Contributions to Egyptian anthropometry. III, The anthropometry of the modern Mahommedans. IV, The comparison of the Mahommedans with the Copts and with the "mixed" group / by Charles S. Myers.

CONTRIBUTIONS TO EGYPTIAN ANTHROPOLOGY:

III. The Anthropometry of the Modern Mahommedans;

IV. The Comparison of the Mahommedans with the Copts and with the "Mixed" Group.

BY

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CONTRIBUTIONS TO EGYPTIAN ANTHROPOLOGY.[1]

By Charles S. Myers.

III. THE ANTHROPOMETRY OF THE MODERN MAHOMMEDANS.

A. Comparison of Average Measurements.

I here give a complete list of the measurements which I made during my anthropometric investigations in Egypt. It comprises height when (1) sitting, (2) standing, (3) kneeling; height above the ground of (4) ear-hole, (5) chin, (6) acromion, (7) elbow, (8) wrist, (9) great trochanter, (10) knee, (11) ankle; (12) maximum breadth and (13) length of head; (14) upper and (15) total length of face; (16) bimalar, (17) bizygomatic, (18) bi-auricular and (19) bigonial breadth; (20) width of mouth; (21) minimal frontal breadth; (22) external bi-orbital, (23) external bi-ocular and (24) internal bi-ocular breadth; nasal (25) breadth and (26) length; (27) orbito-nasal and (28) bi-auricular breadth; (29) horizontal circumference of the head; length of the radius between the ear-hole and the (30) vertex, (31) forehead, (32) nose-root, (33) upper incisors, (34) chin and (35) occiput; (36) bi-acromial and (37) bi-trochanteric breadth; circumference of chest after (38) expiration and (39) inspiration: (40) maximal and (41) minimal circumference of the calf; (42) maximal and (43) minimal circumference of the arm; (44) span of arms.

About sixteen of these measurements were made by me on each individual, so that altogether more than 17,000 data were collected for Egypt and about 2,000 for the Sudan. I hope that at least the more important of these data may be published in a future contribution to this *Journal*.

[1] The expenses of this investigation have been in part defrayed by the Government Grants Committee of the Royal Society and by the British Association for the Advancement of Science. For the supply of subjects I am indebted to Major-General Sir F. R. Wingate, K.C.B., K.C.M.G., Sirdar of the Egyptian Army and Governor-General of the Sudan. The two previous contributions appeared in this *Journal*, vol. xxxiii, 1903, pp. 82-89, and vol. xxxv, 1905, pp. 80-91.

In the present paper it is only possible to examine a few of these measurements and the indices derived therefrom. I have selected those which are *a priori* most likely to be of value in a comparative study of the anthropometry of different Egyptian provinces.

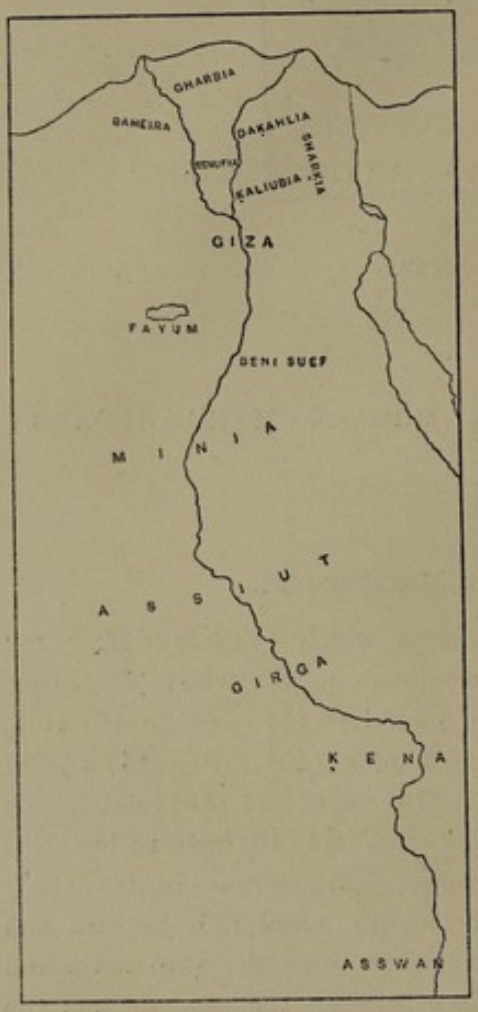

FIG. 1.

The names and position of the provinces into which Modern Egypt is divided are indicated on the map (Fig. 1). I group the soldiers whom I measured according to the province to which their parents belonged. In this section I leave out of consideration the data obtained (i) from the Copts, (ii) from individuals whose parents were born in different provinces or outside Egypt, and (iii) from the inhabitants of the cities of Cairo and Alexandria.

The following table gives the means of certain measurements and indices calculated for six important provinces of Egypt. The measurements are expressed in millimetres. The number of individuals measured in each province is shown.

The column headed A gives the averages or means with their probable errors;[1] that headed σ gives the standard deviations;[2] and that headed C the coefficients of variability.[3]

Do these various values of the averages point to underlying physical differences in different provinces of Egypt, or is their disagreement attributable to accidental errors arising from an insufficient number of individual measurements?

[1] The probable error is found from the expression, $\pm 0{\cdot}6745\,\frac{\sigma}{\sqrt{n}}$.

[2] $\sigma = \sqrt{\frac{\Sigma d^2}{n}}$, where n is the number of individual measurements, and Σd^2 is the sum of the squares of the differences of the individual measurements from the average.

[3] $C = \frac{\sigma \times 100}{A}$.

TABLE I.

Province.	Head Length.				Head Breadth.				Auricular Height.				Horizontal Circumference.			
	No.	A.	σ	C.	No.	A.	σ	C.	No.	A.	σ	C.	No.	A.	σ	C.
Ḳena ...	53	194·79 ±0·54	5·83	2·99	53	143·91 ±0·35	3·80	2·64	27	146·26 ±0·48	3·66	2·50	19	545·47 ±2·24	14·49	2·66
Girga ...	83	194·53 ±0·43	5·83	3·00	83	144·33 ±0·34	4·60	3·19	37	144·78 ±0·54	4·89	3·38	38	547·18 ±1·40	12·75	2·33
Ḳena and Girga	136	194·63 ±0·34	5·83	3·00	136	144·16 ±0·25	4·31	2·99	64	145·41 ±0·37	4·47	3·07	57	546·61 ±1·20	13·38	2·45
Giza ...	54	194·56 ±0·54	5·99	3·08	54	143·41 ±0·37	4·06	2·83	31	146·77 ±0·62	5·09	3·47	14	545·43 ±1·97	10·95	2·01
Daḳahlia	109	193·00 ±0·39	6·07	3·15	109	144·64 ±0·28	4·30	2·97	55	145·38 ±0·42	4·60	3·16	40	547·75 ±2·10	12·48	2·28
Baheira ...	50	196·82 ±0·60	6·33	3·22	50	144·38 ±0·42	4·40	3·05	29	146·69 ±0·51	4·08	2·78	11	546·64 ±2·21	10·90	1·99
Sharḳia ...	20	196·75 ±0·73	4·86	2·47	20	145·40 ±0·74	4·90	3·37	10	146·50 ±1·02	4·80	3·28	—	—	—	—

TABLE I—*continued.*

Province.	Cephalic Index.				Upper Facial Index.				Nasal Index.				Gnathic Index.			
	No.	A.	σ	C.	No.	A.	σ	C.	No.	A.	σ	C.	No.	A.	σ	C.
Ḳena ...	53	73·94 ±0·27	2·90	3·92	53	48·52 ±0·31	3·36	6·92	53	78·90 ±0·78	8·44	10·07	23	102·47 ±0·45	3·35	3·27
Girga ...	83	74·25 ±0·23	3·15	4·25	82	47·81 ±0·22	2·96	6·19	82	77·77 ±0·52	7·11	9·14	28	103·44 ±0·27	2·77	2·17
Ḳena and Girga	136	74·13 ±0·18	3·04	4·10	135	48·09 ±0·17	3·14	6·53	135	78·22 ±0·45	7·68	9·82	51	103·00 ±0·29	3·08	2·99
Giza ...	54	73·76 ±0·23	2·46	3·33	49	48·05 ±0·27	2·84	5·90	47	75·33 ±0·72	7·31	9·74	20	101·00 ±0·66	4·38	4·34
Daḳahlia...	109	75·01 ±0·19	2·95	3·98	106	48·72 ±0·22	3·38	6·94	103	73·41 ±0·51	7·63	10·39	24	101·24 ±0·50	3·66	3·61
Baheira ...	50	73·42 ±0·29	3·03	4·12	48	49·00 ±0·32	3·32	6·77	45	74·39 ±0·67	6·66	8·96	19	100·68 ±0·49	3·18	3·16
Sharḳia ...	20	73·94 ±0·46	3·03	4·09	19	47·56 ±0·37	2·38	5·24	19	76·70 ±0·86	5·58	7·28	6	100·01 ±0·52	1·90	1·90

The Cephalic Index.—Consider, for example, the extreme values of the cephalic index in the above table. The highest is Daḳahlia with 75·01, the lowest is Baheira with 73·42. Is this difference of 1·59 units real, or is it due to insufficiency in the number of measurements from which the averages are calculated? The probable error (E_D) of the mean cephalic index for Daḳahlia is $\pm$ 0·19; the probable error (E_B) of the mean cephalic index for Baheira is $\pm$ 0·29. The probable error of the difference of the two means (derived from the square root of $(E_D^2 + E_B^2)$ is therefore $\pm$ 0·35, which is less than one-quarter the actual difference (1·59) between the two means. From this calculation biometricians would feel justified in supposing that the difference in average cephalic index is more likely to be real than accidental; in other words, that in all probability its occurrence is not due to random sampling. A similar conclusion would be drawn from a comparison of the cephalic index of Daḳahlia with that of Giza.[1]

On the other hand, the difference between the cephalic indices of Daḳahlia and Ḳena only just exceeds, while that between the cephalic indices of Daḳahlia and Girga is actually less than, three times the probable error of their respective differences. This relation becomes still less when the other provinces are similarly compared with one another.

We may conclude, then, that while it is not permissible to regard the differences in cephalic index between the provinces of Daḳahlia, Girga and Ḳena, as with certainty significant, the people of Daḳahlia, on the other hand, are *probably* less dolichocephalic than the people of Giza and Baheira. However, these three provinces lie so near one another geographically as to raise a doubt whether the *improbable* has not occurred in this particular case.[2] As regards the province of Sharḳia, so few individuals were measured that no conclusions can be drawn.

The Upper Facial Index.—The most divergent values for the average upper facial index in Table I are those for the provinces of Sharḳia and Baheira. But so few individuals—only seventeen—belonging to Sharḳia were examined that this average is clearly not very trustworthy. Comparing the average facial indices of Girga and Baheira, we find that while their difference amounts to 1·19, the probable error of their difference is $\pm$ 0·39. The ratio of these two figures is only just sufficient for us to conclude with any degree of certainty that the difference is not accidental, arising from the measurement of an insufficient number of individuals. When, on the other hand, we proceed to take into account the differences in nasal index of the various provinces, we are perhaps entitled to assume (*cf.* page 241) that the differences in facial index are more significant than we should otherwise have supposed them to be.

The Nasal Index.—In striking contrast to the cephalic and upper facial indices, the nasal indices show such marked divergence that it is hardly necessary

[1] It is generally admitted that a difference acquires significance when it is more than three times its probable error.

[2] *Cf.* footnote on page 255.

to resort to statistical methods in order to demonstrate that *the differences cannot be accidental.* If, however, we do take the trouble of comparing the population of Ḳena and Girga with that of Daḳahlia, we see that, while the nasal indices differ by 4·81 units, the probable error of differences of pairs of samples amounts only to ± 0·68.

From the figures in Table I, we may strongly suspect that the nasal index increases in value as we proceed south, a conjecture which is, on the whole, confirmed by the following table:—

TABLE II.

Province.	Number of individuals.	Nasal index.	Province.	Number of individuals.	Nasal index.
Ḳena ...	53	78·90	Fayum ...	34	77·61
Girga ...	82	77·77	Giza ...	47	75·33
Assiut ...	57	78·01	Baheira ...	45	74·39
Minia ...	34	77·36	Gharbia ...	100	73·98
Beni Suef ...	25	77·61	Daḳahlia ...	103	73·41

The three remaining provinces, intermediate in position between Giza on the south, and Baheira, Gharbia, and Daḳahlia on the north, give the following average nasal indices:—

Province.	Number of individuals.	Nasal index.
Menufia	80	76·84
Ḳaliubia	18	78·73
Sharḳia	19	76·70

The high nasal index of Ḳaliubia is in part due to the inclusion of one index of 100 among the eighteen from which the average is derived.

One might, indeed, feel disposed to disregard the values given both by Sharḳia and by Ḳaliubia owing to the small number of individuals examined from these provinces, were it not for the fact that a high index is also given by Menufia, a

province lying in about the same latitude as, and westward of, Ḳaliubia and Sharḳia. Here eighty individuals were measured; so there can be little doubt that the average nasal index of this region of Egypt lies somewhere near 77.

