# ESSENTIALS OF ANTHROPOMETRY

LOUIS R. SULLIVAN

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A HANDBOOK FOR EXPLORERS
AND MUSEUM COLLECTORS



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# PREFACE

The Division of Anthropology of the American Museum of Natural History has as its functions and purposes the study of mankind and the dispersal of the knowledge thus gained in the form of scientific publications and museum exhibits. For these purposes it needs anthropometric data, photographic records, plaster face masks, and skeletal remains of all the races and types of mankind and the many mixtures thereof. It will welcome correspondence from anyone who may have the opportunity and the inclination to assist in obtaining such material. While the number who will find themselves able to contribute anthropometric data may be limited, there are undoubtedly many who can contribute photographs, plaster masks, or skeletal material.

The Division will gladly consider any opportunity to coöperate with such other institutions as may be temporarily interested in anthropological problems but which have no specially trained staff available.

Further explanations or instructions concerning any of the subjects dealt with in this outline will be furnished upon application.

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## ILLUSTRATIONS

# INTRODUCTION

There is practically no limit to the number of measurements and observations which may be taken on the living human body. A majority of these measurements and observations are of interest and importance, but it is a physical impossibility to employ all of them on any considerable number of individuals. Experience has shown that it is necessary and wise to limit the number of measurements and observations and to increase the size of the series studied. In order that observers may proceed in a uniform manner several international and intranational congresses have agreed upon and published lists of preferred measures with details as to how they should be taken. The purpose of these lists of agreements is to insure comparability of the data the world over. Yet, these agreements were made for physical anthropologists primarily and schedule long detailed series of measurements for all parts of the body. This is all well enough for professional specialists, but, as a matter of fact, trained physical anthropologists have contributed only a small part of our anthropometric data. So we must depend upon ethnologists, archæologists, physicians, army and

naval officers, and travelers for anthropometric data on little known and inaccessible peoples with whom they come in contact. Many valuable data have been contributed in this way, but most of these men have carried this work as a side line. Consequently, the number of measures was reduced according to the taste and convenience of each observer. Some measured stature only, some stature and two head diameters; in fact, about ninety per cent of the studies end here. A few more observers have taken face height or width, the nasal diameters, or one or two other measurements. There are times when it is only necessary to make one measurement, but this is when a particular and concrete problem is in mind. Moreover, if one has a definite and specific problem it is legitimate to select only such measures as bear on or help solve that problem. Yet, unfortunately, most of these observers had no specific problem in mind, but gathered their data as general contributions to our knowledge of the races of mankind. While it is true that a knowledge of the stature and cephalic index of all peoples is a very desirable thing, this in itself does not go far towards advancing our knowledge of race relationships. In fact, the popularity of the cephalic index has probably done much to retard

our knowledge of race relationships because so many have relied upon this measure alone. It does not follow that this measure is useless or worthless, far from it, for it is one of the most valuable descriptive measures. Yet it is *one* of many and by itself of little value except in special studies of the cephalic index. Again, what is true of the cephalic index is true of any other one measure or observation, since the larger and finer relationships of the various types of mankind are problems which require a definite number of measures and observations for their solution and upon which all the data of physical anthropology must be brought to bear. For example, most of us desire such schemes of relationship as those devised by Deniker, Sergi, Giuffrida-Ruggeri, and others. We wish to know also just how many and what physical types inhabit such areas as Polynesia, Micronesia, Melanesia, and Malaysia, as well as the relationship of the various physical types to each other and to other known types of mankind. Fortunately, a minimum number of measures and observations will give these larger relationships. Thus, for Polynesia, Micronesia, Malaysia, and Melanesia, it appears that with seven measurements, the resulting four indices, and nine descriptive ob-

servations, we can untangle the relationships of the many physical types involved. While we speak specifically of these four areas, it is probable that the same seven measures, four indices, and nine observations would give us a key to the relationships of racial groups in any part of the world.

The absolute measurements recommended are: stature, head length, head breadth, face breadth, anatomical face height, nasal height, and nasal width. From these measures we derive the cephalic length-breadth index, the transverse cephalo-facial index, the anatomical face index, and the nasal index. These measures and indices should be supplemented by descriptive observations on the color of the skin, color of the hair, form of the hair, eye color, the epicanthic or Mongoloid eyefold, thickness of the lips, form of the upper front (incisor) teeth, the amount of beard development, and the development of body hair.

The main reason for this choice of measures, indices, and observations, is that the races differ most markedly in these characters and that certain of them in combination are characteristic of the different races. Another reason is the simplicity of the technique involved.

In addition we have included other measurements on the head and body to serve as a basis for

more detailed research. The body measurements are recommended for the investigator interested in the proportions of the trunk and the extremities, and should serve as a minimum requirement for growth and constitutional studies. For those dealing with special problems along these lines, many more measurements suited to their purposes will be found in Martin's *Lehrbuch der Anthropologie*.

The purpose of this outline is not merely to urge uniformity of technique, but also uniformity in the number and kind of measures and observations taken, to the end that we may attain the maximum result with a minimum expenditure of time, effort, and money. Further, we wish to encourage the coöperation of archæologists, ethnologists, physicians, and others who find themselves suitably situated to make such studies, and while the physical anthropologist needs no such guide, it is hoped that he too will coöperate in these minimum specifications. Naturally, there is no objection to increasing the number of measures and observations indefinitely, but all should agree on a desirable minimum to be taken by all.

Since this outline is intended for those who have not specialized in physical anthropology, specific and detailed directions are given for taking the measurements and observations. Wherever

possible, illustrations and pictorial standards have been introduced to aid in the description of non-measurable characteristics. While it is our belief that after a careful study of this outline any intelligent and interested person could make very creditable records, it is urged that those who contemplate such work will obtain instruction and training from some anthropologist whenever this is practical and possible. The Department of Anthropology of the American Museum of Natural History will gladly assist in the training and instruction of such persons or aid in the analysis and interpretation of such field records as may be made.

## NECESSARY INSTRUMENTS

1. **Stature Rod.** A metal anthropometer is made by P. Hermann, Rickenbach and Son of Zurich after the plan of Professor Rudolf Martin. Several American instrument houses furnish wood-

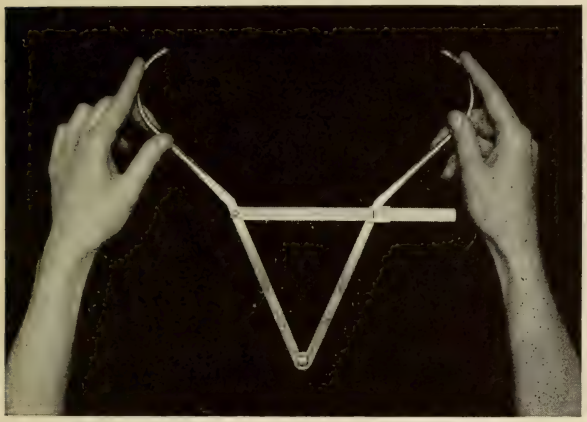


Fig. 1. The Spreading Calipers as they are held when being used.

en rods, jointed in two or three pieces. They are inexpensive and graduated in both inches and centimeters. Such rods may be obtained of George Tiemann Company of New York City or

the Narragansett Machine Company of Providence, Rhode Island.

2. **Spreading Calipers.** The spreading calipers (*Tasterzirkel*) manufactured by P. Hermann, Rickenbach and Son, of Zurich, are superior and

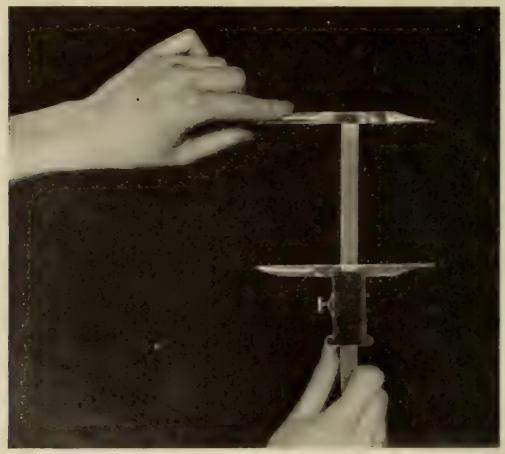


Fig. 2. The Sliding Calipers as they are held when being used.

no more expensive than others. If these cannot be procured, the French or American calipers used by police in Bertillonage will serve. The nearest large police station will furnish the address of

supply houses. Fig. 1 shows this instrument as it is held when being used.

