



Cambridge Anthropometry.

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APRIL 24TH, 1888.

FRANCIS GALTON, Esq., F.R.S., *President, in the Chair.*

The Minutes of the last meeting were read and signed.

The election of GEORGE HODDINOTT, Esq., of 19, Nassington Road, Hampstead, was announced.

The following presents were announced, and thanks voted to the respective donors :—

FOR THE LIBRARY.

From A. L. LEWIS, Esq.—The Antananarivo Annual and Madagascar Magazine. No. 4, Christmas, 1878.

From the AUTHOR.—Ueber die Zeit des ersten Auftretens der Buche in Nord-Europa und die Frage nach der Heimath der Arier. Von K. Penka.

From the MITCHELL LIBRARY, GLASGOW.—Report, 1887.

From the YORKSHIRE PHILOSOPHICAL SOCIETY.—Annual Report for 1887.

From the SOCIÉTÉ ARCHÉOLOGIQUE, AGRAM.—Viestnik hrvatskoga Arkeologičkoga Društva. Godina x. Br. 2.

From the SOCIETY.—Journal of the Society of Arts. Nos. 1847–1848.

— Proceedings of the Society of Biblical Archæology. Vol. x. Part 5.

From the EDITOR.—Nature. Nos. 963, 964.

— Science. Nos. 269, 270.

— Photographic Times. Nos. 341–343.

— Revue Scientifique. Tome xli. Nos. 15, 16.

The following paper was read by the Secretary :—

CAMBRIDGE ANTHROPOMETRY.

By JOHN VENN, D.Sc., F.R.S.

A few years ago, Mr. Galton instituted a small anthropometric laboratory at South Kensington, during the time of the International Health Exhibition. The principal results of the measurements carried out there, and which embraced 9,337 persons, were published in the "Journal of the Anthropological Institute," for February, 1885; and in June, 1885, Mr. Galton

was appointed Rede Lecturer at Cambridge, and chose as the subject of his discourse, the nature, principles, and objects of the quantitative estimate of some of the less commonly, and less easily, measured of the human faculties. In order to perpetuate such interest as was excited by the results of this lecture Mr. Galton presented a set of instruments, similar for the most part to those which had been in use for South Kensington, to a small Committee at Cambridge, for corresponding use there. Some difficulty was experienced at first in choosing a suitable room in which the measurements could be carried out, as the University has but little available space, and unless some room could be found the position of which should bring the subject prominently under the notice of the students, no very extensive results could be hoped for. At first the committee-room of the Union Society was put at our disposal, but this was not very long available, as some demur was made by the authorities there to the use of the room by undergraduates who were not members of the Society. After a time the library of the Philosophical Society, situated in the centre of the new museums and lecture rooms, was secured, and the measurements were taken there by Mr. White, the Librarian of the Society. The bulk of the measurements here discussed were taken by him.

As regards the instruments themselves little need be said, as most of them were fully described by Mr. Galton ("Journ. Anthropol. Inst.," February, 1885). They consisted of the following:—

1. For measuring keenness of eye-sight. This assigns the distance to the nearest odd number (up to 35 inches) at which "diamond type," *i.e.*, that of the ordinary little shilling prayer-book, could be read. The power of each eye was separately determined. (In the present case diamond *numerals* were used).

2. For measuring strength of "pull." The essential part of the instrument consists of two handles connected by an elastic spring. One is held in each hand, and they are then drawn apart as far as possible, by an action resembling that of an archer drawing a bow. The particular exertion of force thus called for is, I apprehend, an unusual one for most persons at the present day. It produces the feeling, if I may judge from my own experience, of acting under very awkward circumstances, and at considerable mechanical disadvantage. Perhaps the only familiar exertion of force which at all resembles this is that which we have to put out in drawing the cork from a bottle; but in this case the hands are held much nearer together.

3. For measuring strength of "squeeze." The essential part

consists of two bars, some three or four inches apart, separated by a spring. They are squeezed together as close as possible and the result read off on a diagram. The power of squeezing thus possessed by each hand is indicated separately in our results. The instrument cannot be regarded as very accurate, since the effective range through which the muscles of the hand can thus work is but small. For purposes of intercomparison, where the same instrument is in use, this does not much matter, but one would have to be cautious in comparing the results obtained at Cambridge with those previously obtained by a different instrument at South Kensington.

4. Head measurement. Two instruments made by the Cambridge Scientific Instrument Company. One measures the maximum length and breadth; the other measures "the maximum height above the plane that passes through the upper edges of the orbits and the orifices of the ears." The magnitudes are assigned to the tenth of an inch.

