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OF CALIFORNIA AND IN THE
U.S. NATIONAL MUSEUM

BY

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CONTRIBUTION
TO THE
PHYSICAL ANTHROPOLOGY OF CALIFORNIA

*Based on collections in the Department of Anthropology of the University
of California and in the U.S. National Museum.*

BY

ALEŠ HRDLIČKA.

I.

No other state in the Union is more interesting and important anthropologically than California. This extensive region, extending over nearly ten degrees of latitude and longitude, offered by its configuration and favorable natural conditions available routes for migration and good opportunities for settlement. Of the aboriginal migrations there are no records; no movement of any great consequence took place since the advent of whites into the region in 1769; the settlement of the country by the Indian, however, was extensive and varied. The number of groups and dialects encountered here by the Spaniards reached into hundreds, and even at the present time the remnants of the tribes and languages, most of the latter peculiar to the region, are numerous and perplexing.¹ Under these circumstances it becomes desirable to survey this territory as far as possible from the standpoint of physical anthropology.

Physical features of man are less mutable than his functional and more or less artificial acquisitions, such as language, or habits and customs. Organic features do undergo frequent modifications fortuitously, and through the influence of environment, but

¹ See J. W. Powell, 7th Ann. Rept. Bur. Amer. Ethnology; and R. B. Dixon and A. L. Kroeber, *The Native Languages of California*, Amer. Anthropol., Vol. 5, January-March, 1903, pp. 1-26.

the development of definite, important, and hereditary characters in whole groups of men, such as tribes or races, must require the time of many generations, and a change of the whole physical type of such a group would take immeasurably longer. These facts constitute an advantage to physical anthropology in determining the racial affinities and past family relations of peoples; it is therefore this branch of investigation that can be expected to throw light on the intraneous and extraneous blood relations of the California Indians.

Physical anthropology, in the widest sense, comprises the knowledge and comparison, in groups of mankind, of every anatomical feature of the body. Usually, however, the study is restricted to a number of the racially more important characteristics, which are observed partly on the living, and partly on the organs of the body, especially the skull and skeleton. The best results are possible only where the living as well as the different parts of the lifeless body can be examined; but this is not always appreciated and in numerous instances, as with extinct tribes, is impossible. In such cases the student must content himself with whatever remnants have been gathered of the skeleton of the people to be studied. It is thus in California. No opportunity has ever been afforded to study physically, on a large scale, the still living tribes of the State.¹ Meanwhile numerous groups are rapidly nearing extinction and of not a few, as for instance of the Islanders in the South, there are no longer any living representatives. Even of the skeletal remains of the Californians there is, except from a few localities, a great deficiency; and the majority of known collections consists of skulls only.

¹Several of the tribes (Southern Californians, Hupas, Round Valley people) have been measured under the auspices of Professor Putnam, Chief of the Department of Ethnology of the World's Fair in Chicago; the results are included in F. Boas' *Zur Anthropologie der Nordamerikanischen Indianer*, Verhandl. d. Berlin. Anthropolog. Gesellsch., 1895, p. 367 et seq. Further anthropometric work has been done by Boas and Streeter among the southern Mission Indians; see F. Boas, *Anthropometrical Observations on the Mission Indians of Southern California*, Proc. A. A. A. S., XLIV, Salem, 1896, 261-269. See also Boas, *Anthropometry of Central California*, Bull. Am. Mus. Nat. Hist., Vol. XVII, pp. 347-380, 1905, based on measurements among the Round Valley Indians and the Maidu by Chestnut and Dr. R. B. Dixon.

The most important collections of California crania are those from the southern islands with the proximate Santa Barbara County, preserved mainly in the National Museum and the Peabody Museum of Harvard University. Lesser gatherings from these localities exist in Prague, Berlin, and Cambridge, in Europe. This material has already received scientific attention. A series of skulls was described by Jennie Smith and L. Carr in 1871,¹ Carr in 1897,² Otis in 1880,⁴ Virchow⁵ in 1889, Harrison Allen⁶ in 1896, Matiegka⁷ in 1904, and Pocock⁸ in 1905.

The data thus accumulated are not as homogeneous as desirable; the American collections require a restudy by modern methods and instruments; nevertheless we are comparatively rich in the craniological knowledge of the region covered, which is an additional stimulus for extending the investigation over the remainder of the State.

Within the last five years the Department of Anthropology of the University of California, under the leadership of Professor F. W. Putnam, has given the subject attention and is forming an osteological collection. In 1902 twenty good crania from various parts of the mainland, which had been gradually acquired by the University, were sent by Professor Putnam to the writer for examination.

¹ Measurements of the Crania received during the year (taken by Miss Jennie Smith and Mr. L. Carr), 11th Ann. Rep. Peabody Mus., Cambridge, Mass., 1878; (Vol. II of the Reports, pp. 221-223).

² L. Carr, Measurements of Crania from California, 12th Ann. Rep. Peabody Mus., Cambridge, Mass., 1879; (Vol. II of the Reports, pp. 497-505).

³ L. Carr, Observations on the Crania from the Santa Barbara Islands, Cal., U. S. Geol. Surveys W. of the 100th meridian (Wheeler's), Vol. VII, Archaeology, Washington, 1879, pp. 276-292. Includes Otis' data.

⁴ G. A. Otis, List of the Specimens in the Anatomical Section of the U. S. Army Med. Mus., Washington, D. C. (This collection is now in the U. S. Nat. Mus. and will ultimately be reexamined.)

⁵ R. Virchow, Beitr. z. Craniologie d. Insulaner v. d. Westküste Nordamerikas, Verhandl. d. Berlin. Gesell. f. Anthrop., Ethnol. and Urgesch., 1889, 382 et seq.

⁶ Harrison Allen, Crania from the mounds of the St. Johns River in Fla.; J. Acad. Nat. Sci. Phila., N. S., X. 4, pp. 391 et seq. Includes description of several California skulls from the mainland.

⁷ J. Matiegka, U. Schaedel und Skelette von Santa Rosa (Sta Barbara Archipel bei California); Sitzber. d. K. böhm. Gesell. d. Wiss., II Classe, Prague, 1904, pp. 1-121. The only one to describe other skeletal parts, besides the skulls, from the region.

⁸ W. I. Pocock, Crania from Shell-bearing Sand-hills near San Francisco, now in the Cambridge Museum, Man, Oct., 1905, pp. 148-152. (This paper was received too late for its contents to be incorporated. It deals with four imperfect specimens.)

The series was found to be a very interesting one, but not as large as desirable. Since then, however, it has become possible for the writer to examine and incorporate with the report the data upon twenty-seven California mainland crania in the U. S. National Museum. The conjoint report is herewith presented. The combined material is still far from ample; nevertheless the data obtained contain many rather surprising and valuable indications.

II.

The material to be described consists of forty-seven skulls, the distribution of which is marked on the accompanying map.¹ The best represented regions are the central counties, especially the territory about the bay of San Francisco; there is almost nothing from the most northern and southern counties.

The most unexpected and important result of the examinations is the close agreement in many respects of a large majority of the crania. This makes possible a grouping together of the various specimens, and will simplify tabulation.

It was found particularly difficult in this series to separate all the female from the male crania. This was due, on one hand, to the small size of many of the skulls which on account of other features had to be classed as male, and on the other hand to the frequent approach of the crania of the two sexes in such sex differentiating characteristics as the supraorbital ridges, mastoids, thickness of the vault, and angle of the lower jaw. It was in this connection that the want of other parts of the skeleton, especially the pelvis, was felt badly. In one instance (178.148) the presence of the pelvis of the same skeleton alone permitted a determination of the cranium as that of a male. The rule adhered to in the records was, to class as masculine, skulls in which the sum of distinguishing features pointed to the male sex, and vice versa. The frequent approach in several characteristics of

¹ When the University of California skulls were sent to Dr. Hrdlicka in 1902, systematic cataloguing of all the collections of the Department of Anthropology had not been undertaken, and the skulls in question, accumulated during a series of years, were accompanied only by loose labels and were for the most part unmarked for identification. In consequence a confusion appears possibly to have taken place between two of the skulls. Number 12-81 is perhaps from Sather, Alameda County, and 12-82 from Sandspit, Humboldt Bay, instead of as given.—[EDITOR.]

female skulls to those of males indicates probably a related amount of muscular activities in numerous members of the two sexes.

