FORM D.—OBSERVERS.

Instructions to Teachers and Other Observers.

Four printed forms are provided :—

Form A—Female. (Tag Board. With or without "Diagnosis" on back.)
Form B—Male. (Tinted card. With or without "Diagnosis" on back.)
Form C—Parents. (Tag Board.)
Form D—Instructions to Observers. (Card, printed both sides.)

On the first day teachers will fill out, with the aid of pupils of their respective rooms, upon each pupil's card, the answers to 1, 2, 3, 4, 6, 16, 17, and 18. Let the child fill out, with pencil, any further items to which he may know the answer. Never examine any pupils until at least Nos. 3 and 6 are filled out in full.

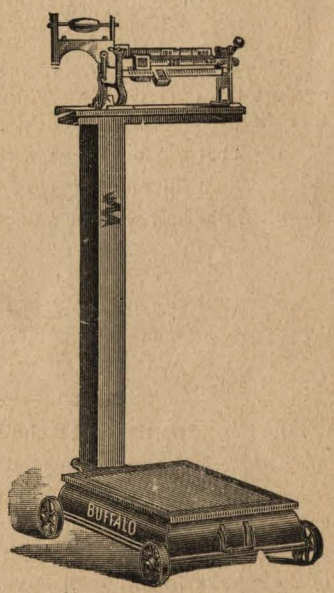
Arrange children for forms A and B in the order in which they sit at their desks, and preserve this arrangement throughout the measurements.

In all measurements the place of the pupil measured should be instantly taken by another. Before the children leave their desks have them unlace their shoes, but tuck in the strings.

The observers stand in line, each ready with the instrument employed for his particular measurement, and a pen or pencil for recording the same, or, if possible, a recorder is provided for each observer.

Teachers marshal the pupils in line. Each individual's card is placed in his hand, and he proceeds to the first observer, and then down the line, carrying his card each time to the next observer.

Send home to parents Form C that day, and ask for its return the following day. The teacher of each room should record 33 that afternoon. The following day answers to 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, and 15 are copied in ink upon Forms A and B.



Anthropometric Scales.

Observations.

16, 17. Color of Hair and Eyes.

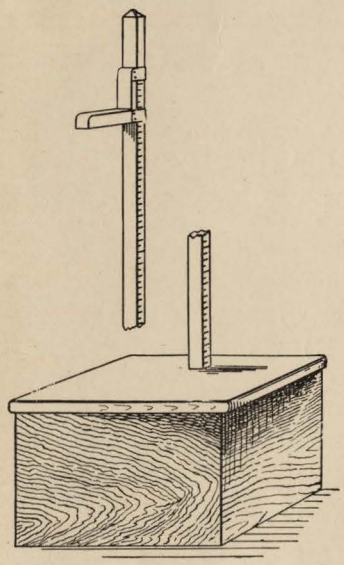
Choose the adjective that most nearly indicates the color—cross out the rest with pen and ink.

19. Weight.

1. Use regular Anthropometric Scales, Buffalo or Fairbanks if available.
2. Be sure that the scales are properly adjusted before weighing.
3. Record the amount in decimal fractions, whatever scales are used.

Height Standing and Height Sitting are taken with the Stadiometer or Seaver Measuring Rod.

20. Height Standing.



Stadiometer, or Height Stand.

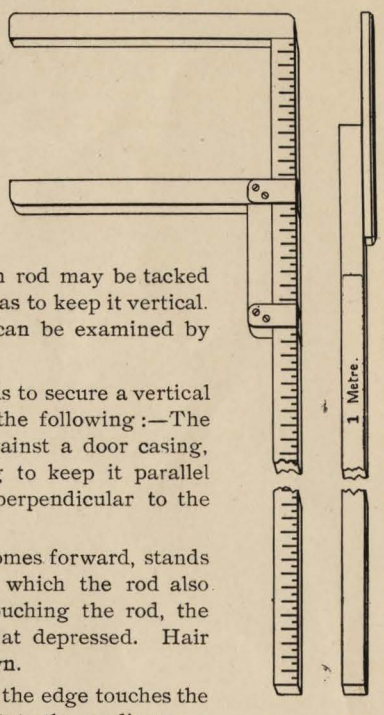
1. The first pupil takes off his shoes and leaves them in charge of a teacher or student assistant, who carries them to the end of the line for him.

