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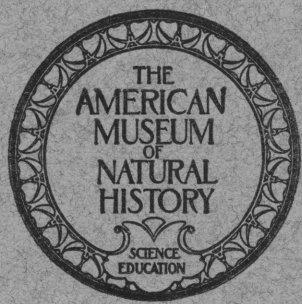
VOLUME XXXIII, PART I

OBSERVATIONS ON THE FACE AND TEETH OF THE NORTH AMERICAN INDIANS

By Clark Wissler



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Introduction

In 1924 the late Louis R. Sullivan, then Associate Curator of Physical Anthropology in this Museum recorded observations upon the Indian school population of western United States. The data are on file at the Museum. Curator Sullivan left directions for the compilation of these data which were eventually carried out as a part of the departmental routine under the direction of Miss Bella Weitzner.

Doctor Sullivan believed that one weakness in the determination of race characters lay in the fact that measurements were taken as the only determinant, whereas, in systematic biology generally, descriptive characters were given first consideration. Therefore, he planned to set up qualitative standards for describing the morphology of the head and face, and tried them out first in Hawaii and then on American Indian subjects. Further, he believed that characters relating to the teeth and eyes were the most promising for detecting relationships between North America and Asia.

Those familiar with Sullivan's work are aware of his accuracy and precision. On the other hand, it is to be expected that the personal equation will always be a disturbing factor in comparing the records of different observers, especially in a case where a judgment is made as to more or less of a certain quality. In this paper, however, all comparisons are based upon Sullivan's records, thus avoiding the variable individual factor. As just stated, these observations upon Indians were made after those in Hawaii, so it is possible that his standards were somewhat refined when applied to the Indians, but according to his belief, they were strictly comparable.

For convenience, Indian school populations were used. Doctor Sullivan visited all the larger Indian schools in New Mexico, Arizona, California, Oregon, and Washington, collecting data on the Indian tribes represented in the accompanying tables. Naturally, there were scattered observations upon other tribes, but the number in each case was so small that they were not included in these tribal tables, but were used in the general tables. Further, the Indian schools in Southwestern United States, for the most part, contained full-blood children. The schools in Washington, Oregon, and California yielded a large number of mixed-bloods. It thus happens that the mixed-bloods listed are drawn from another part of western United States and so observations on them are not strictly comparable to the data for full-bloods.

The distinctions between mixed and full-bloods were determined by the examiner's checking the individual against his school record, and

thus a blood-rating was given each individual. (Table 1.) Further, Sullivan examined other school populations, Mexicans and children of European parentage in Southern California, etc., data for some of which are included in the general tables. Also, certain data for Hawaiian groups have been added. Since the object of this paper is to place the data on record for the use of other observers, few attempts will be made to analyze the results.

TABLE 1

AGES OF MIXED-BLOOD INDIANS

Age	Indian ½-White ½		Indian ¾-White ¼		Indian ¼-White ¾		Miscellaneous Indian-White	
	m	f	m	f	m	f	m	f
4	..	..	1	..	..	..	..	..
5	1	..	..	..	..	1	..	..
6	..	4	2	..	1	..	..	1
7	3	..	3	..	4	1	3	2
8	4	6	1	..	5	2	5	5
9	3	8	2	3	6	3	4	8
10	11	8	3	3	2	1	6	16
11	6	5	6	2	5	5	9	10
12	7	13	9	8	10	13	11	16
13	13	12	11	7	8	8	21	17
14	15	9	9	8	11	12	19	20
15	13	16	13	14	8	15	21	24
16	9	8	13	13	14	12	16	19
17	7	12	9	11	8	14	20	23
18	3	15	8	8	5	6	9	11
19	5	8	2	4	1	3	3	1
20	3	1	1	3	..	2	1	1
21	3	..	5	1	1	..	..	..
22	..	..	..	..	1	..	..	..
Totals	106	125	98	85	90	98	148	174

In Sullivan's former studies of children in the Public Schools of Honolulu, similar qualitative characters were treated according to age, thus revealing yearly progressive changes or growth. Since the Indian schools record the age of pupils it seemed desirable that at least some of the present data be segregated according to age groups. In the original tabulations, a table for each tribe was made, but as the number for each group was small, we have not given these tables in full. We have given instead, summary age tables, disregarding tribal designations.

Intercanthus Distance

Some tribal, sex, and age differences are observable in the recorded judgments on intercanthus distance as presented in the tables. First, as to sex differences: narrow, is recorded for females at 25 per cent and downward, for males, at 59 per cent and downward; wide, for females at 50 per cent to 27 per cent, with no cases lower, males at 46 per cent to 7 per cent, half the tribes falling below 25 per cent (Table 2). There is, then, a tendency to greater frequency for the narrow intercanthus distance among males.

Turning now to age changes, the table in which all the tribes are combined (Table 3), we note a rapid rise in the narrow type with age, and a compensating rapid fall in wide intercanthus distance. This is greater in degree for males, though the direction of growth is the same, regardless of sex. The other observable feature is that while the rate of change from year to year is about the same with females, the "narrow" tendency for males takes a sharp upward trend at thirteen to fourteen years. This result may raise some questions as to the wisdom of disregarding age in the table compiled by tribes. On the other hand, the distribution by age is approximately the same for each tribe, which should equalize whatever variation might be due to this. We did test this out with separate age tables for the several tribes, finding the rankings for the separate tribes comparable when the larger age groups were considered Nevertheless, the small number of cases gives no ground for regarding the tabulated tribal differences as more than suggestive for further testing.[1]

Mixed-blood Indians were tabulated separately, the totals for which are given in the table. The tendency is for the mixed-Indian to exceed the full-blood in the rating of narrow.

