An inquiry into the physiognomy of phthisis by the method of 'composite portraiture' / by Francis Galton and F.A. Mahomed.

from Francis Galton

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AN INQUIRY

INTO

THE PHYSIOGNOMY OF PHTHISIS

BY THE METHOD OF

"COMPOSITE PORTRAITURE."

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AND
F. A. MAHOMED, M.D.

The doctrine of diatheses, or what is often called "temperaments," in other words, the belief that certain physical conformations indicate predispositions to certain diseases, has always held so prominent a place in medicine from the earliest ages that it is unnecessary to dwell upon its history or its present position at any length. Of late years this doctrine has been repudiated by many of our most able teachers, though on the other hand it still receives the powerful support of some of the most distinguished and experienced of our physicians. So that what heretofore has been generally accepted has now become a much disputed question. The objections that have been raised against the doctrine by those of what may be called the new school are chiefly these: that it is founded on the utterly false and erroneous doctrine of "humours" held by physicians in the dark ages; that it is therefore only a relic of false traditions; and lastly, that it is not supported by any modern scientific observations, and that the statements of

[1] Though it would be difficult wholly to disentangle our respective shares in the inquiry, I must at least give the entire credit of the following memoir to Dr. Mahomed.—F. G.

"general impressions" made in support of it are those of impressions prejudiced by traditional beliefs.

In reply to these objections it may be said that the facts which the earlier physicians observed were probably correct enough, and that it was only their explanations and theories that were wrong; thus they may have observed certain facts in connection with the physical characteristics of individuals in association with certain diseases, and then sought to explain them by their false theories; the facts may nevertheless remain true.

The objection that this doctrine is only supported by personal impressions still holds good, and it is with a view to put it to the test of exact, and as far as possible unprejudiced investigation, that the following observations have been made.

Probably no diathetic types are more commonly recognised, either rightly or wrongly, than the so-called tubercular and strumous; both of these, but more especially the former are held, by those who believe in them, to play a prominent part in phthisis, inasmuch, that persons presenting the physical characteristics attributed to these diatheses are said to be especially predisposed towards this disease. It has appeared to us that this belief might be put to the test by means of the method of 'composite portraiture;' in short, that we might be able to ascertain whether there are any facial characteristics common to any large proportion of cases of phthisis.

In the first place, it was necessary that we should accumulate a large number of photographs of patients suffering from this disease, and with this view we obtained permission from the physicians of Guy's Hospital to photograph any patients coming under their care; the authorities of the hospital were also good enough to place the photographic studio at our disposal.

We began our work in January, 1881; by March we found that the progress was too slow, and that we must extend our field of operations in order to get a larger supply of patients. We therefore sought and obtained the permission of the physicians and the governing bodies of the Brompton and Victoria Park Hospitals for Diseases of the Chest, to photograph a large number of their phthisical patients. We would take this opportunity of expressing our gratitude to the authorities of these hospitals for the great facilities they so freely afforded us

for carrying out our observations, and also our most sincere thanks to the physicians and resident medical officers (Dr. Hicks, of Brompton, and Dr. Humphry, of Victoria Park) for their very kind co-operation and assistance in our work. When all did so much, and so willingly, it would be invidious to mention those who were able to contribute most; but when we say that from the out-patient rooms and the wards of these hospitals we were supplied with about 400 cases, and that, in nearly all, the cards to be afterwards described were filled up by the physicians in the case of the outpatients, and by the resident medical officers for the inpatients, some idea may be formed of the labour entailed upon these gentlemen.

Our endeavour has been throughout to protect ourselves from any charge of a prejudiced selection of cases or distortion of facts; we therefore supplied those kind enough to help us with cards on which the chief details of the cases could be briefly recorded, by making a "tick" in the appropriate space; a copy of these cards is here inserted, the method having proved at once simple and convenient.

Hospital.	
PLEASE PHOTOGRAPH BEARER.	Initial of Physician.
Name. Age.	Date. 1881

EXTENT OF DISEASE	ONSET OF DISEASE
Advanced	Insidious
Moderate	OR PRECEDED BY
Slight	Severe hæmoptysis
DURATION OF DISEASE	Bronchitis
Chronic (over 3 yrs.)	Pneumonia
Medium (1—3 yrs.)	Pleurisy
Brief (under 1 yr.)	Syphilis
HEREDITARY TAINT	Gout
Strong	Alcoholism
Some	
None	

Remarks

We asked the physicians to send us all cases of well ascertained phthisis occurring in either sex within the limits of

fifteen and forty years of age. These limits of age were fixed, partly because the faces between these ages are more fairly comparable, and partly to exclude the more evidently acquired phthisis of advanced age.

Mr. Galton then engaged the services of Mr. Mackie as photographer, who has had large experience in rapid photography, having been employed professionally for some years in photographing, for the use of the authorities, the prisoners at the Pentonville Convict Prison. He was often able to secure for us twenty and thirty portraits from the out-patients in the course of an hour or two, and we were enabled to obtain the number we required during the months of April and May.

