. The nose is mesorrhine, but as one moves southward, the nose becomes broader. Gifford (1951, p. 86) divides this area into a Western Mono and a California type, the latter being represented by the Washo and Northern Paiute. He regards the first type as having a medium stature with high faces, narrow heads, and medium noses;

the latter type is typified by broadness of head and face, medium stature, and a nose ranging in shape from long and narrow to short and broad. Hrdlicka (1906, p. 64) argues for a racial affinity of the southern California Indian with tribes in Mexico, and remarks on the similarity of the Pah-Ute skull measured by Virchow to Californian crania.

The Central Area (western and southern Nevada) contains a high frequency of dolichocephalic and acrocranial males in a regional population which is basically mesocephalic and metriocranial. Both sexes are mesoprosopic. Noses are mesorrhine. Loud and Harrington (1929, p. 32) compared the cephalic indices of 21 crania of the author's series with 16 indices from the Gifford series, and derived a lower value for the first group. This discrepancy of measurements was interpreted on the basis that the ancient inhabitants of the region, which they believed their skeletal crania represented, had not mixed with the brachycephalic Sierra Nevada Indians, but that intercourse had occurred in recent times, thus accounting for the broader heads of the living series. It appears to the author that Loud and Harrington cannot have been certain that all of their crania are ancient. It seems more reasonable that they had compared crania from two areas showing physical differences--a Central Area type and a Western Area type. That there have been crossings taking place between the California and Nevada tribes cannot be doubted, but dating the origin of this contact to recent times requires evidence which has not, as yet, been forthcoming. The high V for the western and central Indians suggests a diversity of physical traits in their respective areas. Stature tends to be tall.

The Eastern Area (western and central Utah and the southern periphery) is characterized by Indians with mesocephalic and metriocranial heads. The face is hypereuryprosopic for females and euryprosopic for males. The Upper Facial Index is mesene and the nose is mesorrhine. Stature is shorter here than it is in the Central Area. Hrdlicka (1927, p. 101) describes the Ute head as ranging from mesocephaly to dolichocephaly and having a low vault. Steward (1933, pp. 15-16) notes that crania from the Great Salt Lake are long, high-orbited, with strong brow ridges and occipital bulges--features seen in the modern Shoshone. Hansen (*op. cit.*, 432-33) also recognizes the ruggedness of the Utah material and places his skull in the upper range of Neanderthaloid possibilities, by a comparison of New World with Old World physical types.

The Eastern Periphery Area (eastern Utah, western Colorado, and southwestern Wyoming) has a mesocephalic population in which a high percentage of

females are hyperleptoprosopic. The males are euryprosopic and have broader faces than the females. Noses are mesorrhine, but are a little broader for the females.

Neumann's (1946, pp. 26-28) classification of Shoshonean-speaking tribes should be noted in this context. He employs Von Eickstedt's cranial classification, his sample being that of Hrdlicka's series from the Great Basin and California and Cressman's Catlow Cave specimen. Neumann questions the one-to-one relationship between physical type and languages in this area.

### Anatomical Variations

This section is concerned with the pathological conditions, anomalies, and physiology of the Great Basin Indians as represented in our sample. For the examination of the first of these subjects, the author's series of crania reveals the following conditions and their frequencies:

Pathology	Males			Females		
	Number of			Number of		
	Series	Afflicted	Percent	Series	Afflicted	Percent
<u>Teeth:</u> Teeth lost ante-mortem	15	7	46.67	11	5	45.46
Alveolar abscess	13	3	23.08	12	0	0
Crowding	15	4	26.67	12	3	25.00
Impaction of M <sub>3</sub>	15	0	0	12	2	16.67
Separation of M <sub>1</sub> - M <sub>2</sub> -M <sub>3</sub> (0.4 cm.)	15	1	6.67	12	0	0
<u>Vault:</u> Cranial dissymmetry	15	0	0	15	1	6.67
Facial dissymmetry	15	0	0	15	1	6.67
Palatal dissymmetry	15	0	0	15	1	6.67
Osteoporosis	15	1	6.67	15	0	0

Hrdlicka (1907, p. 104) supplements this list with a cranium having a supernumerary first molar and a lateral right incisor. He also reports a pathologically deformed cranium from his series. Oetteking (1927, pp. 201-09) discusses pathologic plagiocephaly in a skull from Nevada.

Of the physical anomalies found in the author's series, the following list is a summary.

Anomaly	Males			Females		
	Number of			Number of		
	Series Afflicted	Percent		Series Afflicted	Percent	
<u>Vault</u> : Metopism	14	1	7.14	15	0	0
Inca bone	9	2	22.22	9	0	0
Deep grooves for superorbital nerve	14	3	21.43	15	2	13.33
Lambdoid Wormian bones	11	1	9.10	13	2	15.38
<u>Nose</u> : Bony excrescence at naso-spinale	9	2	22.22	8	0	0

The furrows of the superorbital nerve are unusually deep and extended, a condition noted by Smith (1950, p. 65) for one of his crania. Sullivan (1922, pp. 215-18) records the frequency of the four types of apertura pyriformis for his Utah series of crania from the United States National Museum. His finds are compared below with those of the author. Since he had not grouped his series by sex, the sexes of the author's series are combined also.

Series	No.	Sulcus	Prenasal		
			Fossa	Infantile	Anthropine
Sullivan	23	8.70	4.30	47.80	39.10
Kennedy	17	17.64	0	41.80	41.18

Sullivan (op. cit., p. 243) finds no Wormian bones in the coronal suture, which is a discovery in sympathy with the Kennedy series. From his sample of 25 crania, he records 56.00% with lambdoid Wormian bones (ibid., p. 241), a percentage over twice that for the 24 crania from the author's series (24.48%). Sullivan finds none of his series to have transverse sutures (ibid., p. 239) or metopic sutures (ibid., p. 234).

Physiological observations of the Great Basin Indians are referred to in a general way by Hrdlicka (1908, pp. 36-162) in his study of Southwestern groups. Blood-grouping investigations were undertaken by Snyder (1926, p. 249), his 60 subjects coming from Fort Washakie in Wyoming. The percentages derived from both sexes were as follows: O - 51.60%; A - 45.00%; B - 1.60%; AB - 1.60%; P - .264%; q - .011%; r - .718%.

#### Comparison With Other Cranial Series

The averages of the measurements and indices of males living in the Great Basin are compared in Table I with the corresponding values of males from neighboring tribes whose measurements and indices were available in the literature. To the west and east of the Basin area are Indians with large broad heads and faces, while to the south are smaller-boned peoples. As is to be expected, intercourse took place on the peripheries between these respective types and the Great Basin population, but the internal and independent developments of the Great Basin aborigines appear more frequently and seem to be more significant. On these grounds, Steward (1933, p. 16) refutes the idea of Roberts (1932, pp. 8-9) that the route of the Pueblo people was by way of Utah, for the Pueblo physical type is found only in the southern Great Basin. Hrdlicka (1927, p. 101) believes that

the Shoshoneans differed from the western Algonkian primarily on the basis of a perceptibly lower vault, but that in other respects the two groups were similiar. As previously mentioned, Loud and Harrington (op. cit., p. 32) explained brachycephaly for the Northern Paiute as a result of crossings with the broad-headed Sierra Nevada People. Dixon (op. cit., p. 421) sees a Paleo-Alpine race (B-H-P) as dominant in the Great Basin, but recognizes a Mongoloid pattern (B-C-P) for the Utes and Paiutes. The physical remains of the Promontory people have not been recovered or are unrecognized, but Steward (1940, p. 471) suggests for these people a racial affinity with the Athabascans, on the basis of the two skulls found at Grantsville and Kanosh, which are unlike Shoshonean crania of the region. They are very round-headed and have low vaults, both Athabascan physical features.

### Summary and Conclusion

An examination was made on a total of 233 adult male crania and 83 adult female crania from living and non-living Indians in the Great Basin in order to determine the nature of their physical morphology. An additional 188 males and 83 females were recorded for stature. The sample was derived from a collection of published anthropometric data, to which was added a series measured by the author. Six series formed the body of the analysis, five of these coming from the works of Gifford, Boas, and Hrdlicka. The author believes this to be the most complete compilation of anthropometric data gathered for the aboriginal population of the Great Basin.

A brief sketch was made of the geographical and cultural-historical situation for the area, including an account of burial customs. An explanation of the statistical methods used for the series preceded the section describing the cranial measurements and observations. From this review, it was seen that there often were various prominent sexual differences within a series. The views of other investigators were cited and contrasted with the author's interpretation of the data. A subsequent section dealing with the statistical analysis of the data revealed that there were differences of physical types between the series from the eastern and western portions of the Great Basin. The particular regions of the skull showing the greatest variability were the vault, face, nose, and palate. Closer examination of these differences led the author to conceive of five general areas in the Great Basin where a given morphological type had the highest occurrence. These types were described. Following this was a discussion of the pathology, anomalies,

and physiology of the population. A blood-grouping series was recorded. The final section dealt with a comparison of the Great Basin crania with crania from populations living in the peripheral areas, for which values had been recorded by other workers.

The population of the Great Basin shows a basic homogeneity, but minor regional differences occur. More evidence from archaeology and physical anthropology is needed before it can be certain whether these differences are due to crossings with outside peoples, or whether they can be attributed to independent genetic drifts resulting from isolation of groups in the past. Perhaps both processes are involved in varying degrees. The only data on the degree of stability of the population comes from a check made by Michelson (op. cit., p. 856) in 1927 on the Shoshoneans measured by Shaw and Bolton in 1891-92. He found that no significant changes had occurred within that span of time.

The basic mesocephalic pattern shows weighting toward the brachycephalic range in the western Great Basin, but narrower heads become increasingly predominant as one moves eastward and northward. Acrocranial vaults are peculiar to the northern and central areas, but the vault becomes lower in the east. The type for the total face, which shows the greatest variability, is broad in the west, becomes narrower in the heart of the Basin, but returns to the higher index again in the east. The upper face height follows the same pattern. The dimensions of the orbit are larger in the east than in the west. The Nasal and Height-Length Indices are more constant, but the values for the nose are somewhat higher on the eastern and western limits of the Great Basin. Stature decreases going from west to east.

Until further anthropometric investigations are carried out in this field of research, the analysis of the aboriginal population of the Great Basin must remain superficial. The publication of larger samples of non-living and living material and the analysis of these samples hold the answer to a clearer understanding of the problem.



## KEY TO MAP I

This map shows the areal distribution of the entire series referred to in this report. For each locality noted, the initial of the investigator is given, with a number corresponding to a number in the key. The key gives the museum catalog numbers of the crania whenever these are known. Catalog numbers of non-living specimens in the Museum of Anthropology at the University of California at Berkeley are all shown with the prefix "12." The crania in the Kennedy series, which had been measured by Loud (Gifford, 1926, pp. 382, 383) and for which published data are available, are designated by an asterisk (\*). These crania were remeasured, and in all cases the values obtained by the author have been recorded here.

The geographical limits of the Great Basin are indicated by the dotted line (----). Tribal areas are circumscribed in the black line.

### CRANIAL SERIES

#### Non-Living Crania

#### Kennedy Series (K)

##### Male

- 1 Humboldt Valley, Nevada: 12-2608\*, 12-2613\*, 12-2616\*, 12-2617\*, 12-2622\*, 12-2624, 12-5688, 12-5689, 12-5691, 12-5692, 12-5693, 12-5696, 12-8252.
- 2 Lovelock Cave, Nevada: 12-2652\*, 12-2658\*, 12-2664\*.
- 3 Nixon, Nevada: 12-3492\*, 12-3493\*.
- 4 Winnemucca Caves, Nevada: 12-8369(a), 12-8369(b).
- 5 Las Vegas, Nevada: 12-5267.
- 11 Lake Utah, Utah: Hansen.
- 12 Gosiute Reservation, Utah: Smith: 18424.
- 13 Chasein Farm, Utah: Smith.
- \*\*38 Rose Spring, California: 12-9900.
- \*\*39 Churchill County, Nevada: 12-9368.

Total crania for series 27

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\*\* See Appendix B.

Female

- 1 Humboldt Valley, Nevada: 12-2614\*, 12-2615\*, 12-2618\*, 12-2620\*,  
12-2623\*, 12-5690, 12-5695.
- 2 Lovelock Cave, Nevada: 12-2659\*, 12-2663\*.
- 3 Nixon, Nevada: 12-3478\*, 12-3479\*.
- 4 Winnemucca Caves, Nevada: 12-8369(c), 12-8369(d), 12-8369(e).
- 6 Pitt Ranch, Nevada: 12-5694, 12-6527.
- 7 Logandale, Nevada: 12-3929.
- 12 Gosiute Reservation, Utah: Smith: 18425.
- 13 Chasein Farm, Utah: Smith.
- 9 Fort McDermit, Nevada: Virchow.
- 25 Steens Mountain, Oregon: Hrdlicka: 243596.
- \*\*38 Rose Spring, California: 12-8904, 12-9899, 12-9901.
- \*\*39 Churchill County, Nevada: 12-9369, 12-9370, 12-9682.

Total crania for series 28

Hrdlicka Series (H)

Male

- 8 Walker Lake: 243817.  
Nevada, Location Unknown: 243300, 243302, 243303, 243304.
- 14 Provo, Utah: 225085, 225087.
- 15 Paragonah, Utah: 292012.
- 16 Government Springs, Utah: 243930.
- 10 Beaver, Utah: 225256, 288804, 288805.
- 18 Fillmore, Utah: 243772.  
Utah, Location Unknown: 225089.  
South Idaho, Location Unknown: 243837.
- 26 Blue Mountains, Oregon: 225088.

Total crania for series 16

Female

- Nevada, Location Unknown: 243301.
- 14 Provo, Utah: 243292.
- 15 Paragonah, Utah: 292010, 292011.

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\*\* See Appendix B.

Female (cont'd.)