The rank of the tribal groups may be expressed in terms of the rating for wide, by arranging the tribe names in descending order of percentages (Table 2). Zuñi is omitted because of the small number of cases. For males this order is: Shoshoni, Washo, Paiute, Papago, Yaqui, Keresan, Navajo, Pima, Acoma, Hopi, Tanoan; for females: Washo, Papago, Shoshoni, Navajo, Acoma, Yaqui, Keresan, Hopi, Tanoan, Pima, Paiute.

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[1]Herskovits reports some age changes in the interpupillary distance for negro boys five to seventeen years of age, the increase by age class ranging from 54.2 mm. to 64.9 mm. See Herskovits, Melville J., Growth of Interpupillary Distance in American Negroes (*American Journal of Physical Anthropology*, vol. 9, pp. 467–470, 1926).

TABLE 2

INTERCANTHUS DISTANCE

Tribe	Narrow		Medium		Wide		Total
	n	%	n	%	n	%	
				Male			
Navajo	117	39	110	37	70	24	297
Pima	52	20	154	60	49	20	255
Papago	27	16	91	55	47	29	165
Hopi	57	33	84	49	32	18	173
Paiute	23	23	40	40	35	36	98
Acoma-Laguna	38	47	27	33	16	20	81
Keresan	34	35	38	40	24	25	96
Tanoan	25	37	31	46	11	17	67
Zuñi	26	59	15	34	3	7	44
Shoshoni	4	15	10	39	12	46	26
Washo	4	17	10	44	9	39	23
Yaqui	2	5	27	69	10	26	39
Indian–White	237	54	149	34	53	12	439
Eskimo	0	0	7	50	7	50	14
				Female			
Navajo	47	21	93	42	81	37	221
Pima	35	13	154	58	78	29	267
Papago	16	11	69	49	57	40	142
Hopi	19	16	60	50	40	34	119
Paiute	29	25	56	48	31	27	116
Acoma–Laguna	21	17	58	46	46	37	125
Keresan	10	19	24	46	18	35	52
Tanoan	11	19	29	51	17	30	57
Zuñi	1	17	2	33	3	50	6
Shoshoni	5	24	8	38	8	38	21
Washo	3	13	10	44	10	43	23
Yaqui	1	3	21	60	13	37	35
Indian–White	233	49	178	37	69	14	480
Eskimo	1	7	4	31	8	62	13

TABLE 3

INTERCANTHUS DISTANCE–INDIANS

Age	Narrow		Medium		Wide		Total
	n	%	n	%	n	%	
			Male				
5	..	..	2	67	1	33	3
6	..	..	13	87	2	13	15
7	..	..	13	57	10	43	23
8	..	..	16	55	13	45	29
9	1	2	23	56	17	41	41
10	8	10	39	51	29	38	76
11	12	13	43	48	35	39	90
12	16	13	68	54	42	33	126
13	21	18	71	59	28	23	120
14	25	19	72	55	34	26	131
15	52	40	51	40	26	20	129
16	56	42	56	42	21	16	133
17	66	51	45	35	19	14	130
18	65	45	62	43	19	13	146
19	50	53	38	40	6	6	94
20+	37	47	25	32	16	21	78
Totals	409	30	637	46	318	24	1364
			Female				
5	..	..	3	50	3	50	6
6	1	11	3	33	5	56	9
7	..	..	9	36	16	64	25
8	2	6	17	55	12	39	31
9	3	9	20	57	12	34	35
10	7	8	54	62	26	30	87
11	9	11	41	48	35	41	85
12	11	11	55	56	32	33	98
13	17	14	56	47	46	39	119
14	21	15	76	54	43	31	140
15	27	21	53	42	46	37	126
16	24	17	67	48	50	35	141
17	35	27	56	44	37	29	128
18	20	26	38	49	19	25	77
19	12	26	24	52	10	22	46
20+	9	29	12	39	10	32	31
Totals	198	17	584	49	402	34	1184

TABLE 4

INTERCANTHUS DISTANCE—MIXED-BLOOD INDIANS

Group	Narrow		Medium		Wide		Total
	n	%	n	%	n	%	
			Male				
Indian ½–White ½	60	57	40	38	5	5	105
Indian ¾–White ¼	51	52	30	31	17	17	98
Indian ¼–White ¾	52	58	28	31	10	11	90
Miscellaneous Indian–White	74	50	51	35	21	14	146
			Female				
Indian ½–White ½	58	46	50	40	17	14	125
Indian ¾–White ¼	39	46	32	38	13	16	84
Indian ¼–White ¾	52	53	33	34	13	13	98
Miscellaneous Indian–White	84	49	63	36	26	15	173

Nasal Bridge

The individuals examined were rated as to nasal bridge: flat, medium, and high. The tribal summary (Table 5) gives the total ratings for each tribe and sex. The age change tables (Table 6) show a marked decrease in low nose bridge and a corresponding increase in high bridge. Similar growth tendencies appeared in the racial groups studied in Hawaii which is further justification for combining tribes as in our table. Previously, we noted a marked age change in intercanthus distance, the change being from "wide" to "narrow." Apparently this is correlated with the upward push of the nose bridge.

While intercanthus distance was not considered in Sullivan's Hawaiian studies, thus depriving us of comparative checks, the contrary is the case for nasal bridge rating. Accordingly, we have prepared a table (Table 8) showing the chief race groups examined by Sullivan both in Hawaii and in the United States, combining children of all ages. The frequencies given should be comparable, because the age changes in nasal bridge development are fairly uniform throughout and the observations were made by the same person. The table speaks for itself, but note may be taken, that the Japanese, Chinese, and Koreans lead in low bridges; the Europeans are zero; the Hawaiians and Indians are intermediate.