2. Use a Stadiometer if one can be obtained. If not, the lower end of a Seaver combination rod may be tacked lightly to the wall or door casing so as to keep it vertical. All children over a meter in height can be examined by this use of the combination rod.

3. Another method which tends to secure a vertical position of the measuring rod is the following:—The teacher places the measuring rod against a door casing, the projections on the rod serving to keep it parallel with the casing, and presumably perpendicular to the floor.

4. The pupil in the first seat comes forward, stands firmly on the plane surface upon which the rod also rests, his heels, body and head touching the rod, the mouth closed and the chin somewhat depressed. Hair worn in a high knot must be let down.

5. Lower the sliding arm until the edge touches the crown of the pupil's head, and dictate the reading to a pupil assistant, who writes it opposite "20. Height, Standing." Meanwhile, the second pupil gets ready.



"Seaver" Measuring Rod.

21. Height Sitting.

Use a Stadiometer. If one cannot be obtained, place an armless wooden chair with a *flat* seat sideways against the door casing. The measuring rod is held perpendicularly to the seat, the projections on the rod touching, if possible, the casing. Pupils come forward as before. *Take care:*—

1. That the lower part of the spinal column touches the rod.
2. That the mouth is closed and the chin somewhat depressed.
3. That hair worn in a knot on the back of the head does not introduce an error.

22. Span of Arms.

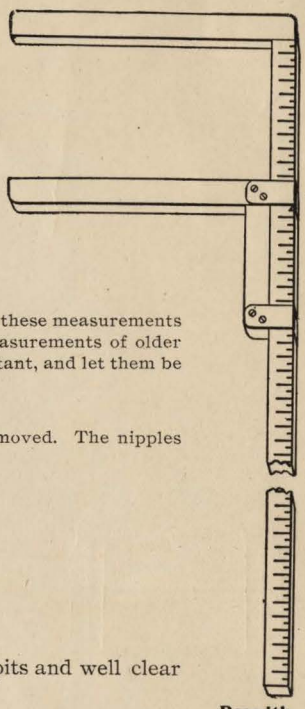
(Use Seaver Measuring Rod.)

1. Draw on the wall a chalk mark parallel with the floor and as high as the chin of a pupil of average height.
2. Hold the measuring rod parallel to the line and as high as the neck of a pupil to be measured.
3. The pupil touches one end with the middle finger of one hand and stretches along the rod as far as he can reach—chin up, heels together, body as close as possible to the rod, or,
4. Have the pupil stand with his back to the observer, extend the left arm and touch the wall with the end of the middle finger, then have him extend the other arm horizontally along the measuring rod and stretch, pushing the sliding cross-bar as far as possible. The observer must see that the arms are horizontal and that the end of the second finger is kept touching the wall.

23. Breadth of Head.

(Use Breadth Calipers.)

Take the greatest breadth of the head between the ears, wherever it is found. Hold the calipers horizontally and symmetrically.



Breadth Calipers.

Breadth of Chest and Waist, Depth of Chest and Girth of Chest.

Note 1. For all these measurements it would be better to have the outer clothing removed, and to take them over one thickness of clothing, but in many places this has been found impracticable on account of objections from parents. Measure under the outer coats for boys, and for girls also where coats are worn. Coats need not always be taken off, but should be unbuttoned, and where vests are excessively thick, unbutton them also. For all these measurements especially, examine girls and boys separately, and secure lady observers for almost all the measurements of older girls. Dictate in centimeters and decimal fractions of a centimeter to a teacher or pupil assistant, and let them be written opposite 24, 25, 26, 28, and 29.

Note 2. All chest measurements are made on a level with the nipples.

Note 3. The axillæ provide a better "landmark" than nipples when clothing is not removed. The nipples are from an inch to two inches below the armpits, according to the size of the individual.

24 and 25. Breadth of Chest and Waist.

(Use Breadth Calipers.)

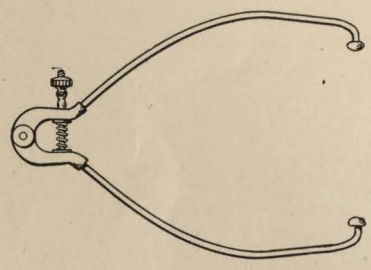
1. In taking breadth of chest, pass the prongs of the calipers under the armpits and well clear of them.

2. Use a firm but light pressure of the prongs, bringing them in contact with the projecting part of the ribs, and catch the measurement at the normal stage of respiration.