We now found at our disposal 442 portraits of patients suffering from phthisis, of whom 261 were males and 181 females. They were obtained as follows:

From Brompton—	Males .	140	
	Females .		116
„ Victoria Park—	Males .	36	
	Females .		42
„ Guy's	Males .	85	
	Females .		23
		261	181
	Total .	442	

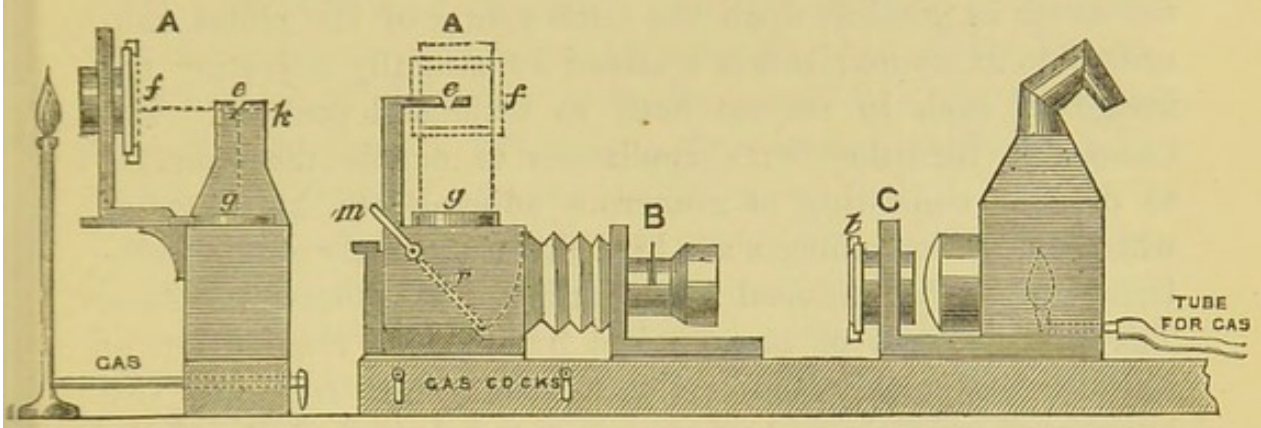
For comparison with these we next proceeded to photograph 100 male and 100 female patients, taken without selection from the wards and out-patient rooms at Guy's, none of whom were suffering from phthisis; these we propose to use as a standard to represent the average of the population of the same class, but suffering from diseases other than phthisis.

During the process of making composites, we received some valuable assistance from Mr. George Turner, who came to our help when we were much pressed for time and made several composites for us, besides assisting in the selection of faces out of which they should be formed.

Before discussing the results obtained, it will be well to say a few words in explanation of the method followed. Composite portraits may be described as *pictorial averages*, they

are independent of the fancy of the operator, just as numerical averages are, though like them, they may be vitiated by errors of calculation or of manipulation. Composite portraits, the method of producing them, and their adaptation to various purposes, have already been described by one of us on several occasions;[1] but it may be desirable for the benefit of our present readers to give an account of the process. They are

APPARATUS FOR MAKING COMPOSITE PORTRAITS.[2]



A The body of the camera, which is fixed.

B Lens on a carriage, which can be moved to and fro.

C Frame for the transparency, on a carriage that also supports the lantern; the whole can be moved to and fro.

r The reflector inside the camera.

m The arm outside the camera attached to the axis of the reflector; by moving it, the reflector can be moved up or down.

g A ground-glass screen on the roof, which receives the image when the reflector is turned down, as in the diagram.

e The eye-hole through which the image is viewed on *g*; a thin piece of glass immediately below *e*, reflects the illuminated fiducial lines in the transparency at *f*, and gives them the appearance of lying upon *g*,—the distances *f k* and *g k* being made equal, the angle *f k g* being made a right angle, and the plane of the thin piece of glass being made to bisect *f k g*.

f Framework, adjustable, holding the transparency with the fiducial lines on it.

t Framework, adjustable, holding the transparency of the portrait.

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[1] "Composite Portraits," by Francis Galton, F.R.S., 'Journ. of Anthropological Inst.,' 1878 (reprinted in 'Nature' and in the 'Photographic News,' and translated in the 'Révue Scientifique.') "Composite Portraiture," by the same author, 'Photographic Journal,' June, 1881 (reprinted in the 'Photographic News,' July 8th and 15th). The process there described was the one adopted in the present inquiry. See also "Generic Images," by the same author, in the 'Proceedings of the Royal Institution,' to which some autotype reproductions of composites are appended.