5. Breathing capacity. "A spirometer is used, made by a counterpoised vessel suspended in water. When the air is breathed into it through a tube, the vessel rises, and the scale at its side shows the number of cubic inches of displacement. The person to be tested fills his chest and expires deeply three or four times for practice; then, after a few seconds rest, he tries the spirometer," as described by Mr. Galton in the South Kensington records.

6. Height without shoes. This is estimated from the measurement in shoes, deduction being made for the measured thickness of the heels, to the tenth of an inch.

7. Weight. This is estimated, in ordinary indoor clothing, to a quarter of a pound.

Altogether, therefore, it is seen that eleven distinct measurements are made and recorded of each person.

When a sufficient number of results had been obtained to furnish a fairly stable basis of experience I was requested by Mr. Galton to undertake an analysis of them, and a comparison of their general outcome with that of those obtained by almost identical instruments at South Kensington. Before proceeding to do this one or two general remarks must be made. In the first place, then, though the actual number of results may not be very large, they are really, for purposes of statistical accuracy, much more extensive than they may seem to be. This is owing to the homogeneousness of the class of persons here represented. At South Kensington more than 9,000 persons were measured; but then these included not only both sexes and very various ages, but the subjects of them belonged to widely different professions and social ranks. To any one who knows the compo-

sition of the English Universities it need hardly be remarked that the overwhelming majority of the students there belong to what may be called the upper professional and gentle classes; and to any one who knows anything of the elements of statistics it need not be added that the more homogeneous our class the smaller the number of instances required in order to establish any conclusions referring to that class.

The subjects of measurement mostly belonged, as just remarked, to the upper professional class. They had, therefore, in most physical respects been made the most of, *i.e.*, they had always been well fed and clothed, and had started well by being the progeny of parents who had mostly for some generations enjoyed the same advantages. They may therefore be supposed to represent as good a type physically as any class of Englishmen, under existing social circumstances, can be expected to show.

The principal interests of the results now in hand, however, depend upon the conclusions that can be drawn about the intellectual characteristics, and the correlation of these with the physical. Any classification of this sort has not, I believe, been attempted before, at any rate on any similar scale, nor is it easy to see under what other circumstances such a classification could be carried out. If any one will reflect for a moment upon the vagueness with which the terms "clever" or "able," &c., are applied to human beings, and upon the abundant sources of bias and confusion which attend their application, he will recognise at once that it is no easy thing to make even a rude division founded on intellectual characteristics. Some kind of objective standard, *i.e.*, one about which no dispute can be raised, must be employed, or the results would be comparatively worthless. Something might possibly be done in this way, by comparing, say, the privates in the engineers (who are all, I believe, required to have learnt some trade) with those in an ordinary infantry regiment; or by comparing the foremen in workshops with the common workmen. But even in these cases the intellectual qualification only enters slightly and indirectly, and as one out of a variety of elements.

At Cambridge no difficulty was felt on this score, and all that was required was some trouble on the part of the tutors of the various colleges, who all most kindly gave me their assistance. A three-fold division was adopted, distinguished here as A, B, and C. By A is meant a first-class man, in any Tripos examination, or one who is a scholar in his college. By B is meant all the remaining "honour men," and by C those who may be called "poll-men," *i.e.*, candidates for the ordinary degree. The "plucked" men, of course, if any such presented themselves, fell into this category.

Every Cambridge man will be able to appreciate the value which ought to be assigned to such a distinction in respect of accuracy and general significance. But for the benefit of others a few words of explanation may be added. Lists were drawn up of the men who had been measured, separated according to their colleges, and the tabulation of them was obtained from the tutors. Of course, in the case of graduates, the grounds of distinction were simply a matter of fact; but in the case of those who had yet to take their degree, an estimate had to be made. But in these days of much examination, and with the thorough knowledge possessed at present by most of the tutors as to the capacity and attainments of their pupils, very little hesitation was felt in the distribution of the characteristic marks. Had the decision been left to a jury of the men themselves, the results would have been almost the same: indeed, if each man had undertaken to label himself, it is not likely that any difference would have been produced sufficient to have any serious effect upon an average.