A number of the specimens were more or less damaged, two showed what were apparently signs of fire, and one, from a cave in Calaveras County, was incrustated with a layer of stalagmite 2 to 4 mm. thick, but not one showed any gross pathological condition. Nothing at all was met with that would indicate syphilis, rachitis, hydrocephalus, or such a premature closure of any suture as would affect the cranial form.

Artificial deformation of the skull existed in four cases only. It consisted in each one of these of a slight occipital compression, such as is produced by the weight alone of the child's head in the cradle.

No skulls that were not of adults are included in the series. The age of the individuals represented by the specimens was judged by the advance of synostosis in the sutures and the degree of wear of the teeth; the estimates are of course only approximative. Many of the crania were undoubtedly those of persons above 50, but no one showed a really high senility.

The instruments and methods used in the examination were, with a few exceptions, those of the French school. The capacity was determined by the method described by the writer, in 1903, in *Science*,¹ which with repeated tests remains satisfactory, giving, with proper care, data that are very near the absolute capacities. In facial measurements the heights to nasion instead of those to the uncertain Broca's ophryon were preferred. The two orbits differ more or less in every individual, therefore both were measured, and the records and index given are the mean of the two. The mean cranial diameter, or cranial module (Schmidt), is at least as good an expression of the size of the skull as the circumference and is therefore also given. Flower's gnathic index is used to indicate the grades of prognathism. Measurements of the palate, or rather of the superior dental arch, have also been taken according to the method of Flower, with the little exception that the breadth taken is the maximum one, while that of

¹A Modification in Measuring Cranial Capacity; *Science*, N. S. Vol. XVII, June 26, 1903, 1011-1014.

Flower, above the middle of the second molars, is not always the greatest dimension (though the difference is never considerable). The region about the second molars is not free from variation, hence it seems more correct to take always the maximum dimension wherever it occurs on the normal parts of the alveolar border. The cranial circumference is the maximum one above the supraorbital arches.

An effort was made, with resulting advantages, to arrange the descriptive terms also in columns, like the figures. The tables thus made permit an easier survey of various characteristics of the crania and facilitate analysis. A serious difficulty of every detailed description of the skull is the employment of proper, universally intelligible terms. I have endeavored to use, wherever possible, ordinary terms that need no explanation; and where the element of comparison to some standard is a necessity, the standard held in mind was a cranium of a white of the same sex, with average features.

III.

The California mainland crania are characterized mostly by small size, which in the Indian is a fairly safe suggestion of small stature. About Centerville, and on the islands and in the vicinity of the bay of San Francisco, larger crania indicate a better developed, probably better nourished, people. The accompanying tables give an abstract of the data on cranial capacity, the mean cranial diameter, and the circumference of the skull. The value of the measurements is such that the averages in the males just about reach the averages of white females, while the female crania approach microcephaly. Nowhere on this continent is the mean size of the Indian skull lower, though there are localities in several parts of the United States, Mexico and Peru, where it is equaled. Naturally, the data do not speak well for either the physical or mental development of the Californians.

	MEN.		WOMEN.	
<i>Cranial Capacity.</i>	Per cent. of Skulls.	No. of Skulls.	Per cent. of Skulls.	No. of Skulls.
1001.-1100.....	—	—	27.00	(3)
1101.-1200.....	9.00	(2)	45.50	(5)
1201.-1300.....	13.50	(3)	27.00	(3)
1301.-1400.....	41.00	(9)	—	—
1401.-1500.....	27.50	(6)	—	—
1501.-1600.....	9.00	(2)	—	—
Average	1357.00 c.c.		1161.00 c.c.	
Total number of specimens	(22)		(11)	

	MEN.		WOMEN.	
<i>Cranial Module.</i>	Per cent. of Skulls.	No. of Skulls.	Per cent. of Skulls.	No. of Skulls.
14.01-14.50.....	—	—	69.00	(9)
14.51-15.00.....	21.50	(6)	31.00	(4)
15.01-15.50.....	43.00	(12)	—	—
15.51-16.00.....	36.00	(10)	—	—
Average	15.23		14.41	
Total number of specimens	(28)		(13)	

	MEN.		WOMEN.	
<i>Circumference Maximum.</i>	Per cent. of Skulls.	No. of Skulls.	Per cent. of Skulls.	No. of Skulls.
46.1-47.00.....	—	—	28.50	(4)
47.1-48.00.....	—	—	21.50	(3)
48.1-49.00.....	12.50	(4)	36.00	(5)
49.1-50.00.....	15.50	(5)	14.00	(2)
50.1-51.00.....	34.00	(11)	—	—
51.1-52.00.....	28.00	(9)	—	—
52.1-53.00.....	9.00	(3)	—	—
Average	50.70		48.10	
Total number of specimens	(32)		(14)	

In shape, when viewed from the front or back, a large majority of the crania shows a marked sagittal elevation, so that the anterior and posterior planes terminate above in a well defined summit. This sagittal elevation begins sometimes as far anteriorly as the middle of the frontal squama and follows the median line to the vertex, or even to the obelion. To some of the specimens this elevation imparts almost a scaphoid appearance. The cause of this elevation lies in a peculiarity, perhaps an excess, of growth of the parietal and occasionally also of the upper

part of the frontal bones along the sagittal and metopic juncture. The temporal ridges bear but little if any relation to this ridging, and it is not of pathological character. The feature in lesser degrees is common in American and other crania, those of whites included. It is possible that a small cerebral growth favors its development, which would well account for its prominence among the Californians. The norma lateralis of the crania is, in the terms of Sergi, ellipsoid, the norma superior more or less ovoid (see illustrations).

As in shape, so in relative proportions the crania approximate one single type. As seen from the subjoined tables, 72 per cent. of the male and 92 per cent. of the female skulls are mesocephalic, with the remaining ones closely related. In the length-height index, 75 per cent. of the male and 82 per cent. of the female crania are, using Turner's term, metriocephalic.

<i>L. B. Index.</i>	MEN.		WOMEN.	
	Per cent. of Skulls.	No. of Skulls.	Per cent. of Skulls.	No. of Skulls.
71 (70.10-71.00).....	—	—	—	—
2.....	3.00	(1)	—	—
3.....	3.00	(1)	—	—
4.....	3.00	(1)	8.00	(1)
5.....	12.50	(4)	—	—
76.....	9.00	(3)	—	—
7.....	22.00	(7)	25.00	(3)
8.....	28.00	(9)	25.00	(3)
9.....	9.00	(3)	17.00	(2)
80.....	3.00	(1)	25.00	(3)
81.....	3.00	(1)	—	—
2.....	—	—	—	—
3.....	—	—	—	—
4.....	3.00	(1)	—	—
Average		77.34		77.58
Number of skulls		(32)		(12)
Dolichocephalie (Broca's classif.)	21	(7)	8	(1)
Mesocephalic	72	(23)	92	(11)
Brachycephalic	6	(2)	—	—

<i>L. H. Index.</i>	MEN.		WOMEN.	
	Per cent. of Skulls.	No. of Skulls.	Per cent. of Skulls.	No. of Skulls.
69 (68.1-69.00).....	—	—	9.00	(1)
70.....	3.50	(1)	—	—
71.....	3.50	(1)	—	—
2.....	7.00	(2)	—	—
3.....	18.00	(5)	18.00	(2)
4.....	3.50	(1)	18.00	(2)
5.....	25.00	(7)	9.00	(1)
76.....	14.00	(4)	36.50	(4)
7.....	14.00	(4)	—	—
8.....	—	—	—	—
9.....	11.00	(3)	—	—
80.....	—	—	9.00	(1)
Average	74.43		74.22	
Number of skulls	(28)		(11)	
Tapeinocephalic				
(Turner's classif.)	14	(4)	9	(1)
Metriocephalic	75	(21)	82	(9)
Akrocephalic	11	(3)	9	(1)

Higher proportions of one type of the cranial vault are not often present even in one and the same tribe of people.

The average breadth-height index in the males is 97.6, in the females 95.8, the distribution being less regular.

The face is of moderate absolute dimensions, and there are no instances of either a very short or a very long face.