3. **Sliding Compass.** Again the sliding compass (*Gleitzirkel*) made by P. Hermann, Rickenbach and Son, is the most desirable instrument on the market. Most large instrument houses offer suitable substitutes if the above are not accessible. Accurate callibration is the main feature to note in procuring instruments of this sort. The sliding compass is shown in Fig. 2.

4. **Head Spanner.** A completely satisfactory head spanner for measuring head height is not available. The necessity of introducing blunt points in the ear holes is extremely unpleasant and may be a serious impediment in dealing with a primitive or unsophisticated people. However, there are several useful models which are serviceable after some practice.

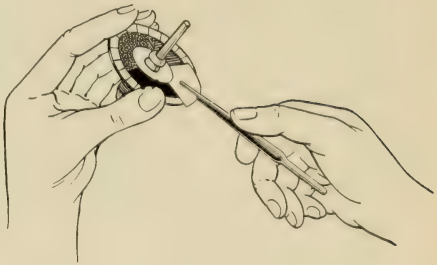
Todd's head spanner may be obtained from the Anatomical Laboratory of Western Reserve University, Cleveland, Ohio. It has a device for determining the eye-ear plane. Hooton's cephalometer has the decided improvement of eliminating the introduction of rods into the ears, but is rather complicated, requiring familiarity and docile subjects for its satisfactory use. It may be obtained from the Peabody Museum of Harvard

University, Cambridge, Massachusetts. There are other methods of obtaining head height to be discussed later.

5. **Skin Color Standard.** Von Luschan's porcelain scale of skin colors sold by P. Hermann, Rickenbach and Son, of Zurich, is by far the most convenient for use in the field. On the other hand, the color top is highly recommended. The standard color top (Fig. 3) manufactured by Milton Bradley Co., Springfield, Massachusetts, may be used successfully. The degree of pigmentation is expressed in percentages of white, black, yellow, and red (ox blood red). These tops are inexpensive and enough of them should be taken to insure a sufficient supply. When neither the scale nor the top are obtainable use any standard color chart, or devise one to meet the needs of a particular area. Hrdlicka has published Broca's old scale on paper. It may be obtained from the Government printing office at Washington, D. C.[1] Many of the color scales used by mammalogists, ornithologists, and conchologists are adaptable to use in anthropology. In general, almost any scale is an improvement on attempting to estimate color offhand. So, if necessary, make your own scale.

[1] "Directions for Collecting Information and Specimens for Physical Anthropology" by Ales Hrdlicka (*Bulletin, United States National Museum*, Part 4, No. 39).


Fig. 3. The Color Top and Method of adjusting the Color Disks.



It can later be standardized with the color top, Von Luschan's or Broca's scales when publishing the results.

Since the color top is a new device, brief directions for its use may be added. The disks furnished with the top are standardized and it is customary to use four of them, white (w), red (r), yellow (y), black (b). The base of the top is divided into twenty sectors from which as a scale one can read in subdivisions of five, thus converting the scale into percentages. The method of adjusting the disks is shown in Fig. 3.

## THE MEASURING POINTS, OR LANDMARKS

The measuring points described below are illustrated in Figs. 4, 5, and 6.

*Vertex:* The highest point on the top of the head in the median sagittal line.

*Tragion* (tr): The notch directly above the tragus of the ear.

*Acromion* (a): The most lateral point on the acromion process. This landmark may be found with the greatest ease by following the spine of the scapula to its outermost border.

*Suprasternale* (sst): This point is located in the deepest part of the upper border of the sternum or breast bone. Frequently the superior border of the sternum is rounded, therefore care must be exercised in determining the upper border.

*Dactylion* (da): The distal end or tip of the middle finger with the hand held fully extended.

*Iliocristale* (ic): This is not a fixed point. It is situated at the widest part on the iliac crest and should be determined by palpating the iliac crest until the most lateral extension is found.

*Glabella* (gl): The most anteriorly projecting

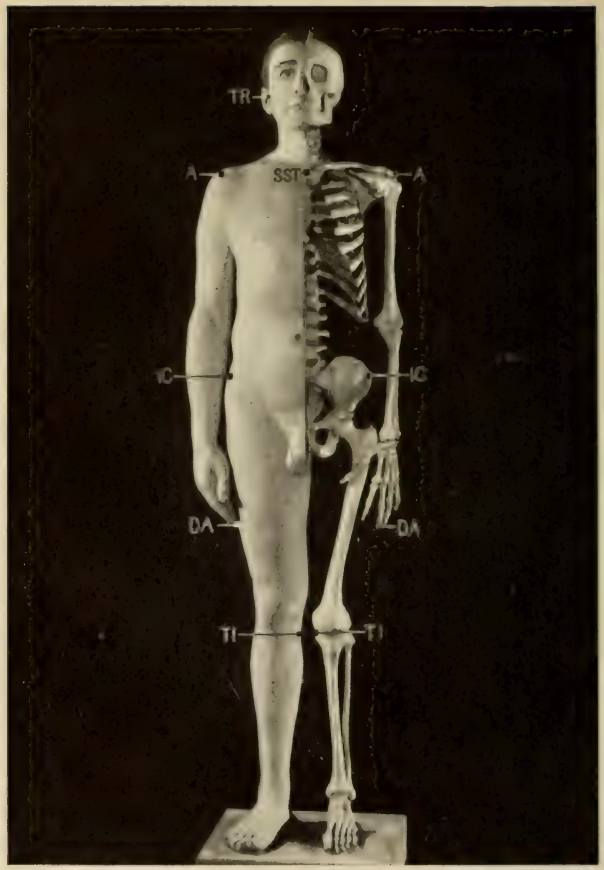



Fig. 4. Landmarks on the Body. tr = tragion; a = acromion; sst = suprasternale; ic = iliocristale; da = dactylion; ti = tibiale.

point on the frontal bone (forehead) in the median sagittal line. Usually it is about on a line with the tops of the eyebrows or very slightly below.

*Opisthocranium* (op): That point in the median sagittal line of the occiput (back of the head) which is most distant from the glabella. It is found by measuring.

*Euryon* (eu): The most laterally projecting point on the sides of the head above the supramastoid and zygomatic crests. It is the point at which greatest width of head is measured. It is very variable in location and determined solely by measuring until the maximum width is found. Obviously, the euryon is found on both sides of the head.

*Nasion* (na): The nasion is the point in the median sagittal line where the nasal bones join the frontal bone. It is one of the most important and at the same time most difficult points to locate on the living. It is best found by running the left thumb up the bridge of the nose with moderate pressure until a distinct angulation is felt where it joins the frontal bone. It is easy to find in people with a high nasal bridge since the angle is moderately abrupt; in races with a very low nasal bridge it cannot be felt, but must be located from our knowledge of anatomy. If possible see this


Fig. 5. The Landmarks and Length and Height Measurements. gl = glabella; op = opisthocranium; ft = frontotemporale; na = nasion; sn = subnasale; gn = gnathion; eu = euryon; zy = zygion; go = gonion. Note that the euryon, zygion, and opisthocranium are not definite anatomical points like the nasion and subnasale, but are located wholly by measuring.


Fig. 6. Measuring Points and Measurements of Width. gl = glabella; na = nasion; sn = subnasale; gn = gnathion; eu = euryon; zy = zygion; ft = frontemporale; go = gonion; al = alare. Note that the euryon, zygion, and alare are not definite anatomical points like the nasion and subnasale: but are located wholly by measuring. Note also that all the above measurements of width are maximum measurements.

point on a skull before attempting any measuring. It is usually on a line with the lowest hairs of the eyebrows where they sweep down upon the nose or very slightly below. It is always above the inner corners of the eyes. It is usually at least a centimeter below the glabella. Once found it is well to mark this point.

*Gnathion* (gn): The gnathion is the lowest point in the middle of the bony chin. Of course, it is impossible to measure to the bony chin. But enough pressure should be used to insure that one is really measuring as closely as possible (with the comfort of the subject in mind) to the bony chin.

*Subnasale* (sn): That point where the septum of the nose joins the upper lip.

*Zygion* (zy): The zygion is the most laterally projecting point on the zygomatic arches. It is found only by measuring. It is the point on either zygomatic arch where the maximum width of the face occurs.

