

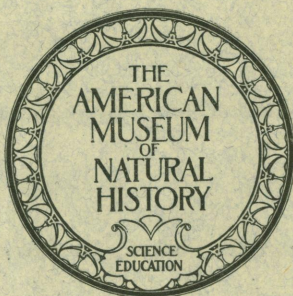
ANTHROPOLOGICAL PAPERS
OF
THE AMERICAN MUSEUM
OF NATURAL HISTORY

VOL. XXIII, PART III

ANTHROPOMETRY OF THE SIOUAN TRIBES

BY

LOUIS R. SULLIVAN



NEW YORK
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1920

AMERICAN MUSEUM OF NATURAL HISTORY

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CONTENTS

	PAGE.
I. INTRODUCTION	89
ACKNOWLEDGEMENTS	89
THE MATERIAL	89
II. RESULTS	91
DESCRIPTIVE CHARACTERS	91
ANTHROPOMETRIC CHARACTERS	93
HOMOGENEITY OF THE SERIES	96
STATURE	97
HEIGHT OF SHOULDER	100
WIDTH OF SHOULDER	102
INDEX OF SHOULDER WIDTH	107
HEIGHT SITTING	108
INDEX OF HEIGHT SITTING	111
ARM REACH	115
INDEX OF ARM REACH	118
LENGTH OF ARM	119
INDEX OF ARM LENGTH	123
LENGTH OF HEAD	123
WIDTH OF HEAD	126
CEPHALIC INDEX	129
WIDTH OF FACE	131
FACIAL WIDTH AND HEAD WIDTH	135
HEIGHT OF FACE: PHYSIOGNOMIC	136
HEIGHT OF FACE: ANATOMICAL	138
HEIGHT OF FACE: UPPER	141
FACIAL INDEX: ANATOMICAL	144
NOSE HEIGHT	151
NOSE WIDTH	151
NASAL INDEX	154
III. CORRELATION OF DIFFERENT MEASUREMENTS	154
IV. THE INHERITANCE OF FACE WIDTH	159
V. CONCLUSIONS	167
VI. BIBLIOGRAPHY	174

ILLUSTRATIONS

TEXT FIGURES

	PAGE.
1. Width of Face: Indian-White Series	162
2. Distribution of Face Width in Reduced Series compared to Distribution in Original Series	168
3. Growth: Indices	174
4. Growth: Absolute Dimensions	174
5. Graphic Distribution of Absolute Body Measurements	174
6. Graphic Distribution of Absolute Head and Face Measurements	174
7. Graphic Distribution of Indices	174

TABLES

I.	Principal Measurements by Tribes and Bands.
II.	Averages of Tribal Groups Compared to Averages of Total Series.
III.	Stature: Averages for Different Observers.
IV.	Stature: Distribution.
V.	Stature: Growth.
VI.	Height of Shoulder: Averages for Different Observers.
VII.	Height of Shoulder: Distribution.
VIII.	Height of Shoulder: Growth.
IX.	Width of Shoulder: Averages for Different Observers.
X.	Width of Shoulder: Distribution.
XI.	Width of Shoulder: Growth.
XII.	Index of Shoulder Width: Averages for Different Observers.
XIII.	Index of Shoulder Width: Distribution.
XIV.	Index of Shoulder Width: Growth.
XV.	Height Sitting: Averages for Different Observers.
XVI.	Height Sitting: Distribution.
XVII.	Height Sitting: Growth.
XVIII.	Index of Height Sitting: Averages for Different Observers.
XIX.	Index of Height Sitting: Distribution.
XX.	Index of Height Sitting: Growth.
XXI.	Arm Reach: Averages for Different Observers.
XXII.	Arm Reach: Distribution.
XXIII.	Arm Reach: Growth.
XXIV.	Index of Arm Reach: Averages for Different Observers.
XXV.	Index of Arm Reach: Distribution.
XXVI.	Index of Arm Reach: Growth.
XXVII.	Length of Arm: Averages for Different Observers.
XXVIII.	Length of Arm: Distribution.
XXIX.	Length of Arm: Growth.
XXX.	Index of Arm Length: Averages for Different Observers.
XXXI.	Index of Arm Length: Distribution.
XXXII.	Index of Arm Length: Growth.
XXXIII.	Length of Head: Averages for Different Observers.
XXXIV.	Length of Head: Distribution.
XXXV.	Length of Head: Growth.
XXXVI.	Width of Head: Averages for Different Observers.
XXXVII.	Width of Head: Distribution.
XXXVIII.	Width of Head: Growth.
XXXIX.	Cephalic Index: Averages for Different Observers.
XL.	Cephalic Index: Distribution.
XLI.	Cephalic Index: Growth.
XLII.	Width of Face: Averages for Different Observers.
XLIII.	Width of Face: Distribution.
XLIV.	Width of Face: Growth.

- XLV. Cephalo-Facial Index: Averages for Different Observers.
- XLVI. Cephalo-Facial Index: Distribution.
- XLVII. Cephalo-Facial Index: Growth.
- XLVIII. Height of Face (Physiognomic): Averages for Different Observers.
- XLIX. Height of Face (Physiognomic): Distribution.
- L. Height of Face (Physiognomic): Growth.
- LI. Height of Face (Anatomical): Averages for Different Observers.
- LII. Height of Face (Anatomical): Distribution.
- LIII. Height of Face (Anatomical): Growth.
- LIV. Facial Index (Anatomical): Averages for Different Observers.
- LV. Facial Index (Anatomical): Distribution.
- LVI. Facial Index (Anatomical): Growth.
- LVII. Nose Height: Averages for Different Observers.
- LVIII. Nose Height: Distribution.
- LIX. Nose Height: Growth.
- LX. Nose Width: Averages for Different Observers.
- LXI. Nose Width: Distribution.
- LXII. Nose Width: Growth.
- LXIII. Nasal Index: Averages for Different Observers.
- LXIV. Nasal Index: Distribution.
- LXV. Nasal Index: Growth.
- LXVI. Correlations.
- LXVII. Correlation: Length to Width of Head in Tribal Groups.
- LXVIII. Theoretical Growth of Face in Width.
- LXIX. Width of Face: Indian-White Hybrids.
- LXX. Average Width of Head Associated with a Given Width of Face.
- LXXI. Face Width and Head Width: Correlation and Regression.
- LXXII. Average Width of Face Associated with a Given Width of Head.
- LXXIII. Width of Face Reduced to the Standard of the Average Width of Head.
- LXXIV. Summary of Anthropometric Results.

I. INTRODUCTION.

ACKNOWLEDGMENTS.

The following material is the result of investigations made on the occasion of the World's Columbian Exposition, Chicago, 1893. The Department of Ethnology and Archaeology, with Professor F. W. Putnam as Chief, appointed Professor Franz Boas head of the sub-department of physical anthropology for the purpose of making an investigation of the physical characteristics of the various native peoples of the American continent. Investigations were carried on upon a majority of the larger tribal groups within the United States. This material, although not as yet fully reported on, constitutes the most comprehensive and important contribution to our knowledge of the physical characteristics of the North American Indian. Professor Boas has already reported in detail upon the Shoshonean¹ tribes and also upon stature,² cephalic index, and width of face for all the groups.

The present report deals only with the Siouan peoples. The observations were made by Messrs. F. C. Smith, J. W. Cooke, G. A. Kaven, Z. T. Daniels, Franz Boas, E. F. Wilson, C. A. Helvin, F. C. Kenyon, and G. M. West. The series of Kaven, Cooke, Smith, and Boas are the larger.

The records are still the property of Professor Boas to whom I am indebted for the privilege of working them up. This report is a part of the writer's laboratory work under Professor Franz Boas of Columbia University who has superintended the work and given advice as to method at various points. The writer alone is responsible for the accuracy of the calculations and feels a fair degree of confidence in them. I am also indebted to the Department of Anthropology of the American Museum of Natural History for valuable clerical help and for the time in which to carry on the work. Finally, I am indebted to my wife for very valuable assistance during the preparation of this report.

THE MATERIAL.

The series includes 1431 individuals distributed as follows by age, sex, and blood:—

Male: Pure Sioux:	Children from 4 to 19 years	186	
	Adults from 20 to 59 years	540	
	Old individuals from 60 years on	54	
	Total Pure Sioux Male		780

¹Boas, 1899.

²Boas, 1895, 1894-1, 1894-2.

Half-Blood: Children from 4 to 19 years	97	
Adults from 20-59	77	
	<hr/>	
Total Half-Blood Male		174
Mixed-Blood Indians	7	
	<hr/>	
Total Mixed-Blood Male		7
Female: Pure Sioux: Children from 4 to 19 years	144	
Adults from 20 to 59 years	157	
Old individuals from 60 years on	24	
	<hr/>	
Total Pure Sioux Female		325
Half-Blood: Children from 4 to 19 years	123	
Adults from 20 to 59 years	19	
	<hr/>	
Total Half-Blood Female		142
Mixed-Blood Indians	3	
	<hr/>	
Total Mixed-Blood Female		3
	<hr/>	
Total Series	1431	1431

The following bands or tribes representing subdivisions of the closely allied Siouan peoples are included among the full-blooded male adults:—

21 Santee	40 Oglala
13 Wahpeton	14 Waziahziah
54 Sisseton	11 Sans Arc
52 Yankton	30 Blackfoot
73 Yanktonai	13 Minneconjou
14 Cut Head	33 Two Kettle
1 Teton	36 Hunkpapa
66 Brulé	18 Assiniboin
12 Loafer	40 Miscellaneous

Total Series 541

About the same proportions hold for the remaining groups.

II. RESULTS.

DESCRIPTIVE CHARACTERS.

Under descriptive characters are included such characters as pigmentation of the skin, hair, and eyes, form of the hair, form of the eyes, ears, nose, and lips. In the main, the value of such characters is not very great, due, not to any great extent to the fault of the observers but, to the use of unsatisfactory standards and the unavoidable range of personal estimation in evaluating minute differences in terms of relative magnitude.

Especially unsatisfactory are observations as to skin color. Special color charts were used. The colors occurring most frequently would correspond to numbers 14 to 24 inclusive of Von Luschan's Hautfarben-Tafel. The results for skin color on the palms of the hands, and exposed and unexposed parts of the body indicate that this test was not very sensitive. Nor is it possible to distinguish certain differences between full-bloods and half-bloods. This should not be taken to indicate that such differences do not exist, but simply that our tests were not sufficiently sensitive to color differences.

The hair color is almost uniformly recorded as black. One observer recorded 14 individuals among the 541 pure Sioux males with dark brown hair and 5 individuals with light brown hair. All the other observers recorded the entire series as having black hair. Among our 77 half-bloods, 11 were recorded with dark brown hair, one with blond, and all the others, black.

Of the full-bloods 25 are recorded as having wavy and 4 as having curly hair. The remaining 512 have straight hair. Of the 77 half-bloods 9 have wavy and 4 curly hair.

As to the development of the beard and moustache there seems to be a real difference between full-bloods and half-bloods. Very few of the full-bloods have any beard on the upper or lower cheek. About 15 percent of the full-bloods have a scanty beard on the chin and about 25 percent have a scanty moustache. Among half-bloods 20 percent have a scanty beard on the upper cheek, 35 percent have a scanty beard on the lower cheek, 65 percent have some development of a beard on the chin, and 80 percent have moustaches. However, many of the full-bloods and several of the half-bloods are reported as having pulled out the beard or moustache hair.

The eye colors of the males are as follows:—

	Full-bloods	Half-bloods
Black	185	14
Dark Brown	338	39
Light Brown	7	14
Gray	4	7
Blue	5	3
Total	539	77

It should be noticed that among the full-blooded Indians 4 are reported as having gray eyes and 5 with blue eyes. Very probably these are mixed-bloods, although the hair color and form, and facial width favor the full-bloods in these instances.

Diagrams of different types of eye form were also used, but the results are very unsatisfactory and not worth recording.

The nasal bridge is reported as high or medium throughout both groups. The profile of the nose is convex and slightly arched in a majority of instances. The nostrils are elongate with the long axes in an antero-posterior direction. Among the full-bloods the point of the nose is recorded as long and thick and among half-bloods as long and thin in a majority of cases.

The thickness of the lips and the slope of the upper lip varies with each observer and the results are not comparable.

The ears are rounding and stand close to the head in most individuals. The helix is thin and rolled inward in nearly every instance. In 5 individuals the helix (upper portion) is recorded as being rolled outward and in 11 flat. The antehelix is high and narrow.

While the majority of these descriptive characters are subject to a considerable personal error of observation, on the whole it seems perfectly justifiable to say that the half-blood approaches the Indian more closely than the white in skin color, hair color and form, and eye color. On the other hand, the half-bloods seem to approach the white in the development of beard and moustache hair.

ANTHROPOMETRIC CHARACTERS.

The measurements taken were as follows:—

1. Stature: without shoes.
2. Shoulder height (to acromion).
3. Arm length (shoulder height minus height to point of middle finger).
4. Arm reach: maximum span.
5. Height sitting.
6. Width of shoulders (bi-acromial width).
7. Head length (maximum).
8. Head width (maximum).
9. Face height:—
 - (a) Hair line to chin.
 - (b) Nasion to chin.
 - (c) Nasion to mouth.
10. Width of face (maximum bizygomatic).
11. Height of nose (nasion to sub-nasal point).
12. Width of nose (maximum).

From these measurements the following indices were calculated:—

1. Arm length (arm length to stature).
2. Arm reach (arm reach to stature).
3. Height sitting (height sitting to stature).
4. Shoulder width (shoulder width to stature).
5. Cephalic (width to length of head).
6. Cephalo-facial (width of face to width of head).
7. Facial (anatomical) (height of face [9 b] to width of face).
8. Nasal (width to height of nose).

The averages of the series of each observer were obtained separately in order to determine in how far they agreed with each other. Unfortunately, no check measurements were made and it is impossible to determine the error of observation. A close study of the various averages indicates that the measurements of stature, arm reach, height sitting, head length, head width, face width, and nose width are the most reliable and show the smallest differences between the different series. Shoulder height, shoulder width, and arm length are not quite as satisfactory. The largest differences, which are undoubtedly due to differences in technique, are found in the three measurements of face height and nose height. Nevertheless, it has seemed best not to correct the measurements but to use them as they stand. The averages of each observer are listed for each measurement and the reader can judge for himself in how far the results are in agreement.

TABLE I.
PRINCIPAL MEASUREMENTS BY TRIBES AND BANDS.
PURE SIOUX MALE.

Tribe or Band	No. of Cases	Stature			Cephalic Index			Length of Head			Width of Head			Width of Face		
		Aver.	σ	e	Aver.	σ	e	Aver.	σ	e	Aver.	σ	e	Aver.	σ	e
* Santee	21	173.7	6.43	1.40	79.8	2.50	.54	194.1	5.76	1.25	155.1	5.83	1.27	147.2	5.58	1.22
	12	174.4	4.54	1.31	78.0	2.38	.68	196.2	5.35	1.54	152.6	3.66	1.05	148.4	5.40	1.62
	54	173.0	6.26	.85	78.3	2.89	.39	195.1	6.26	.86	152.7	4.67	.63	147.2	5.48	.74
Yankton	52	172.4	5.26	.72	80.2	2.91	.40	194.8	5.78	.80	156.0	5.87	.82	150.8	6.60	.91
Yanktonai	72	171.2	6.09	.72	79.7	3.18	.37	193.7	5.91	.69	154.3	4.78	.56	148.6	5.03	.59
Cut Head	13	170.2	4.03	1.12	80.4	2.95	.79	192.1	5.22	1.39	154.4	5.18	1.38	148.4	4.41	1.18
Teton	1	178.0			86.0			190.0			163.0			143.0		
Brulé	66	173.3	4.75	.58	79.2	3.40	.42	194.1	5.06	.62	153.8	4.92	.60	148.8	4.25	.52
Loafer	11	173.5	4.46	1.34	78.7	2.52	.76	194.1	5.74	1.76	152.8	4.99	1.50	146.0	3.88	1.16
Oglala	39	172.8	4.91	.78	80.9	3.02	.47	193.3	5.71	.90	156.3	5.32	.84	150.0	5.01	.79
Waziahziah	14	173.6	4.81	1.29	80.6	2.13	.57	195.6	3.73	.99	157.4	3.98	1.06	150.8	4.14	1.10
Sans Arc	11	170.3	5.51	1.66	80.4	4.10	1.23	193.0	6.22	1.87	155.6	6.46	1.94	148.2	4.43	1.33
Blackfoot	30	171.7	5.65	1.03	79.7	4.48	.81	197.9	7.92	1.44	158.4	6.37	1.16	152.6	5.39	.96
Minneconjou	13	172.8	5.61	1.55	79.8	2.62	.72	193.4	4.97	1.37	154.7	3.91	1.09	149.3	4.61	1.28
Two Kettle	34	173.2	6.18	1.06	79.0	2.28	.39	196.2	6.10	1.04	155.4	5.23	.91	149.2	4.51	.77
Hunkpapa	36	172.0	5.70	.95	79.6	2.56	.43	197.5	5.22	.89	157.6	4.60	.76	153.6	4.32	.73
Assiniboin	18	168.1	5.50	1.29	79.0	3.85	.90	195.9	8.26	1.94	154.7	5.32	1.25	144.1	4.61	1.09
Sioux (Miscel.)	40	173.7	5.28	.83	80.7	3.45	.54	195.0	5.54	.87	156.8	5.57	.87	147.9	5.02	.79
Total Series	538	172.4	5.64	.24	79.6	3.20	.14	194.9	6.16	.26	155.1	5.39	.23	149.1	5.45	.23

*Lines include bands most closely related linguistically.

TABLE II.

RELATION OF DIFFERENCE BETWEEN AVERAGE FOR TOTAL SERIES AND AVERAGE OF TRIBAL GROUPS TO THE DEVIATION OF THE AVERAGE

	Stature		Cephalic Index		Length of Head		Breadth of Head		Breadth of Face	
	A_1-A_2	$\sqrt{e_1^2+e_2^2}$	A_1-A_2	$\sqrt{e_1^2+e_2^2}$	A_1-A_2	$\sqrt{e_1^2+e_2^2}$	A_1-A_2	$\sqrt{e_1^2+e_2^2}$	A_1-A_2	$\sqrt{e_1^2+e_2^2}$
Santee	1.30	1.42	.20	.56	.80	1.28	.0	1.29	1.90	1.24
Wahpeton	2.00	1.33	1.60	.69	1.30	1.56	2.50	1.07	.70	1.63
Sisseton	.60	.88	1.30*	.41	.20	.90	2.40*	.67	1.90	.77
Yankton	.00	.76	.60	.42	.10	.84	.90	.85	1.70	.94
Yanktonai	1.20	.76	.10	.40	1.20	.74	.80	.60	.50	.63
Cut Head	2.20	1.14	.80	.80	2.80	1.41	.70	1.40	.70	1.20
Teton	.90	.63	.40	.45	.80	.67	1.30	.64	.30	.56
Brulé	1.00	1.36	.90	.77	.80	1.78	2.30	1.52	3.10	1.18
Loafer	.40	.82	1.30	.49	1.60	.94	1.20	.87	.90	.82
Oglala	1.20	1.31	1.00	.58	.70	1.02	2.30	1.08	1.70	1.12
Waziahziah	2.10	1.68	.80	1.24	1.90	1.89	.50	1.95	.90	1.35
Sans Arc	.70	1.06	.10	.82	3.00	1.46	3.30	1.18	3.50*	.98
Blackfoot	.40	1.57	.20	.73	1.50	1.40	.40	1.11	.20	1.30
Minneconjou	.80	1.08	.60	.41	1.30	1.07	.30	.94	.10	.80
Two Kettle	.40	.98	.00	.45	2.60	.93	2.50*	.79	4.50*	.76
Hunkpapa	4.30*	1.31	.60	.91	1.00	1.96	.40	1.27	5.00*	1.11
Assiniboin	1.30	.87	1.10	.56	.10	.91	1.70	.90	1.20	.82
Sioux (Miscel.)										

* Denotes real mathematical difference.

HOMOGENEITY OF THE SERIES.

It remains to justify the inclusion in a single series of the results of observations on the seventeen different local groups. Even if we subdivide our total series into the local groups the majority of these groups are of sufficient size to serve as an indication of the true state of affairs. In Table I, I have listed the average, variability, and error for stature, cephalic index, length of head, width of head, and width of face.

It will be seen that the results are in very close agreement. When we compare the average of any group for any measurement with the average for the total series the differences are very small. In Table II, I have compared the differences of the averages of the various groups (A_1-A_2) with the magnitude of the variability of the averages ($\sqrt{e_1^2+e_2^2}$). We find a real mathematical difference between the averages of a given measurement in only seven instances. Yet even these are border-line cases. One is found in stature (Assiniboin), one in the cephalic index (Sisseton), two in breadth of head (Sisseton and Hunkpapa) and three in width of face (Blackfoot, Hunkpapa, and Assiniboin). Of the five characters real differences in two occur in the Sisseton, Hunkpapa, and Assiniboin series. On the whole then, it would seem that the various local groups constitute a fairly homogeneous series.

Among anthropologists who seek to explain the diversity of the American Indian physically by proposing two migrations, the one of a short, short-headed type and the other of a tall, long-headed type, the Sioux are usually pointed to as the results of intermixture of these two types. This is due in part to the fact that they occupy an intermediate geographical position and in part to the fact that their head form is intermediate between the two extremes in proportion. At the present time practically no correlation exists between stature and the cephalic index among the Sioux. The average cephalic indices for different statures among the full-blooded male Sioux are as follows:—

Cephalic			Cephalic		
Stature	Cases	Index	Stature	Cases	Index
152-155	(2)	79.0	172-175	(151)	79.9
156-159	(6)	79.5	176-179	(109)	79.7
160-163	(27)	80.5	180-183	(35)	78.8
164-167	(62)	80.2	184-187	(8)	78.8
168-171	(133)	79.5	188-190	(3)	79.0

No real differences exist. So then we have seen that subdivisions of the total series by observers, by local groups, and by stature have revealed only a very few scattered differences among the most dependable

measurements which might be regarded as real differences. Whatever the source of the elements which characterize the Sioux Indians they are today a reasonably homogeneous group; so much so, that if they represent the intermixture of two different types, it is impossible to point out the elements they received from one group or another. On the other hand, it is reasonable to believe that some of the individuals listed as full-bloods are breeds of varying degrees. But this number probably represents only a very small minority and is probably several generations removed from the time of the intermixture.

STATURE.

Comparability of Results. As we have already seen, most of the observers measured different tribal bands and it is impossible to determine definitely the personal error of these different observers. However, on comparing the average stature of the various local groups we found that the only instance in which there was any certain difference was in the case of the Assiniboin. The averages of all other groups were very similar and indeed the Assiniboin were just within the limits of a possible difference. On the other hand, most of the observers measured individuals belonging to more than one local group. In Table III I have listed the averages of the series obtained by the different observers. There are no certain differences. On the whole we may assume that the results of the different observers are comparable.

TABLE III
STATURE: AVERAGES FOR DIFFERENT OBSERVERS.
(Ages 20-59 inc.)

Observer	Male				Female			
	Pure Sioux		Half-blood		Pure Sioux		Half-blood	
	No.	Average	No.	Average	No.	Average	No.	Average
F. C. Smith	51	173.4	18	173.9	30	160.6	7	158.4
J. W. Cooke	174	171.7	14	172.9	33	159.9	2	161.5
G. A. Kaven	240	172.7	26	172.8	82	160.1	5	164.6
Z. T. Daniels	12	173.8	5	175.2	2	158.0	...	.....
F. Boas	34	173.4	8	174.5	3	152.7	2	164.0
C. A. Helvin and F. C. Kenyon	9	170.6	6	173.2	3	164.3	2	156.5
E. F. Wilson	18	168.5	...	.....	3	158.7	...	.....
G. M. West	...	.....	...	.....	1	162.0	1	167.0
Total Series	537	172.4	77	173.5	157	160.0	19	161.2

Sex. As usual the men are considerably taller than the women both among the full-blood and half-blood Indians. In the former the difference in the average of the two sexes is 12.4 cm., and in the latter the difference is 12.3 cm. The average for women among the full-bloods equals 92.8 percent of the male average and among the half-bloods 92.9 percent. This ratio between the averages of the two sexes is very similar to the ratio among other North American Indians of tall stature.