Sex differences are not marked, but the males show a slight excess in high bridges. Comparing race to race, the Indians seem to show greater sex differences.

In round numbers, the position of the race groups respecting the rating in nasal bridge according to rating in high bridge frequency, is as follows:—

White	50	Indian	15
Hawaiian	35	Asiatics	10

The relative ranks for the Indian tribes in descending order based upon ratings in high nose bridge are: males, Zuñi, Navajo, Acoma, Shoshoni, Washo, Hopi, Pima, Keresan, Tanoan, Papago, Paiute, Yaqui; females, Shoshoni, Keresan, Paiute, Tanoan, Zuñi, Pima, Papago, Navajo, Hopi, Acoma, Washo.

TABLE 5

NASAL BRIDGE DEVELOPMENT

Tribe	Flat		Medium		High		Total
	n	%	n	%	n	%	
				Male			
Navajo	10	3	143	48	144	49	297
Pima	14	6	149	58	92	36	255
Papago	19	12	99	60	47	28	165
Hopi	7	4	96	56	70	40	173
Paiute	4	4	69	70	25	26	98
Acoma–Laguna	..	..	43	52	39	48	82
Keresan	4	4	59	62	33	34	96
Tanoan	..	..	44	66	23	34	67
Zuñi	..	..	11	25	33	75	44
Shoshoni	2	8	12	46	12	46	26
Washo	1	4	12	52	10	44	23
Yaqui	6	15	28	72	5	13	39
Eskimo	6	43	6	43	2	14	14
				Female			
Navajo	18	8	176	80	27	12	221
Pima	30	5	199	83	37	14	266
Papago	28	20	94	66	20	14	142
Hopi	23	19	84	71	12	9	119
Paiute	7	6	84	73	24	21	115
Acoma–Laguna	9	7	105	84	11	9	125
Keresan	1	2	38	73	13	25	52
Tanoan	4	7	43	75	10	18	57
Zuñi	..	..	5	83	1	17	6
Shoshoni	..	..	15	71	6	29	21
Washo	3	13	18	78	2	9	23
Yaqui	10	29	25	71	..	..	35
Eskimo	11	85	2	15	..	..	13

TABLE 6

NASAL BRIDGE DEVELOPMENT—INDIANS

Age	Flat		Medium		High		Total
	n	%	n	%	n	%	
			Male				
5	1	33	2	67	..	..	3
6	7	47	7	47	1	7	15
7	5	22	18	78	..	..	23
8	4	14	23	82	1	4	28
9	4	10	35	83	3	7	42
10	10	13	55	71	12	16	77
11	8	9	70	78	12	13	90
12	6	5	107	85	13	10	126
13	8	7	88	72	26	21	122
14	6	4	82	62	45	34	133
15	..	..	66	51	63	49	129
16	2	3	57	43	72	55	131
17	2	2	44	34	82	64	128
18	1	1	49	33	96	66	146
19	2	2	27	29	65	69	94
20+	1	2	35	45	42	54	78
			Female				
5	4	67	2	33	..	..	6
6	2	22	7	78	..	..	9
7	8	32	17	68	..	..	25
8	3	10	28	90	..	..	31
9	5	14	27	77	3	9	35
10	11	13	66	76	10	11	87
11	12	14	66	77	7	8	85
12	9	9	75	77	14	14	98
13	15	13	89	75	14	12	118
14	14	10	108	77	18	13	140
15	11	9	96	76	19	15	126
16	15	11	103	73	23	16	141
17	12	9	93	73	23	18	128
18	2	13	57	75	17	22	76
19	6	13	30	65	10	22	46
20+	4	13	22	71	5	16	31

TABLE 7

NASAL BRIDGE DEVELOPMENT—MIXED-BLOOD INDIANS

Group	Flat		Medium		High		Total
	n	%	n	%	n	%	
				Male			
Indian ½–White ½	4	4	36	34	65	62	105
Indian ¾–White ¼	6	6	35	36	57	58	98
Indian ¼–White ¾	4	4	27	30	59	66	90
Miscellaneous Indian–White	1	1	55	38	90	62	146
				Female			
Indian ½–White ½	7	6	64	51	54	43	125
Indian ¾–White ¼	8	10	37	44	39	46	84
Indian ¼–White ¾	8	8	40	41	50	51	98
Miscellaneous Indian–White	9	5	83	48	81	47	173

TABLE 8

RACE DIFFERENCES IN NASAL BRIDGE DEVELOPMENT

Group	Low or Flat		Medium		High		Total
	n	%	n	%	n	%	
				Male			
Indians, full-blood	67	5	765	56	533	39	1365
Indians, mixed-blood	15	3	153	35	271	62	439
North European	1	..	98	23	323	77	422
South European	..	..	106	24	335	76	441
Japanese	233	20	798	67	159	13	1190
Chinese	157	20	507	65	119	15	783
Korean	22	18	87	69	17	13	126
Hawaiian	16	6	149	57	97	37	262
Haw.-Asiatic	37	12	209	65	72	23	318
Haw.-North European	6	1	185	38	291	61	482
Haw.-South European	6	4	74	45	83	51	163
Haw.-Asiatic-European	4	3	65	55	50	42	119
				Female			
Indians, full-blood	133	11	886	75	163	14	1182
Indians, mixed-blood	32	7	224	47	224	46	480
North European	..	..	95	22	328	78	423
South European	6	1	137	24	433	75	576
Japanese	263	28	646	69	29	3	938
Chinese	186	26	503	69	37	5	726
Korean	21	20	79	76	4	4	104
Hawaiian	33	12	188	67	59	21	280
Haw.-Asiatic	62	17	255	68	57	15	374
Haw.-North European	12	2	232	42	309	56	553
Haw.-South European	6	3	85	49	83	48	173
Haw.-Asiatic-European	8	6	92	63	45	31	145