- 16 Government Springs, Utah: 243771.
- 19 Dry Creek, Utah: 243768, 243769.
- 20 Fort Douglas, Utah: 243776.  
Utah, Location Unknown: 225109.
- 28 Henry's Lake, Idaho: 243921.
- 35 Owens Valley, California: 243614.

Total crania for series 11

Krantz Series (KR)\*\*

Male

- 40 Karlo, California: 12-9904 - 12-9953.

Female

- 40 Karlo, California: 12-9904 - 12-9953.

Total crania for series 30

Jameson Series (J)\*\*

Male

- 41 Stansbury Island: Burial II.

Female

- 41 Stansbury Island: Burial I.

Total crania for series 2

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\*\*See Appendix B.

Cressman Series (C)

Male

27 Blitzen Valley, Oregon: 11-8, 11-69, 11-71, 11-73, 11-75, 11-76,  
11-91, 11-72.

Catlow Cave, Oregon: Catlow Cave No. 1. Cranium.

Total crania for series 9

Beuttner-Janusch Series (BJ)\*\*

Male

42 Deadman Cave: Burial I, Burial II, Burial III.

Total crania for series 3

Living Crania

Shaw-Bolton Series (Not shown on Map I)

37 The record of names or catalog numbers for the 294 individuals measured is unavailable. The sample represents Bannocks, Shoshone, and Utes (Uintah, White River, Uncompahgre, Moache, and Capote branches) living in Utah and Colorado, but the precise locale where the measurements were made is not disclosed. Some 33 hybrids are included. Boas gives the mean values of the results of his two workers, Shaw and Bolton.

Total crania for series 124 Male  
Total crania for series 26 Female

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\*\*See Appendix B.

Gifford Series (G)

Male

- 29 Area 21a (Northern Paiute): 548, 549, 551, 552, 553, 554.
- 30 Area 21b (Eastern Mono): 562, 563, 564.
- 31 Area 11 (Washo): 577, 578, 579, 580, 581, 582, 583, 584, 585,  
586, 587.

Total crania for series 15

Female

- 29 Area 21a (Northern Paiute): 555, 556, 557, 558, 559, 560.
- 30 Area 21b (Eastern Mono): 565, 566, 567, 568, 569.
- 31 Area 11 (Washo): 588, 589, 590, 591, 710.

Total crania for series 15

Boas Series (B)

Male

- 32 Cahuilla Territory: 52, 53, 54, 55.

Total crania for series 4

Female

- 32 Cahuilla Territory: 77, 78, 79, 80, 81, 82, 83.
- 33 Agua Caliente Territory: 101.
- 34 Serrano Territory: 111.

Total crania for series 9

**Michelson Series (M)**

**Male**

- 21 The records of names or catalog numbers for the 40 or more individuals measured are unavailable. Included in the sample are an unspecified number of Lemhi males. Wind River Indian Reservation, Utah.

Total crania for series 40

**POST\_CRANIAL SERIES**

**Non-Living Post-Cranial**

**Kennedy Series**

**Male**

- 1 Humboldt Lake, Nevada: 12-2604, 12-2605, 12-2617, 12-5696, 12-8252.
- 2 Lovelock Cave, Nevada: 12-2652.

Total crania for series 6

**Female**

- 1 Humboldt Lake, Nevada: 12-2618.

Total crania for series 1

- 2 Lovelock Cave, Nevada: 12-2627, 12-2628, 12-2629, 12-2632, 12-2635, 12-2637, 12-2638, 12-2639, 12-2640, 12-2644, 12-2656, 12-2657, 12-2660, 12-2662, 12-2665.
- 36 Bull's Head Canyon, Nevada: 12-3626.  
Nevada, Location Unknown: 12-2721.

Total crania for series 17

## Living Post-Cranial (Stature)

Shaw-Bolton    The nature of the samples of these observers is the same for  
Gifford        both sexes for the post-cranial measurements as for the  
Boas            cranial measurements.

### Hrdlicka Series

The record of names for the 82 individuals measured is un-  
available. Three localities are represented.

#### Male

22	Bluff City, Utah:	6 in the sample.	
23	Navajo Springs, Utah.		
24	Ignatio Reservation, Utah.		50 in the series

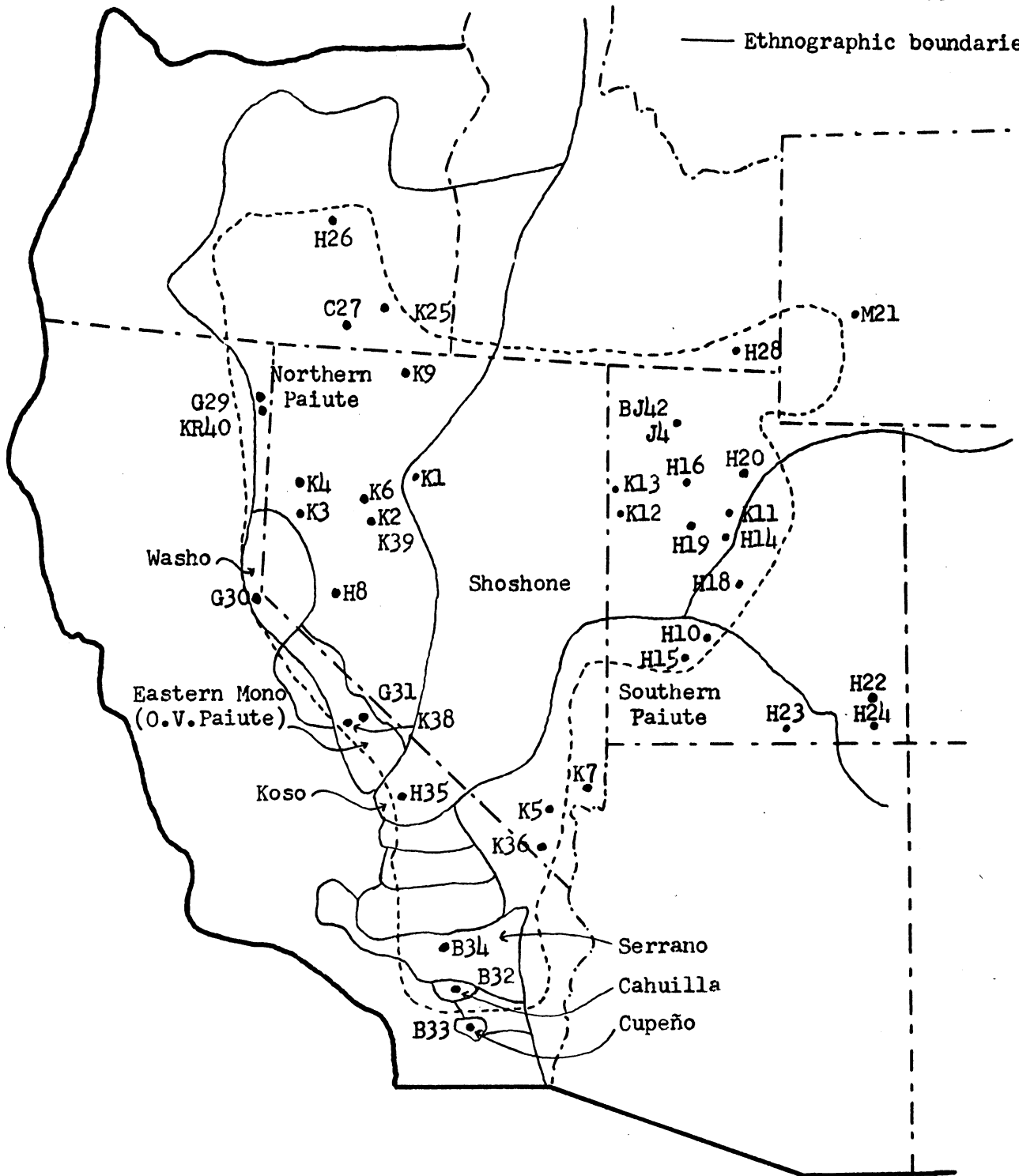
#### Female

	Bluff City, Utah.		
	Navajo Springs, Utah.		
	Ignatio Reservation, Utah.		20 in the series

Total for series    82

Legend

- Limits of Great Basin
- State boundaries
- Ethnographic boundaries



MAP I

THE AREA OF THE GREAT BASIN SHOWING LOCATIONS  
WHERE THE SERIES WERE OBTAINED



APPENDIX A

TABLE I  
COMPARISON OF MALE CRANIA OF THE GREAT BASIN WITH MALE CRANIA FROM PERIPHERAL AREAS

Non-living Crania	Great Basin							California		Utah Basket- maker**		New Mexican Pecos***		Dacotas-Colo. Stoux†		Montana Blackfoot ††	
	(42)	(43)	(43)	(53)	(42)	(33)	(46)	(63)	(11)	(11)	(46)	(63)	(11)	(11)	(63)	(11)	
Cranial Length	182.40	190.45	144.08	185.56	181.60	180.70	175.70	185.50	184.40	175.70	185.50	184.40	185.50	184.40	185.50	184.40	
Cranial Breadth	137.02	144.08	142.16	142.16	146.25	131.90	137.80	143.70	139.80	137.80	143.70	139.80	143.70	139.80	143.70	139.80	
Cranial Height	132.79	145.90	141.56	141.56	143.48	133.30	137.10	130.10	132.60	137.10	130.10	132.60	130.10	132.60	130.10	132.60	
Bi-zygo Diameter	138.82	143.40	142.02	142.02	143.32	134.80	138.60	143.00	138.60	138.60	143.00	138.60	143.00	138.60	143.00	138.60	
Total Face Height	118.92	126.04	121.99	121.99	123.14	123.14	123.14	123.14	123.14	123.14	123.14	123.14	123.14	123.14	123.14	123.14	

\* Newman, 1949, pp. 44-51.

\*\* von Bonin and Morant, 1938, p. 109.

\*\*\* Hooton, 1930, pp. 185-202.

† von Bonin and Morant, 1938, p. 109.

†† Ibid., p. 109.

TABLE I (continued)  
 COMPARISON OF MALE CRANIA OF THE GREAT BASIN WITH MALE CRANIA FROM PERIPHERAL AREAS

Non-Living Crania	Great Basin	Central California (Early)	Central California (Middle)	Central California (Late)	South-East Utah Basketmaker	New Mexican Pecos	Dacotas-Colo. Stoux	Montana Blackfoot
Height-Breadth Index	(23) 96.84	(30) 101.20	(48) 99.76	(39) 98.14	(30) 98.90	(34) 100.50	(61) 110.50	(11) 15.25
Cranial Module	(23) 15.08	(30) 16.02	(48) 15.62	(39) 15.73				
Facial Index	(10) 85.44	(14) 88.64	(46) 86.85	(31) 86.39				
Upper Facial Index	(28) 51.41	(17) 53.74	(44) 53.05	(34) 52.18				
Nasal Index	(27) 49.27	(29) 50.05	(51) 51.02	(38) 48.87	(40) 49.30	(124) 50.40	(60) 48.80	(11) 48.00
Orbital Index (R)	(26) 89.43				(39) 91.40	(120) 87.80	(57) 90.60	(11) 91.80
Stature	(4) 1728	(43) 1690	(38) 1672	(39) 1679				

TABLE I (continued)

COMPARISON OF MALE CRANIA OF THE GREAT BASIN WITH MALE CRANIA FROM PERIPHERAL AREAS

Non-Living Crania	Great Basin	Central California (Early)	Central California (Middle)	Central California (Late)	South-East Utah Basketmaker	New Mexican Pecos	Dacotas-Colo. Stoux	Montana Blackfoot
Upper Face Height	(35) 71.51	(26) 76.35	(50) 74.30	(38) 75.18	(33) 78.30	(32) 73.30	(56) 76.00	(11) 75.60
Nose Height	(29) 50.86	(31) 53.03	(53) 51.76	(38) 52.10	(41) 51.30	(125) 51.00	(61) 55.10	(11) 54.20
Nose Breadth	(27) 25.00	(30) 26.47	(51) 26.33	(38) 25.29	(40) 25.20	(126) 25.80	(60) 26.80	(11) 26.00
Orbital Height	(26) 35.03	(29) 35.93	(49) 35.73	(38) 35.68	(40) 34.70	(119) 34.80	(57) 36.20	(11) 35.80
Orbital Breadth (R)	(26) 39.19	(27) 40.07	(47) 40.68	(37) 40.00	(39) 38.00	(119) 39.90	(57) 40.00	(11) 39.00
Cranial Capacity	(23) 1456.77	(34) 1588.74	(49) 1541.00	(39) 1576.50	(31) 1341.80	(31) 1338.70	(57) 1486.20	(11) 1454.00
Cephalic Index	(40) 76.11	(41) 75.78	(52) 76.20	(40) 80.68	(33) 73.00	(43) 78.30	(63) 77.50	(11) 75.80
Length-Height Index	(23) 73.17	(30) 76.83	(48) 76.03	(40) 78.85	(30) 73.80	(34) 78.10	(50) 70.10	

TABLE I (continued)

COMPARISON OF MALE CRANIA OF THE GREAT BASIN  
WITH MALE CRANIA FROM PERIPHERAL AREAS

<u>Living Crania</u>	Great Basin	* Klamath	** Papago	† Comanche
Cranial Length	(143) 192.24	(13) 182.38	(219) 186.66	(18) 191.70
Cranial Breadth	(143) 153.17	(13) 164.07	(219) 150.25	(19) 160.30
Bizygomatic Diameter	(143) 147.80	(13) 150.61	(217) 142.25	(19) 154.40
Total Face Height	(127) 119.92	(13) 121.54	(218) 133.50	(18) 126.70
Nose Height	(127) 52.60	(13) 54.15	(49) 61.06	(19) 62.80
Nose Breadth	(127) 43.57	(13) 40.08	(219) 40.46	(19) 43.60
Cephalic Index	(184) 79.51	(13) 90.08	(219) 80.52	(18) 83.74
Facial Index	(34) 82.28	(13) 80.79	(217) 93.55	
Nasal Index	(19) 78.94	(13) 69.91	(219) 65.90	(19) 69.49
Stature	(188) 1669	(13) 1687	(219) 1688	(17) 1682

\* Gifford, 1926, pp. 271-272.