It is conceivable that the nasal index of Giza has been unduly lowered owing to the position of Cairo in this province; and that, but for the leptorhine influence of so cosmopolitan a city upon the suburban villages, the nasal index of the various provinces of the Nile valley would have shown a more regular decrease in value from Upper to Lower Egypt; this decrease being especially and suddenly marked in the three provinces, Baheira, Gharbia, and Daḳahlia, which are at the very mouth of the Nile.

The differences among the provinces in upper facial index possibly points in the same direction. Thus this index for Ḳena and Girga averages 48·09, for Giza 48·05, for Daḳahlia 48·72, and for Baheira 49·00. A higher facial index implies a longer or narrower face. When we come to study the upper facial index of the Sudanese, we shall find it noticeably lower than in Egypt. The exceptionally low facial index of Sharḳia is doubtless associated with its surprisingly high nasal index. We shall have occasion to refer to this correlation later, when (in the Appendix to this paper) we make a more detailed study of the province of Menufia.

Gnathic Index.—Differences corresponding to those which we have noted in the nasal index are also apparent in the gnathic index (Table I). This index expresses the ratio between (i) the distance from the ear-hole to the lower margins of the gums of the upper incisor teeth, (ii) the distance from the ear-hole to the root of the nose. Its value is less in Lower than in Upper Egypt, but the number of measurements made in the different provinces is not sufficient to make this relation more than highly probable. I have already called attention[1] to the unsatisfactory character of this index unless supplemented by a determination of the inclination of the two linear distances on which it is based.

Length of Tibia and Radius.—The question naturally arises, is this tendency to prognathism and to platyrhiny in Southern Egypt accompanied by the changes in the proportion of the long bones to one another, with which we should expect to meet in passing from a more Caucasic to a more Negroid people? Has the *fellah* of the province of Ḳena, for example, a longer tibia relatively to his stature than the *fellah* of Daḳahlia? I have attempted to base an answer to this question on the index formed from the ratio of the kneeling height to the standing height. Other things being equal, individuals who have relatively to their stature a longer tibia, should yield a lower index.[2]

[1] *Man*, vol. iii, 1903, 4, pp. 12, 13.

[2] Such an index is obviously a very rough instrument for our purpose; it is unnecessary to point to the fallacies which may be involved in its use. I chose it mainly on the ground of ease of calculation.

TABLE III.

Kneeling Height × 100 / Standing Height	Provinces of Ḳena and Girga.		Provinces of Daḳahlia and Gharbia.	
	Number.	Percentage.	Number.	Percentage.
70–70·99	1	1·25	0	0
71–71·99	1	1·25	0	0
72–72·99	3	3·75	2	1·48
73–73·99	16	20·00	12	8·89
74–74·99	41	51·25	57	42·23
75–75·99	18	22·50	54	40·00
76–76·99	0	0	10	7·40
Total number ...	80	100·00	135	100·00
Average index ...	74·35		74·90	

Obviously the probability that these differences are significant is not very great. Let us turn to the results of examining for the presence of another negroid character, the relative length of the radius.

By subtracting the height of the elbow joint above the ground from that of the acromion above the ground, the length of the upper arm is obtainable. Similarly the difference in the heights of the elbow and wrist joints above the ground gives the length of the forearm. I have calculated and compared the indices for the above four provinces obtained from a ratio of the length of the forearm to that of the upper arm. This is clearly a far more accurate test than the previous index.

TABLE IV.

Forearm length × 100 / Upper arm length	Provinces of Ḳena and Girga, Assiut and Minia.		Provinces of Giza, Baheira, Daḳahlia and Gharbia.	
	Number.	Percentage.	Number.	Percentage.
Below 70	1	3·45	3	11·54
70–74·9	6	20·69	6	23·08
75–79·9	12	41·39	9	34·61
80–84·9	5	17·24	5	19·23
85–89·9	3	10·33	1	3·85
90–94·5	1	3·45	2	7·69
95 and over	1	3·45	0	0
Total number ...	29	100·00	26	100·00
Average	79·32 $\sigma = 6·36$		76·73 $\sigma = 8·51$	

Here again the probable errors are very considerable. The difference of the two means is (79·32 − 76·73 =) 2·59, while the probable error of the difference reaches the high value of ± 1·64. Obviously, the range of values is too wide and the number of data too small to justify a more elaborate study of these indices. The difficulties in measuring accurately the kneeling height and in estimating the length of the long bones on the living subject must also be taken into consideration. Nevertheless, unsafe as they are, these data suggest that *pari passu* with increasing prognathism and platyrhiny in Upper Egypt, there is an increasing relative length of tibia and of radius.

B. Comparison of Average Variability.

In Table I, I have given the standard deviations for six provinces in respect of eight different characters. By its aid we may attempt to compare the variability of the peoples of various parts of Egypt. Now the standard deviation serves to indicate the distribution of the individual measurements about their mean. The more scattered they are—in other words, the greater the variability of the character—the larger becomes the standard deviation. But the magnitude of a standard deviation is also affected by the magnitude of the mean to which it refers. Consequently the coefficient of variability, the ratio of (one hundred times) the standard deviation to the mean, is a better instrument for the comparison of variabilities than the standard deviation.

The trustworthiness of a single standard deviation or coefficient of variability depends, like the mean, upon its probable error. It would be unwarrantable to compare the different provinces, as regards variability in any single character, without taking this into account. However, the chances of error become considerably reduced if we add together the coefficients of variability for the eight characters and compare the averages of their sum in different provinces. For Ḳena, the average coefficient is 4·37, for Giza 4·34, for Daḳahlia 4·56, and for Baheira 4·26. Approximately the same numbers of individuals were measured, belonging to Ḳena, Baheira and Giza. But as about twice as many were measured from Daḳahlia, it may be well to compare the mean variability of this province with that for the combined provinces of Ḳena and Girga; the values, however, are unchanged, namely, 4·56, and 4·37 respectively.

I conclude then, that it is impossible to show from my data that any difference in *average* variability exists between the inhabitants of various provinces. Only by a still larger collection of material could we hope to detect differences of variability as regards *individual* characters.

C. Comparison of Distribution Curves.

So far we have had under consideration only the average values of various measurements and indices for different provinces, and the variability values deduced therefrom. Let us now examine the frequency of distribution of the

individual measurements and indices, and compare the distributions in different provinces. It is obvious that a study of such frequency curves—or frequency polygons, as they should more properly be called—may reveal important features which are concealed in the average figures. The frequency polygons which have been drawn for this paper, relate to the (*a*) head length, (*b*) head breadth, (*c*) cephalic index, (*d*) nasal length, (*e*) nasal breadth, (*f*) nasal index and (*g*) upper facial index, for the provinces of (1) Ḳena and Girga, (2) Assiut and Minia, (3) Gharbia, (4) Daḳahlia and (5) Menufia. (Figs. 2–36, pp. 247–253).[1]

It is now recognised that a frequency polygon of the individual values of such a measurement as stature will approximate to a smooth curve of definite form—called the "normal," "probability" or "binomial" curve—if only a sufficient number of unselected individuals within the community be measured. The mathematical properties of this curve are well known; if certain constants are given, the value of any points on the curve can be calculated. When, on the other hand, the individual measurements are too few in number, as must usually be the case in anthropometric investigations, we may have no longer an approximation to the smooth frequency curve, but a polygon with peaks, the number, height and position of which vary in different samples drawn from the same population.

Comparing the frequency polygons that are presented in this paper (pages 247–253), we see that, while the majority of them contain two or more peaks, others approximate very closely to some form of a simple smooth or theoretical curve. We may assume that the theoretical curve to which they approximate is not appreciably different from the normal or probability curve. For most practical purposes this assumption appears justifiable.[2]

It has been shown by Livi[3] that when two similar binomial curves, expressing the distribution of stature in two (Italian) populations of different race and stature, are compounded, the resultant distribution curve is, to all appearances, smooth, unless the mean stature of the two populations differs by about 16 cms. We have already observed that irregularities in the smoothness of a distribution curve do not necessarily mean plurality of type.[4] We are now warned, conversely, that the approximate smoothness of a distribution curve does not necessarily imply singleness of type.

Professor Pearson has devised a formula for testing the closeness of fit of an actually obtained distribution to a theoretical distribution curve. This formula gives a measure of the probability that we shall obtain a more peaked polygon than that under consideration by taking further samples from the same population;

[1] All the graphs on page 247 refer to head length, all those on page 248 to head breadth, so on for the remaining five measurements. The five graphs on each page refer each to a different province in the order stated above.

[2] I assume here that a single type implies a character from which a number of individuals belonging to that type will certainly diverge, and that a given community may conceivably consist of two or more component types.

[3] *Antropometria*, Milano, 1900, pp. 77–85.

[4] *Cf. Biometrika*, 1902, i, p. 443.

the formula rests on the supposition that the entire series from which the samples are taken truly follows the theoretical distribution. I have tested the goodness of fit for two of the published frequency polygons: and I find, as indeed I had been led to conclude from actual inspection, that while for the one series the normal curve was a fair fit, for the other it was an exceedingly bad one. But the task of calculating the goodness of fit of each of these frequency polygons is a matter rather of statistical concern. I turn now to certain features of the curves which are of greater and more immediate interest for anthropology.

In the frequency polygons of the cephalic index for the province of Assiut and Minia (Fig. 13), and of Daḳahlia (Fig. 15), we note that two peaks are present, a higher at 73 and a lower at 77, while for the provinces of Ḳena and Girga (Fig. 12) the higher peak is at 73, the lower at 76. The polygons for Gharbia and Menufia (Figs. 14, 16) show a single peak at 74. It would be tempting to suppose that each of the above frequency curves is a composite of two (or more) elementary constituents, each having a single peak, *e.g.*, at 73 and at 76–77 respectively, which represents an underlying ethnic type. We might suppose that, combined in certain proportions, the two component curves would yield a resultant curve with these two peaks, while under other conditions of combination a single peak, placed somewhere midway, would result.

So seductive a hypothesis at first sight gains striking support from a like study of the distribution curves of the nasal index (page 252). For in Ḳena and Girga (Fig. 27), in Assiut and Minia (Fig. 28), in Gharbia (Fig. 29), in Daḳahlia (Fig. 30), and in Menufia (Fig. 31), the frequency polygons for the nasal indices *all show one peak at* 72 *and another at* 76–78.

Now it is indeed remarkable that, while the mean nasal index of these provinces varies, roughly, from 73·5 to 78·5, according to the situation of the province, yet in all of the provinces which we chance to have examined, the frequency polygons show one peak at 72 and another at 76 or 78. At first sight it is hardly conceivable that such a series of coincidences is a purely accidental occurrence. And we can hardly escape the conclusion that in each distribution curve we have to deal with a duality, or plurality, of type. For are we not here on the meeting-ground of the platyrhine Sudanese filtering in from the south and the leptorhine Mediterranean colonising from the north? What is more natural than that we should be able to dissect out from a curve two (or more) types, present in different intensity in the different provinces of Egypt? At one time, I must confess, this was the view I myself adopted, but on closer examination it has to my mind proved untenable.

In the first place, the five distribution curves of the nasal index refer only to seven provinces, and include 509 individuals. Of the six remaining provinces (Beni Suef, Fayum, Giza, Ḳaliubia, Sharḳia, and Baheira) the number of individuals measured is too few (188 in all) to warrant the construction of six distribution curves. Yet we cannot neglect the fact that none of these provinces, so far as their few nasal indices go, would give curves with similar features to those of the published curves.

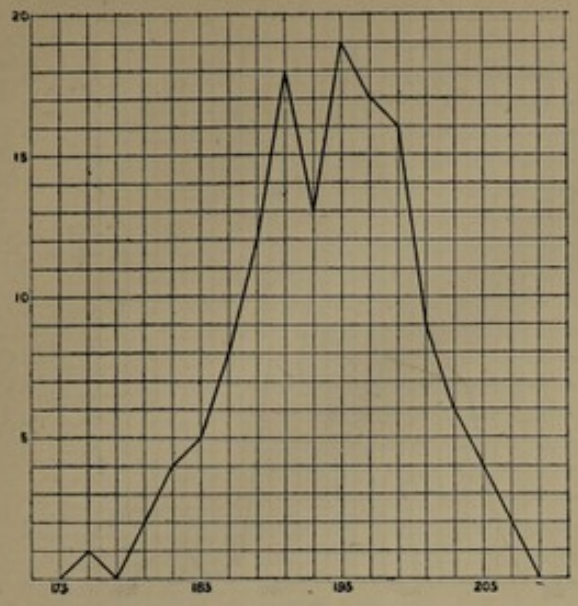

FIG. 2. (ḲENA AND GIRGA.)

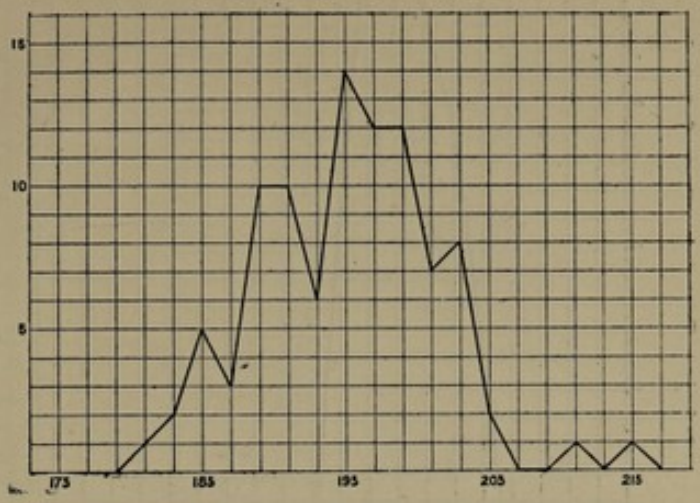

FIG. 3. (ASSIUT AND MINIA.)

