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THE HALF-BLOOD INDIAN.

AN ANTHROPOMETRIC STUDY.

By FRANZ BOAS.*

THERE are few countries in which the effects of intermixture of races and of change of environment upon the physical characteristics of man can be studied as advantageously as in America, where a process of slow amalgamation between three distinct races is taking place. Migration and intermarriage have been a fruitful source of intermixture in the Old World, and have had the effect of effacing strong contrasts in adjoining countries. While the contrasts between European, negro, and Mongol are striking, their territories are connected by broad stretches of land which are occupied by intermediate types. For this reason there are only few places in the Old World in which the component elements of a mixed race can be traced to their sources by historical methods. In America, on the other hand, we have a native race which, although far from being uniform in itself, offers a marked contrast to all other races. Its affiliations are closest toward the races of Eastern Asia, remotest to the European and negro races. Extensive intermixture with these foreign races has commenced in recent times. Furthermore, the European and African have been transferred to new surroundings on this continent, and have produced a numerous hybrid race, the history of which can also be traced with considerable accuracy. We find, therefore, two races in new surroundings and three hybrid races which offer a promising subject for investigation: the Indian-white, the Indian-negro, and the negro-white. The

* The material for this study was collected for the Department of Ethnology of the World's Columbian Exposition. Prof. F. W. Putnam, chief of the department, organized a Section of Physical Anthropology, in charge of the writer. It was one of the objects of this section to collect anthropometric material illustrating the racial characteristics of the North American Indians.

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following study is devoted to a comparison of the Indian race with the Indian-white hybrid race.

It is generally supposed that hybrid races show a decrease in fertility, and are therefore not likely to survive. This view is not borne out by statistics of the number of children of Indian

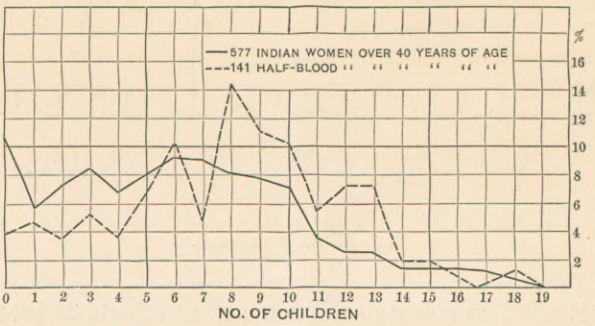

FIG. 1.—NUMBER OF CHILDREN OF INDIAN WOMEN AND OF HALF-BLOOD WOMEN.

women and of half-blood women. The average number of children of five hundred and seventy-seven Indian women and of one hundred and forty-one half-blood women more than forty years old is 5·9 children for the former and 7·9 children for the latter. It is instructive to compare the number of children for each woman in the two groups. While about ten per cent of the Indian women have no children, only 3·5 per cent of the half bloods are childless. The proportionate number of half bloods who have one, two, three, four, or five children is smaller than the corresponding number of Indian women, while many more half-blood women than full-blood women have had from six to thirteen children. This distribution is shown clearly in Fig. 1, which represents how many among each one hundred women have a certain number of children. The facts disclosed by this tabulation show that the mixed race is more fertile than the pure stock. This can not be explained by a difference of social environment, as both groups live practically under the same conditions. It also appears that the small increase of the Indian population is almost entirely due to a high infant mortality, as under better hygienic surroundings an average of nearly six children would result in a rapid increase. It is true, however, that a decrease of infant mortality might result in a decreased birth rate.

Among the Indians of the Pacific coast the infant mortality is also very great, but we find at the same time a still larger proportion of women who bear no children.

It is of some interest to note the average number of children of women of different ages as indicating the growth of families. Among the Indians there is an average interval of four years and

a half—as shown in the following table—which, however, must not be confounded with an average interval between births:

Indian women 20 years of age have on the average							1	child.
"	"	25	"	"	"	"	2	children.
"	"	28	"	"	"	"	3	"
"	"	33	"	"	"	"	4	"
"	"	38	"	"	"	"	5	"

Among the half bloods the interval is shorter, but the number of available observations is insufficient for carrying out the comparison in detail.