\*\* Gabel, 1949, pp. 16-42.

† Goldstein, 1934, p. 312.

TABLE II

## TABULATION OF CRANIAL MEASUREMENTS AND INDICES

	N	R	M	S.E	d/ $\sigma$ -d	S.D	S.E	V.	S.E
<b>Glabello-Occipital Length</b>									
Kennedy	17	170-198	186.18	1.74	K-H2.75	7.18	1.23	3.86	.66
Hrdlicka	16	170-192	179.93	1.44	K-C2.29	5.79	1.45	3.22	.60
Cressman	9	169-189	179.66	2.14	H-C .11	6.43	1.51	3.58	.84
	<u>42</u>	<u>169-198</u>	<u>182.40</u>						
<b>Male</b>									
Shaw-Bolton	124	175-207	192.30	.55	S-G .59	6.10	.39	3.17	.20
Gifford	15	185-201	191.33	1.29		5.00	.91	2.61	.48
Boas	4	186-204	193.75						
	<u>143</u>	<u>175-207</u>	<u>192.24</u>						
Kennedy	18	163-193	177.22	1.77	K-H2.26	7.53	1.25	4.25	.71
Hrdlicka	10	160-184	170.90	1.96		6.20	1.39	3.63	.81
	<u>28</u>	<u>160-193</u>	<u>174.96</u>						
<b>Female</b>									
Shaw-Bolton	26	170-199	184.30	1.26	S-G1.63	6.42	.89	3.48	.48
Gifford	15	168-192	181.07	1.49	S-B .45	5.78	1.05	3.19	.58
Boas	9	177-192	185.33	1.27	G-B 1.88	3.83	.90	2.07	.49
	<u>50</u>	<u>168-199</u>	<u>183.52</u>						
<b>Maximum Width</b>									
Kennedy	17	127-150	138.47	1.37	K-H .17	5.66	.97	4.09	.70
Hrdlicka	15	130-148	138.80	1.28	K-C .87	4.96	.90	3.57	.65
Cressman	9	131-145	140.44	1.69	H-C .48	5.06	1.19	3.60	.84
	<u>41</u>	<u>127-150</u>	<u>139.02</u>						
<b>Male</b>									
Shaw-Bolton	124	141-171	152.80	.42	S-G2.48	4.70	.30	3.07	.19
Gifford	15	148-163	155.93	.93		3.62	.66	2.32	.42
Boas	4	148-163	154.25						
	<u>143</u>	<u>141-171</u>	<u>153.17</u>						
Kennedy	18	110-148	134.28	2.36	K-H .11	10.01	1.67	7.45	1.24
Hrdlicka	9	129-143	134.66	1.36		4.08	.96	3.03	.71
	<u>27</u>	<u>110-148</u>	<u>134.41</u>						
<b>Female</b>									
Shaw-Bolton	26	137-156	146.20	.95	S-G .41	4.86	.67	3.32	.46
Gifford	15	142-155	148.80	1.02	S-B1.66	3.97	.72	2.67	.48
Boas	9	143-157	149.22	1.41	G-B .24	4.24	1.00	2.84	.67
	<u>50</u>	<u>137-157</u>	<u>147.52</u>						

TABLE II

## TABULATION OF CRANIAL MEASUREMENTS AND INDICES (continued)

	N	R	M	S.E	d/ $\sigma$ d	S.D	S.E	V.	S.E
<b>Basion-Bregma Height</b>									
<b>Male</b>									
Kennedy	9	124-146	136.89	2.07	K-H3.45	6.23	1.47	4.55	1.07
Hrdlicka	14	124-137	129.64	1.04		3.90	.74	3.01	.57
Cressman	1		140.00						
	<u>24</u>	<u>124-146</u>	<u>132.79</u>						
<b>Female</b>									
Kennedy	15	97-138	129.07	2.50	K-H1.45	9.68	1.77	7.50	1.37
Hrdlicka	10	116-132	124.30	1.44		4.56	1.02	3.67	.82
	<u>25</u>	<u>97-138</u>	<u>127.16</u>						
<b>Auricular Height</b>									
<b>Male</b>									
Kennedy	10	114-125	118.20	1.27		4.04	.90	3.42	.76
<b>Female</b>									
Kennedy	12	106-119	112.41	1.31		4.53	.92	4.03	.82
<b>Minimum Frontal Diameter</b>									
<b>Male</b>									
Kennedy	12	92-110	98.75	1.49		5.17	1.05	5.23	1.07
<b>Female</b>									
Kennedy	13	85-99	92.69	1.08		3.91	.77	4.22	.83
<b>Maximum Frontal Diameter</b>									
<b>Male</b>									
Kennedy	9	110-129	118.33	1.72		5.16	1.21	4.36	1.03
<b>Female</b>									
Kennedy	10	109-121	113.10	1.65		5.21	1.17	4.61	1.03

TABLE II

## TABULATION OF CRANIAL MEASUREMENTS AND INDICES (continued)

	N	R	M	S.E	$d/\sigma^d$	S.D	S.E	V.	S.E
<b>Maximum Bizygomatic Diameter</b>									
Kennedy	6	121-145	136.00	3.09	K-H1.16	7.57	2.18	5.57	1.61
Hrdlicka	15	132-149	139.20	1.18	K-C1.23	4.56	.83	3.27	.60
Cressman	7	131-148	140.43	1.92	H-C .57	5.07	1.35	3.61	.96
	<u>28</u>	<u>121-149</u>	<u>138.82</u>						
<b>Male</b>									
Shaw-Bolton	124	135-160	147.50	.52	S-G1.68	5.80	.37	3.93	.25
Gifford	15	144-156	150.07	.88		3.41	.62	2.27	.41
Boas	4	142-157	148.50						
	<u>143</u>	<u>135-160</u>	<u>147.80</u>						
Kennedy	9	127-149	132.67	2.13	K-H2.02	6.39	1.51	4.82	1.13
Hrdlicka	8	120-133	127.37	1.41		3.99	1.00	3.13	.78
	<u>17</u>	<u>120-149</u>	<u>130.17</u>						
<b>Female</b>									
Shaw-Bolton	26	127-144	136.90	.96	S-G2.41	4.91	.68	3.59	.50
Gifford	15	131-147	140.93	1.17	S-B4.75	4.54	.83	3.22	.59
Boas	9	136-148	146.11	1.46	G-B2.75	4.38	1.03	3.10	.73
	<u>50</u>	<u>127-148</u>	<u>147.52</u>						
<b>Menton-Nasion Height</b>									
Kennedy	8	117-128	121.75	1.25	K-H4.15	3.53	.88	2.90	.72
Hrdlicka	5	96-118	114.40	1.00		2.24	.71	1.96	.62
	<u>13</u>	<u>96-128</u>	<u>118.92</u>						
<b>Male</b>									
Shaw-Bolton	108	104-130	118.70	.51	S-G5.52	5.30	.36	4.46	.28
Gifford	15	114-137	127.26	1.92		7.43	1.36	5.84	1.07
Boas	4	118-132	125.50						
	<u>127</u>	<u>104-137</u>	<u>119.92</u>						
Kennedy	7	106-123	114.14	2.27		6.02	1.61	5.27	1.41
Hrdlicka	2	96-106	101.00						
	<u>9</u>	<u>96-123</u>	<u>111.22</u>						
<b>Female</b>									
Shaw-Bolton	21	101-122	108.50	.97	S-G6.17	4.46	.69	4.11	.90
Gifford	15	108-127	118.80	1.42	S-B4.58	5.50	1.00	4.63	.84
Boas	9	113-122	117.44	1.93	G-B .57	5.79	1.36	4.93	1.16
	<u>45</u>	<u>101-127</u>	<u>113.72</u>						

TABLE II

## TABULATION OF CRANIAL MEASUREMENTS AND INDICES (continued)

	N	R	M	S.E	d/ $\sigma$ d	S.D	S.E	V.	S.E
<b>Prosthion-Nasion Height</b>									
<b>Male</b>									
Kennedy	12	67-81	73.58	1.02	K-H1.19	3.52	.72	4.78	.97
Hrdlicka	16	65-79	71.87	.98	K-C3.90	3.92	.69	5.45	.96
Cressman	7	60-72	67.14	1.28	H-C2.67	3.40	.91	5.06	1.35
	<u>35</u>	<u>60-81</u>	<u>71.51</u>						
<b>Female</b>									
Kennedy	12	65-75	70.92	.80	K-H3.80	2.78	.57	3.92	.80
Hrdlicka	9	60-76	65.78	1.14		3.42	.81	5.20	1.22
	<u>21</u>	<u>60-76</u>	<u>68.72</u>						
<b>Basion-Nasion</b>									
<b>Male</b>									
Kennedy	6	102-107	104.83	1.60		3.93	1.13	3.75	1.08
<b>Female</b>									
Kennedy	9	97-104	100.00	.71		2.11	.50	2.11	.50
<b>Basion-Prosthion</b>									
<b>Male</b>									
Kennedy	7	92-108	101.71	1.80		4.77	1.27	4.69	1.25
<b>Female</b>									
Kennedy	8	89-104	99.12	1.74		4.91	1.23	4.95	1.24
<b>Nasal Height</b>									
Kennedy	12	32-57	49.61	1.71	K-H1.28	6.18	1.21	12.46	2.44
Hrdlicka	16	48-57	51.87	.78		3.12	.55	6.01	1.06
	<u>29</u>	<u>32-57</u>	<u>50.86</u>						
<b>Male</b>									
Shaw-Bolton	108	46-61	52.20	.29	S-B4.39	3.00	.20	5.75	.39
Gifford	15	50-63	55.93	1.04		4.02	.73	7.19	1.31
Boas	4	48-53	51.00						
	<u>127</u>	<u>46-63</u>	<u>52.60</u>						



TABLE II

## TABULATION OF CRANIAL MEASUREMENTS AND INDICES (continued)

	N	R	M	S.E	d/ $\sigma$ d	S.D	S.E	V.	S.E
Kennedy	12	31-53	48.25	1.78	K-H .33	6.18	1.26	12.81	2.61
Hrdlicka	10	<del>44-57</del>	<del>47.20</del>	.54		1.72	.38	3.64	.77
	<u>22</u>	<u>31-53</u>	<u>47.77</u>						
Female									
Shaw-Bolton	21	38-55	47.00	.83	S-G4.67	3.83	.59	8.15	1.78
Gifford	15	48-58	52.47	.74	S-B .30	2.86	.52	5.45	.99
Boas	9	<del>41-53</del>	<del>47.44</del>	1.08	G-B3.96	3.23	.76	6.81	1.60
	<u>45</u>	<u>38-58</u>	<u>48.91</u>						
Nasal Breadth									
Kennedy	11	22-27	24.18	.40	K-H1.94	1.33	.28	5.50	1.17
Hrdlicka	16	<del>22-29</del>	<del>25.56</del>	.51		2.04	.36	7.98	1.41
	<u>27</u>	<u>22-29</u>	<u>25.00</u>						
Male									
Shaw-Bolton	108	35-51	43.40	.27	S-B1.70	2.80	.19	6.45	.44
Gifford	15	37-53	44.90	1.49		5.78	1.05	12.86	2.35
Boas	4	<del>39-47</del>	<del>43.25</del>						
	<u>127</u>	<u>35-53</u>	<u>43.57</u>						
Kennedy	12	23-40	26.42	1.31	K-H1.75	4.54	.93	17.18	3.51
Hrdlicka	10	<del>22-27</del>	<del>23.80</del>	.44		1.40	.31	5.88	1.31
	<u>22</u>	<u>22-40</u>	<u>25.23</u>						
Female									
Shaw-Bolton	21	35-45	39.52	.55	S-B .08	2.54	.39	6.43	1.40
Gifford	15	35-46	39.60	.86	S-B2.20	3.36	.61	8.48	1.54
Boas	9	<del>33-41</del>	<del>37.44</del>	.81	G-B1.70	2.45	.57	6.54	1.54
	<u>45</u>	<u>33-46</u>	<u>39.13</u>						
Right Orbital Height									
Male									
Kennedy	11	31-38	35.54	.62	K-H1.22	2.05	.44	5.76	1.23
Hrdlicka	15	<del>33-37</del>	<del>34.66</del>	.42		1.60	.29	4.62	.84
	<u>26</u>	<u>31-38</u>	<u>35.03</u>						
Female									
Kennedy	12	33-39	35.08	.59	K-H1.94	2.02	.41	5.76	1.17
Hrdlicka	10	<del>30-36</del>	<del>33.70</del>	.65		2.06	.46	6.11	1.37
	<u>22</u>	<u>30-39</u>	<u>34.45</u>						

TABLE II

## TABULATION OF CRANIAL MEASUREMENTS AND INDICES (continued)

	N	R	M	S.E	d/ $\sigma$ d	S.D	S.E	V.	S.E
Left Orbital Height									
Male									
Kennedy	11	33-39	35.90	.53		1.78	.38	4.96	1.06
Female									
Kennedy	11	32-38	34.91	.57		1.88	.40	5.38	1.15
Right Orbital Breadth									
Male									
Kennedy	11	35-41	39.00	.66	K-H .48	2.19	.47	5.61	1.20
Hrdlicka	15	37-42	39.33	.33		1.29	.23	3.28	.60
	26	35-42	39.19						
Female									
Kennedy	12	33-39	35.08	.59	K-H1.58	2.02	.41	5.76	1.17
Hrdlicka	10	30-36	33.70	.65		2.06	.46	6.11	1.37
Left Orbital Breadth									
Male									
Kennedy	11	36-42	38.90	.61		2.02	.43	5.19	1.11
Female									
Kennedy	10	33-41	37.70	.71		2.24	.50	5.94	1.33
Interorbital Breadth									
Male									
Kennedy	10	20-28	24.30	.81		2.59	.58	2.39	.53
Female									
Kennedy	11	19-26	22.18	.64		2.12	.45	9.56	2.04
Biorbital Breadth									
Male									
Kennedy	8	95-109	100.37	1.52		4.29	1.07	4.27	1.07
Female									
Kennedy	8	93-100	95.87	1.13		3.19	.80	3.33	.83