[2] This woodcut is borrowed from the 'Photographic Journal,' June, 1881.

made from the individual negatives by throwing upon a photographic plate, disposed in a special form of camera, the images of several negatives in succession, an equal fraction of time being given to each, instead of the whole time to one. Thus, if a plate requires 200 seconds of exposure, and it is wished to make a composite of ten individuals, the image of each negative will be thrown upon the sensitised plate for twenty seconds. To obtain a clear result it is, of course, necessary that the chief features of each negative should fall as far as possible upon the same points of the plates submitted to exposure; this is attained by carefully adjusting the image of each in respect both to scale and position. The camera is furnished with appliances to enable the operator to do this, consisting of numerous adjustments, by means of which the various images are brought into exactly similar relations with certain fiducial lines thrown on the focussing glass. The latter consist of one vertical line for the median line of the full face, passing down the middle of the nose, and two horizontal ones, the upper to pass through the pupils of the eyes, the lower across the mouth. The image of each negative is enlarged or diminished as may be necessary, to secure that the distance from eyes to mouth may be the same in all cases. It is then rotated and shifted up or down and sideways, until the upper of the two horizontal lines intersects the pupils and the vertical one divides the face equally. The outlines of the face are entirely disregarded and left to take care of themselves. As it is necessary that the plate to be exposed, having been once put into position, should not be shifted until the close of the operation, and as each negative has to be focussed in succession, the composing camera is made with a horizontal focussing glass on its roof, as well as, or instead of, at the back. By means of a swinging reflector, let down at an angle of 45° with the top of the camera, the image produced by the lens is thrown upwards on to the horizontal focussing glass in the roof, where, by means of a camera lucida, the fiducial lines and certain tinted dots, illuminated by a standard illuminator (marked 'gas' in the diagram, but more properly a candle), are seen as if marked on the horizontal focussing plate, and to these lines the image is adjusted, as already described.

By the use of the standard tinted dots the gas illumination

of the negative is controlled, so that the image of each portrait has equal intensity, and therefore contributes equally to the result; the errors that would be produced by the varying densities of the negatives are thus in great measure obviated. When the image has been exactly adjusted, and the proper illumination has been obtained, the reflector is raised and the image allowed to fall upon the sensitised plate; this process being repeated with each of the component negatives.

A single plate that has been exposed to several negatives yields what is called a *composite*. Several of these composites may in their turn be exposed to another plate under similar conditions, as if they were ordinary negatives; the result is called a *co-composite*. Several of these co-composites may be combined to produce a co-co-composite, and so on.[1]

With this brief account of the process, which is fully described in the papers already referred to, we may pass to the consideration of the photographs obtained. On looking over the individual portraits of the patients suffering from phthisis, one is first struck with the absence of those characteristic faces which we expected to find among them. With the exception of a few who were very severely ill, the faces did not seem to differ much from those of any group of ordinary patients, indeed, there seemed nothing characteristic about them. They were shown to many physicians, many of whom expressed their surprise at the absence of characteristic faces. We were inclined to accept this at first as a distinct answer in the negative to the question, Is there a tubercular diathesis? But after much sorting and arranging into groups, and after combining the individuals, so as to test the similarity of their features, certain results began to unfold themselves. Clinical facts were first taken as guides for grouping; thus the cases of "advanced disease" were grouped, but gave no result beyond well-marked emaciation (Pl. I, fig. 10, and Pl. II, fig. 22). The rapid cases of "brief duration and advanced disease" yielded no characteristic type, nor was anything very definite obtained at first from those in whom the "hereditary taint" was "strong." The one of us least likely to be prejudiced by preconceived notions, dealt with these latter cases single-handed and without consultation with the other.

[1] Composites and co-co-composites are positives and require to be reversed before printing from them.

Concerning them Mr. Galton writes as follows:—"Fifty-six cases (among the women) were recorded by the medical officers as having a strong hereditary taint of phthisis, and it is of these alone I now speak. On first examination of the collection of portraits, I was chiefly struck by their diversity, but after familiarising myself with them and sorting them tentatively in various ways, I began to perceive what seemed to be natural groups, leaving comparatively few that I could not classify. I made composites of each of these groups; there were eleven of them, containing on an average five components each, one only had as few as three, and one only as many as nine. I then sorted the composites and found that they fell into two main divisions, not, however, separated by any abrupt line of demarcation. In the one division there were six composites of, on the whole, thirty-six portraits, and in the other there were five composites of twenty portraits in all. The first division had blunted and thickened features, the second had thin and softened features. I then made a compound composite of each of the two divisions (Pl. I, figs. 4 and 6), and finally I threw both divisions into a doubly compound composite (co-co-composite, Pl. I, fig. 5) to form the general average. I need not stop here to speak of the precautions taken in doing this, further than to mention that the groups were always "weighted" in exact proportion to the number of their constituents, as by giving thirty-six seconds exposure to the co-composite of the first division against twenty seconds to that of the second division, when forming the general average.

"The trustworthiness of the final result must be estimated on the same principle as if we had been dealing with numerical averages. That is to say, we may rest content whenever the averages derived from two large subdivisions of any group resemble the general average as nearly as is needful in the case under consideration. I think this result has been fully reached in the present case, for notwithstanding that the divisions have been made so as to contrast as strongly as possible, their composites (Pl. I, figs. 4 and 6) resemble very nearly that of the general average (Pl. I, fig. 5). It is therefore obvious that if the eleven primary composites were divided into any other pair of groups, the co-composites of each of these two groups would have a yet more close resemblance to each other, and to the

general average also. I have indeed made some trials which amply confirm this view. Therefore, as far as concerns the female patients between the ages of eighteen and forty in London Hospitals who have phthisis, with a strong hereditary tendency to the disease, I have no doubt that any future inquirer who deals as I have done with not less than fifty cases, will arrive at an ideal face almost identical with that which I have produced." The truth of this last remark as regards all cases of phthisis, has been strikingly corroborated by our further investigations, as will be seen by comparing with this result the three other co-composites of phthisis, containing about fifty cases in each (Pl. I, figs. 7, 8, and 9). The two co-composites (figs. 7 and 8), taken absolutely without selection, are almost identically the same face, while fig. 9 is composed of two opposite types of faces—the narrow ovoids and broad faces with coarse features; and this has produced a rather stronger face than either of the others, a nearer approach to the non-phthisical patients.