The Epicanthic Eyefold

In recording the epicanthic eyefold, the subjects were first checked as to eyefold present and then graded as slight, median, marked. As a whole, Indians show the eyefold present as predominating. From the tribal table it appears that the sexes show no certain differences. Higher frequencies for eyefold "present" are noted for the Yaqui, Shoshoni, Washo, Paiute, Papago, and Pima; lower frequencies, for the Keresan and Tanoan Pueblos, Zuñi, Hopi, and Navajo. As both sexes agree closely in these relative ratings, the result seems reasonably certain.

Growth changes in the epicanthic fold have been noted by previous investigators. In Sullivan's Hawaiian data, the fold diminishes in frequency as age increases and the accompanying summary age table shows that Indian children are no exception to the rule.

Finally, we submit a comparative race table for the frequency of the fold in which the approximate positions of the groups are:—

	Per Cent
Asiatic	100
Indian	75
Hawaiian	50
European	0

Thus, as the table stands, the Hawaiians are intermediate between the Europeans and the Asiatics, and the Indians, in turn, are intermediate between the Asiatics and Hawaiians.

TABLE 9

Epicanthic Eyefold Present

Tribe	Male		Female		Total	
	n	%	n	%	m	f
Navajo	184	62	145	66	297	219
Pima	221	88	207	81	250	255
Papago	151	93	121	88	163	137
Hopi	108	62	83	71	173	117
Paiute	82	84	101	86	98	118
Acoma–Laguna	52	63	92	72	82	127
Keresan	49	51	27	51	96	53
Tanoan	35	52	42	75	67	56
Zuñi	22	50	4	67	44	6
Shoshoni	24	92	20	95	26	21
Washo	17	74	22	96	23	23
Yaqui	37	97	33	92	38	36
Eskimo	14	100	13	100	14	13
Mexicans	36	17	34	17	203	183
Negroes	10	50	7	33	20	21

TABLE 10

EPICANTHIC EYEFOLD—INDIANS

Age	Absent		Inferior		Median		Superior		Total
	n	%	n	%	n	%	n	%	
					Male				
5	..	..	1	33	1	33	1	33	3
6	..	..	5	39	..	..	8	61	13
7	3	13	15	65	..	..	5	22	23
8	4	14	12	41	1	3	12	41	29
9	7	16	22	49	4	9	12	27	45
10	12	14	39	50	2	5	25	32	78
11	14	16	44	49	4	4	28	31	90
12	24	19	51	41	2	2	47	38	124
13	26	22	59	51	1	1	30	26	116
14	37	28	56	42	5	4	34	26	132
15	36	28	47	37	5	4	40	31	128
16	49	38	47	36	5	4	28	22	129
17	56	43	39	30	2	2	32	25	129
18	55	38	44	31	2	1	43	30	144
19	39	42	25	27	..	..	29	31	93
20+	33	42	24	31	..	..	21	27	78
					Female				
5	..	..	4	67	..	..	2	33	6
6	..	..	7	70	..	..	3	30	10
7	3	12	10	40	3	12	9	36	25
8	1	3	20	65	1	3	9	29	31
9	5	14	15	43	1	3	14	40	35
10	6	7	46	54	4	5	30	35	86
11	15	18	40	48	2	2	27	32	84
12	20	20	55	57	2	3	19	20	96
13	24	21	50	43	4	4	39	33	117
14	43	32	52	38	..	..	41	30	136
15	33	27	63	51	3	2	25	20	124
16	30	21	61	43	..	..	50	35	141
17	41	33	57	45	3	2	25	20	126
18	27	35	28	36	..	..	22	29	77
19	16	36	20	45	1	2	7	16	44
20+	7	23	12	40	..	..	11	37	30

TABLE 11

EPICANTHIC EYEFOLD—MIXED-BLOOD INDIANS

Group	Absent		Present		Total
	n	%	n	%	
			Male		
Indian ½–White ½	52	49	54	51	106
Indian ¾–White ¼	44	45	54	55	98
Indian ¼–White ¾	59	66	31	34	90
Miscellaneous Indian–White	84	58	42	61	145
			Female		
Indian ½–White ½	63	50	54	61	125
Indian ¾–White ¼	34	40	51	60	85
Indian ¼–White ¾	54	55	44	45	98
Miscellaneous Indian–White	81	47	93	54	174

TABLE 12

RACE DIFFERENCES IN EPICANTHIC EYEFOLD

Group	Present		Absent		Total
	n	%	n	%	
			Male		
Indians, full-blood	982	72	375	28	1357
Indians, mixed-blood	200	46	239	54	439
North European	10	2	412	98	422
South European	22	5	421	95	443
Japanese	1183	99	10	1	1193
Chinese	776	99	9	1	785
Korean	126	99	1	1	127
Hawaiian	133	50	132	50	265
Haw.-Asiatic	288	91	29	9	317
Haw.-North European	120	25	362	75	482
Haw.-South European	46	28	116	72	162
Haw.-Asiatic-European	81	68	38	32	119
			Female		
Indians, full-blood	897	77	271	23	1168
Indians, mixed-blood	250	52	232	48	482
North European	6	1	416	99	422
South European	24	4	559	96	583
Japanese	933	99	7	1	940
Chinese	728	99.8	1	.2	729
Korean	104	100	....	....	104
Hawaiian	150	54	127	46	277
Haw.–Asiatic	328	88	46	12	374
Haw.–North European	128	23	423	77	551
Haw.–South European	39	23	132	77	171
Haw.–Asiatic–European	100	70	43	30	143

The Palpebral Fissure

The direction of the palpebral fissure was recorded as downward, horizontal, and upward. The cases for Indians fall almost exclusively under downward and horizontal. In general, the tribal frequencies for downward are large, those for horizontal, small. Comparing the sexes, it appears that while the females show a lower frequency for horizontal, the difference is too small to credit with much significance.