The question of the general significance of this decision is a somewhat different one. I do not want to overrate its importance, but it seems to me about as good as any such intellectual test can be. The modern Triposes, or honour examinations, are numerous and various, and give an opening to every kind of capacity and attainment. The only defect entailed in such a method, and it must be admitted that it is an unavoidable defect, consists in the fact that a certain proportion of men of equal capacity with the most successful fall into the ranks of the non-reading, owing to indolence or counter attractions of other kinds, or occasionally from ill-health. This must be allowed for what it is worth. But to any one who is inclined to underrate the value of such a distinction, I would ask, where else can anything approaching to it in value and correctness be obtained? Let any one try to picture the results of dividing into "very good," "good," and "indifferent," in respect of their intellectual capacity, the members of any trade or profession, or those who follow art or science, on some system which shall not only be agreed to by any impartial jury, but shall even be accepted by the persons themselves, and I think he will see that there is comparatively not much to complain of in the results here discussed.

One more remark may be added. It is sometimes the practice to despise the "poll-man," as if he were intellectually but a very poor specimen. His absolute value may not be great, but measured by the standard of ordinary English culture, he is by no means bad. On the average he is quite up to the level of the professional man, clergyman, lawyer, doctor, military man, and so forth, in fact he forms a large element of the more

cultivated part of these classes ; and all these classes represent the sifting out, by an intellectual test, from the mass left behind.

The outcome of all this may be thus described. We are concerned here, broadly speaking, with the upper professional class of Englishmen. Our students are, as regards their physical characteristics, a purely chance group from this class ; but as regards their intellectual characteristics, they must be considered as very decidedly selected. As soon as they have come into residence we are able to sub-divide them, with a very fair approach to accuracy and confidence, into three classes, turning on intellectual considerations alone.

There seem to be three main enquiries of interest here, which may be briefly noticed in turn :—

I. We may compare the students, as a class, with the miscellaneous persons measured at South Kensington.

II. We may compare the A, B, C classes with each other, in order to determine whether any physical characteristics, for better or for worse, are associated with the intellectual distinctions.

III. We may examine, within each of these classes, whether any physical alteration, and if so, in what direction, is found to display itself, between the ages of nineteen and twenty-four.

I. As regards the first point, the best way of illustrating the import of our statistics will be to adopt a plan resembling that of Mr. Galton's *percentiles* :—

Class.	Height in inches.	Strength of pull (lb.).	Squeeze (strongest hand).	Breathing capacity (cubic inches).
1st ten ..	72 to 77·8	102 to 155	103 to 125	305 to 400
2nd ten ..	71 — 72	95 — 102	98 — 103	284 — 305
3rd ten ..	70·2 — 71	90 — 95	94 — 98	274 — 284
4th ten ..	69·5 — 70·2	86 — 90	90 — 94	265 — 274
5th ten ..	68·9 — 69·5	83 — 86	87·5 — 90	254 — 265
6th ten ..	68·3 — 68·9	80 — 83	86 — 87·5	248 — 254
7th ten ..	67·6 — 68·3	76 — 80	82·5 — 86	235 — 248
8th ten ..	66·8 — 67·6	72 — 76	78·5 — 82·5	223 — 235
9th ten ..	65·6 — 66·8	68 — 72	73 — 78·5	209 — 223
Lowest ..	60·1 — 65·6	35 — 68	45 — 73	90 — 209

On this scheme the total numbers are supposed to be reduced to the scale of 100, and these to be then divided into ten equally numerous classes. There are several advantages about this method. For one thing any subject of measurement can at once see whereabouts on the scale he stands. Thus, a man of 5 feet 8 inches, who can "pull" 81 lb., can "squeeze" 88 lb., and can "breathe" 270 inches, stands respectively in the 7th, 6th, 5th, and 4th classes. The central line dividing the 5th and 6th classes corresponds to the mean or average man. But the main objects here are to display the extremes of range, and, still more important, to display the law of grouping or "Law of Error" between those extremes. Any one who chooses to examine the numbers in each class will find that the law of dispersion here corresponds pretty closely to the normal one known as the Binomial or Exponential Law.

The total number of men measured here was 1,450. In the tables which follow there are only 1,095, as deductions had to be made for those about whose position in the A, B, and C classes there was some uncertainty, and for other causes. When the mean of these, and of the remaining elements common to the two sets, is compared with the mean of some of those of South Kensington, the result is as follows:—

		Height.	Pull.	Squeeze.	Breathing.	Weight.
Cambridge ..	..	68·9	83	87·5	254	153·6
Kensington	..	67·9	74	85	219	143

At first sight the superiority of the former will seem enormous, and after all deductions are made the disparity remains considerable, and gives abundant justification to the conclusion of Dr. Roberts as to the high physical characteristics of the English upper professional class.