These observations were made while one of us was away from London; on his return it at once became evident that what have been described above as the two types, the one with blunted and thickened features, the other with thin and softened features, closely coincided with the two types constantly described by physicians as the "strumous" and "tubercular." Proceeding now to carefully sort our patients under these two heads, and to put our selections to the test of combination in composites, we soon obtained very striking and highly characteristic faces.

Reviewing the whole of our results, two important conclusions may be adduced, and these may be given as a preface to the consideration of the plates in detail. It appears that the method of composite portraiture may be employed to obtain two different and equally advantageous results. First, by throwing into one a large number, say fifty different faces, taken without any selection whatever, we can obtain an average of them all; but this presents no features or expressions characteristic of what may be called secondary types; such a result is an excellent method of obtaining the broad average as to the general proportions of the face, the average shape of the lower jaw, the average delicacy or coarseness of the features, and the

average amount of emaciation, &c. Secondly, it is possible by taking very carefully selected faces to form a composite face having certain characteristic features; in making such a face the introduction of a few which are not strictly admissible into the group readily effaces the characters sought for in the composite, and as but few faces can be found which closely correspond, the larger the number employed the more does the result approximate to the general average face. This method of combining specially selected faces, is in itself an excellent test of the correctness of the selections made. If the result obtained has lost the special characters sought for, we may be sure that the faces selected were ill assorted; always, however, bearing in mind that the larger the number of faces introduced, the greater the probability of reverting to the general average. This method fails to obtain for us so typical a face as may often be seen in a single individual, yet it tests the accuracy of our opinions as to the general similarity of several selected faces.

Plate I is composed almost entirely of general average faces, both male and female, and the uniformity of the results is very noticeable. Figs. 1 and 3 each contain fifty patients, all suffering from diseases other than phthisis, taken without selection, and chiefly from among the out-patients attending Guy's Hospital. The results, over which the operator can have no voluntary control, are remarkably alike; yet they consist each of fifty entirely different people, no single person occurring in both. With these compare figs. 5, 7, 8, and 9 in the same plate; each of these contains about fifty cases of phthisis, and again the results are wonderfully alike, although another face is arrived at. A certain selection has been made in figs. 5 and 9; the former contains, as above mentioned, fifty-six cases, in all of whom a strongly-marked hereditary taint existed, and the resulting face has distinctly more delicate features, and is a narrower ovoid than figs. 7 and 8. Fig. 9, on the other hand, is composed of two opposite extremes; it was formed by combining a composite of selected narrow ovoids, and one of selected broad faces with coarse features, and contains most of the components of figs. 29, 30, 31, and 32, Pl. II. The result is a face standing midway between the very delicate fig. 5 and the broader faces and coarser features seen in figs. 1 and 3.

From a consideration of these, we are undoubtedly justified in saying that the average of phthisical faces gives more delicate features, an apparently lighter lower jaw, and an altogether narrower face than the average of other diseases. Probably in some measure this result is due to the greater average emaciation of these patients than that of those suffering from other diseases. But emaciation will not always alter the general outline of the face; this is well shown by Pl. I, fig. 10, a composite of eleven cases of phthisis in whom the disease was far advanced; in this face the results of emaciation are well shown in the deeply sunken eye, the hollow cheeks, and thinly-covered lower jaw, but the face nevertheless is not by any means a "narrow ovoid." A critical examination of fig. 1 will show, however, that emaciation in such a face would take away much of the "heavy-jowled" appearance of the lower part of the face, and would thin the nose and lips greatly, bringing it nearer to the phthisical type.

Pl. I, fig. 2, was obtained by selecting all the narrow ovoid faces among the hundred female patients not suffering from phthisis; it contains fifteen individuals. It may be compared with figs. 29 and 30, Pl. II, which contain nine and twelve individuals respectively, or twenty-one in all; these are the selected narrow ovoids occurring among our total number of 181 phthisical women. Pl. I, fig. 2, will be found to be very closely similar to Pl. II, fig. 29. We have, then, the unexpected result of 15 per cent. of the non-phthisical women giving this narrow ovoid face, and only 11·6 per cent. of patients with phthisis presenting it. It must be remembered, however, that many of these fifteen may hereafter develop phthisis, for several of them were young women suffering from those ill-defined functional disorders which often precede it. We may also find another explanation of this result in the fact that we are here dealing with phthisis among the lower classes, and that with them phthisis is probably much more often an *acquired* disease than what is called a *constitutional* one. Yet, allowing due weight to these considerations, the fact still remains well established that no larger proportion of peculiarly narrow ovoid or delicately-formed persons could be selected among those suffering from phthisis than among the ordinary female population; on the other hand, the general average of each class proves the

phthisical women to have the more delicately-featured and narrow faces.