TABLE II

## TABULATION OF CRANIAL MEASUREMENTS AND INDICES (continued)

	N	R	M	S.E	$d/\sigma^2 d$	S.D	S.E	V.	S.E
<b>Nasalia, Upper Breadth</b>									
<b>Male</b>									
Kennedy	9	10-14	12.44	.53		1.56	.37	12.54	2.95
<b>Female</b>									
Kennedy	11	6-9	11.27	1.00		3.32	.71	29.46	6.28
<b>Nasalia, Lower Breadth</b>									
<b>Male</b>									
Kennedy	7	15-22	18.00	.94		2.48	.71	13.78	3.68
<b>Female</b>									
Kennedy	8	11-19	16.25	.90		2.55	.64	15.69	3.92
<b>External Palatal Length</b>									
<b>Male</b>									
Kennedy	10	40-53	45.40	1.18		3.75	.84	8.26	1.85
<b>Female</b>									
Kennedy	11	37-61	47.91	1.83		6.09	1.30	12.71	2.71
<b>External Palatal Breadth</b>									
<b>Male</b>									
Kennedy	9	35-48	40.33	1.35		4.05	.95	10.04	2.37
<b>Female</b>									
Kennedy	12	29-43	39.08	1.18		4.09	.83	10.46	2.13
<b>Foramen Magnum Length</b>									
<b>Male</b>									
Kennedy	8	33-38	35.87	.54		1.53	.38	4.26	1.06
<b>Female</b>									
Kennedy	12	29-37	33.00	.65		2.25	.46	6.81	1.39

TABLE II

## TABULATION OF CRANIAL MEASUREMENTS AND INDICES (continued)

	N	R	M	S.E	$d/\sigma^2 d$	S.D	S.E	V.	S.E
Foramen Magnum Breadth									
Male									
Kennedy	8	28-39	32.12	1.19		3.37	.84	10.49	2.62
Female									
Kennedy	11	26-34	28.54	.67		2.23	.47	7.81	1.66
Nasion-Opisthion Arc									
Male									
Kennedy	9	181-387	291.77	16.79		50.37	11.87	17.26	4.07
Female									
Kennedy	12	238-362	283.08	8.76		30.34	6.19	10.72	2.19
Transverse Arc									
Male									
Kennedy	7	305-326	313.00	2.77		7.33	1.96	2.34	.62
Female									
Kennedy	10	275-319	299.40	4.28		13.53	3.02	4.51	1.01
Maximum Circumference									
Male									
Kennedy	9	507-565	530.00	6.03		18.09	4.26	3.41	.80
Female									
Kennedy	11	474-540	509.90	5.94		19.71	4.20	3.86	.83
Bicondylar Width									
Male									
Kennedy	8	116-134	126.25	1.90		3.58	1.34	4.26	1.06
Female									
Kennedy	5	117-123	119.80	.92		2.05	.65	1.71	.54

TABLE II

## TABULATION OF CRANIAL MEASUREMENTS AND INDICES (continued)

	N	R	M	S.E	$d/\sigma^2 d$	S.D	S.E	V.	S.E
<b>Height of Symphysis</b>									
<b>Male</b>									
Kennedy	12	31-40	36.33	.85		2.94	.60	8.09	1.65
<b>Female</b>									
Kennedy	10	25-40	32.30	1.40		4.44	.99	13.75	3.07
<b>Bigonial Diameter</b>									
<b>Male</b>									
Kennedy	11	96-114	102.63	1.96		6.51	1.39	6.34	1.35
<b>Female</b>									
Kennedy	10	87-107	94.40	2.53		8.00	1.79	8.47	1.89
<b>Height of Ascending Ramus</b>									
<b>Male</b>									
Kennedy	11	57-81	70.18	2.06		6.83	1.46	9.73	2.07
<b>Female</b>									
Kennedy	7	52-70	62.00	1.99		5.26	1.40	8.48	2.23
<b>Minimum Breadth of Ascending Ramus</b>									
<b>Male</b>									
Kennedy	13	33-46	36.69	.89		3.23	.63	8.80	1.72
<b>Female</b>									
Kennedy	7	31-35	33.00	.53		1.41	.38	4.27	1.14
<b>Mandibular Length</b>									
<b>Male</b>									
Kennedy	10	79-94	84.70	1.39		4.39	.98	5.18	1.16
<b>Female</b>									
Kennedy	7	73-81	76.85	.87		2.30	.61	2.99	.80

TABLE II

## TABULATION OF CRANIAL MEASUREMENTS AND INDICES (continued)

	N	R	M	S.E	$d/\sigma d$	S.D	S.E	V.	S.E
<b>Mean Angle Lower Jaw</b>									
<b>Male</b>									
Kennedy	12	101-124	113.83	1.97		6.84	1.40	6.01	1.23
<b>Female</b>									
Kennedy	7	112-125	117.28	1.71		4.53	1.21	3.86	1.03
<b>Total Facial Angle</b>									
<b>Male</b>									
Kennedy	11	76-90	83.09	1.22		4.04	.86	4.86	1.04
<b>Female</b>									
Kennedy	6	62-96	86.50	4.80		11.75	3.39	13.58	3.92
<b>Alveolar Angle</b>									
<b>Male</b>									
Kennedy	8	63-77	69.37	1.67		4.73	1.18	6.82	1.70
<b>Female</b>									
Kennedy	8	49-67	62.50	3.03		8.56	2.14	13.70	3.42
<b>Mid-Facial Angle</b>									
<b>Male</b>									
Kennedy	9	68-83	77.00	1.48		4.45	1.05	5.78	1.36
<b>Female</b>									
Kennedy	9	63-93	77.22	3.04		9.12	2.15	11.81	2.78
<b>Cranial Capacity</b>									
<b>Male</b>									
Kennedy	11	1309.90- 1901.80	1548.71	52.96	K-H2.95	175.67	37.46	11.34	2.42
Hrdlicka	11	1240.00- 1500.00	1370.00	25.44		84.39	17.99	6.16	1.31
Cressman	<u>1</u>	<u>1100.00</u>	<u>1100.00</u>						
	23	1901.80	1456.77						

TABLE II

## TABULATION OF CRANIAL MEASUREMENTS AND INDICES (continued)

	N	R	M	S.E	d/ $\sigma$ d	S.D	S.E	V.	S.E
<b>Female</b>									
		1204.20-							
Kennedy	17	1926.00	1462.40	47.52	K-H4.27	195.94	33.60	13.40	2.30
		1145.00-							
Hrdlicka	19	1390.00	<u>1242.77</u>	23.49		40.47	16.61	6.67	1.34
		1145.00-							
	36	1926.00	1346.48						
<b>Cranial Index</b>									
		69.19-							
Kennedy	16	86.20	74.19	.95	K-H2.16	3.79	.67	5.11	.90
		72.80-							
Hrdlicka	15	87.10	77.29	1.03	K-C1.93	4.17	.76	5.39	.98
		70.20-							
Cressman	<u>9</u>	85.00	<u>77.58</u>	1.59	H-C .14	4.78	1.12	6.16	1.45
		69.19-							
	40	87.10	76.11						
<b>Male</b>									
		72.00-							
Shaw-Bolton	125	89.00	79.50	.24	S-G2.70	2.74	.17	3.45	.22
		77.90-							
Gifford	15	86.50	81.63	1.00	S-M1.63	3.89	.71	4.76	.86
		77.00-							
Boas	4	84.00	79.65		G-M3.00				
Michelson	40		<u>78.75</u>	.47		2.93	.33	3.72	.42
		72.00-							
	184	89.00	79.51						
		63.21-							
Kennedy	17	84.04	76.36	1.06	K-H1.23	4.37	.75	5.72	.98
		73.40							
Hrdlicka	<u>9</u>	85.60	<u>79.04</u>	1.44		4.33	1.02	5.48	1.29
		63.21-							
	26	85.60	77.29						
<b>Female</b>									
		75.00-							
Shaw-Bolton	26	85.00	79.50	.48	S-G2.91	2.45	.34	3.08	.43
		74.70-							
Gifford	15	88.70	82.27	.96	S-B .87	3.74	.68	4.55	.83
		77.70-							
Boas	<u>9</u>	84.70	<u>80.53</u>	.88	G-B1.23	2.64	.57	3.28	.77
		74.70-							
	50	88.70	80.52						

TABLE II

## TABULATION OF CRANIAL MEASUREMENTS AND INDICES (continued)

	N	R	M	S.E	d/ $\sigma^2$ d	S.D	S.E	V.	S.E
Height-Length Index									
Male									
Kennedy	9	69.69- 79.31	73.98	.94	K-H1.07	2.83	.67	3.82	.90
Hrdlicka	13	67.70- 79.41	72.51	.94		3.38	.66	4.66	.91
Cressman	<u>1</u>		<u>74.46</u>						
	23	67.70- 79.41	73.17						
Female									
Kennedy	15	55.74- 81.48	73.07	1.48	K-H .18	5.72	1.04	7.83	1.43
Hrdlicka	<u>9</u>	68.47- <u>78.44</u>	<u>73.14</u>	1.02		3.06	.72	4.17	.98
	24	55.74- 81.48	73.21						
Height-Breadth Index									
Male									
Kennedy	9	98.56- 108.14	100.24	2.25	K-H2.95	6.74	1.59	6.72	1.58
Hrdlicka	13	90.00- 103.07	93.78	.95		3.44	.67	3.67	.72
Cressman	<u>1</u>		<u>106.06</u>						
	23	90.00- 108.14	96.84						
Female									
Kennedy	15	78.18- 106.96	95.35	1.72	K-H .94	6.68	1.22	7.00	1.28
Hrdlicka	<u>9</u>	88.32- <u>101.53</u>	<u>93.06</u>	1.28		3.85	.91	4.14	.97
	24	78.18- 106.96	94.49						
Fronto-Parietal Index									
Male									
Kennedy	10	64.00- 76.25	70.91	1.25		3.94	.88	5.56	1.24
Female									
Kennedy	13	64.39- 78.18	68.46	.98		3.53	.69	5.16	1.01



TABLE II

## TABULATION OF CRANIAL MEASUREMENTS AND INDICES (continued)

	N	R	M	S.E	d/ $\sigma^2$ d	S.D	S.E	V.	S.E
<b>Auricular Height- Length Index</b>									
<b>Male</b>									
Kennedy	9	<del>58.63-</del> 66.48	62.42	.86		2.59	.61	4.15	.98
<b>Female</b>									
Kennedy	12	<del>59.04-</del> 66.25	62.79	.63		2.20	.45	3.50	.71
<b>Cranial Module</b>									
<b>Male</b>									
Kennedy	9	<del>14.51-</del> 16.36	15.30	.19	K-H .32	.58	.14	3.79	.89
Hrdlicka	13	<del>14.43-</del> 15.43	14.91	.02		.09	.02	.60	.12
Cressman	<u>1</u>		<u>15.33</u>						
	23	<del>14.51-</del> 16.36	15.08						
<b>Female</b>									
Kennedy	15	<del>12.70-</del> 15.66	14.68	.17	K-H .80	.65	.12	4.43	.81
Hrdlicka	<u>9</u>	<del>13.93-</del> <u>14.83</u> <del>12.70-</del>	<u>14.35</u>	.45		1.37	.32	9.55	2.25
	24	15.66	14.56						
<b>Facial Index</b>									
Kennedy	5	<del>86.66-</del> 96.69	89.51	1.70	K-H .37	3.80	1.20	4.24	1.34
Hrdlicka	<u>5</u>	<del>80.00-</del> <u>84.70</u> <del>80.00-</del>	<u>81.38</u>	.77		1.72	.54	2.11	.67
	10	96.69	85.44						
<b>Male</b>									
Shaw-Bolton	15	<del>78.10-</del> 89.80	80.50	1.01	S-G1.84	4.91	.90	6.10	1.11
Gifford	15	<del>78.20-</del> 89.80	83.47	1.26		3.92	.71	4.70	.86
Boas	<u>4</u>	<del>83.10-</del> <u>87.40</u> <del>78.10-</del>	<u>84.47</u>						
	34	89.80	82.28						

TABLE II

## TABULATION OF CRANIAL MEASUREMENTS AND INDICES (continued)

	N	R	M	S.E	d/ $\sigma^2$ d	S.D	S.E	V.	S.E	
Female	Kennedy	83.46-	88.32	1.87		4.58	1.32	5.18	1.49	
		93.89								
	Hrdlicka	77.40-	<u>78.55</u>							
		79.70								
		8	93.89	85.88						
	Shaw-Bolton		79.20							
	Gifford	15	77.10-	84.35	1.11	G-B .65	4.31	.79	5.11	.93
			92.00							
	Boas	9	75.20-	<u>83.25</u>	1.22		3.65	.86	4.38	1.03
			88.30							
		24	<u>75.20-</u> 92.00	83.94						
Upper Facial Index										
Male										
Kennedy	6	52.94-	55.49	.94	K-H3.78	2.31	.67	4.16	1.20	
		59.50								
Hrdlicka	15	46.40-	51.48	.56	K-C5.81	2.81	.40	5.46	1.00	
		54.30								
Cressman	7	44.80-	<u>47.76</u>	.94	H-C .89	2.48	.65	5.19	1.39	
		51.10								
		28	<u>44.80-</u> 59.50	51.41						
Female										
Kennedy	9	48.99-	54.19	.89	K-H1.83	2.67	.63	4.93	1.16	
		57.25								
Hrdlicka	7	47.40-	<u>51.57</u>	1.16		3.06	.82	5.93	1.50	
		55.50								
		16	<u>47.40-</u> 57.25	53.04						
Cranio-Facial Index										
Male										
Kennedy	6	87.05-	98.91	2.82	K-H .53	6.91	1.99	6.99	2.02	
		108.20								
Hrdlicka	13	95.13-	100.33	1.24	K-C .08	4.47	.88	4.45	.87	
		105.22								
Cressman	7	94.44-	<u>99.18</u>	1.76	H-C .54	4.67	1.25	4.70	1.26	
		107.63								
		26	<u>87.05-</u> 108.20	99.69						