*Frontotemporale* (ft): Starting just above the outer edge of the eyebrows are two temporal ridges which continue upward and backward over the forehead, diverging from each other in their course. The point to be sought is located at the most inward curving part of the temporal ridge.

*Gonion* (go): Situated at the angle formed by

the ascending branch and the body of the lower jaw.

*Alare* (al): The alare is the most laterally projecting point on the wings of the nose or nostrils.

## THE ESSENTIAL MEASUREMENTS

The most marked measurable differences in the races of man are in stature, head form, face form, and nose form. It is only when we have the measurements necessary to define these peculiarities that we can untangle their relationships.

1. **Weight.** Wherever possible the taking of weight is desirable. Some form of balance scale is, of course, preferable, but small portable spring scales may be used if care is taken to check their accuracy at frequent intervals. The subject should be weighed without clothing, but if this is not feasible a proper allowance should be made for the weight of the clothes. This will differ according to season and country.

2. **Stature**, with shoes removed, to the nearest *centimeter*. The subject should stand with heels together in the attitude of attention, looking straight to the front. The most frequent reaction encountered is for the subject to throw the head too far back on the neck. When the subject is markedly round shouldered or deformed in such a way as to affect the normal stature, be sure to indicate this by recording stature and then drawing a line through the number so that it will not be included in the average. When it is necessary to choose between omitting the measure or

taking it with the shoes on (in other words when the subject refuses to remove shoes), take the measure with shoes on and measure the height of the heel with the sliding calipers. Deduct this at once before recording stature.

3. **Acromion Height.** With the subject in the same position assumed for the measurement of stature, the arm of the anthropometer is lowered until it touches acromion. Where the subcutaneous fat deposits are sufficient to interfere with locating this point, it may be palpated by following the spine of the scapula upwards and outwards.

4. **Dactylion Height.** The distance from the floor to the tip of the middle finger. The arm and hand should be held along the side fully extended.

5. **Sitting Height.** The subject should be seated on a low table so that the thighs are raised above the horizontal plane on which he is sitting. As in taking stature, the head must be directed front and the eyes looking straight ahead so that the eye-ear plane is approximated. The trunk should be held as erect as possible since considerable variation may result from slumping. The distance measured is from the plane on which the subject is sitting to vertex.

6. **Suprasternale Height.** This may be taken while the subject is standing or sitting. If

the trunk height is the desired measurement the latter position is better. In locating suprasternale place the finger in the hollow at the base of the neck making sure that you feel the upper border of the sternum. Measure from the floor if standing or the table if sitting.

7. **Shoulder Width** (Acromion to acromion). Use the first section of the anthropometer. Make sure the body is kept erect.

8. **Chest Width.** This measurement may be taken at different levels: 1, the articulation of the fourth rib with the sternum; 2, the nipple; or, 3, the articulation of the seventh rib with the sternum. Martin recommends the first level. The rod of the anthropometer is held horizontal and the arms are brought against the sides of the ribs. The final reading should represent the average diameter between inspiration and expiration.

9. **Chest Depth.** At the same level as the above and observing the same method.

10. **Maximum Hip Width** (Iliocristale to iliocrastale). The rod is held horizontally while the arms of the anthropometer are pressed against the greatest lateral extension of the iliac crest.

11. **Head Length** (Glabella to opisthocranium). It is to be taken to the nearest *millimeter* with the spreading calipers. This is the maximum length

of the head from the glabella to the most distant point on the occiput in the median sagittal plane. Stand on the left side of the subject, who should be seated. Grasp one branch of the compass with the thumb and finger of the left hand and the other branch with the right hand. Have the hinge pointed towards your own chest and the scale up so you can read it at all times. Rest the middle finger of the left hand on the nasal bridge in such a manner that you can hold the tip of the left branch of the caliper stationary or fixed against the glabella. With the right hand move the right branch of the caliper up and down in the median sagittal line of the occiput until you obtain the maximum measurement. Remove the calipers and then repeat. Repeat until you succeed in obtaining uniform results. Do not use painful pressure, but be sure to penetrate the hair. Usually the weight of the hands furnishes enough pressure without any conscious effort. Do not get too far down on the neck. Be sure the right branch of the caliper does not deviate from the midline of the head.

12. **Head Breadth** (Euryon to euryon). This is the maximum width of the head in a transverse direction wherever it occurs. It is usually slightly above and behind the tips of the ear. Stand

directly in front of the subject. Grasp one branch of the caliper in each hand as before. Be sure that the subject's head is in a vertical position and that the points of the calipers are in a true horizontal plane. Place the points of the caliper on what appears to be the maximum width of the head. Read the scale and explore with the calipers all the neighboring area until the maximum width has been found. Do not get down too low. In general it is safer to keep above the tips of the ears. In any event do not go below the plane where the ear joins the head.

13. **Head Height.** The head height may be obtained directly with a head spanner or by projection. In using the head spanner the tips are placed in the ear holes so that they are within the bony ring, but they must not be pushed in too far lest they injure the ear. With the head in the Frankfort, or eye-ear plane, the vertical height of the head is taken, holding the instrument so that the tips are up against the upper portion of the bony part of the ear. With Hooton's cephalometer the tips are placed in tragion eliminating the danger of injury to the ear. One may also measure the head height directly with the upper section of the anthropometer by adjusting the arms so that one is at tragion and the other is at bregma. The

projective method is also used, but the personal error is frequently very large. This method consists in subtracting the distance from the floor to tragion from the total stature.

14. **Minimum Frontal Diameter** (Frontotemporale to frontotemporale). The temporal ridges are most marked on adult males. The investigator should familiarize himself with the character of these crests by observing them on males with a well-marked development. This diameter may be taken either with the sliding or spreading calipers.

15. **Face Breadth** (Zygion to zygion). This is the maximum width of the face and is to be measured with the spreading calipers, as were the length and breadth of head. Hold the calipers as in measuring width of head. With the tips of the index fingers find the most convex or outstanding point on the zygomatic arches and apply the points of the calipers. Read the scale. Remove the calipers and repeat the process until you are sure that you have obtained the maximum face width. Only moderate pressure is to be used. Appearances are deceiving and most beginners measure too far forward. The maximum width is usually back within two or three centimeters of the ear. This varies in different racial types, so explore

thoroughly with the calipers before recording the measurement.

16. **Bigonial Diameter** (Gonion to gonion). Use the spreading calipers, holding the tips between the thumb and index finger, and place them on the lateral border of the angles of the lower jaw.

17. **Face Height,** anatomical (Nasion to gnathion). This is the distance from the nasion to the gnathion or lower border of the chin. It is best taken with the sliding compass. Gauge approximately the height of the face and open the scale a little more than the height of the face. The subject should now be made to stand. With the left thumb find the nasion. The nasion is the point where the nasal bridge joins the forehead or frontal bone. In skeletal material it is a suture. Place the left thumb on the nasal bridge and with considerable pressure follow up until it reaches the point where the nasal bridge joins the forehead. There is usually an angle here which can be felt. When located, mark either with a wax pencil or with the thumbnail held in place. See that the subject has the mouth closed and the teeth in occlusion. He will not unless you make a special effort to see that he does. Then measure from the nasion to the *lowest* point on the chin (gnathion).

Again use only moderate pressure, but be sure to feel the bone of the chin.

18. **Nasal Height** (Nasion to subnasale). To be measured with sliding calipers from the nasion, as described above, to the point where the nasal septum joins the upper lip. Be sure to touch the septum but avoid pressure which distorts the nose.

19. **Nasal Width** (Alare to alare). This is the maximum width of the nose or nostrils. Measure from the most outstanding point on one nostril to that of the other. See that the subject is not laughing or otherwise distorting the nasal width. Avoid pressure. Do not compress the nose, but be sure to touch the wings with the compasses.