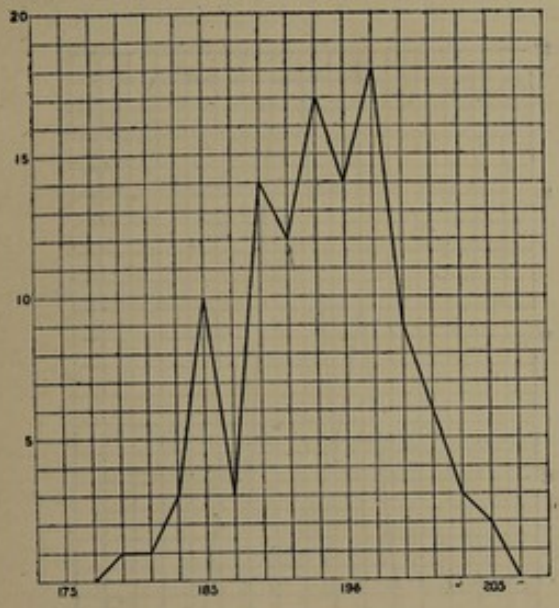

FIG. 4. (GHARBIA.)

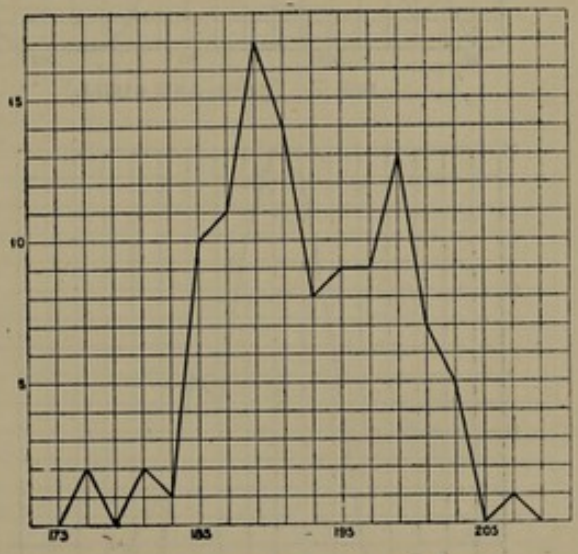

FIG. 5. (DAḲAHLIA.)

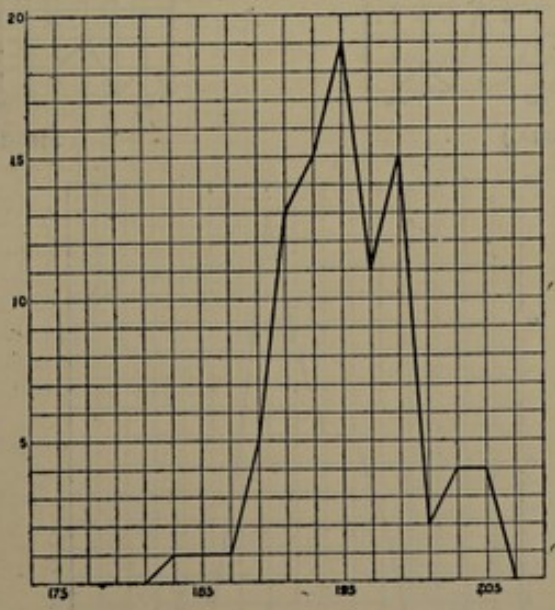

FIG. 6. (MENUFIA.)

HEAD LENGTH.

For an explanation of the curves on this and the following pages see footnote on page 245.

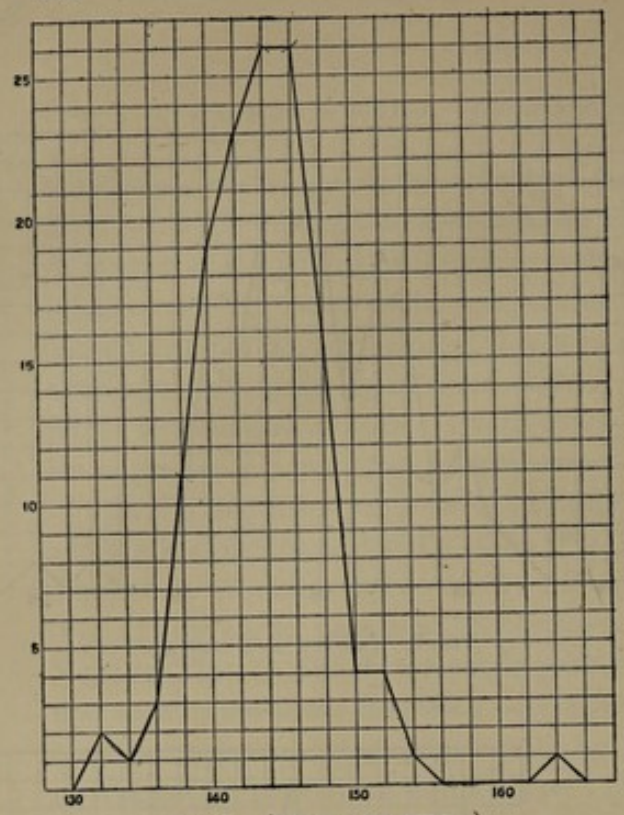

FIG. 7. (KENA AND GIRGA.)

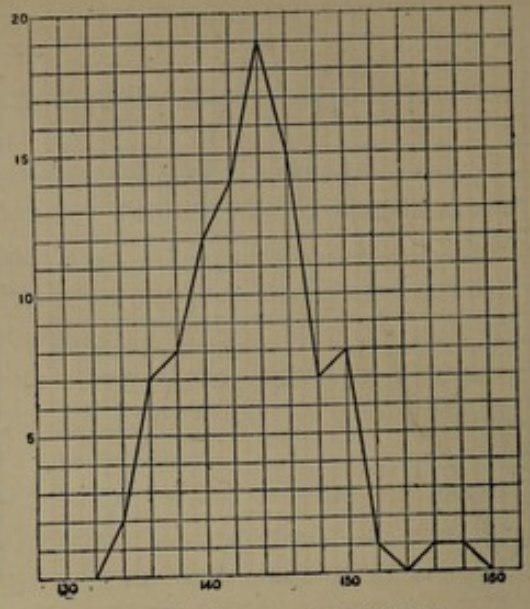

FIG. 8. (ASSIUT AND MINIA.)

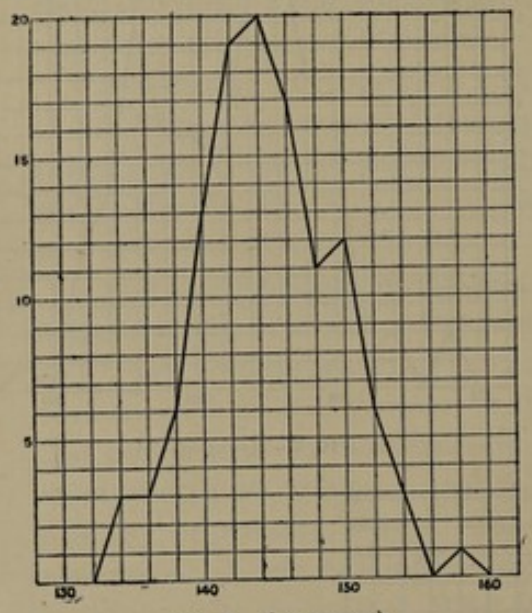

FIG. 9. (GHARBIA.)

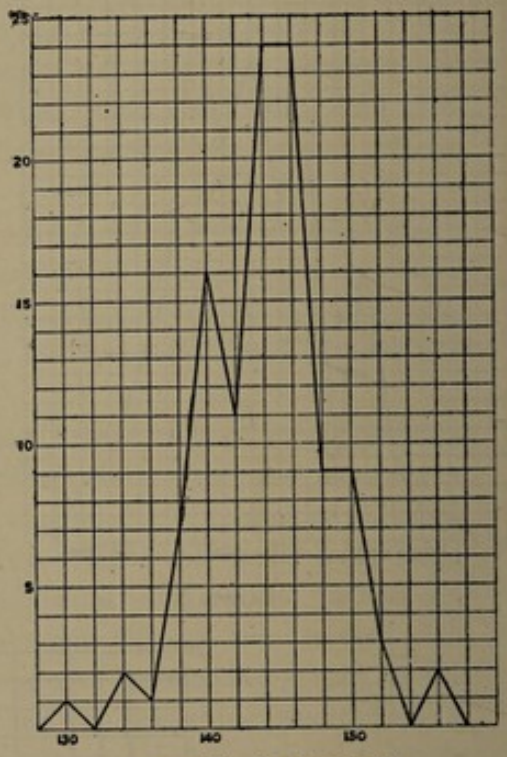

FIG. 10. (DAḲAHLIA.)

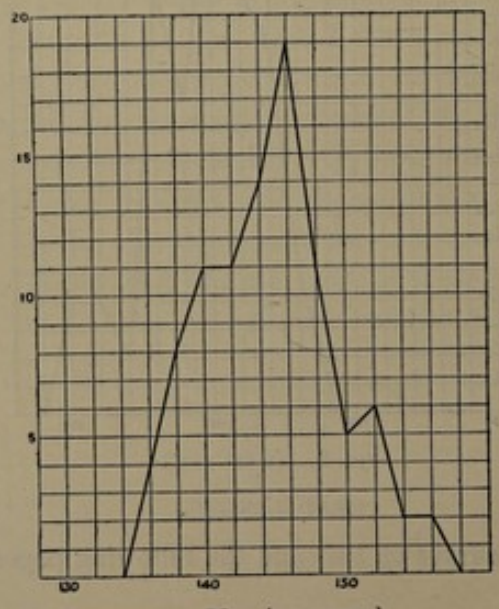

FIG. 11. (MENUFIA.)

HEAD BREADTH.

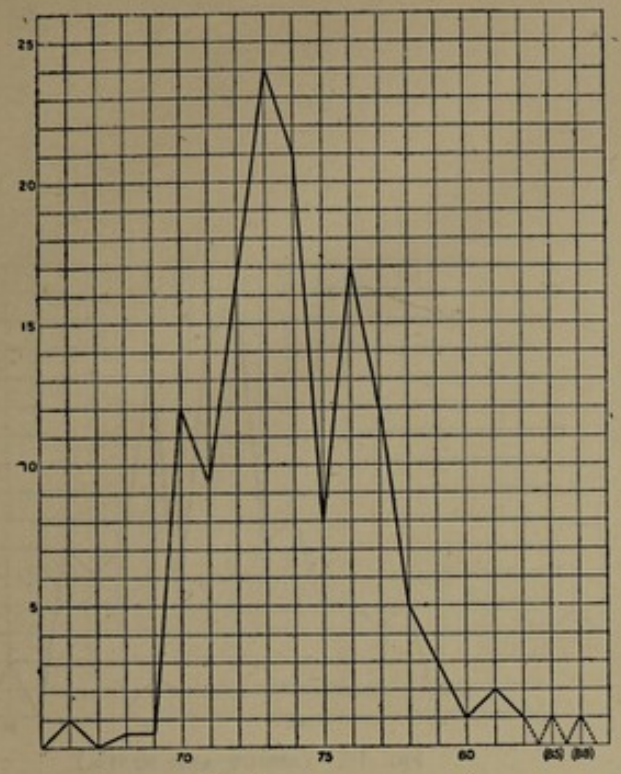

FIG. 12. (ḲENA AND GIRGA.)

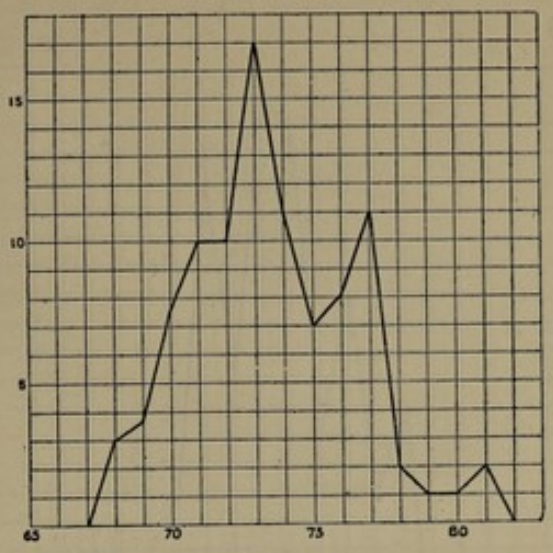

FIG. 13. (ASSIUT AND MINIA.)