TABLE II

## TABULATION OF CRANIAL MEASUREMENTS AND INDICES (continued)

	N	R	M	S.E	d/ $\sigma^2$ d	S.D	S.E	V.	S.E
<b>Male</b>									
Gifford	15	93.08- 98.68	96.25	1.43		5.55	1.01	5.77	1.05
Boas	<u>4</u>	95.94- 96.64	<u>96.26</u>						
	19	93.08- 98.68	96.25						
Kennedy	9	90.71- 117.27	98.70	2.48	K-H1.52	7.45	1.75	7.55	1.78
Hrdlicka	<u>7</u>	91.24- 100.00	<u>94.20</u>	1.03		2.73	.73	2.90	.77
	16	90.71- 100.00	96.73						
<b>Female</b>									
Gifford	15	87.92- 100.00	94.74	.84	G-B .16	3.27	.59	3.45	.63
Boas	<u>9</u>	93.33- 97.94	<u>94.56</u>	.54		1.61	.37	1.70	.40
	24	93.33- 100.00	94.67						
<b>Gnathic Index</b>									
<b>Male</b>									
Kennedy	6	91.08 135.92	103.25	6.07		14.86	4.29	14.39	4.15
<b>Female</b>									
Kennedy	8	89.00- 104.00	99.76	1.58		4.47	1.12	4.48	1.12
<b>Nasal Index</b>									
Kennedy	11	40.35- 75.38	49.16	2.67	K-H .06	8.87	1.89	18.04	3.85
Hrdlicka	<u>16</u>	38.60- 56.20	<u>49.34</u>	1.09		4.37	.77	8.86	1.57
	27	38.60- 75.38	49.27						
<b>Male</b>									
Shaw-Bolton			83.10						
Gifford	15	67.20- 89.30	77.47	1.62		6.26	1.14	8.08	1.47
Boas	<u>4</u>	80.40- 88.70	<u>84.70</u>						
	19	87.20- 89.30	78.94						

TABLE II

## TABULATION OF CRANIAL MEASUREMENTS AND INDICES (continued)

	N	R	M	S.E	d/ $\sigma$ d	S.D	S.E	V.	S.E
Kennedy	12	<del>44.23-</del> 79.36	53.71	2.95	K-Hs.09	10.22	2.09	19.03	3.89
Hrdlicka	<u>10</u>	<del>44.00-</del> <u>57.40</u>	<u>50.55</u>	1.33		4.20	.94	8.31	1.86
	22	<del>44.23-</del> 79.36	52.27						
Female									
Shaw-Bolton	26		85.10						
Gifford	15	67.30 91.70	75.44	1.88	G-BL.23	7.29	1.33	9.62	1.76
Boas	<u>9</u>	71.70- <u>89.10</u>	<u>79.26</u>	2.49		7.46	1.76	9.41	2.22
	50	<del>67.30-</del> 91.70	81.24						
Nasalia Transverse Index									
Male									
Kennedy	7	52.63- 80.00	68.03	4.56		12.08	3.23	17.76	4.75
Female									
Kennedy	8	42.85- 90.90	61.80	4.55		12.87	3.22	20.82	5.20
Right Occipital Index									
Male									
Kennedy	11	75.60- 100.00	90.97	1.59	K-HL.40	5.27	1.12	5.79	1.74
Hrdlicka	<u>15</u>	77.10- <u>96.20</u>	<u>88.30</u>	1.14		4.40	.80	4.98	.91
	26	<del>75.60-</del> 100.00	89.43						
Female									
Kennedy	12	83.41- 102.97	92.41	1.94	K-H .69	6.71	1.37	7.26	1.48
Hrdlicka	<u>10</u>	84.50- <u>97.40</u>	<u>90.93</u>	1.17		3.71	.83	3.49	.78
	22	<del>83.41-</del> 102.77	91.74						
Left Orbital Index									
Male									
Kennedy	11	88.09- 97.50	92.31	.93		3.10	.66	3.36	.72
Female									
Kennedy	10	85.00- 103.03	93.72	1.95		6.15	1.37	6.56	1.47

TABLE II

## TABULATION OF CRANIAL MEASUREMENTS AND INDICES (continued)

	N	R	M	S.E	$d/\sigma^d$	S.D	S.E	V.	S.E
Interorbital Index									
Male									
Kennedy	8	20.58- 28.28	23.66	.88		2.50	.62	10.57	2.64
Female									
Kennedy	8	20.00- 24.17	22.43	.45		1.28	.32	5.71	1.43
External Palatal Index									
Male									
Kennedy	9	72.14- 112.50	88.43	3.48		11.34	2.67	12.82	3.02
Female									
Kennedy	12	63.04 107.50	84.19	4.35		15.08	3.08	17.91	3.65
Mandibular Index									
Male									
Kennedy	6	62.68 75.20	67.77	1.70		4.16	.93	6.14	2.50
Female									
Kennedy	5	62.60 69.23	64.80	1.05		2.35	.74	3.63	1.15
Zygonial Index									
Male									
Kennedy	5	68.27- 89.25	76.05	3.19		7.14	2.26	9.39	2.97
Female									
Kennedy	5	66.66- 81.67	76.29	2.36		5.28	1.67	6.92	2.19
Fronto-Gonial Index									
Male									
Kennedy	6	87.61 110.00	95.51	3.00		7.36	2.12	7.70	2.22
Female									
Kennedy	5	66.66- 81.67	76.29	2.36		5.28	1.67	6.92	2.19
Ramus Index									
Male									
Kennedy	11	44.44- 89.90	59.34	3.72		12.34	2.63	20.69	4.33
Female									
Kennedy	6	48.57- 63.45	53.90	2.14		5.25	1.51	9.74	2.81

TABLE III

## TABULATION OF POST-CRANIAL MEASUREMENTS AND INDICES

	N	R	M	S.E	S.D	S.E	V.	S.E
Right Femur, Bicondylar Length								
Male	3	426-466	449.66					
Left Femur, Bicondylar Length								
Male	4	427-461	448.50					
Female	1		410.00					
Right Femur, Maximum Length								
Male	3	431-471	454.66					
Left Femur, Maximum Length								
Male	3	429-471	451.33					
Female	1		416.00					
Right Femur, Mid- Shaft Circumference								
Male	3	84-91	87.66					
Female	1		74.00					
Left Femur, Mid- Shaft Circumference								
Male	5	76-99	80.20	3.57	7.99	2.53	9.06	2.86
Female	1		72.00					
?	2	79-80	84.50					
Right Femur, Head Diameter								
Male	3	150-162	156.00					
Female	1		129.00					
?	1		122.00					

TABLE III

## TABULATION OF POST-CRANIAL MEASUREMENTS AND INDICES (continued)

	N	R	M	S.E	S.D	S.E	V.	S.E
Left Femur, Head Diameter								
Male	4	133-166	148.25					
Female	1		130.00					
?	2	120-150	135.00					
Right Femur, Sub- Trochanteric Diameter, Antero-Posterior								
Male	3	24-33	27.33					
Female	1		21.00					
?	2	25-24	24.50					
Left Femur, Sub- Trochanteric Diameter, Antero-Posterior								
Male	5	23-32	27.20	1.48	3.32	1.05	12.20	3.86
Female	1		24.00					
?	3	23-31	26.66					
Right Femur, Sub- Trochanteric Diameter, Lateral								
Male	3	29-35	31.66					
Female	1		28.00					
?	2	20-33	26.50					
Left Femur, Sub- Trochanteric Diameter, Lateral								
Male	5	31-36	33.00	2.55	5.70	1.80	17.27	5.46
Female	1		27.00					
?	3	27-36	31.33					

TABLE III

## TABULATION OF POST-CRANIAL MEASUREMENTS AND INDICES (continued)

	N	R	M	S.E	S.D	S.E	V.	S.E
Right Femur, Mid-Shaft Diameter, Antero-Posterior								
Male	3	27-31	29.33					
Female	1		22.00					
?	2	21-33	27.00					
Left Femur, Mid-Shaft Diameter, Antero-Posterior								
Male	5	25-35	29.60	1.55	3.46	1.09	11.69	3.70
Female	1		22.00					
?	4	27-37	32.75					
Right Femur Mid-Shaft Diameter, Lateral								
Male	3	25-31	27.00					
Female	1		23.00					
?	2	20-29	24.50					
Left Femur, Mid-Shaft Diameter, Lateral								
Male	5	23-29	26.60	.94	2.10	.66	9.29	2.94
Female	1		23.00					
?	3	23-29	25.66					
Right Tibia, Maximum Length								
Male	3	356-403	374.33					
Left Tibia, Maximum Length								
?	1		160					



TABLE III

## TABULATION OF POST-CRANIAL MEASUREMENTS AND INDICES (continued)

	N	R	M	S.E	S.D	S.E	V.	S.E
Right Tibia, Mid-Diameter, Antero-Posterior								
Male	4	20-35	28.75					
Female	1		24.00					
?	3	24-29	26.33					
Left Tibia, Mid-Diameter, Antero-Posterior								
Male	3	29-35	31.33					
Female	1		24.00					
?	3	14-30	23.33					
Right Tibia, Mid-Diameter, Lateral								
Male	5	19-31	24.60	2.06	4.60	1.45	18.70	5.91
Female	1		20.00					
?	3	20-27	24.33					
Left Tibia, Mid-Diameter, Lateral								
Male	2	22-26	24.00					
Female	1		20.00					
?	3	20-27	24.33					
Right Tibia, Nutrient Foramen Diameter, Antero-Posterior								
Male	5	30-39	33.20	1.64	3.66	1.16	11.02	3.48
Female	1		30.00					
?	3	31-36	33.33					

TABLE III

## TABULATION OF POST-CRANIAL MEASUREMENTS AND INDICES (continued)

	N	R	M	S.E	S.D	S.E	V.	S.E
<b>Left Tibia, Nutrient Foramen Diameter, Antero-Posterior</b>								
Male	3	30-39	34.66					
?	2	16-37	26.50					
<b>Right Tibia, Nutrient Foramen Diameter, Lateral</b>								
Male	4	20-36	25.00					
Female	1		21.00					
?	3	20-30	23.66					
<b>Left Tibia, Nutrient Foramen Diameter, Lateral</b>								
Male	3	23-33	27.66					
?	2	11-30	20.50					
<b>Right Tibia, Least Circumference</b>								
Male	4	76-90	84.00					
Female	1		67.00					
?	3	77-83	79.66					
<b>Left Tibia, Least Circumference</b>								
Male	3	82-93	86.33					
Female	1		65.00					
?	2	75-81	78.00					
<b>Right Fibula, Maximum Length</b>								
Male	2	341-347	344.00					

TABLE III

## TABULATION OF POST-CRANIAL MEASUREMENTS AND INDICES (continued)

	N	R	M	S.E	S.D	S.E	V.	S.E
Left Fibula, Maximum Length								
Male	1		338.00					
Right Humerus, Maximum Length								
Male	3	318-347	333.33					
?	1		266.00					
Left Humerus, Maximum Length								
Male	4	314-339	329.00					
?	1		337.00					
Right Humerus, Head Diameter								
Male	3	140-153	148.33					
Female	1		126.00					
?	1		134.00					
Left Humerus, Head Diameter								
Male	4	138-155	150.00					
?	2	149-153	151.00					
Right Humerus, Minimum Shaft Circumference								
Male	4	60-71	65.75					
Female	1		55.00					
?	5	43-63	51.40	3.06	6.84	2.16	13.31	4.21
Left Humerus, Minimum Shaft Circumference								
Male	4	57-68	63.75					
Female	1		54.00					
?	4	48-75	61.00					

TABLE III

## TABULATION OF POST-CRANIAL MEASUREMENTS AND INDICES (continued)

	N	R	M	S.E	S.D	S.E	V.	S.E
Right Radius, Maximum Length								
Male	3	249-264	257.66					
Left Radius, Maximum Length								
Male	4	247-266	259.25					
?	2	232-256	244.00					
Right Ulna, Maximum Length								
Male	2	271-283	277.00					
?	1		271.00					
Left Ulna, Maximum Length								
Male	1		280.00					
?	1		263.00					
Right Innominate, Height								
Male	3	201-221	211.00					
Left Innominate, Height								
?	1		206.00					
Right Innominate, Breadth								
Male	1		268.00					
Sagittal Diameter of Pelvic Inlet								
Male	2	110-114	112.00					
Transverse Diameter of Pelvic Inlet								
Male	3	120-138						

TABLE III

## TABULATION OF POST-CRANIAL MEASUREMENTS AND INDICES (continued)

	N	R	M	S.E	S.D	S.E	V.	S.E
Right Scapula, Morphological Breadth								
Male	2	102-113	107.50					
Left Scapula, Morphological Breadth								
Male	1		114.00					
Right Scapula, Morphological Length								
Male	2	157-165	161.00					
Left Scapula, Morphological Length								
Male	2	110-142	126.00					
?	1		130.00					
Left Scapula, Infra- Spinous Fossa Breadth								
Male	1		143.00					
Right Scapula, Supra- Spinous Fossa Breadth								
Male	2	56-109	82.50					
Right Clavicle, Maximum Length								
Male	2	158-170	164.00					
Left Clavicle, Maximum Length								
Male	3	144-164	156.00					
?	1		158.00					
Right Clavicle, Mid- Shaft Circumference								
Male	3	33-40	37.00					
?	1		33.00					

