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The Physical Constitution Of The American Negro

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CHAPTER III

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Introduction

A small group of workers has long been keenly aware of the value and importance of scientific study of the various elements comprising the American population. In the latter part of 1926 there was organized, "in connection with the Section of Anthropology and Psychology of the National Research Council, a 'Committee on the Negro,' the object of which was to promote anthropological and psychological studies on the American Negro. The personnel of the committee consisted of Drs. R. J. Terry (chairman), F. Boas, C. B. Davenport, E. A. Hooton, A. Hrdlička, and T. Wingate Todd, for Anthropology, with Drs. R. S. Woodworth and Knight Dunlap (ex-officio) for Psychology."[1]

Pursuant to the program of the committee Dr. Aleš Hrdlička of the United States National Museum published in 1927 an excellent comprehensive survey of the scientific literature to that date pertaining to the American Negro. This survey will prove an invaluable guide to any who wishes to investigate the subject and may well be read in conjunction with the present paper. It is pertinent at this time to quote from Hrdlička's concluding remarks: "The scientific anthropology of the American Negro is still barely above its beginnings. Almost everything remains to be done or done over and better or more fully according to present methods and standards."

It is not surprising that the physical anthropology of the American Negro is but "barely above its beginnings." The number of studies of scientific value on the living American Negro is quite limited. Only a few institutions have undertaken the proper care and documentation of human remains. A recent survey of human materials in American institutions available for anthropological study revealed that the bulk of such materials consists of skeletal remains, most of which are American Indian.[2] But 5 per cent are American Negro. The greater part of this Negro material is in two institutions, Western Reserve University and Washington University, and is exceptionally well documented.

Existing social conditions excite a peculiar interest in the nature and significance of the distinguishing features of the American Negro. The real interest centers on the human fitness of this product of racial crossing. The present review purports to collate critically the results of investigations

[1] Aleš Hrdlička, "Anthropology of the American Negro, Historical Notes," *Am. J. Phy. Anthrop.*, **10**: 205–35 (1927).

[2] W. Montague Cobb, "Human Materials in American Institutions Available For Anthropological Study," *Am. J. Phy. Anthrop.*, **17**: (Supp.) 1–45 (1933).

of constitution which shed light upon this subject. The scientific objective in the study of racial characters is not the elaboration of politically significant interpretations, but the understanding of the biological phenomena of heredity, growth and development, and environmental influence. Thus do we seek the keys to evolution and to progress.

Anthropometry

Search for recent comprehensive anthropometric investigations of the adult American Negro yields but six studies. These are, in order of publication: Davenport and Love, 1921;[3] Todd and Lindala, 1928;[4] Hrdlička, 1928;[5] Davenport and Steggerda, 1929;[6] Herskovits, 1930;[7] and Day (with notes on the anthropometric data by Hooton), 1932.[8]

Davenport and Love[9]

These authors summarize their conclusions as follows:

> The general comparative picture we get of the white troops (including a great variety of races) and the Negro troops is this: The Negro troops have relatively longer legs and arms, shorter trunk, narrower pelvis, more nearly circular ellipse of cross section of the chest; larger, shorter neck; more nearly parallel outlines of the trunk, larger leg girth, and a greater weight than the Whites. The waist is less marked because of the relatively small transverse diameter of the pelvis and chest and the greater circumference of the waist. The Negro seems more powerfully developed from the pelvis down and the White more powerfully developed in the chest.

The significance of these differences depends upon their reliability and degree, and upon the nature of the parts involved. It is necessary, first, to consider the circumstances of the investigation.

The National Academy of Sciences, realizing the importance of the opportunity offered by the World War, early made earnest effort to secure authorization for special measurements. This was not obtained until demobilization had begun in 1919. Then the measurement of 100,000 men to furnish specifications for uniforms was ordered. After hasty preparations, a small corps of nineteen anthropologists, anatomists, and Army officers was given uniform instructions for technical procedure by Aleš Hrdlička and dispatched to sixteen camps in different sections of the country to supervise the actual mensuration, most of which had to be rapidly done by unselected enlisted men often with imperfect instruments. The subjects were nude except for breech cloth. Sets of measurements of 99,449 men were obtained of whom 93,185 were white and 6,264 Negro.

Much inaccuracy in the original data was inevitable, but reduction was accomplished with the utmost care by the authors. The study is, therefore, a careful statistical treatment of decidedly imperfect original data. The principal justification for such meticulous reduction is that the large size of the several series might be expected to counterbalance the error in the measurements themselves.

Let us now examine the differences found. It may be admitted that the

[3] C. B. Davenport and A. G. Love, *Army Anthropology* (1921).
[4] T. Wingate Todd, and A. Lindala, "Dimensions of the Body; Whites and American Negroes of Both Sexes," *Am. J. Phy. Anthrop.*, 12: 35–119 (1928).
[5] Aleš Hrdlička, "The Full Blood American Negro," *Am. J. Phy. Anthrop.*, 12: 15–34 (1928).
[6] C. B. Davenport, and M. Steggerda, "Race Crossing in Jamaica" (1929).
[7] M. J. Herskovits, *The Anthropometry of the American Negro* (1930); ———, V. K. Cameron, and H. Smith, "The Physical Form of Mississippi Negroes," *Am. J. Phy. Anthrop.*, 16: 193–201 (1931).
[8] C. B. Day, *Negro-White Families in the United States.* (With Notes on the Anthropometric Data by E. A. Hooton.) (1932).
[9] *Op. cit.*

major differences are statistically "significant," that is, they are greater than three times their probable error. But before they can be accepted as of real significance their absolute magnitude must be considered.

The mean stature of 96,595 white troops exceeds that of 6,454 Negro troops by but 0.02 centimeter, hence it may be said that the two groups are of identical height. This is a happy accident because the other bodily proportions of the two groups may be directly compared.

At this point the subject of variability may be briefly discussed. Davenport and Love use the standard deviation as a convenient measure of variability. The authors state that despite the same mean stature, "the colored troops are markedly more variable having a standard deviation of 6.908 ± 0.041, while that of the white is only 6.66 ± 0.010. As the difference is about six times its probable error it is doubtless significant." This means that a range of 6.66 centimeters above and below the average stature of the white troops includes two-thirds of the series. The range necessary to include two-thirds of the Negro series is but 2.4 millimeters greater on either side of the mean. In a small dimension such as nasal breadth a difference in standard deviation of 2.4 millimeters which was six times its probable error would certainly be of moment but so small a difference of variability in the largest of all bodily dimensions can hardly be of importance. This view is greatly strengthened in consideration of the large amount of error certainly inherent in the original data and the fact that two successive determinations of the standing height of an individual by a trained anthropologist may vary as much as 25 millimeters. The actually small value representing the difference in variability of stature, the largest bodily dimension between the Negro and white troops, the juggling of the separate variabilities possible by different types of sampling; the large amount of error inevitably incorporated in the original data; and the fact that the white series was fifteen times larger than the Negro all indicate that the difference in variability found has no real meaning in spite of the fact that it is statistically significant.

Returning to the dimensional differences we note first those dimensions which show a difference of the means greater than 10 mm. Mean differences of smaller value are almost surely unreliable. It is the considered opinion of competent workers that the error in successive measurements on the same living subject by a skilled observer approximates 10 mm. It is certain that this is more than a liberal allowance for the error of determinations in the present study.

Ten measurements present a difference of the means greater than 10 mm. between the white and Negro troops. These are sitting height, height of pubic arch, leg length, breadth of shoulder, breadth of pelvis, span, arm length, forearm length, thigh girth, and height of sternal notch. The level of the sternal notch is subject to especial variability due to respiratory movement or self-conscious pose; shoulder breadth may be markedly altered by changes in muscular tonus; thigh girth like most girths is an ill-defined and inaccurate measurement.

These may be omitted in the discussion with little loss. Arm length also may be eliminated because this dimension was a tailor's measure and included half of the chest as well. Six measurements remain, but these have the greatest morphological importance of the set.

The mean Negro sitting height is 30.4 millimeters less than the white. The standard deviations are practically the same. Since the mean statures are identical a "compensatory" difference of mean leg length would be anticipated. This is found. In both measures of leg length, height of pubic arch, and in distance from internal margin of fold of buttock to medial prominence of ankle the Negro exceeds the white by 26 mm. Thus the Negro torso is roughly a little less than an inch and a quarter shorter than the white; and the Negro leg, a little less than an inch and a quarter longer.

In arm span the Negro mean is 51.8 mm. greater than the white. The transverse chest breadths are practically the same, so the difference may be attributed to the arms. This would make the Negro arm 26 mm. or about an inch longer than the white.

The means of forearm length show this limb segment to be 12.9 mm. longer in the Negro. This dimension represents the distance between two points on the same bone, tip of the olecranon and the styloid process of the ulna.

In the mean pelvic breadth the Negro is 10.1 mm. less than the white. The Negro standard deviation is 5.0 mm. less than the white. The coefficient of variation is 8.27 for the Negro and 9.68 for the white, so that the variability is relatively as well as absolutely less in the former. The small size of this dimension in proportion to the stature and the fact that the measurement is determined between fixed bony points seem to permit the conclusion that the mean difference found is significant.

The mean weight of 79,706 white troops was 144.67 pounds; that of 3,319 Negro troops 149.53 pounds; a difference of five pounds in favor of the Negro. Quite obviously the difference in the sizes of the series lessens the significance of these mean values, especially when the sectional distribution of the white weights is considered. The higher weights, of 180 pounds or more, and the largest proportion of extremely heavy men are found in the groups containing 10 per cent or more of Germans and Scandinavians and 20 per cent or more of Germans and Austrians. In explanation of the Negro's greater weight the authors state: "The Negro groups appear better nourished than those groups that contain an exess of native whites. This is possibly due to the greater resistance on the part of the Negroes to those parasites that tend to keep down the weight." This explanation, however, cannot at present be accepted as more than a considered surmise.

The Army data thus appear to furnish reasonable evidence that the Negro has a narrower pelvis and longer arms and legs than the white with a proportionately shorter trunk. The lack of genealogical information on the composite Negro group renders the results of restricted value in the study of racial constitution, though they may be quite useful as an an-

thropometric census or as a basis for patterns for uniforms.

Todd and Lindala[10]

Since 1911, T. Wingate Todd has carefully documented all the cadavera received in the Anatomical Laboratory of Western Reserve University and preserved their records and skeletal remains in the Hamann Museum. Late in 1931, this collection included 2,139 individuals, of whom 82 per cent were males and 18 per cent females. Two-thirds of the males and slightly more than half of the females were white; the remainder were American Negroes, with occasional Chinese, Mexicans, and Indians. A recent analysis has shown that "although this laboratory population constitutes but 1 per cent of the total dead of the city of Cleveland for the twenty-one year period during which it was assembled, it reflects to a remarkable degree the major concurrent social and industrial developments."

In 1923, there were selected from this collection which then numbered more than a thousand individuals, the records of 100 male whites, 100 male Negroes, 36 female whites, and 32 female Negroes, all normal adults, for a comparative anthropometric study. The whites were largely a sampling of "new" immigrants from Northern and Central Europe and their immediate descendants. The Negroes were in great measure unsuccessful industrial migrants from the South. The groups together represent the lower social strata of a modern industrial community.

From a technical standpoint, this study is in many respects exemplary. A comprehensive series of 75 measurements and a standardized technique according to Martin's original specifications were employed.[11] The instruments were of the best quality. All the measurements were made by a single observer, the senior author. Cognate technical problems such as the comparison of measurements on the living and the dead, the influence of numbers as it affects the representative character of small series, the pitfalls of statistical method, and variability, are critically discussed. The presentation is full and complete. It is intended for the professional reader but the layman may readily follow the clear, succinct statements of conclusions and their validity.

The deductions are drawn from the comparison of the means and variabilities of the separate dimensions. After the elimination of measurements of questionable value, the dimensions were found to group themselves into three classes—the humanity-linked, the sex-linked and the stock (race)-linked. In this last group which is here our particular interest, "the emphasis falls in the main, upon those features already picked out by previous workers, namely pelvis, nose, lips, and inter-pupillary distance." To these might be added arm and leg lengths.

Before the dimensional findings are listed in detail it will be helpful to state that these cadavera proved to be "more nearly characteristically African than any other sample of American Negroes." This is an interesting fact in view of the known socio-

[10] *Op. cit.*

[11] R. Martin, *Lehrbuch der Anthropologie.* Jena: Gustav Fischer (1914).

economic selection of these unclaimed dead. The evidence for the conclusion may aptly be supplied by a quotation which reveals also the careful manner in which the results of this study were compared with those of earlier and contemporary investigators.

The pelvis, like the skull, has its own peculiar contours and dimensions and though, in certain features, there is a Stock-linked or a sex-linked character, yet it is impossible to calculate the dimensions of one sex or Stock from the other.

Our male White cristal [transverse pelvic] breadth is 292 mm. and that of the White troops in the army 294 mm. The slight difference is purely a function of bodily size and corresponds exactly to the difference in stature between the two groups. (Army 1720 mm., W.R.U. 1705 mm.) But our variability is much less than that of the army, the comparative figures being 5.77 and 9.68. The difference is certainly not due to any irregularity in measurements of the living by different individuals. Any such discrepancy would be covered in the spurious stability characteristic of a reasonably sized array of figures. . . . We must conclude that the White men of the army included many diverse forms of pelvis.

The Negro material tells a different story. Our variability is but 6.07%; that of the colored troops is 8.27. But in addition to this greater stability our colored males have a mean cristal breadth of 270 mm. against the 284 mm. of the army. This, I think, is one of the most significant results of all of our work. Herskovits' average is 285 mm. and in his series of 102 colored (Howard University) students without any White blood in their lineage so far as could be ascertained, the average is 286 mm. Our interspinous breadth confirms our cristal diameter and seems to me to indicate the relative purity of our Negro strain of pelvis. The narrow pelvis is so distinctly a Negro character and our average is so much less than those of other American Negro samples that it may well serve as an indication of relatively pure Negro material until such time as genuine African measurements can be obtained in adequate number. Further evidence of the marked Negroid character of the cadaver sample is furnished by the fact that their nasal height is less, their interpupillary distance wider and their skin darker than that of Herskovits' "pure bloods."

The conclusions of the study relating to the American Negro may now be summarized:

In standing height our White population, both male and female, is of a rather low average. Our female Negroes are of typical height but our males are usually very tall (mean 1744 mm., 5 ft. 10 in.).

The umbilicus (navel) is almost startlingly constant in relative position, despite differences in sex or Stock, and in vertical dimensions the torsos of White and Negro, male and female, are built practically upon a single plan, there being however, a slight tendency to raising of the upper sternum [breast bone] in the Negro.

There is some evidence that the nipple in the Negro, both male and female, is relatively high.

The Negro chest is shallow in anteroposterior direction.

The male Negro pelvis is small in all its dimensions compared with the male White. The female White pelvis is relatively some 10 mm. longer and broader than the male though its absolute dimensions are less. The female Negro pelvis is relatively only 6 mm. longer than the male, but 21 mm. broader. The marked restriction in size of the male Negro pelvis exaggerates the sex difference. The greater female dimension in both Stocks is more characteristic of cristal than of spinous breadth.

The greater amount of pelvic subcutaneous fat in the White female accounts for the sex difference in external conjugate (anteroposterior diameter): it is not due to a distinction in bony conjugate. The very great difference between White and Negro of both sexes is accounted for by the great amount of pelvic subcutaneous fat in the latter, especially in the female.

Hand length and breadth are strictly proportionate to arm and length in both sexes and Stocks. The Negro upper arm is short and the forearm long. The female arm is slightly shorter than the male in both Stocks and the entire Negro arm is long compared with the White in both sexes.

The Negro of both sexes has a long lower limb. There is not the slightest evidence of difference in proportion of thigh and leg with either sex or Stock. Foot breadth is strictly proportionate to true leg length. Foot length is proportionate to true leg length in White males and in Negroes of both sexes. But the White woman has a foot which is short though not broad compared with that of her man.

The cranial dimensions—length, breadth and vertical height above the ear—showed no significant Stock differences. The Negro head of both sexes was slightly longer and narrower than the White, but the outstanding feature of all of our heads is their low vertical height. . . . This is a corollary of social status.

[The nasal height is short and the distance from the nose to the edge of the upper gum long in the Negro. The reverse is the

case in the white.] In nasal breadth and depth our values fall into the group of pure Africans.

[Lip thickness was not so definitely African as nasal dimensions.]

Mouth breadth is not a dependable measurement because the element of "pose" is involved in life and the dead value is unnatural.

There is no narrow Negro forehead. The Negro female has a relatively large face.

Interlocular breadth (distance between the eyes) and breadth of palpebral fissure (opening between lids) are characteristics of humanity. The greater dimensions of interocular breadth in the Negro is an illusion and his "large eye" is due to a more rounded rather than a wider orbital fissure. Our Negro populations show a quite definitely African value of inter-pupillary distance.

In pigmentation our Negroes are not typically African. The hair line is lower on the forehead of the Negro.

In pigmentation our Negroes show the characteristics of a low social grade and our skins are darker and less variable than those of other American Negro series so far studied. The females, as would be expected, show lighter and more variable pigmentations than the males.