All of these measures (except stature) are illustrated in Figs. 4, 5, and 6. Practise reading the scale of the calipers before measuring. The spreading calipers are graduated in millimeters from 1 to 300. But only the centimeters or 10 millimeter intervals are marked. Thus 1 means 1 centimeter or 10 millimeters. To one who does not thoroughly understand the decimal scale, it is less confusing to record in terms of centimeters as marked on the scale. Head length, for example, varies from 16.0 to 21.2 centimeters or 160 to 212 millimeters. The sliding calipers are usually

graduated from 1 to 20 centimeters or 1 to 200 millimeters. In some instances only every other millimeter is marked or, in other words, each centimeter is divided only into five parts instead of the customary 10. In such cases estimate the nearest millimeter. It is safest to measure first some object to known length to insure that the calipers are properly callibrated and that you are reading the scale correctly. Millimeter cross-section paper will serve to test one caliper against another. Below is a list giving the normal range of some measurements. If the results obtained are not within these limits, it is very likely that there is some misunderstanding of the technique involved.

*Stature* ranges in adult men from 110 to 220 centimeters. But unless one is measuring dwarfs or giants the range is more often from about 130 to 200 *centimeters.*

*Head length* ranges from 150 to 210 *millimeters.*

*Head width* ranges from 125 to 175 *millimeters.*

*Face width* ranges from 100 to 160 *millimeters.*

*Face height* (anatomical) ranges from 90 to 150 *millimeters.*

*Nose height* ranges from 30 to 75 *millimeters.*

*Nose width* ranges from 23 to 55 *millimeters.*

## DERIVED MEASUREMENTS AND INDICES

The projection method used in measuring the body permits the derivation of the following measurements:—

*Head height* by subtracting the projective height of tragion from total stature.

*Arm length* by subtracting dactylion height from acromion height.

*Leg length* by subtracting sitting height from total stature.

From the head and face measurements given in the text the following indices may be derived:—

1. The *cephalic length-breadth* index is derived by dividing the width of the head by the length of the head. In other words, it expresses the width of the head in terms of percentage of the length of the head. If a head is 150 millimeters wide and 200 millimeters long the cephalic length-breadth index is 75.0 or the width of the head is 75 percent of the length of the head.

Employing the numbers given the several measurements on pp. 30–37, this index could be expressed as $\frac{12 \times 100}{11}$.

2. The cephalic length-height index: $\frac{13 \times 100}{11}$

3. The cephalic breadth-height index: $\frac{13 \times 100}{12}$

4. The transverse cephalo-facial index: $\frac{15 \times 100}{12}$

5. The transverse fronto-parietal index: $\frac{14 \times 100}{12}$

6. The jugofrontal index (zygomatico-frontal): $\frac{14 \times 100}{15}$

7. The jugomandibular index (zygomatico-gonial): $\frac{16 \times 100}{15}$

8. The anatomical face index: $\frac{17 \times 100}{15}$

9. The nasal index: $\frac{19 \times 100}{18}$

Body proportions or indices are expressed in relation to stature, sitting height, or trunk height. For example, the relative leg length is obtained by dividing leg length times 100 by the total stature. The number of such relationships which may be obtained from the body measurements given in the text is large, but some of the most important are given here.

10. Relative sitting height: $\frac{5 \times 100}{2}$

11. Relative trunk height: $\frac{\text{Sitting sst height} \times 100}{2}$

12. Relative leg length: $\frac{(2-5) \times 100}{2}$

13. Relative arm length: $\frac{(3-4) \times 100}{2}$

14. Relative acromion breadth: $\frac{7 \times 100}{2}$

15. Relative hip width: $\frac{10 \times 100}{2}$

16. Thoracic index: $\frac{9 \times 100}{8}$

Since stature is a composite measure many authors prefer to use sitting height or trunk height in calculating relationships. Trunk height is particularly advised because it is comparable to similar measurements on animals.

These indices need not worry one in the field, for they can be more conveniently worked out in the laboratory, since it is best to use a calculating machine or some of the division tables to be found in any scientific library. The most convenient tables are those of Carl M. Furst "Index-Tabellen zum Anthropometrischen Gebrauch," Jena, 1902, which may be purchased through G. E. Stechert and Company, New York City.

## DESCRIPTIVE OBSERVATIONS

In addition to the above measurable characters the races of man differ widely from each other in characters which are not readily measurable. Examples of such traits are skin color, hair form, eye color, etc. While it is impossible to measure these and similar characteristics accurately an effort is made to describe them as uniformly as possible. To this end certain descriptive words have come to have a fairly uniform and widely accepted meaning in anthropology. Low waves, deep waves, and curly, have a definite meaning in anthropology, when applied to hair, which they lack in popular usage. These conceptions are described and illustrated below. The observer will have less difficulty in this part of the work if he appreciates at the start that these classes (such as low waves, deep waves, etc.) are merely arbitrary stages in a widely variable distribution. Just as stature varies from 130 to 200 centimeters so does hair vary from straight through all gradations to the closely coiled spiral hair of some Negroes. In the case of stature we have a rod for measuring it accurately. 150 centimeters means the same the world over. In the case of hair form, hair color, eye color, skin color, and the other characters mentioned below, we have no accurate measuring

rod. So we must set up arbitrary standards of color and form and describe the characteristics as nearly as possible in terms of these standards or conceptions.

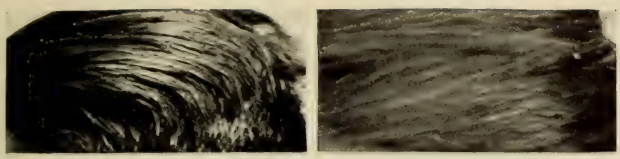
The following observations are recommended:—

*A.* **Skin Color.** Skin color is best described by use of some of the standards devised for the purpose. Skin color is to be taken on an unexposed and an exposed portion of the skin. The under side of the upper arm, which is not usually exposed, is a good place to record skin color unexposed to light and wind. If this part has been exposed, the chest will serve. The cheek is usually studied for the effects of light and wind in pigment. Both are important. If the Von Luschan scale is used, record by number. Hold the scale against the part of the skin being studied and find the closest match. An absolute match will not be found in many cases, but one sufficiently close to indicate the degree of pigmentation will suffice. If a color top is employed, hold the spinning top as near the skin surface as possible, adjusting the disks until an approximate match results. Then record by letters and percentages the portions of each disk exposed.

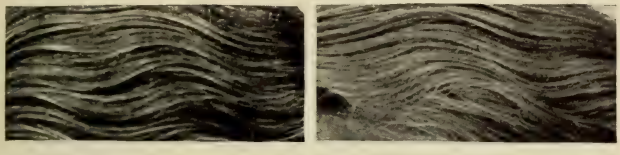
*B.* **Hair Color.** The choice of descriptive terms gives black, dark brown, reddish brown, medium

brown, light brown, blond, golden, red. Red hair should be further qualified as light, brick or auburn. When one is studying Caucasians of lighter tints it is very desirable to make up standards of real hair giving samples of the most outstanding shades of the range. Whenever possible, a small sample of the hair should be collected. These can be used as a check upon the field observations.

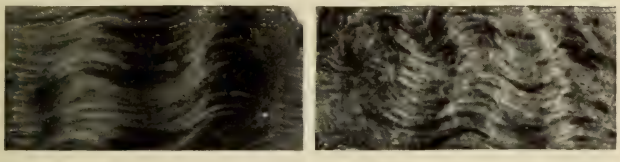
*C.* **Hair Form.** Hair form is one of the most important characters. In Figs. 7, 8, and 9 are given photographic and line examples of the degrees of curliness or waviness usually recognized. Straight hair is easy to recognize, but in this day and age even in the most out-of-the-way places one must look for artificial waves. The natural hair form is of course to be recorded. Following straight hair three degrees of waviness are recognized. While they are described in terms of depth only as low, medium, or deep waves, the degree is really determined by the depth in relation to the width of the wave. The width of a wave is the distance from the apex of one wave to the apex of the next wave. The depth is the distance from a line tangent to these two points to the greatest dip between the two waves. When the depth is from $\frac{1}{12}$th to $\frac{1}{10}$th of the width the hair is described as



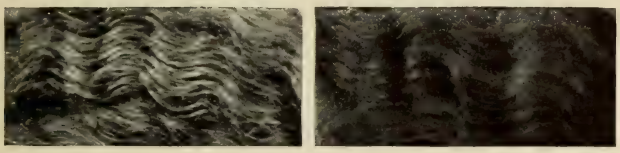
straight



low waves

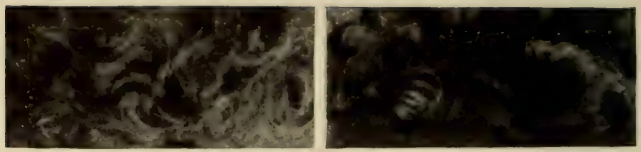


medium waves

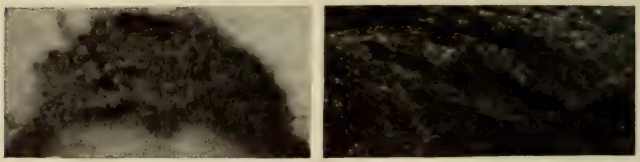


deep waves

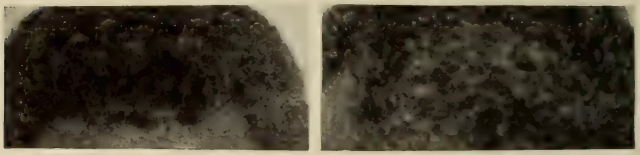
Fig. 7. Types of Hair Form. See Fig. 8.



curly



frizzly



woolly

Fig. 8. Types of Hair Form. See Fig. 7 and compare with Fig. 9 for details. Note especially the difference between curly and wavy hair and frizzly and woolly hair. Wavy hair dips, but does not coil upon itself. Curly hair curls upon itself and forms a complete circle or spiral.