In the matter of tribal differences, the rank for frequency of the "downward" rating in descending order is: males, Washo, Acoma, Shoshoni, Tanoan, Keresan, Paiute, Navajo, Zuñi, Pima, Papago, Hopi, Yaqui; females, Acoma, Keresan, Tanoan, Shoshoni, Paiute, Washo, Navajo, Yaqui, Papago, Pima, Hopi.

The summary age tables show no certain changes with age, suggesting that this character is fixed in infancy.

TABLE 13

DIRECTION OF PALPEBRAL FISSURE

Tribe	Downward		Horizontal		Upward		Total
	n	%	n	%	n	%	
				Male			
Navajo	219	74	74	25	4	1	297
Pima	149	58	103	40	3	1	255
Papago	93	57	69	42	1	1	163
Hopi	96	56	71	41	5	3	172
Paiute	77	79	20	21	..	..	97
Acoma–Laguna	71	88	9	11	1	1	81
Keresan	77	79	19	20	1	1	97
Tanoan	53	79	14	21	..	..	67
Zuñi	32	73	11	25	1	2	44
Shoshoni	22	85	4	15	..	..	26
Washo	21	91	3	9	..	..	23
Yaqui	21	54	18	46	..	..	39
Mescalero Apache	3	43	4	57	..	..	7
White Mt. Apache	18	86	3	14	..	..	21
San Carlos Apache	24	89	3	11	..	..	27
Maricopa	11	50	10	45	1	5	22
Indian–White	331	76	99	23	3	..	433
Eskimo	13	93	1	7	0	..	14
				Female			
Navajo	172	78	49	22	..	..	221
Pima	171	65	94	35	..	..	265
Papago	95	67	47	33	..	..	142
Hopi	75	64	41	35	1	1	117
Paiute	95	81	19	16	3	3	117
Acoma–Laguna	119	94	6	5	1	1	126
Keresan	48	91	5	9	..	..	53
Tanoan	51	91	5	9	..	..	56
Zuñi	6	100	..	..	..	..	6
Shoshoni	19	90	2	10	..	..	21
Washo	18	78	5	22	..	..	23
Yaqui	24	67	12	33	..	..	36
Mescalero Apache	11	92	1	8	..	..	12
White Mt. Apache	5	56	4	44	..	..	9
San Carlos Apache	21	72	8	28	..	..	29
Maricopa	15	60	9	36	1	4	25
Indian–White	388	81	88	18	2	1	478
Eskimo	0	..	12	100	0	..	12

TABLE 14

DIRECTION OF PALPEBRAL FISSURE—INDIANS

Age	Downward		Horizontal		Upward		Total
	n	%	n	%	n	%	
			Male				
5	2	100	..	..	..	..	2
6	7	47	8	53	..	..	15
7	14	61	9	39	..	..	23
8	16	57	12	43	..	..	28
9	28	67	14	33	..	..	42
10	54	68	25	31	1	1	80
11	68	72	25	26	1	1	94
12	97	74	33	25	1	1	131
13	79	64	41	33	3	3	123
14	101	74	33	24	2	2	136
15	92	69	42	31	..	..	134
16	99	68	43	30	3	2	145
17	99	70	41	29	2	1	142
18	103	65	53	34	2	1	158
19	70	68	32	31	1	1	103
20	57	70	24	29	1	1	82
			Female				
5	2	33	4	67	..	..	6
6	7	70	3	30	..	..	10
7	19	79	5	21	..	..	24
8	25	78	7	22	..	..	32
9	28	80	7	20	..	..	35
10	68	78	19	22	..	..	87
11	64	72	25	18	..	..	89
12	79	76	24	23	1	1	104
13	91	75	29	24	1	1	121
14	118	79	31	21	..	..	149
15	106	81	23	18	1	2	130
16	115	73	41	26	2	1	158
17	98	71	40	29	..	..	138
18	70	78	19	21	1	1	90
19	27	53	24	47	..	..	51
20	28	82	6	18	..	..	34

TABLE 15

DIRECTION OF PALPEBRAL FISSURE—MIXED-BLOOD INDIANS

Group	Downward		Horizontal		Upward		Total
	n	%	n	%	n	%	
				Male			
Indian ½–White ½	81	78	22	21	1	1	104
Indian ¾–White ¼	77	79	20	21	..	..	97
Indian ¼–White ¾	66	75	22	23	..	..	88
Miscellaneous Indian–White	107	74	35	24	2	1	144
				Female			
Indian ½–White ½	96	77	28	22	..	..	124
Indian ¾–White ¼	66	79	18	21	..	..	84
Indian ¼–White ¾	81	84	16	16	..	..	97
Miscellaneous Indian–White	145	84	26	15	2	1	173

The Enamel Rim

The tabulations record the frequencies for the enamel rim upon the lateral incisors, mesial incisors, and the canines. To facilitate tribal comparisons the frequency of rim on upper lateral incisors was listed by tribes. The lowest frequencies were found to be among the Pueblo tribes, the highest among the Shoshonean, Washo, Pima, and Papago. A slight sex difference appears; the presence of the enamel rim among females is slightly in excess of the frequency for males.

