ANTHROPOLOGICAL MISCELLANEA.

Some Results of the Anthropometric Laboratory.

By Francis Galton, F.R.S.

(*See the Memoir by the same Author at page* 205.)

The value of the results obtained at the laboratory may be questioned on the ground that the persons who applied to be measured were not random specimens of the crowd who visited the Exhibition, and that the latter themselves were no fair sample of the British population, nor of any well-defined section of it. I have no reply to make to this objection, except that it should not be pushed unreasonably far. On the other hand, it may justly be claimed that results which, taken each by itself, have no great value as absolute determinations, may nevertheless be of considerable importance relatively to one another, by affording materials for testing the relations between various bodily faculties and the influences of occupation and birthplace. Their discussion in any form is a laborious task, and the portion of it that I now submit is very far indeed from exhausting the uses to which the laboratory records can be put. It deals mostly with the very results that I have just spoken of as being the least valuable; but I have taken them in hand first, because it was a necessary preliminary to any further discussion. I also wished to utilise the copious material at my disposal to exemplify what I trust will be found a convenient development of a method of statistical treatment I have long advocated, by presenting in a compact and methodical form (Table II) a great deal more concerning the distribution of the measurements of man than has hitherto been attempted in a numerical form.

The following brief summary of maximum measurements will be interesting:—

9,337 persons were measured, of whom 4,726 were adult males, and 1,657 adult females. The highest records during the whole time that the laboratory was open were those shown in Table I.

TABLE I.

	Highest recorded cases among	
	4,726 Adult Males.	1,657 Adult Females.
Height without shoes, in inches	79·5	70·3
Weight, in lbs.	308	222
Breathing capacity, in cubic inches.. ..	354	270
Strength of pull, in lbs.	148	89
Strength of squeeze, in lbs.	112	86
Swiftness of blow, in feet per second ..	29	20
Sight distance, in inches, of reading diamond test-type	39	40

The meaning of Table II, and that of the new word "per-centile" which is defined in the heading to that Table, will be understood by the help of a single example, for which I will take the line referring to Strength of Squeeze among males. We see that a discussion was made of 519 measurements in that respect, of men whose ages ranged between 23 and 26; that 95 per cent. of them were able to exert a squeeze with their strongest hand (the squeeze was measured by a spring dynamometer) that surpassed 67 lbs. of pressure; that 90 per cent. could exert one that surpassed 71; 80 per cent. one that surpassed 76; and so on. The value which 50 per cent. exceeded, and 50 per cent. fell short of, is the Median Value, or the 50th per-centile, and this is practically the same as the Mean Value; its amount is 85 lbs. This line of the Table consequently presents an exact and very complete account of the distribution of strength in one respect among the middle 90 per cent. of any group of males of the tabular ages similar to those who were measured at the laboratory. The 5 per cent. lowest and the 5 per cent. highest cannot be derived directly from it, but their values may be approximately inferred from the run of the tabular figures, supplemented by such deductions as the Law of Error may encourage us to draw. Those who wish to apply this law will note that the "probable error" is half the difference between the 25th and the 75th per-centile, which can easily be found by interpolation, and they will draw the per-centiles that correspond respectively to the median value *minus* twice, three times, and three-and-a-half times the probable error, at the graduations 8·7, 2·4, 0·8, and those that correspond to the median value *plus* those amounts, at the graduations 91·3, 97·6, and 99·2. The Table is a mere statement of observed fact; there is no theory whatever involved in its construction, beyond simple interpolations between values that differ little from one another and which have been found to run in very regular series.

TABLE II.—ANTHROPOMETRIC PER-CENTILES.

Values surpassed, and Values unreached, by various percentages of the persons measured at the Anthropometric Laboratory in the late International Health Exhibition.