As regards height, no qualification is needed, and no statistician will need to be told what a very large amount is represented by an *average* difference of one inch.

In regard to the other elements we must remember that the Cambridge measurements consist almost entirely of men between 19 and 25, whilst those at Kensington consist of men between 23 and 26, over which period they are presumably distributed evenly. In respect, therefore, of *weight*, which increases with age, the real difference between the two is somewhat underrated. But in respect of muscular strength and breathing

power, where there is a loss with each successive year after 23 or 24, the difference is possibly overrated. Another cause of error probably lies in the necessary imperfection of the instruments for measuring muscular strength. For reasons previously given, I should much doubt if their indications can be relied on within two or three pounds. With the spirometer, it is otherwise, and the difference here (after necessary qualification) is very great. It indicates what a largely superior breathing capacity is inherited or acquired by the practice of continued out-door exercise from childhood.

II. We now come to the main subject of interest so far as our university students are concerned, viz.: Is there any difference, and, if any, what is the nature and magnitude of it, between the physical characteristics of our A, B, and C classes? The following tables contain all the information available upon this subject. They give the measurements of all the students as to whose intellectual status definite information was attainable, viz., 258 A, 476 B, and 361 C; or a total of 1,095. The first eleven columns contain the separate measurements as described at the commencement of this paper. The twelfth and thirteenth give the mean of the right and left eye power, and right and left squeeze. The fourteenth gives the product of the head measurements, and is therefore proportional to the total head capacity.

A mere glance at the tables will serve to show the following facts:—

(1.) In respect of height, weight, breathing and squeezing power, there is little or no difference between any of the classes.

(2.) In respect of eyesight there is a decided inferiority in the A's as compared with the B's and C's taken together; and in respect of the "pull," a similar inferiority of A to B and B to C.

(3.) In respect of head-measurement there is a decided superiority of A's over B's and B's over C's.

But something more than this must be attempted. When we are dealing with statistics, we ought to be able not merely to say vaguely that the difference does or does not seem significant to us, but we ought to have some test as to what difference would be significant. For this purpose appeal must be made to the theory of Probability. Suppose that we have a large number of measures of any kind, grouping themselves about their mean in the way familiar to every statistician, their degree of dispersion about this mean being assigned by the determination of their "probable error." And suppose that we take at random two batches of m and n from these measures. Then we know that if p be the probable error of the single

measures, that of *the difference between the means of any two of these batches* will be $p \sqrt{\frac{m+n}{mn}}$. Comparing, for instance the A's and C's, where the numbers are respectively 258 and 361, we have $\sqrt{\frac{m+n}{mn}} =$ approximately one-twelfth. That is, the differences between the means of such large numbers, had they been a true chance selection, would have displayed a probable error of only one-twelfth of that of the single measures. All that then remains to be done is to calculate the probable error of each of these elements separately, which is done in the usual way by determining the "error of mean square." They are as follows, in the case of the only elements about which any doubt can arise:—¹

Probable error of individual eyesight = 3·7 inches.

"	"	"pull"	= 7·6 pounds.
"	"	O.S. head measurement	= ·145 inches.
"	"	F.B.	= ·173 inches.
"	"	A.B.	= ·186 inches.

For instance, the difference in the mean length of clear vision between the A's and the C's is about an inch and a quarter; that between the same classes, of the age of 24, is slightly more, viz., about an inch and one-third. But the former is the difference between the means of 258 and 361, the latter that between means of 25 and 13. By the formula above given we find that the respective probable errors of the differences between these means are one-twelfth and one-third of 3·7 inches, *i.e.*, about ·3 inches and 1·2 inches. The latter is almost exactly the observed difference, which is therefore seen to be quite insignificant. The former is about one quarter of the observed difference, which is therefore highly significant; for the odds are about 25 to 1 that a measure of any kind shall not deviate by three times its probable error.

The above remarks are somewhat technical, but their gist is readily comprehensible. They inform us which of the differences in the above tables are permanent and significant, in the sense that we may be tolerably confident that if we took another similar batch we should find a similar difference; and which of them are merely transient and insignificant, in the sense that another similar batch is about as likely as not to reverse the conclusion we have obtained.