Blood. A study of the distribution in the various groups indicated in Table IV and Fig. 5 reveals some interesting results. Among the full-bloods, both male and female, we get some resemblance to a normal frequency curve but among the half-bloods the distribution is more irregular. There are so few female half-bloods that our comparison must, for the most part, be confined to the men. In both cases, however, the half-bloods are taller than the full-bloods. Although the difference is not mathematically a real difference, yet the consistency of the results for male and female adults and children for almost every year indicates beyond much doubt that in this particular instance at least the half-bloods are slightly taller than the full-bloods. Professor Boas¹ has previously pointed out this difference for this and several other series.

In some instances this difference might be interpreted to mean that the Indians had mixed with a group that was on the average taller than themselves. In this particular case such an explanation cannot be accepted. Our full-bloods are a very tall people. It is highly improbable that they have mixed with a group of people taller than they. In the majority of instances the half-bloods are the results of intermarriage with the French. In a few cases the other stock has been Scotch. The French most certainly are not taller than our Sioux Indians and the Scotch very doubtfully so. In certain parts of Scotland the average stature exceeds 172.4 cm., but a miscellaneous group of American-Scotch measured by Professor Boas¹ had an average stature of 172.1 cm.

The above results which are apparently not in keeping with our accepted laws of heredity are made still more difficult of interpretation when the results of Wissler² are consulted. In dealing with a series of 1770 male and 1193 female of the Oglala subdivision of the Teton-Dakota, Wissler finds the half-bloods slightly shorter than the full-bloods and apparently falling in line with accepted laws of heredity. However, the average stature for all his groups is higher than that ob-

¹Boas, 1895.

²Boas, 1911.

³Wissler, 1911.

TABLE IV.
STATURE: DISTRIBUTION.
(Ages 20-59).

Cm.	Male				Female			
	Pure Sioux		Half-bloods		Pure Sioux		Half-bloods	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
146					1	.6		
148					4	2.5		
150					4	2.5		
152	1	.2			8	5.1	1	5.3
154	1	.2	2	2.6	14	8.9	2	10.6
156	3	.6	0	.0	15	9.5	3	15.8
158	3	.6	0	.0	20	12.7	3	15.8
160	7	1.3	0	.0	29	18.4	2	10.6
162	20	3.7	4	5.2	24	15.2	1	5.3
164	24	4.5	7	9.1	13	8.3	2	10.6
166	38	7.1	2	2.6	12	7.6	2	10.6
168	47	8.8	4	5.2	8	5.1	1	5.3
170	85	15.8	5	6.5	2	1.3	0	.0
172	86	16.1	11	14.3	2	1.3	2	10.6
174	65	12.1	11	14.3	1	.6		
176	49	9.1	8	10.4				
178	60	11.2	10	13.0				
180	22	4.1	8	10.4				
182	15	2.8	2	2.6				
184	6	1.1	1	1.3				
186	2	.4	1	1.3				
188	2	.4	0	.0				
190	1	.2	0	.0				
192			0	.0				
194			1	1.3				
Average	172.4		173.5		160.0		161.2	
σ	± 5.64		± 6.81		± 5.29		± 5.79	
e	$\pm .243$		$\pm .77$		$\pm .42$		± 1.33	
V in %	3.27		3.92		3.30		3.59	
No. of cases	537		77		157		19	

Mixed Indian

Average 7 men

172.2

3 women

159.6

 σ = standard deviation

e = error of average

V = coefficient of variation in percentage

tained in the present series. The average stature of Wissler's half-bloods is much nearer the average stature of full-blooded Sioux than to that of the whites with whom they have mixed. No satisfactory solution of these contradictory results can be given so long as our series are incomplete in lacking the measurements on the whites with whom the Indians have mixed.

Returning to our own series we notice also that the half-bloods are absolutely and relatively more variable than our full-bloods. Our full-bloods, however, are rather variable in stature. The variability is somewhat higher than that of many uncivilized peoples and more comparable with the variability of some of our European nations. Yet it is lower than the variability of most of the European groups represented among our immigrants.¹

Age and Growth. As a whole there are too few individuals for each year to throw any light on the exact rate of growth. In general the rate of growth in stature is similar to that described for other racial groups. However, the excess in height among half-blood males is most noticeable after the fifteenth year which would indicate a prolongation of the period of rapid growth. Among the full-bloods the girls are slightly taller during the tenth, eleventh, and fourteenth year and among half-bloods during the thirteenth and fourteenth year. Among the males the half-bloods are taller for nine ages, the full-bloods for five, and the two are equal in three instances. Among the females the half-bloods are taller for eight years, the full-bloods taller for eight years, and the two equal in one instance. Individuals above 60 show a considerable decrease in stature.

HEIGHT OF SHOULDER.

(Acromial Height)

Comparability of Results. The average for the series of each observer is listed in Table VI. Where the number of individuals measured was sufficiently large the results are not very different for different observers.

Sex. The sex difference for full-bloods is 10.2 cm., and for half-bloods 9.1 cm. Although there is a considerable absolute difference in shoulder height the women have higher shoulders in proportion to their stature.

¹Boas, 1911.

TABLE V.
STATURE: GROWTH.

Age	Male						Female									
	Pure Sioux						Half-blood									
	No.	Aver.	Inc.	σ	e		No.	Aver.	Inc.	σ	e	No.	Aver.	Inc.	σ	e
4	1	103.0					1	96.0				1	111.0			
5	3	112.0	9.0	1.63	.94		2	99.0	3.0			2	113.5	2.5		
6	6	118.8	6.8	4.68	1.90		4	120.5	21.5			8	119.4	5.9		
7	4	127.8	9.0	1.85	.82		5	122.8	2.3			11	126.0	6.6		
8	13	131.6	3.8	3.85	1.07		7	121.1	-1.7			7	130.8	4.8		
9	13	132.7	1.1	4.46	1.24		4	128.5	7.4			11	129.8	-1.0		
10	13	139.3	6.6	4.82	1.34		10	134.2	5.7	5.10	1.61	4	137.0	7.2		
11	11	147.0	7.7	4.59	1.38		2	141.0	6.8			8	141.4	4.4	6.63	2.34
12	15	151.1	4.1	8.19	2.08		12	143.6	2.6	3.41	.91	10	151.1	9.7	3.62	1.14
13	14	153.5	2.4	4.58	1.22		14	149.7	6.1	4.46	1.29	8	153.5	2.4	4.42	1.56
14	15	161.0	8.5	3.35	.86		19	154.9	5.2	6.81	1.33	10	156.7	3.2	4.40	1.39
15	18	164.8	3.8	6.68	1.57		8	156.9	2.0	4.86	1.72	13	156.5	-2	5.76	1.59
16	17	166.7	1.9	3.82	.87		10	158.6	1.7	2.69	.85	15	160.7	4.2	3.00	.79
17	20	168.3	1.6	4.54	1.01		18	160.2	1.6	4.03	.95	12	158.2	-2.5	5.58	1.61
18	21	173.1	4.8	4.71	1.03		12	157.6	-2.6	3.97	1.15	3	166.0	1.8		
19	537	172.4	-7	5.64	.24		16	159.9	2.3	4.41	1.10	19	161.2	1.2		
20-59	54	170.4	-2.0	6.06	.82		157	160.0	.1	5.29	.42	24	157.7	-2.3	4.56	.93
60+							24	157.7	-2.3	4.56	.93					

TABLE VI
HEIGHT OF SHOULDER: AVERAGES FOR DIFFERENT OBSERVERS.

Observer	Male				Female			
	Pure Sioux		Half-blood		Pure Sioux		Half-blood	
	No.	Aver.	No.	Aver.	No.	Aver.	No.	Aver.
F. C. Smith	51	143.4	18	142.1	30	132.4	7	131.0
J. W. Cooke	173	142.9	14	143.2	33	133.2	2	133.0
G. A. Kaven	237	142.8	26	141.3	82	132.3	5	135.6
Z. T. Daniels	12	144.3	5	145.8	2	132.5		
F. Boas	34	142.0	8	142.9		131.7	2	136.5
C. A. Helvin and F. C. Kenyon	9	139.5	6	141.5	3	136.3	2	128.5
E. F. Wilson	18	140.8			3	126.7		
G. M. West					1	134.0	1	139.0
Total Series	534	142.7	77	142.3	157	132.5	19	133.2

Blood. The distribution of shoulder height in Table VII and Fig. 5 resembles very closely the distribution of stature in the various groups. Among the half-bloods the curve is lower and more irregular than among full-bloods. The half-bloods are also much more variable in this character. Even though the half-bloods are taller the shoulder height of the full-bloods is absolutely and relatively higher. But the difference is not very great.

Age and Growth. The table (Table VIII) and curve (Fig. 4) of growth for shoulder height is very similar to that for stature. The shoulder height of full-bloods is consistently greater than that of half-bloods. The sex differences are most conspicuous after the fifteenth year. In individuals above 60 the shoulder height is considerably lower.

WIDTH OF SHOULDER.

(Biacromial Width).

Comparability of Results. The averages of the series of different observers in Table IX show a fair degree of agreement.

Sex. The sexual difference is 3.3 cm. for full-bloods and 3.5 cm., for half-bloods. The half-blood women have narrower shoulders than the full-blood women.

TABLE VII.
HEIGHT OF SHOULDER: DISTRIBUTION.

Cm.	Male				Female			
	Pure Sioux		Half-bloods		Pure Sioux		Half-bloods	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
120					2	1.3		
2					2	1.3		
4	2	.4			9	5.7	1	5.3
6	1	.2	2	2.6	12	7.6	3	15.8
8	2	.4	0	.0	20	12.7	0	.0
130	3	.6	0	.0	18	11.4	3	15.8
2	11	2.1	2	2.6	22	14.0	3	15.8
4	20	3.8	6	7.8	26	16.6	3	15.8
6	40	7.5	8	10.4	19	12.0	0	.0
8	46	8.6	7	9.1	19	12.0	4	21.0
140	88	16.8	8	10.4	5	3.2	1	5.3
2	82	15.4	9	11.7	1	.6	1	5.3
4	79	14.8	13	16.9	1	.6		
6	63	11.8	6	7.8	0	.0		
8	53	9.9	8	10.4	0	.0		
150	21	3.9	4	5.2	1	.6		
2	11	2.1	3	3.9				
4	8	1.5	0	.0				
6	1	.2	0	.0				
8	2	.4	0	.0				
160	0	.0	1	1.3				
2	1	.2						
Average	142.7		142.3		132.5		133.2	
σ	± 5.03		± 6.07		± 4.89		± 5.23	
e	$\pm .21$		$\pm .69$		$\pm .39$		± 1.19	
V in %	3.52		4.26		3.69		3.92	
No. of cases	534		77		157		19	

Mixed Indian

Average 7 men

143.3

3 women

132.0

Blood. Neither the distribution of this character in Table X and Fig. 1 nor the averages show any marked differences between full-bloods and half-bloods. The range of variation is small.

TABLE VIII.
HEIGHT OF SHOULDER: GROWTH.

Age	Male										Female									
	Pure Sioux					Half-bloods					Pure Sioux					Half-bloods				
	No.	Aver.	Inc.	σ	e	No.	Aver.	Inc.	σ	e	No.	Aver.	Inc.	σ	e	No.	Aver.	Inc.	σ	e
4	1	78.0				1	91.0				1	75.0				1	86.0			
5	2	87.3	9.3	2.48	1.43	4	91.0	.0			2	88.0	13.0			2	90.5	4.5		
6	6	93.5	6.2	4.89	1.99	5	99.6	8.6			4	97.8	-9.8			8	94.8	4.3		
7	4	102.5	9.0	1.50	.75	2	100.5	.9			5	96.6	-1.2			11	100.9	6.1		
8	13	106.0	3.5	3.82	1.06	4	107.0	6.5			7	97.7	1.1			6	105.5	4.6		
9	13	106.4	.4	4.98	1.38	12	109.8	2.8			4	103.5	5.8			11	105.0	-.5		
10	13	112.5	6.1	4.60	1.27	11	112.1	2.3			10	108.5	5.0	4.43	1.40	4	111.5	6.5		
11	13	120.7	8.2	3.76	1.13	7	118.7	6.6			2	116.0	7.5			8	115.4	-.1	5.43	1.91
12	11	120.7	8.2	3.76	1.13	7	118.7	6.6			14	117.1	1.1	4.17	1.11	10	123.9	8.5	3.64	1.15
13	15	124.1	3.4	9.75	2.51	8	122.2	3.5			12	122.8	5.7	4.10	1.18	8	125.8	1.9	3.23	1.14
14	14	126.3	2.2	3.47	.92	10	125.4	3.2			19	126.7	3.9	5.72	1.31	10	129.0	3.2	4.84	1.52
15	15	132.4	6.1	3.57	.92	5	130.4	5.0			8	129.4	2.7	4.24	1.50	13	128.7	-1.3	5.13	1.56
16	18	135.7	3.3	5.54	1.30	10	135.9	5.5			10	130.5	1.1	2.25	.71	15	132.4	3.7	2.96	.76
17	19	136.7	1.0	3.42	.78	6	137.7	1.8			18	132.6	2.1	3.71	.87	12	130.8	1.6	4.76	1.37
18	20	138.4	1.7	4.02	.89	4	138.8	1.1			11	130.9	-1.7	4.29	1.29	3	132.0	1.2		
19	21	142.3	3.9	4.11	.89	9	139.4	.6			16	131.8	.9	3.74	.98	-19	133.2	1.2		
20+	534	142.7	.4	5.03	.21	77	142.3	2.9	6.07	.69	57	132.5	.7	4.89	.39					
60+	54	142.0	-.7	5.71	.77						24	131.0	-1.5	3.44	.73					

TABLE IX.
WIDTH OF SHOULDER: AVERAGES FOR DIFFERENT OBSERVERS.

Observers	Male				Female			
	Pure Sioux		Half-bloods		Pure Sioux		• Half-bloods	
	No.	Average	No.	Average	No.	Average	No.	Average
F. C. Smith	51	39.4	18	39.3	30	36.1	7	36.6
J. W. Cooke	173	38.4	13	38.0	33	35.8	2	37.0
G. A. Kaven	241	38.9	26	38.8	82	35.9	5	33.8
Z. T. Daniels	12	40.5	5	38.6	2	37.0		
F. Boas	34	39.9	8	40.1	3	35.0	2	34.5
C. A. Helvin and								
F. C. Kenyon	9	37.4	6	38.3	3	35.3	2	33.5
E. F. Wilson	18	36.3			3	32.7		
G. M. West					1	36.0	1	36.5
Total Series	538	38.8	76	38.9	157	35.5	19	35.4

TABLE X.
WIDTH OF SHOULDER: DISTRIBUTION.

Cm.	Male				Female			
	Pure Sioux		Half-bloods		Pure Sioux		Half-bloods	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
30	1	.2			5	3.2	1	5.3
2	5	.9	1	1.3	13	8.3	2	10.6
4	18	3.3	3	3.9	43	27.4	7	36.8
6	104	19.4	8	10.4	60	38.2	5	26.4
8	194	36.0	32	42.0	30	19.2	3	15.8
40	174	32.5	27	35.5	6	3.8	1	5.3
2	40	7.5	5	6.5				
4	2	.4						
Average	38.8		38.9		35.5		35.4	
σ	± 1.92		± 1.89		± 2.09		± 2.21	
e	$\pm .08$		$\pm .22$		$\pm .17$		$\pm .51$	
V in %	4.94		4.83		5.91		6.24	
No. of cases	538		76		157		19	

Mixed Indian

Average 7 men 37.3 3 women 36.3

TABLE XI.
WIDTH OF SHOULDER: GROWTH.

Age	Male						Female									
	Pure Sioux						Half-bloods									
	No.	Aver.	Inc.	σ	e		No.	Aver.	Inc.	σ	e	No.	Aver.	Inc.	σ	e
4	1	23.0					1	22.0				1	24.0			
5							2	23.5	1.5			2	25.5	1.5		
6	3	25.0	2.0				4	25.5	2.0			8	26.0	.5		
7	6	26.3	1.3	2.22	.90		5	26.6	1.1			11	27.4	1.4		
8	4	29.2	2.9				7	27.1	.5			6	28.8	1.4		
9	13	29.2	.0	1.31	.36		4	28.0	.9			11	28.6	-2		
10	13	29.0	-2	1.59	.44		10	29.2	1.2	1.72	.54	4	28.5	-1		
11	13	30.2	1.2	1.62	.45		2	28.0	-1.2			8	30.4	1.9	1.40	.49
12	11	32.1	1.9	2.02	.61		14	31.0	-3.0	1.25	.33	10	31.7	1.3	1.19	.37
13	15	32.5	.4	2.07	.53		11	32.1	1.1	1.62	.48	8	32.1	.4	2.76	.97
14	14	33.6	1.1	1.55	.41		19	33.2	1.1	2.36	.54	10	33.4	1.3	.80	.25
15	15	35.2	1.6	1.68	.43		7	35.1	1.9	1.64	.62	13	33.4	.0	1.94	.53
16	17	35.9	.7	1.58	.38		10	35.0	-1	1.41	.44	15	34.0	.6	1.93	.96
17	19	37.0	1.1	1.41	.32		18	34.6	-4	1.96	.46	12	33.8	-2	1.49	.42
18	20	37.6	.6	1.36	.30		12	34.3	-3	1.38	.37	3	34.3	.5		
19	21	38.2	.6	2.09	.43		16	34.7	.4	2.14	.53	19	35.4	1.1	2.21	.51
20+	538	38.8	.6	1.92	.08		157	35.5	.8	2.09	.17	24	33.9	-1.6		
60+	55	37.5	-1.3	1.99	.27		24	33.9	-1.6	2.09	.43					

Age and Growth. The curves of growth (Fig. 4) show greater differences between full-bloods and half-bloods, the full-bloods having consistently wider shoulders. There is a considerable decrease in shoulder width among individuals 60 years old and over.

INDEX OF SHOULDER WIDTH.

Comparability. The average for the series of different observers in Table XII shows close agreement.

TABLE XII.

INDEX OF SHOULDER WIDTH: AVERAGES FOR DIFFERENT OBSERVERS.

Observers	Male				Female			
	Pure Sioux		Half-bloods		Pure Sioux		Half-bloods	
	No.	Average	No.	Average	No.	Average	No.	Average
F. C. Smith	51	22.6	18	22.6	30	22.6	7	23.0
J. W. Cooke	171	22.4	14	21.9	33	22.2	2	22.5
G. A. Kaven	239	22.6	26	22.4	82	22.4	5	20.6
Z. T. Daniels	12	23.3	5	22.3	2	23.3		
F. Boas	34	23.1	8	23.1	3	22.3	2	21.0
C. A. Helvin and F. C. Kenyon	9	22.1	6	22.3	3	21.0	2	21.5
E. F. Wilson	18	21.6			3	21.7		
G. M. West					1	22.3	1	23.0
Total Series	534	22.5	77	22.4	157	22.4	19	21.9

Sex. The sex differences in relative width of shoulder are not pronounced except among half-bloods and here there are too few females to permit any definite conclusion.

Blood. As in the case of absolute shoulder width the distribution of relative shoulder width does not show any very great differences among the different groups. The curves in Fig. 7 are very similar. There are fewer extreme variants among the half-blood males and the variability is smaller than among the full-blood males. As a whole the series shows intermediate shoulder width. The average approaches very closely the average relative shoulder width of the American Indians and mankind as a whole.

TABLE XIII.
INDEX OF SHOULDER WIDTH: DISTRIBUTION.

Age.	Male				Female			
	Pure Sioux		Half-bloods		Pure Sioux		Half-bloods	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
17	1	.2						
18	0	.0						
19	2	.4	1	1.3			1	5.3
20	22	4.1	3	3.9	12	7.6	2	10.6
21	51	9.6	6	7.8	20	12.8	3	16.8
22	191	35.5	29	37.6	52	33.2	6	31.6
23	167	31.2	29	37.6	45	28.6	5	26.4
24	95	17.8	9	11.7	24	15.2	2	10.6
25	4	.7			3	1.9		
26	1	.2			1	.6		
Average	22.5		22.4		22.4		21.9	
σ	±1.10		±1.01		±1.20		±1.35	
e	± .05		± .12		± .10		± .31	
V in %	4.88		4.51		5.36		6.16	
No. of cases	534		77		157		19	
Mixed Indian								
Average for 7 men	22.2		3 women		22.7			

Age and Growth. The curves of growth (Fig. 3) bring out more clearly that the full-bloods have relatively wider shoulders than the half-bloods. The curves for all four groups indicate very clearly that the shoulders are relatively considerably narrower during the period of adolescence than in early childhood or later in life.

HEIGHT SITTING.

Comparability of Results. The averages of the series of the different observers are listed in Table XV. No very marked differences occur in the larger series.

Sex. There is a sexual difference of 6.4 cm. for full-blood and 6.6 cm. for half-blood Indians. The females in both instances are more variable in this character.

Blood. The half-bloods consistently have a higher average sitting height although the difference is very small. The distribution is more regular and less variable among full-bloods than among half-bloods.

TABLE XIV.
INDEX OF WIDTH OF SHOULDER: GROWTH.

Age	Male						Female								
	Pure Sioux						Half-bloods								
	Pure Sioux			Half-bloods			Pure Sioux			Half-bloods					
	No.	Aver.	Inc.	σ	e	No.	Aver.	Inc.	σ	e	No.	Aver.	Inc.	σ	e
4	1	22.0				1	23.0				1	22.0			
5						2	21.0	-2.0			2	22.5	.5		
6	3	22.7				4	21.1	.1			8	22.0	-5		
7	6	22.3				4	21.8	.7			11	21.8	-2		
8	4	22.8				7	22.4	.6			6	21.8	.0		
9	13	22.1				4	22.0	-4			11	22.1	1.3		
10	13	22.1				10	21.8	-2	.75	.24	4	21.2	-9		
11	13	21.6				2	19.5	-1.3			8	21.7	.5	1.33	.47
12	11	21.9				14	21.6	2.1	.69	.18	10	20.9	-8	.83	.26
13	15	21.7				11	21.5	-1	1.10	.33	8	21.0	.1	1.66	.58
14	14	22.0				18	21.0	-5	.85	.20	10	21.5	.5	.50	.16
15	15	22.1				7	22.6	1.6	.74	.28	13	21.5	.0	1.06	.29
16	17	21.9				10	22.0	-6	1.00	.31	15	21.2	-3	1.66	.30
17	19	22.3				18	21.6	-4	1.36	.32	12	21.5	.3	1.19	.24
18	20	22.6				4	22.0	.2	1.02	.29	3	21.6	.1		
19	21	22.2				16	21.6	-2	1.31	.33	19	21.9	.3	1.35	.31
20+	534	22.5				77	22.4	-8	1.01	.12	157	21.9			
60+	54	22.0				24	21.6	.8	1.35	.27					

TABLE XV.

HEIGHT SITTING: AVERAGES FOR DIFFERENT OBSERVERS.