(The value that is unreached by n per cent. of any large group of measurements, and surpassed by 100-*n of them, is called its* nth *per-centile.)*

Subject of measurement.	Age.	Unit of measurement.	Sex.	No. of persons in the group.	Values surpassed by per-cents. as below. 95	90	80	70	60	50	40	30	20	10	5
					Values unreached by per-cents. as below. 5	10	20	30	40	50	60	70	80	90	95
Height, standing, without shoes ...	23–51	Inches	M.	811	63·2	64·5	65·8	66·5	67·3	67·9	68·5	69·2	70·0	71·3	72·4
			F.	770	58·9	59·9	61·3	62·1	62·7	63·3	63·9	64·6	65·3	66·4	67·3
Height, sitting, from seat of chair ...	23–51	Inches	M.	1013	33·6	34·2	34·9	35·3	35·4	36·0	36·3	36·7	37·1	37·7	38·2
			F.	775	31·8	32·3	32·9	33·3	33·6	33·9	34·2	34·6	34·9	35·6	36·0
Span of arms	23–51	Inches	M.	811	65·0	66·1	67·2	68·2	69·0	69·9	70·6	71·4	72·3	73·6	74·8
			F.	770	58·6	59·5	60·7	61·7	62·4	63·0	63·7	64·5	65·4	66·7	68·0
Weight in ordinary indoor clothes ...	23–26	Pounds	M.	520	121	125	131	135	139	143	147	150	156	165	172
			F.	276	102	105	110	114	118	122	129	132	136	142	149
Breathing capacity ...	23–26	Cubic inches	M.	212	161	177	187	199	211	219	226	236	248	277	290
			F.	277	92	102	115	124	131	138	144	151	164	177	186
Strength of pull as archer with bow	23–26	Pounds	M.	519	56	60	64	68	71	74	77	80	82	89	96
			F.	276	30	32	34	36	38	40	42	44	47	51	54
Strength of squeeze with strongest hand	23–26	Pounds	M.	519	67	71	76	79	82	85	88	91	95	100	104
			F.	276	36	39	43	47	49	52	55	58	62	67	72
Swiftness of blow... ...	23–26	Feet per second	M.	516	13·2	14·1	15·2	16·2	17·3	18·1	19·1	20·0	20·9	22·3	23·6
			F.	271	9·2	10·1	11·3	12·1	12·8	13·4	14·0	14·5	15·1	16·3	16·9
Sight, keenness of—by distance of reading diamond test-type ...	23–26	Inches	M.	398	13	17	20	22	23	25	26	28	30	32	34
			F.	433	10	12	16	19	22	24	26	27	29	31	32

It may be used in many ways. Suppose, for example, that a man of the tabular age, viz., above 23 and under 26, and who could exert a squeeze of 80 lbs., desired to know his rank among the rest, the Table tells him at once that his strength in this respect certainly exceeds that of 30 per cent. of those who were measured, because if it had been only 79 lbs. it would have done so. It also tells him that his strength does not exceed that of 40 per cent. of the rest, since it would have required a pressure of 82 lbs. to have done this. He therefore ranks between the 30th and the 40th per-centile, and a very simple mental sum in proportion shows his place to be about the 33rd or 34th in a class of 100.

The Table exhibits in a very striking way the differences between the two sexes. The 5th male per-centile of strength of squeeze is equal to the 90th female per-centile, which is nearly but not quite the same as saying that the man who ranks 5th from the bottom of a class of 100 males would rank 10th from the top in a class of 100 females. The small difference between the two forms of expression will be explained further on. If the male per-centiles of strength of squeeze are plotted on ruled paper, beginning with the lowest, and if the female per-centiles are plotted on the same paper, beginning with the highest, the curves joining their respective tops will be found to intersect at the 7th per-centile, which is the value that 7 of the females and 93 of the males just surpass. Therefore, if we wished to select the 100 strongest individuals out of two groups, one consisting of 100 males chosen at random, and the other of 100 females, we should take the 100 males and draft out the 7 weakest of them, and draft in the 7 strongest females. Very powerful women exist, but happily perhaps for the repose of the other sex, such gifted women are rare. Out of 1,657 adult females of various ages measured at the laboratory, we have already seen that the strongest could only exert a squeeze of 86 lbs., or about that of a medium man. The population of England hardly contains enough material to form even a few regiments of efficient Amazons.

The various measurements of males surpass those of females in very different degrees, but in nearly every particular. A convenient way of comparing them in each case is that which I have just adopted, of finding the per-centile which has the same value when reckoned from the lower end of the male series, and from the higher end of the female series. When this has been done, the position of the per-centiles arranged in order of their magnitude are as follows:—Pull, 4; Squeeze, 7; Breathing capacity, 10; Height, 14; Weight, 26; Swiftness of blow, 26; Keenness of sight, 37. We conclude from them that the female differs from the male more conspicuously in strength than in any other particular, and therefore that the commonly used epithet of "the weaker sex" is peculiarly appropriate.