We may now examine the men, and we shall find very similar results. Pl. I, fig. 11, contains 100 patients suffering from diseases other than phthisis; it is a co-co-composite of figs. 13, 14, 15, and 16, which are co-composites containing twenty-five in each, being composed each of five composites having five individuals in each composite. This subdivision was only employed to check an error more readily and make repetition of a single group easier and shorter if necessary. On the other hand, fig. 17 is a co-co-composite of 206 cases of phthisis, it contains figs. 18, 19, 20, and 21, each of which contains fifty (except fig. 18, which contains fifty-six); these four are co-composites, each containing five composites of ten individuals suffering from phthisis, and taken without selection. Fig. 18 was made entirely from patients under treatment at Guy's, and the average severity of these cases is usually greater than those treated at the hospitals specially devoted to chest disease. A comparison of these groups gives much the same result as in the case of the females. The phthisical composites are evidently much narrower and more delicate faces than those suffering from other diseases. The same exact similarity is not at once apparent in the series of male phthisical faces as in the female, chiefly on account of the variable growth of hair, but still a strong resemblance is to be traced between them. It may be remarked that fig. 13, containing non-phthisical persons, presents a more delicate face than figs. 14, 15, and 16, and closely approaches to the phthisical type; an explanation of this is to be found in the fact that it chances to contain six out of the thirteen narrow ovoid faces contained in fig. 12, or, in other words, three times as many narrow ovoid faces as in either of the remaining three, supposing the rest are equally distributed.

Pl. I, fig. 12, contains thirteen narrow ovoid faces selected from the 100 cases 'other than phthisis,' and it may be compared with Pl. III, fig. 33, the co-composite of fifty-one narrow ovoid faces selected from the 262 males suffering from phthisis, and also with the two female narrow ovoid faces (Pl. I, fig. 3, and Pl. II, figs. 29 and 30). As in the case of the females, the two male narrow ovoids chiefly differ in the degree of emaciation visible, this being well marked in the phthisical cases and

absent in the other diseases. The proportion of narrow ovoids in each class among the males is the reverse of that among the females, for we find only 13 per cent. among the cases 'other than phthisis,' and 19·46 per cent. among the phthisical patients if we include all the fifty-one cases contained in the plate; but at least six of these, we shall hereafter find, ought to have been excluded, for they do not belong to the "narrow ovoid" class. This would bring the number down to forty-five, which would give almost exactly 17 per cent. If we add together the percentages of the narrow ovoids in both sexes we find that the cases 'other than phthisis' give 14 per cent., while the phthisical cases have 14·3 per cent., in short, they are to be found in equal numbers both among the phthisical and non-phthisical patients. Let us here emphasise the fact that we are now comparing phthisis with *other diseases*, and not with the healthy population, and these observations would seem to show that a delicate person may fail in many ways besides becoming phthisical, and that a delicate narrow ovoid face, may mean liability to other diseases not necessarily tubercular.

Turning to Pl. II, fig. 22 is a co-composite of forty-two cases of advanced phthisis, all of whom showed in their faces the ravages of the disease; it contains the six composites, figs. 23, 24, 25, 26, 27, and 28, each containing seven individuals. The co-composite closely resembles fig. 33, the co-composite of narrow ovoids, and both of these in their turn closely approximate to the phthisical type seen in fig. 17 and its components; yet the components of fig. 22 are strongly dissimilar.

Fig 23, one of the components of fig. 22, is a most typical, perhaps the most typical phthisical face, yet the individuals contained in it were in no way selected, except for the severity of their disease; they were taken merely in the order in which they chanced to be photographed. It is interesting to compare this face with figs. 29 and 30, and some of the composites in Pl. III; in several of these instances the same face is very nearly arrived at. In this face the large projecting ears are very noteworthy; they are noticeable in several other composites, and in many of the component faces; these, taken together with a narrow mouth, often open, a short and small chin, a small and narrow lower jaw, make together an often-recurring face in

phthisis. A very typical face of this nature is seen in Pl. III, fig. 34, No. 101. This face is one of the components of fig. 23, and lends to it much that is characteristic.

We have remarked that the method of composing faces is a good test of their real resemblance, that is, the more closely allied they are to each other the better composite will they produce; this is well exemplified in figs. 27 and 28, but especially in the former, in which the faces, having been taken without selection, have very imperfectly combined. While by adjustment the central features have been exceedingly well blended, yet the main outlines of the various faces remain very distinct, and at least five out of the seven it contains can be traced around the chin and ears, especially on the left side.

Figs. 29 and 30 are two composites of narrow ovoid faces, and have been already referred to. Their components are arranged adjacent to them; they are the nearest approaches we could find to the so-called "tubercular type," which seems singularly rare or much modified among the lower classes of the population. An attempt has been made to arrange them in two groups, containing a higher and a lower type of face, but the results are very similar.