The statures of Indians and half bloods show differences which are also in favor of the half bloods. The latter are almost

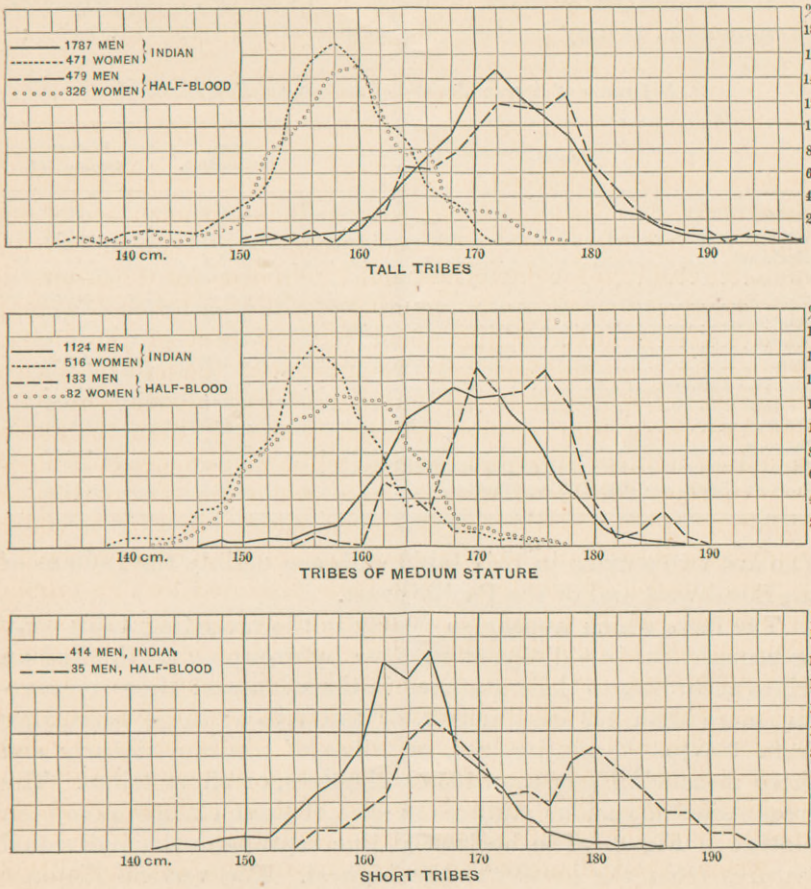

FIG. 2.—STATURES OF INDIANS AND OF HALF BLOODS.

invariably taller than the former, the difference being more pronounced among men than among women. The white parents of the mixed race are mostly of French extraction, and their statures

are on an average shorter than those of the Indians. We find, therefore, the rather unexpected result that the offspring exceeds both parental forms in size. This curious phenomenon shows that size is not inherited in such a manner that the size of the descendant is intermediate between those of the parents, but that size is inherited according to more intricate laws.

From investigations carried on among whites we know that stature increases under more favorable surroundings. As there is no appreciable difference between the social or geographical surroundings of the Indians and of the half bloods, it seems to follow that the intermixture has a favorable effect upon the race.

The difference in favor of the half blood is a most persistent phenomenon, as may be seen by a glance at the following table:

Differences of Average Statures of Indians and Half Bloods.

Tribes.	Men, centimetres.	Women, centimetres.
Eastern Ojibwa	−0·1	0·0
Omaha	0·0	−0·7
Blackfeet	+0·1	.....
Micmac	+0·6	−0·2
Sioux	+1·0	+0·9
Delaware	+1·6	+0·4
Ottawa	+1·7	+0 4
Cree	+2·0	+2·8
Eastern Cherokee	+3·2	.....
Western Ojibwa	+3·2	+0·7
Chickasaw	+4·5	.....
Choctaw	+7·0	.....
Tribes of medium stature (165 to 169 centimetres)	+3·3	+2·5
Shortest tribes (less than 165 centimetres)	+8·3	+14·8

The last two entries in this table embrace mainly the Indians of the Southwest and of the Pacific coast.