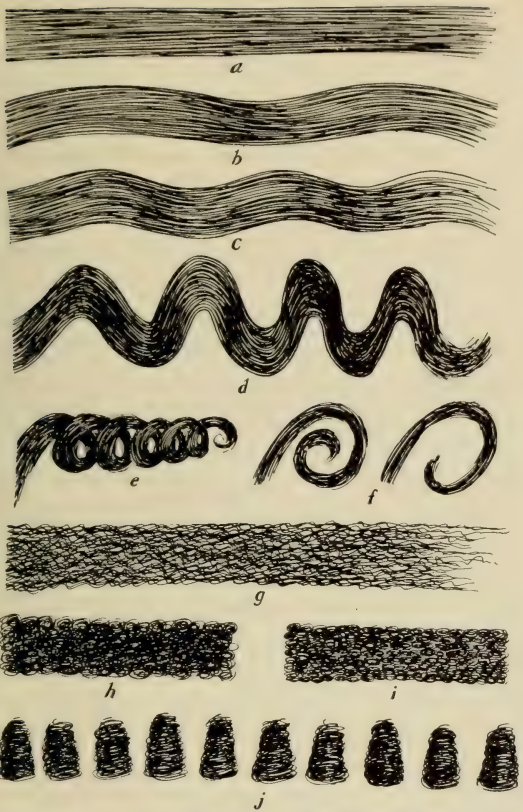



Fig. 9. A Standard to aid in describing the Form of the Hair. It is a modification of Martin's (*Lehrbuch der Anthropologie*). a = straight; b = low wave; c = medium wave; d = deep wave; e and f = curly; g = frizzly; h and i = woolly; j = coiled or spiral tufts.

low waved. When the depth fluctuates above or below $\frac{1}{6}$th of the width, it is described as a medium or moderate wave. When the depth fluctuates above and below one-half of the width it is described as deeply waved. The next class, curly, is most often abused. Medium and deep waves are often described as curly. Real curly hair is rare. When long, curls are easily recognized of course. We are all familiar with the artificial curls of childhood. In races characterized by curly hair the same long spiral curls from two to three centimeters in diameter are found. But when the hair is cut it is more difficult to recognize curly hair. Tousled, or unkempt, wavy hair is often described as curly. But curly hair does not form waves. It is always tousled in appearance when short. Each hair, even when cut quite short, forms a more or less complete circle or a large spiral. Before a hair can be called curly it should form at least three-fourths or more of a circle. On the other hand it is not to be mistaken for the matted woolly hair of Negroes. It is easily distinguished from this by the diameter of the curl or spiral which fluctuates around 2 centimeters near the head and dwindles gradually as the spiral continues. Curly hair does not form such a close, low mat, as does the woolly hair of Negroes.

Frizzly hair is hair with a very short deep wave, but it does not form a curl or a spiral. It is distinguished by the small dimensions of the wave. A low wave is frequently about 5 centimeters wide and about .5 centimeter deep; a medium wave is about 3.5 or 4 centimeters wide and 6 or 7 millimeters deep; a deep wave is about 2.5 centimeters wide and about 12 millimeters deep, but frizzly hair has a wave only about 5 millimeters wide, and about the same depth or slightly less. Woolly hair is the familiar Negro hair consisting of more or less closely coiled spirals linked together forming a matted mass. In Bushmen and some other Negroid types one frequently sees very closely coiled hair grouped together in *tufts* which are more or less isolated from each other. The scalp is clearly visible between the tufts. Now, while mention is made of these classes, it is to be clearly understood that these forms do not exist as distinct types. The measures given are only approximate and arbitrary standards of judgment. In the field one will encounter a complete gradation from the stiff straight hair of the Mongol to the tufted or spiral hair of the Bushmen. These artificial standards are given as an aid to description. Match the hair as nearly as possible with the standards given. If it is impossible to say whether

it is low waved or medium waved, etc., mark it intermediate between the two or in some way indicate your doubt. It should be possible, however, to allocate a large proportion of the individuals encountered to one class or another. Study these standards until they are firmly fixed in the mind. Keep them constantly with you in the field since one easily loses his perspective in a new racial environment.

*D.* **Eye Color.** Eyes range in color from the unpigmented albino to the very dark brown eyes of the heavily pigmented Negro races. These very dark brown eyes are often described as black. Describe the eye color as nearly as possible with the following terms: black, dark brown, medium brown, light brown, gray, green, blue-brown, gray-brown, dark blue, light blue. Gray is used not for a very light blue, but for a very light-brown eye. Such gray eyes are frequently described as blue in Jews and Slavs. Green eyes are also a very light brown. Blue-brown and gray-brown are mixed eyes in which the brown pigment is present in the iris as specks, patches, rings or rays, often in definite patterns which should be noted. The background of the iris is either blue or gray in such instances. Eye color varies from time to time in different states of health, temper,

and age. In the aged of very heavily pigmented races the eyes are frequently a light or medium brown due to a thickening of the covering. If working on Caucasians, it is best to make up a standard series of glass eyes to aid in description.

*E.* **The Epicanthic, or Mongoloid Fold.** This is a very important character, but unless the structure of this fold is thoroughly understood it is impossible to note its presence or absence accurately. In Fig. 10 the details of a European and of a Japanese eye are given. The canthus is the corner of the eye opening. There is an inner canthus and an outer canthus. Occasionally in Whites sometimes in Negroes, and very often in the Mongoloid peoples a fold of skin covers the inner canthus; hence, it is called an epicanthic fold and because of its frequency in the Mongols it is sometimes spoken of as a Mongoloid fold. Further, it should be clearly understood that this fold is not the upper lid overlapping the lower, but a fold of skin arising three or four millimeters above the free edge which bears the eyelashes. In extreme cases this fold may sag down over the upper lid and conceal it completely. Often when it is attached far down on the nasal bridge it also tends to draw up the skin below in such a way that the lower lid is partly concealed. A careful study


Fig. 10. A Caucasoid Eye compared with a Japanese Eye to show the Structure of the Epicanthic or Mongoloid Eyefold. 1 = inner canthus; 2 = outer canthus; 3 = free upper lid with lashes; 4 = free lower lid with lashes; 5 = caruncula lacrimalis; 6 = the fold in the skin which in the Japanese type below sweeps down and covers the inner canthus (1) and the caruncula lachrimalis (5). This fold (6) is the characteristic to be described. Note especially that the free upper lid (3) plays no part in forming the epicanthic fold but is often itself covered by the fold (6).

of Fig. 10 will make clear just what the difference is between eyes having this fold and eyes which do not have it. In Fig. 11 are shown a series of eyes which are often mistaken for eyes with the Mongoloid or epicanthic fold. Close observation will show that this is not true. The caruncula lacrimalis, the small pale red glandular body marked 5 in Fig. 10 is clearly observable. In eyes which have a fold this caruncula is covered in part or entirely by the fold. In Fig. 12 the degrees of development of this fold are portrayed. Describe as nearly as possible by the terms absent, slight fold (or trace of fold), medium fold, and marked fold. Use Fig. 12 as a standard.