<i>Facial Total Index.</i> (<i>Kollman's.</i>)	MEN.		WOMEN.	
	Per cent. of Skulls.	No. of Skulls.	Per cent. of Skulls.	No. of Skulls.
80.1-85.00.....	38.50	(5)	20.00	(1)
85.1-90.00.....	46.00	(6)	80.00	(4)
90.1-95.00.....	15.50	(2)	—	—
Average	86.22		86.93	
Number of skulls	(13)		(5)	

<i>Facial Upper Index.</i> (<i>Kollman's.</i>)	MEN.		WOMEN.	
	Per cent. of Skulls.	No. of Skulls.	Per cent. of Skulls.	No. of Skulls.
45.1-50.00.....	11.00	(2)	33.5	(3)
50.1-55.00.....	50.00	(9)	44.5	(4)
55.1-60.00.....	39.00	(7)	22.00	(2)
Average	53.41		52.07	
Number of skulls	(18)		(9)	

Facial prognathism, as with Indians in general, is also in the Californians mostly but moderate. That in the female exceeds somewhat that in the male crania.

<i>Gnathic Index.</i> (<i>Flower's.</i>)	MEN.		WOMEN.	
	Per cent. of Skulls.	No. of Skulls.	Per cent. of Skulls.	No. of Skulls.
93.33-95.00.....	20.00	(4)	—	—
95.1-100.00.....	50.00	(10)	20.00	(2)
100.1-105.00.....	15.00	(3)	70.00	(7)
105.1-110.00.....	5.00	(1)	10.00	(1)
110.1-115.00.....	5.00	(1)	—	—
115.1-118.07.....	5.00	(1)	—	—
Average		100.31		101.11
Number of skulls		(20)		(10)
Orthognathic	40	(8)	—	—
Mesognathic	35	(7)	80	(8)
Prognathic	25	(5)	20	(2)

The palatal proportions, being related to prognathism, should be considered in this connection. They were found for the most part to be moderate. The palatal or uranic (Turner) index in almost half of the specimens shows a relative shortness of the structure. The shape of the palate, ventrally, was in the larger number elliptical, in a few instances parabolical and in a few other cases (particularly in 12-76) of the U-shape variety.

<i>Palatal Index.</i> (<i>Turner's.</i>)	MEN.		WOMEN.	
	Per cent. of Skulls.	No. of Skulls.	Per cent. of Skulls.	No. of Skulls.
98.21-100.00.....	—	—	10.00	(1)
100.1-110.00.....	27.00	(6)	20.00	(2)
110.1-120.00.....	50.00	(11)	50.00	(5)
120.1-125.44.....	23.00	(5)	20.00	(2)
Average		114.73		113.03
Number of skulls		(22)		(10)
Dolichouranic	27	(6)	20	(2)
Mesuranic	27	(6)	20	(2)
Brachyuranic	46	(10)	50	(5)

The nasal index is remarkable in that it shows 52 per cent. of the males and 41½ per cent. of the females as leptorhynian, there being almost the same proportion of mesorhynians and but a few mild platyrhynians. The large proportion of relatively

narrow apertures is exceptional among the Indians in general, who are prevalently mesorhynic. The tracing of this feature, even though not as yet well understood, along the western coast of the continent, will alone prove of much interest.

<i>Nasal Index.</i> (<i>Broca's.</i>)	MEN.		WOMEN.	
	Per cent. of Skulls.	No. of Skulls.	Per cent. of Skulls.	No. of Skulls.
38.89-40.00.....	3.5	(1)	—	—
40.1-45.00.....	26.00	(7)	8.50	(1)
45.1-50.00.....	37.00	(10)	41.50	(5)
50.1-55.00.....	29.50	(8)	50.00	(6)
55.1-59.35.....	3.50	(1)	—	—
Average		47.87		49.41
Number of skulls		(27)		(12)
Leptorhynic	52	(14)	41.5	(5)
Mesorhynic	40.5	(11)	41.5	(5)
Platyrrhynic	7	(2)	17	(2)

The orbital index, though ranging mostly between 85 and 95, was found quite variable, even in the same localities (*e.g.*, Centerville). On the whole the males are more megaseme than the females. No plausible cause of the irregularity in regard to this point has suggested itself; it accentuates the need of more material.

<i>Orbital Index.</i> (<i>Broca's.</i>)	MEN.		WOMEN.	
	Per cent. of Skulls.	No. of Skulls.	Per cent. of Skulls.	No. of Skulls.
78.75-80.00.....	3.50	(1)	—	—
80.1-85.00.....	14.00	(4)	28.50	(4)
85.1-90.00.....	31.00	(9)	36.00	(6)
90.1-95.00.....	41.50	(12)	28.50	(4)
95.1-100.00.....	10.50	(3)	—	—
Average		90.38		87.19
Number of skulls		(29)		(14)
Microseme	14	(4)	28.5	(4)
Mesoseme	21	(6)	36	(6)
Megaseme	65.5	(19)	28.5	(4)

The thickness of the parietal is taken easily with a compass (one of the branches of which is introduced through the foramen magnum), 1 to 2 cm. above the squamous suture and along its extent; it serves as a qualificative to the circumference and other

measurements of the vault. In crania of whites this thickness ranges for the most part from 4 to 6 mm. in the males and 3 to 5 mm. in the females. In the California skulls here considered the measurements averaged about 5.5 mm. (4.5 to 8 mm.) in the males and 5.4 mm. (4.5 to 7 mm.) in the females.

The mean diameter of the foramen magnum

$$\frac{\text{max. length} + \text{max. breadth}}{2}$$

is given because it probably bears some relation to stature. It is small in both sexes in the skulls that form the subject of this paper, ranging from 29 to 38 mm. (average 31.6 mm.) in the males and from 27.5 to 33.5 mm. (average 30.4 mm.) in the females.

IV.

The detailed descriptive characters of the California mainland crania can be in brief resumed as follows: The frontal, sagittal, and lambdoid sutures, in all the skulls, show serration more or less inferior to that in average whites. Some of the sutures, particularly the frontal ones, are hardly serrated at all. This character is usually taken as an indication of an inferior development of the vault.

The pterions, though often quite narrow, were found in every case to be of the ordinary H variety. The breadth of the parieto-sphenoidal suture ranged, in men, from 2.5 to 19 mm., in women from 7.5 to 20 mm. Evidently the size of the skull alone is not the determining agent of the form of the pteric articulation.

Sutural bones are decidedly scarce in the Californians, except in some of the male crania from near Centerville. The small number of intercalated ossicles is also in general an indication of small development of the cranial vault.

Examination of the teeth showed that the dentition has, in a majority of the cases, been normal; but in five of the males and two of the females there were some anomalies. In one of the male skulls (225.178) the lower lateral incisors have never appeared; in the male skull 225.194 both lower and the right upper last molars have never appeared; in the male skull 12-79 none of

the last molars has ever appeared; in the female skull 12-82 both lower last molars, and in the female 225.184 all the last molars, have never erupted. On the other hand, in three of the male crania a supernumerary tooth had been present (lost post-mortem). In number 225.169 the supernumerary element existed between the left upper incisors; in number 225.178 a similar tooth had been present externally to the left upper incisors, and in number 12-84 one supernumerary tooth was situated ventrally to the left upper bicuspid, while another similar tooth was present on the right, immediately in front of the anterior bicuspid. The writer has encountered such supernumerary teeth, situated in the anterior portion of the upper alveolar process, between, in front, or back of the incisors, in Indian crania from other localities, and also in living Indians. Generally there is but one such supernumerary tooth and it has certain well defined and constant features. The tooth seems to appear during or soon after the eruption of the incisors of the second dentition; its root is usually less voluminous than that of the median upper incisor; and the free portion, well covered with enamel, is generally conical in shape. This curious dental element (on which the writer reports more extensively in his *Physiological and Medical Observations, etc.*, 31st Bull. Bur. Am. Ethn., 1906) both as to its shape and location is too constant to admit of viewing it as a meaningless, entirely fortuitous appearance.

The teeth were almost in every case worn off to such a degree that the dentine was exposed on the top. In some instances the wearing was so excessive as to leave only irregularly planed bases. This wearing off of the teeth is general among Indians, and is due to the rather crude nature of their food, though it is not impossible that it is aided by the quality of the enamel. The upper incisors, where sufficiently preserved, all showed a pronounced concavity of the ventral surface, not unlike that of a shovel. This characteristic, rare in whites, is generally present in Indians. It is confined to the upper incisors.