Observer	Male				Female			
	Pure Sioux		Half-bloods		Pure Sioux		Half-bloods	
	No.	Average	No.	Average	No.	Average	No.	Average
F. C. Smith	51	89.3	18	90.5	30	82.5	7	82.2
J. W. Cooke	174	89.1	14	88.9	32	83.2	2	75.5
G. A. Kaven	240	87.7	26	88.6	82	81.0	5	84.2
Z. T. Daniels	12	90.0	5	90.4	2	84.0		
F. Boas	34	90.1	81	90.9	3	87.6	2	87.0
A. Helvin and F. C. Kenyon	9	88.9	6	90.0	3	88.0	2	82.5
E. F. Wilson	18	87.0			3	79.4		
G. M. West					1	86.0	1	91.0
Total Series	538	88.5	77	89.6	156	82.1	19	83.0

TABLE XVI.

HEIGHT SITTING: DISTRIBUTION.

Cm.	Male				Female			
	Pure Sioux		Half-bloods		Pure Sioux		Half-bloods	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
66							1	5.3
8			1	1.3			0	.0
70	1	.2	0	.0	1	.6	0	.0
2	0	.0	0	.0	0	.0	0	.0
4	0	.0	0	.0	2	1.3	0	.0
6	1	.2	0	.0	11	7.0	0	.0
8	0	.0	1	1.3	23	14.7	1	5.3
80	8	1.5	1	1.3	30	19.2	2	10.6
2	32	6.0	2	2.6	35	22.5	6	31.5
4	70	13.0	6	7.8	29	18.6	5	26.4
6	85	15.8	9	11.7	16	10.2	2	10.6
8	107	20.0	11	14.3	7	4.5	0	.0
90	117	21.8	20	26.0	1	.6	2	10.6
2	85	15.8	11	14.3	0	.0		
4	24	4.5	14	18.2	1	.6		
6	7	1.3	1	1.3				
8	1	.2						
100								

HEIGHT SITTING: DISTRIBUTION (Contd.)

Average	88.5	89.6	82.1	83.0
σ	± 3.50	± 4.39	± 3.49	± 4.91
e	$\pm .15$	$\pm .50$	$\pm .28$	± 1.12
V in %	3.95	4.89	4.25	5.91
No. of casse	538	77	156	19

	Mixed Indian			
Average 7 men	89.0	3 women	84.4	

Age and Growth. The half-bloods consistently have a higher average sitting height than the full-bloods. The females exceed from the twelfth to the sixteenth year. This measurement also decreases considerably in adults over 60 years of age.

INDEX OF HEIGHT SITTING.

Comparability of Results. There is a considerable degree of uniformity in the averages of the series of different observers listed in Table XVI.

Sex. The females have relatively a slightly higher index of sitting height. As in the absolute sitting height the females are more variable than the males for this character.

TABLE XVIII.

INDEX OF HEIGHT SITTING: AVERAGES FOR DIFFERENT OBSERVERS.

Observer	Male				Female			
	Pure Sioux		Half-bloods		Pure Sioux		Half-bloods	
	No.	Average	No.	Average	No.	Average	No.	Average
F. C. Smith	51	51.5	18	52.0	30	51.8	7	51.9
J. W. Cooke	173	51.9	14	51.4	32	51.1	2	47.0
G. A. Kaven	239	50.8	26	51.2	82	50.7	5	51.2
Z. T. Daniel	12	51.8	5	51.6	2	53.0		
F. Boas	34	52.0	8	52.0	3	55.3	2	52.5
C. A. Helvin and F. C. Kenyon	9	52.2	6	52.5	3	53.3	2	52.5
E. F. Wilson	18	51.6			3	52.0		
G. M. West					1	53.0	1	54.0
Total Series	536	51.4	77	51.6	156	51.4	19	51.4

TABLE XVII.
HEIGHT SITTING: GROWTH.

Age	Male						Female									
	Pure Sioux						Half-bloods									
	No.	Aver.	Inc.	σ	e		No.	Aver.	Inc.	σ	e	No.	Aver.	Inc.	σ	e
4	1	58.0					1	54.0				1	61.0			
5							2	62.1	.81			2	62.0	1.0		
6	3	60.3	2.3				4	64.8	2.7			8	64.5	2.5		
7	6	63.5	3.2				5	65.0	.2			10	67.1	2.6		
8	4	69.0	5.5				7	65.1	.1			6	69.3	2.2		
9	13	68.1	-9	5.52	1.53		4	67.5	2.4		.90	11	68.3	-1.0		
10	13	69.2	1.1	2.52	.69		12	70.8	1.3			4	71.5	3.2		
11	13	72.5	3.3	3.22	.89		11	72.7	1.9			8	74.0	2.5		1.06
12	11	75.9	3.4	2.71	.81		7	76.3	3.6		.73	10	79.1	5.1	2.38	.75
13	15	77.3	1.4	3.83	.98		8	77.0	.7		1.01	8	79.6	.5	2.44	.86
14	14	78.8	1.5	2.73	.73		10	79.9	2.9		.75	10	82.8	3.2	2.48	.78
15	15	82.3	3.5	2.35	.61		5	80.4	.5		1.05	13	82.2	-6	2.70	.74
16	18	83.0	.7	4.04	.95		10	84.4	4.0		.58	15	84.1	1.9	1.78	.46
17	19	85.5	2.5	2.32	.53		6	88.0	3.6		.44	12	83.9	-2	3.72	1.07
18	20	86.8	1.3	2.32	.52		4	86.2	-1.8		.72	3	85.3	1.4		
19	21	89.9	3.1	3.14	.68		9	90.2	4.0		.92	19	83.0	-2.3	4.91	1.12
20+	538	88.5	-1.4	3.50	.15		77	89.6	-6	43.9	.50	156	82.1			
60+	54	85.5	-3.0	4.36	.59		24	78.7	-3.4	3.68	.75	24	78.7			

TABLE XIX.
INDEX OF HEIGHT SITTING: DISTRIBUTION.

Cm.	Male				Female			
	Pure Sioux		Half-bloods		Pure Sioux		Half-bloods	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
41			1	1.3			1	5.3
2			0	.0			0	.0
3			0	.0	1	.6	0	.0
4			0	.0	0	.0	0	.0
5			0	.0	0	.0	0	.0
6	1	.2	0	.0	1	.6	0	.0
7	5	.9	0	.0	1	.6	0	.0
8	22	4.1	2	2.6	7	4.5	0	.0
9	36	6.7	4	5.2	7	4.5	1	5.3
50	102	19.0	5	6.5	29	18.6	1	5.3
1	93	17.4	20	26.0	34	21.8	4	21.0
2	148	27.5	24	31.2	40	25.5	5	26.4
3	77	14.4	13	16.9	25	16.0	5	26.4
4	36	6.7	5	6.5	5	3.2	2	10.6
5	15	2.8	2	2.6	2	1.3		
6	1	.2	1	1.3	2	1.3		
7					1	.6		
8					0	.0		
9					1	.6		
Average	51.4		51.6		51.4		51.4	
σ	± 1.68		± 1.94		± 1.90		± 2.75	
e	$\pm .07$		$\pm .22$		$\pm .15$		$\pm .63$	
V in %	3.26		3.76		3.71		5.35	
No. of cases	536		77		156		19	

Mixed Indian

Average 7 men

51.6

3 women

51.4

Blood. The half-bloods apparently have a slightly higher index of sitting height. The distribution curves (Fig. 7) are regular except for the fact that the half-bloods, both male and female, present a few extreme cases which greatly increase their variability.

Age and Growth. As in the case of the index of shoulder width the curves of growth (Fig. 3) for the index of sitting height would seem to indicate that there is a rapid decrease in the proportionate height of the head and trunk during the adolescent period but that later in life

TABLE XX.
INDEX OF HEIGHT SITTING: GROWTH.

Age	Male						Female									
	Pure Sioux						Half-bloods									
	Pure Sioux						Half-bloods									
	No.	Aver.	Inc.	σ	e		No.	Aver.	Inc.	σ	e	No.	Aver.	Inc.	σ	e
4	1	46.0				1	57.0				1	55.0				
5						2	57.0	.0			2	55.0	.0			
6	3.	54.0	8.0			4	54.0	-3.0			8	53.8	-1.2			
7	6	53.7	-3			5	53.2	-6			10	53.2	-6			
8	4	54.2	.5			2	53.0	-2			6	53.0	-2			
9	13	52.0	-2.2	1.57	.43	3	52.0	-1.0			4	52.5	.2			
10	13	52.3	.3	1.07	.30	12	51.8	-2			10	52.2	-.3	1.18	.37	
11	13	52.2	-1	1.19	.33	11	52.6	.8			2	49.5	-2.7			
12	11	51.7	-.5	.95	.28	7	52.4	-2			14	52.4	2.9	1.99	.53	
13	15	51.1	-.6	1.59	.41	8	51.9	-.5			12	51.8	-.6	1.69	.49	
14	14	51.4	.3	.95	.25	10	52.0	.1			18	51.7	-.1	1.55	.36	
15	15	51.1	-.3	.85	.22	5	52.2	.2			8	52.0	.3	1.73	.61	
16	18	50.3	-.8	1.60	.37	10	50.8	-1.4			10	52.9	.9	.94	.30	
17	19	51.2	.9	1.24	.28	6	52.2	1.4			18	51.7	-1.2	.85	.20	
18	20	51.8	.6	1.85	.41	4	50.8	-1.4			12	52.8	1.1	1.48	.42	
19	21	51.5	-.3	1.36	.29	9	52.6	1.8			16	51.0	-1.8	2.76	.69	
20+	536	51.4	-.1	1.68	.07	77	51.6	-1.0	1.94	.22	156	51.4	.4	1.90	.15	
60+	54	50.3	-1.1	2.05	.28						24	49.9	-1.5	2.11	.43	

there is a tendency for this proportion to increase. However, the increase is not very great and in a very general sense the tendency is for this proportion to decrease with age. The sexual differences are also brought out more clearly in the curves of growth.

ARM REACH.

(Maximum)

Comparability of Results. Although we find greater differences in the averages of different observers the variability of this measurement is also considerable and the results probably comparable.

TABLE XXI.

ARM REACH: AVERAGES FOR DIFFERENT OBSERVERS.

Observer	Male				Female			
	Pure Sioux		Half-bloods		Pure Sioux		Half-bloods	
	No.	Average	No.	Average	No.	Average	No.	Average
F. C. Smith	51	184.2	18	182.4	30	167.8	7	165.5
J. W. Cooke	172	179.5	14	182.0	32	167.7	2	163.0
G. A. Kaven	239	182.3	25	181.9	81	169.2	5	173.4
Z. T. Daniels	12	183.6	5	181.8	2	167.5		
F. Boas	34	184.9	8	183.2	3	167.5	2	170.5
C. A. Helvin and F. C. Kenyon	9	179.7	6	182.3	3	173.3	2	162.5
E. F. Wilson	18	176.8			3	158.0		
G. M. West					1	175.0	1	175.0
Total Series	535	181.4	76	182.2	155	168.3	19	167.4

Sex and Blood. There is a sexual difference of 13.7 cm., among the full-bloods and of 14.8 cm., among the half-bloods. There are no very marked differences in this dimension between full-bloods and half-bloods. In both instances the reach is considerably greater than stature. The distribution curves (Fig. 5) indicate the variability of this dimension. The full-bloods are more variable than the half-bloods. This is due to the very extreme cases.

Age and Growth. The curves of growth (Fig. 4) show that the full-bloods have a greater arm reach in a majority of the years. During the years 13 and 14 the females exceed the males. Apparently this dimension decreases slightly after 60 years of age.

TABLE XXII.
ARM REACH: DISTRIBUTION.

Cm.	Male				Female			
	Pure Sioux		Half-bloods		Pure Sioux		Half-bloods	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
150					1	.6		
2					1	.6		
4					4	2.6		
6	1	.2			3	1.9	1	5.3
8	0	.0			9	5.8	1	5.3
160	2	.4			6	3.8	1	5.3
2	4	.8			12	7.7	5	26.4
4	1	.2	2	2.6	12	7.7	1	5.3
6	5	.9	0	.0	9	5.8	2	10.6
8	7	1.3	0	.0	24	15.4	0	.0
170	14	2.6	2	2.6	21	13.6	2	10.6
2	28	5.2	3	3.9	21	13.6	1	5.3
4	41	7.7	5	6.5	12	7.7	2	10.6
6	44	8.3	7	9.1	8	5.1	2	10.6
8	61	11.4	6	7.8	6	3.8	0	.0
180	60	11.2	8	10.4	6	3.8	1	5.3
2	58	10.8	10	13.0				
4	60	11.2	10	13.0				
6	50	9.4	9	11.7				
8	32	6.0	2	2.6				
190	26	4.9	2	2.6				
2	16	3.0	5	6.5				
4	11	2.0	4	5.2				
6	6	1.1	0	.0				
8	5	.9	1	1.3				
200	2	.4						
2	1	.2						
4								
Average	181.4		182.4		168.3		167.4	
σ	± 7.03		± 6.99		± 6.43		± 6.79	
e	$\pm .30$		$\pm .80$		$\pm .51$		± 1.55	
V in %	3.87		3.83		3.83		4.05	
No. of cases	535		76		155		19	

Mixed Indian

Average 7 men

178.6

3 females

166.0

TABLE XXIII.
ARM REACH: GROWTH.

Age	Male										Female				
	Pure Sioux					Half-bloods					Pure Sioux				
	No.	Aver.	Inc.	σ	e	No.	Aver.	Inc.	σ	e	No.	Aver.	Inc.	σ	e
4	1	104.0				1	96.0				1	108.0			
5						1	102.0	6.0			2	117.5	9.5		
6	3	116.7	12.7	1.23	.71	4	123.5	21.5			8	122.5	5.0		
7	6	122.3	5.6	5.16	2.11	5	128.8	9.8			11	128.6	6.1		
8	4	133.5	11.2	2.18	1.08	2	126.5	-2.3			6	134.5	5.9		
9	13	134.0	.5	4.81	1.33	4	134.8	8.3			11	134.4	-1		
10	13	135.8	1.8	5.39	1.49	12	140.0	5.2			4	140.5	6.1		
11	13	144.4	8.6	5.96		11	141.0	1.0			8	147.8	7.3	5.64	1.99
12	11	151.6	7.2	7.36	2.22	7	149.6	8.6			10	155.4	7.6	4.73	1.49
13	15	156.2	4.6	8.78	2.26	8	154.1	4.5			8	162.4	7.0	4.61	1.63
14	14	159.9	3.7	5.37	1.43	10	158.4	4.3			10	164.8	2.4	8.03	2.54
15						5	169.6	11.2			12	164.6	-2	5.70	1.64
16	15	169.2	9.3	4.71	1.21	10	176.1	6.5			15	167.6	3.0	5.10	1.31
17	18	171.3	2.1	5.81	1.37	6	178.0	1.9			12	164.7	-2.9	5.38	1.61
18	18	178.2	6.9	4.25	.97	4	179.0	1.0			3	166.0	1.3		
19	19	178.8	.6	5.00	1.12	9	180.1	1.1			19	167.4	1.4	6.79	1.55
20	20	183.8	5.0	6.70	1.49	76	182.2	2.1							
20+	535	181.4	-2.4	7.03	.30				6.99	.80					
60+	54	177.9	-3.5	6.41	.87										

INDEX OF ARM REACH.

Comparability of Results. As in the absolute arm reach, so too in the relative arm reach, we get fairly large differences between the averages of the series of different observers. However, the larger series shows a fair degree of uniformity.

TABLE XXIV.

INDEX OF ARM REACH: AVERAGES FOR DIFFERENT OBSERVERS.

Observers	Male				Female			
	Pure Sioux		Half-bloods		Pure-Sioux		Half-bloods	
	No.	Average	No.	Average	No.	Average	No.	Average
F. C. Smith	48	105.3	18	105.0	30	104.4	7	104.4
J. W. Cooke	171	104.5	14	105.3	32	105.0	2	101.0
G. A. Kaven	239	105.5	25	105.2	82	105.7	5	104.6
Z. T. Daniels	12	105.6	5	103.8	2	106.0		
F. Boas	34	106.7	8	104.9	3	105.3	2	104.0
C. A. Helvin and F. C. Kenyon	9	105.1	6	105.0	3	105.3	2	103.0
E. F. Wilson	18	105.0			3	103.7		
G. M. West					1	108.0	1	105.0
Total Series	531	105.2	76	105.0	156	105.3	19	103.8

Sex and Blood. The distribution of this character in Table XXV and Fig. 7 does not bring out any very marked differences. The frequency curve for half-bloods is more regular than that of the full-bloods and the variability is much smaller. The relative arm reach for both full-bloods and half-bloods is rather great. The full-bloods have a slightly greater reach than the half-bloods. Although the difference is small it is consistent and more clearly brought out by the averages for children of different ages.

Age and Growth. The curve of growth (Fig. 3) shows more clearly that the full-bloods have a greater relative arm reach than the half-bloods for nearly every year. As usual the sex differences are most noticeable after the fifteenth year. The general tendency of this proportion is to increase with age.

TABLE XXV.
INDEX OF ARM REACH: DISTRIBUTION.

Cm.	Male				Female			
	Pure Sioux		Half-bloods		Pure Sioux		Half-bloods	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
95	1	.2						
6	1	.2						
7	1	.2			1	.6		
8	2	.4			0	.0		
9	2	.4	1	3.1	1	.6		
100	4	.8	0	.0	2	1.3	1	5.3
1	15	2.8	2	2.6	5	3.2	0	.0
2	34	6.4	6	7.8	7	4.5	4	21.0
3	69	13.0	7	9.1	15	9.6	3	15.8
4	73	13.7	15	19.8	26	16.6	4	21.0
5	80	15.0	16	21.0	25	16.0	3	15.8
6	89	16.7	12	15.8	32	20.5	3	15.8
7	64	12.0	9	11.8	11	7.1	1	5.3
8	54	10.2	4	5.2	18	12.2		
9	26	4.9	1	1.3	9	5.4		
110	12	2.2	2	2.6	2	1.3		
11	3	.6	0	.0	1	.6		
12	1	.2	1	1.3				
Average	105.2		105.0		105.3		103.8	
σ	± 2.41		± 2.19		± 2.32		± 1.75	
e	$\pm .10$		$\pm .25$		$\pm .19$		$\pm .40$	
V in %	2.29		2.09		2.11		1.68	
No. of cases	531		76		156		19	

Mixed Indian

Average 7 men

105.2

3 women

104.6

LENGTH OF ARM.

Comparability of Results. The averages for the series of different observers are very similar. Yet when we consider the technique involved in obtaining this measurement it seems probable that the measurement is not very accurate.

Sex and Blood and Growth. The sex difference is 5.2 cm. for full-bloods and 6.3 cm. for half-bloods. This measurement also does not show any very great differences for the different groups. In proportion

TABLE XXVI.
INDEX OF ARM REACH: GROWTH.

Age	Male						Female													
	Pure Sioux					Half-bloods					Pure Sioux					Half-bloods				
	No.	Aver.	Inc.	σ	e	No.	Aver.	Inc.	σ	e	No.	Aver.	Inc.	σ	e	No.	Aver.	Inc.	σ	e
4	1	101.0				1	99.0				1	99.0				1	97.0			
5						1	95.0	-4.0			1	95.0	-4.0			2	103.5	6.5		
6	3	104.7	3.7			4	103.8	2.8			4	102.7	7.7			8	103.5	.0		
7	6	103.0	-1.7			5	102.8	-1.0			4	103.0	.3			11	102.1	-1.4		
8	4	104.2	1.2			2	100.0	-2.8			7	104.1	1.1			6	102.6	.5		
9	13	102.0	-2.2	2.15	.59	3	102.3	2.3			4	103.7	-4			11	103.3	.7		
10	13	102.5	.5	2.26	.63	12	102.7	.4			10	102.3	-4	3.23	1.02	4	102.5	-8		
11	13	103.4	.9	1.44	.40	11	102.2	-5			2	102.5	.2			8	104.5	2.0	2.57	.91
12	11	103.0	-4	2.41	.72	7	102.4	.2			14	103.3	.8	2.54	.68	10	102.9	-1.6	2.30	.72
13	15	103.2	2	1.79	.46	8	103.2	.8			12	104.1	.8	2.14	.61	8	105.8	2.9	2.71	.95
14	14	104.2	1.0	2.37	.63	10	102.8	-4			18	104.4	.3	2.00	.47	10	105.3	-5	3.41	1.07
15	15	105.0	.8	2.08	.53	5	105.2	2.4			8	105.6	1.2	1.94	.68	13	104.5	-8	2.30	.63
16	18	104.4	-6	2.31	.54	10	106.0	.8			10	105.4	-2	1.96	.61	15	104.3	-2	1.93	.50
17	19	107.1	2.7	1.80	.41	6	105.3	-7			18	104.8	-6	1.68	.39	12	104.3	.0	2.35	.68
18	20	106.1	-1.0	2.41	.54	4	105.2	-1			12	104.5	-3	2.63	.75	3	103.6	-7		
19	20	106.4	.3	2.13	.47	9	105.2	.0			16	105.2	.7	1.88	.46	19	103.8	.2	1.75	.40
20+	531	105.2	-1.2	2.41	.10	76	105.0	-2	2.19	.25	156	105.3	.1	2.32	.19					
60+	54	104.7	-5	2.34	.32						24	105.6	.3	2.38	.48					

TABLE XXVII.
LENGTH OF ARM: AVERAGES FOR DIFFERENT OBSERVERS.

Observer	Male				Female			
	Pure Sioux		Half-bloods		Pure Sioux		Half-bloods	
	No.	Average	No.	Average	No.	Average	No.	Average
F. C. Smith	51	77.3	18	78.0	30	71.0	7	69.9
J. W. Cooke	171	76.7	14	76.4	33	72.7	2	68.5
G. A. Kaven	241	77.2	26	77.2	81	71.7	5	72.8
Z. T. Daniels	12	77.4	5	78.0	2	70.0	•	
F. Boas	34	77.7	8	77.9	3	71.3	2	74.5
C. A. Helvin and F. C. Kenyon	9	76.8	6	77.5	3	74.0	2	68.5
E. F. Wilson	17	75.6			3	67.7		
G. M. West					1	82.0	1	73.0
Total Series	535	77.0	77	77.3	156	71.8	19	71.0

TABLE XXVIII.
LENGTH OF ARM: DISTRIBUTION.

Cm.	Male				Female			
	Pure Sioux		Half-bloods		Pure Sioux		Half-bloods	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
64	2	.4			3	1.9	1	5.3
6	1	.2	1	1.3	19	12.2	2	10.6
8	10	1.9	0	.0	16	10.2	5	26.4
70	20	3.7	2	2.6	37	23.7	2	10.6
2	45	8.4	7	9.1	33	21.1	4	21.0
4	87	16.2	11	14.2	27	17.2	3	15.8
6	131	24.5	15	19.5	12	7.7	1	5.3
8	110	20.5	26	33.9	7	4.5	1	5.3
80	82	15.4	7	9.1	0	.0		
2	27	5.0	6	7.8	1	.6		
4	14	2.6	1	1.3	0	.0		
6	4	.7	1	1.3	0	.0		
8	0	.0			1	.6		
90	1	.2						
3	0	.0						
4	1	.2						
Average	77.0		77.3		71.8		71.0	
σ	± 3.57		± 3.28		± 3.63		± 3.59	
e	$\pm .15$		$\pm .37$		$\pm .29$		$\pm .82$	
V in %	4.64		4.24		5.05		5.05	
No. of cases	535		77		156		19	

Mixed Indian

Average 7 men

76.1

3 women

71.3

TABLE XXIX.
LENGTH OF ARM: GROWTH.