3. Breadth of Waist is taken at the narrowest part, with the chest normal.

26. Depth of Chest.

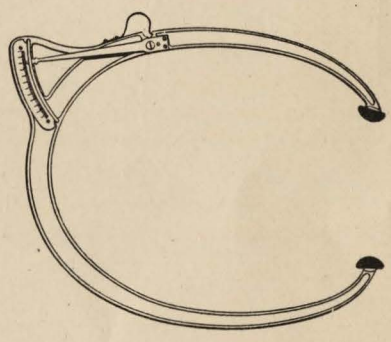
(Use Depth Calipers.)



Chest Depth Calipers.

1. Taken after a natural inspiration. Place one foot of the calipers on the sternum midway between the nipples, and the other foot on the spine at such a point that the line of measurement is at right angles with the axis of the spinal column.

2 Use self registering calipers if available. If not, the distance between the tips of calipers may be measured on a tape tacked to the wall or table, or upon the breadth calipers.

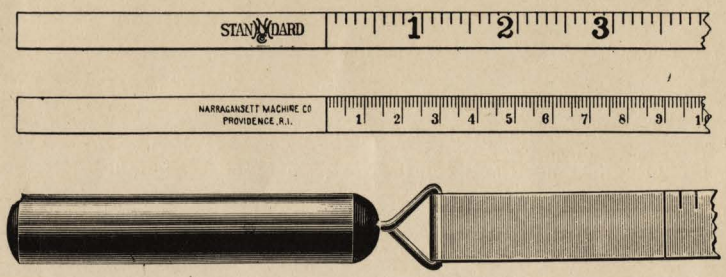


Chest Depth Calipers. Self Reading.

27. Girth of Head.

(Use Anthropometric Tape.)

This measurement should be taken around the head with the tape at the upper edge of the eyebrows, over the supraorbital and occipital prominences.



Anthropometric Tape 5 Ft. Metric and Inches.

28 AND 29. GIRTH OF CHEST CONTRACTED (CON.) AND EXPANDED (EXP.).

28. *Contracted.* Pupil breathes out, makes chest as small as possible, inclines head forward, draws shoulders slightly together.

29. *Expanded.* Shoulders back, head raised, deepest possible inspiration. Many children will require to be shown how to do this.

Wet Spirometer.

30. LUNG CAPACITY.

The pupil, after loosening the clothing about the chest and taking a full inspiration, filling the lungs completely, should blow steadily into the spirometer until all the air possible has been expelled from the lungs. Two or three trials may be allowed.

31 AND 32. STRENGTH OF SQUEEZE.

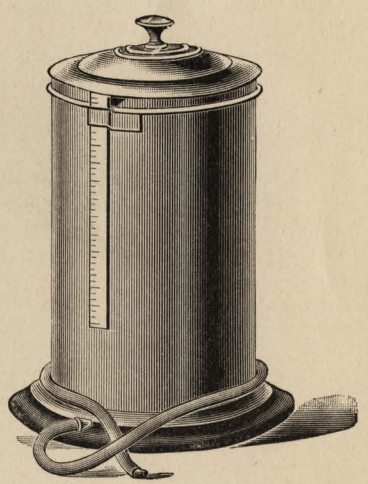
1. Depress the indicator of the dynamometer until the point of the indicator is exactly over the zero line of the scale.

2. Hold the dynamometer in the right hand so that the dial is turned inward, and squeeze the spring as hard as possible.

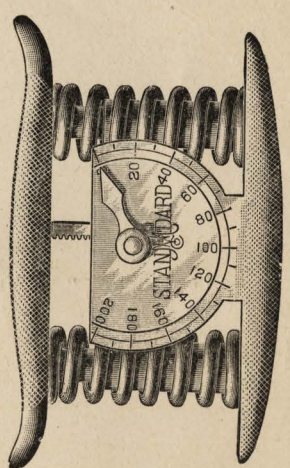
3. Read the outer scale (graduated from 0 to 100) to kilograms as exactly as possible. Write the number after "31. Strength of Squeeze, right hand"

If the dynamometer is graduated to pounds, the transposition to kilograms may be obtained approximately by dividing by 2.2.

4. Reset the instrument, and test left hand. (Do not touch the indicator. Always use the trigger, if the machine possesses one.)



Spalding's Spirometer.