The facts which appear so clearly in the preceding table may be brought out in a different manner by grouping all the Indian tribes according to their statures in three classes: those measuring more than 169 centimetres, or tall tribes; those measuring from 165 to 169 centimetres, or tribes of medium stature; and those measuring less than 165 centimetres, or short tribes. The frequencies of various statures in each of these classes have been plotted in Fig. 2. The horizontal line represents the individual statures from the lowest to the highest. The vertical distance of the curves from any point of the horizontal line shows how many among each one hundred individuals have the stature represented by that particular point. Thus it will be seen that 14·4 per cent of the full-blood men of the tallest class have a stature of 172 centimetres, while only 12·3 per cent of the half blood of

the same class have the most frequent stature belonging to them —namely, 178 centimetres. Among the Indian women of the full-blood tribes 16·8 per cent have a stature of 158 centimetres, while only 14·4 per cent of the half bloods have their most frequent stature—namely, 160 centimetres.

This tabulation brings out the peculiarity that the statures of

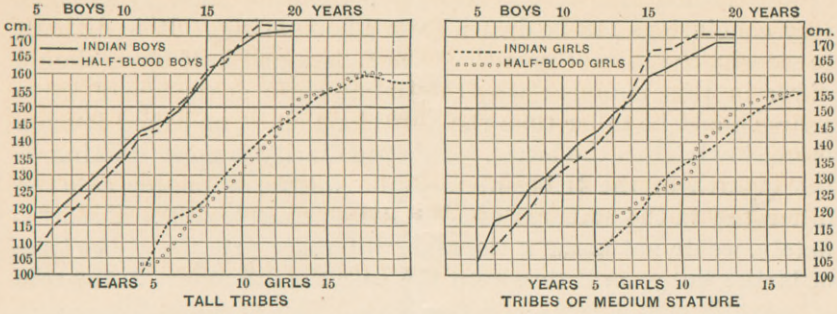

FIG. 3.—GROWTH OF INDIAN AND HALF-BLOOD CHILDREN.

the half bloods are throughout higher than those of the full bloods; and that, at the same time, the most frequent statures are more frequent among the pure race than in the mixed race. This is expressed by the fact that the curves illustrating the distribution of statures among the half bloods are flatter than those illustrating the same feature among full bloods. This peculiarity may be noticed in all the curves of Fig. 2, with the exception of that of the men of the second group.

The statures near the average of each group are most frequent and as these values do not occur as often among the half bloods as among the full bloods, the values which are remote from the

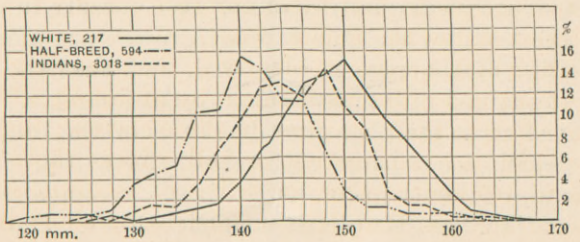

FIG. 4.—BREADTH OF FACE OF INDIANS, HALF BLOODS, AND WHITES.

average are at the same time relatively more frequent. Thus it becomes apparent that the mixed race is less homogeneous than the Indian race.