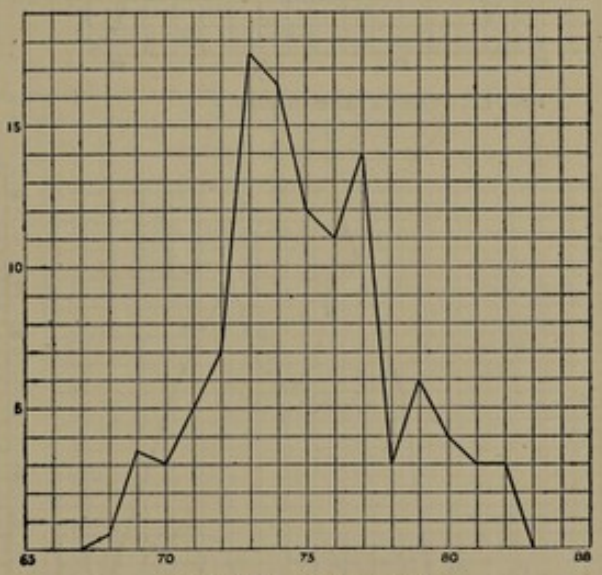

FIG. 15. (DAḲAHLIA.)

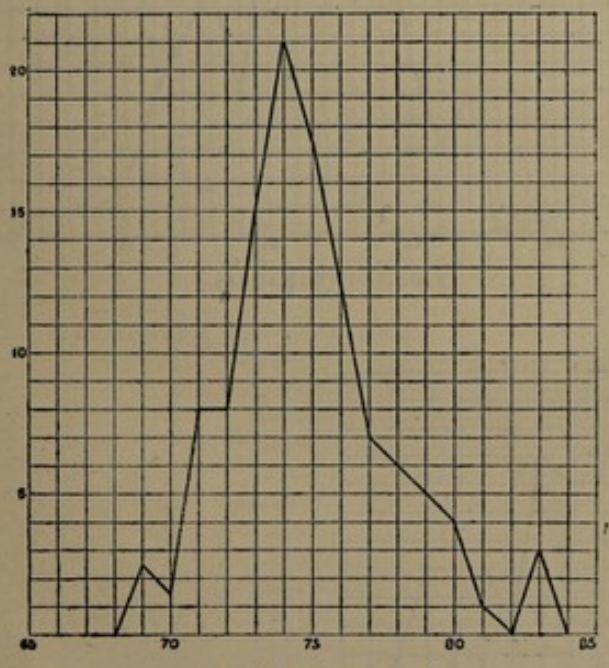

FIG. 14. (GHARBIA.)

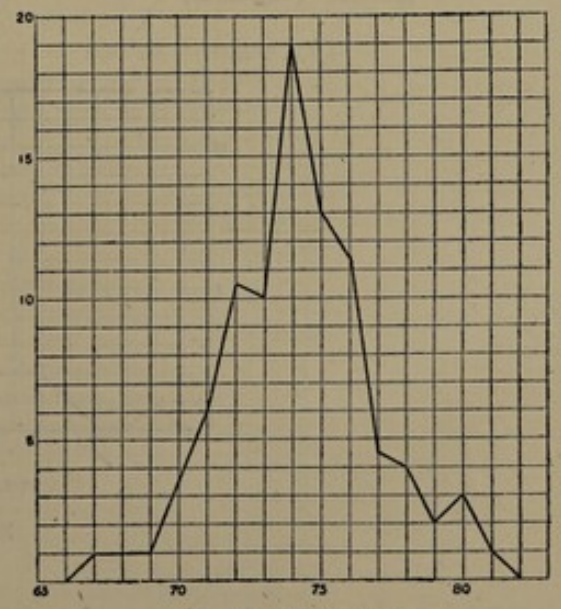

FIG. 16. (MENUFIA.)

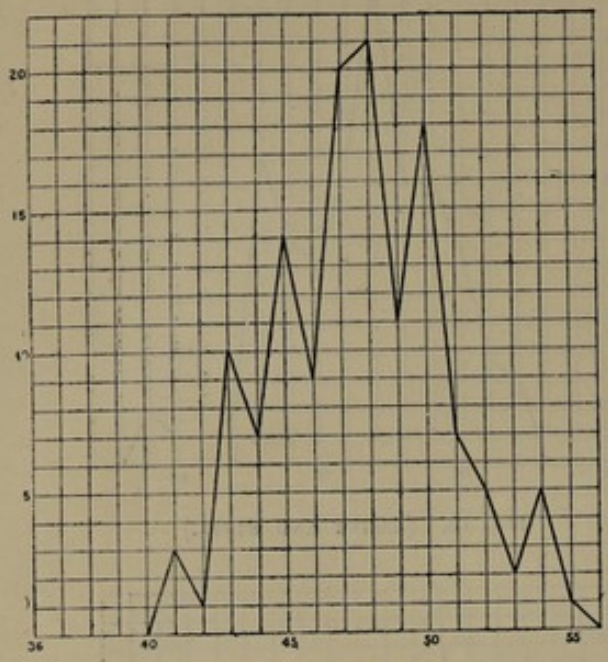

FIG. 17. (KENA AND GIRGA.)

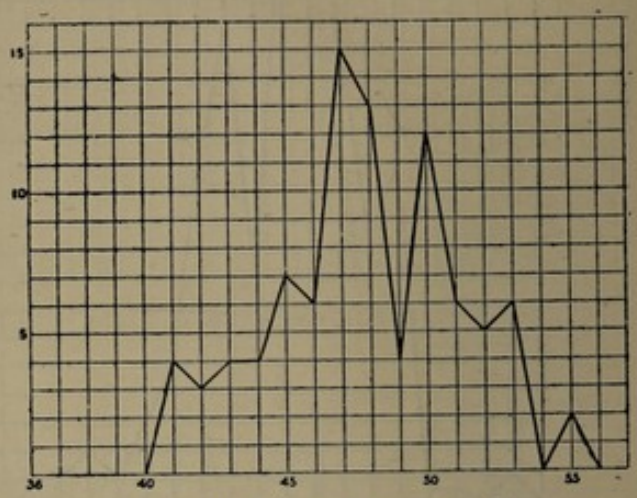

FIG. 18. (ASSIUT AND MINIA.)

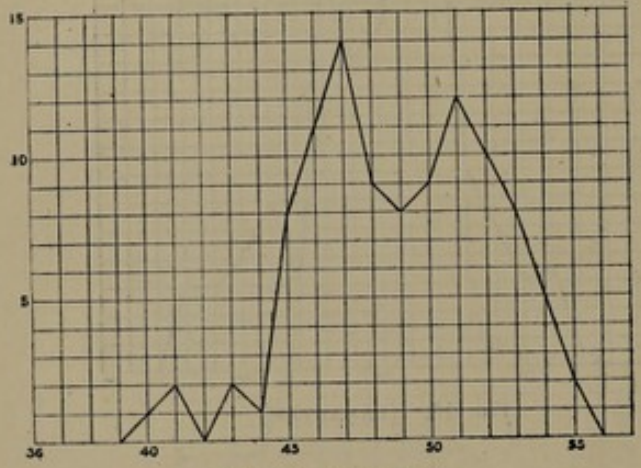

FIG. 19. (GHARBIA.)

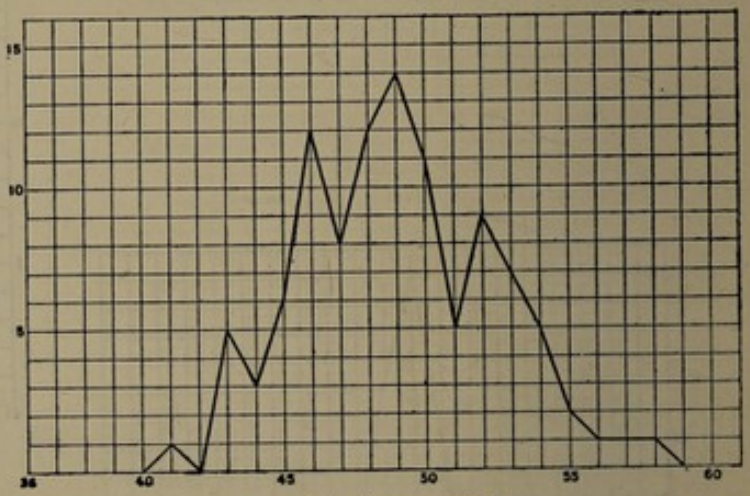

FIG. 20. (DAḲAHLIA.)

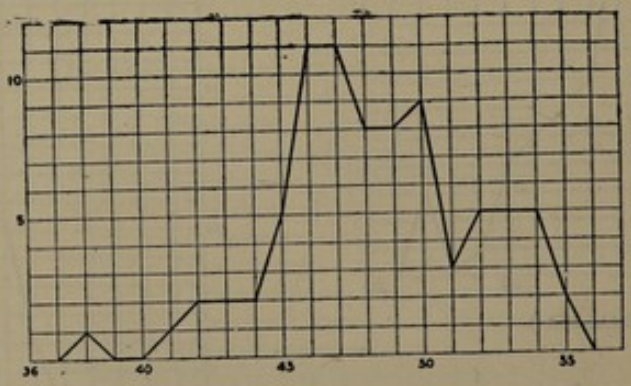

FIG. 21. (MENUFIA.)

NASAL LENGTH.

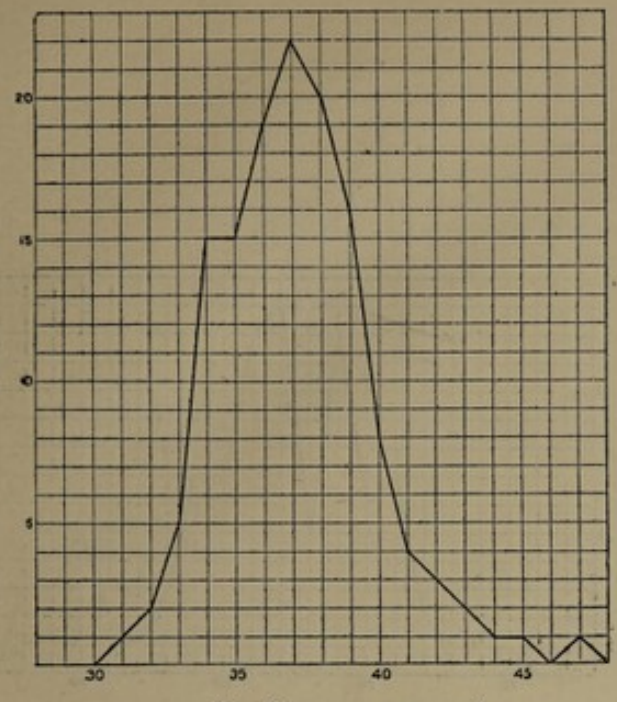

FIG. 22. (ḲENA AND GIRGA.)

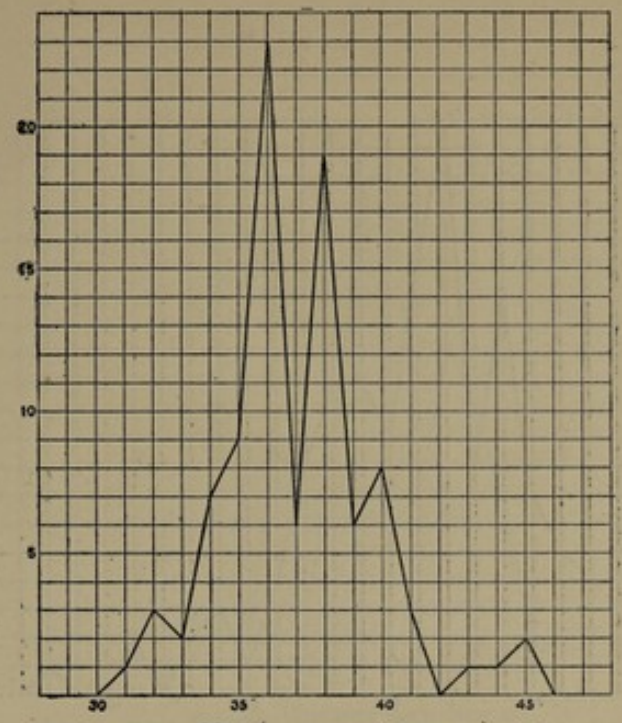

FIG. 23. (ASSIUT AND MINIA.)

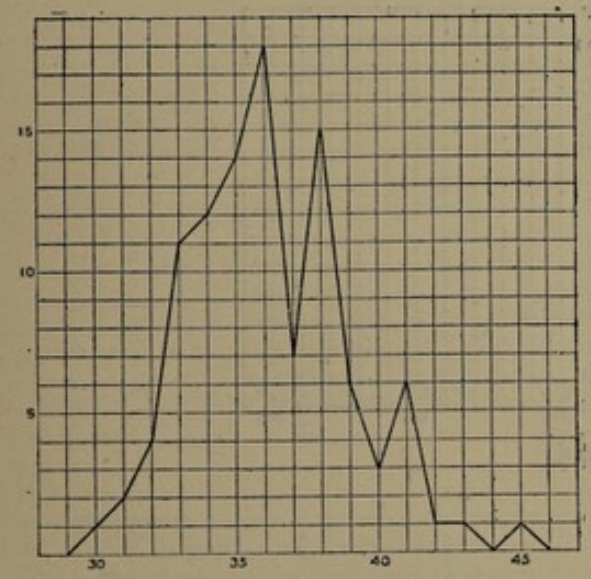

FIG. 24. (GHARBIA.)