Manuometer, or Grip Dynamometer.

Cuts of various pieces of apparatus are given in the order of the qualities examined, in the order of their position in the examining room. After the last piece of apparatus used in this examination there have been introduced a few pieces for the net measurements recommended in the last chapter. For the cuts of apparatus, I am indebted to the Narragansett Machine Co., who are prepared to furnish all forms of anthropometric apparatus. A. G. Spalding & Bros. have provided also a cut of their new spirometer, graduated to both cubic inches and litres.

APPARATUS FOR THE SHORTER FORM OF MEASUREMENT FOR PUBLIC SCHOOL CHILDREN.

1.	*†	Anthropometric Scales, Fairbanks	$26 00
		Anthropometric Scales, Buffalo	32 00
2.		*Stadiometer	8 00
3.		Seaver Rod	4 00
4.		Breadth Calipers	3 00
5.	†	Chest Depth Calipers, nickeled metal	4 00
		Chest Depth Calipers, aluminum, self-registering	12 00
6.		Anthropometric Tape, with spring	75 cents
		Anthropometric Tape, without spring	25 cents 1 00
7.	†	Wet Spirometer, Narragansett Machine Co	12 00
		Wet Spirometer, Spalding & Bros	16 50
8.		Grip Dynamometer	10 00
		Net total for *briefest set of apparatus, without scales*	$34 00

Total for full set of apparatus of best quality, $68.00 to $86.50, subject to school discount.

ADDITIONAL APPARATUS FOR THE SHORTER FORM OF MEASUREMENT IN USE BY HIGH SCHOOLS, PREPARATORY SCHOOLS, NORMAL SCHOOLS, COLLEGES, AND YOUNG MEN'S CHRISTIAN ASSOCIATIONS.

1.		Push and Pull Attachment for the Grip Dynamometer	$10 00
2.	†	Back and Legs Dynamometer, Tieman	50 00
		Back and Legs Dynamometer, Upham	44 00
3.		*Anthropometric Cabinet	10 00
		Net total	$54 00

Gross total, $64.00 to $70.00.

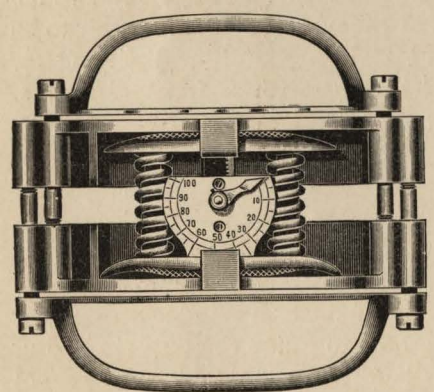
NOTE.—*1. Scales may often be borrowed or rented from merchants, where schools cannot afford to purchase. They are less convenient, because graduated to ounces, and usually somewhat less reliable.

2. The Seaver Rod may be substituted for the Stadiometer to save money, but this is not economical of time, and not advisable.

3. The Anthropometric Cabinet is recommended for convenience and economy. Care of instruments pays.

†Either instrument may be used. Both are reliable, but in each case the more expensive instrument is more convenient. The Fairbanks Scale has a double beam; the Buffalo a triple beam. The more expensive Chest Calipers are self-registering, and the measurement consumes, therefore, one-third the time required with the cheaper instrument. The Spirometer gotten up by Spalding & Bros. is graduated to both cubic inches and litres. It is a simpler machine in construction. The removal of the air is easier.

Liberal discounts are usually made to educational institutions, so that the above is not net cost of apparatus.



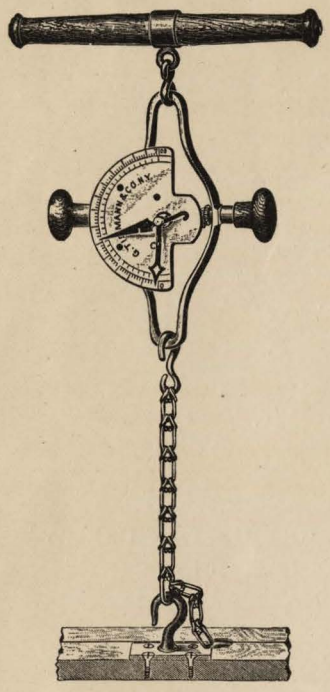
Push and Pull Attachment.

SHOULDER RETRACTORS.

(Use Push and Pull Attachment.)