This fold often makes eyes appear oblique or slant. But all obliquely placed or slant eyes do not have this fold. Each eye must be studied in detail. It frequently happens that the fold appears on one eye and not on the other. A very high percentage of Mongols do not have this fold even though their eye-slits may be narrow and obliquely placed. It is found in Negroes and Whites to some extent. Look for it in all races.

*F.* **Thickness of Lips.** Describe as thin, medium, thick, and very thick. Fig. 13 gives the standards.

Fig. 11. A Series of Eyes which are often mistaken for Eyes with the Epicanthic or Mongoloid Eyefold. Eyes may be obliquely placed or may have very narrow eyeslits without having the Mongoloid or epicanthic fold

*G.* **Shovel-shaped Incisor Teeth.** The upper incisor (front) teeth of some Mongoloid and other peoples have a depression or fossa on the inner surface which is surrounded by a rim or ridge of enamel. This looks not unlike a coal shovel and has been described as shovel-shaped by Hrdlicka. In the field it is best described in terms of rim development. In Fig. 14 are given the standard degrees of development in the central and lateral incisors to aid in description. This type of fossa may be distinguished in three degrees, slight, medium, and marked, as indicated in Fig. 14. It is possible to observe this character by having the subject open the mouth and hold the head back. A dental mirror (which may be purchased at a trifling cost from any dental supply house) helps in observing this character without contorting the subject.

*H.* **Amount of Beard.** The development of the beard is an important character in males. It is usually described as absent, scant, medium, or marked. By absent is meant that nothing is found but the soft downy hair common to women and children, scant is used when the well-developed hairs are decidedly scattering in distribution, and could easily be counted. Heavy is applied to well-developed dense beards such as occur in some of


fold absent
trace fold
medium fold
marked fold

Fig. 12. A Standard to be used in describing the Degree of Development of the Mongoloid or Epicanthic Eyefold. Be sure there is a trace before recording it as such. Sometimes the degree of development varies in the two eyes of the same individual. The "swollen" or beveled lower lid is frequently found with the fold, but very often occurs independently. When the epicanthic fold is extreme the lower lid is usually slightly introverted.

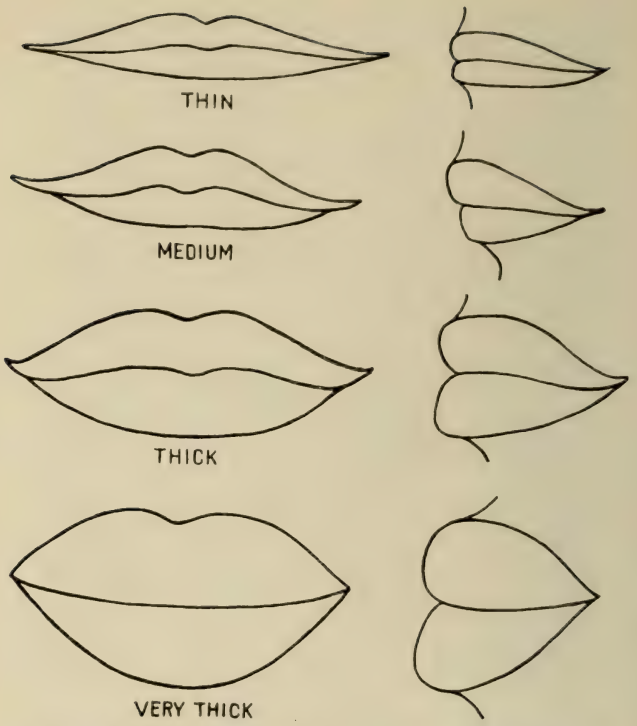



Fig. 13. Standard to aid in describing the Thickness of the Lips.

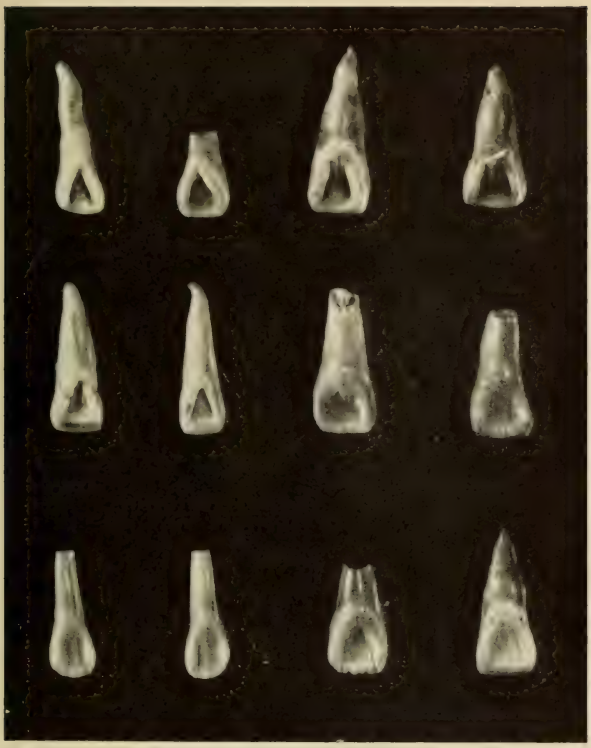


Fig. 14. Standard to aid in describing the Degree of Development of the Rim and Fossa in the Upper Incisor (front) Teeth. Describe the development of the rim as slight (bottom row), medium (middle row), or marked (upper row). The rims are on the inner (lingual) surface of the teeth and result in a fossa or depression in this surface producing a shovel-shaped incisor. (Scale arranged by Milo Hellman.)

the darker Caucasians and other peoples. Medium is applied to the intermediate density. In recording do not be deceived by length which depends on shaving or trimming. Consider only the density of distribution. The density varies in different parts of the cheek and chin so its degree of development should be recorded separately for the upper cheek (from the hair to a point opposite the angle of the lower jaw), the lower cheek (from the above to a point below the corner of the mouth) and the chin. Describe as absent, scant, medium, heavy. Use the symbols, 0 for absent, 1 for scant, 2 for medium, and 3 for marked, or abbreviations of your own.

*I.* **Body Hair.** Describe as above: absent, scant, medium, heavy. Observe the chest, forearm, and leg separately. It is best to restrict this to male subjects also. 0 = absent, 1 = scant, 2 = medium, 3 = heavy. See Fig. 15.

*J.* **Physiology.** In comparative racial studies we suffer from a great paucity of data on the physiology of primitive people. Those who are specially equipped should, of course, take observations on the metabolic rate and make other physiological tests which may be practical under field conditions. But it is a simple matter for anyone to record the pulse rate, and with a

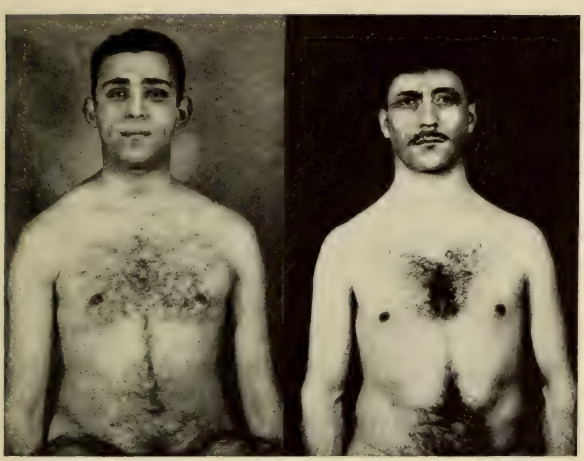


Fig. 15. Heavy but not Extreme Developments of Body Hair are shown Above.

clinical thermometer, the body temperature. Other information of a medical nature is desirable, such as prevalence of certain diseases.

*K.* **Vital Statistics.** Of much interest are the birth and death rates. The most satisfactory method for obtaining such data is from genealogical tables. The investigator, wherever possible, should record such tables including all the members of the family, direct and collateral in descent. Care should be taken to include the children who died very young, since they are frequently omitted in enumerating the members of a family.

*L.* **Psychological Tests.** We are not yet in a position to recommend definite tests for primitive people. Performance tests and tests of musical ability may be successfully used. Improvements in testing are so frequent that the safest procedure is to consult a psychologist before entering the field.