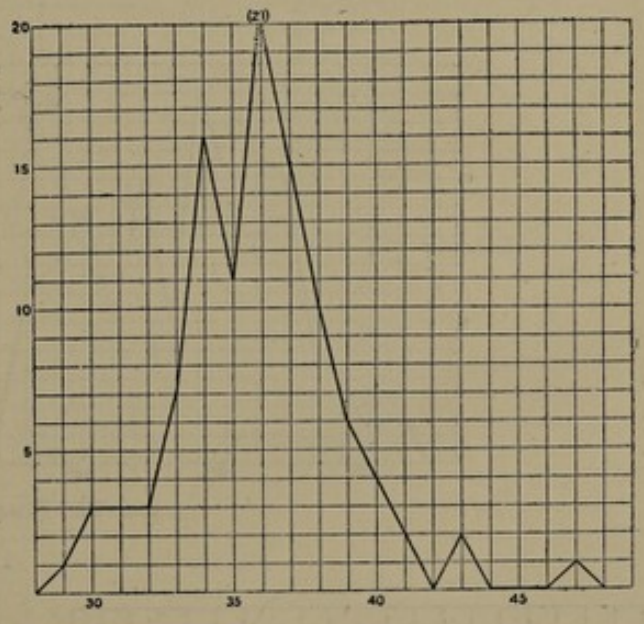

FIG. 25. (DAḲAHLIA.)

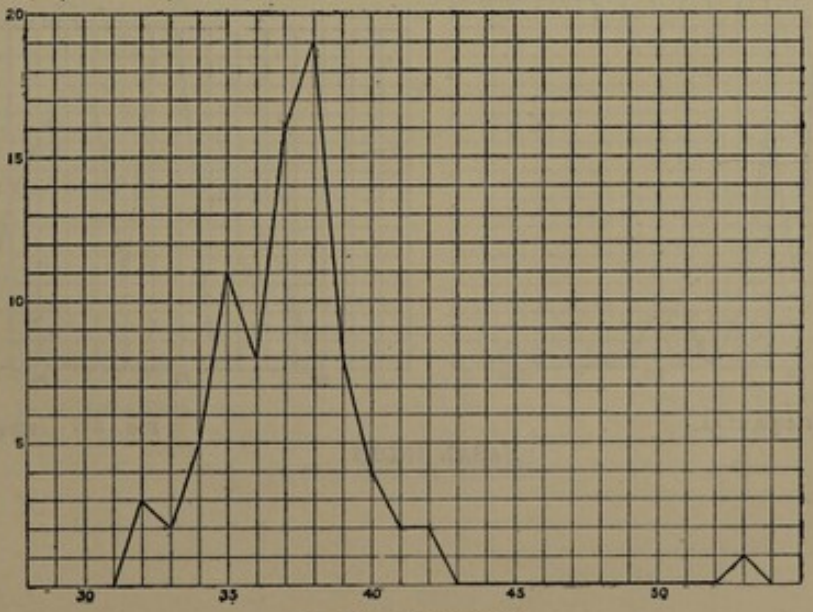

FIG. 26. (MENUFIA.)

NASAL BREADTH.

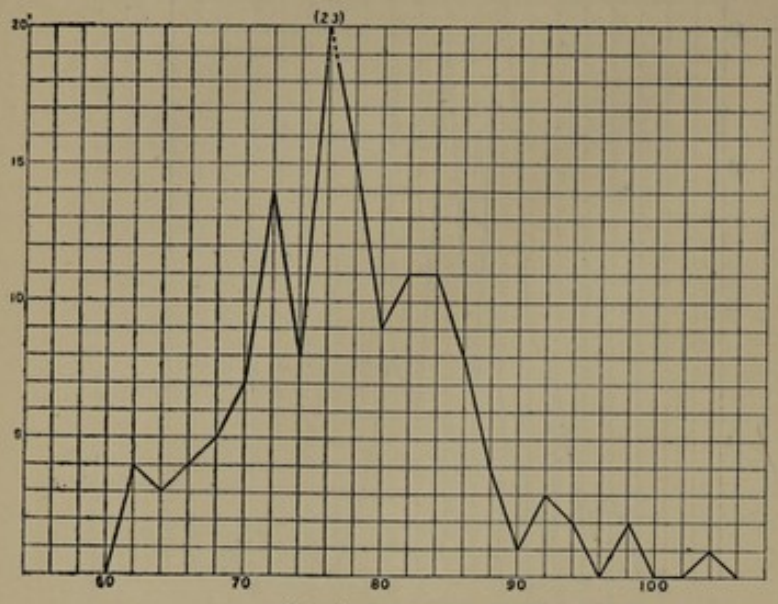

FIG. 27. (ḲENA AND GIRGA.)

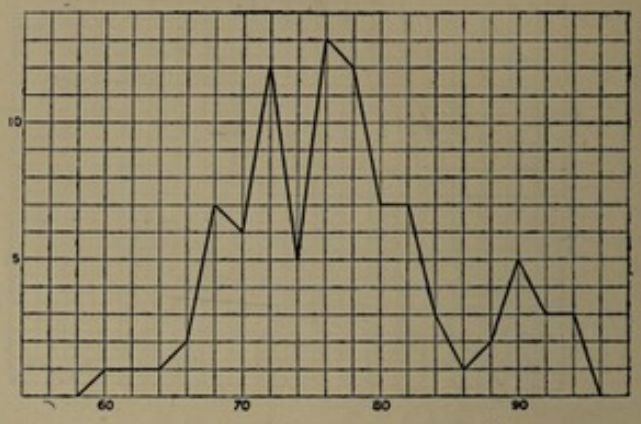

FIG. 28. (ASSIUT AND MINIA.)

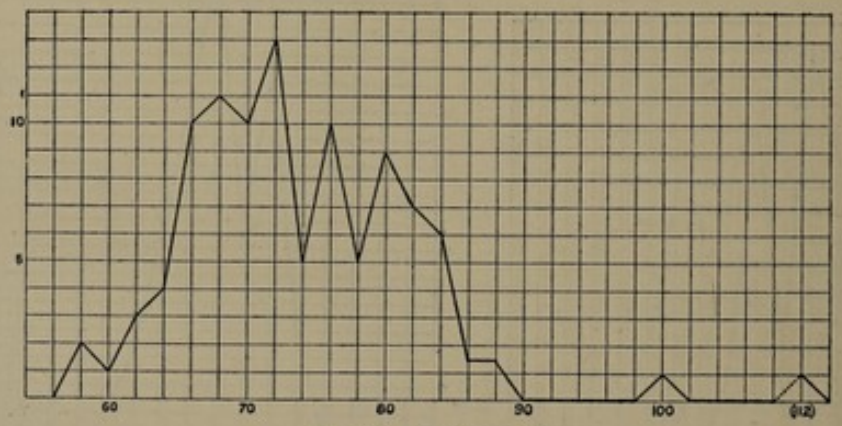

FIG. 29. (GHARBIA.)

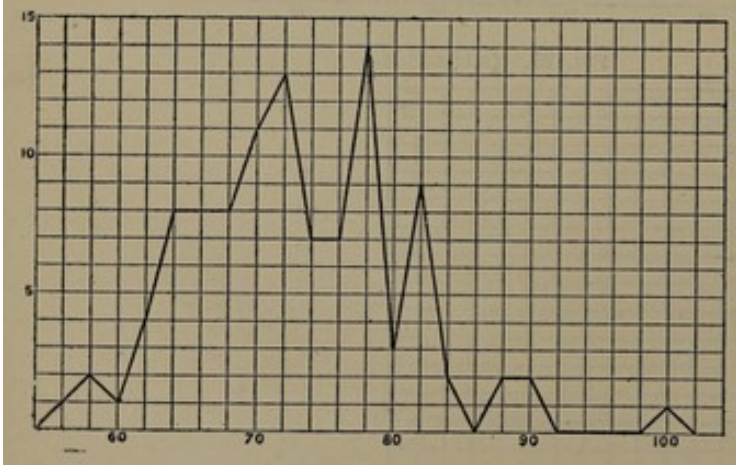

FIG. 30. (DAḲAHLIA.)

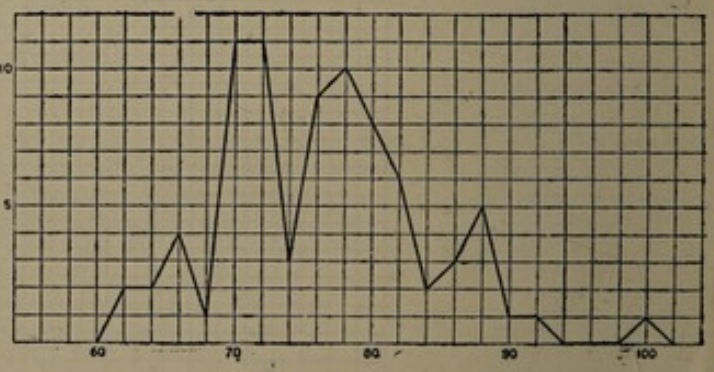

FIG. 31. (MENUFIA.)

NASAL INDEX.

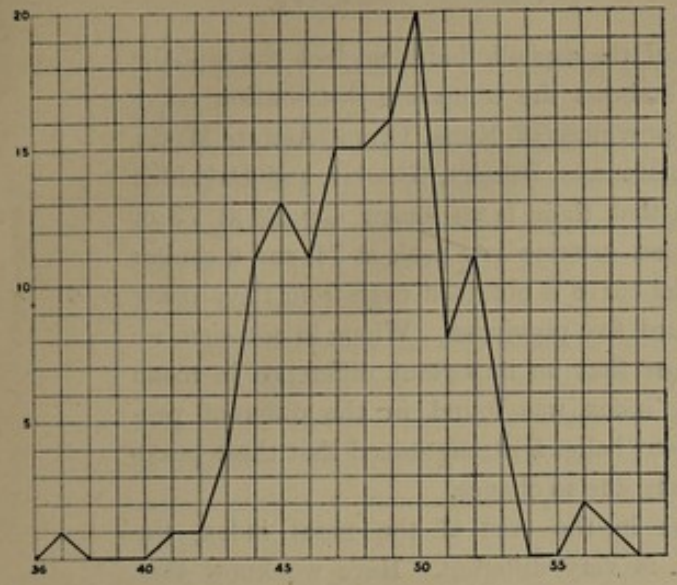

FIG. 32. (KENA AND GIRGA.)

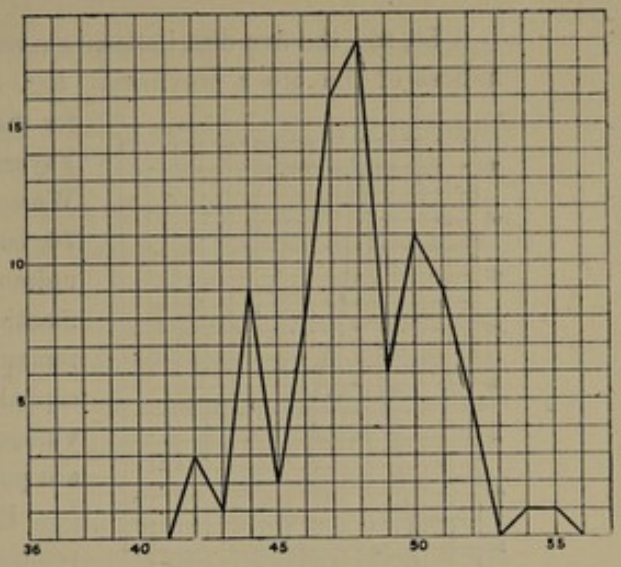

FIG. 33. (ASSIUT AND MINIA.)

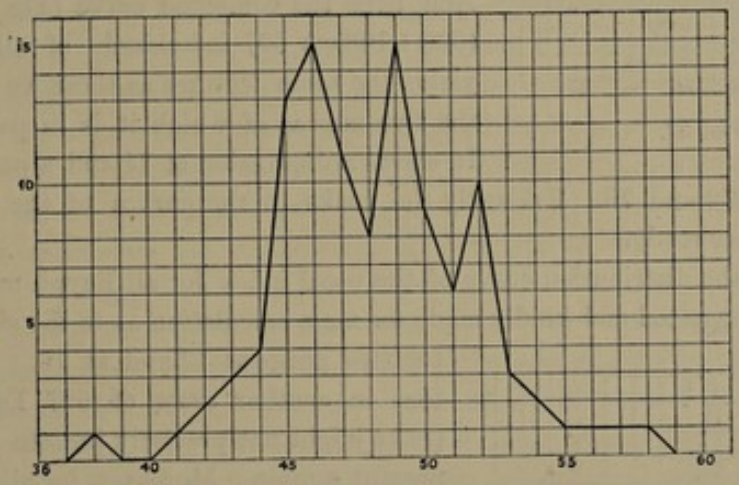

FIG. 34. (GHARBIA.)