TABLE III

## TABULATION OF POST-CRANIAL MEASUREMENTS AND INDICES (continued)

	N	R	M	S.E	S.D	S.E	V.	S.E
<b>Left Clavicle, Mid-Shaft Circumference</b>								
Male	4	32-40	36.25					
?	3	17-35	27.33					
<b>Sacrum, Breadth</b>								
Male	4	125-146	130.50					
<b>Sacrum, Anterior Length</b>								
Male	5	111-127	119.00	2.85	6.37	2.01	5.35	1.69

TABLE III

## TABULATION OF POST-CRANIAL MEASUREMENTS AND INDICES (continued)

	N	R	M	S.E	$d/\sigma_d$	S.D	S.E	V.	S.E
<b>Stature</b>									
<b>Male</b>									
Kennedy	4	1680- 1772	1728						
Shaw-Bolton	109	1530- 1870	1661	5.67	S-G2.45	59.20	.38	3.56	.24
Gifford	15	1550- 1858	1702	18.04		69.90	3.29	4.11	.75
Boas	4	1710- 1881	1745						
Hrdlicka	<u>56</u>	1533- <u>1788</u>	<u>1668</u>						
	188	<u>1530</u> - 1870	1669						
<b>Female</b>									
Shaw-Bolton	21	1470- 1630	1528	8.31	S-G .91	38.10	5.78	2.49	.38
Gifford	14	1365- 1675	1550	27.03	S-B1.56	93.84	17.73	6.05	1.14
Boas	9	1531- 1645	1580	32.29	G-B .71	96.88	22.83	6.13	1.44
Hrdlicka	<u>26</u>	1428- <u>1645</u>	<u>1533</u>						
	70	<u>1365</u> - 1675	1541						

TABLE III

## TABULATION OF POST-CRANIAL MEASUREMENTS AND INDICES (continued)

	N	R	M	S.E	S.D	S.E	V.	S.E
Right Femur, Index of Platymeria								
Male	3	68.57- 113.79	87.66					
Female	1		75.00					
?	2	75.75- 120.00	97.87					
Left Femur, Index of Platymeria								
Male	5	69.69- 96.77	82.68	4.95	11.06	1.28	13.38	4.23
Female	1		88.88					
?	3	83.87- 88.46	86.14					
Right Femur, Middle Index								
Male	3	192.56- 197.18	194.98					
Left Femur, Middle Index								
Male	3	195.22- 219.02	206.35					
Female	1		175.60					
Right Femur, Pilastric Index								
Male	3	96.77- 124.00	109.59					
Female	1		95.65					
?	2	105.00- 113.79	109.39					
Left Femur, Pilastric Index								
Male	5	103.84 125.00	111.10	3.31	7.41	2.34	6.67	2.11
Female	1		125.00					
?	3	103.45- 124.00	114.94					
Right Femur, Index of Robusticity								
Male	2	122.53- 130.90	126.71					



TABLE III

## TABULATION OF POST-CRANIAL MEASUREMENTS AND INDICES (continued)

	N	R	M	S.E	S.D	S.E	V.	S.E
<b>Left Femur, Index of Robusticity</b>								
Male	4	123.64-	139.88	129.44				
Female	1			109.75				
?	3	68.97-	100.00	85.95				
<b>Left Tibia, Middle Index</b>								
Male	3	62.85-	89.65	75.27				
Female	1			83.33				
?	3	71.42	92.30	85.24				
<b>Right Tibia, Index of Platycnemia</b>								
Male	5	58.33-	120.00	74.34	5.01	11.20	3.54	15.06 4.76
Female	1			70.00				
?	3	55.55-	90.91	71.40				
<b>Left Tibia, Index of Platycnemia</b>								
Male	3	58.97-	110.00	82.03				
?	2	68.75-	81.08	74.91				
<b>Right Tibia, Length-Thickness Index</b>								
Male	4	191.01-	251.39	214.28				
<b>Left Tibia, Length-Thickness Index</b>								
?	1			237.50				
<b>Right Tibia, Tibio-Femoral Index</b>								
Male	3	78.33-	86.48	83.41				

TABLE III

## TABULATION OF POST-CRANIAL MEASUREMENTS AND INDICES (continued)

	N	R	M	S.E	S.D	S.E	V.	S.E
<b>Right Humerus, Index of Robusticity</b>								
Male	4	184.43- 210.68	196.69					
Female	1		183.33					
?	1		203.00					
<b>Left Humerus, Index of Robusticity</b>								
Male	4	181.52- 205.43	196.64					
Female	1		184.93					
?	1		201.78					
<b>Right Humerus, Humero-Femoral Index</b>								
Male	4	71.89- 76.08	74.63					
<b>Left Humerus, Humero-Femoral Index</b>								
Male	2	72.01- 72.90	72.45					
Female	1		71.21					
<b>Right Radius, Humero-Radial Index</b>								
Male	3	76.08- 78.30	77.33					
<b>Left Radius, Humero-Radial Index</b>								
Male	3	78.46- 78.66	78.57					
<b>Right Innominate, Breadth-Height Index</b>								
Male	1		75.00					
<b>Left Innominate, Breadth-Height Index</b>								
Male	1		90.90					

TABLE III

## TABULATION OF POST-CRANIAL MEASUREMENTS AND INDICES (continued)

	N	R	M	S.E	S.D	S.E	V.	S.E
Right Scapula, Scapular Index								
Male	2	64.96- 68.48	66.72					
Right Scapula, Infra-Spinal Index								
Male	2	70.06- 86.06	78.06					
Right Scapula, Supra-Spinous Index								
Male	2	35.67- 66.06	50.86					
Right Clavicle, Length-Thickness Index								
Male	2	208.86- 232.52	216.19					
Left Clavicle, Length-Thickness Index								
Male	2	218.75- 231.00	225.22					
?	1		107.59					
Sacral Index								
Male	4	106.77- 115.87	111.46					

TABLE IV

## TABULATION OF CRANIAL MORPHOLOGICAL OBSERVATIONS

	Male		Female	
	No.	%	No.	%
<b>1 - Description</b>				
Cranium	9	42.86	8	40.00
Calvarium	3	14.29	3	15.00
Calvaria	1	4.76	4	20.00
Calva	2	9.52	1	5.00
Mandible	6	28.57	4	20.00
	<u>21</u>		<u>20</u>	
<b>2 - Condition</b>				
Poor	6	28.57	5	25.00
Fair	6	28.57	5	25.00
Good	9	42.86	10	50.00
	<u>21</u>		<u>20</u>	
<b>3 - Muscularity</b>				
Small	1	5.26	10	58.83
Medium	13	68.42	6	35.29
Large	5	26.32	1	5.88
	<u>19</u>		<u>17</u>	
<b>4 - Age by Suture Closure</b>				
Young Adult (21-35)	2	9.52	1	5.00
Middle-Aged Adult (36-55)	10	47.62	10	50.00
Old Adult (56-75)	3	14.29	1	5.00
Very Old (76-X)	0	0	0	0
Age Unknown	6	28.57	8	40.00
	<u>21</u>		<u>20</u>	
<b>5 - Deformation</b>				
None	9	100.00	8	100.00
Occipital	0	0	0	0
Right Occipital	0	0	0	0
Left Occipital	0	0	0	0
Lambdoid	0	0	0	0
Fronto-Occipital	0	0	0	0
Other	0	0	0	0
	<u>9</u>		<u>8</u>	
<b>6 - Form</b>				
Ellipsoid	1	12.50	0	0
Ovoid	1	12.50	0	0
Spheroid	5	62.50	9	81.82
Pentagonoid	1	12.50	1	9.09
Rhomboid	0	0	0	0
Sphenoid	0	0	1	9.09
Brisoid	0	0	0	0
	<u>8</u>		<u>11</u>	

TABLE IV

## TABULATION OF CRANIAL MORPHOLOGICAL OBSERVATIONS (continued)

	Male		Female	
	No.	%	No.	%
7 - Brow Ridges				
Median	6	50.00	8	72.73
Divided	3	25.00	1	9.09
Continuous	3	25.00	2	18.18
	<u>12</u>		<u>11</u>	
8 - Brow Ridges Size				
Trace	0	0	0	0
Small	1	6.67	9	75.00
Medium	5	33.33	3	25.00
Large	6	40.00	0	0
Very Large	3	20.00	0	0
	<u>15</u>		<u>12</u>	
9 - Glabella				
Small	0	0	4	33.33
Medium	4	30.77	7	58.34
Large	6	46.15	1	8.33
Very Large	3	23.08	0	0
	<u>13</u>		<u>12</u>	
10- Frontal Height				
Very Low	0	0	0	0
Low	6	46.15	1	8.33
Medium	7	53.85	10	83.34
High	0	0	1	8.33
Very High	0	0	0	0
	<u>13</u>		<u>12</u>	
11- Frontal Slope				
None, Bulging	0	0	1	8.33
Slight	1	7.69	2	16.67
Medium	8	61.54	7	58.33
Pronounced	4	30.77	2	16.67
Very Pronounced	0	0	0	0
	<u>13</u>		<u>12</u>	
12- Metopism				
Absent	13	76.92	15	100.00
Traces	1	23.08	0	0
Complete	0	0	0	0
	<u>14</u>		<u>15</u>	
13- Postorbital Constriction				
Small	0	0	3	33.33
Medium	6	60.00	6	66.67
Large	4	40.00	0	0
	<u>10</u>		<u>9</u>	

TABLE IV

## TABULATION OF CRANIAL MORPHOLOGICAL OBSERVATIONS (continued)

	Male		Female	
	No.	%	No.	%
14- Frontal Bosses				
Small	10	83.33	6	60.00
Medium	2	16.67	2	20.00
Large	0	0	2	20.00
	<u>12</u>		<u>10</u>	
15- Median Crest				
Small	9	64.29	11	91.67
Medium	3	21.43	1	8.33
Large	2	14.28	0	0
	<u>14</u>		<u>12</u>	
16- Sagittal Elevation				
Small	4	33.33	4	30.77
Medium	5	41.67	6	46.15
Large	2	16.67	3	23.08
Very Large	1	8.33	0	0
	<u>12</u>		<u>13</u>	
17- Postcoronal Depression				
Small	2	18.18	3	25.00
Medium	8	72.73	8	66.67
Large	1	9.09	1	8.33
	<u>11</u>		<u>12</u>	
18- Parietal Bosses				
Small	1	9.09	0	0
Medium	6	54.55	4	33.33
Large	4	36.36	8	66.67
	<u>11</u>		<u>12</u>	
19- Parietal Foramina				
None	6	60.00	5	38.46
Small	2	20.00	7	53.85
Medium	2	20.00	0	0
Large	0	0	1	7.69
	<u>10</u>		<u>13</u>	
20- Temporal Fullness				
Flat	0	0	0	0
Small	4	40.00	2	18.18
Medium	6	60.00	6	54.55
Large	0	0	3	27.27
	<u>10</u>		<u>11</u>	

TABLE IV

## TABULATION OF CRANIAL MORPHOLOGICAL OBSERVATIONS (continued)

	Male		Female	
	No.	%	No.	%
21- Temporal Crests				
Low	2	16.67	0	0
Medium	9	75.00	10	83.33
High	1	8.33	2	16.67
	<u>12</u>		<u>12</u>	
22- Supramastoid Crest				
Small	3	27.27	8	66.67
Medium	5	45.46	4	33.33
Large	3	27.27	0	0
	<u>11</u>		<u>12</u>	
23- Sphenoid Depression				
Medium	8	100.00	11	100.00
Large	0	0	0	0
	<u>8</u>		<u>11</u>	
24- Occipital Curve				
None	1	10.00	0	0
Small	2	20.00	3	27.27
Medium	6	60.00	7	63.64
Pronounced	1	10.00	1	9.09
	<u>10</u>		<u>11</u>	
25- Inion				
None	0	0	0	0
Small	2	22.22	9	90.00
Medium	6	66.67	1	10.00
Large	1	11.11	0	0
	<u>9</u>		<u>10</u>	
26- Torus				
Absent	5	35.71	4	36.36
Small	3	21.43	5	45.46
Medium	4	28.57	2	18.18
Large	2	14.29	0	0
	<u>14</u>		<u>11</u>	
27- Shape of Torus				
Ridge	4	44.44	2	25.00
Mound	5	55.56	6	75.00
	<u>9</u>		<u>8</u>	
28- Lambdoid Flattening				
None	1	12.50	3	25.00
Small	2	25.00	1	8.33
Medium	4	50.00	2	16.67
Pronounced	1	12.50	6	50.00
	<u>8</u>		<u>12</u>	

TABLE IV

## TABULATION OF CRANIAL MORPHOLOGICAL OBSERVATIONS (continued)

	Male		Female	
	No.	%	No.	%
<b>29- Transverse Suture</b>				
Absent	7	77.78	9	100.00
Present	2	22.22	0	0
	<u>9</u>		<u>9</u>	
<b>30- Lambdoid Wormian Bones</b>				
None	10	90.90	11	84.62
Few	1	9.10	1	7.69
Medium	0	0	0	0
Many	0	0	1	7.69
	<u>11</u>		<u>13</u>	
<b>31- Other Wormian Bones</b>				
Coronal	0	0	0	0
Sagittal	0	0	0	0
Temporo-Occipital	0	0	0	0
Other	0	0	1	100.00
	<u>0</u>		<u>1</u>	
<b>32- Glenoid Fossa Depth</b>				
Small	1	12.50	3	25.00
Medium	6	75.00	8	66.67
Large	1	12.50	1	8.33
	<u>8</u>		<u>12</u>	
<b>33- Postglenoid Process</b>				
Small	0	0	1	11.11
Medium	8	100.00	8	88.89
Large	0	0	0	0
	<u>8</u>		<u>9</u>	
<b>34- Tympanic Plate</b>				
Thin	1	10.00	0	0
Medium	9	90.00	10	90.91
Thick	0	0	1	9.09
Very Thick	0	0	0	0
	<u>10</u>		<u>11</u>	
<b>35- Auditory Meatus</b>				
Round	1	0	1	8.33
Oval	7	70.00	9	75.01
Ellipse	0	0	1	8.33
Slit	2	20.00	1	8.33
	<u>10</u>		<u>12</u>	