Age	Male						Female					
	Pure Sioux						Half-bloods					
	No.	Aver.	Inc.	σ	e		No.	Aver.	Inc.	σ	e	
4	1	43.0					1	41.0				
5							2	46.0	5.0			
6	3	50.0	7.0				4	53.2	7.2			
7	6	52.0	2.0	2.88	1.17		5	53.2	.0			
8	4	56.8	4.8	1.93	.96		7	53.7	.5			
9	13	57.2	.4	2.16	.59		4	57.2	3.5			
10	13	58.2	1.0	2.14	.59		10	58.6	1.4	3.01	.95	
11	13	60.9	1.7	1.86	.52		2	61.5	2.9			
12	11	65.0	4.1	3.43	1.03		14	64.2	2.7	3.26	.87	
13	15	67.2	2.2	6.58	1.70		12	65.9	1.7	2.75	.79	
14	14	68.3	1.1	2.28	.61		19	69.3	3.4	3.41	.78	
15	15	72.5	4.2	2.52	.65		8	70.1	.8	3.06	1.08	
16	18	73.8	1.3	3.52	.83		10	71.1	1.0	.94	.29	
17	19	76.0	2.2	3.06	.70		18	72.2	1.1	2.75	.65	
18	20	76.4	.4	3.88	.86		12	69.9	-2.3	2.46	.71	
19	21	77.8	1.4	3.25	.71		16	71.6	1.7	2.43	.61	
20+	535	77.0	-8	3.57	.15		156	71.8	.2	3.63	.29	
60+	54	76.9	-1	3.80	.52		24	71.7	-1	3.29	.67	

to the body height the full-bloods have slightly longer arms. Again the half-bloods are relatively and absolutely less variable in this character than the full-bloods. The curve of growth (Fig. 4) shows nothing of special interest.

INDEX OF ARM LENGTH

Comparability of Results. The results of the different observers are very uniform.

TABLE XXX.

INDEX OF ARM LENGTH: AVERAGES OF DIFFERENT OBSERVERS.

Observer	Male				Female			
	Pure Siouix		Half-bloods		Pure Siouix		Half-bloods	
	No.	Average	No.	Average	No.	Average	No.	Average
F. C. Smith	51	44.5	18	44.7	30	44.5	7	44.3
J. W. Cooke	171	44.7	14	44.2	33	45.4	2	43.0
G. A. Kaven	238	44.7	26	44.6	82	44.8	5	44.0
Z. T. Daniels	12	44.5	5	44.6	2	44.0		
F. Boas	34	44.7	8	44.4	3	44.7	2	45.0
C. A. Helvin and F. C. Kenyon	9	45.1	6	44.7	3	45.0	2	44.0
E. F. Wilson	17	44.8			3	44.3		
G. M. West					1	50.0	1	44.0
Average	532	44.6	77	44.6	157	44.9	19	44.1

Sex, Blood, Age. There are no striking differences in these characters. The curve of growth would seem to indicate that the full-bloods had slightly longer arms. The greater number of extreme cases in both the male and female full-bloods makes the variability greater than that of the half-bloods.

LENGTH OF HEAD.

Comparability of Results. There seem to be quite marked differences between the averages of some of the larger series. However, this diameter is quite variable and the results probably comparable.

Sex and Blood. The sexual difference for full-bloods is 7.4 mm., and for half-bloods 7.1 mm. Although very small, this difference seems to persist throughout. In the case of the males the full-bloods

TABLE XXXI.
INDEX OF ARM LENGTH: DISTRIBUTION.

	Male				Female			
	Pure Sioux		Half-bloods		Pure Sioux		Half-bloods	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
34	1	.2						
5	0	.0						
6	0	.0						
7	0	.0						
8	0	.0			1	.6		
9	1	.2			0	.0		
40	2	.4			0	.0		
1	1	.2	1	1.3	0	.0		
2	22	4.0	4	5.2	6	3.8	2	10.6
3	72	13.5	7	9.1	17	10.8	4	21.0
4	142	26.5	25	32.5	40	25.5	7	36.4
5	148	27.7	25	32.5	46	29.2	3	15.8
6	99	18.6	10	13.0	30	19.1	2	10.6
7	23	4.3	4	5.2	8	5.1	1	5.3
8	14	2.6	1	1.3	5	3.2		
9	4	.8			1	.6		
50	1	.2			2	1.3		
1	2	.4			0	.0		
2					0	.0		
3					1	.6		
Average	44.6		44.6		44.9		44.1	
σ	± 1.47		± 1.26		± 1.68		± 1.29	
e	$\pm .06$		$\pm .17$		$\pm .13$		$\pm .29$	
V in %	3.29		2.82		3.75		2.93	
No. of cases	532		77		157		19	

Mixed Indian

Average of 7 men

45.1

3 women

44.3

have the larger head and in the case of the females the half-bloods have the longer heads. The children show the same results. This character is quite variable throughout all the series. There seems to be a large number of extreme cases. However, the distribution among male half-bloods is more irregular than among the full-bloods and the variability greater. The female full-bloods are also very variable.

TABLE XXXII.
INDEX OF ARM LENGTH: GROWTH.

Age	Male						Female									
	Pure Sioux						Half-bloods									
	No.	Aver.	Inc.	σ	e		No.	Aver.	Inc.	σ	e	No.	Aver.	Inc.	σ	e
4	1	42.0					1	42.0				1	39.0			
5	3	45.0	3.0				2	41.5	-5			2	44.0	5.0		
6	6	43.4	-1.6				4	44.2	2.7			8	43.6	-4		
7	4	44.5	1.1				4	43.5	-7			11	43.6	.0		
8	13	43.4	-1.1	1.14	.31		7	44.4	.9			6	43.5	-1		
9	13	43.9	.5	1.03	.29		4	44.5	.1			11	44.0	.5		
10	13	43.6	-3	1.07	.30		10	43.9	-6	1.81	.57	4	44.7	.7		
11	11	44.2	.6	1.64	.49		2	43.0	-9			8	44.4	-3	.84	.29
12	15	44.4	.2	2.36	.61		14	44.6	1.6	1.79	.47	10	43.1	-1.3	2.07	.65
13	14	44.5	.1	.98	.26		12	43.9	-7	1.03	.29	8	44.8	1.7	.84	.29
14	15	45.0	.5	1.55	.40		18	44.5	.6	1.17	.27	10	44.9	.1	1.58	.49
15	18	44.8	-2	1.72	.40		8	44.8	.3	.98	.35	13	44.9	.0	1.64	.45
16	19	45.5	.7	1.32	.30		10	45.0	.2	1.00	.31	15	44.3	-6	1.28	.33
17	20	45.4	-1	1.97	.44		18	44.9	-1	.96	.22	12	44.9	.6	1.44	.41
18	21	45.0	-4	1.07	.23		12	44.3	-6	1.16	.33	3	45.6	.7		
19	532	44.6	-4	1.47	.06		16	45.1	.8	1.69	.42	19	44.1	-1.5	1.29	.29
20+	54	45.4	.8	1.35	.18		157	44.9	-2	1.68	.13	24	45.5	.6	1.99	.41

TABLE XXXIII.

LENGTH OF HEAD: AVERAGES FOR DIFFERENT OBSERVERS.

Observer	Male				Female			
	Pure Sioux		Half-bloods		Pure Sioux		Half-bloods	
	No.	Average	No.	Average	No.	Average	No.	Average
F. C. Smith	51	195.0	18	194.7	30	186.8	7	185.6
J. W. Cooke	174	196.1	14	196.6	32	187.5	2	190.0
G. A. Kaven	241	193.9	26	193.2	82	185.2	5	187.2
Z. T. Daniels	12	195.0	5	196.2	2	190.0		
F. Boas	34	194.3	8	196.2	3	184.7	2	186.5
C. A. Helvin and F. C. Kenyon	9	192.3	6	189.7	3	188.6	2	188.5
E. F. Wilson	18	196.9			3	181.7		
G. M. West					1	191.0	1	193.0
Total Series	539	194.9	77	194.4	156	187.0	19	187.3

Age and Growth. The heads of the males are longer throughout. As mentioned before the full-blood males and the half-blood females have the longer heads for nearly every year. The total growth in this diameter from the eighth to the twentieth year is very small.

WIDTH OF HEAD.

Comparability of Results. Again we find considerable differences in the averages of different observers. This doubtless indicates slight differences in technique but on the whole the results are comparable.

Sex and Blood. The sexual difference among full-bloods is 4.2 mm. and 4.0 mm., among half-bloods. The half-bloods are considerably less variable in head width than the full-bloods. Again this seems to be due to fewer extreme cases rather than a more regular distribution within the curve proper. The full-bloods have very slightly wider heads

Growth. The curve of growth (Fig. 4) for this character is very similar to that for length of head. The half-bloods stand intermediate between the male and female full-bloods. The male full-bloods have a wider head throughout, while the female half-bloods exceed the female full-bloods until the seventeenth year when the full-bloods have the wider head.

TABLE XXXIV.
LENGTH OF HEAD: DISTRIBUTION.

Cm	Male				Female			
	Pure Sioux		Half-bloods		Pure Sioux		Half-bloods	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
164	1	.2						
6	0	.0						
8	0	.0						
170	0	.0						
2	0	.0						
4	0	.0			2	1.3		
6	0	.0	1	1.3	2	1.3	1	5.3
8	3	.6	1	1.3	7	4.5	1	5.3
180	6	1.1	1	1.3	18	11.6	0	.0
2	6	1.1	2	2.6	15	9.6	0	.0
4	21	3.9	3	3.9	15	9.6	4	21.0
6	22	4.1	3	3.9	19	12.2	2	10.6
8	30	5.6	8	10.4	19	12.2	3	15.8
190	64	11.8	7	9.1	35	22.5	7	37.0
2	64	11.8	7	9.1	9	5.8	1	5.3
4	76	14.2	7	9.1	10	6.4		
6	72	13.4	11	14.3	2	1.3		
8	57	10.6	11	14.3	2	1.3		
200	45	8.4	3	3.9	1	.6		
2	27	5.0	6	7.8				
4	23	4.3	1	1.3				
6	14	2.6	1	1.3				
8	2	.4	2	2.6				
210	4	.7	1	1.3				
12	0	.0	1	1.3				
14	1	.2						
16	0	.0						
18	1	.2						
Average	194.9		194.4		187.0		187.3	
σ	± 6.16		± 7.12		± 5.09		± 4.17	
e	$\pm .26$		$\pm .81$		$\pm .41$		$\pm .96$	
V in %	3.16		3.66		2.72		2.22	
No. of cases	539		77		156		19	

Mixed Indian

Average for 7 men

194.0

3 women

189.3

TABLE XXXV.
LENGTH OF HEAD: GROWTH.

Age	Male						Female								
	Pure Sioux						Half-bloods								
	No.	Aver.	Inc.	σ	e		No.	Aver.	Inc.	σ	e				
4	1	175.0					1	166.0							
5	3	172.3	-2.7				2	174.5	8.5			1	179.0		
6	6	177.2	4.9	4.13	1.68		4	179.5	5.0			2	172.5	-6.5	
7	4	183.5	6.3				5	174.4	-5.1			8	174.8	2.3	
8	13	183.4	-1	4.13	1.14		7	178.7	4.3			11	179.6	4.8	
9	13	181.4	-2.0	4.52	1.25		4	178.8	.1			7	181.1	1.5	
10	13	184.3	2.9	6.21	1.72		10	177.3	1.5	6.34	2.00	11	177.9	-3.2	
11	11	188.1	3.8	4.84	1.45		2	178.0	.7			4	180.5	2.6	
12	15	194.9	-3.2	4.65	1.19		14	181.2	3.2	4.49	1.19	8	184.5	4.0	3.38
13	14	186.7	1.8	5.68	1.51		12	181.2	.0	5.27	1.51	10	184.6	.1	6.50
14	15	186.3	-4	6.39	1.65		19	184.5	2.3	4.30	.98	8	184.0	-6	4.72
15	18	188.9	1.6	5.67	1.33		8	185.9	1.4	6.92	2.44	10	188.1	4.1	4.66
16	19	188.9	.0	4.44	.99		10	185.5	-.4	4.67	1.47	13	188.4	.3	3.95
17	20	187.7	-1.2	4.75	1.06		18	184.7	-8	5.04	1.18	15	186.1	-2.3	3.41
18	21	193.2	5.5	3.97	.86		12	184.3	-1.7	4.46	1.28	12	185.2	-9	5.10
19	539	194.9	1.7	6.16	.26		16	182.6	-4.4	3.86	.96	3	183.3	-1.9	
20+	55	194.8	-1	5.42	.73		156	187.0	4.4	5.09	1.41	19	187.3	4.0	4.17
60+							24	185.6	1.4	8.75	0.74				.96

TABLE XXXVII.
WIDTH OF HEAD: DISTRIBUTION.

Mm.	Male				Female			
	Pure Sioux		Half-bloods		Pure Sioux		Half-bloods	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
134	1	.2						
6	0	.0						
8	1	.2	1	1.3				
140	0	.0	1	1.3	4	2.5		
2	2	.4	0	.0	7	4.4	2	10.6
4	8	1.5	2	2.6	11	7.0	1	5.3
6	29	5.4	3	3.9	19	12.1	1	5.3
8	21	3.9	5	6.5	19	12.1	3	15.8
150	70	13.0	7	9.1	23	14.8	5	26.4
2	79	14.6	13	17.0	30	19.2	3	15.8
4	92	17.0	12	15.6	18	11.5	2	10.6
6	75	14.0	14	18.2	11	7.0	1	5.3
8	50	9.3	9	11.6	8	5.1	0	.0
160	53	9.9	3	3.9	5	3.2	1	5.3
2	25	4.6	6	7.8	2	1.3		
4	14	2.6	1	1.3				
6	10	1.9						
8	3	.6						
170	2	.4						
2	2	.4						
4	1	.2						
6	0	.0						
8	0	.0						
180	0	.0						
2	1	.2						
Average	155.1		154.3		150.9		150.3	
σ	± 5.39		± 5.04		± 4.83		± 4.50	
e	$\pm .23$		$\pm .57$		$\pm .38$		± 1.03	
V in %	3.47		3.26		3.20		2.99	
No. of cases	539		77		157		19	

Mixed Indian

Average for 7 men

155.8

3 women

152.4

TABLE XXXVIII.
WIDTH OF HEAD: GROWTH.

Age	Male						Female					
	Pure Sioux						Half-bloods					
	No.	Aver.	Inc.	σ	e		No.	Aver.	Inc.	σ	e	
4	1	146.0					1	138.0				
5							2	141.5	3.5			
6	3	145.0	-1.0				4	142.8	1.3			
7	6	143.8	-1.2	4.80	1.96		5	142.0	-8			
8	4	146.2	2.4				7	142.8	.8			
9	13	146.8	.6	4.62	1.28		4	144.8	2.0			
10	13	146.2	-6	3.07	.85		10	142.9	-1.9	3.24	1.02	
11	13	146.6	.4	4.79	1.32		2	140.0	-2.9			
12	11	149.4	2.8	3.43	1.03		14	145.1	5.1	6.67	1.78	
13	15	148.0	-1.4	5.43	1.40		12	147.2	2.1	2.07	.60	
14	14	150.0	2.0	5.66	1.51		18	148.0	.8	4.40	1.04	
15	15	152.8	2.8	4.85	1.25		8	147.8	-2	3.44	1.21	
16	18	151.3	-1.5	4.67	1.09		10	148.0	.2	2.32	.73	
17	19	151.3	.0	4.35	.99		18	150.4	2.4	5.67	1.34	
18	20	153.1	1.8	5.05	1.12		12	150.1	-3	4.80	1.38	
19	21	153.9	.8	4.85	1.05		16	150.4	.3	4.84	1.21	
20+	539	155.1	1.2	5.39	.23		151	150.9	.5	4.83	.38	
60+	55	155.4	.3	4.16	.56		24	150.3	-6	4.31	.88	

TABLE XXXVI.
WIDTH OF HEAD: AVERAGES FOR DIFFERENT OBSERVERS.

Observer	Male				Female			
	Pure Sioux		Half-bloods		Pure Sioux		Half-bloods	
	No.	Average	No.	Average	No.	Average	No.	Average
F. C. Smith	51	156.5	18	155.3	30	151.7	7	151.3
J. W. Cooke	174	156.2	14	156.5	33	104.4	2	150.0
G. A. Kaven	241	153.9	26	152.5	82	150.7	5	150.2
Z. T. Daniels	12	159.3	5	156.4	2	159.0		
F. Boas	34	155.6	8	154.4	3	150.7	2	145.5
C. A. Helvin and F. C. Kenyon	9	154.3	6	151.8	3	151.6	2	152.5
E. F. Wilson	18	154.6			3	150.7		
G. M. West					1	149.0	1	150.0
Total Series	539	155.1	77	154.3	157	150.9	19	150.3

CEPHALIC INDEX.

Comparability of Results. The results for the cephalic index in the different series are undoubtedly comparable.

Sex and Blood. The females have slightly shorter heads, the sexual differences being 0.9 for full-bloods and 1.1 for half-bloods. The averages for full-bloods and half-bloods are almost identical. Again we find the full-blood males more variable than the half-bloods and for the same reason that we have more marginal cases among them. However, these results show clearly that it is dangerous to rely wholly on the variability of the cephalic index as a test for racial intermixture. It must be inferred from these results that the groups with whom these Indians have mixed have had very similar head proportions. Nor could the absolute diameters have been very different.

Growth. The general trend is for a decrease in this proportion with increasing age. The females have a shorter head throughout with the exception of ages 14, 15, and 16.

WIDTH OF FACE.

(Maximum)

Comparability of Results. On the whole the results of different observers are very similar and the personal equation is undoubtedly not very large.

TABLE XXXIX.
CEPHALIC INDEX: AVERAGES FOR DIFFERENT OBSERVERS.

Observer	Male				Female			
	Pure Sioux		Half-bloods		Pure Sioux		Half-bloods	
	No.	Average	No.	Average	No.	Average	No.	Average
F. C. Smith	51	80.3	18	79.8	30	80.8	7	81.4
J. W. Cooke	173	79.6	14	79.7	32	79.9	2	80.5
G. A. Kayen	241	79.4	26	79.0	82	80.5	5	80.4
Z. T. Daniels	12	81.9	5	79.4	2	83.5		
F. Boas	34	80.3	8	78.6	3	81.3	2	82.0
C. A. Helvin and F. C. Kenyon	9	80.2	6	80.2	3	80.3	2	81.0
E. F. Wilson	17	79.4			3	79.0		
G. M. West					1	78.0	1	78.0
Total Series	537	79.6	77	79.4	156	80.5	19	80.5

Sex and Blood. The sexual difference in the width of the face is 6.3 mm. for the full-bloods and 4.3 mm. for the half-bloods. As has already been pointed out by Professor Boas on many occasions, the greater width of the face is one of the most conspicuous differences between full-bloods, half-bloods, and whites. The average difference between full-blood and half-blood males in this series is 5.7 mm. This constitutes a real mathematical difference and one which is consistent throughout for males and females, children and adults. Although the half-bloods are only very slightly more variable in this character the distribution in the two cases is quite different. As will be noticed in Fig. 6 the half-bloods form a mode on either side of the mean and median. The higher mode at least, corresponds fairly closely to the mean and mode of the full-blooded Indian. This distribution would seem to indicate that the inheritance of facial width is alternating.¹

Growth. The racial difference is more clearly noticeable after the seventeenth year while the sexual differences are most marked after the fifteenth year. The width of the face seems to increase somewhat more than the width of the head during the period from the sixth to the twentieth year.

¹For a further discussion of the inheritance of face width see Section IV, p. 159.

TABLE XL.
CEPHALIC INDEX: DISTRIBUTION.

Cm.	Male				Female			
	Pure Sioux		Half-bloods		Pure Sioux		Half-bloods	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
70	1	.2						
1	1	.2						
2	4	.7			1	.6		.6
3	5	.9			1	.6		
4	13	2.4	3	3.9	1	.6		
5	12	2.2	2	2.6	4	2.5	1	5.3
6	47	8.7	8	10.4	7	4.5	1	5.3
7	37	6.9	7	9.1	4	2.5	0	.0
8	83	15.4	7	9.1	16	10.2	3	15.8
9	72	13.4	9	11.7	16	10.2	1	5.3
80	70	13.0	12	15.6	23	14.8	5	26.4
1	48	9.0	12	15.6	25	16.0	2	10.6
2	53	9.9	11	14.3	25	16.0	2	10.6
3	32	6.0	4	5.2	14	9.0	1	5.3
4	26	4.8	0	.0	11	7.0	0	.0
5	11	2.0	1	1.3	5	3.2	2	10.6
6	13	2.4	0	.0	1	.6	1	5.3
7	1	.2	0	.0	2	1.3		
8	0	.0	1	1.3				
9	4	.7						
90	3	.6						
1	0	.0						
2	0	.0						
3	0	.0						
4	0	.0						
5	1	.2						
Average	79.6		79.4		80.5		80.5	
σ	± 3.20		± 2.64		± 2.68		± 2.85	
e	$\pm .14$		$\pm .30$		$\pm .22$		$\pm .65$	
V in %	4.03		3.33		3.33		3.54	
No. of cases	537		77		156		91	

Mixed Indian

Average for 7 men

80.4

3 women

80.4

TABLE XLI.
CERHALIC INDEX: GROWTH.

Age	Male						Female									
	Pure Sioux						Half-bloods									
	Pure Sioux						Half-bloods									
	No.	Aver.	Inc.	σ	e		No.	Aver.	Inc.	σ	e	No.	Aver.	Inc.	σ	e
4	1	83.0					1	83.0				1	83.0			
5	3	84.7	1.7				2	81.5	-1.5			2	81.5	-1.5		
6	6	81.2	-3.5				4	79.5	-2.0			8	80.8	-7		
7	4	79.8	-1.4				4	32.7	3.2			11	80.9	.1		
8							7	80.0	-2.7			7	79.4	-1.5		
9	13	80.0	.2	2.38	.66		4	81.0	1.0			11	79.7	.3		
10	13	80.5	.5	2.43	.67		10	80.8	-2	2.32	.73	4	80.2	.5		
11	13	79.5	-1.0	2.73	.75		2	78.5	-2.3			8	79.6	-6	1.72	.61
12	11	79.5	.0	2.36	.71		14	80.1	1.6	4.82	1.28	8	80.8	1.2	2.82	.89
13	14	80.3	.8	3.51	.93		12	81.3	.2	2.02	.58	10	80.8	.1	2.80	.99
14	14	80.4	.1	2.53	.67		18	79.9	-1.4	2.48	.58	8	80.9	-4	3.56	1.12
15	15	81.7	1.3	3.01	.77		8	79.6	-3	2.86	1.01	10	80.5	-1.0	1.81	.50
16	18	80.1	-1.6	3.26	.76		10	79.9	.3	2.12	1.42	13	79.5	.3	2.67	.81
17	19	80.3	.2	2.74	.62		18	81.2	1.3	2.81	.66	15	79.8	.5	2.24	.64
18	20	81.0	.7	2.30	.51		12	81.4	.2	2.63	.76	12	80.3	.3	2.85	.65
19	21	79.4	-1.6	3.16	.69		16	82.3	.9	3.16	.79	3	80.6	-1		
20+	537	79.6	.2	3.20	.14		156	80.5	-1.8	2.68	.22	19	80.5			
60+	55	80.0	.4	3.13	.42		24	80.5	.0	3.10	.63					

TABLE XLII.
WIDTH OF FACE: AVERAGES FOR DIFFERENT OBSERVERS.

Observer	Male				Female			
	Pure Sioux		Half-bloods		Pure Sioux		Half-bloods	
	No.	Average	No.	Average	No.	Average	No.	Average
F. C. Smith	51	150.3	18	145.9	30	143.1	7	140.4
J. W. Cooke	173	150.8	14	143.9	33	143.8	2	138.5
G. A. Kaven	241	148.4	25	142.7	82	142.6	5	138.8
Z. T. Daniels	12	148.0	5	139.2	2	141.5		
F. Boas	34	148.1	8	142.5	3	141.0	2	137.0
C. A. Helvin and F. C. Kenyon	9	145.4	6	141.7	3	148.7	2	137.5
E. F. Wilson	18	144.1			3	132.4		
G. M. West					1	145.0	1	140.0
Total Series	538	149.1	76	143.4	157	142.8	19	139.3

FACIAL WIDTH AND HEAD WIDTH.