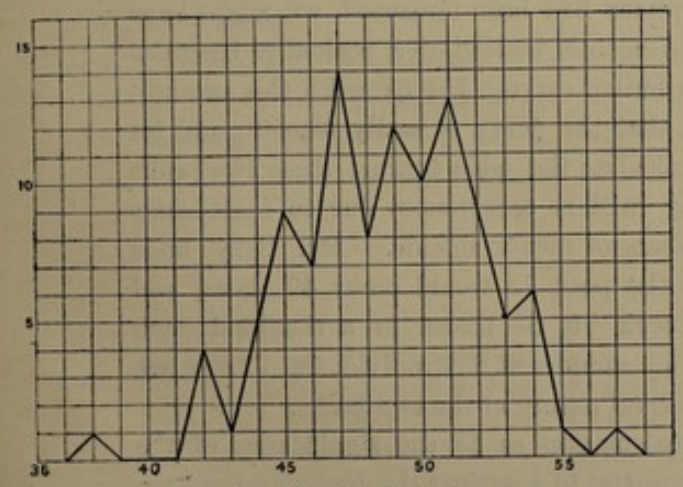

FIG. 35. (DAḲAHLIA.)

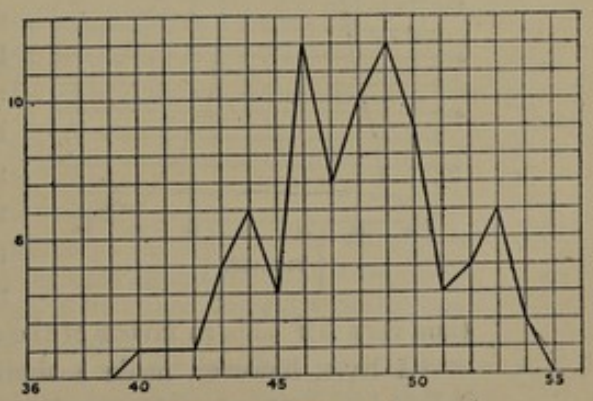

FIG. 36. (MENUFIA.)

b

UPPER FACIAL INDEX.

So, too, the five distribution curves of the cephalic index neglect the cephalic indices of the other provinces. Fig. 37 shows the composite distribution curve for the provinces of Ḳena, Girga, Assiut, Minia, Fayum, Menufia, Baheira, Gharbia, and Daḳahlia. We see that there is no longer a peak at 73 or 76, but an intermediate peak at 74, and a similar unimodal curve is obtained even from the already mentioned five provinces. When, in addition, we remember that no important difference in mean cephalic index was found in the different provinces, our belief is strengthened that these peaks are purely due to chance.

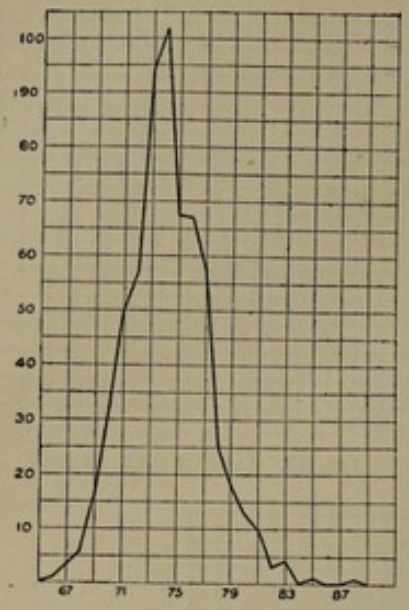

FIG. 37.

But in the case of the nasal index, the position is very different. Here we know that the nasal index rises as we proceed further south. And here the combined curve (Fig. 38), for the (509+188=) 697 individuals of all Egypt still yields the same features as those we have seen in the five curves of which it is in part made up. It shows a depression at 74 and a peak on either side of it at 72 and 76. Evidently the peaks in the curves of the nasal index deserve further study.

Taking the distribution curve of the nasal index for all Egypt, my friend Mr. John Gray suggested and kindly made for me a calculation as to the significance of the two peaks at 72 and at 76. It is obvious that in another draw of 697 Egyptians the peaks might not precisely imitate those in the present sample. Moreover, for all we know to the contrary, if only 69,700 instead of 697 Egyptians had been measured, we might have had a smooth instead of a peaked or irregular distribution curve. Let us make this assumption, that the curve is really smooth, and let us calculate the odds against these two peaks being random occurrences due to insufficient numbers of measurements. Mr. Gray finds that the peak 72 would occur 49 times, and the peak 76, 55 times, in a thousand such random samples of 697 individuals. There are thus very fair odds in favour of the *accidental* nature of the two peaks.

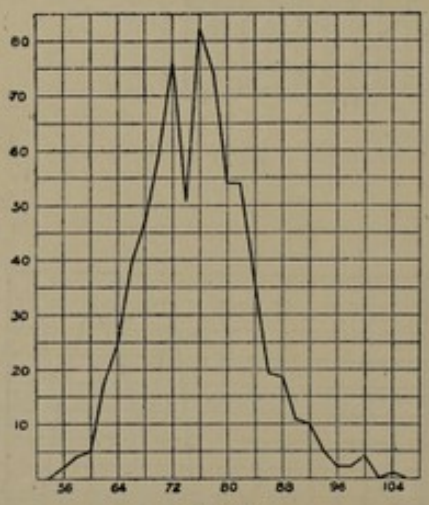

FIG. 38.

I have, however, made a similar calculation as to the significance of the depression at 74. In this case the odds are 100 to 1 against the deviation from the normal curve being due to random sampling. Yet even these odds are occasionally

met;[1] our hypothesis of plurality of type again, therefore, receives no material support.

The question remains, whether this improbability of 100 to 1 is not raised by the occurrence of the depression at 74 in all the five sample curves, and this in spite of the different value of the mean nasal index in each curve. After considerable attention to this point, I have come to the conclusion that the improbability is not thereby raised.

But even were the two peaks and the intervening depression really significant, it would nevertheless be impossible to resolve the doubly-peaked curve into two component curves. The apices stand far too near one another to permit of analysis in this way. It has been already pointed out (p. 245) that the respective means (or rather modes) of two normal curves must differ by a considerable amount in order that the combined curves may yield a doubly peaked curve. It is easy to convince oneself of this fact by empirically compounding various pairs of distribution curves of different modes and of different extents. Only by the unwarrantable assumption that the two curves are markedly and in opposite directions asymmetrical, can the required effects of composition be obtained. Indeed, the very closeness of the two peaks itself suggests the accidental nature of their constant occurrence. We may observe that the distribution curves of nasal length in these provinces all show one peak at 46 or 47, and another at 49, 50, or 51. Evidently it is a mere chance that a depression occurs in all of them at 48, and I believe that the same explanation holds of the depression at 74, between 72 and 76, in the case of the nasal index.[2]

Lastly, it may be pointed out that even were such composition and resolution possible in the case we have been considering, the analysis would have no known anthropometrical significance. We have seen that the value of the nasal index varies in Egypt roughly from 73·5 to 78·5. The nasal index in South Europe is 70; in Nubia it is 85, and in the Sudan, 100. What ethnological meaning, then, can be attached to two curves, the means (or modes) of which are at 72 and at 76 respectively?

We are forced to the conclusion that the coincident position of the peaks, in the various provinces which we have been considering, is a matter of pure accident, and that it is in no sense a proof of the presence of two or more distinct ethnic types, variously distributed in the different provinces of the country.

[1] Professor Bowley, who has kindly given me advice on the subject, tells me that he has recently met with a number in random sampling, the odds against which he knows to be 1200 : 1. He is of opinion that odds of something like 25,000 : 1 are required by statisticians before they can acknowledge the *necessity* of an interfering cause.

[2] One special cause for the appearance of peaks lies in the unconscious tendency to misinterpret near lying measurements in terms of a more convenient central value, *e.g.*, to read 49 or 51 millimetres as 50 millimetres, whereby a falsely and constantly preponderating frequency at 50 is obtained. But this cause clearly fails to account for the present instances.

4. COMPARISON OF NON-NUMERICAL CHARACTERS.

I have left to the last the consideration of these differences of form, colour and texture of certain parts of the body, which it is difficult or impossible to express numerically.

Table V gives the coloration of the eye, skin and hair, the texture of the hair and the form of the chin and lips, in thirteen provinces. The figures which are enclosed in brackets show the *number* of individuals who were examined for any particular character. The other figures express the *percentage* of individuals belonging to the various classes into which the characters are divided.

TABLE V.

	Kena.	Girga.	Assiut.	Minia.	Beni Suef.	Fayum.	Giza.	Menufia.	Kaliubia.	Sharkia.	Baheira.	Gharbia.	Dakahlia.
Eye colour.	(51)	(82)	(60)	(32)	(31)	(34)	(46)	(105)	(24)	(68)	(54)	(124)	(109)
Dark brown	37	30	28	16	14	16	22	22	25	17	13	7	18
Brown ...	51	49	38	53	42	46	40	42	44	58	53	55	47
Light brown	10	20	32	25	29	30	34	32	27	22	30	33	31
Dark blue ...	0	0	0	3	2	3	0	0	0	0	0	0	0
Blue ...	0	0	1	0	5	0	0	2	2	0	1	0	1
Light blue ...	2	1	0	0	3	0	0	1	0	0	1	2	1
Green ...	0	0	1	3	5	4	4	1	2	3	2	3	2
Grey... ...	0	0	0	0	0	0	0	0	0	0	0	0	0
Skin colour.	(53)	(82)	(63)	(33)	(28)	(29)	(45)	(93)	(25)	(15)	(49)	(114)	(98)
Very dark ...	11	5	3	3	4	0	0	1	0	—	0	0	0
Dark... ...	51	21	27	6	14	10	7	4	0	7	4	4	5
Slightly dark	19	34	27	12	11	28	27	13	12	13	12	12	14
Medium ...	19	35	25	64	43	45	42	44	44	60	47	56	42
Slightly fair...	0	4	10	9	14	10	9	24	24	7	17	12	20
Fair	0	1	8	6	11	4	13	11	16	13	16	13	18
Very fair ...	0	0	0	0	3	3	2	3	4	0	4	3	1

TABLE V.—*continued.*

	Kena	Girga.	Assiut.	Minia.	Beni Suef.	Fayum.	Giza.	Menufia.	Kaliubia.	Sharkia.	Baheira.	Gharbia.	Dakahlia.
Colour of hair on head.	(43)	(60)	(54)	(20)	(20)	(24)	(34)	(73)	(19)	—	(40)	(87)	(77)
Black ...	53	47	51	45	43	46	41	42	42	—	44	52	49
Dark brown...	13	17	15	23	22	21	18	29	19	—	25	24	19
Light brown	0	2	1	5	2	2	6	2	5	—	1	3	0
Reddish ...	34	34	33	27	33	31	35	27	34	—	30	21	32
Texture of hair on head.	(24)	(29)	(20)	—	—	(16)	(19)	(38)	—	—	(22)	(35)	(43)
Spiral ...	13	19	25	—	—	6	0	13	—	—	9	0	5
Crisp... ...	48	33	33	—	—	19	37	19	—	—	23	19	23
Curly ...	29	24	30	—	—	38	50	42	—	—	41	46	39
Wavy ...	2	14	7	—	—	25	13	21	—	—	23	17	24
Straight ...	8	10	5	—	—	12	0	5	—	—	4	18	9
Chin.	(50)	(78)	(62)	(32)	(27)	(28)	(43)	(92)	(19)	(14)	(52)	(112)	(100)
Feeble ...	10	11	14	13	4	5	7	10	10	11	12	8	8
Moderate ...	60	66	72	48	74	77	62	69	74	68	56	75	64
Prominent ...	21	23	14	39	22	18	31	21	16	21	33	17	28
Lips.	(57)	(83)	(61)	(34)	(29)	(31)	(50)	(104)	(23)	(16)	(53)	(113)	(102)
Negroid ...	24	2	0	0	0	0	0	1	0	0	0	0	0
Thick ...	22	19	14	15	10	10	6	8	4	3	4	5	9
Medium ...	56	63	64	69	48	63	53	52	63	66	62	58	52
Thin	20	16	22	16	42	27	41	39	33	31	34	37	39

I found little difficulty in fixing for myself and maintaining standards of eye colour. If an individual's eyes were midway in colour between my standards or showed a speckling of two colours, he was ascribed half to one class, and half to another.

The determination of skin colour presents much greater difficulties. I saw at the outset that without standard colours I was liable to error from contrast between a given skin colour under consideration and the skin colour of the individual who

had just previously been examined. On the other hand, I found it extremely difficult to obtain standard coloured papers which had the requisite number and variety of hues. Moreover, I found that the colour class to which an individual belonged would vary with the region of the skin chosen. It by no means always followed that, because the skin of an individual A was lighter than that of B in one region, therefore it was also lighter in another region. The plan which I finally adopted was this. An artist friend spent a morning with me, painting in oils the skin colour of various Egyptians, and choosing for this purpose the inner surface of the upper arm. I was fortunate in having an unusually extensive and representative series of skin colours among the subjects who came to be measured on that occasion. The papers on which these colours were painted, were then cut into equal slips, and having been arranged in order of brightness, they were numbered and tied together. Experience soon enabled me to call certain shades medium, others dark, fair, etc. And on this basis the classes in which individuals are grouped in Table V were formed.

As regards the colour of the hair, only one remark is necessary, namely, that the characteristic Egyptian hair colour is a reddish black. Hence the percentage figures for this character must be used with caution, most individuals being recorded half in black, and half in the red class.

We are able to draw the following deductions from Table V:—

Eye and Skin.—A material lightening of the colour of the iris and skin is evident as we proceed northward, province by province. While the percentage of brown eyes keeps fairly constant, that of dark brown falls and that of light brown eyes rises. The percentage of blue and green eyes is lower in the four southernmost provinces taken together than in any other four more northern provinces.[1] Similarly as regards skin colour, no "very fair" skins are met south of Beni Suef, and (with one exception) no "very dark" skins are to be found north of the Fayum.