The proportions of limbs and torso reported by Davenport and Love are thus confirmed by the findings of Todd and Lindala. In view of the nature of the latter's sample, this would indicate that the Army Negroes measured showed little evidence of admixture as a whole. The differences in nasal height-subnasal distance ratios found between the white and Negro cadavera are distinctive as well as on the skull.

The decided African proportions shown by certain of the dimensions led Todd to the conclusion that "perhaps some bodily features are more strongly entrenched than others and therefore less subject to variation even in hybridization." This theme was investigated and the results separately reported.[12] These may be appropriately treated at this time.

[12] T. Wingate Todd, "Entrenched Negro Physical Features," *Human Biol.*, 1: 57–69 (1929).

Entrenched Features.—The physical characters which distinguish races may have functional importance or denote form alone. A series of studies on characters related to function (suture closure, epiphysial union, pubic differentiation and the architectural patterns of muscles) by Todd and his associates show that in these features no significant distinctions between whites and Negroes are to be found. These studies will shortly be described.

Distinctions in form pattern are more useful. Comparison of identical measurements on the Negro cadavera, Herskovits's Negroes with no knowledge of white blood in their ancestry, Herskovits's general series (which included individuals with white and Indian admixture), and the white cadavera indicated that certain features (pigmentation, head breadth, total facial height and nasal height), show a definite progression with the Negro cadavera at one end of the scale. Hence "these features are readily modified by hybridization." On the other hand, nasal breadth, lip thickness, mouth width, interpupillary distance and ear height, show a uniformity in the three Negro series which indicates that hybridization has had little effect upon these features.

The laws of human heredity are yet but imperfectly understood. Biometric theory would make an increased variability expected in a hybrid population in those characters in which the parents differed most. Todd's tables show that "the Negro male is consistently more variable than the white male in all limb dimensions both of leg and arm including shoulder breadth;

in pelvic diameters, chest circumference and depth; but not in torso length, transverse chest and internipple breadth." In this class also are ear and cranial dimensions, nasal height and length of the nasal septum. But other facial dimensions are less variable in the hybrid Negro male cadavera. This is taken as further evidence of entrenchment of these less variable characters.

As an additional test, the variabilities in eight traits of the heterogeneous male white cadavera were compared with those of Hrdlička's Old Americans, a purer white stock, and the variabilities of the male American Negro cadavera with those of West African Ashanti. In stature, cheek breadth and total facial height the hybrid Negroes showed less variability, compared with the Ashanti, than did the white cadavera compared with the Old Americans, a third evidence of entrenchment of certain Negroid features in the hybrids.

The author concludes that quantitative determination and study of variability in comparison of samples differing in their hybridization and by comparison with samples of undoubtedly purer stock indicate that in "our Negro hybrids (cadavera), some features are more stable or firmly entrenched than others and that these features are mostly to be found in the face." This finding will be of particular interest when we reach the Harvard study.[13]

In conclusion it may be said that the study of Todd and Lindala in its breadth of approach to the subject, the thoroughness of its method, and the completeness of its exposition of the facts is a valuable contribution to the study of the American Negro. Its significance is momentarily restricted by the nature of its sample but as more knowledge accumulates the results will have a wider importance.

Hrdlička[14]

The study, "The Full Blood American Negro," consists of measurements and some observations on 20 normal American Negro males and 6 females, "all of whom could with full confidence be regarded as full-blood, . . . presented as the first systematic contribution to the anthropometry of this racial group."

Hrdlička has long been a leader of the small but able group of scientists who have labored assiduously to perfect the methods of physical anthropology and the present study clearly exhibits the imprint of his characteristic meticulous care. All the subjects were measured by the author with instruments and according to technique described in his volume "Anthropometry."

The study began after 1903, and extending over a period of years, was undertaken because "the only sound basis for all future studies on the American blacks can be knowledge of the full bloods," and the large Negro population of Washington, D.C. seemed to present excellent opportunity for study.

The small size of the series at once raises a query which is met with the explanation that suitable "full blood" Negroes were very difficult to find, and when found, "with infrequent exceptions, were not eager to be

[13] C. B. Day, *op. cit.*

[14] *Op. cit.*

measured," for, "it is quite a different thing to measure among the pliant, trusting savage, and then among the semi-civilized, suspicious, scattered free laborers and servants of a big city."

We are not told, however, nor are there photographs to show, the criteria by which the full bloods were distinguished and these are precisely what it is most necessary to know. It is familiar history that the Negro in America represents an undetermined but heterogeneous mixture of African elements whose cultural background is much better known than their physical form.[15]

The conclusion is thus forced that the author's subjective concepts of what constitutes a full blood American Negro were his guide in selection. While the very small size of his series is undoubtedly evidence of the investigator's care as well as of the rarity of the type, the study cannot be considered in the light of present knowledge as a conclusive contribution because the standards for selection of material are neither known nor validated. With little further comment a summary of the findings is presented, so that the reader may have opportunity to determine whether they constitute a true picture of the full-blood. The tables show means and ranges; variabilities are not computed.

The statutes (males 1686 mm.) are somewhat shorter than those of the American Negro at large, over three-fourths of whom in the more Northern states carry probably some white or Indian admixture;

The head is mesocephalic in shape with tendency toward dolichocephaly (long headedness), and with considerable variation. It is somewhat smaller than in whites with which compared (Old Americans). It is also somewhat lower than in the whites relatively to the mean of the other two head diameters. . . . If in addition the thicker scalp and thicker skull of the male negro are considered, then the probable size of the brain of the negro appears decidedly to a disadvantage.

The head of the full blood negro has a very typical form. This is best seen in the young, especially in boys. It is characterized by medium supraorbital ridges (above the eyebrows); by a more or less bulging forehead with a single median convexity or eminence; by nearly straight and but slightly ascending line from the hair line to the summit of the head; by nearly straight side lines, diverging from back of the forehead to the moderate parietal eminences and giving the impression of lateral frontal (forehead) narrowness; by a very evident straight slope from the summit to the occipital protuberance, and by a blunt pointed occiput.

The negro forehead is bombed or "cocoanut-shaped" rather than bilobed. It tends generally toward a single large central eminence, while in whites there is a general tendency toward the development of two lateral eminences or "bossae." Occasionally, there is an approach to this also in the black, but a marked bilateral frontal eminence has never been seen by me in a full-blood negro. . . . The upper part of the forehead, apparently the total forehead area, and the diameter frontal minimum are smaller in the negro. . . . The negro forehead in both sexes appears higher than that of the whites, due to a somewhat higher hair insertion.

The face is somewhat larger than in the whites.

The subnasal region in the full-blood negro is invariably markedly more protruding than it is in the whites. The lips are very thick, their mucosa blackish-brown, not red. The gums have a more or less marked bluish tinge and may have blackish-brown stains. . . . The mouth of the negro is larger than that of the whites.

The negro ear is smaller and especially shorter than in the whites.

The chest of the negroes examined, mainly laborers and servants, is larger and especially deeper than that of the whites of lighter work.

The negro hand is relatively long and somewhat narrow, the foot relatively broad and long, as compared with hand and foot of the whites.

Since Todd's Cleveland cadavera were of similar social and occupational origin to Hrdlička's Washington sample, and the cadavera showed numer-

[15] M. J. Herskovits, "The Negro in the New World: The Statement of a New Problem," *Am. Anthrop.*, 32: 145–55 (1930).

ous indications of pure African strain, it will be of interest to note certain more or less antithetical conclusions of the two investigators.

The low vertical height of the Washington series was found also in the cadavera, both Negro and white and has been shown[16] to be a "corollary of social status." That the effect of skin thickness and skull thickness, both features which have not themselves been quantitatively studied, on cranial capacity has not been demonstrated to be as great as implied by Hrdlička will be shown when Todd's monograph on the latter subject is considered.

The hair line on the forehead is high according to Hrdlička's observations and low according to Todd's measurements. The narrow Negro forehead of the Washington sample disappears as a "myth" in Todd's comparisons.

The long narrow hand of the Washington series is not present in the Negro cadavera for in the latter "relative to arm length, there are no Stock or sex-linked differences in these dimensions. . . . We may not impute this to admixture of White blood for the pelves of these series forcibly express relative purity of strain."

Similarly, Hrdlička found the Negro foot "longer and especially broader than that of the whites, and these conditions are particularly marked in relation to stature," while according to Todd foot length and breadth in the Negro are strictly proportionate to length of limb, as in the white male.

These differences in results render knowledge of the basis for selection of material all the more important and serve but to emphasize the difficulties which the student of human constitution must encounter as progress is made in anthropological science.

Davenport and Steggerda[17]

This study was pursued under the most auspicious circumstances; it was planned with careful deliberation, and had the benefit of expert consultation throughout. There is every indication that the work was ably executed, and certainly the presentation is excellent. A series of good photographs of representative subjects is appended. The data recorded included anthropometric and general physical observations, a dental examination, hair-form from samples, finger- and palm-prints, dynamometer readings, sociological information and results of psychological tests. The time consumed in the complete examination of one individual was 1 hour and 10 minutes.

The principal reasons for the selection of Jamaica as a site for the investigation were apparently the existence on the island of satisfactorily "pure" and mixed population samples, and of the uniform social level resulting from the principal industry, agriculture. A fairly well authenticated history[18] shows that "Negroes were more or less segregated in parts of Jamaica 90 to 130 years ago. They have had little contact with the whites

[16] T. Wingate Todd, "The Anatomy of Our Social Life," *Northwest Med.*, Ap (1928).

[17] *Op. cit.* ("In March 1926, the Carnegie Institution of Washington accepted a gift from a gentleman (Col. W. P. Draper) who expressed his interest in the problem of race crossing, with special reference to its significance for the future of any country containing a mixed population. The work was undertaken by the Department of Genetics, Carnegie Institution of Washington.")

[18] Johnston, H. H. *The Negro in the New World.* London: Methuen & Co., Ltd. (1910).

and constitute a nearly 'pure stock' of Negroes." In addition to the "pure" Negroes, hereafter called the blacks, there were also on the island browns, individuals representing various degrees of admixture, and presumably "pure" whites.

Because the series were small greatest importance attaches to the manner in which the subjects were selected. It will be interesting to quote certain comments of the authors on this point:

> There are great inherent difficulties in selecting personnel for the three groups that will be strictly comparable, as representing random samples of the respective groups. First of all it was decided that all three groups should belong to the prevailing agricultural class and that the Whites of the governing class and the White merchants of Kingston should be excluded. A difficulty arises in this, that just those Whites who are satisfied to live as agriculturalists in the midst of the island are hardly as representative of the more ambitious and intellectually endowed Whites as the agricultural Blacks are of the run of the Black population. It is possible that in choosing non-urban Whites we have selected farther below the average of Whites than in selecting non-urban negroes we have selected below the average of negroes.

This comment is a dangerous interweaving of science and sociology. At least it takes no account of the fate of the "more ambitious and intellectually endowed" blacks. A total of 370 adults were measured in towns and public institutions and the authors concluded that they came in equal proportions from city and urban communities.

The anthropometric results may be briefly stated:

> The three groups (Whites, Browns, Blacks) do not differ greatly in stature and weight; but the great size of the Cayman islanders has raised the average stature of the Whites 2 cm. above that of the Blacks. The Blacks are slightly the heaviest, despite the fact that the chest girth, absolute and relative, is not greater than that of the Whites. The question is raised whether the skeleton of the Blacks is perhaps heavier than that of the Whites.

The usual findings of relatively short trunk and long limbs in the Negro were confirmed in the blacks. "The foot is longer in the Black than the White, and probably slightly broader.

> The head height and breadth are apparently the same for Blacks and Whites, but the Blacks have much the longer head and, accordingly, the larger cranial capacity, as computed by a formula that is based on external measurements.
>
> The interpupillary distance is markedly greater in the Blacks than Whites, and a gene difference is probably involved, since the Browns are very variable in this respect.
>
> Of the facial features that of the nose seems especially to differentiate the races. The nose of the Blacks is one-third broader than that of the Whites. The Browns are very variable; thus we conclude that one or more genes are involved in this difference in nose form. The nose height is less in the Black, and so the nasal index is much (over $\frac{1}{3}$) greater in Blacks than in Whites.
>
> The external ear is shorter and, if anything a trifle wider in Blacks than Whites. Consequently the ear index shows a much rounder ear, by as much as 10 per cent.
>
> The papillary patterns of the fingers are markedly different in Blacks and Whites. Thus, in males, Blacks have whorls in 32 per cent of the fingers while Whites have them in 23 per cent. Radial loops, the rarest type, were found in 1.8 per cent of the fingers of Blacks and 9.7 per cent of those of our Whites. The high proportion of whorls in Blacks is the more striking since their fingers are comparatively slender. The condition in Browns is usually intermediate.
>
> The palm patterns show a difference between the two races, such as had been previously pointed out by Wilder. The Browns approximate the Negroes more nearly than they do the Whites.
>
> Skin color was measured by the color top. The Browns show much the highest variability of the three groups. In hair color as in eye color, the Whites of Jamaica are the most variable of the three color groups. The diameter of hair curl was measured in many individuals of each color group. The coefficient of variation is greatest for the Browns, indicating segregation.
>
> A study of hair on arms and hands revealed, quantitatively, the relative glabrousness of the Black and (to a less extent) of the Browns, while the females are more glabrous than the males.
>
> Considering the bite, the Whites show

more overhang of the upper jaw than do the Blacks.

It is further stated that "despite the frequency of human mutations, the Blacks of Jamaica still resemble those of the West Coast of Africa in many respects. They differ in others, however. This difference may be due to new mutations or to our ignorance of the African source of Jamaican Negroes."

The absolute differences found between the black and white types are those already known. The variabilities attract particular interest. A high variability is cited in the browns in a number of traits which are marked differential characters between the white and the black, such as interpupillary distance, nasal breadth, ear index, skin color, diameter of hair curl. The authors comment that "this high variability of these traits is excellent evidence that human traits segregate just as those of other animals and of plants do. . . . That the consequences of mendelian segregation can be obscured in a mixed hybrid population by subsequent selective mating cannot be denied." On this basis an explanation of the greater resemblance of the browns to the blacks than to the whites is suggested, namely, that environmental circumstances have favored repeated back crossing with blacks more than with whites. The hypothesis of selective mating is also held to account for the "homogeneity" of Herskovits's American Negroes, the study next to be discussed.

The latter author stresses the importance of the stabilizing influence of the preference of dark males for lighter-skinned mates. Davenport and Steggerda point out that Mendelian phenomena cannot properly be detected by noting the relation of the mean of the mixed population to that of the parental stocks but only by family studies.

Before passing on, reference must be made again to the fact that statistical validation of results does not constitute their absolute verification. In the authors' Table 353 are listed the means and variabilities (with probable errors) of twelve dimensions which have been selected by them as differential between Negroes and whites. In two of these dimensions, pinna (ear) height and intercristal (pelvic) breadth, the variability of the browns is less than that of at least one of the parental stocks in both male and female. In seven dimensions, relative sitting height, span, arm length, forearm length, hand length, foot length, and head length, the variability of the browns is consistently less than that of one of the parental stocks in the males but greater in the females. In only three dimensions, absolute sitting height, interpupillary distance and nasal breadth does the variability of the browns exceed that of the blacks and whites in both males and females. When it is considered that in these small series the absolute difference between the variability of the browns and that of either parental stock in no case exceeds 10 mm. in large dimensions, or 1 mm. in small dimensions, a generous restriction for error, the significance of the differences in variabilities cited by the authors as well as what differences they mean becomes less apparent, even though these differences

may be greater than three times their probable error.

No evidence of hybrid vigor was found in the browns. Significant differences in basal metabolism between the three groups were not discovered.

One other feature of greatest interest is the reference to disharmonious combinations of physical traits in the hybrids. This subject is of paramount importance because if the crossing of stocks results in unfavorable characters in the hybrids, such crossing might with scientific justification be discouraged. The authors show that long arms and legs are closely correlated in the males. But brown females are found to have very short arms and medium long legs. Still another is found to have long arms and short legs. Obviously, no functional advantage or disadvantage can be conclusively demonstrated from such slight differences in proportions but the point is made that "even so closely correlated traits as these are inherited, to a certain extent independently." However, disharmonic growth has not been shown to be a peculiarity of Negro-white crosses and, indeed, the paucity of the author's examples show that even in these hybrids it is not the rule. The incidence of such cases in other series should be studied. Jaws of disproportionate size are a common example of disharmonic development.

Discussion of the mental tests is not in the scope of this article but mention of certain of their results is necessary to show in what measure the authors' considered their study to have fulfilled one of its primary objectives, namely, to throw light on "the relative capacity of the negro and the hybrid to play a part in carrying forward the white man's civilization."

Disharmonies in the mental sphere were found to be apparently common in the adult browns.

> Such disharmonies and confusion apparently appear in visualization and reproduction, as in putting together the parts of the manikin. . . . One gains the general impression that, though on the average the Browns did not do so badly, there was among them a greater number of persons than in either Blacks or Whites, who were muddled and wuzzle headed. The Blacks may have low intelligence, but they generally can use what they have in fairly effective fashion; but among the Browns there appear to be an extra 5 per cent who seem not to be able to utilize their native endowment. [Then the caution is finally added], There are so many variables, however, and the numbers are so small, that the results merely propose an hypothesis and do not warrant a conclusion.