The table for the different race groups gives the gradations for the prominence of the enamel rim as slight, medium, or marked. The cases for these groups vary greatly in number so that some allowance must be made for differences in reliability of count. However, as recorded, the lowest frequencies for enamel rim on upper incisors occur for the European and American white, possibly among Negroes also. The highest frequencies are among the Indians and Asiatics. One peculiarity in the table is that the Indian and Mexican data show a tendency to exceed in medium grades; the other race groups show this grade to be rare. One unacquainted with Sullivan's technique might regard this as an error, but we suspect that this is due to a qualitative difference in the form of the rim as between Indians and Asiatics.

As a check upon the upper incisors, Indian data were tabulated for the lower incisors and for the canines. The striking difference is that the rim is much less noticeable on the lower incisors. Respecting the canines, the frequency for the lower canines is in excess.

Finally, a table for the various mixtures of Indian and white indicates the frequencies for these groups.

As a general race group summary in rounded off percentages for the upper incisors, the following seems to present the relative positions of the groups as observed.

	Per Cent
Asiatics	90
Indians	85
Hawaiians	50
Whites	15

TABLE 16

PRESENCE OF ENAMEL RIM ON UPPER LATERAL INCISORS

Tribe	Male		Female		Total	
	n	%	n	%	m	f
Navajo	248	82	198	90	301	220
Pima	223	90	242	92	249	263
Papago	119	90	109	92	133	120
Hopi	128	74	100	87	173	115
Paiute	78	84	103	87	93	118
Acoma–Laguna	70	86	106	84	81	126
Keresan	69	70	48	79	99	61
Tanoan	49	74	48	84	66	57
Zuñi	36	80	5	83	45	6
Shoshoni	22	92	20	100	24	20
Washo	21	91	21	96	23	22
Yaqui	26	84	29	91	31	32
All Indians	1123	82	1051	87	1356	1186

TABLE 17

PRESENCE OF ENAMEL RIM ON UPPER LATERAL INCISORS—MIXED-BLOOD INDIANS

	Male			Female		
	n	Rim Present	%	n	Rim Present	%
One-fourth white	97	52	53	80	58	72
One-half white	105	49	46	126	71	56
Three-fourths white	89	35	39	99	47	47
Miscellaneous	142	71	50	130	99	76
Total	433	207	49	435	275	63

TABLE 18

Enamel Rim on Upper Incisors

Group	Sex	Lateral Total	Lateral Present n	Lateral Present %	Lateral Slight n	Lateral Medium n	Lateral Marked n	Mesial Total	Mesial Present n	Mesial Present %	Mesial Slight n	Mesial Medium n	Mesial Marked n
Chinese	m	617	557	90	119	5	433	702	629	89	122	6	501
	f	577	525	90	90	3	432	649	603	93	97	4	502
Japanese	m	981	860	88	178	9	673	1118	990	89	185	8	797
	f	741	672	91	113	5	554	856	784	92	123	5	656
Korean	m	113	90	79	22	0	70	121	98	81	20	0	78
	f	94	81	86	10	0	71	96	84	88	11	0	73
Negro	m	28	6	21	4	0	2	29	4	14	4	0	0
	f	38	5	13	4	1	0	39	5	13	4	1	0
American	m	445	64	15	38	3	23	489	59	12	34	2	23
	f	479	80	17	58	4	18	508	81	16	57	6	18
European	m	693	101	15	58	11	32	752	80	11	43	7	30
	f	903	150	16	93	15	42	951	141	15	88	15	38
Hawaiian	m	278	139	47	69	5	65	306	149	49	69	4	76
	f	302	164	54	77	7	80	315	163	52	74	8	81
Hawaiian–North	m	408	152	37	83	2	67	447	150	33	74	2	74
European	f	499	211	42	97	4	110	525	211	41	93	5	113
Hawaiian-South	m	133	47	36	27	1	19	150	48	32	29	0	19
European	f	151	71	47	31	0	40	164	72	44	31	0	41
Hawaiian-Asiatic	m	246	182	74	55	1	126	289	203	70	60	1	142
	f	331	253	76	68	7	178	361	269	75	70	6	193
Hawaiian-Asiatic-	m	102	48	47	18	2	28	109	53	48	20	2	31
European	f	136	94	70	24	2	68	143	98	70	22	2	74
Indian	m	1356	1123	82	349	454	320	1388	1194	85	325	450	419
	f	1186	1051	87	298	447	306	1205	1083	88	258	439	396
Mexican	m	215	76	35	39	17	20	232	86	37	41	23	22
	f	199	85	42	29	35	21	205	91	44	27	39	25

TABLE 19

ENAMEL RIM ON INCISORS AND CANINES—INDIANS

	Sex	Total	Absent	Slight	Medium	Marked
Lower lateral incisors	m	1357	747	375	226	9
	f	1170	582	396	187	5
Lower mesial incisors	m	1366	747	384	226	9
	f	1188	599	405	189	5
Upper canines	m	1155	935	196	24	0
	f	1010	756	221	31	2
Lower canines	m	1244	756	319	169	0
	f	1095	634	324	135	2

Carabelli's Cusps

The presence of Carabelli's cusps was noted on a large number of subjects. These frequencies were tabulated for the right side. Sample tabulations were made for the left side, but these revealed no positive differences. The tables suggest a tendency for these cusps to appear upon the permanent rather than upon the deciduous teeth. The difference between deciduous M^2 and permanent M^1, regarded as analogous teeth are less than between deciduous M^1 and permanent M^1. Further, whereas the frequency of Carabelli's cusps is high for permanent M^1, it is very low for M^2. The emphasis of this study, however, is upon group differences, respecting which the tables show these cusps as prominent among whites and possibly negroes. Further, the mixed white group takes intermediate positions.