In four instances where the cuspids of the molars could be seen, there was found nothing unusual.

In two female skulls, 12-78 and 12-70, all the teeth were sub-medium in size.

The characteristics of the base of the skull agree with those of Indian crania in general.¹ The depression of the petrous portions is generally less than in whites, and sometimes nearly absent. The middle lacerated foramina are mostly small. Both of these features are common to crania of smaller cerebral development and are directly due to the same. The styloids were found in many instances to be small; in some cases there was present only the base, scarcely 2 or 3 mm. in height. The measurements of the length in the tables of detail are from the base, as far as it could be seen, to the apex.

The jugular foramina were generally smaller than in whites. Perhaps that, also, coincides with small stature. In the majority of cases, particularly in the female crania, the right foramen was the larger.

In four of the male and three of the female skulls (14 per cent. and 23 per cent.) there was present a moderate sized, medio-basial ("pharyngeal") fossa. This characteristic depression is situated at or near the middle of the basilar process and is regularly oval in shape, 7 to 12 mm. long and usually about half of the length, or a little more, in breadth; its depth varies from 1.5 to 4 mm.

In a large majority of the skulls, both male and female, there was noticed, mostly on both sides, a tendency towards the formation, or an actual completion, of a distal, or proximal, or distal as well as proximal, pterygo-spinous foramen. The formation takes place by a process extending from the distal or more proximal portion of the large pterigoid wing towards the apex of the spinous process. In whites the condition has been studied by W. Gruber, and especially by Roth;² it is also referred to by Turner.³ It is due to ossification of ligamentous bands, and is rather common in Indians. Besides these foramina there were also observed two others in this neighborhood which are in general very rare. In a number of specimens from near Centerville (localization of the feature points to its heredity)

¹ See writer's *Certain Racial Characteristics of the Base of the Skull*; *Science*, February 22, 1901, p. 309.

² Roth, E., *Ein Beitrag zu den Merkmalen niederer Menschenrassen am Schädel*; *Arch. f. Anthrop.*, XIV, 1882, pp. 75-77.

³ Turner, Sir Wm., *Report on the Human Crania*, *Challenger Reporter*, *Zoology*, Part XXIX, 1884, 119.

there was a foramen at the base of one, mostly the left, spinous process. And in one case a complete foramen was formed between the base of the pterigoid and the great wing of the sphenoid. The causes of tendency to, and the anthropological significance of, all these structures are not yet clear. They seem to develop accidentally and to propagate in limited areas through inheritance of the tendency towards their production.

One feature which occurs quite frequently in Indian crania from some localities, and which was also present in rather numerous instances in the California mainland skulls, is what Hyrtl termed dehiscence in the bony floor of the auditory canal. The floor of the canal is generally not completed until after birth. In some instances a thorough completion is not effected and an irregular aperture, or several minor defects, remain throughout life. This is the condition known as dehiscence. It was present in a slight to moderate degree, on one or both sides, in eight of the male (27.5 per cent.) and six (46 per cent.) of the female California crania.

A number of additional abnormalities appearing in one or in but a few skulls will be found referred to under the heading of miscellaneous in the detailed records.

Special attention was paid to synostosis in the cranial sutures. The examinations show that in these Californians the process generally began (externally) about contemporaneously in the middle portion of the sagittal and the inferior or pteric portions of the coronal suture. The nasal suture was in some cases affected about the same time, in others later. Subsequently synostosis appeared in the temporo-occipital and the lambdoid, and then in the malar articulation. The temporo-parietal suture remained potent in all the crania. On the whole, it is plain, the sequence of obliteration was much like that in the whites; it is probable, however, that in some of the California skulls the synostosis of the coronal suture was more rapidly advanced, or sooner completed.

The general results of the examination are as interesting as unexpected. The California mainland crania from all the regions represented in the collection, show numerous and important relations in absolute and relative proportions, in shape, and in

many other features. All this points to the conclusion that the skulls are those of one single physical type of people. There are, as can be seen in the detailed data, local differences in some particulars, but these differences are in no case great enough to allow a separation of distinct types. An almost necessary conclusion from the above is that many, if not all, of the California tribes as we see them to-day, with their different languages and perhaps other ethnological differences, sprung from one original people, their ethnological differentiation taking place later.

As to its relations, the California mainland physical type is practically identical with that of the Santa Barbara mainland, and with that of at least a large part of the adjoining archipelago. Beyond the boundaries of the state no indication of this type has yet been found in the immediate north or in the northwest. Along the eastern border of California are the Pa-Utes. Of the physical type of these people but little is as yet known, but the few crania that have been described or are in our collections are very close indeed to the Californians. A single Pa-Ute skull described by Virchow in his *Crania Ethnica Americana* (Pl. XVI) had the cephalic index 79.1, orbital index 85, and nasal index 50; while its shape was such that it could not be picked out, if mixed, from the skulls under consideration.

In the immediate south are the Mission Indians, who represent perhaps a comparatively recent immigration into that country and are of the physical type of the Mohave. Ancient crania from the California Peninsula are also of a different type. Arizona and Sonora show no population, recent or ancient, allied physically to the Californians. In Mexico, however, are several great Indian peoples who in many features approach the Californians to such a degree that an original identity must be held as probable. One of these is the Otomi, of the States of Hidalgo and Mexico. A large group of peoples in the States of Puebla, Michoacan, and farther south, even including the Aztecs, and finally the Tarahumare, in Chihuahua, are all physically related to the Otomi as well as to the Californians.

All of which makes very desirable further and if possible more ample collections.





1



2

ANTERIOR VIEW.

1. No. 12/67; U. C.; Sausalito: 2. No. 12/73; U. C.; Millbrae.



ANTERIOR VIEW.

1. No. 12/83; U. C.; West Berkeley: 2. No. 12/80; U. C.; Humboldt Bay.



1



2

SUPERIOR VIEW.

1. No. 12/67; U. C.; Sausalito: 2. No. 12/73; U. C.; Millbrae.



1



2

SUPERIOR VIEW.

1. No. 12/83; U. C.; West Berkeley: 2. No. 12/80; U. C.; Humboldt Bay.



LATERAL VIEW.

1. No. 12/67; U. C.; Sausalito: 2. No. 12/73; U. C.; Millbrae.



LATERAL VIEW.

1. No. 12/83; U. C.; West Berkeley: 2. No. 12/80; U. C.; Humboldt Bay.



1



2

POSTERIOR VIEW.

1. No. 12/67; U. C.; Sausalito: 2. No. 12/73; U. C.; Millbrae.



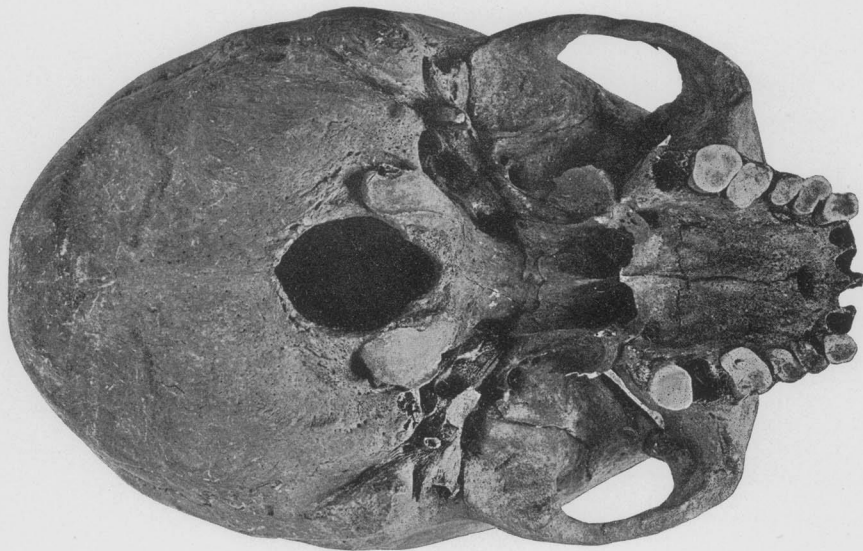
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2

POSTERIOR VIEW.