## DEFORMATIONS

It is rare indeed to find a people who do not in some way deform, manipulate, bleach, or dye some part of the body. Always be on the lookout for such customs as will interfere with obtaining normal measures and descriptions. Obtain as much detail as possible about the practice. Find out what proportion of the population practise it and if confined to one sex or one social class. Elderly women will be found the best informants. Especially be on the watch for:—

1. Practices of deforming the head by:—
   a. Manipulation and massage when very young
   b. Binding the head
2. Unconscious deformation of the head due to:—
   a. Peculiarities of cradling (keeping child constantly on back or side)
   b. Use of hard cradleboards or hard pillows
3. Bleaching, dyeing, or painting the skin
4. Bleaching or dyeing of the hair
5. Methods of producing artificial waves or curls in the hair, or in the case of Negroes the use of preparations which straighten the hair
6. The use of wigs, switches, etc., or hair

which is not wholly that of the subject. This is not restricted to civilized peoples

7. Pulling out the hair of the beard and body

8. Manipulating the nose or nasal bridge in an attempt to make it higher or lower

The Department of Anthropology of this Museum will welcome descriptions of such customs even if no anthropometric data are contributed.

## ASSISTANCE

Wherever possible a field worker should have an assistant to record the measurements as taken. Practise until the recorder is familiar with the measurements. In planning your procedure arrange the sequence of measurements so that the least amount of change is necessary in the position of the subject and the handling of instruments. After this is determined always take them in the same order. Have your recorder sit near-by so that you can see that he or she puts down the measure you give exactly as you give it and in the correct space. Be very careful to speak the number clearly and distinctly. When it comes to taking the descriptive observations take the blanks in your own hands and with a good pencil check or write the term that applies for each character. It can be done more rapidly in this way and creates less excitement among the subjects and makes the procedure much less embarrassing for the individual being examined. This latter point is an important one. Never embarrass the subject any more than is absolutely necessary. Continued success will follow only an impersonal, kindly, and considerate attitude towards the subjects examined.

## CLASSIFICATORY DATA

This consists of the name, sex, and age of the subject. For adults it is only necessary to obtain the age in years. If it is not known get an approximate age and question it. If a study of the growth of children is contemplated age must be exact and in as much detail as possible. Preferably get the date of birth to year, month, and day. The place where the study is made should follow and also the date of the examination. Residence, place of birth, tribe or race of subject, tribe or race of mother and father should always be given. Occupation and language or dialect are also useful in working up the material. Such other data as may be deemed necessary to make it clear to just what race, tribe, or division of a race or tribe an individual belongs should be recorded. In order to do this it is often desirable to add data on religion or clan, etc. In recording place of birth be sure to give town, as well as country, state, island, etc. Race is used in a loose sense. Do not put down white, brown, or black, etc., or even American, Polynesian, or Malay. Give the most definite term possible, such as Hawaiian, Samoan, Zuñi, or Yankton Sioux. Always record the data as the subject gives them. If you doubt any of them, such as for instance that the subject is a full-

blooded Sioux, put a question mark after it and make any applicable remark such as "looks part White" or "neighbor says he is part Negro," etc., etc. A majority of people tell the truth about their parentage unless there are political or social motives for concealing it.

## DESIRABLE SUBJECTS

A working series starts with 100 adults between the ages of twenty and sixty of each sex. When possible the series should be increased to two or three hundred of each sex. This is not so large an order as it sounds. Once the technique is mastered only a few minutes are necessary to examine a subject. Of course, there are times and places when it is impossible to get such series. There are also times when it is wise or necessary to omit the women. When it is impossible to get more, fifty individuals are much better than none, and even twenty-five adults of one sex will give an approximation to the characteristics of the people. In general, obtain as large a series as is possible. It will usually be found necessary to examine may persons whom one does not wish to examine. It does not pay to offend anyone, especially the very old. Measure them even though you do not wish their records. Young children may be omitted without offense.

Anthropology is badly in need of data on family groups. If opportunity offers, measure complete family groups from the youngest baby to the grandparents or greatgrandparents. In such cases make a rough family tree with the relationships clearly indicated and the individual names or their

key numbers placed where they belong on the chart. It is particularly desirable wherever possible to measure complete tribes or communities and to know the relationships of every individual to every other individual.

Do not select the subjects from one class entirely. If possible get a representative sample of the population. Record the occupation of each subject.

Your work will progress more smoothly if you start with the chiefs and influential members of the group and work down. It is best to give no incorrect or mysterious explanation of the purpose of the work. In most cases it will be sufficient to state that you want to find out how big they are or that you want to have a record of them so that their children and grandchildren will know what they were like. A dynamometer or some other strength-testing device is a valuable asset in entertaining the crowd until their turns come.

## PHOTOGRAPHY

It is very desirable to supplement each record with a full-face and profile photograph of the head of the subject (see Figs. 5 and 6 for example). Unless the subject is largely naked there is little advantage in photographing the body. If the trunk is bare, however, it is important to include it or the upper portion of it in the photograph.

If possible get a camera with a good lens. Use the 4 by 5 or 5 by 7 size for portraits. It is desirable to use the ground glass and focus for each photograph. Take close-up photographs in which the head uses about half of the plate. Have the camera only four or five feet from the subject. Have the lens on a level with the eyes. Focus sharply on the eyes.

Whenever possible take photos on the shady side of a building. Avoid as much as possible the taking of pictures in the sunlight and under trees. The shade of trees gives the picture a mottled, blurred effect. Direct sunlight results in squinting and other distortion of the features. On a cloudy day get in the strongest light. Avoid covered porches and over-hanging eaves. Whenever possible take pictures between eight in the morn- and five at night. Before and after this time,

time exposures are necessary, as of course they are indoors and on very dark days.

A very good photograph may be taken on the shady side of a building with both the subject and the camera in the shade. The subject should be not more than five or six feet from the lens at most. Focus sharply on the eyes with the lens wide open. Close the shutter and set it at about 8 or have it closed only very slightly. Under these conditions $\frac{1}{10}$ of a second exposure gives a good picture in the middle of a bright, clear day. Earlier in the morning and late in the afternoon it may be necessary to expose $\frac{1}{5}$ of a second. In countries where the light is very fast it will be necessary to cut this exposure or to close the shutter more. A few experiments should always be made before doing any photography on a large scale. Remember that the close-up photographs of people are quite different from distant scenery and require different light conditions and times of exposure. It is economical of time and money to consult the nearest photographer about the light conditions.

For the purposes of anthropology there is little advantage in carrying the heavy and fragile glass plates into the field. The flat films and the film packs are much more convenient and serve every

purpose just as well. In most respects the flat films are the equal of the glass plates.

Each photograph should be named or numbered so that it will be possible to identify it with the record of measurements and observations. In this respect flat films are more convenient than film packs.

Photograph the subject full-face and in profile. The profile should always be as nearly as possible a true profile with the *left* side of the face toward the camera. Try to have the photographs uniform in the size of the subject. Figs. 5 and 6 may be taken as an example of the types of photographs desired.

Again the Department of Anthropology of this Museum will be very grateful for photographs of racial types and interesting mixtures. In the case of mixture the photograph is much more valuable if the photographs of the parents accompany it. Family groups of mixed peoples are also very valuable. As much genealogical data as possible should accompany each photograph.

## SKELETAL COLLECTIONS

Skeletal material is badly needed to further our knowledge of different races. Whenever possible collect whole skeletons. At least make every effort to get the long bones of the arms and legs. Also when collecting the skull try to find the lower jaw. Make a special effort to get all of the teeth. If they are loose wrap them in a paper and put them inside the cranial cavity or put them in a small envelope and give them a corresponding field number. Always give all parts of one skeleton the same field number. A wax pencil is good for this or an indelible pencil will serve. Number all of the large bones. Wrap the small bones in packages or put in small bags and put a slip of paper in with the number. When packing to ship there will be less breakage if the skulls are packed separately in another box. When possible each skeleton should be photographed before it is moved. As much data as possible on the condition, type of burial, archæological and ethnological inclusions should be given. The Department of Anthropology of this Museum will gladly examine and furnish reports on any skeletal remains presented to it. It will also be glad to receive information as to where well-preserved skeletal remains are accessible.

With a little practice one soon becomes adept at making plaster casts of the face, hands, or other parts of the body. These are very valuable for museum exhibits and study purposes. This Museum will gladly furnish detailed instructions to anyone who may have an opportunity for doing such work.

Hair samples are also desirable. Whenever it is possible collect large hair samples. Smaller samples of about twenty hairs cut off close to the head and put in an envelope are also useful. Number the same as field records and photographs.