The Table was constructed as follows:—I had groups of appropriate cases extracted for me from the duplicate records by Mr. J. Henry Young, of the General Register Office. I did not care to

have the records exhausted, but requested him to take as many as seemed in each case to be sufficient to give a trustworthy result for these and certain other purposes to which I desired to apply them. The precise number was determined by accidental matters of detail that in no way implied a selection of the measurements. The summarised form in which I finally took them in hand is shown in the two upper lines of the following specimen:—

Height, Sitting, of Female Adults, aged 23–50, *in inches.*

29–	30–	31–	32–	33–	34–	35–	36–	37–	
2	8	52	116	226	227	108	31	5	Total 775
2	10	62	178	404	631	739	770	775	Abscissæ 0 to 775
30	31	32	33	34	35	36	37	38	Corresponding Ordinates.

The meaning of the two upper lines is that in a total of 775 observations there were 2 cases measuring 29 and under 30 inches, 8 cases measuring 30 and under 31 inches, and so on. The third line contains the sums of the entries in the second line reckoned from the beginning, and is to be read as follows:—2 cases under 30 inches, 10 cases (=2+8) under 31 inches, 62 cases (=2+8+52) under 32 inches, and so on.

I plotted these 775 cases on French "sectional" paper, which is procurable in long and inexpensive rolls, ruled crossways by lines 1 millimetre apart. I counted the first line as 0° and the 776th as 775°. Supposing the measurements to have been plotted in the order of their magnitude, in succession between these lines, the first would stand between 0° and 1°, the second between 1° and 2°, and so on. Now we see from the Table that the second measurement was just short of 30 inches, consequently the third measurement was presumably just beyond it, therefore the abscissa whose value is 2°, and which separates the second from the third measurement, may fairly be taken to represent the abscissa of the ordinate that is equal to 30 inches exactly. Similarly, the abscissa whose value is 10° divides the measurement that is just under 31 inches from that which is presumably just above it, and may be taken as the abscissa to that ordinate whose precise value is 31°, and so on for the rest. The fourth line of the Table gives the ordinates thus determined for the abscissæ whose values are entered above them in the third line. I dotted the values of these ordinates in their right places on the sectional paper, and joined the dots with a line, which in every case, except the breathing capacity, fell into a

strikingly regular curve. (I shall speak further on about this one partial exception.) Per-centiles were then drawn to the curve, corresponding to abscissæ that were respectively 5 per cent., 10 per cent., 20 per cent., &c., of the length of the base line. As the length of the base line was 275, these per-centiles stood at the graduations 13·8°, 27·5°, 55·0°, &c. Their values, as read off on the sectional paper, are those which I have given in the Table.

It will be understood after a little reflection that the 9th rank in a row of 10, the 90th rank in a row of 100, and the 900th rank in a row of 1000, are not identical, and that none of them are identical with the 90th per-centile. There must always be the difference of one half-place between the post which each person occupies in a row of n individuals, numbered from 1 to n, and that of the corresponding graduation of the base on which he stands, and which bears the same nominal value, because the graduations are numbered from 0 to n and begin at a point one half-place short of the first man, and end at one half-place beyond the last man. Consequently the graduations corresponding to the posts of the 9th, 90th, and 900th man in the above example, refer to the distance of those posts from the beginning at 0 of their several base lines, and those distances are related to the lengths of the base lines in the proportions of 8·5 : 10, of 89·5 : 100, and of 899·5 : 1000, which when reckoned in per-cents. of the several base lines are 85, 89·5, and 89·95 respectively. The larger the number of places in the series, the more insignificant does this half-place become. Moreover, the intrusion of each fresh observation into the series separates its neighbours by almost double that amount, and propagates a disturbance that reaches to either end, though it is diminished to almost nothing by the time it has arrived there. We may therefore ignore the existence of this theoretically troublesome half-place in our ordinary statistical work.

There is a latent source of error that might affect such statistics as these, as well as many others that are drawn up in the usual way, which has not, so far as I know, been recognised, and which deserves attention. It is due to uncertainty as to the precise meaning of such headings as 30–, 31–, &c. If the measurements, no matter whether they were made carefully or carelessly, are read off from the instruments with great nicety, then a reading such as 30·99 would fall in the column 30–, and the mean of all the entries in such a column might fairly be referred to a mean value of 30·50.