1. No. 12/83; U. C.; West Berkeley: 2. No. 12/80; U. C.; Humboldt Bay.



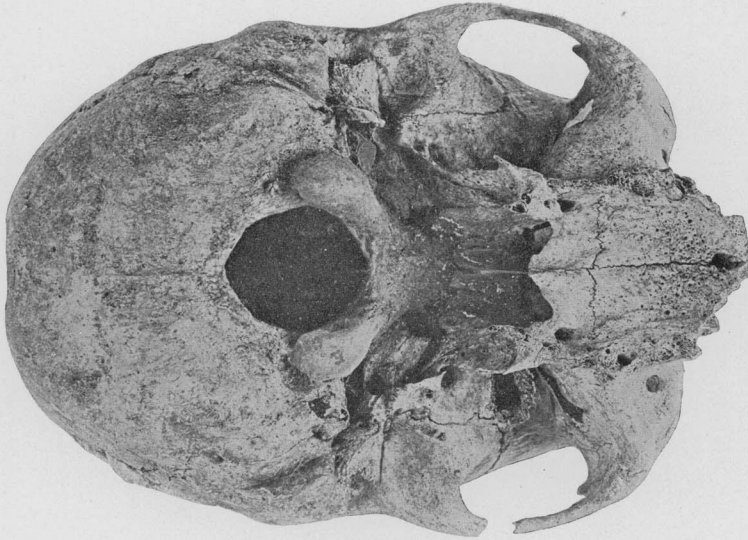
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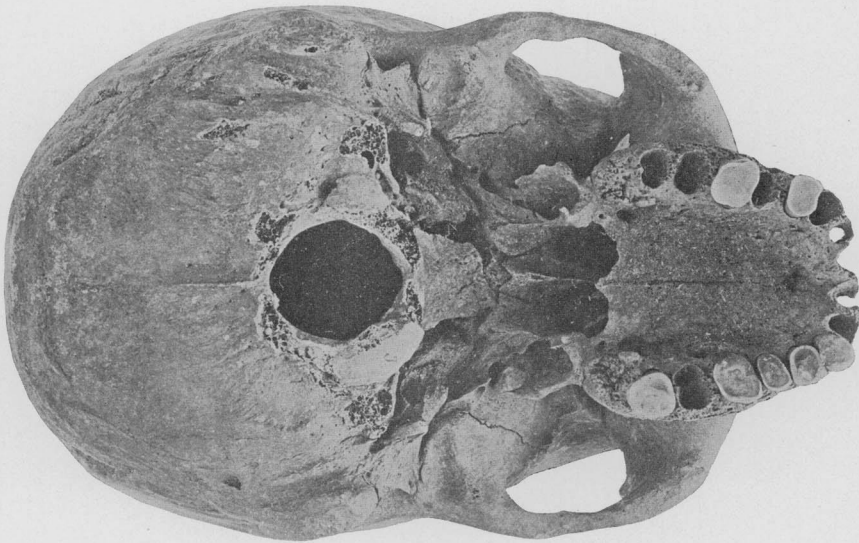
2

BASAL VIEW.

1. No. 12/67; U. C.; Sausalito: 2. No. 12/73; U. C.; Millbrae.



1



2

BASAL VIEW.

1. No. 12/83; U. C.; West Berkeley: 2. No. 12/80; U. C.; Humboldt Bay.

*Lower Jaws**Males*

Catalogue No.	Locality	Height in Middle Line Anteriorly	Height of Vertical Ramus	Breadth minim. of Vertical Ramus	Angle
12/80	Humboldt Bay	4.-	r. 6.9 , l. 6.85	r. 3.9 , l. 3.95	124°
225.173	Calaveras Co.	3.8	r. 7.1 , l. 6.8	r. 3.4 , l. 3.25	116°
225.177	Centerville	—	r. 5.75, l. 5.75	r. 3.35, l. 3.-	129°
225.178	do	3.3	r. 6.6 , l. 6.5	r. 3.8 , l. 3.8	121°
225.179	do	3.8	r. 6.2 , l. 6.6	r. 3.2 , l. 3.5	—
225.180	do	3.75	r. 6.2 , l. 6.2	r. 3.3 , l. 3.4	119°
225.181	do	3.8	r. 7.2 , l. 6.9	r. 3.1 , l. 3.3	118°
12/85	Inverness	3.45	r. 6.2 , l. 6.2	r. 3.7 , l. 3.6	119°
12/67	Sausalito	3.7	r. — , l. —	r. — , l. —	117°
225.192	Yerba Buena Is.	4.-	r. 6.8 , l. 6.5	r. 3.4 , l. 3.45	123°
225.193	Angel Island	3.55	r. 6.9 , l. 7.-	r. 3.1 , l. 3.1	115°
225.194	do	3.4	r. — , l. 5.6	r. — , l. 3.75	117°
12/84	W. Berkeley	3.7	r. 7.2 , l. —	r. 4.- , l. —	109°
225.199	San Felipe	3.5	r. 6.85, l. 6.7	r. 3.3 , l. 3.35	116°

Females

12/82	Sather	3.55	r. — , l. 5.5	r. — , l. 2.95	122°
12/78	Redding	3.3	r. 5.3 , l. —	r. 3.3 , l. —	122°
225.184	Centerville	3.3	r. 5.4 , l. 5.5	r. 3.2 , l. 3.45	125°
225.188	do	3.7	r. 5.8 , l. —	r. 3.05, l. —	122°
225.195	Angel Island	3.7	r. 5.6 , l. 5.4	r. 3.1 , l. 3.1	120°
12/77	W. Berkeley	3.7	r. — , l. 5.93	r. — , l. 3.15	123°
12/76	do	3.4	r. 5.7 , l. 5.5	r. 3.4 , l. 3.35	118°

Males.