The components of fig. 30 are chiefly characterised by the large ears, the narrow, open mouths, with prominent upper teeth, and short, small chins, which have been mentioned as forming a frequent type in phthisis. No. 608, the last portrait on this plate, was also included in this group. This face presents the narrow ovoid outline, but the coarse features and broken nose of fig. 32.

Figs. 31 and 32 are the direct converse of the narrow ovoid just described. In these we find the broad faces, heavy lower jaws, short upper lips, thick and rather up-turned noses, often with a depressed bridge, which are characteristic of what is called the "strumous diathesis." When we examine a group of the most degraded of this type, as seen in fig. 32, we cannot but recognise that we are dealing with such features as those which characterise syphilis. This view seems well borne out by the five faces at the bottom of this plate, and in the composite produced by them. If we compare fig. 31 and its components with them, we can readily trace a close similarity between these and the more degraded ones in fig. 32. Possibly one or two

generations have sufficed to effect the change, so that the deformed and ill-formed faces, the direct products of disease, when sufficiently diluted, may give rise to the comely and attractive face seen in the composite, fig. 31, and in one or two of its components. In this way we may often observe the disappearance of eccentricities and deformities, and that return to the average type, by which alone the maintenance of the race is possible.

In Plates III and IV, the male patients having the same characteristics as the females in Plate II, have been selected and combined. They have required greater subdivision on account of their larger number and the growth of hair upon the faces. Among the narrow ovoids the selection has not been sufficiently critical, and several have been admitted which might with advantage have been excluded; the final co-composite, Pl. III, fig. 33, would then have been more typical. As it is, the outlines are somewhat ill-defined, and the face scarcely as narrow as it should be. In this group, moreover, numbers have increased the difficulty of arriving at a type; it contains fifty-one components and its tendency is to revert to the general average, as may be seen by comparing it with fig. 17, which it much resembles.

We would remark that the nine composites forming the components of fig. 33 are only stages in the production of the co-composite. The faces in each composite have not been selected for their resemblance to each other, but merely as belonging to the "narrow-ovoid" class. They have been chiefly taken in the order in which they were photographed, except that in the first three figures the hairless faces have been put together while in the next two those wearing hair have been combined; all contained in these first five composites were patients at Brompton, those in the next three at Guy's, and those in the last at Victoria Park.

The component composites of fig. 33 are more characteristic than the co-composite itself, though not so typical in many cases as they should be. Fig. 34 somewhat resembles fig. 30, and one of its components, No. 101, bears some resemblance to No. 578 in the female group. These are the two most typical faces in either, and partake more largely of the characteristic features of the groups than any other single faces; they therefore more

closely resemble the composites. It may be argued that they have contributed too large a share to each, and possibly this may be true. They both exhibit in a striking degree the characteristics of the lower so-called "tubercular type" already described. Out of the components of fig. 34, No. 160 should have been excluded.

In fig. 35, No. 192 might have been omitted on account of the irregularity of his features, but his ears are highly characteristic of the semi-idiotic or degraded type.

Figs. 36 and 37 are striking faces and good results, but in fig. 38 none of the faces are very characteristic, though all belong to the narrow ovoid class.

Fig. 39 has been ruined by the admission of Nos. 7 and 11; No. 7 can only have been admitted by mistake, and No. 11 owes his admission to his emaciation and not to his original conformation; for the broad strong angles of his lower jaw are characters the reverse of what is noticeable in the other faces on this page. No. 6 also might have been excluded with advantage. Fig. 39 may be compared with fig. 18, and a strong resemblance traced between them and accounted for by the fact that among its fifty-six components fig. 18 includes all the components of fig. 39, as it does also those of fig. 40. From the latter figure Nos. 20 and 36 and perhaps No. 15 might have been omitted. Indeed, had the last two figures been merged into one and only allowed to include Nos. 9, 13, 28, 24, and perhaps 23, a far better result would have been obtained, both in it and in the final result (fig. 33). Time, however, did not allow us to make these alterations, when, on arranging these plates the errors of selection were discovered; in some measure it is perhaps desirable that the corrections should not have been made, for it will allow our readers to see both the strength and weakness of the process, that is, its mechanical accuracy and the check it makes on the selection of faces, and, on the other hand, the failures and misleading results obtainable by bad selection. This question of selection is still further emphasised by fig. 41 (Plate IV), which contains a very ill-assorted collection of faces; long and short faces, and the broad lower jaw of No. 212, being all mingled in terrible confusion, giving the many outlines to the face obtained in fig. 41, in which almost every one of its components can be traced.

Fig. 42, on the other hand, gives a very good result, except as regards its mouth.

Fig. 43 on Pl. IV, and the composites (figs. 44 to 48) out of which it has been formed, contain twenty-seven individuals selected as possessing broad faces with coarse features. In this group a difficulty arises from the fact that there is a mixed class, the representatives of which among the men are chiefly included in these composites; they have a narrow ovoid face, but with coarse and thick features, as in the case of No. 608, fig. 32, among the women, who was also included in the narrow ovoids of a lower type. If this work was being done again it would be well to put these in a class by themselves. Many of these faces are included in fig. 44, and the result has been to obtain a decidedly narrow ovoid face; the same is true of fig. 47, and these two faces having been admitted to the co-composite fig. 43, have done much to destroy its typical characters, though it still remains a well-marked contrast to fig. 33, and it much resembles the corresponding female composite fig. 31.