But if the instruments are roughly read, say to the nearest half inch, the reading of a real instrumental value of 30·99, and even that of a real value of 30·76, would both be entered in the column 31–. The column 30– would then contain measurements whose real instrumental values ranged between 29·75 and 30·75, and the column 31– would contain those that ranged between 30·75 and 31·75; consequently, the means of all the entries in those columns

respectively should be referred, not to 30·5 and 31·5, but to 30·25 and to 31·25. Thus an error of a quarter of an inch in the final results might easily be occasioned by the neglect to note and allow for the degree of minuteness with which the instruments were read. No multiplication of measurements would get rid of it, neither would any increase of care in setting the instruments nor any increase in their accuracy. The error of which I speak is purely dependent on the degree of minuteness with which the instruments are read off. I strongly suspect that many statistical tables are affected by this generally unrecognised cause of error. The measurements at my laboratory were read to the nearest tenth of an inch and to a fraction of a pound, so I can afford to disregard this consideration. There was, however, a slight bias in favour of entering round numbers, which should have been, but were not (because I neglected to give the necessary instructions), rateably divided between the columns on either side.

I will now make a few remarks upon the measurements severally, and give some extracts from the numerous MS. tables already prepared, which I propose ultimately to present to the Anthropological Institute, together with the original laboratory records. They will form a valuable addition to those now in their possession, made by the Anthropometric Committee of the British Association, if utilised in connection with future inquiries into the influences of occupation and birthplace.

Height, Standing *and* Sitting, *and* Span *of* Arms *in* Adults.

A compendious view of the chief linear measurements of the persons examined is afforded by the three data: (1) height standing (without shoes); (2) height when sitting, measured upwards from the seat of the chair; (3) the span of the extended arms measured from the extreme finger tips. From these we can infer with approximate and adequate accuracy the lengths of the trunk, legs, and arms, and the proportion they severally bear to the total stature.

Height Sitting, and Span.

The ratio between height sitting and span varies as is well known during the period of growth, and is different in tall and short adults. The following table shows the relation between the two in persons of both sexes of approximately medium stature, who are between the ages of 23 and 51.

Height Sitting.			Span.		
Inches.	Males. Height 5 feet 8½ inches.	Females. Height 5 feet 3½ inches.	Inches.	Males. Height 5 feet 8½ inches.	Females. Height 5 feet 3½ inches.
31–	..	1	60–	..	3
32–	..	7	61–	..	4
33–	..	39	62–	..	31
34–	4	42	63–	..	23
35–	31	11	64–	..	19
36–	44	..	65–	1	10
37–	19	..	66–	2	3
38–	2	..	67–	3	..
..	..	..	68–	12	..
..	..	..	69–	18	..
..	..	..	70–	27	..
..	..	..	71–	22	..
..	..	..	72–	10	..
..	..	..	73–	3	..
..	..	..	74–	1	..
..	..	..	75–	1	..
	100	100		100	100

Height, Sitting and Standing.

As regards the ratio between height sitting and standing, it does not appear that a moderate increase of tallness in males is associated with a disproportionate increase of length of legs, the ratio of height sitting to height standing being uniform up to 6 feet or more. Its value is 54 : 100; in other words, the ratio of their legs to their trunk is 46 to 54 or thereabouts. When the stature exceeds 6 feet, the length of the legs as compared to that of the trunk increases notably; but my cases are too few to warrant a numerical estimate. As regards females, the case is curiously different. Here an increase of stature is from first to last accompanied by an increase of the length of legs as compared to that of trunk. The data calculated as above are as follows:—For a female stature of 4 feet 10½ inches it is as 45 : 55, for 5 feet 2½ inches 46 : 50, and for 5 feet 6½ inches it is as 47 : 53. As regards taller females, my data distinctly point to a rapid progression in the rate of increase of the relation in question.

Weight.

As regards weight, I have nothing more to say at present.

Breathing Capacity.

The returns show a remarkable regularity in the alteration of the breathing capacity as life advances. It increases rapidly in early youth, and becomes stationary between the ages of 20 and 30

or a little later, and thenceforward steadily declines. I have already alluded to the existence of some irregularity in the run of the per-centiles of breathing capacity, in adults aged from 23 to 51. This is chiefly due, I think, to an unequal representation of the various ages between those limits, and to the somewhat irregular mixture of town and country folk, and of sedentary and active professions among the persons measured.

The following brief abstract gives a very fair epitome of the returns:—

AVERAGE BREATHING CAPACITY

(in cubic inches).