(Cephalo-Facial Index.)

Comparability of Results. The averages for the larger series are very similar.

Sex and Blood. The sexual differences in the cephalo-facial index, which expresses the width of the face in terms of proportionate width of the head, are not as marked as the differences due to race. Even in the full-blooded females this index is higher than in half-blood males.¹ Among full-bloods the sex difference is 1.4 and among half-bloods only 0.4. The male half-bloods are slightly more variable than the full-bloods although the curves in both cases are very similar.

Age and Growth. The curve of growth for this index brings out very clearly the differences in the amount and rate of growth in the transverse diameter of the head and the corresponding diameter of the face. The face becomes proportionately much wider than the head during the period of growth.

¹Cf. Jenks, 1916.

TABLE XLIII.
WIDTH OF FACE: DISTRIBUTION.

Mm.	Male				Female			
	Pure Sioux		Half-bloods		Pure Sioux		Half-bloods	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
130			1	1.3	6	3.8		
2			1	1.3	3	1.9		
4	3	.6	4	5.3	8	5.1	4	21.0
6	3	.6	6	7.9	3	1.9	4	21.0
8	8	1.5	8	10.5	13	8.3	2	10.6
140	32	6.0	10	13.2	28	17.8	3	15.8
2	35	6.5	10	13.2	21	13.4	3	15.8
4	58	10.8	5	6.6	29	18.6	1	5.3
6	77	14.4	10	13.2	18	11.4	2	10.6
8	69	12.8	12	15.7	16	10.2		
150	88	16.4	6	7.9	9	5.7		
2	53	9.9	1	1.3	2	1.3		
4	41	7.6	0	.0	1	.6		
6	34	6.3	1	1.3				
8	16	2.9	1	1.3				
160	9	1.7						
2	3	.6						
4	4	.8						
6	1	.2						
8	1	.2						
170								
Average	149.1		143.4		142.8		139.3	
σ	±5.45		±5.49		±5.05		±3.70	
e	±.23		±.63		±.40		±.85	
V in %	3.65		3.83		3.53		2.65	
No. of cases	538		76		157		19	

	Mixed Indian		
Average for 7 men	149.3	3 women	141.6

HEIGHT OF FACE: PHYSIOGNOMIC
(Hair-line to Chin)

Comparability of Results. There are no real differences between the averages of the different observers. But this diameter is rather more variable than the width of the face. This is undoubtedly due to the

TABLE XLIV.
WIDTH OF FACE: GROWTH.

Age	Male						Female					
	Pure Sioux						Half-bloods					
	No.	Aver.	Inc.	σ	e		No.	Aver.	Inc.	σ	e	
4	1	121.0					1	112.0				
5	3	119.6	-1.4				2	120.5	8.5			
6	6	122.0	2.4				4	120.5	.0			
7	4	124.8	2.8				5	120.6	.1			
8	13	126.2	1.4	4.79	1.33		7	123.3	2.7			
9	13	126.4	.2	4.20	1.16		4	124.5	1.2			
10	13	127.3	.9	3.17	.88		10	124.3	-2			
11	11	129.5	2.2	4.88	1.17		2	125.5	1.2			
12	15	133.0	3.5	3.80	.99		14	131.0	5.5	4.29	1.14	
13	14	134.0	1.0	3.54	.95		12	133.7	2.7	3.98	1.14	
14	15	136.5	2.5	6.31	2.55		18	136.3	2.6	5.08	1.19	
15	18	138.5	2.0	4.28	1.01		8	138.8	2.5	4.59	1.62	
16	19	140.4	1.9	4.90	1.12		10	139.4	.6	3.69	1.16	
17	20	142.6	2.2	6.30	1.41		18	138.2	-1.2	5.62	1.32	
18	21	145.0	2.4	4.22	.92		12	142.6	4.0	6.04	1.74	
19	20	149.1	4.1	5.45	.23		16	140.1	-2.5	5.52	1.37	
20+	538	149.1	4.1	5.45	.62		157	142.8	2.7	5.05	.40	
60+	55	150.7	1.6	4.62	.62		24	141.3	-1.5	4.78	.98	

TABLE XLV.
CEPHALO-FACIAL INDEX: AVERAGE FOR DIFFERENT OBSERVERS.

Observer	Male				Female			
	Pure Sioux		Half-bloods		Pure Sioux		Half-bloods	
	No.	Average	No.	Average	No.	Average	No.	Average
F. C. Smith	51	96.1	18	93.8	30	94.4	7	92.0
J. W. Cooke	170	96.6	14	92.5	32	95.6	2	90.5
G. A. Kaven	242	96.3	26	93.2	82	84.9	5	90.0
Z. T. Daniels	12	92.7	5	89.2	2	88.0		
F. Boas	34	95.1	8	92.5	3	93.7	2	94.0
C. A. Helvin and F. C. Kenyon	9	94.3	6	93.3	3	98.0	2	91.0
E. F. Wilson	18	93.2			3	90.0		
G. M. West					1	97.0	1	93.0
Total Series	536	96.1	77	92.9	156	94.7	19	92.5

difficulty in taking the measurement from exactly the same points in each case. However, the differences due to personal errors on the part of the observers are less than in the case of the anatomical face height.

Sex and Blood. The sexual difference in this measurement is quite marked being 10.5 mm. for full-bloods and 12.8 mm. for half-bloods. The full-bloods in both instances have the higher faces. The index of variability is greater among full-bloods than among half-bloods. Yet, barring the greater number of marginal cases the distribution within the curve proper is more regular among full-bloods than among half-bloods.

Age and Growth. This diameter also shows a greater increase during the years 8 to 20 than the diameters of the head. The sexual differences are most marked after the sixteenth year. The full-bloods consistently have a higher face throughout.

HEIGHT OF FACE: ANATOMICAL.

(Nasion to Chin).

Comparability of Results. The averages for different observers show very marked differences indicating a considerable difference in technique. Smith and Cooke have evidently selected a low point for

TABLE XLVI.
CEPHALO-FACIAL INDEX: DISTRIBUTION.

	Male				Female			
	Pure Sioux		Half-bloods		Pure Sioux		Half-bloods	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
76	1	.2						
7	0	.0						
8	0	.0						
9	0	.0						
80	1	.2						
1	0	.0						
2	0	.0						
3	0	.0						
4	0	.0	2	2.6				
5	0	.0	1	1.3				
6	2	.4	1	1.3				
7	1	.2	1	1.3	1	.6		
8	1	.2	2	2.6	5	3.2		
9	2	.4	2	2.6	2	1.3	2	10.6
90	11	2.0	3	3.9	7	4.5	2	10.6
1	16	3.0	11	14.3	6	3.7	1	5.3
2	36	6.7	10	13.0	15	9.6	2	10.6
3	32	6.0	10	13.0	19	12.2	7	37.0
4	62	11.6	10	13.0	20	12.8	3	15.8
5	45	8.4	10	13.0	24	15.4	1	5.3
6	76	14.2	6	7.8	13	8.3	1	5.3
7	83	15.5	2	2.6	21	13.4		
8	45	8.4	3	3.9	4	2.5		
9	57	10.6	2	2.6	6	3.8		
100	20	3.7	1	1.3	2	1.3		
1	27	5.0			8	5.1		
2	9	1.7			2	1.3		
3	7	1.3			0	.0		
4	0	.0			0	.0		
5	1	.2			1	.6		
6	0	.0						
7	0	.0						
8	0	.0						
9	0	.0						
110	1	.2						
Average	96.1		92.9		94.7		92.5	
σ	± 3.22		± 3.23		± 3.22		± 1.88	
e	$\pm .14$		$\pm .37$		$\pm .26$		$\pm .43$	
V in %	3.35		3.48		3.40			
No. of cases	536		77		156		19	

TABLE XLVII.
CEPHALO-FACIAL INDEX: GROWTH.

Age	Male						Female													
	Pure Sioux					Half-bloods					Pure Sioux					Half-bloods				
	No.	Aver.	Inc.	σ	e	No.	Aver.	Inc.	σ	e	No.	Aver.	Inc.	σ	e	No.	Aver.	Inc.	σ	e
4	1	83.0				1	77.0				1	81.0				1	81.0			
5						4	83.5	6.5	3.50	1.75	2	85.0	4.0			2	83.5	2.5		
6	3	82.3	-7	2.06	1.19	6	84.0	.5	3.65	1.44	4	83.8	-1.2			8	82.6	-9	2.76	.98
7	6	84.7	2.4	2.74	1.12	2	82.0	-2.0			5	85.0	1.2	2.20	.94	11	84.5	1.9	3.35	1.00
8	11	84.8	.1	2.98	.87	4	86.8	4.8			7	86.0	1.0	3.87	1.09	7	85.3	.8	2.71	1.03
9	8	87.6	2.8	2.93	1.04	12	85.6	-1.2	2.81	.82	4	85.8	-2			11	87.6	2.3	2.28	.69
10	13	86.5	-1.1	3.91	1.08	11	86.3	.7	2.22	.67	10	87.1	1.3	3.67	1.16	3	86.7	-9		
11	13	86.9	.4	2.64	.73	8	88.9	2.6	2.20	.78	3	88.3	1.2			8	90.2	3.5	2.11	.74
12	11	86.6	-3	3.98	1.19	10	90.4	1.5	4.18	1.32	14	89.4	1.1	2.54	.68	10	89.1	1.1	1.92	.61
13	15	89.9	3.3	3.47	.90	12	89.8	-6	2.15	.62	19	92.0	.9	2.94	.67	8	89.6	.5	3.16	1.12
14	14	89.2	-7	3.76	1.01	6	90.2	.4	.90	.37	10	93.1	1.1	3.45	1.09	10	88.4	-1.2	2.15	.68
15	15	89.7	.5	3.59	.92	11	91.0	.8	2.59	.78	10	94.2	1.1	2.60	.85	13	91.1	2.7	2.56	.71
16	18	91.4	1.7	3.34	.78	6	94.0	3.0	4.16	1.69	18	92.3	-1.9	2.66	.63	15	91.7	.6	2.44	.63
17	19	92.8	1.4	2.50	.57	4	92.8	-1.2			13	95.0	2.7	3.16	.88	12	91.0	-7	1.92	.56
18	20	93.8	1.0	3.27	.73	9	92.7	-1	2.82	.94	16	93.1	-1.9	2.96	.74	3	95.7	4.7	1.92	
19	21	94.3	.5	2.61	.57	77	92.9	.2	3.23	.37	156	94.7	1.6	3.22	.26	19	92.5	-3.2	1.88	.43
20+	536	96.1	1.8	3.35	.14						24	93.9	-8	2.94	.59					
60+	54	96.9	.8	2.92	.40															

TABLE XLVIII.

HEIGHT OF FACE (HAIRLINE TO CHIN): AVERAGES FOR DIFFERENT OBSERVERS

Observers	Male				Female			
	Pure Sioux		Half-bloods		Pure Sioux		Half-bloods	
	No.	Average	No.	Average	No.	Average	No.	Average
F. C. Smith	51	188.3	18	185.7	30	177.3	7	175.8
G. A. Kaven	236	190.2	23	186.3	82	179.8	5	169.2
F. Boas	34	190.6	8	187.0	3	185.7	2	178.0
C. A. Helvin and F. C. Kenyon	9	195.5	6	188.3	3	185.7	2	174.0
G. M. West					1	178.0	1	170.0
Average	330	189.9	55	186.4	119	179.4	17	173.6

the nasion while Kaven has selected a higher point. On the whole this diameter seems to be one of the most variable recorded, a part of which at least is due to the difficult technique involved. However, the difference does not seem of sufficient size to warrant correction, but it should be kept in mind that the average is probably not the true average. Since the results of each observer seem to be fairly consistent for all four groups the general results will not be seriously affected.

Sex and Blood. The sex difference for full-bloods is 7.2 mm. and 7.4 mm. for half-bloods. The half-blood males are relatively more variable than the full-bloods and the distribution is more irregular. The full-bloods in both sexes have the higher anatomical faces.

Age and Growth. The growth of this diameter brings out more clearly the differences due to sex and blood. The four curves of growth are quite widely separated throughout.

HEIGHT OF FACE: UPPER

(Nasion to Chin).

The following averages of upper face height show the same differences for sex and blood that we have already found for the physiognomic and anatomic face heights.

	No.	Average	σ	e
Pure Sioux Male	43	81.1	± 5.77	$\pm .88$
Half-blood Male	13	78.5	± 4.79	± 1.33
Pure Sioux Female	6	77.3	± 2.86	± 1.16
Half-blood Female	4	71.2	± 4.71	± 2.36

TABLE XLIX.
HEIGHT OF FACE (HAIRLINE TO CHIN): DISTRIBUTION.

Mm.	Male				Female			
	Pure Sioux		Half-bloods		Pure Sioux		Half-bloods	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
158					2	1.7	1	5.9
160					0	.0	0	.0
2					1	.8	0	.0
4					2	1.7	1	5.9
6					4	3.3	0	.0
8	2	.6			6	5.0	1	5.9
170	3	.9			5	4.2	3	17.6
2	6	1.8	3	5.4	5	4.2	1	5.9
4	6	1.8	4	7.2	11	9.3	2	11.8
6	9	2.7	2	3.6	12	10.1	4	23.5
8	14	4.2	1	1.8	14	11.8	2	11.8
180	18	5.5	5	9.1	11	9.3	1	5.9
2	16	4.8	2	3.6	10	8.4	1	5.9
4	21	6.4	4	7.2	8	6.7		
6	27	8.2	9	16.4	7	5.9		
8	25	7.6	5	9.1	7	5.9		
190	31	9.4	6	10.9	5	4.2		
2	36	11.0	5	9.1	5	4.2		
4	29	8.8	3	5.4	2	1.7		
6	25	7.6	3	5.4	1	.8		
8	25	7.6	2	3.6	1	.8		
200	14	4.2	0	.0				
2	12	3.6	1	1.8				
4	1	.3						
6	3	.9						
8	2	.6						
210	3	.9						
12	1	.3						
14	1	.3						
Average	189.9		186.4		179.4		173.6	
σ	± 8.32		± 7.27		± 8.12		± 5.65	
e	$\pm .45$		$\pm .98$		$\pm .74$		± 1.37	
V in %	4.32		3.90		4.52		3.25	
No. of cases	330		55		119		17	

TABLE L.
HEIGHT OF FACE (HAIRLINE TO CHIN): GROWTH.

Age	Male						Female									
	Pure Sioux						Half-bloods									
	No.	Aver.	Inc.	σ	e		No.	Aver.	Inc.	σ	e	No.	Aver.	Inc.	σ	e
4	1	149.0					1	144.0				1	152.0			
5																
6	3	146.6	-2.4			2	153.5					1	139.0	-5.0		
7	4	154.7	8.1			4	151.8	-1.7				3	158.9	19.9		
8	2	162.0	7.3			1	147.0	-4.8				3	151.7	-7.2		
9	5	158.6	-3.4			3	153.7	5.7				2	147.0	-4.7		
10	6	157.7	-9			6	165.3	11.6				4	158.0	11.0		
11	8	162.4	4.7			7	163.1	-2.2				1	148.0	-10.0		
12	2	173.0	10.6			5	166.2	3.1				8	167.2	19.2		
13	7	176.0	3.0			5	168.8	2.6				5	169.8	2.6		
14	7	176.4	.4			9	178.0	9.2				9	173.9	4.1		
15	6	177.3	.9			5	176.8	-1.2				3	179.0	5.1		
16	6	180.8	3.5			7	181.9	5.1				5	180.0	1.0		
17	10	179.9	-9			5	179.2	-2.7				11	181.2	1.2		
18	11	189.6	9.7			4	179.0	-2				8	174.2	-7.0		
19	16	188.0	-1.6			7	186.4	7.4				14	179.4	5.2		
20+	330	189.9	1.9			55	186.4	.0				119	179.4	.0		
60+	39	191.2	1.3									15	176.4	-3.0		

TABLE LI.

HEIGHT OF FACE (NASION TO CHIN): AVERAGES FOR DIFFERENT OBSERVERS

Observers	Male				Female			
	Pure Sioux		Half-bloods		Pure Sioux		Half-bloods	
	No.	Average	No.	Average	No.	Average	No.	Average
F. C. Smith	51	120.9	18	118.9	30	113.5	7	113.3
J. W. Cooke	172	123.8	14	121.4	33	115.2	2	114.5
G. A. Kaven	241	125.9	26	121.9	82	119.7	5	116.6
Z. T. Daniels	12	127.2	5	122.2	2	116.0		
F. Boas	34	125.3	8	124.7	3	119.0	2	114.5
C. A. Helvin and F. C. Kenyon	9	122.1	6	120.7	3	120.0	2	113.0
E. F. Wilson	18	122.7			3	113.7		
G. M. West					1	116.0	1	118.0
Total Series	537	124.6	77	121.5	157	117.4	19	114.1

FACIAL INDEX: ANATOMICAL.

Comparability of Results. The differences in this index in the series of different observers are very similar to the differences in the height of the face previously mentioned.

Sex and Blood. The females have somewhat lower faces. The half-blood males have relatively slightly higher faces than the full-bloods. There is a greater difference between the width of face in full-bloods and half-bloods than in the height of the face. The half-blood males are more variable than the full-bloods. On the whole, this index is extremely variable and unsatisfactory for showing the differences between the full-bloods and half-bloods. It is very evident from the absolute measurements that one of the most marked differences between full-bloods, half-bloods, and whites is the more massive face of the former.¹ The full-blood has a much wider and higher face. The difference would be brought out more clearly by an average of these two diameters or the product of height and width of the face indicating the relative area of the face.

¹Compare Boas, 1894-2 and 1895; also Jenks, 1916.

TABLE LII.
HEIGHT OF FACE (NASION TO CHIN): DISTRIBUTION.

Mm.	Male				Female			
	Pure Sioux		Half-bloods		Pure Sioux		Half-bloods	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
100					2	1.3		
2					2	1.3		
4					2	1.3	1	5.3
6			1	1.3	0	.0	0	.0
8	2	.4	1	1.3	7	4.5	1	5.3
110	7	1.3	1	1.3	17	10.8	2	10.6
12	11	2.0	2	2.6	14	8.9	5	26.4
14	13	2.4	10	13.0	16	10.2	2	10.6
16	38	7.1	3	3.9	13	8.3	4	21.0
18	32	6.0	9	11.6	21	13.4	2	10.6
120	68	12.7	15	19.5	19	12.1	1	5.3
2	68	12.7	9	11.6	19	12.1	1	5.3
4	86	16.0	8	10.4	9	5.7		
6	41	7.6	2	2.6	9	5.7		
8	40	7.5	7	9.1	6	3.8		
130	60	11.2	4	5.2	1	.6		
2	23	4.3	2	2.6				
4	24	4.5	1	1.3				
6	12	2.2	1	1.3				
8	5	.9	0	.0				
140	3	.6	1	1.3				
2	1	.2						
4	1	.2						
6	0	.0						
8	1	.2						
150	0	.0						
2	1	.2						
Average	124.6		121.5		117.4		114.1	
σ	± 6.39		± 6.36		± 6.18		± 4.12	
e	$\pm .27$		$\pm .72$		$\pm .49$		$\pm .94$	
V in %	5.12		5.23		5.26		3.61	
No. of cases	537		77		157		19	

Average 7 men

Mixed Indian
121.0

3 women

118.7

TABLE LIII.
HEIGHT OF FACE (NASION TO CHIN): GROWTH.

Age	Male										Female				
	Pure Sioux					Half-bloods					Pure Sioux				
	No.	Aver.	Inc.	σ	e	No.	Aver.	Inc.	σ	e	No.	Aver.	Inc.	σ	e
4	1	91.0				1	85.0				1	96.0			
5						2	98.0	13.0			2	92.5			
6	3	88.3	-2.7			4	97.7	-3			8	94.5	-3.5		
7	6	97.5	11.2			5	99.0	1.3			11	96.8	2.0		
8	4	104.0	6.5			7	97.5	-1.5			7	95.3	2.3		
9	13	104.0	.0	4.69	1.30	4	101.0	4.5			11	98.1	-1.5		
10	13	104.1	.1	3.70	1.03	10	99.5	-1.5	4.88	1.54	3	103.6	2.8		
11	13	104.2	.1	3.73	1.04	2	103.5	4.0			8	105.0	5.5		
12	11	109.0	4.8	2.80	.84	14	108.8	5.3	4.55	1.21	10	105.5	1.4	6.46	2.28
13	15	111.0	2.0	5.09	1.32	12	108.4	-4	4.59	1.32	10	105.5	.5	6.10	1.93
14	14	114.4	3.4	4.64	1.24	17	112.7	4.3	5.77	1.40	8	109.4	3.9	4.55	1.61
15	15	118.0	3.6	8.41	2.17	8	115.8	3.1	4.57	1.61	10	112.5	3.1	5.14	1.62
16	18	120.4	2.4	5.09	1.20	10	115.4	-4	4.72	1.48	13	111.2	-1.3	6.03	1.67
17	19	120.7	.3	5.71	1.31	18	116.6	1.2	6.04	1.42	15	110.9	-3	4.25	1.09
18	19	124.3	3.6	4.85	1.11	12	115.6	-1.0	5.85	1.68	12	111.5	.6	6.18	1.78
19	21	127.2	2.9	5.60	1.22	16	116.9	1.3	6.51	1.62	3	113.6	2.1		
20+	537	124.6	-2.6	6.39	.27	157	117.4	-2.3	6.18	.49	19	114.1	.5	4.12	.94
60+	54	125.1	.5	8.14	1.11	24	115.5	.9	6.93	1.42					

TABLE LIV.
FACIAL INDEX (ANATOMICAL): AVERAGE FOR DIFFERENT OBSERVERS.

Observer	Male				Female			
	Pure Sioux		Half-bloods		Pure Sioux		Half-bloods	
	No.	Average	No.	Average	No.	Average	No.	Average
F. C. Smith	51	80.5	18	81.7	30	79.5	7	80.0
J. W. Cooke	170	82.1	14	83.2	33	80.1	2	83.0
G. A. Kaven	241	84.8	26	86.0	82	84.0	5	84.4
Z. T. Daniels	12	86.1	5	90.2	2	83.0		
F. Boas	33	84.7	8	87.4	3	84.6	2	84.0
C. A. Helvin and F. C. Kenyon	9	83.8	6	85.3	3	81.7	2	81.0
E. F. Wilson	18	85.2			3	85.6		
G. M. West					1	80.0	1	84.0
Total Series	534	83.6	77	84.8	157	82.3	19	82.2

TABLE LV.
FACIAL INDEX (ANATOMICAL): DISTRIBUTION.

Mm.	Male				Female			
	Pure Sioux		Half-bloods		Pure Sioux		Half-bloods	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
68	1	.2						
70	0	.0			1	.6		
2	4	.7			2	1.3	1	5.3
4	19	3.5	2	2.6	7	4.4	0	.0
6	36	6.7	3	3.9	12	7.6	0	.0
8	42	7.9	4	5.2	20	12.8	2	10.6
80	74	13.8	14	18.2	26	16.6	3	15.8
2	83	15.6	11	14.3	26	16.6	6	31.6
4	97	18.2	10	13.0	27	17.2	4	21.0
6	69	12.9	8	10.4	18	11.4	3	15.8
8	53	10.0	7	9.1	9	5.7		
90	27	5.1	10	13.0	5	3.2		
2	13	2.4	4	5.2	2	1.3		
4	8	1.5	2	2.6	2	1.3		
6	5	.9	1	1.3				
8	2	.4	0	.0				
100	1	.2	0	.0				
2			1	1.3				
Average	83.6		84.8		82.3		82.2	
σ	± 4.84		± 5.28		± 4.40		± 3.27	
e	$\pm .21$		$\pm .60$		$\pm .35$		$\pm .75$	
V in %	5.78		6.22		5.35		3.97	
No. of cases	534		77		157		19	

Mixed Indian

Average for 7 men

78.2

3 women

84.0

TABLE LVI.
FACIAL INDEX (ANATOMICAL): GROWTH.