TABLE IV

## TABULATION OF CRANIAL MORPHOLOGICAL OBSERVATIONS (continued)

	Male		Female	
	No.	%	No.	%
<b>36- Orbits Shape</b>				
Oblong	3	30.00	1	12.50
Rhomboid	1	10.00	3	37.50
Square	5	50.00	4	50.00
Ellipse	0	0	0	0
Round	1	10.00	0	0
	<u>10</u>		<u>8</u>	
<b>37- Orbits Inclination</b>				
None	1	10.00	1	12.50
Small	5	50.00	3	37.50
Medium	4	40.00	4	50.00
Pronounced	0	0	0	0
	<u>10</u>		<u>8</u>	
<b>38- Suborbital Fossa</b>				
Absent	0	0	0	0
Slight	2	20.00	3	33.33
Medium	5	50.00	5	55.56
Deep	3	30.00	1	11.11
	<u>10</u>		<u>9</u>	
<b>39- Malar Size</b>				
Small	0	0	0	0
Medium	3	30.00	6	75.00
Large	6	60.00	2	25.00
Very Large	1	10.00	0	0
	<u>10</u>		<u>8</u>	
<b>40- Malars Lateral Projection</b>				
Small	0	0	2	25.00
Medium	5	55.56	6	75.00
Large	4	44.44	0	0
	<u>9</u>		<u>8</u>	
<b>41- Malars Anterior Projection</b>				
Small	1	11.11	0	0
Medium	7	77.78	6	75.00
Large	1	11.11	2	25.00
	<u>9</u>		<u>8</u>	
<b>42- Malars Marginal Process</b>				
Absent	0	0	0	0
Submedium	0	0	4	44.44
Medium	3	50.00	5	55.56
Large	3	50.00	0	0
	<u>6</u>		<u>9</u>	

TABLE IV

## TABULATION OF CRANIAL MORPHOLOGICAL OBSERVATIONS (continued)

	Male		Female	
	No.	%	No.	%
43- Zygomatic Process Thickness				
Small	1	12.50	6	66.67
Medium	6	75.00	3	33.33
Pronounced	1	12.50	0	0
	<u>8</u>		<u>9</u>	
44- Nasion Depression				
Absent	1	10.00	0	0
Small	3	30.00	3	42.85
Medium	4	40.00	4	57.15
Deep	2	20.00	0	0
	<u>10</u>		<u>7</u>	
45- Nasal Root Height				
Very Low	0	0	0	0
Low	1	8.33	2	18.18
Medium	6	50.00	9	81.82
High	5	41.67	0	0
Very High	0	0	0	0
	<u>12</u>		<u>11</u>	
46- Nasal Root Breadth				
Very Small	0	0	1	9.00
Small	2	16.67	3	27.00
Medium	10	83.33	6	55.00
Large	0	0	1	9.00
Very Large	0	0	0	0
	<u>12</u>		<u>11</u>	
47- Nasal Bridge Height				
Very Low	0	0	1	11.11
Medium	3	42.86	6	66.67
High	2	28.57	1	11.11
Very High	2	28.57	1	11.11
	<u>7</u>		<u>9</u>	
48- Nasal Bridge Breadth				
Small	0	0	2	25.00
Medium	7	100.00	6	75.00
Large	0	0	0	0
	<u>7</u>		<u>8</u>	
49- Nasal Profile				
Straight	0	0	0	0
Concave	2	25.00	5	62.50
Concavo-Convex	6	75.00	3	37.50
Convex	0	0	0	0
	<u>8</u>		<u>8</u>	

TABLE IV

## TABULATION OF CRANIAL MORPHOLOGICAL OBSERVATIONS (continued)

	Male		Female	
	No.	%	No.	%
<b>50- Nasal Sills</b>				
Absent	0	0	0	0
Dull	2	22.22	1	12.50
Medium	3	33.33	4	50.00
Sharp	$\frac{4}{9}$	44.45	$\frac{3}{8}$	37.50
<b>51- Nasal Spine</b>				
Absent	0	0	0	0
Small	1	12.50	4	57.14
Medium	6	75.00	3	42.86
Large	$\frac{1}{8}$	12.50	$\frac{0}{7}$	0
<b>52- Subnasal Grooves</b>				
Absent	0	0	0	0
Small	0	0	2	25.00
Medium	5	55.56	0	0
Pronounced	$\frac{4}{9}$	44.44	$\frac{6}{8}$	75.00
<b>53- Alveolar Prognathism</b>				
Absent	0	0	0	0
Slight	1	8.33	3	25.00
Medium	2	16.67	1	8.33
Pronounced	$\frac{9}{12}$	75.00	$\frac{8}{12}$	66.67
<b>54- Alveolar Border Absorption</b>				
None	1	11.11	3	42.86
Slight	3	33.33	1	14.28
Medium	5	55.56	2	28.58
Pronounced	$\frac{0}{9}$	0	$\frac{1}{7}$	14.28
<b>55- Palate Shape</b>				
Parabolic	8	88.89	6	75.00
Hyperbolic	1	11.11	1	12.50
Elliptical	0	0	0	0
Small U	0	0	1	12.50
Large U	$\frac{0}{9}$	0	$\frac{0}{8}$	0
<b>56- Palate Height</b>				
Low	1	11.11	1	12.50
Medium	1	11.11	4	50.00
High	6	66.67	2	25.00
Very High	$\frac{1}{9}$	11.11	$\frac{1}{8}$	12.50

TABLE IV

## TABULATION OF CRANIAL MORPHOLOGICAL OBSERVATIONS (continued)

	Male		Female	
	No.	%	No.	%
<b>57- Palatine Torus Form</b>				
Ridge	1	11.11	0	0
Mound	0	0	0	0
Lump	8	88.89	7	100.00
	<u>9</u>		<u>7</u>	
<b>58- Palatine Torus Size</b>				
Absent	0	0	1	12.50
Small	3	33.33	4	50.00
Medium	5	55.56	3	37.50
Large	1	11.11	0	0
	<u>9</u>		<u>8</u>	
<b>59- Postnasal Spine</b>				
Absent	0	0	0	0
Small	2	25.00	4	66.67
Medium	6	75.00	2	33.33
Large	0	0	0	0
	<u>8</u>		<u>6</u>	
<b>60- Mandible Size</b>				
Small	0	0	4	44.44
Medium	6	46.15	5	55.56
Large	7	53.85	0	0
Very Large	0	0	0	0
	<u>13</u>		<u>9</u>	
<b>61- Chin Form</b>				
Median	5	41.67	6	60.00
Bilateral	7	58.33	4	40.00
	<u>12</u>		<u>10</u>	
<b>62- Chin Projection</b>				
Negative	0	0	0	0
Neutral	0	0	0	0
Small	1	7.69	5	50.00
Medium	8	61.54	5	50.00
Large	4	30.77	0	0
	<u>13</u>		<u>10</u>	
<b>63- Mandibular Alveolar Prognathism</b>				
None	0	0	2	20.00
Slight	8	75.00	7	70.00
Medium	4	25.00	1	10.00
Pronounced	0	0	0	0
	<u>12</u>		<u>10</u>	

TABLE IV

## TABULATION OF CRANIAL MORPHOLOGICAL OBSERVATIONS (continued)

	Male		Female	
	No.	%	No.	%
<b>64- Genial Tubercles</b>				
Absent	0	0	0	0
Small	2	15.38	6	60.00
Medium	7	53.85	2	20.00
Large	4	30.77	2	20.00
	<u>13</u>		<u>10</u>	
<b>65- Mylo-hyoid Ridge</b>				
Absent	1	7.69	1	10.00
Slight	6	46.15	8	80.00
Medium	5	38.47	1	10.00
Pronounced	1	7.69	0	0
	<u>13</u>		<u>10</u>	
<b>66- Pterygoid Attachment</b>				
Small	2	16.67	6	85.71
Medium	9	75.00	1	14.29
Pronounced	1	8.33	0	0
Very Pronounced	0	0	0	0
	<u>12</u>		<u>7</u>	
<b>67- Gonial Angle Eversion</b>				
None	3	25.00	4	50.00
Small	3	25.00	2	25.00
Medium	5	41.67	1	12.50
Pronounced	1	8.33	1	12.50
	<u>12</u>		<u>8</u>	
<b>68- Tooth Eruption</b>				
Incomplete	0	0	0	0
Complete	12	100.00	10	100.00
Third Molar Suppressed	0	0	0	0
	<u>12</u>		<u>10</u>	
<b>69- Teeth Lost Ante-Mortem</b>				
0	8	53.33	6	54.54
1-4	5	33.33	4	36.37
5-8	2	13.34	1	9.09
9-12	0	0	0	0
13-16	0	0	0	0
17-20	0	0	0	0
21-X	0	0	0	0
	<u>15</u>		<u>11</u>	

TABLE IV

## TABULATION OF CRANIAL MORPHOLOGICAL OBSERVATIONS (continued)

	Male		Female	
	No.	%	No.	%
70- Mandibular Torus				
Small	0	0	5	55.56
Medium	8	72.72	4	44.44
Large	3	27.28	0	0
	<u>11</u>		<u>9</u>	
71- Teeth Wear				
None	0	0	0	0
Slight	2	15.39	2	15.38
Medium	7	59.24	9	69.24
Pronounced	4	30.77	1	7.69
Very Pronounced	0	0	1	7.69
	<u>13</u>		<u>13</u>	
72- Teeth Caries				
0	14	100.00	12	100.00
1-4	0	0	0	0
5-8	0	0	0	0
9-16	0	0	0	0
17-X	0	0	0	0
	<u>14</u>		<u>12</u>	
73- Alveolar Abscess				
0	10	76.92	12	100.00
1-3	3	23.08	0	0
4-X	0	0	0	0
	<u>13</u>		<u>12</u>	
74- Shovel-shaped Incisors				
Absent	5	71.43	5	55.56
Slight	0	0	3	33.33
Medium	2	28.57	1	11.11
Pronounced	0	0	0	0
	<u>7</u>		<u>9</u>	
75- Bite				
Under	1	16.67	0	0
Edge	0	0	0	0
Slight Over	2	33.33	0	0
Medium Over	2	33.33	4	66.67
Pronounced Over	1	16.67	2	33.33
	<u>6</u>		<u>6</u>	
76- Crowding				
Absent	11	73.33	9	75.00
Slight	4	26.67	2	16.67
Medium	0	0	0	0
Pronounced	0	0	1	8.33
	<u>15</u>		<u>12</u>	

## APPENDIX B

### Additional Anthropometric Material From the Great Basin

Additional investigation has been conducted on the problems of the anthropometry of the Great Basin in the four years subsequent to the preparation of the original paper. This work is summarized in the analysis of the five series presented in this appendix. Two of these series were examined by the writer and are named accordingly. The frequency of crania for all the series is low, but their values are noted in order to extend as far as possible the anthropometric data for this area. Post-cranial material is also fragmentary and small, but when possible the dimensions of the long bones have been taken in order to give an estimate of stature. The series are as follows:

1. Kennedy Series 38: Four crania from Rose Spring (site Iny-372), Inyo County, California. They are on record at the Museum of Anthropology, University of California, Berkeley (catalog numbers 12-9900, 12-8904, 12-9899, 12-9901).
2. Krantz Series: Skeletal remains of thirty individuals from Karlo (site Las-7), Lassen County, California. These were measured by Mr. Grover Krantz and are on record at the Museum of Anthropology, University of California, Berkeley (catalog numbers 12-9904 through 12-9953). Time has not permitted the writer to measure this series, and the metric values presented below are those obtained by Mr. Krantz.
3. Kennedy Series 39: Three crania from Churchill County, Nevada (site Ch-15), and one cranium from Douglas County, Nevada. These are on record at the Museum of Anthropology, University of California, Berkeley (catalog numbers 12-9368, 12-9369, 12-9370, 12-9682).
4. Jameson Series: Two crania from Stansbury Island, Utah. (Sydney J. Jameson, 1953, Archaeological Notes on Stansbury Island. Anthropological Papers of the Department of Anthropology, University of Utah, No. 34, pp. 39-44.)
5. Beuttner-Janusch Series: Three crania from Deadman Cave, Utah. (John Beuttner-Janusch, 1954, Human Skeletal Material from Deadman Cave, Utah. Anthropological Papers of the Department of Anthropology, University of Utah, No. 19, pp. 1-9.)

These series constitute further samples from the areas of the Great Basin that have been described regionally as Western (Kennedy Series 38, Krantz Series), Central (Kennedy Series 39), and Eastern (Jameson and Beuttner-Janusch Series). Comparison of these with the values obtained from the larger original sample is profitable.

The series that pertain to the Western Area represent two groups with widely differing cranial morphologies. The Krantz series comes from the western border of the Great Basin area and is more representative of the Early Central California crania than of Great Basin material, as judged by its extreme dolichocephaly. In facial measurements, these specimens resemble more closely those of their trans-montane neighbors. Representatives of their probable southern contemporaries at Rose Spring (Kennedy Series 38) show metric affinities with Gifford's Western Mono type, in terms of medium to narrow crania, high faces, medium noses, and medium statures; hence they are well within the range of variability for the Great Basin. The male cranium of this small series was unacceptable for certain measurements, but visual examination shows it to be highly dolichocephalic, a condition reflecting perhaps the trend in this area of Nevada for males to be long-headed in an otherwise mesocephalic population. There is a close correlation of cranial data between the four crania from the Central Area (Kennedy Series 39) and the larger initial series for this region. Similarly, the two series from the Eastern Area (Jameson and Beuttner-Janusch Series) agree with data already on record from Utah. Examination of the metric data for these series best illustrates the regional integrity of the Great Basin material, although caution should be exercised in the application of strict areal boundaries.