In a slightly later publication,[19] however, written for educated laymen, the senior author is much more definite. He states:

> The most serious defect found in hybrids is perhaps the bad behavior of Philippino hybrids and the negro-white crosses, apparently due to conflicting instincts. [And further], We are led to the conclusion that there is no universal rule as to the physical or social consequences of race crossing. Sometimes the progeny are superior to, sometimes equal to, sometimes inferior to the parental stocks. In the absence of any uniform rule as to the consequences of race crossing and in view of the disharmony shown by many hybrids it is well to discourage hybridization between extreme types, except in those cases where, as in the Chinese-Hawaiian cross, it clearly produces superior progeny. The negro-white and the Phillippino-European crosses seem, on the other hand, of a type that should be avoided.

The Jamaica study certainly does not justify these conclusions for large population groups and examination of the author's additional evidence introduces highly controversial material concerned with environmental influ-

[19] C. B. Davenport, "The Mingling of Races," in *Human Biology and Racial Welfare* (E. V. Cowdry, Ed.). New York: Paul B. Boeber (1930).

ences. The writer is forced to the conclusion, therefore, that the Jamaica study, though admirably conceived, executed, and presented, does not warrant the emphatic suggestions on the effects of Negro-white crossing which have emanated from it, nor does it constitute an adequate basis for social planning.

Herskovits[20]

The study of Herskovits is without doubt the outstanding single contribution to the anthropometry of the American Negro. It was well conceived, comprehensive, ably conducted and the results were fully presented. The work progressed with the benefit of penetrating criticism especially from Franz Boas, T. Wingate Todd, and E. L. Thorndike. The final monograph contains ample discussion of the problems bearing upon the interpretation of the results, so that the reader may readily evaluate for himself the author's final conclusion. He states that:

> As a result of comparing means and standard deviations for the traits measured in this sample and in other populations for which these are available, the conclusion must be reached that the American Negro is forming a type which lies somewhere between the European, African, and American Indian, ancestral types which have gone to make his physical form what it is, and further that in spite of this enormous amount of racial mixture which it represents, it has no unusually high variability, *i.e.*, it is relatively homogeneous.

The mechanism accounting for the increasing uniformity of type in the American Negro the author holds to be social rather than biological. There is first the pressure for Negroes to mate within the Negro community, a pressure which he states is "operative almost as strongly within the Negro population as that which compels similar racial endogamy on the part of the Whites." Then there is the highly invidious position which light color and non-Negroid traits hold among Negroes themselves. As a result of this attitude dark men tend to marry women of lighter complexion (this Herskovits shows to be true in his sample) and very light men tend to "pass" over into the white community while the darkest women have the poorest chance of obtaining mates.

> What the effect on future generations will be depends largely on the continuing in force of the present mores regarding selection. If they continue, however, the daughters of these matings will, in the main, be darker than their mothers, and if they are selected in turn and choose still darker men, the effect will be that the American Negro population will become more like the Negroid type as far as skin color is concerned since the relative amount of Negro blood in the Negro population will be increased. However, . . . there is too much White and American Indian blood in the American Negro population to permit of reversion to the pure Negro type. On the other hand, with this social selection in operation, and with the stoppage of crossing with the Whites to any appreciable extent, it seems reasonable to assume there will not be change toward the White norm.

The data for the study were gathered from 1923 to 1926. A total of 5,659 American Negroes ranging in age from one year to adulthood were measured, of whom 3,378 were males and 2,281 were females. We shall deal at this time only with data relating to the adults. The author shows that the geographical distribution of the birthplaces of the adult members of the series "included practically all States where Negroes are found in any considerable numbers, and in addition a large series from the West Indian

[20] M. J. Herskovits, *The Anthropometry of the American Negro*. New York (1930); ———, V. K. Cameron, and H. Smith, "The Physical Form of Mississippi Negroes." *Am. J. Phy. Anthrop.*, 16: 193–201 (1931).

islands." He shows also that comparison of the means and standard deviations of his sample with those of two entirely different samples of American Negroes, the Army series of Davenport and Love, and Todd's cadavera, reveals a closeness which "demonstrates very clearly that we are dealing with a representative sample of the entire American Negro population."

Martin's anthropometric technique and standard instruments were employed. The comparability of the results of the several observers is adequately demonstrated. The data obtained upon individuals consisted of 26 measurements, a record of skin pigmentation, and genealogical information.

On the basis of the latter the adult subjects were arranged into eight classes according to the amount of white or Indian admixture indicated in the following manner:

Unmixed Negro	N	342	22.0%
Negro mixed with Indian	N(I)	97	6.3%
More Negro than White	NNW	384	24.8%
More Negro than White, with Indian	NNW(I)	106	6.9%
About the same amount of Negro and White	NW	260	16.7%
About the same amount of Negro and White, with Indian	NW(I)	133	8.5%
More White than Negro	NWW	154	9.3%
More White than Negro, with Indian	NWW(I)	75	5.5%

Because the relative accuracy of the genealogies is important to the conclusions and because special doubts have been raised concerning the reliability of Negro genealogies a chapter is devoted to the subject of their validity.

It is not claimed that the classes represent hard and fast lines; that, for example, the class "about the same amount of Negro and White ancestry" is exactly one-half Negro and one-half White. There may be fairly large variations from this rigid standard, as there must be in any series of genealogical data.

Having employed the occurrence of appreciable differences between the averages of the different genealogical classes to establish that those traits which are differential for the parental stocks show a progressive change from the Negroid to the white type with increasing amounts of white ancestry, the author turns to the variability to demonstrate the relative homogeneity of the American Negro type. He compares the variability of the adult male series as a whole with that of other populations and finds that "in ten traits the adult American Negroes are at the top of the list, that in seven, they are about at the center, while in six, they are among the least variable." He then concludes that, "this group of Negro-Indian-White hybrids, so greatly mixed racially, are inbreeding to form a type, the general variability of which in numerous traits is not only less than that of an unselected sample of American Whites, but in many instances no greater than the unmixed European, African, and American Indian peoples who have contributed to its ancestry."

One of the chief criticisms which has been directed at the study is that in interpreting the variabilities, Herskovits should not have considered the variabilities of all the traits measured, for only those in which the parental stocks differ markedly would be expected to show an increased

variability in the hybrid. When, however, the variabilities of such differential traits are examined it is found that while nasal breadth, lip thickness and skin pigmentation do show an increased variability in the American Negro series, other differential traits such as hip width, interpupillary distance, ear height, and total facial height do not show an increase or are less variable than samples of the parental stocks.

It could be argued that error in measurement might be a factor in the failure of all differential traits to show an increased variability, for hip width measured over the clothing as done by Herskovits is not a very reliable measurement, and interpupillary distance and facial height require the exercise of the greatest care. But experimental error cannot account for the phenomenon.

In the author's Table CI the variabilities of the traits measured are arranged by the classes of various degree of admixture according to the genealogical statements. Considering only racially differential traits it is found that, "the lowest summated average variability is not that of the unmixed Negro group, where it would be expected were low variability and lack of racial mixture as closely correlated as biologists have assumed, but rather in the group whose descent is more Negro than White, mixed with Indian. On the other hand, the greatest variability is not at the point of greatest mixture (the NW) but rather in that group which is composed of persons who are of preponderantly White ancestry with some Negro admixture." There is thus apparent some basis for the author's conclusion that the physical types of the American Negro sample cannot be explained as being due to simple Mendelian inheritance and that if Mendelian principles do apply, multiple factors must be assumed for each character. This view, it will be recalled, is distinctly at variance with that of Davenport and Steggerda.

The writer, after a careful examination of Herskovits's tables, is of the opinion that the author overstates his case when he insists a lesser variability for the American Negro is demonstrated by his sample as compared with samples of parental populations. His figures do seem to admit of a comparable or similar variability. A caution is further indicated by the fact that Herskovits himself demonstrates in his comparisons of the genealogical groups that physical characteristics are altered in a definite direction by progressive degrees of white admixture. The hereditary principles here involved must become better known before final interpretations of variability are permissible. In addition, he shows by comparison of the samples measured by the different observers that the mean of the series holds also for various local groups of American Negroes, rural and urban, university and non-university, except such selected groups as the light complexioned economically secure of Harlem and isolated communities of relatively unmixed Negroes of the deep South, but because the numbers and behavior of the last two groups have been incompletely studied their ultimate effect on the general Negro population cannot be predicted.

The writer feels that Herskovits

has made a valuable contribution to physical anthropology by an apparently conclusive demonstration that the consolidation of type which the American Negro would be expected to show as a result of known social factors and mores affecting mating, is actually occurring.

Day[21]

While there are many aspects of the physical anthropology of the American Negro which may be profitably investigated by the analysis of means and variabilities of sample groups whose genetic constitution is known only approximately, it has long been clear that the only way in which the hereditary phenomena involved in Negro-white crossing could be adequately studied was through family series, in which data would be available on the Negro and white ancestors of the original crosses and on their various descendants. Social conditions have rendered the acquisition of such data by the proper scientists practically impossible, so when in 1919 Day at the instance and under the direction of Hooton undertook the task of obtaining these very desirable data, she entered upon one of the most ambitious and difficult as well as promising projects in American physical anthropology.

It was anticipated that the principal material resulting from Day's efforts would be a large mass of anthropometric data which could be analyzed by families of known degrees of mixture. What she did succeed in obtaining was a "great body of 346 genealogical charts, illustrated with photographs and documented (in part) with measurements, hair samples, and family histories."

The subjects were chosen with the purpose of making the study "a real cross section of life among colored people of mixed blood in this country," and to this end an excess of college graduates was avoided. A total of 2,537 individuals over fourteen years of age were studied, of whom 996 were deceased.

Measurements were taken whenever possible but many families studied had split up so that adult sons and daughters were living in various parts of the United States where they could not be reached. In other cases members of families "were passing for White" and hence were inaccessible. Surprisingly often, individuals were unwilling to be measured. Actually, measurements were obtained only on about one person for each family investigated sociologically and genealogically. In addition, the measurements were not taken under ideal conditions or with irreproachable technique, so that the greatest value of this study lies in the findings from the documented photographs. The latter constitute a valuable collection which probably cannot be duplicated or equalled in the future.

The author and Hooton have been the first to acknowledge the defects of the study and in view of the circumstances and difficulties encountered, the results are very creditable indeed.

The presentation includes a foreword and notes on the anthropometric data by Hooton. The main text is illustrated with fifty-three excellent plates. There is a chapter, also illustrated, devoted to sociological ob-

[21] *Op. cit.*

servations, but these do not concern us here.

The "dominant-recessive" relationships suggested by Day are very interesting and while not entirely clear at present will undoubtedly be further elucidated in future studies. Comparison with Todd's findings on "entrenched" Negro physical features after hybridization shows that two of the most stable "entrenched" or dominant Negro features according to his evidence, nasal breadth and lip thickness, yield readily to hybridization according to Day's findings. Yet American Negroes themselves, on those occasions which frequently arise in daily life rely chiefly upon mouth and nose to determine whether a light person with straight hair has Negro blood.

A finding of particular interest is that $\frac{1}{4}$ or less of Negro blood in an individual is marked by no unmistakable physical indications. The author knew of no quadroon who might not easily "pass for white." The manifestations of $\frac{1}{4}$ or less white blood in a Negro are less understood and must be studied further before the complex hereditary relationships can be more clearly defined.

The final conclusions of the study are set forth by Hooton at the close of his chapter on the anthropometric data:

> I cannot see that these data afford any comfort to those who contend that miscegenation between Negroes and Whites produces anthropologically inferior types. . . . The most outstanding fact disclosed by Mrs. Day's investigation, on the physical side, is that within a group of a set proportion of White and Negro blood, features are so combined in some individuals as to create approximations respectively to White and Negro types, together with a majority of intermediates.

Whatever the aspects in which Day's study fell short of its original aims, the work is a distinct contribution to anthropology not only in respect to its findings, but also because it makes available in excellent and unique form data which have long been desired and possibly cannot be obtained again.

Summary of Anthropometric Studies

Though recent anthropometric studies of the adult American Negro are but six in number, these have all been conducted by or under the direction of scientists of the highest standing. The varied circumstances of the several investigations give an indication at once of the complex nature of the problem, the different aspects which have been approached and the difficulties involved in study.

As a result of these investigations it may be stated that:

1. The external differences between American Negroes and whites have been fairly well established. These are related essentially to form rather than function.

2. Some actual effect of a social mechanism tending to consolidate an American-Negro type has been demonstrated.

3. No advantageous nor deleterious effects have been proven to be a consequence of hybridization.

4. The hereditary behavior of differential characters in Negro-white crosses is still imperfectly known. There is evidence that some differential characters are less readily modified by hybridization than others and that within a group of a fixed proportion of white and Negro blood, a majority of individuals will show an in-

termediate combination of features with some approximating the white and some, the Negro types.

External Features

Skin Color.—Greatest interest has naturally centered upon the genetic behavior in the hybrid American Negro of this most conspicuous differential character. The most recent comprehensive study of the subject is that of Barnes.[22] This work is a special analysis of the pigmentation records assembled during Herskovits anthropometric investigation[23] and a critical summary of the results of other workers, principally Davenport,[24] Todd,[25] and Herskovits.[26] The color top was the instrument used to determine the degree of N (black) pigmentation by these investigators. The color top consists of a disc on which are adjustable sectors of black, red, yellow, and white. When spun one color appears and by adjustment of the several colored segments the shade of the skin may be matched. A scale permits the percentage of each color in a match to be read off.

Barnes' results, with which those of Davenport and Todd are in essential agreement, show that:

> The percentage of N pigmentation of the American Negro increases quite rapidly until puberty, with a maximum at the age of 15; decreases rapidly until about the age of 35; and then decreases very slowly the remainder of life.

Davenport found the frequency distribution of N pigmentation in 18 full blood Negroes in Jamaica, to show two modes, one at 45–49 per cent N and the other above 70 per cent N. This led him to postulate a dimorphism of the black element in the skin color of the Negro. On comparing the variability of skin pigmentation in 52 F_1 or first generation offspring of Negro-white parentage with that in 32 individuals of the second or F_2 generation, Davenport found the variation in the F_2 generation was more than twice as great as that of the F_1 generation.

If only one genetic factor were involved, it would be expected that one-fourth of the children in the F_2 would be white; one-fourth, black; and about one-half, mulatto. But in the 32 F_2 individuals only two were white, indicating that more than one factor is involved in black skin pigmentation. After close study of all the data Davenport concluded that: "There are two (double) factors (A and B) for black pigmentation in the full-blooded Negro of the West Coast of Africa, and these are separately inheritable."

The red of the color top itself includes 59 per cent of black. In Barnes' (Herskovits's) series this 59 per cent was subtracted from the red reading of the color top and added to that of the black. Davenport arbitrarily considered the red element of the color top to represent the hemoglobin of the red blood cells, and so did not perform this step. When Barnes so treated Davenport's data his bimodal curve disappeared, and her own curves for all genealogical classes of mixture presented monomodal form.

According to Mendelian principles

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[22] Irene Barnes, "The Inheritance of Pigmentation in the Skin of the American Negro," *Human Biol.*, 1: 321–81 (1929).

[23] M. J. Herskovits, *The Anthropometry of the American Negro.* New York (1930).

[24] C. B. Davenport, "Heredity of Skin Color in Negro White Crosses," (1913).

[25] T. Wingate Todd, and Leona Van Gorder, "The Quantitative Determination of Black Pigmentation in the Skin of the American Negro," *Am. J. Phy. Anthrop.*, 4: 239–60 (1921).

[26] M. J. Herskovits, "Age Changes in the Pigmentation of American Negroes," *Am. J. Phy. Anthrop.*, 9: 321–2 (1926).

the variability of the offspring of parents of approximately the same percentage of N pigmentation should increase as the amount of racial heterogeneity of the parents. The Negroes in the middle ranges of N, being theoretically more heterozygous, should produce more variable offspring than either the very light or the very dark. But when this hypothesis was tested Barnes found that:

> . . . total, family and fraternal variability show essentially the same tendency to increase as the intermixture of white increases being least in the N, or unmixed Negro, and usually greatest in the NWW, which is more white than Negro. Family variability is greater than fraternal variability, which indicates that there is a greater variability between families of the population than within the families themselves.

Concerning the popular assumption that offspring tend to approach the darker parent in pigmentation more nearly than the lighter, Barnes found some evidence that this was the case.

Hooton[27] analyzing Day's records of skin color taken with a Von Luschan color scale on 140 males and 240 females, states that, "so far as our data carry us, there is a close correlation between skin color and amount of Negro blood." This relationship is expressed as a mean square contingency of .73 for males and .71 for females, the maximum value possible for this coefficient would be .926. These results are taken to indicate a Mendelian segregation of skin pigment with multiple factors and no clear indication of dominance.

Hooton notes that Day's females are somewhat lighter than the males but Davenport, Todd, Herskovits, and Barnes emphasize that there is no sex difference in human skin pigmentation.