Age	Male						Female									
	Pure Sioux						Half-bloods									
	No.	Aver.	Inc.	σ	e		No.	Aver.	Inc.	σ	e	No.	Aver.	Inc.	σ	e
4	1	75.0					1	76.0				1	80.0			
5	3	73.7	-1.3				2	81.5	5.5			2	79.0	-1.0		
6	6	80.0	-6.3				4	81.2	-3			8	80.9	1.9		
7	4	83.3	3.3				4	78.5	-2.7			11	78.8	-2.1		
8	13	82.2	-1.1	4.72	1.31		7	78.3	.8			7	78.1	-7		
9	13	82.3	.1	3.99	1.11		4	81.5	2.2			11	79.3	1.2		
10	13	81.8	-5	3.39	.94		10	79.2	-2.3	1.12	.35	3	82.6	3.3		
11	11	83.4	1.6	3.85	1.16		2	82.5	3.3			8	79.5	-3.1	4.87	1.72
12	11	83.3	-1	3.38	.87		14	82.4	-1	3.84	1.02	10	79.7	.2	5.12	1.61
13	15	83.3	-1	3.42	.91		12	81.2	-1.2	3.28	1.02	8	83.0	3.3	4.21	1.48
14	14	85.4	2.1	3.87	1.14		18	83.1	1.9	3.63	.85	10	83.5	.5	4.20	1.32
15	15	86.5	1.1	5.87	1.51		8	83.6	.5	2.34	.82	13	81.6	-1.9	4.02	1.11
16	18	87.1	.6	4.84	1.14		10	82.7	-9	3.87	1.22	15	81.4	-2	2.60	.67
17	19	86.1	-1.0	4.70	1.07		18	84.6	1.9	5.79	1.36	12	82.5	1.1	3.86	1.11
18	19	86.7	.6	4.01	.92		12	81.0	-3.6	4.86	1.40	3	80.6	-1.9	3.27	.75
19	21	87.8	1.1	4.54	.99		16	83.9	2.9	5.98	1.50	19	82.2	1.6		
20+	534	83.6	-4.2	4.84	.21	.60	157	82.3	-1.6	4.40	.35	19	82.2	1.6		
60+	54	83.0	-6	5.71	.78		24	81.8	-5	5.36	1.09					

TABLE LVII.
HEIGHT OF NOSE: AVERAGE FOR DIFFERENT OBSERVERS.

Observer	Male				Female			
	Pure Sioux		Half-bloods		Pure Sioux		Half-bloods	
	No.	Average	No.	Average	No.	Average	No.	Average
F. C. Smith	51	55.9	18	54.4	30	53.3	7	51.9
J. W. Cooke	174	57.4	14	55.9	33	55.2	2	52.5
G. A. Kaven	241	59.8	26	56.0	82	56.2	5	53.2
Z. T. Daniels	12	56.8	5	53.0	2	52.5		
F. Boas	34	57.0	8	53.8	3	54.7	2	50.0
C. A. Helvin and F. C. Kenyon	9	54.6	6	52.8	3	54.7	2	47.5
E. F. Wilson	18	58.6			3	51.4		
G. M. West					1	49.0	1	49.0
Total Series	539	58.3	77	54.9	157	55.2	19	51.5

TABLE LVIII.
NOSE HEIGHT: DISTRIBUTION.

Mm.	Male				Female			
	Pure Sioux		Half-bloods		Pure Sioux		Half-bloods	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
46	2	.4			1	.6	1	5.3
8	4	.8	6	7.8	6	3.8	5	26.4
50	11	2.0	11	14.2	18	11.4	5	26.4
2	41	7.6	12	15.6	21	13.4	2	10.6
4	82	15.2	12	15.6	37	23.5	5	26.4
6	97	18.1	18	23.4	32	20.5	0	.0
8	73	13.6	10	13.0	28	17.8	1	5.3
60	121	22.5	6	7.8	12	7.7		
2	54	10.0	2	2.6	2	1.3		
4	38	7.1						
6	12	2.2						
8	1	.2						
70	3	.6						
Average	58.3		54.9		55.2		51.5	
σ	± 3.94		± 3.55		± 3.51		± 2.95	
e	$\pm .17$		$\pm .40$		$\pm .28$		$\pm .68$	
V in %	6.75		6.48		6.35		5.73	
No. of cases	539		77		157		19	

Mixed Indian

Average for 7 men

56.4

3 women

53.7

TABLE LIX.
NOSE HEIGHT: GROWTH.

Age	Male										Female									
	Pure Sioux					Half-bloods					Pure Sioux					Half-bloods				
	No.	Aver.	Inc.	σ	e	No.	Aver.	Inc.	σ	e	No.	Aver.	Inc.	σ	e	No.	Aver.	Inc.	σ	e
	1	40.0				1	37.0				1	39.0				1	47.0			
4	3	37.0	-3.0			4	37.2	.2			2	38.5	-5			2	37.0	-10.0		
5	6	41.5	4.5			5	40.8	3.6			4	43.5	5.0			8	37.5	-5		
6	4	45.0	3.5			2	39.0	-1.8			5	44.0	.5			11	41.1	3.6		
7	13	45.3	.3	3.68	1.02	4	43.0	4.0			7	42.3	-1.7			7	41.0	.0		
8	13	45.6	.3	4.06	1.12	12	44.2	1.2			4	44.5	2.2			11	42.6	1.6		
9	13	45.6	.0	2.23	.61	11	45.7	1.5			10	45.1	.6	3.78	1.19	4	43.8	1.2		
10	11	44.9	-7	2.81	.84	7	47.4	1.7			2	46.0	.9			8	44.6	.8	3.77	1.33
11	15	50.8	5.9	3.51	.91	8	46.1	-1.3			14	47.8	1.8	4.60	1.23	10	46.6	2.0	3.17	1.00
12	14	50.6	-2	2.96	.79	10	49.3	3.2			12	47.0	-8	4.51	1.30	8	46.2	-4	3.46	1.22
13	15	52.2	1.6	3.45	.89	5	54.2	4.9			18	50.6	3.6	4.13	.97	8	49.8	3.6	2.78	.88
14	18	53.8	1.6	4.31	1.01	10	47.5	3.3			8	52.0	1.4	2.83	1.00	10	49.8	3.6	2.78	.88
15	19	54.6	.8	3.56	.81	6	47.0	-5			10	51.8	-2	3.06	.97	13	48.8	-1.0	3.26	.90
16	20	55.8	1.2	3.30	.73	4	49.2	2.2			18	52.0	.2	4.23	.99	15	49.6	.8	3.65	.94
17	21	57.4	1.6	3.33	.72	9	54.1	4.9			11	51.7	-3	3.32	1.00	12	47.9	-1.7	3.64	1.05
18	539	58.3	.9	3.94	.17	77	54.9	.8	3.55	.40	16	52.6	.9	3.38	.84	3	52.0	4.1		
19	55	60.6	2.3	4.22	.57						157	55.2	2.6	3.51	.28	19	51.5	-5	2.95	.68
20+											24	57.3	2.1	3.89	.79					
60+																				

Age and Growth. The curves of growth are rather irregular but bring out quite clearly the sexual differences in this index. The females consistently have lower faces. The general tendency is for this index to increase during the period of growth, indicating a greater increase in height than in width of the face.

NOSE HEIGHT.

Comparability of Results. The same differences are noticeable here that were conspicuous in the anatomical face height. Smith's and Cooke's averages are low and Kaven's average is high throughout.

Sex and Blood. The same differences are found here that we noticed in the measurements of height of the face. The noses of the females are 3.1 mm. shorter on the average among full-bloods and 3.4 mm. shorter among half-bloods. The full-bloods have the higher noses in both sexes. This diameter is very variable. This again is undoubtedly partly due to differences in technique. The full-bloods are more variable in both sexes.

Growth and Age. The sexual and racial differences are clearly brought out in the curves of growth. All four groups show a considerable increase in this diameter during the period from the eighth to the twentieth year.

NOSE WIDTH.

Comparability of Results. There is a very close agreement in the averages of the different observers.

Sex and Blood. The males have the wider noses. The sexual difference is 2.5 mm. for full-bloods and 2.8 mm. for half-bloods. The full-bloods have the wider noses. The half-bloods are less variable as measured by the coefficient of variation, but the distribution is more regular in the case of the full-bloods.

Age and Growth. This diameter does not increase as much as the diameter of height. The full-bloods have the wider noses for almost every year. Sex differences are quite marked after the fourteenth year. The old individuals over 60 years seem to have wider noses. Whether this is accidental or actual is difficult to say. It is possible that a lack of muscle toneness causes an increase in this diameter in old age.

TABLE LX.
WIDTH OF NOSE: AVERAGES FOR DIFFERENT OBSERVERS.

Observer	Male				Female			
	Pure Sioux		Half-bloods		Pure Sioux		Half-bloods	
	No.	Average	No.	Average	No.	Average	No.	Average
F. C. Smith	51	40.3	18	38.8	30	38.5	7	34.6
J. W. Cooke	175	39.5	14	35.1	33	37.7	2	33.0
G. A. Kaven	241	40.3	26	37.9	82	37.1	5	34.6
Z. T. Daniels	12	41.4	5	39.6	2	38.0		
F. Boas	34	38.0	8	36.6	3	36.0	2	35.5
C. A. Helvin and F. C. Kenyon	9	39.3	6	38.0	3	36.7	2	37.5
E. F. Wilson	18	41.0			3	36.7		
G. M. West					1	32.0	1	35.0
Total Series	540	39.9	77	37.6	157	37.4	19	34.8

TABLE LXI.
NOSE WIDTH: DISTRIBUTION.

Mm.	Male				Female			
	Pure Sioux		Half-bloods		Pure Sioux		Half-bloods	
	No.	Average	No.	Average	No.	Average	No.	Average
30			1	1.3				
2	10	1.9	4	5.2	13	8.3	7	36.4
4	33	6.1	15	19.4	27	17.2	4	21.0
6	81	15.0	21	27.3	43	27.5	5	26.3
8	116	21.5	15	19.4	42	26.7	3	15.8
40	151	27.0	13	17.0	20	12.8		
2	73	13.6	6	7.8	8	5.1		
4	47	8.7	1	1.3	2	1.3		
6	20	3.7	1	1.3	1	.6		
8	8	1.5			1	.6		
50	1	.2						
Average	39.9		37.6		37.4		34.8	
σ	± 3.22		± 3.04		± 2.91		± 2.27	
e	$\pm .14$		$\pm .35$		$\pm .23$		$\pm .52$	
V in %	8.07		8.08		7.77		6.52	
No. of cases	540		77		157		19	

Mixed Indian

Average for 7 men

40.6

3 women

36.3

TABLE LXII.
NOSE WIDTH: GROWTH.

Age	Male						Female									
	Pure Sioux						Half-bloods									
	No.	Aver.	Inc.	σ	e		No.	Aver.	Inc.	σ	e	No.	Aver.	Inc.	σ	e
4	1	33.0					1	27.0				1	29.0			
5							2	31.5	4.5			2	28.0	-1.0		
6	3	31.0	-2.0				4	30.2	-1.3			8	29.1	1.1		
7	6	31.5	.5				5	30.4	.2			11	31.2	2.1		
8	4	31.8	.3				6	32.0	1.6			7	20.1	-1.1		
9	13	32.8	1.0	1.87	.51		4	31.0	-1.0			11	31.2	1.1		
10	13	32.8	.0	2.47	.66		10	33.5	2.5	2.06	.65	4	31.2	.0		
11	13	33.4	.6	1.86	.51		2	32.0	-1.5			8	32.6	1.4	1.23	.43
12	11	34.2	.8	2.85	.86		14	33.1	1.1	2.19	.58	10	33.7	1.1	1.73	.54
13	15	36.1	1.9	3.32	.85		12	33.7	.6	1.47	.42	8	34.8	1.1	3.02	1.06
14	14	34.3	-1.8	3.53	.94		18	34.6	.9	2.33	.55	10	34.4	-4	1.80	.56
15	15	37.2	2.9	2.74	.71		8	34.8	.2	2.11	.74	13	35.3	.9	2.43	.67
16	18	37.3	.1	2.26	.53		10	34.4	-4	2.15	.68	15	34.3	-1.0	2.30	.60
17	19	38.0	.7	3.88	.89		18	35.2	.8	1.90	.44	12	33.6	-7	1.70	.48
18	20	36.4	-1.6	1.62	.36		12	35.5	.3	3.07	.88	3	34.6	1.0	2.27	.52
19	21	37.8	1.4	2.92	.63		16	35.6	.1	2.59	.65	19	34.8	.2		
20+	540	39.9	2.1	3.22	.14		157	37.4	1.8	2.91	.23	24	40.2	2.8	2.44	.49
20+	55	43.3	3.4	3.15	.44		24	40.2	2.8	2.44	.49					

NASAL INDEX.

Comparability of Results. The extreme variability of this index, due in part to differences in technique, will not allow us to make any generalizations unless we find very considerable differences in the averages.

TABLE LXIII.

NASAL INDEX: AVERAGE FOR DIFFERENT OBSERVERS.

Observer	Male				Female			
	Pure Sioux		Half-bloods		Pure Sioux		Half-bloods	
	No.	Average	No.	Average	No.	Average	No.	Average
F. C. Smith	51	72.3	18	72.4	30	72.2	7	66.6
J. W. Cooke	171	69.1	14	65.2	33	69.1	2	63.5
G. A. Kaven	241	67.8	26	68.1	82	66.0	5	65.2
Z. T. Daniels	12	72.7	5	75.0	2	72.5		
F. Boas	34	66.9	8	68.2	3	63.7	2	70.5
C. A. Helvin and F. C. Kenyon	9	72.1	6	72.0	3	67.4	2	79.5
E. F. Wilson	18	70.7			3	72.6		
G. M. West					1	65.0	1	71.0
Total Series	536	68.8	77	69.2	157	68.0	19	67.8

Sex and Blood. As stated before, this index is very variable and our small differences are very uncertain. In general all we can say is that females have a slightly narrower nose as measured by the nasal index. All the groups are about equally variable. As in the instance of the face the racial differences seem to lie more in the actual diameters than in their relation to one another. The full-bloods have longer and wider noses than the half-bloods but the index is very similar.

Age and Growth. The excess of increase in height over increase in width causes a marked decrease in this index or a relative narrowing of the nose during the period of growth.

III. CORRELATION OF DIFFERENT MEASUREMENTS.

In order to decrease the amount of work involved in making out correlation tables we have determined the coefficient of correlation by means of the use of the coefficient of variability of two absolute diameters and the index indicating the relationship of these two measurements.

TABLE LXIV.
NASAL INDEX: DISTRIBUTION.

Mm.	Male				Female			
	Pure Sioux		Half-bloods		Pure Sioux		Half-bloods	
	No.	Average	No.	Average	No.	Average	No.	Average
52	3	.6			1	.6		
4	6	1.1			0	.0		
6	13	2.4	2	2.6	4	2.6		
8	14	2.6	4	5.2	11	7.0	1	5.3
60	44	8.2	4	5.2	16	10.2	3	15.8
2	36	6.7	9	11.6	14	8.9	0	.0
4	57	10.6	7	9.1	15	9.6	5	26.4
6	75	14.0	7	9.1	17	10.8	2	10.6
8	65	12.2	10	13.0	15	9.6	1	5.3
70	55	8.4	7	9.1	19	12.0	1	5.3
2	57	10.6	8	10.4	12	7.7	2	10.6
4	33	6.2	1	1.3	13	8.3	1	5.3
6	25	4.7	5	6.5	4	2.6	2	10.6
8	15	2.8	5	6.5	6	3.8	0	.0
80	17	3.2	5	6.5	4	2.6	0	.0
2	11	2.0	1	1.3	2	1.3	1	5.3
4	13	2.4	1	1.3	1	.6		
6	3	.6	1	1.3	3	1.9		
8	2	.4						
90	2	.4						
Average	68.8		69.2		68.0		67.8	
σ	± 7.05		± 7.08		± 7.09		± 6.42	
e	$\pm .30$		$\pm .81$		$\pm .57$		± 1.47	
V in %	10.25		10.23		10.42		9.47	
No. of cases	536		77		157		19	

Mixed Indian

Average for 7 men

72.0

When V_i = the coefficient of variability of a given index, V_a = the coefficient of variability of one dimension and V_b equals the coefficient of variability of the second dimension then

$$V_i^2 = V_a^2 + V_b^2 - 2rV_aV_b$$

$$\text{or } -r = \frac{V_i^2 - V_a^2 - V_b^2}{2(V_aV_b)}$$

TABLE LXV.
NASAL INDEX: GROWTH.

Age	Male						Female													
	Pure Sioux					Half-bloods					Pure Sioux					Half-bloods				
	No.	Aver.	Inc.	σ	e	No.	Aver.	Inc.	σ	e	No.	Aver.	Inc.	σ	e	No.	Aver.	Inc.	σ	e
4	1	82.0				1	86.0				1	69.0				1	62.0			
5						4	80.2	-5.8			2	82.0	13.0			2	72.5	10.5		
6	3	84.3	2.3			6	75.5	-4.7			5	69.6	-1.2			8	78.1	5.6	10.89	3.84
7	6	76.0	-8.3			2	74.0	-1.5			7	75.1	5.5	7.49	2.83	11	76.7	1.4	8.89	2.67
8	5	73.4	-2.6			4	76.5	2.5			4	70.2	-4.9			7	74.3	-2.4	9.11	3.45
9	13	72.8	-6	8.32	2.31	4	75.3	-1.2	7.39	2.22	10	74.7	4.5	6.20	1.96	11	73.9	-4	5.30	1.59
10	13	73.5	.7	8.67	2.40	12	75.3	-1.8	5.93	1.78	3	70.0	-4.7			4	71.5	-2.4		
11	13	73.4	-1	5.40	1.50	11	73.5	-1.8	5.93	1.78	14	69.7	-3	7.17	1.91	8	73.1	1.6	5.67	2.01
12	11	76.2	2.8	6.68	2.01	8	69.0	-4.5	6.40	2.40	13	70.8	1.1	8.30	2.30	10	72.6	-5	6.05	1.91
13	15	71.3	-4.9	6.94	1.79	12	71.7	2.7	7.42	2.11	19	68.6	-2.2	7.26	1.66	8	75.5	2.9	8.82	3.11
14	14	69.1	-2.2	10.37	2.77	12	68.4	-3.3	6.43	1.87	9	65.7	-2.9	4.72	1.57	10	69.3	-6.2	4.54	1.43
15	17	71.4	2.3	6.23	1.51	6	65.0	-3.4			11	66.9	1.2	5.85	1.76	13	72.8	3.5	7.30	2.02
16	17	70.1	-1.3	7.87	1.91	11	73.9	8.9	7.71	2.32	18	68.3	1.4	7.25	1.71	15	70.2	-2.6	6.56	1.69
17	19	69.9	-2	8.10	1.85	6	71.3	-2.6			13	69.2	.9	8.41	2.33	12	69.8	-4	5.14	1.48
18	20	65.4	-4.5	4.92	1.10	4	71.5	2			16	68.3	-9	8.23	2.05	3	66.7	-3.1		
19	21	66.2	.8	6.05	1.32	9	67.4	-4.1	5.56	1.85	157	68.0	-3	7.09	.57	19	67.8	1.1	6.42	1.47
20+	536	68.8	2.6	7.05	.30	77	69.2	1.8	7.08	.81	24	71.0	3.0	7.54	1.54					
60+	55	71.8	3.0	6.58	.88															

Substituting in the above formula we obtained the coefficient of correlation for total stature and sitting height, stature and width of shoulders, stature and arm reach, stature and length of arm, length of head and width of head, width of head and width of face, width and height (anatomical) of face, width and height of nose. The results are listed in Table LXVI.

The highest degree of correlation exists between stature and arm reach. A very high degree of correlation also exists between length of arm and stature and sitting height and stature. The correlation between

TABLE LXVI.

CORRELATIONS.

Measurements	Male				Female			
	Pure Sioux		Half-bloods		Pure Sioux		Half-bloods	
	No.	r	No.	r	No.	r	No.	r
Stature and Sitting Height	536	.61	77	.65	157	.54		
Stature and Width of Shoulder	534	.35	77	.48	157	.43		
Stature and Arm Reach	531	.81	77	.85	157	.83		
Stature and Length of Arm	532	.70	77	.76	157	.67		
Length to Width of Head	538	.27	77	.54	156	.38		
Length to Width of Head ¹			126	.54	243	.31	82	.24
Width of Head and Width of Face	538	.55	77	.51	156	.49		
Width of Head and Width of Face ¹			126	.54	243	.52	82	.68
Height and Width of Face	534	.16	77	.08	157	.31		
Height and Width of Face ¹			126	.13	243	.20	82	.43
Height and Width of Nose	536	.05	77	.02	157	-.08		

stature and width of shoulder is somewhat less. Among the diameters of the head and face we find the highest correlation between the width of the head and the width of the face. There is a fair degree of correlation between width and length of head especially among the half-blood males. The face proportions do not show as high a degree of relationship as those of the head. Practically no correlation exists between the diameters of the nose. In some of the head and face measurements we have

¹In these series the measurements of children have been changed into adult measurements by adding the average yearly increment times the number of years below twenty. Ages 15 to 19 inclusive have been so treated. The purpose was to increase the number of cases. Such procedure has not effected the correlation coefficient to any great extent.

added the proper correction to the measurements of children and considered them as adults. The purpose was to increase the number of cases. Apparently this has not seriously effected the coefficient of correlation since it resulted only in minor changes in the coefficient obtained when dealing with adults only.

As has been previously mentioned practically no correlation exists between stature and the cephalic index among full-blood males.

It had been expected that racial intermixture would effect the correlation of the various proportions of the head and body and that there would be marked differences between the pure Sioux and the half-bloods. On the whole the differences are rather small. Among the half-bloods the coefficients of correlation for stature and sitting height, stature and width of shoulder, stature and arm reach, stature and length of arm, and length and width of head are somewhat larger than the corresponding coefficients among full-bloods. On the other hand the coefficients of correlation for width and height of face, and width and height of nose are somewhat smaller.

It is perhaps significant that the decreased correlation in half-bloods is for the most part confined to those diameters in which the Indians and whites are most widely contrasted. The high degree of uniformity in the relationship of other dimensions would seem to indicate that there were no very marked differences in these proportions in the intermingling groups.

If we subdivide our series of full-bloods into its component bands we get marked differences in the coefficients of correlation of length of head and width of head. The coefficient ranges from $-.09$ to $+.60$. The number of cases in each series is very small and the error correspondingly large.

TABLE LXVII.

CORRELATION OF LENGTH AND WIDTH OF HEAD AMONG TRIBES AND LOCAL GROUPS.

Pure Sioux.

53	Sisseton	$r = .30$
52	Yankton	$r = .44$
72	Yanktonai	$r = .15$
66	Brulé	$r = -.09$
40	Oglala	$r = .32$
30	Blackfoot	$r = .01$
33	Two Kettle	$r = .60$
35	Hunkpapa	$r = .33$
40	Miscellaneous	$r = .12$
538	Total Series	$r = .27$

IV. THE INHERITANCE OF FACE WIDTH.

In view of the fact that the marked difference in face width is one of the most constant and characteristic differences between Indians and whites it seems to be important to study in more detail the behavior of this characteristic in heredity and the condition found in the Indian-white offspring. Up to this point we have considered all our Indian-white individuals as half-bloods. For general averages this course is justified since the one-quarter Indians balance the three-quarter Indians in the series. In order to study the inheritance of face width it seems necessary to distinguish the following degrees of intermixture:—

1. One-fourth Indian = White \times one-half Indian.
2. One-half Indian = White \times full Indian.
3. Two-fourths Indian = One-half Indian \times one-half Indian
(second generation).
4. Three-fourths Indian = One-half Indian \times full Indian.