Unaided common sense might possibly have found its way

¹ O.S. signifies here "opposite sides," *i.e.*, from temple to temple. F.B. signifies "front to back." A.B. signifies "above the brow," a line being drawn from brow to earhole.

aright here in the case of the eye-sight, and the "pull," but it would hardly have done so in the case of the head-measurements. For instance, the difference between the mean "front to back" measurements in the case of the A's and C's is only about the tenth of an inch; a quantity hardly appreciable to ordinary observation. But when we observe that this quantity is about seven times the probable error we see that its chance occurrence is excessively unlikely.

The drift of these last remarks is simply to justify the summary conclusions which were drawn two pages back. They enable us to say not merely that the differences in question have actually presented themselves in the given range of statistics, but that they may be confidently expected to do so in future under similar circumstances.

We find then that, in regard to all the ordinary elements of health and strength, there does not seem to be the slightest difference between one class of our students and another: that is, they are equally tall, they possess the same weight, the same muscular strength of hand, and the same breathing capacity,—this last characteristic probably carrying a good deal along with it. The only exception here is in respect of the "pull," which is not very easily accounted for. If the practice of rowing were specially the amusement of those who do *not* read, we should have a plausible explanation; but I hardly think that any one who knows the habits of our students would say that this is the case. With this exception we may say that there is nothing in the previous habits of life of the reading men, in their inherited condition of body, or in the pursuits they follow when in residence, to give them any physical distinction for better or worse as regards what is commonly understood by "strength."

In respect of eye-sight there is a difference. The high honour men have a certain slight but pronounced inferiority in this respect. But this characteristic requires a little closer attention. In the case of each of the other measured elements the usual law of error is justified, that is, the variations on each side of the mean are symmetrical, and fall off very rapidly as we recede from the mean (a glance at the first table will display this characteristic in the case of the four elements there represented). But the full course of the curve of facility of eyesight is not represented. It stops abruptly at 35 inches, owing to the instrument not being graduated beyond this point, so that the assigned mean is not the true mean. But again, the case in question is one in which the arithmetic mean itself is not, taken alone, a fair test. This will be seen by a glance at the actual statistics in the case of our A men. The number measured was 260, the power of both eyes being separately determined.

Inches	0	1	3	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	Total
Men ...	18	0	0	8	14	19	12	28	18	22	18	39	55	36	52	58	50	32	41	520

The ordinary mean here, viz., 22·7, is obviously an imperfect guide in respect of both the above considerations. What we ought to do is to consider the men who are marked with 0 (viz., those who could not see to read at any distance without glasses) separately. And in respect of the others what we ought to do, owing to the obvious asymmetry of the curve of frequency, is to take not the arithmetic mean but what is called the “point of maximum frequency,” as this is a far truer index of what may be considered the normal length of vision. But any successful appeal to this requires far more extended statistics than those at our disposal.

When we separate the men of “no sight” (without glasses) we find that the prominent distinction between the reading and non-reading classes lies here; the number of these, per thousand, amongst the A, B, C, being respectively 34, 13, and 16. When these are subducted, the difference between the remaining groups is diminished, and does not appear to me to be very significant. That is, the main characteristic of the reading men is that a larger proportion of them are distinctly short-sighted.

In respect of head measurement, the difference, though actually small, seems decisive. The three dimensions are as follows:—

	O.S.	F.B.	A.B.	Product of the three.
A	5·99	7·66	5·33	244·56
B	5·93	7·57	5·30	237·91
C	5·91	7·55	5·31	237·33

III. The only remaining point is the consideration of the laws of growth and decay within the limits of age here considered, in respect of each of the capacities measured.

The general conclusions seem to be the following:—

1. Eye-sight. There seems, on the whole, a decided decline from the age of 19, and to much the same extent in the case of each of the three classes. The only exception is about the age of 24, where there appears to be a marked revival. As to the explanation of this latter fact, I have no conjecture to offer

in the absence of specific information as to the general character and habits, &c., of the men of this age.

2. As regards the power of pulling, squeezing, and breathing, there is a maximum about the age of 23 or 24, after which the strength seems to begin to fall off.

3. The height shows no apparent growth after 19.

4. The weight on the whole shows a tendency to continuous increase.

5. As regards the head-measurement, there seems to be a small, but decided increase after the age of 19, in the case of all the students alike.

As these changes appear to be about the same in the case of the A, B, and C men, it will be convenient to throw the three classes into one, in order to secure the stability of larger numbers. The results are given in the following table:—

Age.	Eye (mean).	Pull.	Squeeze.	Breath.	Weight.	Head.	Nos.
19	25·5	81·0	82·0	251	151	234·7	139
20	24·3	82·3	83·9	253·5	152·5	238·0	305
21	23·4	83·9	83·7	256	153·5	238·6	248
22	23·6	86·8	85·7	261·5	153·5	242·7	189
23	21·8	82·4	85·0	260·0	155	239·7	83
24	24·3	88·7	87·3	258	158	247·0	52
25→	22·4	80·9	82·3	251	155	244·6	79
							1095

(A.)