Dermal Resistance.—The much cited tendency in the Negro to the formation of keloids, or scars of excessive size after relatively slight wounds, has given rise to many explanations. One of these has been elaborated into a thesis by S. J. Holmes, entitled, "The Resistant Ectoderm of the Negro."[28] According to the assumptions of this thesis, keloid formation would be a powerful reaction against injury. The claim is made, based principally upon mortality statistics, that the Negro has an immunity to skin diseases more than that of the white and also to diseases of regions covered by invaginated ectoderm (mouth, anus). The embryological interpretation of ectoderm is fictional. It is stated that, "Another disease to which it has long been recognized that the Negro is relatively immune is diphtheria." Then two and a half pages are devoted to showing that Schick tests and the efficacy of antitoxin indicate no wide differences between the immunity of Negroes and whites. Nearly every point mentioned in this paper requires further study. The "resistant ectoderm" idea has been stated before by others, particularly Bean who describes the Mesomorph Negro as a mesodermopath in contrast to the Hypermorph white who is an epitheliopath.

Hair-Form.—Hair-form like skin color is socially one of the most diagnostic of racial criteria, yet its details and inheritance have been little studied. Davenport and Davenport[29] in a

[27] C. B. Day, *op. cit.*

[28] *Am. J. Phy. Anthrop.*, 12: 139–54 (1928).

[29] G. C. Davenport, and C. B. Davenport, "Heredity of Hair Form in Man," *Am. Naturalist*, 42: 341–49 (1908).

study of 500 white children for two ascending generations, came to the conclusion that straight hair is recessive to the curved types, and that wavy hair is usually, if not always, a heterozygous condition and not merely an intermediate stage that is recessive to a higher stage (curly) and dominant over a lower (straight). This was a Mendelian hypothesis.

R. H. Post[30] analyzing Day's data found confirmation of Davenport's results. He recognized six types of hair-form: straight, low waves, deep waves, curly, frizzly and woolly. The progeny of the primary crosses all had uniformly curly hair. The males were found to have far curlier hair than the females. This difference was greater than among the more Negroidal families, and was only slightly in evidence among the quadroons and still whiter fractions. Hooton comments:

> As far as our data carry us we may conclude that $\frac{1}{2}$N males, $\frac{1}{2}$N females and even $\frac{3}{4}$N females may exhibit the entire range of hair curvatures generally recognized, but that if Mrs. Day's information is valid, distinctively Negroid forms of hair, such as frizzly and woolly, do not appear unless there is at least $\frac{3}{8}$ of Negro blood in the individual.

Peter Browne[31] in 1853 first described the racial differences in the shape of the cross sections of hair which have universally been accorded considerable approval. He divided mankind into three "species": "the cylindrical piled," represented by an Indian, "the oval piled," represented by a white man and "the eccentrically-elliptical piled" represented by a Negro. Danforth,[32] however, points out that Browne's classification has not proven adequate, for the cross-section form varies greatly within the same race and to some extent in the same person.

The cause of the shape of the hair has not been determined. Danforth states that the most plausible explanation is that it is due to the shape and inclination of the hair follicle and that although the finding of Gothe, in 1867, that the follicle of Negro hair is strongly curved or saber-shaped whereas that of peoples with other types of hair is straight, has been amply confirmed by subsequent workers. Opinion has been divided as to whether or not the shape of the follicle could account for the form of the hair.

Distribution of Hair.—Although man is by no means the most hairless of mammals, a reduced amount of hair is a characteristic human trait. Various authors (Davenport and Steggerda, Bean, Day) have stated that the American Negro is more glabrous than the white, but racial variation in the total number of hairs per unit area seems to have been determined for only two regions the face and the fingers.[33]

Trotter,[34] at Washington University, studied the hairs per square inch on five selected areas of the faces of 25 white and 11 Negro cadavera and 945 white and 516 Negro clinical patients. She found no racial differences in the actual number of hairs. But the average thickness of the facial hairs of the whites was greater than that of the Negroes and the hairs of the white

[30] C. B. Day, *op. cit.*

[31] P. A. Browne, Trichologia Mammalium; or a Treatise on the Organization, Properties and Uses of Hair and Wool (1853).

[32] C. H. Danforth, "Hair," *Am. Med. Assn.* (Chicago), (1925).

[33] *Ibid.*

[34] Mildred Trotter, "A Study of Facial Hair in the White and Negro Races," *Wash. Univ. Studies.* (Sci. Studies), 9: 273–89 (1922).

women slightly exceeded those of the Negro women in length.

In man, hair is generally present on the basal segments of the fingers and invariably absent from all the terminal ones. The middle segment shows much variation with apparent familial and racial tendencies. Danforth,[35] in an examination of a very large series of whites, American Negroes, Japanese, and Indians, found that, "the Indian, the Negro, and the Japanese, as races have gone farther towards freeing the mid-digital region of hair than has the white race, although certain numbers of the latter race have reached a stage quite as advanced as that of any representative of the colored races." This tendency to depilation of the fingers and toes seems to be a common one running through all the higher Primates.

Hair reduction may be of two types, an actual diminution in the number of follicles, and a deficiency of growth of the individual hairs. The two types have not been adequately studied but Danforth states that they may occur more or less independently in the white race but are associated in the Negro and Indian.

Hair Weight.—Bernstein and Robertson[36] took ten strands of hair from the center of the scalp of each of 100 male and 100 female Caucasoids, 20 male Mongoloids, and 20 male Negroids, all of college age. The samples were trimmed to five centimeter lengths, washed in ether and weighed on a sensitive balance. The mean weight for the Mongoloids was 4.95 mg., for the Negroids 2.7 mg. and for the male Caucasoids 3.1 mg. "There was very little overlapping between races." Microscopic examination of the cross sections indicated the racial differences in hair weight may be due to a difference in area of cross section and a difference in the quantity of pigment. The hair of the Negroids contained numerous large air bubbles not noted in the other groups.

Sweat Glands. — Exocrine sweat glands arise from the free surface of the skin; the larger apocrine sweat glands take origin from hair follicles. Homma,[37] at Johns Hopkins, made a study of the apocrine sweat glands in skin samples taken from the armpit, middle of the breast, lower abdomen, mons veneris, and the region around the anus, of 12 white subjects and 10 Negroes who appeared to have no white admixture. He found that the apocrine glands were three times more frequent in the Negroes than in the whites. The glands were never found in the white breasts but occurred occasionally in those of the Negroes. There was no difference in the frequency of iron in the glands of the two races.

Glaser,[38] at the University of Cape Town, compared the distribution of the sweat glands without reference to type of gland in a Bantu Negro and a European. His work is mentioned because of its interest although the subject was not an American Negro. Skin samples from 29 arbitrarily chosen sites were studied and it was found that the regional distribution of the glands was the same in both races but

[35] C. H. Danforth, "Distribution of Hair on the Digits in Man," *Am. J. Phy. Anthrop.*, 4: 189–204 (1921).

[36] M. Bernstein, and S. Robertson, "Racial and Sexual Differences in Hair Weight," *Am. J. Phy. Anthrop.*, 10: 379–86 (1927).

[37] H. Homma, "On Apocrine Sweat Glands in White and Negro Men and Women," *Johns Hopkins Hosp. Bull.*, 38: 367–71 (1926).

[38] S. Glaser, "Sweat Glands in the Negro and the European," *Am. J. Phy. Anthrop.*, 18: 371–6 (1934).

the Negro showed a definite superiority in the number of glands present. The latter fact is supposed to be of value in the Negro's better adaptation to tropical climate.

Dermatoglyphics.—Wilder[39] in 1904 began the serious study of the configuration of the papillary lines of the palm and sole by means of prints. His American Negro series of 24 individuals obtained largely from two institutions in Providence, R.I., the Shelter for colored children, and the Home for Aged Colored Women was small. It is impossible to attempt without illustrations a satisfactory resume of Wilder's findings but it will suffice to say that despite a wide variation in all groups he concluded that racial differences could be distinguished which he was able to express roughly by formulae, based on triradiate lines arising near the bases of the four digits.

In 1913, Wilder[40] obtained palm and sole impressions of 100 native Liberian soldiers. The study of these prints confirmed his previous Negro formula, and he described the minute findings in greater detail and with better illustrations. He stated that:

> In the Negro hands 52 per cent show the typical "Negro formula," 7·5·5·3·5. The figures represent lines. In the white hands this appears in only 10 per cent. In the white hands 63 per cent show the formula 11·9·7·2·5, a formula which may be called provisionally the "white formula." In the Negro hands this appears in only 8 per cent.

Cummins[41] in 1930 reported a study of Wilder's Liberian material with revised and amplified methods. He again stated the Negro formula as 7·5·5·–, and cited additional significant racial trends. The findings of Davenport and Steggerda in Jamaica have already been described.

Nose.—The general features of the nasal form of the American Negro have been already discussed with the anthropometric studies. Bean[42] describes three forms of the nose in man to accord with his theory of bodily types. The Negro is represented by the meso-phylo-morph nose which is "massive, long and broad, not very high, with apparently depressed root due to overhanging brows and glabella: it has a straight bridge and nostrils that open downward and slightly forward."

Schultz,[43] at Johns Hopkins University, made dissections of 8 adult white, 23 adult American Negro, and 5 juvenile American Negro noses to determine the relation of the external nose to the bony nose and nasal cartilages. He found that all the nasal cartilages showed racial differences in form.

In the whites the nasal septum projected horizontally from a well developed bony nasal spine; in the Negroes, the septum bent upward immediately in front of a less well developed nasal spine. The lateral nasal cartilages were quadrangular in the whites and triangular in the Negroes. In the Negroes the bilateral greater alar cartilages came into contact in the median line below the septum, but in the whites they were separated by the septum except in concave noses. The nasal cartilages were better de-

[39] H. H. Wilder, "Racial Differences in Palm and Sole Configuration," *Am. Anthrop.*, 6: 244–92 (1904).

[40] ———, "Racial Differences in Palm and Sole Configuration" (II. Palm and Sole Prints of Liberian Natives), *Am. Anthrop.*, 15: 189–207 (1913).

[41] H. Cummins, "Dermatoglyphics in Negroes of West Africa," *Am. J. Phy. Anthrop.*, 14: 9–21 (1930).

[42] R. B. Bean, "Three Forms of the Human Nose," *Anat. Rec.* 7: 43–46 (1913).

[43] A. H. Schultz, "Relation of the External Nose to the Bony Nose and Nasal Cartilages in Whites and Negroes," *Am. J. Phy. Anthrop.*, 1: 329–38 (1918).

veloped in the whites, and, this, the author considered to be a consequence of the greater prominence of the white nose which would entail more cartilaginous support and a greater prominence of the nasal septum.

External Ear.—Based on measurements of 200 ears of American Negro cadavera in New Orleans and 222 of Washington, D.C. Negroes, and an infinite number of observations of ears in various races, Bean[44] announced racial differences in ear type to conform with his universal bodily types the Hypermorph, the Mesomorph and the Hypomorph. He described the Negro ear as being smaller than the white and relatively shorter, less symmetrical and more glabrous and cited numerous detailed points of difference. The Negro ear is stated to represent an advanced stage of regressive evolution. Most conspicuous of the regressive features is the in-rolling of the helix or margin of the ear.

Confirmatory studies are not available and it is difficult for one not intimately acquainted with Bean's methods to classify a random sample of ears with his descriptions and illustrations as criteria.

Additional general observations on the facial appearance are mentioned by Day, Hrdlička and Davenport.

Bodily Types.—As a result of investigations extending over nearly twenty years Bean has described in four papers[45] a classification of human races based on constitutional type. These studies represent an attempt to coordinate recent knowledge gained from experimental embryology, endocrinology, and human ontogeny with information on certain prehistoric human skeletal remains in a theory of human evolution. Similar theories have been suggested by others, notably Stockard[46] and Keith[47] and the general concept is known as the hormone theory of evolution. Although Bean's work deals only incidentally with the American Negro it is cited here because his conclusions contain physiological implications of significance to the Negro.

Bean describes three constitutional types which have been indicated under different names by other authors. Bean's types are: the Hypermorph or Linear type, characterized by measurable features which are long and relatively narrow; the Mesomorph or Bulky type, whose characters are large and relatively broad; and the Hypomorph or Round type, of persons who are usually fat and rounded and whose characters are short and broad.

Using Hrdlička's classification of the races of man into white, yellow-brown, and black, Bean found in the white race only Hypermorphs and Mesomorphs; in the yellow-brown group, Hypermorphs, Mesomorphs and Hypomorphs, and in the Black group only Mesomorphs and Hypomorphs, yet in an earlier publication he made frequent mention of Negro hyper-ontomorphs.[48]

[44] R. B. Bean, "Some Characteristics of the External Ear of American Whites, American Indians, American Negroes, Alaskan Esquimos, and Filipinos," *Am. J. Anat.*, **18**: 201–25 (1915).

[45] R. B. Bean, "The Two European Types," *Am. J. Anat.*, **31**: 359–71 (1923); "The Three Anatomic Types of Africa," *Am. J. Anat.*, **33**: 105–18 (1924); "Types of Man in the Yellow-Brown Race," *Am. J. Anat.*, **35**: 63–80 (1925); "Types of the Three Great Races of Man," *Am. J. Anat.*, **37**: 237–71 (1926).

[46] C. R. Stockard, "Human Types and Growth Reactions," *Am. J. Anat.*, **31**: 261–88 (1923).

[47] Arthur Keith, "The Evolution of Human Races in the Light of the Hormone Theory," *Johns Hopkins Hosp. Bull.*, **33**: 155, 195 (1922).

[48] R. B. Bean, "The Weights of Organs in Relation to Type, Race, Sex, Stature and Age," *Anat. Rev.*, **11**: 326–8 (1917).

The Hypermorph is said to be a high thyroid type, the Hypomorph a low thyroid type and the Mesomorph intermediate. It is suggested that iodine intake associated with a high metabolic rate may have been a factor in the evolution of the Hypermorph because this type is found chiefly near the sea, realizing their most extreme characters about the Baltic and Mediterranean and in Britain. On the other hand, the Hypomorph, as represented by the Lapp, Negrillo, and Eskimo, are found in inland localities living under extremely adverse environmental conditions.

Development of the individual is said to be from the Hypomorph (infantile) stage through the Mesomorph (adolescent) to the final adult Hypermorph stage. Thus the Negro is termed an adolescent form of man, and the yellow-brown infantile, while the Hypermorph white alone reaches the full expression of adult development.

This would be significant were not Bean's conclusions open to serious criticisms. In the first place, his presentations have been so abbreviated that dogmatic expression has been unavoidable, and for this reason, doubtless, evidence for many conclusions at variance with those of competent colleagues has not been made available. Secondly, the definitions of his types are specific but by no means clear. It is stated that physiognomy was the chief basis for classification yet most of the discussion and all of the conclusions are devoted to bodily build. Facts not in conformity with the theory are vaulted over too easily. For example, all Negroes who answer the description of the Hypermorph build are said to have white admixture, whether obviously or not. The long legs and short trunk of the Negro which are Hypermorph characters are explained as arrested adolescent characters, thus, "The extremities grow faster than the torso almost to the age of puberty when the torso grows more rapidly than the extremities. At the beginning of the latter period the legs are relatively longer and the torso relatively shorter than at any other time. This is the condition found in the adult of the Black race." Still another objection is that when the Bean type standards are applied to various population standards by an independent observer almost every individual appears to be a "variant" of one sort or another. Bean himself admits that the number and kinds of "variants" are very great and that his investigations have only "scratched the surface." Our parting comment is that his studies are apparently an overenthusiastic and decidedly premature attempt to synthesize facts from different fields of science into broad generalizations.

Muscles

The passage from the consideration of external bodily features to that of the deeper structures leads directly to the dissecting room and the major portion of the findings discussed in the following pages is from studies on cadavera in the laboratories of Western Reserve University, Washington University and Johns Hopkins University. The character of the population sample represented by the cadavera of Western Reserve has already been indicated.

Concerning the Washington University sample Terry[49] writes:

> The American Negro material received by our department is derived from the poorer class of the native St. Louis population and from the numbers coming to the city from the South during the migration of the past ten or more years. I have no further information on birthplace than that the individuals are native Americans. The age ranges between 16 years and extreme old age with a considerable proportion between 20 and 40.

While a specific statement of the demographic character of the Johns Hopkins cadavera is not available, the Baltimore sample is undoubtedly the result of the same social selective factors as affect the other dissecting room population.

Facial Musculature. — Practically the entire investigative career of Ernst Hüber was devoted to exhaustive and painstaking researches upon the origin and evolution of the muscles of the face. His results are summarized in a small volume from which the quotations that follow are taken.[50]

Hüber describes differences in the architecture of the facial musculature for six races. These differences become apparent, at least between Negro and white, in fetal life. In the Negro type, as revealed by cadavera at Johns Hopkins during the period 1921–31, the facial muscles are said to be less finely differentiated and more crudely constituted and arranged than in the white. The muscles inserted around the mouth, most expressive of the features, are represented as forming in the Negro a coarsely bundled undifferentiated mass, whereas in the white this mass is resolved into distinctly demarcated bands of singularly delicate construction.