Another important phenomenon is revealed by a comparison of the growth of Indians and half bloods (Fig. 3). When the average statures of children of both races are compared, it ap-

pears that during the early years of childhood the Indian is taller than the half blood, and that this relation is reversed later on. This is found in both the groups for tall tribes and for tribes of medium stature. It is to be regretted that this comparison can not be carried on for whites also. The social surroundings of the white child are, however, so entirely different from those of the Indian and of the half-blood children that no satisfactory conclusions can be drawn from a comparison. It is difficult to see why the laws of growth of the Indian and half blood should differ in this manner; why the Indian child at the age of three years should be taller than the half-blood child, and then develop more slowly than the latter. This peculiarity is most striking in the growth of the tribes of medium stature, as in this case the difference in the statures of adults is so considerable. Unfortunately, we do not know if the same difference prevails at the time of birth; but even if this were the case the difference in the rate of growth would remain mysterious. The various phenomena

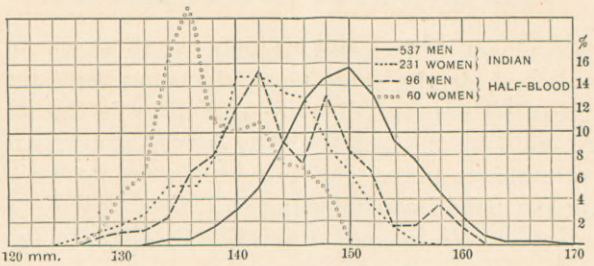

FIG. 5.—BREADTH OF FACE. SIOUX.

described here merely emphasize the fact that the effect of intermixture is a most complicated one, and that it acts upon physiological and anatomical qualities alike. We observe in the mixed race that the fertility and the laws of growth are affected, that the variability of the race is increased, and that the resultant stature of the mixed race exceeds that of both parents.

One of the most striking characteristics of the Indian face is its great breadth as compared with that of the whites. It is therefore of peculiar interest to compare this measurement among the full-blood Indian, the half bloods, and the whites. The curves on Fig. 4 show the result of this inquiry. Among adult students of American colleges we find an average breadth of face (between the zygomatic arches) of 140 millimetres, while the average value among Indians is nearly 150 millimetres. The facial measurements of the half bloods are intermediate, the average value being nearer the typical Indian measurement and remote from the white measurement. We find in these curves also the peculiarity observed before—that the half blood is more variable than the

pure race. This fact is expressed in the greater flatness of the curve.

It will be noticed that the central portion of the curve illustrating the distribution of the measurements of breadth of face

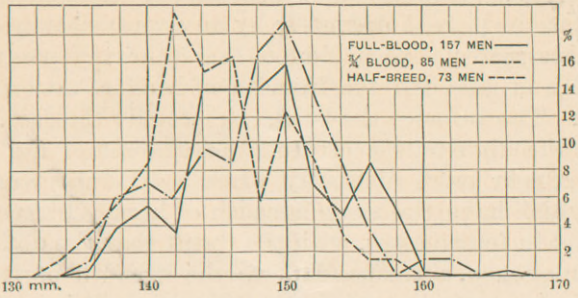

FIG. 6.—BREADTH OF FACE. Eastern Ojibwas.

of half bloods is markedly irregular, particularly that it shows a depression in its central portion. This might seem accidental, but it will be seen that in Figs. 5 and 6, where the same measurements for the Sioux and Ojibwas are given, the same phenomenon appears. We see in all these curves that the measurements which