The machine rests lightly against the upper sternum, with the indicator to the front. The pull is made with the bent arms in about a horizontal plane. The pull is from the median line of the trunk, outward.

Directions for taking Strength of Back and Legs are taken from "Intercollegiate Strength Tests":—



Back, Legs and Chest Dynamometer. (Tieman.)

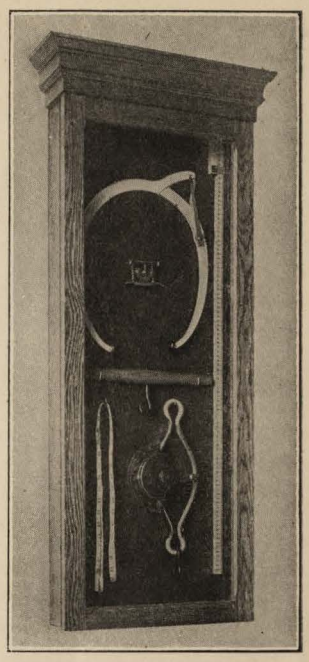
STRENGTH OF BACK.

(Use Back and Legs Dynamometer.)

Adjust the handle to the chain or dynamometer so that when standing erect the outstretched fingers placed in front of the thighs will come within about three inches of the handle. Incline the body forward at an angle of about sixty degrees, grasp the handle, take a full breath, and without bending the knees give one hard, steady lift, mostly with the back. In taking the lift the person must stand with the back to the wall, or back-board, but in no case will the body be allowed to sway back against it.

STRENGTH OF LEGS.

With the same apparatus arranged as for the back lift, standing upon the foot-rest or table with the body and head erect, chest thrown forward, and bending the knees until the handle, grasped with both hands, rests against the thighs, take a full breath, and give one hard, steady lift, mostly with the legs, using the hands to hold the handle in place. In making the leg lift, two pads, each twelve inches long, six inches wide, and one inch thick, may be used to protect the hands and thighs, but in no case may these pads be attached to the legs or to the garments. Lifts made by "snapping," "jerking," or "jumping" up the dynamometer will not be accepted.



Anthropometric Cabinet.

Some General Directions May Be of Use.

Take the measurements in the order given upon the blank. This makes it necessary to place the apparatus in the same order about the room. Have as many tables as recorders, if possible, and let the pupils pass down the line of observers between the tables and the wall. This plan is conducive to order and speed. When this method is used the pupil can hand his card to the first recorder and let him pass it down the line of recorders as the pupil is examined. For the most advantageous work there should be eight observers. One may combine the taking of the first quality, Weight, with the supervision of the whole, but it is better to be free. One observer is placed on Weight (No. 19), one on Height and Height Sitting (Nos. 20 and 21), one on Span of Arms (No. 22), one on Breadth of Head, Chest and Waist (Nos. 23, 24 and 25), one on Depth of Chest (No. 26), one on Girth of Head and Chest (Nos. 27, 28 and 29), one on Lung Capacity (No. 30), and one on Strength of Squeeze (Nos. 31 and 32). A reliable recorder is given to each observer.

Instructions should be given to teachers as a body at some stated time before the examination. When there is a physical director it belongs to him to supervise this preliminary training. They should be practiced in the individual measurements which each one is to take, and have a little preliminary practice, also, upon a few individuals, as a regular examining corps, with all members present. This should include, also, how to guide the pupil in taking the proper position. The pupils should receive instructions before leaving their own school room, as to the nature of the scheme and what is expected of them. It is better, also, to repeat

with the first group some general instructions as to progress along the line of observers, where to unlace their shoes, where to leave the completed examination blank, etc. Groups which follow will learn by seeing others under process of examination.

It is evident that, by such a coöperative method of examination, the whole work can only proceed as fast as the slowest observer. It may be necessary to make changes in the observers after the work is begun, but it is always safe to put the most adept examiners on the following measurements. The order of importance is usually the following: The Girths, Span of Arms, Breadths and, unless a self-registering pair of calipers is used, Depth of Chest.

As has been intimated the pupils should be moved, not the apparatus. A room of comfortable proportions should be set apart for the work for boys and a separate room for girls. Where examinations are taken in the afternoon, it works well to begin in the kindergarten and primary grade rooms and progress by grades upward, as the older pupils can usually be kept longer.

Give special instructions to recorders to place figures close to the qualities taken, to use ink if possible, and in any case to make clear, bold figures.