As a result, explains Hüber:

> In the responsive faces of whites we notice, especially in the upper region of the face and about the mouth, a great range of varied expressions with many modulations. The mouth, even when closed, may serve as an admirable index of character or mental state through a slightly increased tonus of its musculature. A slight muscle contraction, induced through complex association of ideas, may produce a fine gentle smile. As the underlying thought passes by, the expression around the mouth previous to the smile is gradually restored; but if stronger stimuli are added to the first, these will effect a more marked smile, because additional muscle portions now begin to contract and those already contracted are intensified in their action. . . .
>
> For these fine modulations of expression in the face of the white the necessary basis comprises a readily responsive neuromechanism, rather well differentiated, not too massive mimetic muscles and a not excessively thick, elastic skin. . . .
>
> Could we expect to find equally fine modulations of expression in the face of the Negro? The less differentiated, coarsely bundled mimetic musculature typical of the Negro and the greater thickness of the skin render this improbable. In fact there is a marked difference in facial expression compared with the white. But this is by no means due alone to the structural difference of the involved mimetic musculature and to the increased thickness of the skin but probably more to the difference in the functioning of the neuro-mechanism. Apparently nerve impulses that are less finely graded reach the respective mimetic muscle groups, thus setting them into sudden, strong contraction which rather suggests more primitive muscle actions. The expression is characteristic. Through the strong "labial tractors," especially through the undifferentiated zygomaticus muscle mass, the bulky lips are vigorously pulled upward and outward, so that the large white teeth show in vivid contrast to the dark face. Instead of a graded laugh typical of the white we notice the characteristic grinning of the Negro. And through sounds, often simultaneously uttered, which differ in tone of voice from those of the white, the Negro's grinning becomes even more characteristic.

It is at once obvious that Hüber's acquaintance with the range of facial expression in Negroes was quite limited. Innumerable portrait studies and even a certain vogue in art owe

[49] R. J. Terry, Personal Communication. (1934).
[50] Ernst Hüber, *Evolution of Facial Musculature and Facial Expression* (1931).

their being to the mobile, plastic and sensitive qualities resident in the facial expressions of the Negro.

Observations on American Negro cadavera at Howard University, individuals of the same social origin as those in Baltimore, indicate that the pattern of facial musculature described by Hüber as typical of the Negro does occur but it is not the rule even among subjects of marked Negroid external features. These observations are being continued. Hüber himself admits that in addition to his coarse Negro muscular patterns: "There were noticed also more 'gracile' types, with less strongly developed facial musculature and greater differentiation of the mid-face region. These were apparently more frequent among female bodies. The racial differences as described above were thus not constant throughout. Future investigations on material of purer African strains may show whether this inconstancy of the author's available material of American Negroes was due to the admixture of white blood."

Mammalogists recognize that the female of a species usually reveals more generalized anatomical structure than the male where there are marked sexual differences. Hüber's findings of more 'gracile' muscular structure in the females, generally, would seem to point to a specialization of structure more pronounced in males, rather than a functionally inferior mechanism.

There are no anatomical or neurological facts which warrant the invidious though enthusiastic inferences on degree of cerebral development which Hüber drew from his variable findings.

Eye.—The peculiar appearance of the inner portion of the eyes of Asiatics has directed attention to the so-called Monogoloid fold. Evans[51] describes dissections of the muscles underlying this region in 6 cadavera at Long Island College Hospital, a Japanese, 2 Negroes, a Pole, a Cuban, and a Hebrew. Possibilities of racial differences are suggested but there are no illustrations to make clear what these might be and the series is obviously too small to be conclusive.

Arm.—In a study of muscular mechanics on 54 American Negro and 51 white cadavera at the University of Maryland, the Jefferson Medical College, and Johns Hopkins University, Schultz[52] found that the insertions on the humerus, the bone of the upper arm, of the pectoralis major and deltoid, two powerful muscles which join the arm to the chest, occupied similar positions in both races.

Forearm.—Thompson, Batts and Danforth[53] in an examination of 1,201 whites and 318 Negroes in St. Louis found that the palmaris longus, a slender muscle of the forearm of little functional importance, was absent in one or both arms of 19.5 per cent of males and 29.1 per cent of females in the whites and in 2.5 per cent of males and 7.6 per cent of females in the Negroes, a racial difference in frequency of absence of this muscle which they concluded could not be due to chance or error. Their family

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[51] T. H. Evans, "Tendo Oculi and Pars Orbitalis in Different Races," *Am. J. Phy. Anthrop.*, 8: 411–23 (1925).

[52] A. H. Schultz, "The Position of the Insertion of the Pectoralis Major and Deltoid Muscles on the Humerus of Man," *Am. J. Anat.*, 23: 155–73 (1918).

[53] J. W. Thompson, J. Batts, and C. H. Danforth, "Hereditary and Racial Variation in the Musculus Palmaris Longus," *Am. J. Phy. Anthrop.*, 4: 205–18 (1921).

studies showed absence of the muscle to be a hereditary condition.

Psoas Minor.—Seib[54] determined the incidence of the psoas minor muscle in 250 American white and 250 American Negro cadavera at Washington University. This muscle helps to bend the spine on the pelvis but it is small and of irregular occurrence. It was absent on one or both sides of 64.2 per cent of Seib's entire series. Absence was most frequent in the black race (66.6 per cent); next in the white race (57.1 per cent) and least, according to the literature in the yellow race (49.9 per cent).

Leg.—It has long been an observation both of anthropologists and laymen that the calves of Negroes are more slender and less bulky than those of whites. Because pronounced development of the calf muscles is specifically a human characteristic associated with the upright posture, the structural differences responsible for the differences in external appearance of the calves in the two races have been investigated by several European workers with conflicting results.

The prominence of the calf is produced by a three headed muscle, the triceps surae, of which the superficial upper portion (the double-headed gastrocnemius), is most conspicuous. Williams *et al.*[55] studied the proportions of this muscle in dissections of 73 male white and 59 male Negro cadavera at Washington University and St. Louis University. They found that:

> The tendinous part of either of the two bellies of the gastrocnemius muscle forms a greater proportion of the total length of the muscle in American Negroes than in whites. Conversely, the muscle bellies of Negroes are, in proportion to the total muscle length, shorter than in whites. These facts explain at least in part the slimmer appearance of the Negro calf as compared to the bulkier appearance of the calf in whites. . . . The racial difference in proportion of tendon to muscle is found to obtain whether the stature be short, medium, or tall.

The Negro tibia or shin bone was found to be longer than the white in proportion to the total length of the gastrocnemius muscle and both tibia and fibula were thinner than in the white.

Foot.—The architecture of the foot of man like that of the calf is characteristically human. Functionally significant racial differences, if they occur, would be expected in the patterns of insertion of the principal muscles of the foot. Hallisy[56] after careful dissection of 145 pairs of feet of Western Reserve University cadavera, 93 white and 55 Negro, found no essential racial differences in the mode of insertion and variations exhibited by the muscles on the inner border of the foot.

Many studies of muscles and other soft parts by Continental authors relate to Negroes who do not happen to be of American origin. Because such data are useful for comparative purposes the reader will find Loth's[57] volume on the anthropology of the soft parts an excellent reference. The reader will also find Todd's review[58] of this work of much value.

Internal Organs

The viscera have not been extensively studied for evidence of racial

[54] G. A. Seib, "The Incidence of the M. Psoas Minor in Man," (Abstr.) *Anat. Rec.*, 56: 86 (1934).

[55] G. D. Williams, G. E. Grim, J. J. Wimp, and T. F. Whayne, "Calf Muscles in American Negroes," *Am. J. Phy. Anthrop.*, 14: 45–58 (1930).

[56] Hallisy, J. E. C. "The Muscular Variations in the Human Foot: A Quantitative Study," *Am. J. Anat.*, 45: 411–42 (1930).

[57] Edward Loth, *Anthropologie des Parties Molles* Paris: Masson et cie. (1931).

differences. Those observations which exist are concerned chiefly with the weights of organs and have been compiled by one investigator, Bean.[59] His data were selected, with great care to exclude the abnormal from a large series of necropsy records at the Johns Hopkins Hospital, the Charity Hospital in New Orleans, the Touro Infirmary in New Orleans, and the University of Virginia Hospital. The conclusion was that: "There is not much difference in organ weight (liver, heart, kidneys, spleen) between the white and the colored except for the spleen. The spleen of the American Negro is smaller than that of the American white, and the difference varies from 8 to 25 per cent." Comparing the organ weights according to his classification of bodily types, Bean found that the Hypomorphs and Mesomorphs had large organs and the Hypermorphs small organs, and that the differences between the types was greater than racial differences found.

The foramen ovale of the heart is an aperture which exists during fetal life between the two septa which form a partition between the two atrial chambers of the heart. Usually the opening is obliterated at nine months after birth but reduced in size it may remain patent to adult life. Seib[60] found a frequency of patent foramen of 23.1 per cent in 2,648 recorded observations. He found no racial differences in its occurrence in 250 American white and 250 American Negro cadavera at Washington University.

Blood Vessels

One of the types of investigation which may be pursued with greatest facility in the dissecting room is the study of variations in patterns of branching exhibited by the blood vessels. Consequently, the patterns of branching of the principal arteries and the largest veins in Negroes and whites has been reported upon by several institutions. In the discussion no attempt can be made to elucidate the various vessels cited but readers who have enjoyed biological training will be familiar with most of them.

Aortic Arch.—Williams *et al.*[61] found on examination of 80 white and 70 Negro cadavera at Washington University and St. Louis University that a common origin of the innominate and left common carotid arteries from the aortic arch was 2.6 more frequent in the Negroes than in the whites. This is in accord with Keith's statement on Negroid races in 1895 but not with those of DeGaris' 78 American Negro cadavera.

Subclavian Artery.—Bean,[62] in a study of the subclavian artery in 90 Negro and 24 white cadavera at Johns Hopkins noted an uncommonly large number of anomalies and variations, which he suggests may be explained as hybrid variability. We are not told what percentage of variations would be common.

[58] T. Wingate Todd, "Book Review: Anthropologie des Parties Molles, by Edward Loth," *Anat. Rec.*, 51: 219–22 (1931).

[59] R. B. Bean, "The Weights of Organs in Relation to Type, Race, Sex, Stature and Age," *Anat. Rec.*, 11: 326–8 (1917); "Some Racial Characteristics of the Spleen Weight in Man," *Am. J. Phy. Anthrop.*, 2: 1–9 (1919); "Some Racial Characteristics of the Liver Weight in Man," *Am. J. Phy. Anthrop.*, 2: 167–73 (1919); "Some Racial Characteristics of the Weight of the Heart and Kidneys," *Am. J. Phy. Anthrop.*, 2: 265–74 (1919); "Composite Study of Weight of Vital Organs in Man," *Am. J. Phy. Anthrop.*, 9: 293–319 (1926).

[60] G. A. Seib, "Incidence of the Patent Foramen Ovale Cordis in American White and American Negro Cadavers," (Abstr.), *Anat. Rec.*, 58: 86 (1934).

[61] G. D. Williams, H. M. Aff, Schmeckebier, H. W. Edmonds, E. G. Graul, "Variations in the Arrangement of the Branches Arising from the Aortic Arch in American Whites and Negroes," *Anat. Rec.*, 54: 247–51 (1932).

[62] R. B. Bean, "A Composite Study of the Subclavian Artery in Man," *Am. J. Anat.*, 4: 303–28 (1905).

DeGaris[63] encountered variations in the origin of the subclavian artery in 2.8 per cent of 52 whites at the University of Wisconsin and in 9.3 per cent of 87 Negroes at the same institution and at the University of Mississippi. On the same series this author[64] established two normal patterns of branching of the subclavian artery, A and B, in relation to the thyreocervical trunk or its components. Pattern A had a slightly higher incidence in the whites and pattern B occurred more frequently in the Negroes. Variations from the two normal patterns numbered 42 in the whites and 131 in the Negroes, the incidence in the Negro being nearly twice that in the white.

Axillary Artery.—On the subjects used in the study just mentioned plus an additional number of cadavera at Jefferson Medical College and Johns Hopkins, to bring the total of Negroes to 127 and of whites to 129, DeGaris and Swartley[65] made a study of the branching of the axillary artery. They found two normal patterns A and B. Pattern A, with the more clumped branching, was the prevailing pattern in the Negroes (429.1 per 1,000) and Pattern B, with the more disparate branching the prevailing pattern in the whites (507.7 per 1,000). Variations from the normal patterns had a higher incidence in the Negro, 480.4 per 1,000, as compared with 267.7 per 1,000 in the whites. The authors conclude that there is no justification for assigning different norms to the two races, but there is unqualifiedly more diversity of pattern in the Negroes.

Trotter *et al.*[66] describe their findings on 103 Negro and 99 white cadavera at Washington University. They found that "no variation occurred frequently enough to justify the suggestion of a different 'normal' (from that of the texts) or of a 'second' normal arrangement, with possible exception of the arrangement . . . in the Negro-female group." In 43 per cent of the latter series the arrangement differed from the normal in that the anterior and posterior humeral circumflexes came from the axillary artery by a common trunk. In the male series no racial difference was found "the 'normal' arrangement being present in approximately 50 per cent of both races." These findings do not agree with those of DeGaris and Swartley.

Deep Brachial Artery.—Charles *et al.*[67] at Washington University studied the types of origin of the deep brachial artery in 75 American Negro males and 75 American white males. Their Type I, the "normal" of the texts, in which the deep brachial arises from the brachial by a single trunk, occurred in 55 per cent of the series. Definite differences did not exist between the two sides of the same race, but the right side was slightly more variable in the white group and the left side in the Negro group. This difference is probably a chance one which will disappear when larger series become available.

[63] C. F. DeGaris, "Modes of Origin of the Subclavian Artery in Whites and Negroes, with Report of a Case of Anomalous Right Subclavian Artery," *Anat. Rec.*, **26**: 235 (1923).

[64] ———, "Patterns of Branching of the Subclavian Artery in White and Negro Stocks," *Am. J. Phy. Anthrop.*, **7**: 95–107 (1924).

[65] DeGaris, C. F., and Swartley, W. B., "The Axillary Artery in White and Negro Stocks," *Am. J. Anat.*, 41: 353–98 (1928).

[66] M. Trotter, J. Henderson, H. Gass, R. Brua Weismann, H. Agress, G. Curtis, and E. Westbrook "The Origins of Branches of the Axillary Artery in Whites and in American Negroes," *Anat. Rec.*, **46**: 133–37 (1930).

[67] C. M. Charles, L. Penn, H. Holden, R. Miller, and E. Alvis, "The Origin of the Deep Brachial Artery in American White and American Negro Males," *Anat. Rec.*, **50**: 299–302 (1931).

Femoral Artery.—At Washington University Williams *et al.*[68] compared the patterns of origin of the deep and circumflex femoral group of arteries, on the right side of 55, and the left side of 52, male white cadavera; and the right side of 29, and the left side of 30, Negro males. They found no racial differences which they felt were more than suggestive. The text-book "normal" variety of origin occurred with 10 per cent greater frequency in the Negroes.

Superficial Anticubital Veins.—The readily accessible superficial veins in front of the elbow are employed for many clinical purposes. The greater variability in the arrangement of these veins has long been recognized. In 62 male American Negro and 60 male American white cadavera at Washington University, Charles[69] studied the patterns of these veins. He described five principal types of arrangement. These that are commonly described in the textbooks occurred in 70 per cent of the entire series. The arrangement Type IV was more frequent in the Negroes and Type III in the whites. In view of the marked predominance of the "normal" type in both races, this difference is hardly significant.

Azygos System of Veins.—This venous complex drains the walls of the torso. Seib[70] at Washington University divided the thoracic azygos patterns found in 100 American Negro and 100 American white cadavera into three groups of types: double column, transitional, and single column. The single column type was significantly predominant in the Negroes and the double column type significantly predominant in the whites. The author's figures and evaluation of his findings are not available at this writing.

Circumflex Veins of the Thigh.—The mode of termination of the circumflex veins of the thigh exhibits considerable variation. Charles *et al.*[71] studied, at Washington University, arrangements in 53 white males, right side; 52 white males, left side; and 30 Negro males, right and left sides. They found that again the text-book "normal" was the type of most frequent occurrence and that the Negro appeared to be slightly less variable than the white in the mode of termination of the circumflex veins. The authors caution that their conclusions are only tentative.

Brain and Nerves

Absolute demonstration of quanitative racial differences in cerebral structures whose function is precisely known would swiftly end all controversy about the mental potentialities of the brains of various peoples and individuals. The fact is, however, that anatomical structure and mental processes have by no means been correlated to a satisfactory degree, so that the demonstration of an anatomical difference carries only limited functional implications. In addition, the soft plastic character of the brain and the changes which it undergoes in preservatives make it frequently difficult for the original form and dimen-

[68] G. Williams, R. Sindelar, J. Peart, N. Martin, L. McIntire, and C. Martin, "Origin of the Deep and Circumflex Femoral Group of Arteries," *Anat. Rec.*, 46: 273–9 (1930).

[69] C. M. Charles, "On the Arrangement of the Superficial Veins of the Arbital Fossa in American White and American Negro Males," *Anat. Rec.*, 54: 9–14 (1932).