But since we have only 77 male adults and 19 female adults in our mixed Indian-white series the division into four types would make some of our groups extremely small and of little value. Under these circumstances it seems advisable to reduce our entire series of children to adults and the females to males. Such a procedure will give us adult male series as follows:—

47	One-fourth Indian.
49	Two-fourths Indian.
169	One-half Indian.
63	Three-fourths Indian.
328	Total mixed Indian-white.

In order to convert our series of children into an adult series it is first necessary to smooth the irregular line of growth indicated by our small age groups. For this purpose we have employed the formula for a straight line.

$$o = a + bt =$$

in which $a = [o]$ and $b = \frac{[ot]}{[t^2]}$. All values were weighted by the number

of cases (n).

But the face increases very considerably (nearly 3 cm.) in width during the period of growth covered by our series. It is evident that the rate of growth for each year is not the same and our line of growth is not a straight line but a composite line. For this reason we divided

our series of male children into three groups, the first of which contained the ages 5 to 10, the second ages 11 to 16, and the third ages 17 to 26. Individuals up to the age of 26 were included in the series because the face does not attain the adult proportions until about that time. The average yearly increment (b) for males, ages 5 to 10 years, was found to be 2.0 mm., ages 11 to 16 years, 2.6 mm., ages 17 to 26 years, 0.5 mm.

The series of girls was grouped as follows: ages 5 to 9, 10 to 15, 16 to 26. The average yearly increment for the ages 5 to 9 was found to be 2.5 mm., ages 10 to 15 years was 1.5 mm., and ages 16 to 26 years was 0.5 mm.

Our smoothed rate of growth and correction added to convert to adults follow:—

TABLE LXVIII.
THEORETICAL GROWTH OF FACE IN WIDTH.

Age	Male		Female	
	Face Width mm.	Adult Correction mm.	Face Width mm.	Adult Correction mm.
5	115.7	28.9	114.1	26.3
6	117.7	26.9	116.7	23.7
7	119.7	24.9	119.1	21.3
8	121.7	22.9	121.7	18.7
9	123.7	20.9	124.1	16.3
10	125.7	18.9	126.7	13.7
11	126.5	18.1	128.2	12.2
12	129.1	15.5	129.7	10.7
13	131.7	12.9	131.2	9.2
14	134.3	10.3	132.7	7.7
15	136.9	7.7	134.2	6.2
16	139.5	5.1	135.4	5.0
17	140.1	4.5	135.9	4.5
18	140.6	4.0	136.5	3.9
19	141.1	3.5	137.0	3.4
20	141.6	3.0	137.5	2.9
21	142.2	2.4	138.0	2.4
22	142.6	2.0	138.4	2.0
23	143.2	1.4	138.9	1.5
24	143.6	1.0	139.4	1.0
25	144.2	0.4	139.9	.5
26+	144.6	.0	140.4	.0

TABLE LXIX.

WIDTH OF FACE: INDIAN-WHITE HYBRIDS.

Face Width mm.	1-4 Indian		2-4 Indian		1-2 Indian		2-4+1-2 Indian		3-4 Indian		Total Series	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent
128					1	.6	1	.5			1	.3
130	1	2.1			1	.6	1	.5	1	1.6	3	.9
132	1	2.1			4	2.3	4	1.8	1	1.6	6	1.8
134	0	0			1	.6	1	.5	0	.0	1	.3
136	4	8.5	3	6.1	9	5.3	12	5.5	1	1.6	17	5.2
138	4	8.5	4	8.1	13	7.7	17	7.7	7	1.1	28	8.5
140	6	12.7	5	10.2	22	13.0	27	12.3	4	16.3	37	11.3
142	8	17.0	10	20.4	24	14.2	34	15.6	9	4.3	51	15.5
144	5	10.6	7	14.3	15	8.8	22	10.1	8	12.7	35	10.7
146	4	8.5	4	8.1	31	18.3	35	16.1	12	19.0	51	15.5
148	4	8.5	4	8.1	25	14.9	29	13.3	7	11.1	40	12.2
150	5	10.6	7	14.3	10	6.0	17	7.7	6	9.5	28	8.5
152	3	6.3	1	2.0	6	3.5	7	3.2	3	4.7	13	3.9
154	1	2.1	3	6.1	1	.6	4	1.8	1	1.6	6	1.8
156	0	.0	1	2.0	4	2.3	5	2.3	1	1.6	6	1.8
158	1	2.1			2	1.2	2	.9	2	3.2	5	1.5
No. of Cases	47		49		109		218		63		328	
Average		144.0		144.94		144.37		144.59		145.25		144.49
σ		± 5.88		± 4.99		± 5.31		± 5.18		± 5.43		± 5.37
e		$\pm .86$		$\pm .71$		$\pm .40$		$\pm .34$		$\pm .68$		$\pm .29$

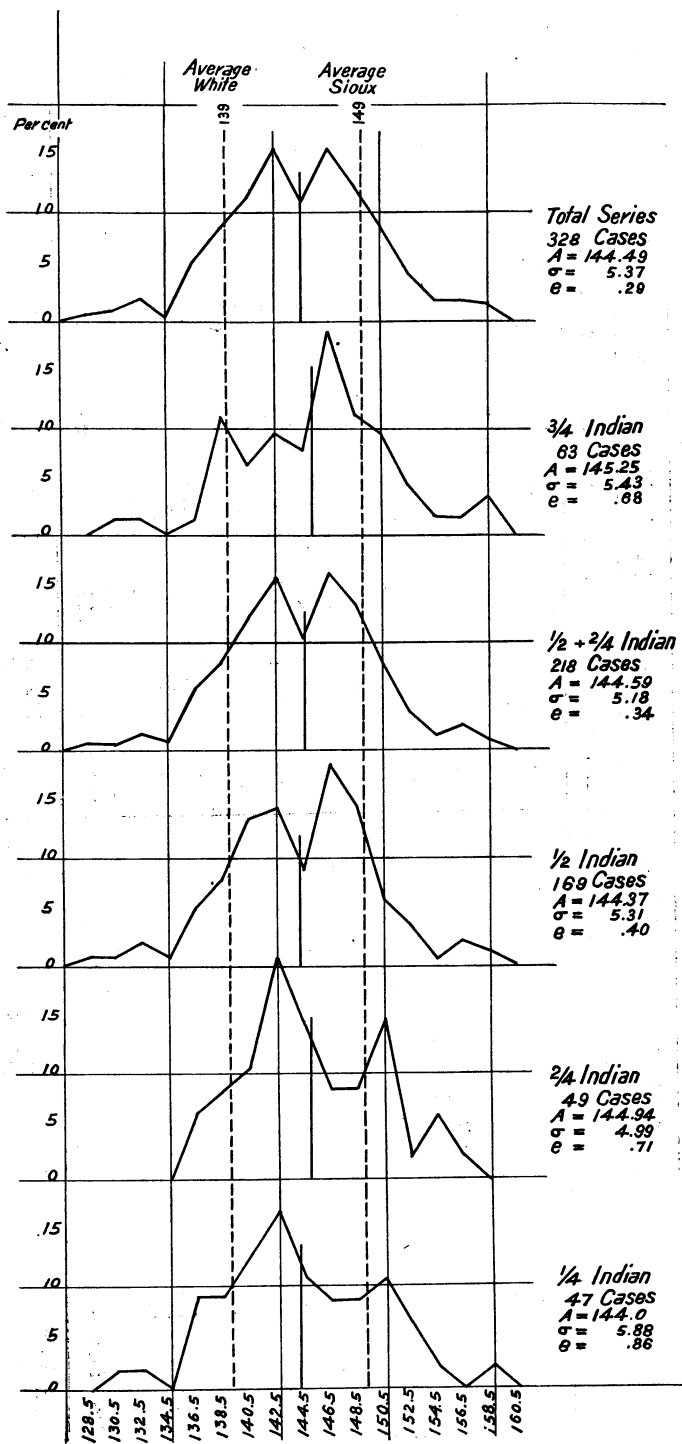


Fig. 1. Width of Face: Indian-White Series.

To each female was added 4.2 mm. to convert it to the male standard. The seriation, averages, and variability of the various groups are shown in Table LXIX and Fig. 1.

The average width of face for the converted series of 328 is slightly higher than the actual average of the 76 male half-bloods in Table XLIII. This difference, however, will not appreciably influence the distribution of this character.

In the table of distribution of face width of 76 adult male half-bloods (Table XLIII and Fig. 6) we noted a bimodal distribution. The average was 143.4 mm., and the modes were 140 and 148 mms. The average width of face of those European peoples with whom these Indians have mixed most (French, Scotch, English, Irish) is approximately 139 mms. In our series of full-blood Indians the average was 149 mms. and the mode 150 mms. While our Indian-white crosses have an average of 144.5 mms., intermediate between the Indian and white, the modes tend toward the averages of the whites and Indians respectively.

When we consider our reconstructed series we find similar results. In the one-fourth Indian the bimodal distribution is not as clear, nevertheless the tendency seems to be to form a major mode of 142 mm., and a minor mode of 150 mm. In the two-fourths Indians the distribution is very similar and the modes are the same as those of the one-fourth Indians. The curve is more clearly bimodal. The series of half-blood Indians has its modes at 142 and 146 mms. If we combine the two-fourths and one-half we get a distinctly bimodal distribution with modes of 142 and 146 mms. In the case of the three-fourths Indians the bimodal distribution is not as certain. The mode and average are very similar. If we re-combine the entire series again we still have a bimodal distribution. In every case except the three-fourths Indians the bimodal distribution is fairly clear. The average in all of these cases falls at a point of low frequency. From this it would seem that we are justified in concluding that face width is inherited in such a manner that either the Indian or white type of face is inherited. There is no tendency to form an intermediate type and in fact the intermediate type of face is of rare occurrence.

We have also noticed that the ratio of face width to head width was considerably different in full-bloods and half-bloods. The full-bloods had absolutely and relatively much wider faces than the half-bloods. However, the distribution of this ratio, expressed by the cephalo-facial index in Table XLVI and Fig. 7, was fairly symmetrical. This can be explained only by the fact that there is a fairly high degree of

TABLE LXX.
AVERAGE WIDTH OF HEAD ASSOCIATED WITH A GIVEN WIDTH OF FACE.

Width of Face	1-4 Indian		2-4 Indian		1-2 Indian		2-4+1-2 Indian		3-4 Indian		Total Series	
	No. of Cases	Average Width of Head	No. of Cases	Average Width of Head	No. of Cases	Average Width of Head	No. of Cases	Average Width of Head	No. of Cases	Average Width of Head	No. of Cases	Average Width of Head
128					1	146.5	1	146.5			1	146.5
130	1	150.5			1	150.5	1	150.5	1	140.5	3	147.1
132	1	156.5			3	141.8	3	141.8	1	146.5	5	145.7
134					1	146.5	1	146.5			1	146.5
136	4	153.0	3	148.5	9	151.8	12	151.0	1	146.5	17	151.2
138	4	151.5	4	153.0	13	151.6	17	151.9	7	149.1	28	151.4
140	6	151.5	5	152.1	22	151.5	27	151.6	4	153.5	37	151.8
142	8	157.3	10	151.5	24	152.9	34	152.5	9	154.1	51	153.5
144	5	153.5	7	152.5	15	154.1	22	153.6	8	154.7	35	153.8
146	4	153.5	4	154.0	31	153.5	35	153.5	12	155.3	51	153.9
148	4	157.5	4	154.5	25	158.1	29	156.6	7	155.9	40	156.5
150	5	157.7	7	157.5	10	158.9	17	158.5	6	157.8	28	158.1
152	3	161.8	1	158.5	6	159.5	7	159.4	3	158.5	13	159.7
154	1	156.5	3	158.5	1	154.5	4	156.5	1	160.5	6	157.8
156	1	156.5	1	164.5	4	159.0	5	160.1	1	152.5	7	158.5
158					2	163.5	2	162.5	2	159.5	4	161.5
Total Cases	47		49		168		217		63		327	
Average Width of Head		155.1		153.8		153.9		153.9		154.5		154.2
Average Width of Face		144.0		145.1		144.5		144.6		145.3		144.6

correlation between width of head and width of face which is not disturbed by intermixture. That some such relationship exists may be seen by obtaining the average width of head¹ for a given width of face. This has been done in Table LXX. In spite of the small number of cases we get a rather regular progression of head width with an increase in face width.

This relationship may be more accurately expressed by means of the coefficients of correlation and coefficients of regression. These are given in Table LXXI. It will be seen that there is a fairly high degree of correlation (.55) in the full Indians. This correlation seems on the whole to be increased in the mixed-bloods.

TABLE LXXI.

FACE WIDTH AND HEAD WIDTH: CORRELATION AND REGRESSION.

	1-4 Indian	2-4 Indian	1-2 Indian	2-4+ 1-2 Indian	3-4 Indian	Total Indian White	Full Indian
Number of cases	47	49	168	217	63	327	536
Coefficient of Correlation (r)	.53	.58	.60	.59	.72	.58	.55
Regression of Width of Face on Width of Head (px)	.78	.58	.65	.64	.86	.66	.54
Regression of Width of Head on Width of Face (py)	.36	.58	.55	.55	.60	.51	.56

By means of the coefficient of regression we can determine the average width of face for a given width of head in our series. These averages are listed in Table LXXII.

From this and the preceding tables it seems that those individuals with a narrow head tend to inherit the European type of face while those with wide heads tend to inherit the Indian type of face. A similar tendency was demonstrated by Professor Boas² in a much larger series.

We can test this conclusion further by reducing the width of face of the entire series to the standard of the average width of head. This can be done by use of the coefficient of regression. Suppose, for example, that the coefficient of regression of width of face on width of head is 0.7

¹Head width was also converted to the adult male standard.

²Boas, 1895. (The present series was included in 1895 series).

TABLE LXXII.
AVERAGE WIDTH OF FACE ASSOCIATED WITH A GIVEN WIDTH OF HEAD.

	1-4 Indian	2-4 Indian	1-2 Indian	1-2 +3-4 Indian	3-4 Indian	Total Mixed Bloods	Full Indian
Coefficient of Regression	.78	.58	.65	.64	.86	.66	.54
Width of Head							
138	130.76	135.94	134.16	134.42	131.20	133.91	139.87
9	131.54	136.52	134.81	135.66	132.06	134.57	140.41
140	132.32	137.10	135.46	135.70	132.92	135.23	140.95
1	133.10	137.68	136.11	136.34	133.78	135.89	141.49
2	133.88	138.26	136.76	136.98	134.64	136.55	142.03
3	134.66	138.84	137.41	137.62	135.50	137.21	142.57
4	135.44	139.42	138.06	138.26	136.36	137.87	143.11
5	136.22	140.00	138.71	138.90	137.22	138.53	143.65
6	136.90	140.58	139.36	139.54	138.08	139.19	144.19
7	137.68	141.16	140.01	140.18	138.94	139.85	144.73
8	138.46	141.74	140.66	140.82	139.80	140.51	145.27
9	139.24	142.32	141.31	141.46	140.66	141.17	145.81
150	140.02	142.90	141.96	142.10	141.52	141.83	146.35
1	140.80	143.48	142.61	142.74	142.38	142.49	146.89
2	141.58	144.06	143.26	143.38	143.24	143.15	147.43
3	142.36	144.64	143.92	144.02	144.10	143.81	147.97
4	143.14	145.22	144.56	144.66	144.96	144.47	148.51
5	143.92	145.80	145.22	145.30	145.82	145.13	149.05
6	144.70	146.38	145.87	145.94	146.68	145.79	149.59
7	145.48	146.96	146.52	146.58	147.54	146.45	150.13
8	146.26	147.54	147.17	147.22	148.40	147.11	150.67
9	147.04	148.12	147.82	147.86	149.26	147.77	151.21
160	147.82	148.70	148.47	148.50	150.12	148.43	151.75
1	148.60	149.28	149.12	149.14	150.98	149.09	152.29
2	149.38	149.86	149.77	149.78	151.84	149.75	152.83
3	150.16	150.49	150.42	150.42	152.70	150.45	153.37
4	150.94	151.02	151.07	151.06	153.56	151.11	153.91
5	151.72	151.60	152.72	151.70	154.42	151.77	154.45
6	152.50	152.18	153.37	152.34	155.28	152.43	154.99
7	153.28	152.76	154.02	152.98	156.14	153.09	155.53

and the average width of head for a series is 154 mm. A given individual "A" has a head width of 158 mm. and a face width of 148 mm. The head width has diverged from the average of the series 4 mm. Our coefficient of regression indicates that on the average the width of face diverges from the average 0.7 of a unit for every unit of change in head width. Consequently we may assume that "A," who has diverged

TABLE LXXIII.

WIDTH OF FACE REDUCED TO THE STANDARD OF THE AVERAGE WIDTH OF HEAD
REDUCED SERIES COMPARED TO ORIGINAL SERIES IN ()

Mm.	Cases	Percent
128		
9	(1)	(.3)
130	2 (2)	.6 (.6)
1	1 (1)	.3 (.3)
2	1 (2)	.3 (.6)
3	1 (4)	.3 (1.2)
4	1 (0)	.3 (.0)
5	2 (1)	.6 (.3)
6	5 (4)	1.5 (1.2)
7	5 (13)	1.5 (3.9)
8	8 (15)	2.4 (4.6)
9	10 (13)	3.0 (3.9)
140	14 (18)	4.2 (5.5)
1	22 (19)	6.7 (5.8)
2	32 (28)	9.8 (8.5)
3	27 (23)	8.2 (7.0)
4	32 (15)	9.8 (4.5)
5	24 (20)	7.3 (6.1)
6	26 (30)	8.0 (9.1)
7	35 (21)	10.7 (6.4)
8	35 (27)	10.7 (8.2)
8	16 (13)	4.8 (3.9)
150	9 (15)	2.7 (4.6)
1	5 (13)	1.5 (3.9)
2	1 (10)	.3 (3.0)
3	6 (3)	1.8 (.9)
4	4 (5)	1.2 (1.5)
5	2 (1)	.6 (.3)
6	1 (6)	.3 (1.8)
7	1 (0)	.3 (.0)
8	(5)	(1.5)
Totals	328 (328)	99.7 (99.4)
Average	144.5	(144.5)
σ	± 4.34	(± 5.37)
	$\pm .24$	(e .29)

4 mm. from the average in head width has also diverged $.7 \times 4$ or 2.8 mm. in face width. By subtracting 2.8 mm. from 148 mm. we reduce "A's" face width to the standard of the average width of head. In case of a minus deviation the correction would be added.

If our assumption that individuals with a narrow head inherit a narrow face and those with a wide head inherit a wide face is true we shall expect our bimodal distribution to persist. If, on the other hand, our bimodal distribution is accidental the reduction to the standard of average width of head should give us a normal distribution. The results of such procedure are given in Table LXIII and Fig. 2.

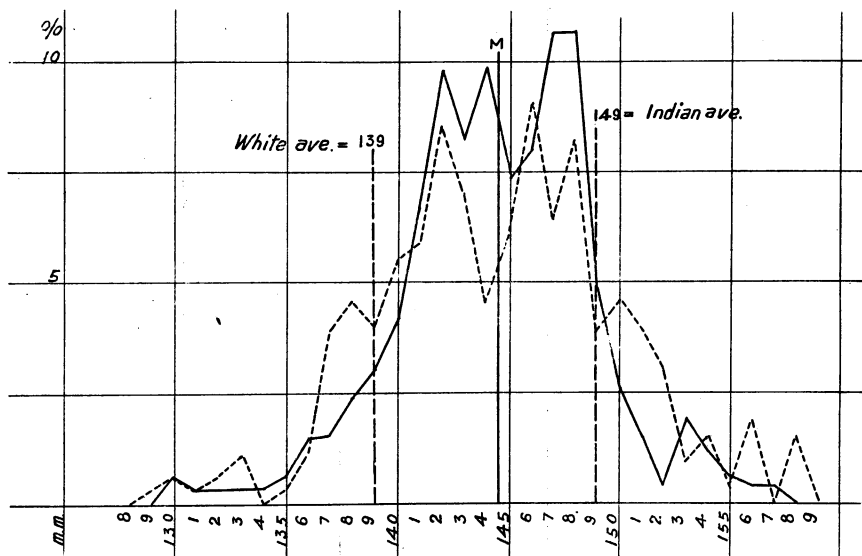


Fig. 2. Distribution of Face Width in Reduced Series compared to Distribution in Original Series.
 ————— Reduced Series. Original Series.

The results have been to produce a series much less variable in face width. Many of the extreme cases have been eliminated. Although not quite as marked, our bimodal distribution with modes at 142-4 and 147-8 and a low frequency at the average 144-6 persist. It seems safe then to conclude that the distribution is bimodal and that a very definite correlation exists between width of face and width of head. This correlation is increased by intermixture. There is little or no disharmonic heredity in these two characters. Much has been made of misfit anatomical structures due to the crossing of widely different races. This is one instance at least in which the harmonic relationship between two characters is retained in the hybrid offspring.

V. CONCLUSIONS.

TABLE LXXIV.

SUMMARY OF ANTHROPOMETRIC RESULTS.
(Ages 20-59)

	Male		Female	
	Pure Sioux	Half-bloods	Pure Sioux	Half-bloods
No. of cases	540	77	157	24
Stature	172.4	173.5	160.0	161.2
σ \pm	5.64	6.81	5.29	5.79
Shoulder Height	142.7	142.3	132.5	133.2
σ \pm	5.03	6.07	4.89	5.23
Shoulder Width	38.8	38.9	35.5	35.4
σ \pm	1.92	1.89	2.09	2.21
Index of Shoulder Width	22.5	22.4	22.4	21.9
σ \pm	1.10	1.01	1.20	1.35
Sitting Height	88.5	89.6	82.1	83.0
σ \pm	3.50	4.39	3.49	4.91
Index of Sitting Height	51.4	51.6	51.4	51.4
σ \pm	1.68	1.94	1.90	2.75
Arm Reach	181.4	182.2	168.3	167.4
σ \pm	7.03	6.99	6.43	6.79
Index of Arm Reach	105.2	105.0	105.3	103.8
σ \pm	2.41	2.19	2.32	1.75
Arm Length	77.0	77.3	71.8	71.0
σ \pm	3.57	3.28	2.63	3.59
Index of Arm Length	44.6	44.6	44.9	44.1
σ \pm	1.47	1.26	1.68	1.29
Head Length	194.9	194.4	187.0	187.3
σ \pm	6.16	7.12	5.09	4.17
Head Width	155.1	154.3	150.9	150.3
σ \pm	5.39	5.04	4.83	4.50
Cephalic Index	79.6	79.4	80.5	80.5
σ \pm	3.20	2.64	2.68	2.85
Face Width	149.1	143.4	142.8	139.3
σ \pm	5.45	5.49	5.05	3.70
Cephalo-Facial Index	96.1	92.9	94.7	92.5
σ \pm	3.22	3.23	3.22	1.88
Height of Face Physiognomic	189.9	186.4	179.4	173.6
σ \pm	8.32	7.27	8.12	5.65
Height of Face: Anatomic	124.6	121.5	117.4	114.1
σ \pm	6.39	6.36	6.18	4.12
Facial Index: Anatomic	83.6	84.8	82.3	82.2
σ \pm	4.84	5.28	4.40	3.27
Nose Height	58.3	54.9	55.2	51.5
σ \pm	3.94	3.55	3.51	2.95
Nose Width	39.9	37.6	37.4	34.8
σ \pm	3.22	3.04	2.91	2.27
Nasal Index	68.8	69.2	68.0	67.8
σ \pm	7.05	7.08	7.09	6.42

We have seen that the seventeen local groups of Sioux Indians here described may be justly included in a single series since they show no marked differences in the descriptive or anthropometric characters recorded. In spite of the fact that it is impossible to segregate the different elements they are on the whole a rather variable group in all characters, due in most instances to a number of very extreme cases rather than to irregular distribution within the curve proper. The variability in most characters approaches very closely the variability of some of our more civilized national groups.