Hair.—With two exceptions the cases of light brown hair are all "half cases." That is to say, they are instances of hair colour the shade of which falls intermediate between dark and light brown. Of the two really light brown-haired individuals, one belonged to Menufia, the other to Kaliubia. It is evident that there is a remarkable uniformity of the hair colour throughout Egypt, in spite of such divergences in measurement as we have already described.

Spiral and crisp hair is relatively predominant, as we should expect, in Upper Egypt, curly and wavy hair relatively in Lower Egypt. The rare instances of straight hair which are almost all "whole cases," appear to be scattered fairly uniformly throughout Egypt, when due consideration is paid to the small total of cases examined.

[1] The cases in which an oblique direction of the long axes of the eyes was noticed appear to be uniformly distributed through Egypt. Twenty-three well-marked, and fourteen slight cases were noted in all.

The degree of prominence of the chin bears no obvious relation to the various provinces of Egypt.

TABLE VI.

Exceptional nose forms.	Kena (*58*).			Girga (*83*).			Assiut (*73*).			Minia and Beni Suef (*70*).			Fayum (*39*).		
Wide root	21	84	36	31	91	37	26	90	36	15	83	21	13	93	33
Narrow root	4	16	7	3	9	4	3	10	4	3	17	4	1	7	3
Wide bridge	20	87	34	26	87	31	21	100	29	14	64	20	7	88	18
Narrow bridge	3	13	5	4	13	5	0	0	0	8	36	11	1	12	3
Wide alæ ...	17	89	29	22	92	27	20	95	27	15	79	21	9	82	23
Narrow alæ ...	2	11	3	2	8	2	1	5	3	4	21	6	2	18	5

Exceptional nose forms.	Giza (*56*).			Menufia (*114*).			Ḳaliubia (*27*).			Baheira (*60*).			Gharbia (*137*).			Dakahlia (*122*).		
Wide root	12	92	21	31	79	27	9	100	33	7	70	12	24	69	18	11	48	9
Narrow root ...	1	7	2	8	21	7	0	0	0	3	30	5	11	31	8	12	52	10
Wide bridge ...	11	69	20	20	69	18	6	75	22	8	50	13	16	48	12	12	40	10
Narrow bridge	5	31	9	9	31	8	2	25	7	8	50	13	17	52	12	18	60	15
Wide alæ	7	70	13	25	78	22	6	100	22	7	50	12	20	57	15	14	45	11
Narrow alæ ...	3	30	5	7	22	6	0	0	0	7	50	12	15	43	11	17	55	14

Nose.—Table VI gives the number of exceptional nose forms. When an individual differed noticeably from the average type in narrowness or breadth of the root, bridge or alæ of the nose, note was made of the fact on his card. The figures in brackets beneath the name of the province indicate the number of individuals who passed under examination. Of the three columns of figures ranged under each province, the first gives the absolute number of unusually narrow and

TABLE VII.

Shape of Occiput regarded from behind.	Kena. (*36*)	Girga. (*57*)	Assiut. (*44*)	Minia. (*23*)	Beni Suef. (*19*)	Fayum. (*17*)	Giza. (*29*)	Menufia. (*55*)	Baheira. (*29*)	Gharbia. (*76*)	Dakahlia. (*73*)
Ovoid	89	85	83	85	89	94	81	80	81	90	90
Pentagonoid	11	15	17	15	11	6	19	20	19	10	10

TABLE VIII.

Development of Lobe of the Ear.	Kena and Girga. (*104*)	Assiut and Minia. (*73*)	Menufia. (*76*)	Gharbia. (*87*)	Dakahlia. (*91*)
L_0 (=absent)	15	11	5	12	11
L_1	17	15	21	18	26
L_2	36	41	42	36	32
L_3 (fully developed) ...	32	33	32	34	31

wide cases recorded, the second gives the percentage relation of these two classes to one another, and the third the percentage relation of each class to the total number of individuals (the bracketed figures) belonging to that province.

The table clearly corroborates the conclusions we have already drawn from a study of the nasal index.

Other characters.—Tables VII and VIII are two of many vain attempts to discover other differentiating characters in Egypt, the one showing that the relative frequency of the ovoid and pentagonoid forms of the norma occipitalis and the other that the degree of development of the lobe of the ear is fairly constant throughout different provinces of this country. I have also records of the form of the head and face in norma verticalis and frontalis, according to Sergi's nomenclature, but a study of the data yielded by the various provinces utterly failed to indicate that these characters are of ethnological value in Egypt. Similarly negative results attended a detailed study of the ear, *e.g.*, the development of the helix, the prominence of the tragus, the size and delicacy of the auricle and the degrees of its outstanding from the head. It would be useless to publish tables of these data.

APPENDIX.

THE PEOPLE OF MENUFIA AND THE FAYUM.

For different reasons these two provinces merit separate treatment (Table IX).

The Fayum is an oasis lying some thirty miles from the Nile Valley. It was inhabited by the Egyptians from a very early date and was largely colonised by Greeks from the year 600 B.C., until after the beginning of the Christian era. It seemed worth while to find out whether, owing possibly to climatic conditions or to influences of the above admixture, the modern inhabitants of the Fayum sensibly differ from the general population of Egypt as regards the measurements which we have previously been studying.

The province of Menufia, too, deserves special study owing to the unusually high nasal index (76·84) which it gave (p. 241), compared with the indices of Baheira (74·39), Gharbia (73·98), Daḳahlia (73·41). The standard deviations are too low, the number of individual measurements too great and the difference found is too wide for it to be, with any degree of probability, a matter of accident. This high value of the nasal index in the case of Menufia is corroborated by the similar indices obtained from the inhabitants of the neighbouring provinces of Ḳaliubia and Sharḳia. The question naturally arises, are other exceptional features, besides the relatively high nasal index, present in the people of Menufia?

The head length and breadth and cephalic index for the province of Menufia are in no way remarkable, when compared with those already given in Table I for other provinces of Egypt. The unusually great auricular height is noticeable, but we are at present ignorant of its meaning.

TABLE IX.

Group.	Head length.				Head breadth.				Auricular height.			
	No.	Av.	σ	C.	No.	Av.	σ	C.	No.	Av.	σ	C.
Moslems[1]	369	194·56	6·09	3·13	369	144·29	4·34	3·01	173	145·84	4·65	2·83
Menufia	91	195·69	4·30	2·20	93	145·16	4·59	3·16	58	147·93	4·63	3·13
Fayum	36	194·61	6·78	3·49	36	143·50	3·75	2·61	25	147·00	4·04	2·75

Group.	Cephalic index.				Upper facial index.				Nasal index.			
	No.	Av.	σ	C.	No.	Av.	σ	C.	No.	Av.	σ	C.
Moslems	369	74·26	2·86	3·85	391	48·39	3·53	7·29	349	75·83	7·67	10·12
Menufia	91	74·18	2·59	3·49	81	47·85	3·14	6·56	80	76·84	7·36	9·55
Fayum	36	73·81	2·87	3·89	34	48·61	2·47	5·08	34	77·61	6·51	8·39

The upper facial index is lower in Menufia than in Daḳahlia and Baheira; indeed it is lower than in Giza, Ḳena and the Fayum. Thus, we have once again a low facial index associated with high nasal index, just as we found to be the case in Sharḳia (*cf.* p. 241):—

	Nasal index.	Upper facial index.
Daḳahlia	73·41	48·72
Baheira	74·39	49·00
Menufia	76·84	47·85
Sharḳia	76·70	47·56

On the other hand, the gnathic index for Menufia is 101·05 (No. = 35; σ = 3·43), a value not sensibly different from those obtained for neighbouring provinces. And further, the kneeling-standing index (*cf.* p. 243) is 74·84 (No. = 53), a value again not sensibly different from those obtained for neighbouring provinces. Much stress, however, cannot be laid upon these indices, as neither of them appears to be much altered in the case of more northerly provinces.

[1] The term "Moslems" refers to the general population of Egypt.

Turning to Table V we note the high percentage of dark brown eyes and of spiral hair in the provinces of Menufia and Ḳaliubia, compared with that in other provinces of Lower Egypt.

We can only conclude that the sample of individuals who were measured, belonging to Menufia, is more negroid in character than we should have expected in so northerly a province of Egypt. If, as we may perhaps suppose, this sample is a true representative of the entire province, it must be left for future investigation to determine the cause. On the other hand, with regard to the Fayum, it is interesting to note that the nasal index has the value we might have expected from the latitude of the Oasis (*cf.* p. 240). There is no trace of any leptorhine influence resulting from the settlements of Greeks, who were so plentiful there years ago. On the contrary, the nasal index is considerably higher than that of the coast provinces of Baheira and Gharbia. We can only infer that whatever influence the colonists from the Mediterranean had is now wiped out and that the aboriginal type has reasserted itself. Neither in head nor in face measurement do the inhabitants of the Fayum differ from the inhabitants of a corresponding latitude in the Nile Valley. That is to say, the conditions of life in the Fayum appear to have had no special influence in these respects.

IV. THE COMPARISON OF THE MAHOMMEDANS WITH THE COPTS AND WITH THE "MIXED" GROUP.

A. Comparison of Non-Numerical Characters.

We pass now to a comparison between the Mahommedan population of Upper and Lower Egypt which we have already studied, and two other classes of Egyptians which so far we have left unconsidered. These are (1) the Copts, who number possibly about one-sixteenth of the entire Egyptian population, and, having intermarried solely among themselves during the past thirteen hundred years, still preserve the Christian religion which prevailed throughout Egypt before the Mahommedan conquest: and (2) the "mixed" group of Mahommedans, whose parents belong to different provinces of Egypt, or one of whose parents is of non-Egyptian origin.

Of the thousand Egyptians whom I measured, forty-two were Copts, and seventy belonged to the "mixed" group. More than three times as many of the forty-two Copts belonged to Upper Egypt as to Lower Egypt, while nearly twice as many of the "mixed" people belonged to Lower as to Upper Egypt. The greater prosperity and ease of communication in Lower Egypt is doubtless responsible for these conditions. Fewer of the Copts in Upper Egypt have the means of purchasing their release from service in the Army. A larger number of the Lower Egyptian *fellahin* find an opportunity of obtaining wives from other

provinces than their own. The seventy individuals, belonging to the "mixed" group, may be thus classified :—

TABLE IX.

Parents.	No. of cases.
Both Lower Egyptian	23
Lower Egyptian and Sudanese	15
Lower Egyptian and Turkish	2
Lower and Upper Egyptian...	8
Both Upper Egyptian	9
Upper Egyptian and Sudanese	9
Upper Egyptian and Maghrabi	3
Upper Egyptian and Bedawi	1

The table suggests that intermarriage with the Sudanese is more frequent in Lower than in Upper Egypt. If this be so, it is doubtless the result of the employment of Sudanese in various factories and works in Lower Egypt. The word "Maghrabi" in the above table applies to a man who has come to Egypt from the West.

In the following table we are able to study and to compare the colour of the eye, skin and hair, the texture of the hair and the form of the nose and lips, (i) among the Mahommedans of Upper and Lower Egypt, (ii) among the Copts, and (iii) among the "mixed" group. The figures in the table, which are enclosed in brackets, represent the total number of individuals on whom the observations were made. The unbracketed figures give the percentage frequency of the different characters.

TABLE X.

Character.	Upper Egypt.	Lower Egypt.	Copts.	Mixed.
Eye colour.	(*290*)	(*460*)	(*36*)	(*68*)
Dark brown	24	17	12	43
Brown	46	49	49	40
Light brown	24	30	29	15
Dark blue	1	0	0	0
Blue	1	1	1	1
Light blue	1	1	3	0
Green	3	2	6	1

TABLE X.—*continued.*

Character.	Upper Egypt.	Lower Egypt.	Copts.	Mixed.
Skin Colour.	(*288*)	(*439*)	(*40*)	(*63*)
Very dark	4	0	3	16
Dark	21	4	2	11
Slightly dark	22	15	15	22
Medium	39	49	48	30
Slightly fair	8	16	10	14
Fair	5	14	20	5
Very fair	1	2	2	2
Texture of hair.	(*109*)	(*169*)	(*17*)	(*38*)
Spiral	14	7	6	26
Crisp	31	25	20	41
Curly	36	43	44	19
Wavy	12	17	24	9
Straight	7	8	6	5
Colour of hair.	(*221*)	(*336*)	(*36*)	(*50*)
Black	48	48	45	53
Dark brown	19	19	15	10
Light brown	1	2	7	0
Red	32	31	33	37
Nasal root.	(*120*)	(*135*)	(*6*)	(*33*)
Unusually wide ...	87	77	83	88
„ narrow ..	13	23	17	12
Nasal bridge.	(*104*)	(*135*)	(*10*)	(*34*)
Unusually wide ...	81	60	60	82
„ narrow ...	19	40	40	18
Nasal alæ.	(*94*)	(*133*)	(*12*)	(*38*)
Unusually wide ...	87	69	83	84
„ narrow ...	13	31	17	16
Nasal tip.	(*118*)	(*165*)	(*11*)	(*34*)
Unusually wide ...	89	83	73	88
„ narrow ...	11	17	27	12

TABLE X.—*continued.*

Character.	Upper Egypt.	Lower Egypt.	Copts.	Mixed.
Lips.	(*295*)	(*461*)	(*39*)	(*68*)
Negro	1	0	0	11
Thick	15	6	5	24
Medium	60	58	55	43
Thin	24	36	40	22
Occiput in vertical view.	(*198*)	(*293*)	(*26*)	(*29*)
Flat	14	17	13	15
Round	74	63	75	59
Prominent	12	20	12	26

Let us first survey the general position which the Copts occupy, as compared with the Mahommedans of Upper and Lower Egypt. On the whole we find that the differences with which we have already met between the Upper and Lower Egyptians are still further accentuated between the Lower Egyptians and the Copts. When we pass to the Copts, the fairness of the eyes and skin increases, the crispness of the hair and the fulness of the lips still further decrease; and this, in spite of the fact that the bulk of the Copts come from Upper Egypt, where in the Moslem population negroid features are most accentuated. But it is noteworthy that, although the average Copt is less negroid than the Lower Egyptian, and is considerably less negroid than the Upper Egyptian, nevertheless, instances of thick lips, crisp or even spiral hair and very dark skin do occasionally occur. It is highly improbable that this is the result of any modern irregular intimacy with the Sudanese and of subsequent adoption of the offspring. The probability is far greater that it expresses the past history and present variability of the Coptic race.