[70] G. A. Seib, "The Azygos System of Veins in American Whites and American Negroes," Including Observations on the Inferior Caval System," *Am. J. Phy. Anthrop.*, (In press) (1934).

[71] C. M. Charles, "On the Termination of the Circumflex Veins of the Thigh," *Anat. Rec.*, 46: 125–32 (1930)

sions of the organ to be determined. Again, the range and character of variation in large series of brains from many selected groups should be available for comparison. Too few such series exist.

It is apparent that the detection and and interpretation of significant differences between different types of men is a problem for the expert neuroanatomist, so great are the possibilities for error in objective determinations and for introduction of the subjective quality in interpretations. When in 1906 Bean[72] described racial differences between the brains of Negroes and whites which he had found after examination of 103 specimens from American Negroes and 49 specimens from whites, most of which were in the Anatomical Laboratory of Johns Hopkins University, he had had by his own statement (p. 410) little previous experience in handling brains. The frequent interpolation of statements of the invidious connotation such as the following, "Type IV. This represents the tall, fair-skinned Negro (or mulatto), of the enterprising nature, but the most dangerous of all characters to human society. Rape and murder attach themselves here," indicate very clearly that the subjective element had been very strongly projected into the author's interpretations. It occasions no surprise, therefore, when it is noted that dissatisfaction with Bean's results prompted Mall,[73] under whose direction Bean's study was made, to make his own investigation. Mall's own report has made of Bean's study a now classic example of the discreditable results that accrue from attitude biased in scientific study.

In a later study Bean[74] reports on differences found in the temporal lobe of the brain between American Negroes and whites. In this paper no mention is made of Mall's criticisms.

The gist of Bean's findings is that the Negro brain is smaller than the white, especially the frontal and temporal lobes and also the fore part of the corpus callosum, the great association tract whose fibers connect the two hemispheres. The implications of these findings are almost fantastically elaborated.

Mall pointed out technical, instrumental and personal sources of error in Bean's work as well as contradictory results. Using the racial criteria of Bean and others Mall and his associates were unable to satisfactorily identify race in mixed assortments of brains. Mall concluded his report as follows:

> In this study of several anatomical characters said to vary according to race and sex, the evidence advanced has been tested and found wanting. It is found, however, that portions of the brain vary greatly in different brains and that a very large number of records must be obtained before the norm will be found. For the present the crudeness of our method will not permit us to determine anatomical characters due to race, sex or genius and which if they exist, are completely masked by the large number of marked individual variations. The study has been still further complicated by the personal equation of the investigator. Arguments for difference due to race, sex and genius will henceforward need to be based upon new data, really scientifically treated and not on the older statements.

Poyntner and Keegan[75] reported from the University of Nebraska, a

[72] R. B. Bean, "Some Racial Peculiarities of the Negro Brain," *Am. J. Anat.*, **5**: 353–415 (1906).

[73] F. P. Mall, "On Several Anatomical Characters of the Human Brain, Said to Vary According to Race and Sex," *Am. J. Anat.*, **9**: 1–32 (1909).

[74] R. B. Bean, "A Racial Peculiarity in the Pole of the Temporal Lobe of the Negro Brain," *Anat. Rec.*, **8**: 479–92 (1914).

[75] C. W. M. Poyntner, and J. J. Keegan, "A Study of the American Negro," *J. Comp. Neur.*, **25**: 183–202 (1915).

study of 13 male, 3 female adult brains and 1 fetal brain from American Negro cadavera who presented very marked Negroid features. They noted, "A general characteristic of the Negro brain which has been remarked by a number of observers, is the prominent parietal lobe in contrast to the 'ill filled' frontal region." They concluded that:

> There is an essential difference between the Negro and the Caucasian brain. This consists in a fairly constant variation of the Negro brain from an imaginary average type of fissuration obtained by a study of a large number of Caucasian brains. But the Negro type thus established lies within the limits of individual variation for the Caucasian, hence it is not possible to establish a single morphological feature which can be claimed as absolutely characteristic.

After additional years of experience Poyntner[76] wrote in 1917:

> When we take into consideration all of the relative characteristics of the Negro brain, we may conclude that, while it does not necessarily suggest a closer relation to the apes, it is not as highly developed as that of other races observed and is consequently inferior to them.

Mall's criticisms and those of Wilder[77] apply equally to Bean's and Poyntner's work. Although Mall wrote in 1909, the "arguments" based on new data have not yet appeared. However, Kappers[78] of Amsterdam, writing in 1929, presented a summary of the scant existent data on the anthropology of the brain in which Bean's results were stated rather fully although other citation shows that the author was familiar with Mall's work also.

Shortly, it will be seen that recent knowledge of the forms of cranial patterns of growth provide a new approach to the study of the brain itself which may help to clarify the problems presented by differences and variation in adult brains.

Phrenic Nerve.—Schureman[79] studied the origin, course, and relations of the phrenic and accessory phrenic nerves in 75 male American white and 75 male American Negro cadavera at Washington University. The phrenic nerve supplies the diaphragm, the principal muscle of respiration. An accessory phrenic nerve was present in 36.6 per cent of the sides of the body examined by Schureman. He found no significant differences between the races.

Brachial Plexus.—The nerves which supply the upper limb arise from a complex network which lies beneath the collar bone formed by nerves from the spinal cord. Over a fifteen year period, first at Johns Hopkins University and later at Cornell University, Kerr[80] collected well validated records of the patterns formed by this plexus on 90 American Negro and 85 white cadavera. On the basis of the number and amount of cervical spinal nerves entering the plexuses at their upper border the plexuses were divided into three groups. Kerr stated that, "so far as this investigation has been carried, it does not show that sex, color or side of the body has any influence whatever in determining the group of plexus." Assymetry of the plexuses on the two sides of the body occurred most often in white males, least often in colored males, and more

[76] ———, "Some Conclusions based on Studies in Cerebral Anthropology," *Am. Anthrop.*, **19**:

[77] B. G. Wilder, *The Brain of the American Negro* (1909).

[78] C. U. Kappers, Ariens, *The Evolution of the Nervous System in Invertebrates, Vertebrates and Man.* Haarlem: De Erven F. Bohn, pp. 198–302 (1929).

[79] O. P. Schureman, "On the Phrenic and Accessory Phrenic Nerves in American Whites and American Negroes," (Abstr.) *Anat. Rec.*, **58**: 86 (1934).

[80] A. T. Kerr, "The Brachial Plexus of Nerves in Man, the Variations in its Formation and Branches," *Am. J. Anat.*, **23**: 285–395 (1918).

often among colored than white females. This indicates absence of significant racial difference.

Lumbo-Sacral Plexus.—Bardeen and Elting[81] in a statistical study of records of a large series of dissections of white and Negro cadavera at Johns Hopkins noted that race seemed to play no marked part in the number or kind of variations found in the lumbo-sacral plexus from which pass the nerves to the lower limb and crotch.

Sciatic Nerve.—The sciatic nerve is the largest nerve in the body. It supplies the muscles on the back of the lower limb. It is composed of two main divisions which usually separate in the lower third of the thigh, but the point of separation varies considerably. Bardeen and Elting found that sex, race, side of body and skeletal conditions had no intimate association with the natural separation of the sciatic nerve. In from 10 to 20 per cent of cases this nerve or a portion of it pierces the piriformis muscle. Trotter,[82] on 117 white and 114 Negro cadavera at Washington University, determined that variations from the usual relationship of the sciatic nerve to the piriformis muscle occurred with about 5 per cent greater frequency in white males than in Negro males.

Cross-Section Area.—There is close relation between the area of a nerve root and its contained fibers. Todd, McGaw and Kuensel[83] measured the cross-sectional area of the brachial (upper limb) and lumbo-sacral (lower-limb) plexuses of 24 white and 7 Negro cadavera at Western Reserve University. A larger series was not studied because it had become apparent that the technical difficulties of the method rendered it unsuitable for routine use. The data obtained revealed no racial differences.

Ide[84] made a study of the cross sectional area of sets of nerves from 21 white and 29 Negro male cadavera and 16 white and 14 Negro female cadavera from Western Reserve University. The nerves used were the median, sections from the middle of the upper arm, and the sciatic, sections from the upper third of the thigh. He reported that measurements of the entire cross-sectional area, the number of fasciculi, the area of the fasciculi, and the area of the largest fibers all gave higher values for the Negro male than for the white male and for the Negro female than for the white female. This implied a more rapid rate of nerve impulse in the Negro. The difference between the sexes in the whites was greater than in the Negroes. The smallness of the size and the number of correctional factors which had to be applied to the data make it doubtful if these valuable findings may be accepted as final.

Skeleton

Because of the physical character of bones it has been possible to subject the skeleton to more thorough and complete examination than most other

[81] C. R. Bardeen, and A. W. Elting, "A Statistical Study of the Variations in the Formation and Position of the Lumbo-Sacral Plexus in Man," *Anat. Anz.*, **19**: 132, 209 (1901).

[82] Mildred Trotter, "The Relation of the Sciatic Nerve to the Piriformis Muscle in American Whites and Negroes," *Anat. Rec.*, **52**: 321–3 (1932).

[83] T. W. Todd, W. H. McGaw, W. M. Kuenzel, Measurements of the Brachial and Lumbo-Sacral Plexuses in Man," *Am. J. Phy. Anthrop.*, **8**: 281–91 (1925).

[84] Hiro Ide, "On Several Characters Shown by the Cross Sections of the Median and Sciatic Nerves of Human Males According to Race," *J. Comp. Neur.*, **51**: 457–88 (1930); ———, "On Several Characters Shown by the Cross Sections of the Median and Sciatic Nerves on Human Females and a Comparison of these with the Corresponding Observations on the Male Nerves from Whites and Negroes," *J. Comp. Neur.*, **51**: 489–521 (1930).

rts of the body. Consequently any anthropological treatises relate the bones. Western Reserve Uni-rsity (800 complete skeletons) and ashington University (550 complete eletons) house the only two skeleton llections of American Negro mate-al of significant size yet assembled id it is upon these collections that ost skeletal studies of the American egro have been made.

Skull

Cranial Capacity.—In his well-nown exhaustive monograph on ranial capacity Todd[85] published in 923 the mean cranial capacities as etermined by the water method f 167 male and 31 female white adavera and 87 male and 17 female Negro cadavera. He commented:

> Cranial capacity in the Reserve material is unexpectedly low. The averages are the following: male White 1391cc.; female White 1232cc.; male Negro 1350cc.; female Negro 1221cc. The sociological factors at work are probably responsible for these figures but there is reason to believe that entirely different sociological influences are affecting the White and Negro groups.

Todd compared his American Negro means with those of two series of African crania, Batetela and Gaboon. The means of his groups fell between those of the two African series, and coincided with the values which Pearson in 1912 had predicted as probable for the Negro. These circumstances coupled with the fact that the social selective factors operative for the Negro cadavera seemed to differ from those for the white cadavera in being, "less of crime and moral obliquity than of misfortune and hereditary disadvantages," led Todd to the conclusion that, "our series is fairly representative of the population at large, and that contact with the White man, and even the formation of hybrid material, over three hundred years has not in the slightest obscured the plainly Negro characters."

It was always apparent to Todd, however, that the low head height was the dimension chiefly responsible for the small cranial capacity of both his white and Negro cadavera. When Herskovits[86] later proved his sample representative of the American Negro as a whole, and this large sample had a high mean height and a large cranial capacity (1603 cc.) as calculated roughly by Hrdlička's approximate method (head length—breadth—height—height—3), the effect of social selection became more obvious. Meanwhile, Todd had obtained evidence that in years of depression the cranial capacity of the cadavera showed an increase, indicating a better class of individual, so in 1928 after additional investigation he stated specifically that low head height in his white and Negro samples, appeared to be a "corollary of social status."

Racial Features.—Hrdlička[87] in his catalogue of the United States National Museum crania presented measurements of 56 "full blood" American Negro skulls and 122 Negro skulls for West, East, and South Africa. He commented that the data showed two outstanding results. "One is the close relation of the Negro skulls from widely separated parts of Africa. The

[85] T. W. Todd, "Cranial Capacity and Linear Dimensions in White and Negro," *Am. J. Phy. Anthrop.*, 6: 97–194 (1923).

[86] M. J. Herskovits, *The Anthropometry of the American Negro.* New York (1930).

[87] A. Hrdlička, "Catalogue of Human Crania in the United States National Museum Collections: Australians, Tasmanians, South African Bushmen, Hottentots, and Negro," *Proc.*, U. S. Nat'l. Mus., 71: 1–140 (1928).

second is the practical identity to this day of the American with the African Negroes." He stated also that, "All through the material is charterized by a poor development in the males of the external sex characters of the skull, particularly supraorbital ridges. . . . Tendency to premature occlusion of the sagittal suture and consequent cranial deformation, especially scaphocephaly, necessitating the elimination of the specimen from anthropometric work is met with in all the groups, but is much more common in the American than in the African Negro."

The series of American Negro skulls is so small that a pronouncement on the incidence of premature union of the sagittal suture seems unwarranted. Todd in his careful study of suture closure records no finding resembling Hrdlička's. Todd shows that suture closure occurs as a definite stage of development. The sutures of the vault of the skull, the sagittal, coronal and lambdoid, tend to close together. A general tendency to acceleration of development which may be detected in the character of the symphysial face of the pubic bone, may be manifest in the skull as premature suture union. When this occurs it usually does so by the age of seven years according to Bolk.[88] Retardation of suture union is as common a phenomenon as acceleration. None of the skulls white or Negro, discarded by Todd[89] from his series for age standards because of precocious union, exhibit closure of the sagittal suture alone.

[88] L. Bolk, "On the Premature Obliteration of Sutures in the Human Skull," *Am. J. Anat.*, **17**: 495–523 (1914).

[89] T. W. Todd, and D. W. Lyon, "Endocranial Suture Closure: Its Progress and Age Relations," (Parts I–IV) *Am. J. Phy. Anthrop.*, **7**: & **8**: (1924, 1925).

Todd and Tracy[90] set out to find a means to express quantitatively and to analyze with greater precision those features which mark off the Negro from the white and thus obtain a clearer idea of the effect of hybridization between the white and colored peoples of America. They soon discovered that, "features characteristic of sex and others which are related more properly to growth of the skull confuse the issue. It therefore became necessary to distinguish very carefully between the features which indicate growth and those which characterise racial origin. This, however, is easier in theory than in practice and ultimately it was decided to consider growth and race as different aspects of the same problem." The final decision represents a new and promising method for anthropologists. It was the logical results of the accumulated findings of many investigators of the physical problems of race.

The forehead and lateral contour of the cranium were the regions found best adapted for study. The brow ridges or eminences above the eyes were found to present a key feature to cranial architecture. With smooth or undulating brow ridges were associated eye sockets with sharp margins, rounded glabellae, plain junction between the bones of the forehead and nose, and wide inter-orbital distance. This was called the U-type skull and given the formula USRPW to signify the characters just mentioned. When, however, the brow ridges formed prominent eminences or mesas they tended to be associated with eye sockets with blunt margins, depressed

[90] T. Wingate Todd, and G. Tracy, "Racial Feature in the American Negro Cranium," *Am. J. Phy. Anthrop.*, **15**: 53–110 (1930).

glabellae, beetling junction between forehead and nasal bones and narrow inter-orbital distance. This was called the M-Type skull and designated by the formula MBDBN to denote its characteristic features.

In the U-skull the highest point of the vault or vertex lies in front of the vertical plane through the ear holes (auricular point, Frankfort plane). In the M-type of skull the vertex tends to lie behind the auricular point. The U-skull is thus the type with smooth bulbous forehead and the M-type presents the ridged forehead with more marked slope. Intermediate or "Mixed" forms also occur. Although, "there are no absolutely discriminating traits inheritable in full value to distinguish Negro from White," a series of white skulls will be richest in M-type features and a series of Negro skulls richest in those of the U-type.

Todd and Tracy compared the incidence of U, M, and Mixed type skulls in the Von Luschan collection of 277 West, East and, South African skulls, 398 American Negro skulls in the Western Reserve and Parsons series of 65 Anglo-Saxon skulls, a more homogeneous series of whites than would be found in this country. M-type Negroes fell into a position intermediate between the U-type Negroes and the whites and established a well graded series from the rounded forehead of the U-type Negroes to the predominately angular one of the whites. In the white series there were found 84 per cent M-skulls and 16 per cent U-skulls; in the American Negro series the corresponding figures are 66 per cent and 34 per cent, respectively, and in the West African series, the M-skulls are 33 per cent and the U-skulls 67 per cent. The position of the American Negro series would seem to tempt genetic inferences but because "no feature can be used as an unequivocal indicator of Stock and what we may call typical Negro and White skulls are merely individual specimens at the extreme ends of the range," the authors limit their conclusion to the statement that, "homogeneity is more marked among the U-type Negroes of Africa than among the corresponding American Negro material."

The cranial features analyzed in this study thus indicate the intermediate character of the American Negro material between white and African groups and demonstrate "the futility of hoping to obtain a graded expression of hybridization from the study of individuals."