## STATISTICS

For the convenience of those who wish while still in the field to reduce the accumulated mass of measurements to some order we give here the formulæ for deriving the mean, standard deviation, and coefficient of variability. Our purpose is to supply a helpful reminder to those already familiar with statistical methods.

The first step is the seriation of the data into classes. The class intervals used will depend on the range in the measurements and the size of the dimension. For most of the head and face measurements intervals of one millimeter are recommended, while for such large measurements as stature, one centimeter. For ease in tabulation the class intervals may be so chosen as to give about twenty classes. In the following table a sample series is given and the method by which the constants are derived is displayed.

Head Length

| Class Interval mm. | f* | d* | fd | fd² |
|---|---|---|---|---|
| 170 | 1 | —17 | —17 | 289 |
| 171 | 0 | —16 | 00 | 0 |
| 172 | 2 | —15 | —30 | 450 |
| 173 | 0 | —14 | 0 | 0 |
| 174 | 2 | —13 | —26 | 338 |
| 175 | 0 | —12 | 0 | 0 |
| 176 | 1 | —11 | —11 | 121 |
| 177 | 0 | —10 | 0 | 0 |
| 178 | 1 | —9 | —9 | 81 |
| 179 | 0 | —8 | 0 | 0 |
| 180 | 1 | —7 | —7 | 49 |
| 181 | 2 | —6 | —12 | 72 |
| 182 | 4 | —5 | —20 | 100 |
| 183 | 2 | —4 | —8 | 32 |
| 184 | 5 | —3 | —15 | 45 |
| 185 | 2 | —2 | —4 | 8 |
| 186 | 6 | —1 | —6 | 6 |
| | | | —165 | |
| 187 | 9 | 0 | | 0 |
| 188 | 3 | +1 | +3 | 3 |
| 189 | 3 | +2 | +6 | 12 |
| 190 | 4 | +3 | +12 | 36 |
| 191 | 2 | +4 | +8 | 32 |
| 192 | 6 | +5 | +30 | 150 |
| 193 | 6 | +6 | +36 | 216 |
| 194 | 4 | +7 | +28 | 196 |
| 195 | 2 | +8 | +16 | 128 |
| 196 | 2 | +9 | +18 | 162 |
| 197 | 2 | +10 | +20 | 200 |
| 198 | 0 | +11 | +0 | 0 |
| 199 | 1 | +12 | +12 | 144 |
| 200 | 2 | +13 | +26 | 338 |
| | 75 | | +215 | 3208 |

*f=frequency; d=deviation

Number = 75
Sum + fd 215
Sum — fd 165
Sfd +50

Correction for Mean $= \frac{Sfd}{N} = \frac{50}{75} = +.6667^{**}$ $c^2 = .4445$

Trial Mean 187.00
Correction +.6667
Mean 187.6667
Sum $fd^2 = 3208$

$$\text{Standard Deviation} = \sqrt{\frac{\text{Sum } fd^2 - c^2}{N}}$$
$$= \sqrt{\frac{3208}{75} - .4445}$$
$$= \sqrt{42.7733 - .4445}$$
$$= \sqrt{42.3288}$$
$$= 6.51^{**}$$

$$\text{Coefficient of Variability} = \frac{\sigma}{M} \times 100 = \frac{6.51}{187.67} \times 100 = 3.49$$

$$\text{Error of M.} = .6745\frac{\sigma}{\sqrt{N}} = .6745\frac{6.51}{8.66} = \frac{4.39}{8.66} = .51$$

$$\text{Error of } \sigma = .6745\frac{\sigma}{\sqrt{2N}} = .6745\frac{6.51}{12.25} = \frac{4.39}{12.25} = .36$$

$$\text{Error of V.} = .6745\frac{CV}{\sqrt{2n}} = .6745\frac{3.49}{12.25} = \frac{2.34}{12.25} = .19$$

Mean $= 187.67 \pm .51$
$\sigma = 6.51 \pm .36$
V $= 3.49 \pm .19$

**If the class interval is more or less than the unit of measurement a correction is made by multiplying by the number of units in the class interval.

## RECORD BLANKS AND PUBLICATION

Use some such record blank as the one suggested below. If only a few are to be used it will be found cheaper to mimeograph them.

When publishing give individual records as well as averages. This makes your work available to all workers for all time. The Division of Anthropology in this Museum will be glad to receive field records submitted for analysis and publication. If the records are accepted and published, due credit will be given the collector for his share in the enterprise.

## SUGGESTED ANTHROPOMETRIC RECORD BLANK

Observer: Date

### Classificatory Data

| | |
|---|---|
| Name of subject: | Sex: |
| Residence: | Age: |
| Place of birth: | Occupation: |
| Race or tribe of father: | Language: |
| Race or tribe of mother: | Religion: |
| Race of subject: | Photo No.: |

Other details of race, relationship, etc.

### Measurements

| | | | |
|---|---|---|---|
| 1. | Weight | 11. | Head length |
| 2. | Stature | 12. | Head breadth |
| 3. | Acromion height | 13. | Head height |
| 4. | Dactylion height | 14. | Minimum frontal diameter |
| 5. | Sitting height | | |
| 6. | Suprasternale height | 15. | Face breadth |
| 7. | Shoulder width | 16. | Bigonial diameter |
| 8. | Chest width | 17. | Face height |
| 9. | Chest depth | 18. | Nasal height |
| 10. | Maximum hip width | 19. | Nasal width |

Head deformed?

### Indices

1. Cephalic length-breadth index
2. Cephalic length-height index
3. Cephalic breadth-height index
4. Transverse cephalo-facial index
5. Transverse fronto-parietal index
6. Jugofrontal (zygomatico-frontal) index
7. Jugomandibular (zygomatico-gonial) index
8. Anatomical face index
9. Nasal index
10. Relative sitting height
11. Relative trunk length
12. Relative leg length
13. Relative arm length
14. Relative acromion breadth
15. Relative hip width
16. Thoracic index

NOTE.—The numerals used in the above correspond to those in the text and refer to the same measures and indices.

## SUGGESTED ANTHROPOMETRIC RECORD BLANK

### Observations

*(Continued)*

A. Skin color: inner side of arm.... cheek....

B. Hair color: black, dark brown, medium brown, reddish brown, light brown, blond, golden, light red, brick red, auburn (is it bleached or dyed?)

C. Hair form: straight, low waves, medium waves, deep waves, curly, frizzly, woolly, tufts (is the form natural?)

D. Eye color: black, d. brown, med. brown, lt. brown, gray, green, blue-brown, gray-brown, dark blue, light blue

E. Epicanthic or Mongoloid fold: absent, slight, medium, marked

F. Thickness of lips: thin, medium, thick, very thick

G. Shovel-shaped incisor teeth: laterals: rim absent slight, medium, marked; centrals or mesials: rim absent, slight, medium, marked

H. Amount of beard: upper cheek, 0, 1, 2, 3; lower cheek, 0, 1, 2, 3; chin, 0, 1, 2, 3

I. Amount of body hair: chest, 0, 1, 2, 3; forearm, 0, 1 2, 3; legs, 0, 1, 2, 3

J. Pulse rate; temperature.

NOTE.—The letters correspond to those used in the text and refer to the same characters.

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While it is believed that a careful study of this outline will enable anyone to make observations and measurements of great value to science, it is of course understood that it is merely a primer and that anyone who hopes to do serious work in physical anthropology will go to some museum or university to be properly trained. In any case the field-worker should consult the standard text-books of anatomy and physical anthropology, a few of which are enumerated below. Additional titles will be found in the bibliographies accompanying these works.


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Journal of the Anthropological Institute of Great Britain and Ireland.

L'Anthropologie.

Archivio per l'Anthropologia e la Etnologia.

## Anthropological Handbooks

The following may be secured from the American Museum of Natural History in New York City If ordered by mail, add ten cents to list price for postage.

North American Indians of the Plains. By Clark Wissler. *Third Edition*, 164 pages, maps and illustrations. *Cloth, 75 cents.*

Indians of the Southwest. By Pliny Earle Goddard. *Third Edition*, 195 pages, maps and illustrations. *Cloth, 75 cents.*

Indians of the Northwest Coast. By Pliny Earle Goddard. 176 pages, map and illustrations. *Cloth, 75 cents.*

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