Fig. 44 contains eight individuals, namely, those on a line with it in the plate. We have already remarked that they present much in common, but that their faces are mostly narrow ovoids, though their features are coarse and the upper lips short. No. 193 and perhaps 336 might well have been introduced into fig. 46.

The components of fig. 45 make a good composite, but we are willing to allow that they do not possess typically "broad faces," nor the features generally called "strumous."

On the other hand, fig. 46 and its components have undoubtedly broad faces and powerful lower jaws, but they have not the broken noses nor short upper lips of the strumous face.

The features of the faces in fig. 47 are similar; all have the mouth open, a short upper lip, and a broad nose with more or less depressed bridge, yet the outlines of the faces are narrow rather than broad.

Fig. 48 and its components exhibit the broad face and characteristic features of struma when not sufficiently strong to be ill-favoured or deformed; they belong to much the same class of faces as fig. 31 among the women.

In closing this review and criticism of our own plates, we must express our great regret that some unforeseen pressure of

time at the last did not allow us to revise our male composites before publishing them; if we had been able to do so, we should have obtained better results. We dealt with the women first, and by submitting them to revision, we have procured more characteristic faces than at first. We would also draw attention to the fact that this is the first attempt at applying the new process of composite portraiture on a large scale, and that many technical difficulties, mechanical and others, could only gradually be overcome.

There is one advantage, however, in submitting the photographs of men in a somewhat imperfect condition; it affords an opportunity of demonstrating errors in selection, and gives examples of one of the advantages of composites as tests of accuracy of selection and grouping.

Finally, we may say that our results appear to lend no countenance to the belief that any special type of face predominates among phthisical patients, nor to the generally entertained opinion that the narrow, ovoid, or "tubercular" face is more common in phthisis than *among other diseases*. Whether it is more common than among the rest of the *healthy* population we cannot at present say.

It is true that taking both sexes together we find 14·3 per cent. of faces that may be classed as "narrow ovoids" and 9·3 per cent. that come under the head of "broad faces with coarse features," making in all 23·6 per cent. of our cases which may be grouped under one or other extreme departure in either direction from the normal average; but we doubt if this is more than would be found among the general population. Our results are therefore negative, but it may be they are no less valuable; although we commenced our investigations with the expectation of establishing a "type" on a firm foundation, we shall be little less satisfied with them if they have succeeded in refuting an error.

Although these conclusions would seem to indicate that there is no foundation for the belief that persons possessing certain physical characteristics are especially liable to tubercular disease, yet it may hereafter be proved that some explanation of the doctrine may be found in the course of the disease when it attacks such persons. In suggesting this we are going beyond the facts recorded in our present inquiry,

but the suggestion appears warranted by daily observation. Thus, the delicately organised individuals called "tubercular," and characterised by their "narrow ovoid" faces, have been compared with horses and cattle who have been what is called "over bred;" such animals are described as having too much nerve and too little bone and muscle; they have no "staying power" and readily "knock-up." In like manner these more delicately formed individuals, with highly susceptible nervous systems, well exemplified in the "precocious child," are little able to stand the strain and racket of disease, of whatsoever sort it may be, and more readily fall victims to its attacks than their more robustly built fellow-creatures.

Again, if it be true, as frequently asserted, that those having the features called "strumous" probably inherit a more or less diluted syphilitic taint; it is not surprising that they should be especially liable to inflammatory changes of a low type, and that disease in them should be readily amenable to treatment, especially by mercury, a result commonly seen in the so-called "strumous" diseases of children and often in those of adults.

These questions we hope to take up again hereafter, when possibly we may be able to demonstrate that though much error has been accumulated around the doctrine of "diatheses," it nevertheless contains a nucleus of valuable truth.

DESCRIPTION OF PLATES I, II, III, IV.

The *composites* are in medallions, the *original photographs* are in small squares.

The composites are numbered consecutively as Figs. 1, 2, 3, &c.

The small numbers attached to the composites and to the photographs of individuals are for the purpose of identification in our indices of composites and of cases.

The faces are classified under the following heads; the references in the columns being to a good composite specimen of each variety:—

	Phthisical.		Non-phthisical.	
	Male.	Female.	Male.	Female.
	Fig.	Fig.	Fig.	Fig.
General average	17	7	11	1
Narrow ovoid ("tubercular" type):				
a. Delicate and regular	36	29	12	2
b. Coarse and thickened	34	30		
Broad faces, thick features ("strumous" type):				
a. Somewhat comely	48	31		
b. Coarse and deformed	47	32		
Emaciated	22 or 18	10		

Plate I

Contains *general averages* of phthisical and non-phthisical patients, both males and females (except Figs. 2, 10, and 12).

Figs. 1 and 3.—Female non-phthisical patients (each contains 50).

Fig. 2.—Do., with narrow ovoid faces (contains 15). Compare also Figs. 20 and 30, Plate II.

Figs. 7, 8, and 9.—Female phthisical patients, taken without selection (each contains 50).