Turning our attention to the "mixed" group, we find that on the whole the distinguishing features of the Moslem Upper Egyptians are here accentuated. Although the nose alters little, the lips are more frequently thicker, the hair and eye colour is darker, and the hair inclines more to a negroid character than is the case in Egyptians of unmixed parentage.

B. COMPARISON OF MEASUREMENTS AND INDICES.

We now pass to a comparison of certain measurements made (i) upon the (unmixed) Moslems of Upper and Lower Egypt, (ii) on the Copts of Upper and Lower Egypt, and (iii) on the Moslems of "mixed" parentage. The numbers of individuals examined, the averages, their probable errors, standard deviations and coefficients of variability are set forth in the accompanying table.

TABLE XI.

Group.	Head length.				Head breadth.				Auricular height.				Horizontal circumference.				Nasal height.			
	No.	Av.	σ	C.	No.	Av.	σ	C.	No.	Av.	σ	C.	No.	Av.	σ	C.	No.	Av.	σ	C.
Moslems ...	369	194·56 ±0·21	6·09	3·13	369	144·29 ±0·15	4·34	3·01	173	145·84 ±0·24	4·65	2·83	116	547·19 ±0·88	13·16	2·40	510	48·29	—	—
Copts... ...	44	193·05 ±0·62	6·13	3·17	44	143·09 ±0·52	5·09	3·56	23	146·39 ±0·58	4·15	2·83	17	548·41 ±1·97	12·01	2·19	42	47·76 ±0·37	3·41	7·14
"Mixed" ...	64	195·98 ±0·48	5·65	2·88	64	145·14 ±0·39	4·64	3·20	43	146·77 ±0·50	4·90	3·3	16	547·25 ±3·47	20·60	3·76	58	47·38 ±0·30	3·43	7·24

Group.	Nasal breadth.				Cephalic index.				Upper facial index.				Nasal index.				Gnathic index.			
	No.	Av	σ	C.	No.	Av.	σ	C	No.	Av.	σ	C.	No.	Av.	σ	C.	No.	Av.	σ	C.
Moslems ...	514	36·6	—	—	369	74·26 ±0·10	2·86	3·85	391	48·39 ±0·12	3·53	7·29	349	75·83 ±0·28	7·67	10·12	120	101·80 ±0·25	4·01	3·94
Copts... ...	43	35·93 ±0·28	2·72	7·57	44	74·00 ±0·35	3·48	4·70	42	48·57 ±0·33	3·18	6·55	42	75·77 ±0·85	8·16	10·77	15	100·86 ±0·61	3·53	3·50
"Mixed" ...	59	38·24 ±0·28	3·22	8·42	64	74·10 ±0·24	2·86	3·86	62	48·12 ±0·24	2·68	5·57	56	79·41 ±0·74	8·21	10·33	25	101·35 ±0·55	4·07	4·02

We will now examine whether there are any significant differences in measurement between the Moslems and Copts. The excess in head length (1·56 mm.) and in head breadth (1·20 mm.) of the former over the latter is not great enough in relation to the probable errors of these differences ($\pm$ 0·65, $\pm$ 0·54) to be with certainty significant. These differences and those in nasal height and breadth are possibly in part due to the fact that the Moslems are selected for the army on account of their stature, while the Coptic soldiers, whose superior education leads to their frequent employment in military clerical work, undergo perhaps a somewhat less rigorous test of physique. It is conceivable that the average measurements of breadth and length of head and nose run somewhat higher in a taller group of men. Even making this allowance, the diminution in nasal breadth is greater than that in nasal length (*cf.* Table XII). On the other hand, in the measurements of auricular height and horizontal circumference, the excess is on the side of the Copts; but here again the probable errors of the Coptic measurements are too great to make certain that the difference is not accidental.

Turning to the comparison of indices among the Moslems and the Copts, we find that the cephalic, the upper facial and the nasal indices are almost identical, while the difference in gnathic index is not large enough to be with certainty significant. We might at first sight be led to conclude that metric methods fail to reveal *any difference at all* between the Copts and the Mahommedans, although other differences to which attention has been already drawn (*e.g.*, the relative rarity of dark skin, full lips and spiral hair among the Copts) undoubtedly exist. But in drawing such an inference we should be leaving unnoticed the fact that whereas the Moslem data in Table XI have been obtained as much from Lower as from Upper Egyptian measurements (*cf.* Table IX), the Coptic data, on the other hand, are derived predominantly from an Upper Egyptian source. Of the forty-two Copts measured, only ten belong to Lower Egypt.

The effects of this undue weighting of the Coptic data with Upper Egyptian material come out sufficiently well in a study of the nasal index. We saw in Table XI, that the Copts have a nasal index of 75·77, while the Moslems have the almost identical index of 75·83. If now we differentiate between Upper and Lower Egyptian Copts, we find that the Coptic nasal index for Upper Egypt is 76·76, and for Lower Egypt 72·61, in each case noticeably lower than the corresponding values for the Moslem population (*cf.* Table II). There can thus be little doubt that the same features, *i.e.*, the increasing negroid characters, which we have already traced in the case of the Moslem population, also occur among the Copts, as we proceed to an increasing distance from the Mediterranean shores. But throughout alike in Upper and in Lower Egypt, the Copts are relatively less negroid than the Moslems.

Now let us turn to a comparison of the Moslem with the "mixed" group, remembering that the latter are the offspring of marriages between Egyptians of different parts of Egypt, and between Egyptians and Sudanese or other foreign peoples, as set forth on p. 264. Here again the greater head length and head

breadth of the "mixed" group is not with certainty significant, the difference falling short of the requisite value, viz., more than thrice the probable error of the difference.

Neither cephalic, nor facial, nor gnathic index shows any sensible difference. It is only in nasal breadth and in nasal index that we meet with a striking contrast between the two groups.

The following figures are here given to show the average nasal length and breadth for the individual provinces, with which the "mixed" group may be compared.

TABLE XII.

	Provenance.	No.	Nasal length.	Nasal breadth.
Moslems	Ḳena and Girga	134	47·63	37·10
	Assiut and Minia ...	91	47·78	37·05
	Menufia	80	48·36	37·16
	Gharbia	102	48·88	36·16
	Dakahlia	103	48·96	35·89
	Copts	42	47·76	35·93
	"Mixed"	58	47·38	38·24

It will be seen that none of the provinces are so wide in nasal breadth or so short in nasal length as the "mixed" group.

As regards the difference in nasal index between the Moslems and the "mixed" group, we note that while the difference amounts to 3·58 units, its probable error is $(\pm\sqrt{(0{\cdot}25)^2+(0{\cdot}74)^2})\pm 0{\cdot}78$, so that the difference is undoubtedly beyond the ikelihood of accident. It is true that in Table X we found no evidence of such difference in comparing the nasal forms of Egyptians, mixed and unmixed; but we must remember that we were there concerned with the proportion of abnormally broad to abnormally narrow noses, as determined by the unaided eye. This proportion might well be the same in the two groups despite a difference in the mean value of their nasal index. In point of fact, Table X does serve to corroborate our present conclusion, as it shows that the lips are more frequently thicker, the hair and eye colour is darker, and the hair inclines more to a negroid character among the Egyptians of "mixed" parentage.[1]

[1] It is very interesting to study the results of this comparison, between the "Moslem" and the "mixed" groups, beside the comparison instituted by Dr. Arthur Keith (*Man*, 1906, 2), between a series of ancient Egyptian crania and a series of which one-eighth were negro crania and the remainder were ancient Egyptian crania. No significant differences between the two series were found in respect of average head length, head breadth, cephalic index, and upper facial height. There was a possibly significant difference as regards facial breadth and upper facial index. Unfortunately no nasal measurements were available for comparison.

To some extent, the relation between this "mixed" group and the general Moslem population may be regarded as similar to that between the general Moslem population and the Copts. The Copts differ from the general Moslem population in having kept free from Arab, Levantine and Sudanese admixture during the past 1300 years. So, too, the general Moslem population differs from the "mixed" group by an absence of heterogeneous elements in its immediate parentage. We might therefore expect that the greater breadth of nose, the higher nasal index and the more negroid character of the skin, hair, etc., which are the distinguishing features of the "mixed" group, would also distinguish the Moslems from the Copts. This we have found to be the case. We may also note that the only index which appears to be at all sensibly affected by the admixture of Egyptians with outlying peoples is the nasal index.[1]

C. The Comparative Variability of the Copts and Moslems.

At one stage of this enquiry, I thought that the Copts showed greater individual variability in the above measurements than the Moslem population, but the subsequent calculation of further constants has convinced me that no appreciable difference in variability exists between them. Evidence is similarly wanting to show that the Moslems are more homogeneous than the "mixed" group. One might have expected that the introduction of Turkish and Sudanese parentage would have led to a perceptibly greater variability, say in the upper facial, nasal and gnathic indices of the offspring. In point of fact, the coefficient of variability of the facial index is considerably lower for the mixed group than for the general Moslem population, while the coefficients of variability of the other indices are not sufficiently different to be significant.

The general truth seems to be that there is so wide a variability in the individual measurements and indices among the different provinces of Egypt, that the introduction of foreign blood (in not too great amount) makes no perceptible impression upon determinations of the average or of the variability. Under these conditions the peoples with which Egypt is surrounded on the west and north-east —the Libyans, Syrians, Bedawin and other Arabs—are not so different physically from the Egyptians as to be able appreciably to modify the measurements and indices which we have had under consideration. On the south, however, the Sudanese are capable of effecting such a change. It is unnecessary here to repeat the already studied results of Sudanese admixture.

Summary.

1. The cephalic index, probably has a constant mean value throughout the various parts of Egypt.

The only difference in cephalic index, likely to be significant in the present material, occurred between the (more dolichocephalic) provinces of Giza and

[1] There is good reason to suppose, however, that slight changes in facial and gnathic index are correlated with change of the nasal index (*cf.* pp. 241, 262).

Baheira and the (less dolichocephalic) province of Daḳahlia. But these three provinces lie so near together, and there is for other reasons so little ground for suspecting any ethnic difference between them, that we are justified in believing that the found difference is in reality accidental and that it would vanish if a still larger number of individuals were examined.

2. The nasal index increases in Egypt as we pass from the more northern to the more southern provinces.

3. Probably the upper facial index decreases and the gnathic index increases in the same direction.

4. The mean length, breadth, and auricular height of the head is constant throughout the various provinces of Egypt.

5. There is some likelihood that, as we pass from Lower to Upper Egypt, the lengths of the tibia and radius increase relatively to the lengths of the femur and humerus respectively.

6. The colour of the eye and skin darkens, the frequency of spiral and crisp hair and of unusually broad noses increases, as we pass in the same direction.

7. It is possible that three provinces, Menufia, Ḳaliubia and Sharḳia form an exception to the conclusions 2, 3, 5 and 6. But in two of these provinces a sufficient number of measurements was not obtained.

8. The average colour of hair, shape of head, face and ear, and degree of prominence of chin appear to be constant throughout different parts of Egypt.

9. There is no evidence that the peoples of various provinces differ in variability.

10. It has not been found possible to resolve distribution curves of measurements or indices into two or more component curves, each corresponding to an underlying "ethnic type."

11. The Copts are fairer in eye and in skin colour, they have straighter hair and thinner lips than the Moslems. The nasal index, alike for Upper and for Lower Egyptian Provinces, is distinctly lower among the Copts than among the Moslems. It is lower among the Copts of Lower Egypt than among those of Upper Egypt.

12. The "mixed" group is darker, with a tendency to more spiral hair, broader nose, thicker lips than the unmixed Moslems. The nasal index is distinctly higher among the "mixed" group.

13. Neither in the Copts nor in the "mixed" group was any *significant* deviation from the general Moslem population discoverable, as regards head measurements, cephalic, facial, or gnathic indices.

14. There is no appreciable difference between the variability of (i) the Copts, (ii) the (unmixed) Moslem, and (iii) the "mixed" (Moslem) group.

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