Since U-type and M-type skulls each presented characteristic lateral silhouettes comparable distinctions were sought in the individual cranial bones, through superposition of orthodiagraphic tracings. It was found that the lateral contour of the skull is relatively stable in U-type Negroes and short-headed whites, because individual differences are provided for in relative breadth in whites and in backward prolongation of the occiput in Negroes. On the other hand M-type Negroes and long-headed whites the lateral contour is very variable because in these types individual differences find expression in the contour of the vertex. Here we have for the first time differences in cranial architectural pattern which have hitherto been expressible in subjective terms, definitely established by the orthodiagraphic craniostat.

Todd and Tracy compared mean values of the bodily dimensions of 11 U-type individuals and 12 M-type individuals in his American Negro series, with those of the white and Negro standards in his original dimensional study, in a further effort to detect effects of hybridization. It might be expected that the M-type Negroes would show a general tendency toward the means of the white series. Only four traits showed such a trend, external antero-posterior pelvic diameter, ear breadth and height and skin pigmentation. This finding confirmed Todd's earlier statement on "entrenched" traits by indicating, "a segregation of features into those relatively stable and those readily modified by hybridization."

In order to detect variations in contour which might be due to interruptions in growth a series of 20 young Negro skulls was studied by the superposition of orthodiagraphic tracings and the general cranial growth pattern determined. These growth patterns for both Negroes and whites have since been greatly amplified by meticulous studies on large series of the living.[91]

Craniometry.—A large number of craniometric studies have been made upon the collections of the Hamann Museum and the United States National Museum by Cameron.[92] These have been concerned chiefly with various indices in different races and have the value which attaches to such indices. Conspicuous external racial differences such as the short wide nose of the Negro were confirmed on the skull of the American Negro.

Cameron found that in the American Negro the total length of the base of the skull in front of the opening through which the spinal cord passes is about 1 mm. greater than in the white. This portion of the skull is occupied chiefly by two depressions, the anterior and middle cranial fossae, in which rest the frontal and temporal lobes of the brain respectively. Another depression, the sella turcica, contains the pituitary gland and is situated in the mid-line between the anterior and middle fossae of the skull. Measurement of the distance from the front of the skull to the anterior boundary of the sella showed the white to be about 1 mm. longer than the Negro in this dimension thus giving the Negro according to Cameron less room for the frontal lobe. The discrepancy is accounted for by the fact that the two cranial fossae are not on the same level. By measurement of an angle, the main angle of cranial flexion (nasion to pituitary point, pituitary point to basion), which is nearest a right angle in the white race, Cameron showed that the length of the skull anterior to the opening for the spinal cord (nasion-basion distance) diminished as the main angle decreased. In lemurs this angle is almost a straight line and diminishes progressively from the lower to the higher primates to its smallest value in the white man. The slightly greater value Cameron found for the line in Negro held for both sexes.

Cameron devised also a triangle called the inferior frontal triangle which had for its base the nasion-

[91] T. Wingate Todd (Unpublished Studies of the Brush Foundation).

[92] (See: list of studies in "Selected Bibliography' at the end of this volume.)

pituitary line he had found 1 mm. longer in whites than in Negroes. The upper limits of the triangle were determined by the height of the frontal bone. Cameron suggested an evolutionary scale based on progressive increase in the size of this triangle which is largest in the white man.

Cameron[93] implies from his observations that the frontal and sphenoidal sinuses are larger in the Negro than in the white.

These studies must be regarded as incomplete because they deal only with the architecture of part of the brain case. Undoubtedly the author will complete and coordinate them in the future.

Hrdlička[94] determined from measurements of 55 Negro, 90 white and 20 Indians skulls in the National Museum that the middle or temporal fossa in the Negro in which the temporal lobe of the brain lies was small both absolutely and relative to the maximum external length of the skull.

The pituitary body is assuming an increasing importance in clinical medicine. The data on the dimensions of the cranial fossa which contains it, and thus indirectly of the organ itself, are insufficient. As a contribution to the subject Pruett[95] reported from Washington University that measurements of 56 white and 42 Negro pituitary fossae revealed no appreciable racial differences in size, but in the male Negro the fossa averages a little longer and deeper than in the white.

Internal Nose.—Although the external nose has been studied extensively little investigation has been done on the internal nose. Pitkin[96] on 100 male white skulls at Western Reserve made an initial modern analytical study of the problem. The later monograph of Charles[97] is the principal racial contribution to date. This author's study was based upon 100 white, 100 American Negro, and 5 African Basuto skulls at Washington University. The American Negro skulls were divided into three groups according to the apparent purity of Negroid strain of the individuals from whom they had come. Charles' principal findings were: (a) the anterior nasal aperture opening on the face of the posterior nasal aperture opening into the upper throat are lower and broader in the American Negro than in the white; (b) the floor of the nasal cavity is not as long in the Negro as in the white; (c) the total nasal or septal area is less in the Negro, but the olfactory triangular area, which includes the greater part of the upper lateral walls of the basal chamber, is the same in both races; (d) the phyletic trend of the nose to swing under the cranium with greater expansion of the brain case has progressed further in the white than in the Negro; (e) a tendency to the establishment of metrical differences between the three Negro sub-groups representing increasing amounts of white admixture is definite; and (f) in the majority of measurements the

[93] J. Cameron, "The Level of the Pituitary Point in the Basis Cranii in the White and Negro," *Am. J. Phy. Anthrop.*, 12: 155–63 (1928); "The Level of the Naison in the White and Negro," *Am. J. Phy. Anthrop.*, 12: 164–75 (1928).

[94] A. Hrdlička, "Measurements of the Cranial Fossae," *Proc.*, U.S. Nat'l. Mus., 32: (1907).

[95] B. S. Pruett, "On the Dimensions of the Hypophyseal Fossa in Man," *Am. J. Phy. Anthrop.*, 11: 205–22 (1928).

[96] C. E. Pitkin, "An Analytic Study of Nasal Form," *Ann.*, Otol. Rhinol., & Laryng., pp. 24 (1924).

[97] C. M. Charles, "The Cavum Nasi of the American Negro," *Am. J. Phy. Anthrop.*, 14: 177–253 (1930).

American Negro is differentiated from the African Negro in both male and female, these distinctions being more marked in the sub-groups with evidence of white admixture.

Shrinkage.—Bones shrink appreciably on drying and consequently alter their dimensions. The cranial capacity of a skull diminishes about 50 cc. on drying, an amount approximating the volume of the cerebral membranes. In a series of investigations on the effects of maceration and drying on bones, Todd[98] found no differences in the behavior of the skull between white and Negro. Ingalls[99] working with the same collection found that the femur shrank slightly more rapidly and to greater degree in the Negro than in the white and that the Negro femur approximated its original size more quickly and more closely than did the white. Todd and Pyle[100] found no significant differences in the behavior of the vertebral column. The series used in these investigations were all of necessity small.

Upper Limb

Clavicle.—Terry[101] at Washington University studied 100 pairs of clavicles or collar bones, of American Negroes and 50 pairs of American whites. He reported that the lateral extremity of the Negro clavicle appears to be relatively and absolutely smaller and more slender than that of the white which has a broader more spatulate form. In addition the conoid tubercle of the bone is less constant and more slightly developed in the Negro, and the Negro clavicle may possibly be relatively longer.

The ends or epiphyses of long bones are ossified but do not unite to the shafts until maturity. The clavicle is an epiphysis only on its inner end. Todd and D'Errico[102] showed that the lateral extremity does have an epiphysis which ossifies irregularly and rapidly joins the shaft so that it is very infrequently detected. No racial distinctions were found in the union of either epiphysis of this bone.

Scapula.—The vertebral border of the scapula or shoulder blade, which is the inner border parallel to the spine, may be convex, straight or concave in contour. Graves[103] in numerous investigations has shown that a random sampling of the various elements in our population composed of persons in the first ten years of life, approximately 80 per cent of such persons will have straight or concave scapulae which together he calls the scaphoid type, and 20 per cent the convex type; whereas, in a random sampling of individuals of seventy years or over, approximately 20 per cent will now have the scaphoid scapula but 80 per cent will have the convex type. Since the contour of the shoulder blade is determined by the twelfth week of fetal life and does not change thereafter, Graves' finding can mean only that possessors of scaphoid shoulder blades do not survive to old age in as large numbers as possessors of the convex type. Graves

[98] T. Wingate Todd, "The Nature of Mummification and Maceration. II. Female and Negro Skulls," *J. Anat.*, 60: 309–28 (1926).

[99] N. W. Ingalls, "Studies on the Femur. III. Effects of Maceration and Drying in the White and Negro," *Am. J. Phy. Anthrop.*, 10: 297–321 (1927).

[100] T. Wingate Todd, and S. J. Pyle, "Effects of Maceration and Drying upon the Vertebrae Column," *Am. J. Phy. Anthrop.*, 12: 303–19 (1928).

[101] R. J. Terry, "The Clavicle of the American Negro," *Am. J. Phy. Anthrop.*, 16: 351–79 (1932).

[102] T. Wingate Todd, and J. D'Errico, "The Clavicular Epiphyses," *Am. J. Phy. Anthrop.*, 41: 25–50 (1928).

[103] W. W. Graves, "The Relations of Scapular Types to Problems of Human Heredity, Longevity, Morbidity and Adaptability in General," *Arch. Int. Med.*, 34: 1–26 (1924).

therefore has termed the scapular type an index of human fitness and it is the only single character in the body which may be so designated.

Sterling[104] was the first to secure data on the incidence of scapular types in large numbers of Negro school children. She compared the findings on 5,062 Negro children in Atlanta, Ga., with those on 3,357 white children in Du Page County, Ill. The incidence of the types in the white children corroborated Graves reports but in the Negro children Sterling found a much greater percentage of convex types, namely 48 per cent in children of ten years and under. She concluded: "It would seem that there can be little room for doubt that the difference is a racial characteristic."

In a personal communication to the writer Graves points out several important technical faults in Sterling's work with which his own experience has made him sympathetic, but supplies new data of his own on Negro school children shortly to be published, and finally states: "My own investigations, whether in skeletal or living material, have shown no appreciable differences in the percentages of convex and scaphoid types, between White and Negro stocks in similar age periods and in material of similar nature."

Humerus.—Two variations in the human body of no practical functional importance which have been studied for possible anthropological significance are the supracondylar processes and septal apertures which sometimes feature the humerus or arm bone.

The supracondyloid process is a bony spur which occurs on the anteromedial surface of the humerus about one and a half inches from the end of the bone. In some lower mammals the structure may form a bony arch through which the principal artery of the arm passes. It is a rare variation, the incidence of which has been studied recently by Hrdlička[105] and Terry.[106] It was found by the latter author in 2.8 per cent of white Missouri prison inmates, the highest incidence cited. In 1,000 adult American Negroes Terry was able to find but one possessing the variation. He estimated that the supracondyloid process occurs about twelve times more frequently in whites than in Negroes.

That portion of the humerus which is just above the joint surface for articulation with the ulna, the bone of the elbow, is always a relatively thin septum. Perforations of this septum are called septal apertures. They are evidently not produced by impact of the ulna either in front or behind.

In his comprehensive monograph on the subject Hrdlička[107] attaches phyletic significance to the variation. It occurs with varying frequency in different races. Hrdlička found it in 4.19 per cent of 2,361 male and 9.57 per cent of 993 female whites and in 13.08 per cent of 130 male and 28.79 per cent of 66 female American Indians. Trotter,[108] in the Washing-

[104] E. B. Sterling, "Health Studies of Negro Children," *U.S. Pub. Health Rep.*, (Repr. No. 1251): 2713–2774 (1928).

[105] A. Hrdlička, "Incidence of the Supracondyloid Process in Whites and Other Races,' *Am. J. Phy. Anthrop.*, 6: 405–12 (1923).

[106] R. J. Terry, "A Study of the Supracondyloid Process in the Living," *Am. J. Phy. Anthrop.*, 4: 129–39 (1921); "On the Supracondyloid Variation in the Negro. *Am. J. Phy. Anthrop.*, 6: 401–403 (1923); "New Data on the Incidence of the Supracondyloid Variation," *Am. J. Phy. Anthrop.*, 9: 265–70 (1926); "On the Racial Distribution of the Supracondyloid Variation," *Am. J. Phy. Anthrop.*, 14: 459–62 (1930).

[107] A. Hrdlička, *Anthropologie.* Prague: (1932) pp. 10, 31–96.

[108] M. Trotter, "Septal Apertures in the Humerus," *Am. J. Phy. Anthrop.*, (In Press) (1934).

ton University collections, found an incidence of 4.3 per cent for American whites and 12.6 per cent for American Negroes.

Torso

Atlas.—The atlas is the first vertebra. Upon it rides the skull. In man it is a greatly reduced element being merely a bony ring whereas in the lower mammals it is usually a very robust segment. Ossenfort,[109] on 102 atlases from whites and 81 from Negroes at Washington University, showed that the tendency toward variations and retrogressive changes in the atlas was more marked in the white than in the Negro.

Thoraco-Lumbar Vertebrae.—Man and the anthropoid apes have lost their tails and with them the tail vertebrae. There is an additional tendency in these primates for the pelvis, which gives attachment to the lower limbs, to shift upward on the vertebral column still further reducing the number of vertebrae. The morphological factors here involved have been elucidated by Todd,[110] and Willis.[111]

The position of the pelvis on the vertebral column has become much more stabilized in man than in the anthropoids. Human beings have 12 chest (thoracic) and 5 back (lumbar) vertebrae with little variability. The number of thoraco-lumbar vertebrae in the anthropoids is very variable indicating a pattern less stable than that of man. Todd has shown that variations in the number of thoraco-lumbar vertebrae occur slightly more frequently in the Negro than in the white.

Entire Spine.—Todd and Pyle[112] found no differences in Western Reserve material between Negroes and whites in total spine length or in cervical, thoracic or lumbar segments. Trotter,[113] on 92 Negro and 97 white columns in the Washington collection, found that the column of the white was longer than that of the Negro in the male while the reverse was true in the female. An extraneous factor, possibly stature, is probably concerned here. Trotter found no racial differences in the lengths of the respective segments. In the females she found the Negroes to show a greater forward lumbar (small of the back) convexity than the whites. The transition from concavity to convexity also occurred higher in the Negro females (2nd vertebra) than in the whites (4th vertebra.)

Sternum.—The manubrium or upper part of the human breast-bone usually remains separate from the body of the bone throughout life, but union of the two parts frequently occurs. Trotter[114] found in 480 white and 397 Negro sterna that union of the two elements occurred in about 10 per cent of individuals but the white females showed the condition more than twice as frequently as the Negro females or as the males of either race.

[109] W. F. R. Ossenfort, "The Atlas in Whites and Negroes," *Am. J. Phy. Anthrop.*, **2**: 439–43 (1926).

[110] T. Wingate Todd, "Numerical Significance in the Thoracicolumbar Vertebrae of the Mammalia,' *Anat. Rec.*, **24**: 261–86 (1922).

[111] T. A. Willis, "The Thoracicolumbar Column in White and Negro Stocks," *Anat. Rec.*, **26**: 31–40 (1923); "The Lumbo Sacral Vertebral Column in Man, Its Stability of Form and Function," *Am. J. Phy. Anthrop.*, **32**: 95–123 (1923).

[112] T. Wingate Todd, and S. I. Pyle, "A Quantitative Study of the Vertebral Column by Direct and Roentgenoscopic Methods," *Am. J. Phy. Anthrop.*, **12**: 321–38 (1928).

[113] M. Trotter, "The Vertebral Column in Whites and in American Negroes,' *Am. J. Phy. Anthrop.*, **13**: 95–107 (1929).

[114] ———, "Synoctosic between Manubrium and Body of the Sternum in Whites and Negroes, ' *Am. J Phy. Anthrop.*, **18**: 439–42 (1934).

Lower Limb

Ilium.—The ilium is the upper and largest part of the hip bone. It produces the flare of the hips. Straus[115] made a study of 150 white and 99 Negro ilia in the Western Reserve collections. He found that in all of the absolute dimensions of the ilium the white shows larger averages than the Negro for both sexes, but that within one sex there were no race-linked differences in iliac proportions, either in regard to the relation of one dimension to another or to larger bodily dimensions. He also emphasized that all of the characters he studied exhibited such marked sexual and racial overlapping that they were of limited value in sexing or determining racial affinities of pelves. A later study by Straus[116] on primate ilia gave no new clue to racial differences which might be found in man.

Pelvis.—Caldwell and Moloy[117] made a study of anatomical variations in the female pelvis with particular interest in their effect on labor. They studied material at several institutions, principally Western Reserve, where their American Negro series was obtained. Their investigations led them to classify female pelves into three main types: (a) the gynecoid, which possessed the characteristics generally recognized as typically female; (b) the android, which in several features resembled the male type; and (c) the anthropoid, which bore resemblance to the pelvis of the anthropoid apes. Their table shows that the gynecoid type was of equal frequency in both groups, 42 per cent. The whites, however, showed double the percentage of android pelves (32.5 per cent) found in the Negroes (15.7 per cent) but the Negroes exhibited the anthropoid type (40.5 per cent) with nearly twice the frequency shown by the whites. There is no implication whatever of phyletic relationship in this classification.