Catalogue No.	Locality.	Serration.	SUTURES.		Dentition.	TEETH.			Petrous Garts, Depression.	Middle Lacerated Foramina.	Styloids.	BASE.		Medio-basal Fossa.	Pterygo-spinous Foramina.	Dehiscence in Floor of Auditory Canal.	MISCELLANEOUS.
			Pterions.	Sutural Bones.		Quality.	Cuspids.	Anomalies.				Jugular Foramina.	Pterygo-spinous Foramina.				
225.168	Hoopa Valley	simple	H: right 14, left 13 mm.	1 small in lambdoid 1 small in squamo-mastoid angle	upper 16, lower ?	slightly worn off	upper: r. 4, 4, 2; l. 4, 4, 4 lower ?	—	nearly level	small	only small bases	left much larger	—	tendency to proximal, on left	—	high vaginal processes; left post. condyloid canal absent	
12/80	Humboldt Bay	submedium	H: r. 12.5, l. 12.5	2 small in lambdoid	32	much worn off	?	—	moderate	quite small	r. 10, l. n. 12 mm.	right much larger	—	tendency to proximal as well as distal, each side	moderate, each side	surface of skull shows signs of smoking or fire	
225.169	Sutter Co.	quite simple	H: r. 15, l. 16.5	1 large epipteric on left 2 small in lambdoid	u. 17, l. ?	much worn off	?	a supernumerary tooth between the left upper incisors	submedium	+	were small (damaged)	right larger	—	—	—	spinous processes small	
225.170	Sutter Co.	simple	H: r. 6, l. 6	—	u. 16, l. ?	much worn off	?	—	moderate	submedium	were small (sm. damaged)	left larger	—	slight tendency on each side to proximal	slight, right side	—	
225.172	Calaveras Co.	submedium	H: (broad-damaged)	1 moderate in right temp-occip.	?	much worn off	?	?	?	?	?	?	?	?	?	base incrustated with stalagmitic mass	
225.173	Calaveras Co.	submedium	H: r. 19, l. 19	—	32	much worn off	?	—	+	slightly sub-medium	r. 18, l. 10	equal	—	some tendency to proximal each side	—	exostosis about right vaginal process	
12/71	near Vallejo	slightly submedium	H: (moderate-damaged)	—	?	?	?	?	—	—	—	—	—	—	—	damaged	
12/81	Humboldt Bay	quite simple	H: r. 11, l. 15	1 moderate in lambda	u. 16, l. ?	somewhat worn off	?	—	slight	small	r. 13, l. 16	right larger	—	—	slight, each side	—	
225.176	Centerville	quite simple	H: r. 12, l. 12	1 small in left asterion 1 small in right temp-pariet.	?	?	?	?	submedium	small	were small (broken)	equal	—	tendency to proximal, each side	—	—	
225.177	Centerville	quite simple	H: r. 4, l. 7	1 small in right asterion	?	?	?	?	nearly level	very small	r. only base, left 11	right larger	moderate	right proximal 3/4, left proximal 3/4	—	left post. condyloid canal absent; a nearly complete anomalous foramen at base of left spinous process	
225.178	Centerville	submedium	H: r. 12, l. 12	1 small epipteric on right 4 moderate in lambdoid 1 large in each temp-occip. 1 in each squamo-mastoid angle	31	slightly worn off	upper: r. 4, 3, 3; l. 4, 3, 3 lower: r. 5, 5, 5; l. 5, 5, 4	a supernumerary tooth external to left upper incisors; lower lateral incisors have not appeared	submedium	—	r. 8, l. only base	left larger	—	proximal nearly complete on left	—	a nearly complete anomalous foramen at base of left spinous process; vaginal processes high	
225.179	Centerville	submedium	H: r. 14, l. 10	9 moderate in lambdoid 1 in left squamo-mastoid angle	32	quite worn off	?	—	slight	quite small	r. 8, l. 11	equal	—	proximal nearly complete on right, 3/4 on left	—	a small precondylar tubercle on left side on the basilar process; an anomalous foramen at base of left spinous process	
225.180	Centerville	quite simple	H: r. 18, l. 18	2 at lambda (3.5x2.7 and 3.5x2.9 cm.) 3 small in lambdoid 1 in left squamo-mast. angle	32	much worn off	?	—	slight	submedium	r. 9, l. 13	right larger	—	tendency to proximal, each side	—	a 3 mm. spine ventrally from basilar process into foramen magnum; an anomalous foramen at base of right spinous process	
225.181	Centerville	submedium	H: r. 11, l. 14	1 small in right squamo-mastoid angle	32	much worn off	?	—	nearly level	small	r. ? (broken), l. 12	left larger	—	tendency to distal on right	—	an anomalous foramen at base of left spinous process	
225.183	Centerville	?	H: r. 15, l. 15	?	?	?	?	?	slight	submedium	rudimentary	equal	—	—	—	left post. condyloid canal absent	
12/85	Inverness	submedium	H: (narrow)	1 moderate epipteric on right 1 moderate in right temporo-occipital	32	much worn off	?	—	moderate	submedium	r. very short, l. broken	right larger	moderate	tendency to proximal, both sides	—	—	
225.191	Petaluma	quite simple	H: r. 12.5, l. 12.5	3 small in lambdoid	?	?	?	?	nearly level	moderate	r. rudimentary, l. 9, slender	left larger	—	—	—	spinous processes nearly deficient	
12/87	Sausalito	submedium	H: (narrow)	—	32	much worn off	?	—	moderate	moderate	r. 13, l. ?	equal	—	tendency to proximal, both sides	moderate, on right	upper alveolar process square in front	
12/68	Sausalito	moderate	H: r. 12.5, l. 12.5	—	32	much worn off	?	—	moderate	quite small	both strong, broken	right larger	—	?	—	—	
12/75	San Francisco	?	?	?	?	?	?	?	very slight	very small	broken	left larger	?	?	?	surface of whole skull black by smoke or some pigment	
225.192	Yerba Buena Isl.	quite simple	H: (moderate width)	—	32	very much worn off	?	?	moderate	very small	r. broken, l. only base	right larger	—	on right tendency to distal; on left distal 2/3, proximal nearly complete	—	—	
225.193	Angel Isl.	submedium	H: (r. 8.5, l. 13)	1 in left squamo-mastoid angle	32	moderately worn off	?	—	submedium	small	r. 11, l. 11	equal	—	a complete foramen on left between base of pterygoid and the sphenoid; slight tendency on each side to distal	—	absence of left post. condyloid canal	
225.194	Angel Isl.	submedium	H: r. 11.5, l. 12	1 small in left temporo-occipital	29	slightly worn off	upper: r. 4, 3; l. 4, 3, 3 lower: r. 5, ?; l. 5, ?	both lower and right upper 3rd molars have not appeared	moderate	moderate	r. 10, slender; l. only base	right larger	moderate	distal 3/4 on right, 3/4 on left	—	basispinous foramen on left	
12/84	West Berkeley	submedium	H: r. 2.5, l. 11	1 small in lambdoid	34	moderately worn off	?	a supernumerary tooth on each side in the upper jaw (see Miscell)	slight	very small	rudimentary	left larger	—	proximal 3/4 on left, ? on right	—	one of the supernumerary teeth is situated ventrally to the left upper bicuspid; it has a conical free extremity 15 mm. high; the second supernumerary was on the right, in front of the anterior bicuspid; both canines displaced outward and backward	
12/72	Millbrae	submedium	H: (narrow)	—	?	much worn off	?	?	slight	very small	r. 13.5, l. ?	equal	—	proximal complete, each side	moderate, each side	massive and large spinous processes	
12/73	Millbrae	quite simple	H: r. 13, l. 15.5	—	?	moderately worn off	?	?	moderate	very small	?	equal	—	—	slight, on left	—	
12/74	Millbrae	quite simple	H: r. 14, l. 12	1 moderate epipteric on left	?	?	?	?	nearly level	small	rudimentary	?	—	?	moderate, each side	no vaginal process on right, on left small	
178.148	Palo Alto	submedium	H: r. 8, l. 11.5	1 small in lambdoid	?	?	?	?	moderate	small	r. broken, l. 13.5, slender	right larger	—	proximal 3/4 on left, tendency on right	—	face burnt away	
12/79	Felton	submedium	H: r. 6.5, l. 7	—	28	much worn off	?	third molars have never appeared	moderate	very small	r. 10.5, slender; l. rudimentary	equal	—	—	—	—	
12/86	Santa Cruz	submedium	H: (moderate)	—	u. 16	much worn off	?	—	moderate	small	r. 8, l. ?	?	?	?	?	skull damaged	
225.197	Monterey	?	H: r. 10, l. 12	?	u. 16	much worn off	?	?	?	?	?	?	?	?	?	—	
225.198	San José Mis'n.	submedium	H: r. 10, l. 12	6 small in lambdoid 2 in left temporo-occipital	u. 16	much worn off	?	?	nearly level	small	r. 8, slender; l. 9, slender	equal	—	—	slight, each side	—	
225.199	San Felipe	quite simple	H: r. 11.5, l. 12.5	3 small in right squamo-mastoid angle	?	much worn off	?	?	nearly level	small	r. small, l. 8.5	left larger	moderate	tendency to proximal on left; slight tendency to distal both sides	—	a 2 mm. process projecting into for. magnum from the middle of its posterior border	

Females.