The approximate positions of the group are as follows:—

White	25
Hawaiian	15
Asiatic	9
Indian	7

TABLE 20

Carabelli's Cusps on Deciduous Teeth

		Right Upper First Molar			Right Upper Second Molar		
			Present			Present	
Group	Sex	Total	n	%	Total	n	%
Indian	m	132	0	0	445	9	2
	f	134	2	1	427	19	5
Mexican	m	102	1	1	207	5	2
	f	90	1	1	190	5	2
Negro	m	5	1	20	21	5	25
	f	7	0	0	23	1	5
European	m	9	0	0	160	6	4
	f	4	0	0	190	9	5

TABLE 21

CARABELLI'S CUSPS ON PERMANENT TEETH

	Right Upper First Molar				Right Upper Second Molar			
			Present				Present	
Group	Sex	Total	n	%	Sex	Total	n	%
Indian	m	1881	126	7	m	977	2	..
	f	1706	125	7	f	814	2	..
Mexican	m	265	34	13	m	128	2	1
	f	229	30	13	f	112	2	2
Chinese	m	832	78	9	m	536	3	..
	f	735	55	7	f	286	2	1
Japanese	m	1232	112	9	m	856	2	..
	f	951	54	6	f	305	..	..
Negro	m	44	30	69	m	12	0	0
	f	65	28	42	f	20	0	0
American	m	429	125	29	m	250	2	1
	f	432	109	23	f	286	1	..
European	m	1580	378	24	m	378	6	2
	f	1830	427	23	f	545	4	1
Hawaiian	m	579	89	15	m	227	4	2
	f	557	52	9	f	234	5	2
Haw.-North	m	467	88	19	m	193	0	0
European	f	550	97	19	f	273	1	..
Haw.-South	m	163	27	16	m	50	0	0
European	f	171	30	17	f	83	3	3
Haw.-Asiatic	m	316	41	13	m	98	0	0
	f	376	38	10	f	153	0	0

The Number of Molar Cusps

From the examination records a compilation was made of the numbers of normal molar cusps upon the permanent right lower second molar. The table (22) speaks for itself. Some group tendencies appear, as the Indians and Asiatics show an excess in five cusps, the other groups in four. Respecting sex differences, the suggestion is for a slight excess of five cusps among males.

TABLE 22

Number of Cusps on Permanent Right Lower Second Molar

Group	Sex	3	4	5	6	Total
Indian	m	2	454	681	28	1165
	f	1	442	528	29	1000
Mexican	m	0	37	13	0	50
	f	0	31	12	0	43
Chinese	m	0	139	253	0	392
	f	0	151	198	0	349
Japanese	m	0	258	387	0	645
	f	0	219	205	0	424
Korean	m	0	31	50	0	81
	f	0	36	35	0	71
Negro	m	0	11	7	0	18
	f	0	22	10	0	32
American	m	0	87	8	0	95
	f	0	91	6	0	97
European	m	0	662	127	0	789
	f	0	931	85	0	1016
Hawaiian	m	0	74	96	1	171
	f	0	107	94	0	201
Haw.-North	m	0	179	98	0	277
European	f	0	257	93	1	351
Haw.-South	m	0	49	28	0	77
European	f	0	71	38	0	109
Haw.-Asiatic	m	0	65	73	0	138
	f	0	93	115	0	208
Haw.-Asiatic-	m	0	33	26	0	59
European	f	0	46	49	0	95

Skin Color

Readings for unexposed skin color of the Indians were recorded with the Von Luschan scale. The tabulation shows the frequencies for each numbered facet of the scale. Where the numbers of cases were small, the actual number of cases are given instead of percentages. Anyone familiar with the instrument used will understand why there are no readings for Nos. 19 and 20. According to the table, the light colored are the Zuñi, Navajo, Acoma, Laguna, and Tanoan; the dark, the Pima and Papago; intermediate, Hopi and Paiute. Data for Mexican children, previously published by Sullivan, show them lighter than any of the Indian tribes recorded here.[1]

[1]Paschal, F. C., and Sullivan, Louis R., Racial Differences in Mexican Children. (*Comparative Psychological Monographs*, vol. 3, no. 14, 1925).

TABLE 23

Unexposed Skin Color[1]