Fig. 5.—Do., with strong hereditary taint (contains 56).

Figs. 4 and 6.—Do., components of Fig. 5.

Fig. 10.—Do., with advanced disease (contains 11).

Fig. 11.—Male non-phthisical patients (contains 100).

Figs. 13, 14, 15, and 16.—Do., components of Fig. 11 (each contains 25).

Fig. 12.—Do., with narrow ovoid faces (contains 13).

Fig. 17.—Male phthisical patients, taken without selection (contains 200).

Figs. 18, 19, 20, and 21.—Do., components of Fig. 17 (50 in each).

Plate II.

Fig. 22.—Male phthisical patients, with advanced disease (contains 42).

Figs. 23, 24, 25, 26, 27, 28.—Do., do., components of Fig. 22 (each contains 7).

Fig. 29.—Female phthisical patients, narrow ovoids, high type (contains 9).

Fig. 30.—Do., narrow ovoids, low type (contains 12).

Fig. 31.—Do., broad faces, with comely features (contains 10).

Fig. 32.—Do., do., with deformed features (contains 5).

Plate III.

Fig. 33.—Male phthisical patients, co-composite of all narrow ovoids (contains 51).

Figs. 34, 35, 36, 37, 38, 39, 40.—Do., components of Fig. 33, with the individual portraits.

Plate IV.

Figs. 41, 42.—Male phthisical patients, components of Fig. 33 (continued from Plate III).

Fig. 43.—Do., co-composite of broad faces with thick features (contains 27).

Figs. 44, 45, 46, 47, 48.—Do., components of Fig. 43, with the individual portraits.

Fig 1. Co-composite of 50

Fig 2. co composite (narrow ovoids)

Fig 3. co composite of 50

Fig 4. (N° 90)

Fig 5. (N° 96) of 56

Fig 6. (N° 95)

Fig 7. (N° 157)

Fig 8. (N° 158)

Fig 9. (N° 159)

Fig 10. (N° 198)

Advanced disease.

Fig 11. Co co composite

Fig 11 Contains 100 non phthisical mates

Figs. 15. 14. 15. 16 are co composites included in it.

Fig VI. contains 200 unselected cases of Phthisis

Figs. 18-21 are composites contained in Fig VI. each have 50 unselected cases of Phthisis.

Fig 12. Co composite (Narrow ovoids)

Fig 13. (N° 150-154)

Fig 14. (N° 155-159)

Fig 15. (N° 160-164)

Fig 16. (N° 165, 167, 192, 195)

Fig VI. Co co composite

Fig 18. (N° 7)

Fig 19. (Nos. 201-205.

Fig 20. (N° 206-210)

Fig 21. (N° 211-215)

Fig 22 (Composite)

Fig 23 (N° 176)

Fig 24. (N° 177)

Fig 25 (N° 178)

Fig 26. (N° 185)

Fig 27 (N° 180)

Fig 28. (N° 187)

Fig 29. (N° 196)

Fig 30. (N° 122)

Also 608.
see Fig 32

Fig 31. (N° 199)

Fig 32 (N° 120 (Struma, Syphilis?))

Co-composites of males having narrow ovoid faces

165

Fig. 34.

101 104 120

129 160

171 183 189 192 307

172 125 148 322 334

100 106 115 125 178

105 107 306 316 319

2 7 9 10 11 15

6 15 20 23 24 25 29

34

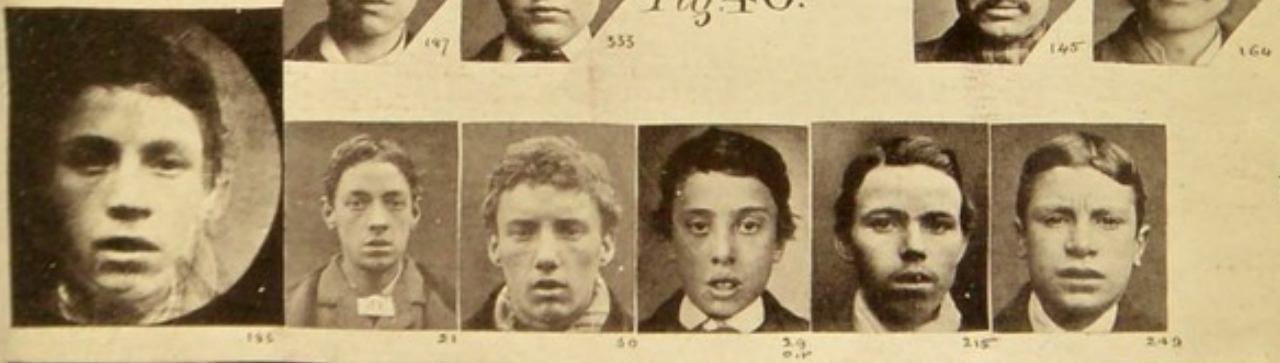
Components of "Narrow ovoid" Composite (Fig. 33).

Narrow ovoids

Fig. 44.

Co-compw Broad faces

Fig. 46.



Components of "Broad and Thick" Composite. (Fig. 43.)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