Catalogue No.	Locality.	Serration.	SUTURES.		Dentition.	TEETH.			Petrous Garts, Depression.	Middle Lacerated Foramina.	Styloids.	BASE.		Medio-basal Fossa.	Pterygo-spinous Foramina.	Dehiscence in Floor of Auditory Canal.	MISCELLANEOUS.
			Pterions.	Sutural Bones.		Quality.	Cuspids.	Anomalies.				Jugular Foramina.	Pterygo-spinous Foramina.				
12/82	Sather	quite simple	H: right 9, left 12 mm.	—	30	much worn off	?	both lower 3rd molars have not appeared	slight	very small	submedium	right much larger	—	proximal 3/4 formed, each side	moderate, each side	Posterior condyloid canals both wanting; foramen magnum asymmetrical	
12/78	Redding	quite simple	H: r. 12, l. 12	1 in lambdoid 1 very small epipteric on each side	?	much worn off	?	teeth abnormally small, with diastemae	moderate	very small	small	right larger	moderate	proximal 1/2 on the right, left ?	—	—	
12/69	Vallejo	moderate	H: (medium)	—	upper 16, lower ?	?	?	?	moderate	small	only bases	equal	—	some tendency to distal on right	—	—	
12/70	Vallejo	moderate	H: r. ? , l. 17	1 small in left parieto-temporal 1 small in left temporo-occipital	?	?	?	of submedium size	slight	small	medium	right larger	—	distal 3/4, each side	—	—	
225.184	Centerville	simple	H: r. 7.5, l. 7.5	1 moderate epipteric on left 1 in squamo-mastoid angle 7 small in lambdoid 2 in left, 1 in right temporo-occipital	28	moderately worn off	upper: r. 4, 3; l. 4, 3 lower: r. ?; l. ?	last molars never appeared	nearly level	submedium	r. rudimentary, l. 12	right larger	moderate	—	—	—	
225.185	Centerville	simple	H: r. ? , l. 11	—	u. 16	?	?	(all lost)	very slight	small	only bases	right larger	large, shallow	—	moderate, each side	—	
225.186	Centerville	simple	H: r. 13, l. 15	2 small in lambdoid	u. 16	very much worn off	?	?	level	submedium	r. 8, l. 12	right larger	—	—	—	—	
225.187	Centerville	submedium	H: r. 8.5, l. 11	1 quite large in each temporo-occipital	u. 16	much worn off	?	—	moderate	small	r. 13, l. 9	right larger	—	1/2 of distal on left	moderate, on left	3rd articular facet (inter-condyloid)	
225.188	Centerville	quite simple	H: r. 11.5, l. 11.5	1 in right squamo-mastoid angle 1 small epipteric on right 1 in right temporo-occip.	32	much worn off	?	—	level	small	r. 25 +, l. 9 —, slender	right larger	—	slight tendency to distal each side	slight, on right	a foramen on basilar process in front of right condyle; a small articular eminence anteriorly to this foramen; fusion on right of spinous process with petrous part	
225.195	Angel Isl.	quite simple	H: r. 20, l. 19	—	32	much worn off	?	—	submedium	very small	+ (broken)	right larger	—	proximal 3/4 on left, tendency to distal both sides	—	—	
225.196	Angel Isl.	submedium	H: (medium)	—	u. 16	much worn off	?	—	slight	submedium	r. 4, l. 4, very slender	right larger	—	tendency to proximal on left, to distal on both sides	—	—	
12/77	West Berkeley	submedium	H: (medium)	2 small in lambdoid	32	very much worn off	?	—	?	?	?	?	?	?	?	—	
12/83	West Berkeley	submedium	H: r. 12.5, l. 12.5	—	?	?	?	?	moderate	submedium	?	left larger	—	tendency to distal as well as proximal on left	quite large, each side	palate U-shaped; upper alveolar process square in front	
12/76	West Berkeley	submedium	H: r. 8, l. 9.5	—	?	much worn off	?	of anterior right upper bicuspid are left 2 cylindrical, entirely free portions; root of left ant. u. bicuspid consists of similar parts, but fused	moderate	small	r. 18, l. ?	equal	—	proximal 3/4 each side	small, on right	—	

Males.

Catalogue No.	Locality.	Forehead.	Sagittal Region.	Occiput.	Mastoids.	Supraorbital Ridges.	Nasion Depression.	Nasal Bridge and Bones.	Inferior Nasal Border.	Nasal Spine.	Malars.	Submalar Fossae.	Chin.	Miscellaneous.
225.168	Hoopa Valley	sloping	slightly elevated	+	medium masculine	pronounced	+	+	+	submedium	+	somewhat shallow	?	—
12/80	Humboldt Bay	low, quite sloping	elevated (ridge extends to frontal)	+	submedium masculine	pronounced along proximal ½	+	+	pronounced gutters	low, weak	+	shallow	nearly vertical	upper alveolar process square in front
225.169	Sutter Co.	somewhat sloping	somewhat elevated	+	moderate masculine	very pronounced	+	+	moderate subnasal fossae	submedium	+	+	?	skull heavy, massive
225.170	Sutter Co.	+	slightly elevated	+	moderate masculine	very pronounced	+	bridge low	quite large subnasal fossae	submedium	+	+	?	skull heavy and massive
225.172	Calaveras Co.	somewhat low and sloping	somewhat elevated	slightly protruding	quite large	pronounced	+	+	dull	+	+	+	?	—
225.173	Calaveras Co.	sloping	somewhat elevated	+, or slightly compressed	of good size	very pronounced	+	+	moderate subnasal fossae	+	+	somewhat shallow	square	—
12/71	near Vallejo	somewhat low	somewhat elevated (ridge extends to frontal)	+	sm. submedium masculine	+	+	+	—	—	—	—	+	superior occipital ridge strongly developed
12/81	Humboldt Bay	quite low	slightly elevated	quite protruding	submedium masculine	+	+	bridge low	somewhat dull	very low, short	+	somewhat shallow	?	upper alveolar process square in front
225.176	near Centerville	sloping	slightly elevated	protruding	moderate masculine	very pronounced	+	+	moderate subnasal fossae	submedium	+	+	?	—
225.177	near Centerville	low, quite sloping	slightly elevated	+	moderate masculine	pronounced	+	+	somewhat dull	?	somewhat prominent	+	+	—
225.178	near Centerville	somewhat low	somewhat elevated	quite protruding	moderate masculine	+	+	bridge low	dull	submedium	+	spacious, especially right	but slightly prominent	—
225.179	near Centerville	slightly sloping	slightly elevated	slightly protruding	moderate masculine	+	+	+	+	submedium	+	+	square, lower part prominent	—
225.180	near Centerville	somewhat sloping	quite elevated	+	moderate masculine	pronounced	+	+	+	+	+	deep, especially left	square, prominent	—
225.181	near Centerville	low	slightly elevated	+	moderate masculine	quite pronounced	+	bridge somewhat low	moderate gutters	+	+	somewhat shallow	+	—
225.183	near Centerville	low	slightly elevated	+	submedium masculine	moderate	submedium	bridge somewhat low	?	?	+	very shallow	?	—
12/85	Inverness	low, slightly sloping	slightly elevated	ridges pronounced slightly protruding	submedium masculine	quite pronounced	+	bridge short, bones uneven	+	very low	+	+	square; prominence slight	—
225.191	Petaluma	somewhat sloping	somewhat elevated, anterior ½	ext. occip. protuberance large	of good size	very pronounced	+	+	(nearly straight, like in young)	submedium	+	left +, right deep	?	—
12/67	Sausalito	somewhat low and sloping	quite elevated	somewhat protruding	submedium masculine	very pronounced	+	bridge somewhat low	dull	very low, short	+	+	but slight prominence	—
12/68	Sausalito	quite low	marked elevation from above ophryon to vertex	+	of good size	very pronounced	+	bridge short, wide	moderate gutters	very low, short	molar ridge pronounced	+	prominent	—
12/75	San Francisco	somewhat low	moderate elevation	+	moderate masculine	+	+	?	?	?	?	?	?	—
225.192	Yerba Buena Isl.	somewhat sloping	quite elevated	+	large	glabella and proximal ½ of ridges heavy	+	+	+	low	+	shallow	square	skull heavy and massive
225.193	Angel Island	quite sloping	slightly elevated	+	of good size	pronounced	+	+	+	low	+	shallow	+	—
225.194	Angel Island	slightly low	slightly elevated	slightly protruding	moderate masculine	+	+	+	large subnasal fossae	submedium	+	+	+	—
12/84	West Berkeley	somewhat low	slightly elevated	+	moderate masculine	pronounced	submedium	bridge low	a moderate gutter on left	submedium	+	left +, right shallow	+	—
12/72	Millbrae	low, sloping	quite elevated	superior ridge pronounced	submedium masculine	pronounced	+	bridge low, broad	dull	very low, short	+	+	but slightly prominent	—
12/73	Millbrae	low, somewhat sloping	somewhat elevated	quite protruding	submedium masculine	quite pronounced	+	bridge somewhat low	dull	very low, short, bifid	+	quite shallow	?	—
12/74	Millbrae	low, sloping	somewhat elevated	protruding	submedium masculine	+	+	+	dull	?	+	+	?	—
178.148	Palo Alto	quite low	slightly elevated	+	moderate masculine	+	?	?	?	?	?	?	?	—
12/79	Felton	+	quite elevated (the ridge begins on frontal)	+	moderate masculine	+	submedium	bridge low	somewhat dull	low, small	+	somewhat shallow	+	—
12/86	Santa Cruz	slightly sloping	elevated into a pronounced ridge	+	+	+	+	+	moderate gutters	?	+	?	?	—
225.197	Monterey	+	?	?	?	very pronounced	+	+	somewhat dull	submedium	+	right +, left somewhat shallow	?	—
225.198	San José Miss'n.	+	slightly elevated	+	moderate masculine	pronounced	+	bridge somewhat low	slight gutters	+	+	+	?	—
225.199	San Felipe	sloping	somewhat elevated	+	+	pronounced	+	bridge somewhat low	dull	submedium	+	+	square	—

Females.