Special variations and anomalies are few for the five small series here appended. Mention should be made of the great differences in tooth condition and wear between dentitions of the Krantz series, where tooth wear is extreme, and the Kennedy Series 38, where the dentition is remarkably good for all crania. Both groups share a moderate incidence of lambdoid flattening. Two crania from Rose Spring (catalog numbers 12-8904 and 12-9899) have a torsional orientation along the bregma-lambda medial line, which results in a bulging of the right parietal region. This is accompanied in the second cranium by a low metopic crest extending from glabella to bregma. Crania of Kennedy Series 39 show a poor quality of dentition with regard to wear, abscessing, and crowding. One cranium (catalog number 12-9682) has an occipital bun, a feature shared with some crania of the Krantz series. For both Utah series the teeth show average wear and a low frequency of caries. Wormian bones are common in all the series. One



cranium (Burial II of the Jameson Series) has a metopic ridge similar to that of a cranium noted in the Kennedy Series 39 (catalog number 12-9899). Artificial deformation is limited to a single cranium from Utah (Burial II of Beuttner-Janusch Series).

In summary, five series of crania from three areas of the Great Basin have been analyzed and compared. They all reveal regional variations which correspond to areal differences already noted in the original paper. This analysis has served to validate some of the concepts offered by the writer before the addition of the appendix, as well as to extend up to the present record data on samples of skeletal material available for the Great Basin.

TABULATION OF CRANIAL MEASUREMENTS AND INDICES

Series	Kennedy Series 38		Krantz Series	
	Male	Female	Male (Mean)	Female (Mean)
Sex				
Age	50-55	60-65	12-9904 to 12-9953	(30 individuals)
Catalog Number	12-9900	12-9899	12-9904 to 12-9953	(30 individuals)
Glabella-Occipital Length	172	168	197	181
Maximum Width	135	132	132	131
Auricular Height		117	118	112
Minimum Frontal Diameter			93	89
Maximum Frontal Diameter			138	128
Total Facial Height	118		117	110
Upper Facial Height	72		71	66
Nasal Height	52		52	49
Nasal Breadth	24		27	24
Orbital Height (Mean)		38	33	33
Orbital Breadth (Mean)		41	43	40
Internal Palate Height	54			

TABULATION OF CRANIAL MEASUREMENTS AND INDICES (continued)

Series	Kennedy Series 38				Krantz Series	
	Male	Female	Female	Female	Male (Mean)	Female (Mean)
Age	50-55	50-55	60-65	25-30		
Catalog Number	12-9900	12-8904	12-9899	12-9901	12-9904 to 12-9953 (30 individuals)	
Internal Palate Breadth	40			37		
Mandibular Length	66	94		84		
Mandibular Width	114	127		125	126	118
Cranial Index			78.5	76.1	67.2	72.7
Auricular Index			69.6	59.6	60.5	62.0
Total Facial Index					85.3	85.6
Upper Facial Index				54.1	51.4	51.8
Nasal Index	46.2			54.5	52.9	50.3
Orbital Index (Mean)	86.5		92.6	88.2	76.0	80.9
Internal Palate Index	74.1			78.7		
Mandibular Index	57.8		74.0	67.2		
Stature	159	148	153		160	150

TABULATION OF CRANIAL MEASUREMENTS AND INDICES (continued)

Series	Kennedy Series 39		Jameson Series		Beuttner-Janusch Series	
	Male	Female	Male	Female	Male	Female
Sex						
Age	35-40	55-60	30-35	30-35	35-40	40-45
Catalog Number	12-9368	12-9369	12-9370	12-9682	Bur. I Bur. II Com. III	Bur. I Bur. II Com. III
Glabella-Occipital Length	180	176	172	181	196	174
Maximum Width	132	135	130	128	137	148
Auricular Height	122	114	114	115	127	119
Minimum Frontal Diameter	99	92	93	90		
Maximum Frontal Diameter	132	123				
Total Facial Height	117	127		124	120	
Upper Facial Height	74	72		73	72	71
Nasal Height	52	54		50	49	51
Nasal Breadth	26	26		22	27	25
Orbital Height (Mean)	33	37			30	34
Orbital Breadth (Mean)	38	38			33	37
Internal Palate Height	55	50		50		



## Bibliography

### Antevs, Ernst

- 1925 On the Pleistocene History of the Great Basin. Carnegie Institution of Washington, Publ. No. 352, pp. 53-114.
- 1948 Climatic Changes and Pre-White Man. In The Great Basin, Univ. Utah. Bull. Vol. 38, No. 20, pp. 168-91.
- 1952 Climatic History and the Antiquity of Man in California. UCAS-Report No. 16, pp. 23-31.

### Boas, Franz

- 1895 Anthropological Observations on the Mission Indians of Southern California. Proc. Amer. Assoc. Advancement of Science, 44th Meeting, pp. 261-69.
- 1895 Zur Anthropologie der Nordamerikanischen Indianer. Zeitschrift für Ethnologie. Vol. 22, pp. 366-416.
- 1899 Anthropometry of Shoshonean Tribes. American Anthropologist, n.s., Vol. 1, No. 4, pp. 751-58.

### Cameron, John

- 1929 The Influence of the Sexual Factor Upon the Cephalic Index. Amer. Journ. Physical Anthropology, Vol. 13, No. 1, pp. 171-76.

### Cressman, L. S.

- 1938 Early Man and Culture in the Northern Basin in Oregon. Carnegie Institution of Washington Year Book No. 37, pp. 341-44.
- 1942 Archaeological Researches in the Northern Great Basin. Carnegie Institution of Washington, Publ. No. 538, pp. 141-43.
- 1951 Western Prehistory in the Light of Carbon 14 Dating. Southwestern Journal of Anthropology, Vol. 7, No. 3, pp. 289-313.

### Dixon, R. B.

- 1923 The Racial History of Man. C. Scribner's Sons.

Gabel, Norman

- 1949 A Comparative Racial Study of the Papago. Univ. New Mexico  
Publ. in Anthropology, No. 4.

Gifford, E. W.

- 1926 Californian Anthropometry. Univ. Calif. Publ. Amer. Archaeol.  
and Ethnol., Vol. 22, No. 2, pp. 217-390.
- 1951 California Indian Physical Types. In The California Indian:  
A Source Book Compiled and Edited by R. F. Heizer and M. A.  
Whipple. Univ. Calif. Press, Berkeley and Los Angeles, pp. 82-87.

Goldstein, M. S.

- 1934 Anthropometry of the Comanches. Amer. Journ. Physical Anthro-  
pology, Vol. 9, No. 2, pp. 289-319.

Hansen, G. H.

- 1934 Utah Lake Skull Cap. American Anthropologist, Vol. 36, No. 3,  
pp. 431-33.

Harrington, M. R.

- 1934 A Camel-Hunter's Camp in Nevada. Master Key, Vol. 8, No. 1,  
pp. 22-24.

Heizer, R. F.

- 1951 Preliminary Report on the Leonard Rock Shelter Site, Pershing  
County, Nevada. American Antiquity, Vol. 17, No. 2, pp. 89-98.

Hooton, E. A

- 1930 The Indians of the Pecos. Dept. of Archaeology, Phillips  
Academy, Andover, Mass. Yale Univ. Press.
- 1946 Up From the Ape. Revised Edition. Macmillan.

Hrdlicka, Ales

- 1906 Contribution to the Physical Anthropology of California. Univ.  
Calif. Publ. Amer. Archaeol. and Ethnol., Vol. 4, No. 2, pp.  
49-64.
- 1907 Paiute Skull from Nevada (No. 243817): Skeletal Remains Suggest-  
ing or Attributed to Early Man in North America. Bur. Amer.  
Ethnol. Bull. 33, pp. 1-113.

- Hrdlicka, Ales (cont'd.)
- 1908      Physiological and Medical Observations Among the Indians of Southwestern United States and Northern Mexico. Bur. Amer. Ethnol. Bull. 34, pp. 1-460.
- 1909      On the Stature of the Indians of the Southwest and of Northern Mexico. Anthropological Essays, Putnam Anniversary Volume, pp. 405-26.
- 1927      Catalogue of Human Crania in the United States National Museum Collections. Proc. United States National Museum, Vol. 69, Art. 5, pp. 92-101.
- 1939      Practical Anthropometry. Wistar Institute of Anatomy and Biology.
- Loud, L. L. and M. R. Harrington
- 1929      Lovelock Cave. Univ. Calif. Publ. Archaeol. and Ethnol., Vol. 25, No. 1, pp. 1-183.
- Lowie, R. H.
- 1909      The Northern Shoshone. Anthropological Papers of the Amer. Mus. Natural History, Vol. 2, Pt. 2, pp. 169-306.
- 1923      The Cultural Connection of California and Plateau Shoshone Tribes. Univ. Calif. Publ. Amer. Archaeol. and Ethnol., Vol. 20, pp. 145-56.
- Martin, P. S., G. I. Quimby and D. Collier
- 1946      Indians Before Columbus. Chicago.
- Michelson, Truman
- 1930      Note on Shoshone Anthropometry. Proc. Twenty-Third International Congress of Americanists, p. 856.
- Mooney, J.
- 1898      Calendar History of the Kiowa. Seventeenth Annual Report of the Bur. Amer. Ethnol, pp. 131-444.
- Neumann, Georg
- 1946      On the Physical Types of the Shoshonean-Speaking Tribes. Reprinted from the Proc. Indiana Academy of Sciences, Vol. 55, pp. 26-28.



- Newman, R. W.  
 1957 A Comparative Analysis of Prehistoric Skeletal Remains from the Lower Sacramento Valley. UCAS-Report No. 39, pp. 1-66.
- Oetteking, B.  
 1927 Pathologic Plagiocephaly in a Nevada Skull. Indian Notes and Monographs, Heye Foundation, No. 3, pp. 201-09.
- Putnam, F. W.  
 1880 Report of the Curator to the Trustees of the Peabody Museum of American Archaeology and Ethnology: Measurements of the Crania Received During the Year. Eleventh Annual Report of the Trustees of the Peabody Museum, Vol. 2, No. 2, pp. 221-22.
- Roberts, F. H. H., Jr.  
 1932 The Village of the Great Kivas on the Zuffi Reservation, New Mexico. Bur. Amer. Ethnol. Bull. 111.
- Simpson, G. G. and Ann Roe  
 1939 Quantitative Zoology. First Edition. McGraw-Hill.
- Smith, Elmer  
 1950 Post-Caucasian Gosiute Burials from Deep Creek Area of Utah: The Archaeology of the Deep Creek Region, Utah. A Reprint of the Archaeology and Ethnology Papers, Number 1 to 8, of the Museum of Anthropology, University of Utah. Paper No. 5, pp. 64-68.
- Snyder, L. H.  
 1926 Human Blood Groups: Their Inheritance and Racial Significance. Amer. Journ. Physical Anthropology, Vol. 9, No. 2, pp. 233-63.
- Steward, J. H.  
 1933 Archaeological Problems of the Northern Periphery of the Southwest. Museum of Northern Arizona, Bull., 5 pp.  
 1940 Native Cultures of the Intermontane (Great Basin) Area. Smithsonian Miscellaneous Collections, Vol. 100, pp. 445-502.
- Sullivan, L. R.  
 1922 The Frequency and Distribution of Some Anatomical Variations in American Crania. Anthropological Papers of the American Museum of Natural History, Vol. 23, pt. 5, pp. 203-58.

Trotter, Mildred and G. C. Gleser

- 1952 Estimation of Stature from Long Bones of American Whites and Negroes. Amer. Journ. Physical Anthropology, Vol. 10, No. 4, pp. 463-514.

Virchow, Rudolf

- 1892 Shädel eines Pah Ute, Nordamerika. Crania Ethnica Americana. Tafel 16. Verlag von A. Asher and Company. Berlin.

von Bonin, Gerhardt and G. M. Morant

- 1938 Indian Races in the United States. A Survey of Previously Published Cranial Measurements. Biometrika, Vol. 30, pp. 94-129.

Wissler, Clark

- 1931 Observations on the Face and Teeth of North American Indians. Anthropological Papers of the American Museum of Natural History, Vol. 33, Pt. 1, pp. 1-33.

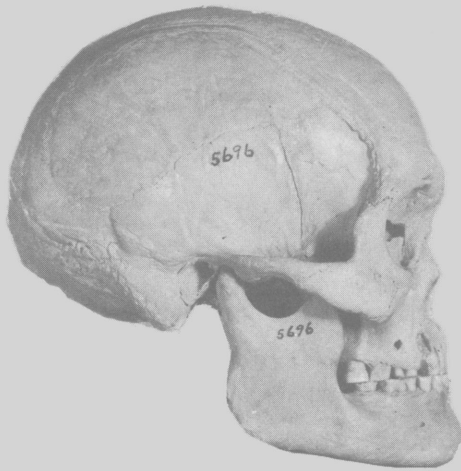
Explanation of Plate 1

a, b, c: The Central Area Morphological Type. Male; front, side, top views (University of California Museum of Anthropology Specimen No. 12-5696).

d, e, f: Three Examples of Anatomical Variation in Central Area Morphological Type. d: Infantile form of pyriform aperture, male (UCMA No. 12-8252). e: Inca bone, male (UCMA No. 12-2617). f: Pronounced superorbital grooves on the frontal bone, male (UCMA No. 12-2624).



a



b



c



d



e



f