Give special instructions to teachers about the removal of over-jackets, and just how to take each measurement over the clothing, if it is one where clothing is to be reckoned with. Less than half of the measurements in the accompanying tables require any special attention to clothing on the part of the observer.

Examine in the fall and spring, when about the same weight of clothing is worn. October is a good month for the fall, the middle of September not too early in most states. Examine in the spring, six months later.

The weight of clothing is a comparatively constant quantity in children at the same time of year. According to Dr. Bowditch's experiments upon children from five to sixteen years of age, the average per cent of the gross weight to be allowed for the clothing of boys is 8 per cent, for girls is 6.8 per cent. The weight of the clothing increases very regularly about half a pound each year for boys and a little less for girls, but the percentage of gross weight remains practically the same.

Two methods have been followed as to giving warning of examination to pupils. One city warned schools beforehand, another did not, but pounced down upon the school without warning except to the Principal. The latter plan was most successful. Children were in neither case compelled to take examinations, but in the latter case parents did not have a chance to object beforehand to that which they did not understand, and the children were not made foolish by their objections. To some few children, measurements are at first a bugbear, but, after one examination, usually a pleasant anticipation. Even the younger children frequently ask very thoughtful questions about development.

Pupils often attempt to carry away or ask to keep the blanks upon which their measurements are recorded. Explain to them before the examination your policy about the matter, whether you will allow those that wish it the privilege of using blanks upon which to make duplicates, or whether they will be provided with anthropometric tables for this purpose. This may seem a very small thing to mention, but it has been known to consume a vast amount of time. It is evident that to get rid of interfering causes is the only way to secure speed and accuracy.

Instructions for Taking Measurements.

For directions and illustrations as to the taking of measurements with clothing removed, you are referred to Dr. Gulick's "Manual for Physical Measurements," to Dr. Seaver's "Anthropometry," and to Dr. Sargent's "Anthropometric Manual." For the most extensive statement of matter and method for psycho-physical measurements, to "The Experi-

mental Study of Children," by Arthur MacDonald. Dr. Porter's "Growth of St. Louis Children" is very suggestive as to methods of examination as well as calculations of results.

The writer has no desire to trench upon ground already covered, and will confine his statements to a few further cautions as to gross measurements.

With proper care clothing is not a serious barrier to obtaining satisfactory standards of development. Less than half of the measurements in the accompanying tables are affected by clothing, and in only four is any especial care necessary upon the part of the observer. Height and Height Sitting are increased almost inappreciably, an average of about one millimetre. As has already been stated, with reference to the remaining measurements affected by clothing, Weight, Breadth of Chest and Waist, and Depth of Chest, the most important direction is that the measurements be taken in the fall or spring, and not in the winter. There are two distinct reasons for this direction. Thickness of clothing varies more in the winter; greater thickness prevents accuracy of examination and renders the accompanying anthropometric tables less accurate as standards of development.

In taking weight, care should be exercised in relieving any intentional or undue loading of pockets, and all overcoats and over-jackets must be removed. The removal of shoes has already been indicated. Hats are of course removed. Breadth of Chest and Waist, and Depth of Chest must be taken with the chest normal. The observer must see that the arms hang naturally at the sides. Pupils tend to lift the arms from the sides in all chest breadths and girths (this increases the breadth from one to three centimetres) and to swell out the chest, deepening it abnormally during the taking of the Depth of Chest. As has already been indicated, in case of obvious excess of thickness of clothing, unbutton at the front and include but two thicknesses, and where both are unduly heavy include but one. In a few such cases it has been necessary to unbutton the vests of boys, where they were very heavy. Attention is called again to the caution in Form D for Observers, with reference to errors which may be introduced by the manner in which the hair is worn. Where coils and combs, etc., interfere, they must be taken down, as otherwise Height, Height Sitting, Breadth of Head and Girth of Head are materially affected. The chest measurements are taken on a level with the nipples, not because it is thought they are as valuable as those taken at the ninth rib, but because, without the removal of clothing, it is practically impossible to take them accurately at the ninth rib. The axillæ form a good "landmark" in taking "on a level with the nipples." The instruction for obtaining Breadth of Chest may be, "take breadth under the armpits." The general caution which includes almost everything is, be careful of *position*.

(Extract from "Manual for Physical Measurements," by Wm. W. Hastings, Ph. D.