Catalogue No.	Locality.	Forehead.	Sagittal Region.	Occiput.	Mastoids.	Supraorbital Ridges.	Nasion Depression.	Nasal Bridge and Bones.	Inferior Nasal Border.	Nasal Spine.	Malars.	Submalar Fossae.	Chin.	Miscellaneous.
12/82	Sather	quite low	moderate elevation, beginning on frontal	+	medium feminine	quite pronounced	somewhat shallow	bridge quite low	dull	very low	+	shallow	+	—
12/78	Redding	low	moderately elevated	slightly protruding	above medium	masculine-like	+	?	somewhat dull	?	+	quite shallow	+	except for its small size the skull could pass for masculine
12/69	Vallejo	low, sloping	slightly elevated	slightly flattened	above medium	pronounced	somewhat shallow	quite low	+	very low	+	shallow	?	—
12/70	Vallejo	+	oval	very slightly flattened	above medium	pronounced	+	+	somewhat dull	very low, short	+	+	?	—
225.184	Centerville	+	somewhat elevated	slight compression very probable	of good size (feminine)	small	shallow	bridge low	somewhat dull	small	(rather small)	+	+	—
225.185	Centerville	+	nearly oval	+	above medium	quite masculine-like	+	bridge low	+	submedium	+	+	+	—
225.186	Centerville	+	slightly elevated	slightly protruding	+	small	+	+	dull	+	+	+	?	—
225.187	Centerville	+	somewhat elevated	+	of good size (feminine)	quite marked	+	quite low	moderate gutters	small	+	quite shallow	?	—
225.188	Centerville	sloping	nearly oval	+	of good size (feminine)	quite marked	+	somewhat low	dull	small	+	somewhat shallow	+	—
225.195	Angel Island	+	slightly elevated	slightly protruding	+	quite marked	+	+	moderate subnasal fossae	submedium	+	deep	+	—
225.196	Angel Island	+	slightly elevated	slightly protruding	above medium (feminine)	quite masculine-like	+	+	?	?	+	quite deep	?	—
12/77	West Berkeley	slightly low	somewhat elevated (begins on frontal)	slightly protruding	above medium (feminine)	quite masculine-like	somewhat shallow	bridge somewhat low	somewhat dull	very low, bifid	+	shallow	but slightly prominent	traces of red paint on lower jaw and face
12/83	West Berkeley	slightly low	much elevated (extends from above the lowest ¼ of frontal)	slightly protruding	short, but strength above medium	quite masculine-like	+	bridge somewhat low	+	very low, short	+	left deep, r. somewhat shallow	?	approaches masculine type
12/76	West Berkeley	slightly low	much elevated in anterior ¼	+	+	quite masculine-like	+	bridge low	very dull	low, short	quite prominently anteriorly	+	narrow, but slight prominence	—

OSSIFICATION IN SUTURES.

Catalogue No.	Collection	Locality	
225.168	N.M.	Hoopa Valley	none;
12/80	U. C.	Humboldt Bay	whole coronal, sagittal and temporo-occipitals, advanced in lambdoid, slight in nasal;
12/81	do	Humboldt Bay	none;
225.169	N.M.	Sutter Co.	traces in coronal, middle $\frac{1}{3}$ of sagittal, nearly whole nasal; all remaining free;
225.170	do	do	coronal above pterions and in upper $\frac{1}{3}$, whole sagittal, middle $\frac{1}{3}$ of lambdoid; nasal and others free;
225.172	do	Cave in Calaveras Co.	nearly whole coronal sagittal and lambdoid; some in temporo-occipitals, whole nasal; others free;
225.173	do	Calaveras Co.	nearly whole coronal, whole sagittal, median $\frac{2}{3}$ of lambdoid, most of temporo-occipitals, most of nasal, left malo-zygomatic;
12/71	U. C.	near Vallejo	lower and upper $\frac{1}{3}$ of coronal, much of sagittal, some in lambdoid, whole temporo-occipitals, some in nasal;
225.176	N.M.	near Centerville	most of coronal, whole sagittal, median $\frac{2}{3}$ of lambdoid, slight in temporo-occipitals, slight (end) in nasal;
225.177	do	do	most of coronal, whole sagittal, median $\frac{2}{3}$ of lambdoid, most of temporo-occipitals, whole nasal;
225.178	do	do	none;
225.179	do	do	some in posterior $\frac{2}{3}$ of sagittal, traces in nasal;
225.180	do	do	most of posterior $\frac{2}{3}$ of sagittal, none in coronal or lambdoid, $\frac{1}{3}$ of each temporo-occipital, slight if any in nasal;
225.181	do	do	slight in median $\frac{1}{3}$ of coronal, most of sagittal, all except inferior extremities of lambdoid, very little in temporo-occipitals, whole nasal;
225.183	do	do	whole coronal, sagittal and lambdoid, most of temporo-occipitals, none in internasal;
12/85	U. C.	Inverness	most of coronal, advanced in sagittal, some in lambdoid; temporo-occipitals and nasal free;
225.191	N.M.	near Petaluma	whole coronal except about ridges, whole sagittal and lambdoid, $\frac{1}{3}$ of each temporo-occipital, whole nasal;
12/67	U. C.	near Sausalito	whole coronal and sagittal, some in lambdoid, most of temporo-occipitals and nasal;
12/68	do	do	nearly whole coronal and sagittal, advanced in lambdoid and temporo-occipitals, whole nasal;
12/75	do	San Francisco	?
225.192	N.M.	Yerba Buena Is.	all occluded except temporo-parietals;
225.193	do	Angel Island	coronal below ridges and at bregma, most of sagittal, traces in lambdoid, none in temporo-occipitals, all nasal;
225.194	do	do	none;
12/84	U. C.	West Berkeley	much in coronal, post $\frac{2}{3}$ of sagittal, some in lambdoid, whole left temporo-occipital; right temporo-occipital and nasal free;
12/72	do	near Millbrae	advanced in coronal, much of sagittal, some in lambdoid, whole temporo-occipitals, nearly whole nasal;
12/73	do	do	cranial all free, nasal obliterated;
12/74	do	do	traces in coronal, much of sagittal, slight in lambdoid; nasal free;
178.148	N.M.	Palo Alto	none;
12/79	U. C.	Felton	advanced in lower and median $\frac{1}{3}$ of coronal, most of sagittal, slight in lambdoid, whole nasal; others free;
12/86	do	Santa Cruz	most of coronal, most of sagittal, whole nasal; all others free;
225.197	N.M.	near Monterey	?
225.198	do	San José Mission	middle $\frac{2}{3}$ of sagittal, slight in lambdoid, $\frac{1}{3}$ of each temporo-occipital; others free;
225.199	do	San Felipe	whole coronal, sagittal and nasal, most of lambdoid and temporo-occipitals.
<i>Females.</i>			
12/82	U. C.	Sather	none;
12/78	do	Redding	none;
12/69	do	near Vallejo	?
12/70	do	do	?
225.184	N.M.	near Centerville	traces in coronal above the temporal ridges; all others free;
225.185	do	do	none;
225.186	do	do	none;
225.187	do	do	most of coronal, all sagittal, middle $\frac{2}{3}$ of lambdoid; all others free;
225.188	do	do	traces in sagittal, $\frac{2}{3}$ of right $\frac{1}{3}$ of left temporo-occipital;
225.195	do	Angel Island	advancing in coronal, traces in sagittal, $\frac{1}{3}$ of each temporo-occipital, $\frac{1}{3}$ of nasal, none in lambdoid;
225.196	do	do	whole coronal and sagittal, traces in lambdoid, little in temporo-occipitals, whole nasal;
12/77	U. C.	West Berkeley	traces in median $\frac{1}{3}$ of coronal, advanced in middle $\frac{2}{3}$ of sagittal; all others free;
12/83	do	do	much in coronal, especially on left, much in sagittal, traces in lambdoid; nasal and temporo-occipitals free;
12/76	do	do	in coronal below ridges, only traces elsewhere (in nasal and sagittal).

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