Ages.	Males.	Females.
10	135	121
15	199	138
20	216	142
25	217	137
30	213	137
35	211	136
40	203	123
45	194	119
50	191	118
55	178	111

The superior breathing capacity of the male is partly related to his stature and bulk; it is little in excess of that of females in early life, but becomes half as great again at the age of 20, and that large ratio is more than maintained throughout the whole of the after life.

Strength of Pull and Squeeze in Adults.

The strength of squeeze, as indicated by the instrument, does not keep ahead of that of pull at the highest end of the scale. The difference between them falls off, and is even reversed in the higher figures. I ascribe this wholly to the fault of the instrument, which does not permit the hand to act throughout with the same advantage. The more nearly it squeezes the bars together, the more it closes upon itself, and the less advantageously do the muscles act. It is easy to contrive an adjustment that might offer a similar grip in all cases, but it is not easy to construct one that shall act without additional loss of time. I have thought of a grip that should be forced by a steady increasing pressure, the strain at the moment of forcing it being registered automatically.

Strength of the Right and Left Hands.

I had a batch of about 500 cases of males between the ages of 23 and 51 analysed to determine the relative strength of the right and left hands. Out of every 100 cases about 50 had the right hand strongest; 20, or rather more, had the left hand strongest; and in 30 the strength was the same. A single line out of the table will give a good idea of the whole. The total of the cases to which it refers was only 82, but for the convenience of percentages I have raised it to 100.

Squeeze of the right hand (in lbs.)	Squeeze of the left hand (in lbs.)										Total cases.
	50–	55–	60–	65–	70–	75–	80–	85–	90–	95–	
75–80.	1	1	6	9	26	27	21	6	2	1	100

On the average of all the cases the left hand appears to be about 6 per cent. weaker than the right hand.

While the figures were accessible, I thought it as well to see if by chance there existed any relation between the superior strength of the right or left hand and the superior reading power, as explained farther on, of the right or left eye. There was absolutely none. Had I had means to compare the inferior skill of the right or left hand, which I had not, the existence of some relation would be less improbable.

Strength of Squeeze and Breathing Capacity.

I was surprised to find that there is no close relation between strength of squeeze and breathing capacity. As the measurements are peculiarly trustworthy, being all made with the same instruments and by the same observers, I give the records in full to establish the fact. The importance of a large breathing capacity to a man who expends force rapidly, as to a runner or a mountain climber, is undoubted, but for a strain of short duration it seems comparatively non-essential. Still, I should have thought it to have been more nearly connected with every form of strength than it is. The table shows that an increase of breathing capacity from 150 to 300 inches is accompanied by an increase of strength of squeeze from an average of 75 lbs. to not more than 92 lbs. That is to say, when the breathing capacity is double, the strength of squeeze is on the average only one quarter greater.

BREATHING CAPACITY AND STRONGEST SQUEEZE.—Males, age 23, 24, and 25.

Breathing capacity.	STRONGEST SQUEEZE IN LBS.															
	45–	50–	55–	60–	65–	70–	75–	80–	85–	90–	95–	100–	105–	110–	115–	Total.
Cubic inches.																
70–80	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	1
100	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
110	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	1
120	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	2
130	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	2
140	..	..	1	..	1	..	1	..	..	..	..	..	..	..	..	3
150	..	..	1	..	1	3	1	1	..	1	..	1	..	..	..	9
160	..	..	..	1	2	3	4	2	1	2	..	..	..	..	..	15
170	..	..	..	..	1	3	7	6	3	1	1	..	..	..	..	22
180	..	..	1	3	3	9	10	6	6	3	1	1	1	..	..	44
190	..	..	1	..	..	4	6	10	3	2	3	2	..	1	..	32
200	..	..	..	1	1	10	7	9	8	9	3	..	1	..	..	49
210	..	..	..	1	4	2	9	11	7	6	5	3	3	..	..	51
220	..	..	..	1	4	6	11	12	11	6	10	4	..	..	..	65
230	..	..	1	1	3	1	6	6	13	5	9	1	2	1	..	49
240	..	..	..	..	1	5	4	10	10	8	7	2	1	..	..	48
250	..	..	..	1	..	1	2	4	8	4	4	3	2	..	..	29
260	..	..	..	..	1	2	3	1	7	4	4	1	..	..	..	23
270	..	..	..	..	..	..	2	3	5	1	2	1	..	1	..	15
280	.	..	..	..	..	..	2	2	1	2	4	3	2	1	..	17
290	..	..	..	..	..	..	..	2	3	7	4	2	1	1	..	20
300	..	..	..	..	1	..	3	2	3	6	2	1	..	..	..	18
310	..	..	..	..	..	..	..	..	1	..	1	1	..	..	..	3
320	..	..	..	..	..	..	..	..	1	..	..	1	1	..	..	3
330	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
340	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1
..	..	..	5	9	26	49	80	88	91	67	60	28	14	5	..	522

Eyesight.