Age.	Sight.		Pull.	Squeeze.		Head			Breath.	Height.	Weight.	Sight (mean).	Squeeze (mean).	Head (product).	No. of measures.
	R.	L.		R.	L.	O.S.	F.B.	A.B.							
19	24.1	22.8	75.4	81.5	78.8	5.97	7.66	5.29	249	69.07	147	23.4	80.2	241.91	17
20	23.9	23.8	81.0	86.0	82.5	5.95	7.67	5.35	255	69.17	151.8	23.8	84.2	244.15	54
21	23.2	23.6	81.4	85.1	80.2	5.94	7.63	5.33	256	68.91	153	23.4	82.6	241.03	52
22	21.5	21.6	81.8	86.7	82.8	6.04	7.72	5.32	262.5	68.63	154.1	21.5	84.8	248.06	50
23	19.6	20.9	80.7	87.0	84.1	6.04	7.54	5.37	262	69.66	151.8	20.2	85.6	244.55	27
24	23.0	24.1	87.6	87.1	82.4	6.06	7.71	5.26	261	68.58	155	23.5	84.7	245.76	25
25	22.6	22.6	79.7	84.0	78.5	6.04	7.69	5.35	246	68.64	155	22.6	81.2	248.94	33
Mean	22.6	22.8	81.3	..	..	..	..	..	256.2	68.93	154	22.7	83.5	244.94	258

(B.)

Age.	Sight.		Pull.	Squeeze.		Head.			Breath.	Height.	Weight.	Sight (mean).	Squeeze (mean).	Head (product).	No. of measures.
	R.	L.		R.	L.	O.S.	F.B.	A.B.							
19	24.9	25.2	80.4	83.3	79.3	5.93	7.53	5.31	251.5	68.78	150	25.0	81.3	237.10	70
20	24.3	24.4	82.9	85.7	83.4	5.93	7.57	5.30	254	68.94	152.5	24.3	84.5	237.91	149
21	23.6	23.6	83.4	86.3	81.9	5.92	7.57	5.26	256	68.69	152.5	23.6	84.1	236.40	117
22	25.6	25.3	86.4	86.2	83.5	5.95	7.62	5.33	261	69.31	152.3	25.4	84.8	241.65	73
23	23.4	23.4	80.2	84.7	81.3	5.95	7.55	5.32	262	69.48	155	23.4	83.0	238.98	33
24	25.3	26.5	93.0	93.0	89.0	6.04	7.73	5.38	269	69.57	163.5	25.4	91.0	251.18	14
25	23.6	21.3	85.4	90.4	85.4	5.92	7.57	5.32	267	69.34	159.8	22.4	87.9	239.10	20
Mean	24.3	24.3	83.1	..	..	..	..	..	256.2	68.95	153	24.4	84.1	238.42	476

(C.)

Age.	Sight.		Pull.	Squeeze.		Head.			Breath.	Height.	Weight.	Sight (mean).	Squeeze (mean).	Head (product).	No. of (measures).
	R.	L.		R.	L.	O.S.	F.B.	A.B.							
19	25.3	25.8	83.6	86.9	80.2	5.77	7.52	5.28	250	68.93	153	25.5	83.5	229.10	52
20	24.7	24.3	82.2	84.8	79.2	5.91	7.52	5.29	252	68.87	152.7	24.5	82.8	235.10	102
21	23.7	22.4	86.3	86.3	82.2	5.94	7.56	5.35	255	68.96	155.5	23.0	84.2	240.24	79
22	23.5	23.2	91.1	89.3	85.8	5.97	7.57	5.31	261	68.64	154	23.3	87.5	239.97	66
23	21.0	21.6	87.5	89.7	84.7	5.91	7.53	5.28	254	69.31	158	21.3	87.2	234.97	23
24	24.3	25.3	86.3	89.8	87.0	5.97	7.68	5.33	240	68.00	156	24.8	88.4	244.37	13
25	21.6	22.8	79.2	81.9	77.2	6.02	7.56	5.34	244	67.59	152.5	22.2	79.5	243.48	26
Mean	23.87	23.77	85.2	..	..	..	..	..	253.0	68.76	154	23.7	84.1	237.20	361