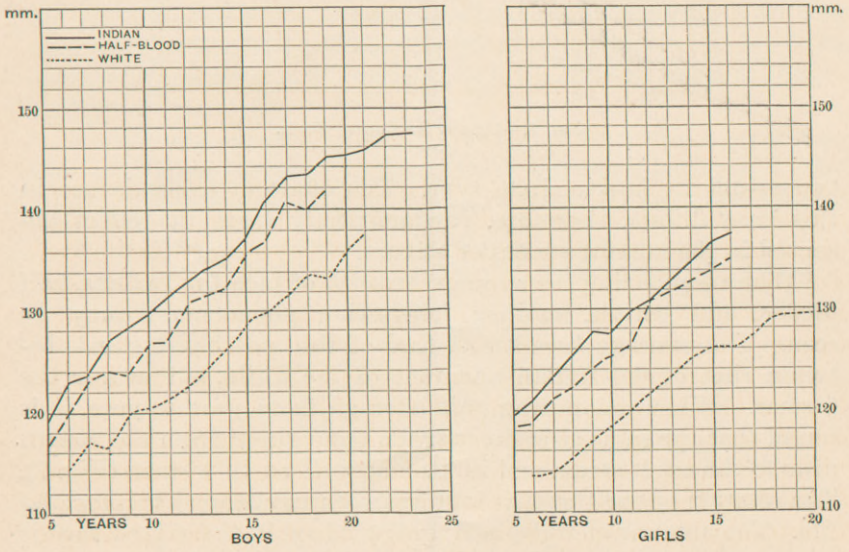

FIG. 7.—BREADTH OF FACE OF INDIAN, HALF-BLOOD, AND WHITE CHILDREN.

are near those of the parental races appear more frequently in the mixed race than the intermediate measurements. It is true that the number of observed cases may seem rather small to draw this deduction with absolute certainty; but I have noticed that all tabu-

lations of face and head measurements which include more than five hundred individuals give very regular curves except in the case of half bloods, so that I believe I am justified in interpreting the phenomenon illustrated in Fig. 4 as a real one, and that it is not due to the small number of measurements. The correctness of this view can be proved definitely by an appropriate grouping of the available material according to the following point of view: The breadth of face and the breadth of head of man are closely correlated. The broader the head, the broader the face. Irregularities in the distribution of the measurement of the face will, therefore, appear more distinctly when individuals are grouped together which have the same breadth of head. I have grouped the material in four classes, with the result that the double maximum of frequency, corresponding to the breadth of face of the parental types, appears more strongly marked in every class. Therefore we must draw the important inference that the face of the offspring has a tendency to reproduce one of the ancestral

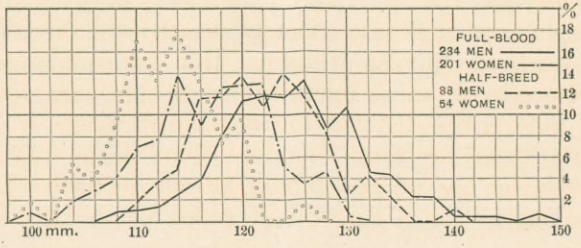

FIG. 8.—HEIGHT OF FACE. SIOUX.

types—not an intermediate type. The effect of intermixture in this case differs, therefore, fundamentally from the effect observed in the measurements of stature.

When comparing the average breadth of face for Indians, half bloods, and whites, another interesting phenomenon may be seen. The average breadth of face of the half blood stands between that of the Indian and that of the white, but nearer the former. When computing this average from year to year, it is found that the same relation prevails throughout from the fourth year to the adult stage, and in men as well as in women (Fig. 7). The relation of the three groups remains unchanged throughout life. The amount of white and Indian blood in the mixed race is very nearly the same. We find, therefore, the remarkable fact that the Indian type has a stronger influence upon the offspring than the white type. The same fact is expressed in the great frequency of dark hair and of dark eyes among half bloods.

Two reasons may be assigned for this fact. It may be that the dark hair and the wide face are more primitive characteris-

tics of man than the narrow face and light eyes of the whites. Then, it might be said that the characteristics of the Indian are inherited with greater strength because they are older. It must, however, also be considered that half bloods are almost always

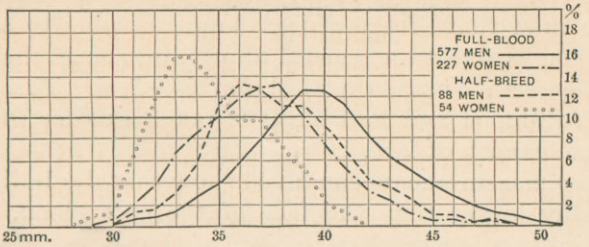

FIG. 9.—BREADTH OF NOSE. SIOUX.

descendants of Indian mothers and of white fathers, and this may have had an influence upon the race, although there is no proof that children resemble their mothers more than they resemble their fathers.