Femur.—In a series of studies on the femur or thigh bone Ingalls[118] found from an examination of 46 white and 17 Negro femora that the cartilage covering the joint surfaces was thicker and more variable in the Negro than in the white. He could attach only speculative significance to the finding, but the more regular character of the cartilage in the white seemed to favor more stable hip and knee joints.

In further study of the same material Ingalls[119] found that in the Negro the mean position of the head of the femur was more lateral and farther back relative to the knee than in the white. This finding also, he concluded, would argue for a more favorable general stability and efficiency of the knee in the extended position in the white.

It would seem that the small size of the series used would necessitate further investigation of these interesting results.

Growth and Development

The body undergoes a continuous succession of changes between con-

[115] W. L. Straus, "The Human Ilium: Sex and Stock," *Am. J. Phy. Anthrop.*, **11**: 1–28 (1927).

[116] W. L. Straus, "Studies on Primate Ilia," *Am. J. Anat.*, **43**: 403–60 (1929).

[117] W. E. Caldwell, and H. C. Moloy, "Anatomical Variations in the Female Pelvis and their Effects in Labor, with a Suggested Classification," *Am. J. Obst. and Gynec.*, **26**: 479–514 (1933).

[118] N. W. Ingalls, "The Cartilage of the Femur in the White and The Negro: Studies in the Femur," *Am. J. Phy. Anthrop.*, **9**: 356–74 (1926).

[119] ———, "Some Relations of the Head and Condyles in the White and Negro," *Am. J. Phy. Anthrop.*, **10**: 393–405 (1927).

ception and senescence. The changes which occur in adult life will be considered here as well as those which precede it.

Prenatal Life

General.—From the unparalled Carnegie collection of human embryos and fetuses Schultz[120] selected for a study of growth 623 of the best normal and well-preserved white and Negro fetuses. He reported that:

> [racial differences] exist as early in development as the human form can be recognized; many of them become more marked with advancing growth, but some are as pronounced in fetuses of three months as in the newborn or even in the adult stage. These differences are essentially the same as those which distinguish adult whites from adult Negroes. No racial differences in any part of the body were found to diminish with advance in growth; they all seem to develop in diverging directions. In many instances the greatest divergence is reached early in fetal life and growth thereafter proceeds in parallel directions. It seems hardly necessary to point out that this speaks strongly in favor of a monophyletic origin for at least these two human races.

External Nose.—Schultz[121] also made a special study of the development of the external nose in 320 fetuses of the Carnegie Embryological Collection, ranging in age from the tenth week of pregnancy to full term. Of these, 254 were whites, 50 American Negroes, and 8 of other races. He determined that the general morphological progress of development was the same for both races, but the nose of the Negroes was different from that of the whites during the entire fetal period. "One of the most marked points of distinction is the nasal breadth, which is greater in Negroes, absolutely as well as in relation to the nasal height and to the facial breadth. Further differential characters are the blunter appearance of the nose in Negroes and the great frequency of a transverse position of the nostrils in older foetuses of that race." There is considerable variability in the size and form of the nose in fetuses at all stages.

External Ear.—Bean[122] showed from measurements of the ears of 44 Negro and 22 white fetuses, that the physiognomic ear index (the breadth expressed as a percentage of the length) decreased from 75 to 67 in the white ears, with an increase in total fetal length from 30 to 60 cm., but the Negro ears presented the same index in all the fetal stages. Thus the Negro index is greater than that of the white in fetal life (fifth month), and the racial character is this early evident. Bean stated further that as stature increases in post-natal life the ear index decreases in the white but the reverse is true in the Negro. Thus the tiniest ears would be expected in the tallest Negroes, for Bean says, "purity of ear-type goes with tallness in Negro males." This is a paradoxical, incongruous hypothesis which has not been confirmed.

Anthropometry

The dimensional growth of the American Negro has been insufficiently studied. Dodge,[123] in a study of the growth in weight of 596 Negro infants in Cleveland dispensaries during the first eighteen months, reported that: " . . . the colored infant is not

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[120] A. H. Schultz, "Fetal Growth in Man," *Am. J. Phy. Anthrop.*, 6: 389–400 (1923).

[121] ———, "The Development of the External Nose in Whites and Negroes," *Carn. Cont. to Embryol.*, No. 34, V. 9: 175–90 (1920).

[122] R. B. Bean, "Some Characteristics of the External Ear of American Whites, American Indians, American Negroes, Alaskan Esquimos, and Filipinos," *Am. J. Anat.*, 18: 201–25 (1915).

[123] C. T. J. Dodge, "Weight of Colored Infants. Growth During the First Eighteen Months," *Am. J. Phy. Anthrop.*, 10: 337–45 (1927).

only smaller than the white infant at birth but grows at a slower rate. There is the same difference between the sexes as in the whites." Dodge's subjects came from the congested districts of the city. He suggested that these growth curves probably do not represent the true curve for the Negro and that this must be sought in Southern environments.

The standards for statures and weights of children under six years compiled by Woodbury[124] were based on the records 167,024 white and 4,976 Negro children. Compared with the whites the smaller Negro sample showed an average deficiency in stature of about two-fifths of an inch, or 1.3 per cent for boys, and one-fifth of an inch or 0.8 per cent for girls. In weight the average deficiency of the Negroes was nearly 11 ounces for boys and 9 ounces for girls—3 per cent and 2.5 per cent, respectively. The deficiency in both stature and weight was greatest at and under one year. After four years the deficiency was converted into an excess, or was small. The author suggested that a selective survival might be a factor in explaining the change.

Mustard and Waring[125] found from the measurement of 1,650 Negro children in Rutherford County, Tennessee, that, " . . . colored children of school age were found uniformly heavier than white children of the same age, and taller than white children until toward the end of adolescence."

Royster and Hulvey[126] compiled height-weight-age standards for Negro children from records of 4,281 boys and 4,595 girls measured in Richmond, Charlottesville, and Greene County, Va. These data showed that, " . . . the average weight according to height is the same for Negro children as for white children until the height of 52 inches (132.1 cm.) is reached; after this, Negro children weigh less for their height than do white children, and the variation constantly becomes greater thereafter, being 5 pounds (2.3 Kg.) for boys and 6 pounds (2.7 Kg.) for girls at 65 inches (165.1 cm.)." Royster and Hulvey thus found Negro boys above 57 inches and Negro girls above 60 inches lighter for their height than did Mustard and Waring.

The height-for-age curves indicates that

> . . . there is no variation at 5 years, but that from the 6th to the 16th years inclusive, there is a constant minus variation for Negro boys, ranging from one-half inch (1.27 cm.) to 2.8 inches (7 cm.) with minor periodic variations. . . . The relation of height to age for girls shows striking differences. At the 6th and 7th years, Negro girls show a plus variation over white girls of a little less than one-half inch. Between the 7th and 8th years, the lines cross, from then on the height of Negro girls is constantly below that of white girls, the minus variation ranging from 1 to 3 inches.

Davenport and Steggerda[127] included in their Jamaica study a growth series of measurement on 565 black, 695 brown, and 206 white school children. In these young subjects (eight to fifteen years) the adult racial differences in limb and torso proportions were apparent. The measurements of the browns tended to occupy an intermediate position be-

[124] R. M. Woodbury, "Statures and Weights of Children Under Six Years of Age," *Pub.*, Children's Bureau, U.S. Dept. Labor. No. 87, 1–117 (1921).

[125] H. S. Mustard, and J. I. Waring, "Weights and Heights of Colored School Children," *Am. J. Pub. Health*, 16: 1017 (1926).

[126] L. T. Royster, and C. N. Hulvey, "The Relations of Weight, Height and Age in Negro Children," *Am. J. Dis. Child.*, 38: 1222–30 (1929).

[127] C. B. Davenport and M. Steggerda, *op cit.*

tween those of the blacks and the whites. The blacks developed more rapidly than the whites as indicated by the age of first decussation, the female passing the male, in the growth curves of the two races. Jamaican black infants were lighter at birth than brown infants and white infants of other countries.

Herskovits[128] has in his monograph a chapter on growth curves and sex differences. The age changes in pigmentation shown by his data have already been described. In other respects the curves represent normal human growth patterns.

Skeletal Development

Cranial Bones.—Limson[129] examined 101 Negro and 62 white fetal and infant skulls from the Carnegie collection. He found racial differences marked in the maxilla and occipital bone. In the maxilla, the bone of the upper jaw, the dental arch projects forward noticeably more than in the white and the nasal spine at the base of the narial aperture is less developed in the Negro. The Negro occiput appeared more convex and prominent and the external occipital protuberance more strongly formed than that of the white.

Sella Turcica.—Royster and Moriarty[130] studied the size of the sella turcica, which lodges the pituitary body, by means of roentgenograms of 200 children between the ages of eight and nine years, 50 whites and 50 Negroes of each sex. Such a study presents numerous technical difficulties, but the authors concluded that: "In a very general way, the sellae of white children both male and female, are more regular and uniform in contour than those of colored children. The colored children show both a larger proportion of very large and very small sellae than do the white children."

Age Changes.—A comprehensive series of researches by Todd[131] and his associates has served to elucidate the age changes in the human skeleton from infancy to old age. An excellent coordinated account of this work may be found in a recent publication of the White House Conference Committee on Growth and Development of the Child.[132]

Todd's findings on the living have been based upon the meticulous study of upward of 3,000 Cleveland children, upon whom physical, anthropometric, developmental, mental, and social data were recorded. The collections of the Hamann Museum have furnished the macerated skeletal material. Age and developmental progress to adult life are revealed in the skeleton between birth and five years by the appearance of centers of ossification; between five and fourteen years by the bony penetration of cartilaginous areas; and from fourteen to twenty-five years by epiphysial union. In adult life the principle

[128] M. J. Herskovits, *The Anthropometry of the American Negro.* New York (1930).

[129] M. Limson, "Observations on the Bones of the Skull in White and Negro Fetuses and Infants," *Cont. to Embryol.*, No. 136: 205–22 (1932).

[130] L. T. Royster, and M. E. Moriarty, "A Study of the Size of the Sella Turcica in White and Colored Males and Females between the Eighth and Ninth Years, As Measured on Flat X-Ray Films," *Am. J Phy. Anthrop.*, 14: 451–8 (1930).

[131] T. Wingate Todd, "Differential Skeletal Maturation in Relation to Sex, Race, Variability and Disease," *Child Dev.*, 2: 49–65 (1931); T. Wingate Todd, and D. W. Lyon, "Endocranial Suture Closure: Its Progress and Age Relations (Parts I–IV), *Am. J. Phy. Anthrop.*, 7: 8: (1924, 1925); T. Wingate Todd, "Age Changes in the Pubic Bone," (Parts I–IV–VI), *Am. J. Phy. Anthrop.*, 3 & 4 (1920–21); T. Wingate Todd, "Age Changes in the Pubic Symphysis. VII. The Anthropoid Strain in Human Pubic Symphyses of the Third Decade," *J. Anat.*, 58: 274–94 (1923).

[132] T. Wingate Todd, "The Skeleton," *In Growth and Development of the Child.* New York: Century Co., (1933).

gauges of the march of time are the closure of the cranial sutures and the differentiation of the pubic symphysis. In addition, there are changes in the dentition and bony texture, and lipping of the joint margins which serve as auxiliary though not precise indicators of developmental progress. In none of these processes has a different pattern been discovered for Negroes and whites. Groups and individuals do vary, but from the same human pattern. In sub-adult skeletal maturation Todd has found Negroes to show greater divergence in age relationships than do the whites. This he attributes to pathological background in many cases, rather than to fundamental stock differences.

Cranio-Facial Growth.—There is no significant racial difference in skull growth but there are distinctions in detail. Todd and Tracy, and Todd and Forbes[133] have shown that greatest growth occurs in the hinder part of the Negro cranium in the region of the lambdoid suture while in the white cranium expansion is greatest in the forward part along the line of the coronal suture. Thus, the bulging occiput of the Negro and the more vertical forehead of the white in the adult are explained. Because the dental arch of the Negro is longer than that of the white, "the forward growing brain case overhangs the face to a greater extent in the white than in the Negro." Thus the so-called Negro prognathism is not a true prognathism as in the anthropoid, where the upper jaw grows forward in front of the brain case to accommodate the teeth. "In the Negro as in the white, the nasal root area travels forward till the eighteenth year, by which time forward facial growth is complete. Since, however, forward alveolar (jaw) growth is less in white than in Negro, the white face is overhung to a greater extent by the brain case."[134] In vertical growth of the face "that part between the nasal root and the nasal floor is shorter in the Negro and the part between the nasal floor and the upper gum line is greater than in the white throughout the growth period." The difference in facial proportions has already been described in the adult.

Suture Closure.—Todd and Lyon,[135] in a study of cranial suture closure on 365 white and 149 Negro skulls found the order and pattern of closure the same for both races. Individual variability, however, was greater in the Negro. The most frequent variation was a delay in closure of the lambdoid suture. The authors interpreted this to mean that some morphological change is even now occurring in this region of the skull.

Pubic Differentiation. — Between nineteen and forty-five years the symphysial surface of the pubic bone of the pelvis which articulates with its fellow of the opposite side is transformed from an irregularly outlined area marked by transverse ridges and furrows into a distinctly demarcated smooth oval area surrounded by a rim. Todd[136] was able to divide the progress of this change into ten phases. He found that again the pattern of differentiation was the same for white and

[133] *Ibid.*

[134] *Ibid.*

[135] T. Wingate Todd, and D. W. Lyon, "Endocranial Suture Closure: Its Progress and Age Relations," (Parts I–IV), *Am. J. Phy. Anthrop.*, **7**: **8**: (1924, 1925).

[136] ———, "Age Changes in the Pubic Bone," (Parts I–IV–VI), *Am. J. Phy. Anthrop.*, 3 & 4 (1920–21).

Negro, but in the latter, "the symphysial outline is completed about two years earlier and certain features like lipping and secondary erosion commence some years earlier but do not progress so far." In a later study[137] this author defined two types of pubic differentiation, one the modal type just described, the other a pattern which bore certain resemblances to the pubic metamorphosis of the anthropoids. A third intermediate type was also distinguished. The three types occurred in both races but were more distinctly demarcated in the Negro. The anthropoid strain occurred with slightly greater frequency in the Negro group, though the evidence did not warrant final conclusions.

Summary and Conclusions

Summary.—An attempt has been made to present the results of recent investigations relating to the physical constitution of the American Negro. There have been included not only the findings themselves but also the circumstantial background of the studies as an aid to the appraisal of the value and difficulties of the work. The presence of an ample measure of all the faults to which such an effort is subject is at once acknowledged. It is hoped that in a later communication it will be possible to point out more specifically the fields in which present knowledge is most deficient and to indicate possibilities for future investigations not already obvious.

It has been noted that the studies of the American Negro have had two principal objectives, *first*, to determine as fully as possible the number of differential characters between the parent white and Negro stocks, and *second*, to discover the effects of hybridization.

1. Studies of the physical constitution of the American Negro have shown him to be forming a type intermediate between the parent Negro, white and Indian stocks in those superficial traits which are differential race characters.

2. Bodily features in which the full-blood Negro differs from the white are chiefly proportions of limbs and torso and cranial architectural pattern.

3. Except in a general way the genetic behavior of racial characters of the parent stocks in the American Negro has not been determined.

4. The racial features of Negroid individuals appear early in fetal life and are the same as those which characterize the adult.

5. In fundamental bodily characters and developmental patterns the American Negro is identical with other types of modern man.

6. Beneficial or dysgenic effects have not been demonstrated as a result of racial crossing in the case of the American Negro.

Conclusions.—The evidence now available shows clearly that racial characters are largely variations of form which have no distinct functional survival value in modern civilization. We have slight knowledge of the behavior of superficial differential traits, such as skin color, in hybrids. We do not have nor could we expect to have precise knowledge of the genetic behavior in hybridization of more fundamental bodily traits such as skeletal form and cranial architecture.

[137] ———, "Age Changes in the Pubic Symphysis. VII. The Anthropoid Strain in Human Pubic Symphyses of the Third Decade," *J. Anat.*, 58: 274–94 (1923).

Castle[138] has recently maintained that, " . . . demonstrably Mendelian unit-characters of animals are relatively special and superficial in nature, whereas the more general and fundamental characters, though equally subject to heredity, are not inherited, through the mechanism of chromosomal genes." This is an important consideration because it demonstrates on what uncertain grounds rest the allegations that racial crossing has dysgenic effects because of disharmonic genes.

Modern anatomical evidence has fully sustained Castle's[139] statement that, "So far as a biologist can see, human race problems are not biological problems any more than rabbit crosses are social problems. The rabbit breeder does not cross his selected races of rabbits unless he desires to improve upon what he has. The sociologist who is satisfied with human society as now constituted may reasonably decry race crossing. But let him do so on social grounds only. He will wait in vain, if he waits to see mixed races vanish from any biological unfitness."

[138] W. E. Castle, "The Incompleteness of Our Knowledge of Heredity in Mammals," *J. Mammalogy*, **14:** 183–8 (1933).

[139] W. E. Castle, "Biological and Social Consequences of Race-Crossing," *Am. J. Phy. Anthrop.*, **9:** 145–56 (1926).