Von Luschan Scale in Percentages

Tribe	Sex	n	10	11	12	13	14	15	16	17	18	21	22	23	24	25	26
Zu˙i	m	34	3	3	0	21	28	12	12	15	..	..	3	3	..	..	..
	f	4	..	..	..	(1)	(1)	(2)	..	..	..	..	..	..	..	..	..
Navajo	m	196	..	2	5	12	25	12	12	8	15	1	1	5	..	2	..
	f	140	..	3	19	27	29	9	8	1	3	..	1	..	..	..	..
Pima	m	82	..	..	..	..	..	2	4	..	18	1	15	18	25	16	1
	f	64	..	..	..	2	8	3	9	6	31	2	20	14	5	..	..
Papago	m	35	..	..	..	..	3	..	3	..	17	3	14	14	28	9	9
	f	32	..	..	..	3	13	19	16	3	21	..	22	..	3	..	..
Hopi	m	87	..	..	1	7	14	9	18	3	25	3	13	3	3	1	..
	f	52	..	4	10	27	34	6	13	2	2	2	..	..	..	..	..
Paiute	m	27	..	..	4	7	19	7	11	23	11	..	7	4	7	..	..
	f	38	..	3	8	18	26	16	8	5	11	5	..	..	..	..	..
Acoma–Laguna	m	41	2	7	10	17	25	10	22	2	5	..	..	..	..	..	..
	f	55	..	5	35	35	20	5	..	..	..	..	..	..	..	..	..
Keresan	m	36	..	..	6	6	17	17	21	..	27	..	..	3	3	..	..
	f	8	..	..	(2)	..	(4)	..	(2)	..	..	..	..	..	..	..	..
Tanoan	m	30	..	..	10	7	26	10	17	7	10	..	7	3	3	..	..
	f	18	..	18	11	18	40	2	11	..	..	..	..	..	..	..	..
Yaqui	m	32	..	..	..	6	9	0	20	15	20	21	0	6	3	..	..
	f	27	3	0	11	0	7	0	24	12	24	6	3	3	0	7	..
Washo	m	6	..	..	..	..	(1)	(1)	..	..	(1)	..	(1)	..	(1)	(1)	..
	f	6	..	..	(2)	..	(2)	(1)	..	(1)	..	..	..	..	..	..	
Shoshoni	m	4	..	..	(1)	..	(1)	(1)	..	(1)	..	..	..	..	..	..	..
	f	8	..	..	(2)	(2)	(2)	..	(2)	..	..	..	..	..	..	..	..

[1]No readings were recorded for 19 and 20 of the scale. The numerals in parentheses are actual, not percentages.

Tribal Similarities

As the foregoing data were compiled it appeared that certain tribes took similar rank respecting their frequency rating for two or more characters. For example, Papago and Pima are in close agreement in respect to nasal bridge, eyefold, palpebral fissure, enamel rim, and skin color. Perhaps this is just what would be expected by anyone familiar with the history of these two tribes. However, to reveal other tribal similarities we compiled a ranking table (Table 24). This shows that the Pima and Papago, while holding similar positions in rank, as respects themselves, change their places in respect to the whole number of tribes. It is further observable that the Paiute tend to follow the Pima and Papago. The Navajo and Yaqui are less regular, but in total rank tend to fall with the Papago.

The village groups, Hopi, Zuñi, the eastern Keresan (San Felipe, Sia, Santa Ana, Cochiti, Santo Domingo) and the Tanoan pueblos form a cluster. The variants are the western Keresan, Acoma and Laguna, who fall in a class of their own.

Another closely similar pair is the Washo and Shoshoni. According to the records, these Shoshoni are from Nevada and adjacent California; they are probably of the Mono-Paviotso group. It is observable that these Shoshoni are more like the Washo than the Paiute.

The above groupings are for males, but the female ratings are in close agreement, except that the Acoma–Laguna rank tends to join the other Pueblo group.

So far we have considered similarities solely upon linkage in rank, but in terms of the characters used in this rating, one would say that the Shoshoni and Washo present high rank in intercanthus distance, downward palpebral fissure and presence of enamel rim; and above the median rank in high nasal bridge and presence of the eyefold. The contrasting group is the Pueblo villages with low rank in intercanthus distance, frequency of eyefold, and enamel rim, and median in nasal bridge, and the direction of the palpebral fissure. If they agree anywhere with the Washo and Shoshoni it is in skin color. The Papago, Pima, etc., tend to median positions, but are the darkest in skin color.

	Enamel Rim		Eyefold		Nasal Bridge		Palpebral Fissure	
Group	m	f	m	f	m	f	m	f
Washo–Shoshoni	91	98	83	95	45	19	88	84
Pima-Papago	90	92	90	84	32	14	57	56
Pueblos	77	83	56	67	46	16	75	88
Indian–White	49	65	46	52	62	46	75	81
Mexican	35	42	17	17	..	..	..	..
White	15	16	2	1	77	78	..	..

Naturally, these comparisons must be considered as tentative until more data are available. One curious relation observed is that if the European is taken as the basis of comparison, the village tribes are nearer the whites than are the other Indians, or perhaps one should say the Mexicans and mixed-Indians.

TABLE 24

TRIBAL RANKS—MALE

Wide Intercanthus		High Nasal Bridge		Fold Present		Downward Fissure		Rim Present	
Shoshoni	46	Zuñi	75	Yaqui	97	Washo	91	Shoshoni	92
Washo	39	Navajo	49	Papago	93	Acoma	88	Washo	91
Paiute	30	Acoma	48	Shoshoni	92	Shoshoni	85	Pima	90
Papago	29	Shoshoni	46	Pima	88	Tanoan	79	Papago	90
Yaqui	26	Washo	44	Paiute	84	Keresan	79	Acoma	86
Keresan	25	Hopi	40	Washo	74	Paiute	79	Paiute	84
Navajo	24	Pima	36	Acoma	63	Navajo	74	Yaqui	84
Pima	20	Keresan	34	Navajo	62	Zuñi	73	Navajo	82
Acoma–Laguna	20	Tanoan	34	Hopi	62	Pima	58	Zuñi	80
Hopi	18	Papago	28	Tanoan	52	Papago	57	Hopi	74
Tanoan	17	Paiute	26	Keresan	51	Hopi	56	Tanoan	74
Zuñi	9	Yaqui	13	Zuñi	50	Yaqui	54	Keresan	70