The light at the laboratory was rarely sufficient, and it was very variable, since the tests were carried on partly in the daytime, partly when the light was waning, and partly during the evening illumination. The absolute results are therefore of little importance, though they are worth recording, namely, that one quarter of the males of various ages who were able to read small print at all without glasses, were able with one eye to read pages taken from the well-known little shilling prayer-book, printed in diamond type, at a greater distance than 27 inches, one-half of them at a greater distance than 22 inches, and three-quarters at a greater distance than 18 inches. No person at the laboratory succeeded in reading a page further off than 38 inches, though one lady at my own house, probably under better light and using both her eyes, unmistakably exceeded 41 inches.

Though the tests are of little importance absolutely, they are of much value relatively in comparing the power of the two eyes, as to whether on the whole the right eye is stronger than the left, or *vice versâ*, and what is the average difference between their powers. It appeared from an examination of about 850 cases that the number of those whose two eyes were equally effective bore the ratio of 2 to 3 (or a very little more than 3) to the number of those in whom the powers of the two eyes differed to a notable degree. It also appeared, on taking the average of all the 850 cases, that the difference between the greatest reading distance of the two eyes with the above test type, was just 2 inches (or the merest trifle less). And lastly, it appeared that the average strength of the right and of the left eyes was almost exactly the same. Thus with the right eye there were 253 cases in which the greatest reading distance lay between 20 and 24 inches, and with the left eye there were 256 such cases; again, when the greatest distances lay between 25 and 29 inches, the cases were 229 and 224 respectively.

I have nothing of novelty to say regarding the colour sense, as the data, although they have been tabulated, have not yet been discussed.

Highest Note Audible.

The measurements were made with five whistles set to emit 10, 20, 30, 40, and 50 thousand vibrations per second respectively. Notwithstanding the roughness of the measurements, the results fall into a very fair curve; however, it would be hardly justifiable to give per-centiles, because the values on which the curve is based are wide apart. I therefore limit myself to giving a table of the actual observations reduced to percentages for the convenience of comparison. It will be seen here, as in every other faculty that has been discussed, the male surpasses the female; 18 per cent. of the males hear the shrillest test-note, as against 11 per cent. of the

females, and 34 per cent. of the males hear the next shrillest test-note, as against 28 per cent. of the females.

	Ages.	Percentage of cases in which the under-mentioned number of vibrations were perceived as a musical note.				Number of Cases.
		Number of vibrations per second.				
		20,000	30,000	40,000	50,000	
Males..	23–26	99	96	34	18	206
	40–50	100	70	13	4	317
Females	23–26	100	94	28	11	176
	40–50	100	63	8	1	284

On Composite Photographs *of* Skulls.

By Dr. Billings, Curator, Army Medical Museum, United States.

(*Extracts from a letter to Mr. F. Galton, relating to the Photographs exhibited at the Meeting of the Institute on November 11th*, 1884.)

"War Department, Surveyor-General's Office,
"Washington, D.C., *October 28th*, 1884.

"I have the honour to forward to you by mail to-day a few specimens of composite photographs illustrating the application of your suggestion of that mode of illustration to the subject of craniology. These composites have been made directly from the crania themselves, and not by combining different photographs. I have satisfied myself that this method bids fair to be of great importance in craniological studies, permitting a comparison of crania in different collections more satisfactorily than any system of measurements which has yet been devised.[1]

"John S. Billings,
"*Surgeon U.S. Army.*"

List of photographs sent.

Composite photograph of seven adult male *Sandwich Islanders' Skulls*, side view; Nos. 425, 444, 442, 445, 446, 438, 286, Section IV, a.m.m. Wet process, exposure 70 seconds.

[1] See Memoir by Mr. Galton, "On the Application of Composite Portraiture to Anthropological Purposes." Report of the British Association, 1881, p. 690.