In carrying out the comparison of breadths of face it would be better to study the curves of distribution for each year, but the number of observations is insufficient for applying this method. As stated before, the distribution of measurements is such that the parental types are more frequent than the average; for this reason the latter has no real biological significance. It must be considered merely as a convenient index of the general distribution.

Among the eastern Ojibwas I was able to make a classification into three groups: Indians, three-quarter bloods, and half bloods. In this case (Fig. 6) it will be noticed that the influence

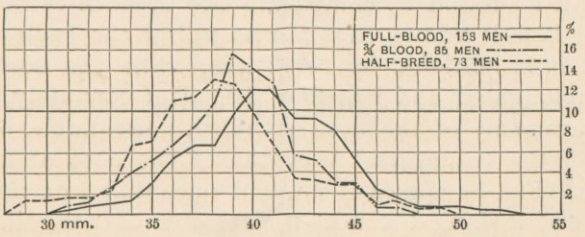

FIG. 10.—BREADTH OF NOSE. EASTERN OJIBWAS.

of the white admixture is very slight in the three-quarter bloods. The maximum frequency of the breadth of face remains at 150 millimetres, and we observe that a small increase in frequency takes place at 140 millimetres.

From the breadth of face I turn to the consideration of the height of face—i. e., the distance from the chin to the suture

between the nasal bones and the frontal bone (Fig. 8). This measurement is subject to considerable variations, on account of the difficulty of determining the initial points of the measurement with sufficient accuracy. This accounts for the irregularity of the curves. It appears clearly that the face of the half blood is shorter than that of the white. I am not able to say if this phenomenon is due to a general shortening, or if the nose, the jaw, or the teeth contribute most to this effect. The difference between full blood and half blood is much smaller than in the case of the breadth of face.

The two measurements combined show that the Indian face is considerably larger than the face of the half blood, while the latter is in turn larger than the face of the white. As the head measurements of the tribes which have contributed to these statistics prove that there is no appreciable difference between these races regarding the size of the head, we are led to the conclusion

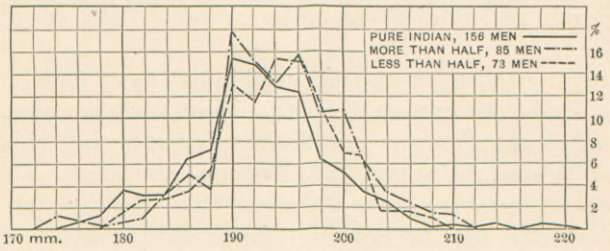

FIG. 11.—LENGTH OF HEAD. Eastern Ojibwas.

that the Indian face is also relatively larger than that of the half blood and of the white.

Another characteristic difference between Indians and half bloods will be found by comparing the breadth of nose of both races. It is well known that the nostril of the Indian is round, and that it is bordered by thick alæ, while the nostril of the white is elongated and has fine alæ. Unfortunately, there are no measurements of the nose of the white available, but a comparison of the transversal breadths of the nose of Indian and half blood (Fig. 9) makes it clear at once that intermixture has the effect of making the nostril narrower and the alæ thinner, thus producing a much narrower nose. It appears at once that the nose of the half-blood man is not wider than that of the full-blood woman. The three-quarter bloods of the Ojibwas (Fig. 10) are found to take an intermediate position between full bloods and half bloods.

We will finally consider the effect of intermixture upon the length of head from the point between the eyebrows (the glabella) to the occiput among a tribe with a head that is shorter

than that of the American white. The Ojibwa has a head which measures about 191 millimetres, while that of the white measures about 195 millimetres. A comparison of the three classes (Fig. 11) shows a gradual increase in length from the full blood, through the three-quarter blood, to the half blood.

We find, therefore, that the laws of heredity in the forms of the head and face are uniform, in so far as intermediate forms are produced. I presume, however, that in all these cases the middle forms are not found as frequently as forms resembling the two parental types.