Again this investigation brings out the fact that we cannot rely wholly on the coefficient of variability as an index of homogeneity of type. When a given character is very similar for two groups the one which is racially more pure may show a higher degree of variability than the one which is the more heterogeneous. On the whole the seriation tables and curves of distribution bring out the differences between two groups more clearly. In our present investigation we found the half-bloods more variable than the full-bloods in stature, shoulder height, sitting height, absolute and relative, head length, face width, cephalofacial index, facial index, and nasal index. In the remaining twelve of the twenty-one observations recorded the full-bloods are slightly more variable. In a greater number of observations, however, the distribution among the half-bloods was more irregular.

In our correlations we found the closest relationships to exist between diameters in the same axis such as stature and arm reach, stature and arm length, stature and sitting height, and width of head and width of face. A fair degree of correlation exists between gross diameters in opposite axes such as stature and width of shoulder. Other diameters in different axes such as length and width of head, height and width of face and height and width of nose show a lower degree of correlation. The differences in the degree of correlation of two diameters in full-bloods and half-bloods are not very great. On the whole it does not seem as if intermixture has seriously affected the degree of correlation between the various diameters. In the instance of face width and head width the correlation seems to be increased by intermixture. We found that individuals with a narrow head had a strong tendency to inherit the European type of face while those with a wide head had a tendency to inherit the Indian type of face. The greatest difference is in the correlation between length and width of head. The coefficient among half-bloods is twice that of the full-bloods. On the other hand, however, we found a lowered degree of correlation in half-bloods in those diameters

which differed most widely in Indians and whites. Face width is the exception.

In regard to such characters as skin color, hair color, eye color, and hair form it seems that the half-bloods approach the Indian more closely than they do the whites. In regard to the amount of hair on the face (beard and moustache) the half-bloods seem to stand intermediate between Indians and whites.

The anthropometric characters bring out two points of interest. First, that in general body form and proportions these Indians are not very different from the whites with whom they have mixed. There are practically no differences between the full-bloods and half-bloods in absolute or relative shoulder height, shoulder width, sitting height, arm length, arm reach and very small differences in cephalic, facial, and nasal indices.

Second, by far the most noticeable and consistent differences are differences in absolute size. The half-bloods are taller than the full-bloods in the case of both males and females, children and adults. On the other hand, the full-bloods have the more massive heads, faces, and noses. While the relation of the diameters of these parts as expressed by indices are very much alike the absolute diameters are different. The most marked difference is in the width of the face.¹ The full-bloods have a much wider face than the half-bloods or whites. At the same time the face is higher both in respect to total height or in respect to any of its component parts. The area of the face in full-bloods is considerably greater than that of half-bloods or whites. Also the full-bloods have the longer and wider heads and the higher and wider noses. The relation of the transverse diameter of the face to the transverse diameter of the head is also very different. The width of the face more nearly approaches the width of the head among full-bloods.¹ At the same time, in so far as our comparative data will allow us to judge, it seems that in those characters in which the Indian differs most markedly from whites the half-bloods stand more closely to the Indians than to the whites.

In regard to growth our data are too scanty for generalizations. The absolute dimensions and a majority of the indices increase with age. The cephalic index decreases slightly and the nasal index decreases markedly with age. The height sitting and shoulder width indices

¹Compare also Jenks, 1916.

decrease until the period of rapid growth after which there is a slight increase. The index of arm reach shows a slight decrease until the period of rapid growth during and after which there is a rapid increase.

In conclusion some statement as to the relationship of the Sioux Indians to other North American Indians seems desirable. Detailed measurements on nearby tribes are scarce. The following data however are available for adult male full-bloods:—

	Sioux	Chippewa (Hrdlicka)	Shoshoni (Boas)	Pima (Ten Kate)	Maricopa (Ten Kate)
No. of Cases	540		109	77	29
Stature	1724.1	1719.0	1661.0	1696.0	1722.0
Index of Height Sitting	51.4			50.8	50.9
Index of Arm Reach	105.2			103.9	104.7
Index of Arm Length	44.6			43.5	43.7
Cephalic Index	79.6	79.6	79.5	78.7	82.9
Facial Index	83.6	83.7	80.5	86.8	87.4
Nasal Index	68.8	75.5	83.1	81.7	85.2
Cephalo-Facial Index	96.1				
Head Length	194.9	199.0	192.3	190.0	188.8
Head Width	155.1	158.0	152.8	150.0	156.3
Face Width	149.1	151.5	147.5	146.2	149.7
Face Height	124.6	124.5	118.7	127.5	129.9
Nasal Height	58.3	56.5	52.2	48.8	49.0
Nasal Width	39.9	42.8	43.4	39.0	41.4

Of these groups the Chippewa (Ojibway) of Hrdlicka shows the greatest similarity. In nearly every measurement and index the averages are in very close agreement. There can be no doubt that these two groups are very closely related.

In so far as we can judge from stature and head form the Sioux are uniform in physical type with a majority of the Plains tribes and possibly also with some other nearby groups. The relationship of the Sioux to the Blackfoot, Cheyenne, Arapaho, Crow, Pawnee, Kutenai, Ojibway, Chippewa, Micmac, Abnaki, Delaware, Iroquois, Ottawa, and Menomini is suggested by these averages. In the case of the Blackfoot, Cheyenne, Arapaho, Crow, Pawnee, Kutenai, Ojibway, and Chippewa the relationship is also indicated by their physiognomy. The form of the nose and profile is very similar. Only slightly more divergent are the Omaha, Kiowa, and Arikara. However, it is useless to establish physical types on such meager details.

The following data are available on stature and head form:—

Cephalic Index

Stature in Centimeters	79	80	81	82
	175	Cheyenne		
	174			Creek
	173	Arapaho Oneida Iroquois	Crow	Omaha
	172	Sioux, Blackfoot, Chip- pewa, Micmac, Ab- naki, Delaware		Eastern Ojibway
	171	Western Ojibway, Pawnee		Kiowa Western Cherokee
	170	Pima	Ottawa Menomini	Choctaw Papago
	169	Kutenai		Arikara
	168	Cree		Eastern Cherokee Chickasaw
	167			
	166	Shoshoni Ute		

We may conclude by saying that the Sioux are among the very tallest of the American Indians among whom we find the average stature ranging from the 153 centimeters of the Guaranis of South America to the 175 centimeters of the Maricopa and Cheyenne. The Sioux are exceeded in stature only by these two latter tribes, the Bororo of South America, the Creek of the Southeastern United States, the Tlingit, Winnebago, Iroquois, and a few closely related Plains groups, the Arapaho, Omaha, and Crow. In head form they are mesocephalic, which characteristic they share with a large number of North and South American groups, among which are a majority of the tribes of the Plains, the Eastern Woodlands, Mackenzie area and a number of tribes in Southern California, and the Southwestern United States.

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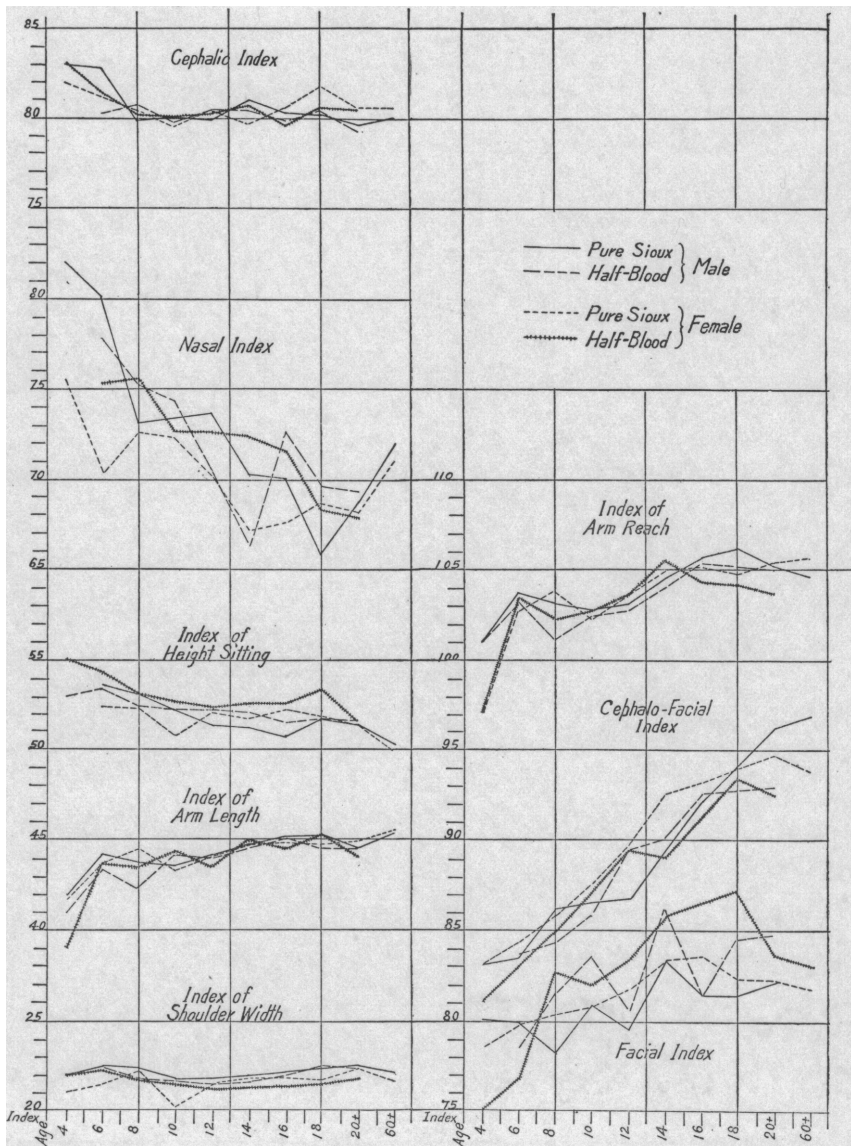


Fig. 3. Growth: Indices.

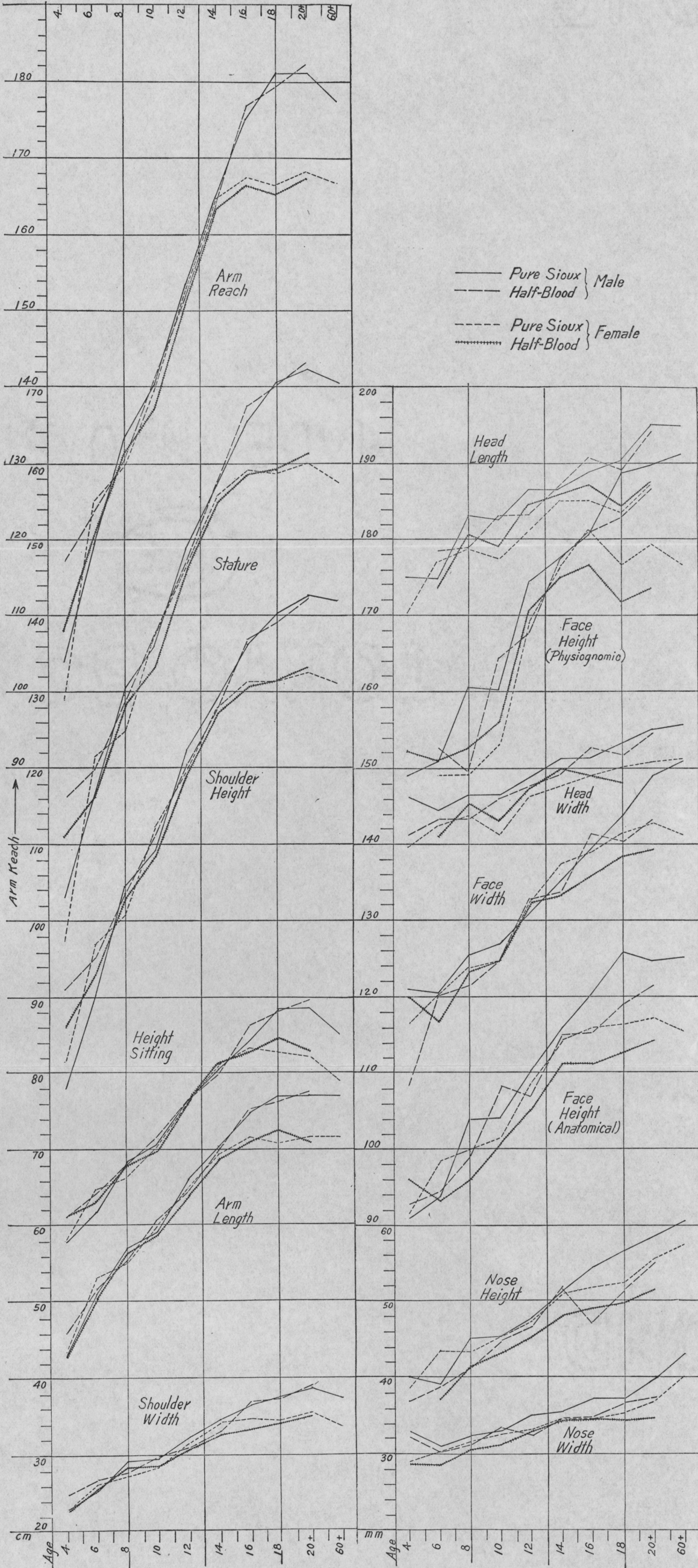


Fig. 4. Growth: Absolute Dimensions.

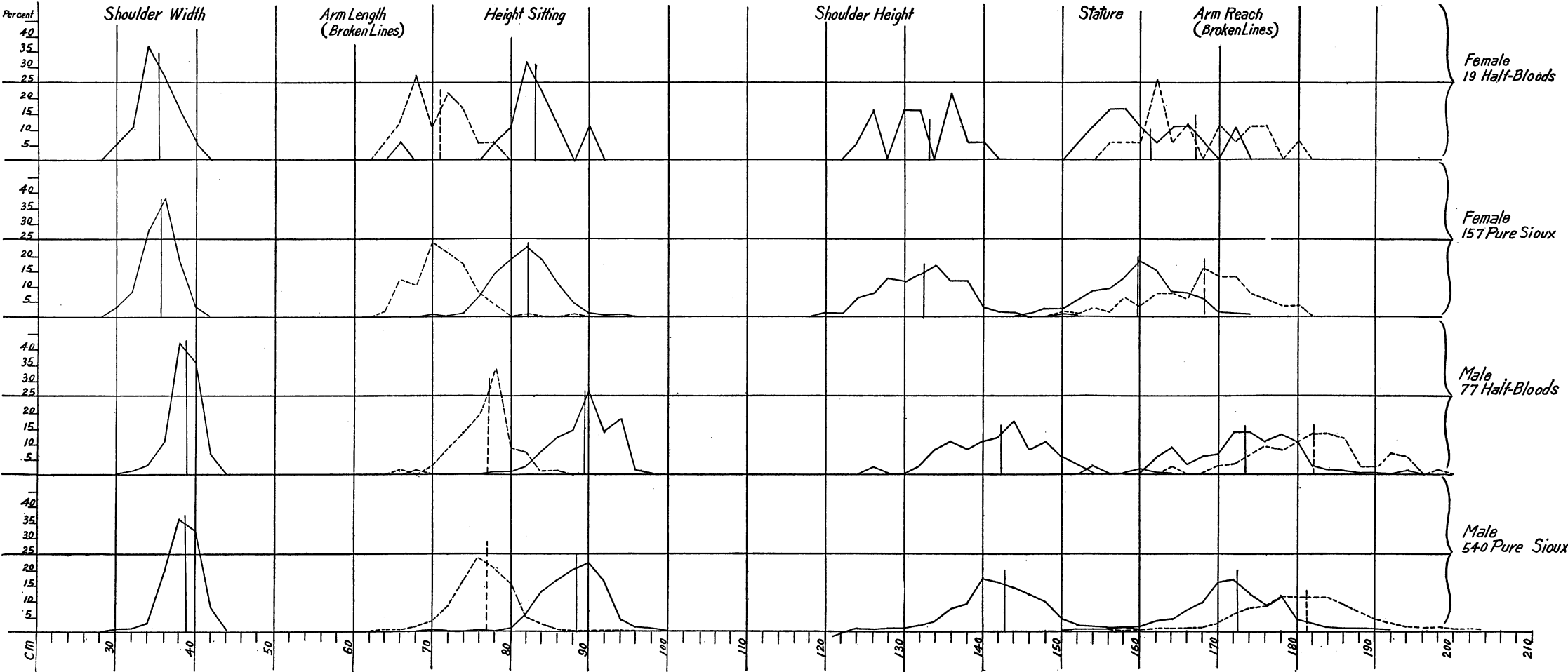


Fig. 5. Graphic Distribution of Absolute Body Measurements.

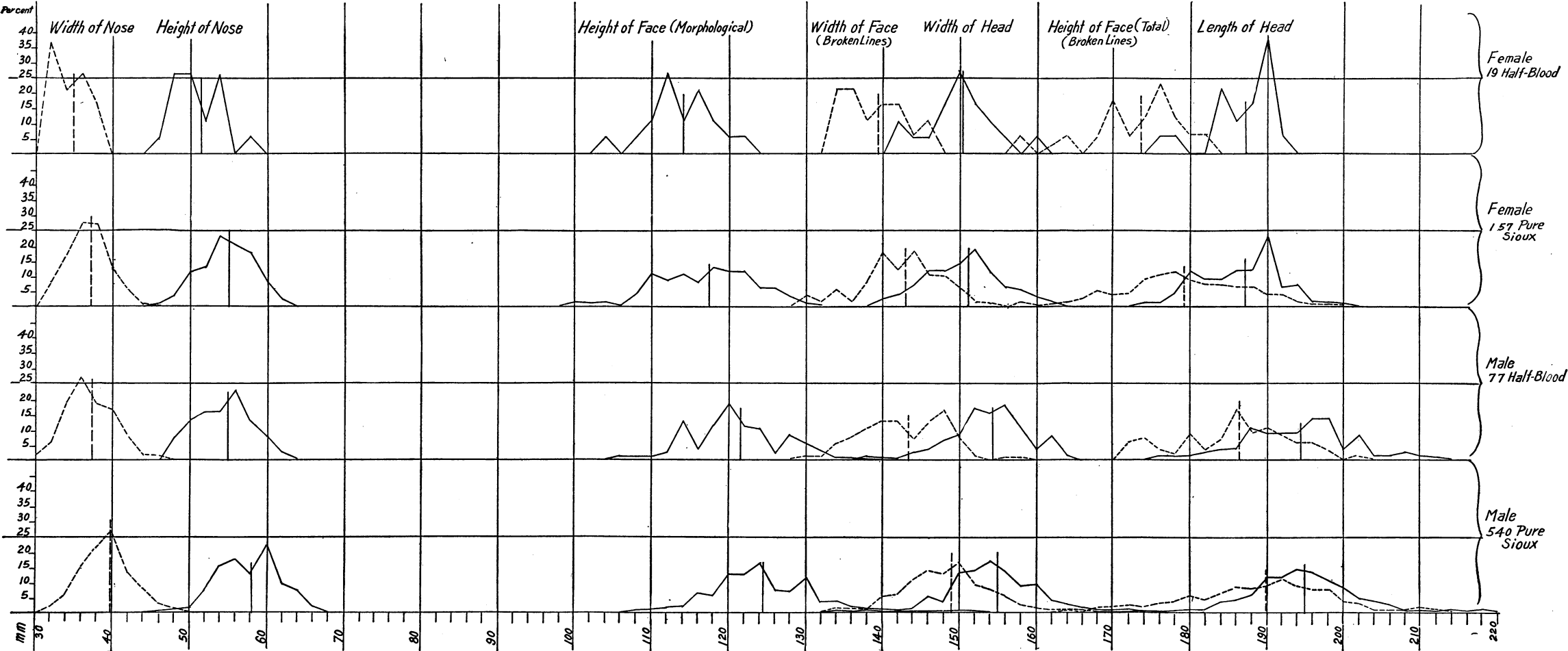


Fig. 6. Graphic Distribution of Absolute Head and Face Measurements.

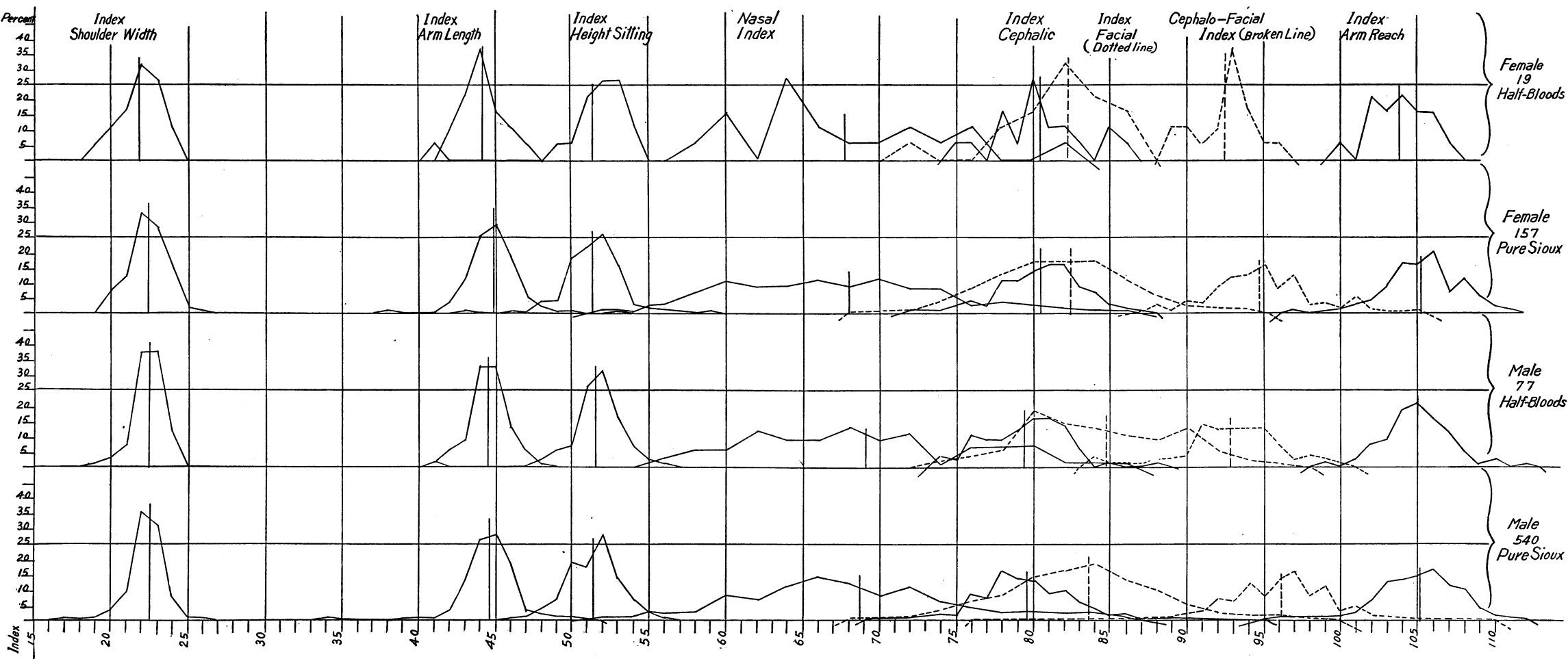


Fig. 7. Graphic Distribution of Indices.

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