as typhoid fever, there is seldom any evidence of a septic or infective origin. Prolonged venous stasis with consequent malnutrition of the walls of the veins is the usual predisposing cause, and some trivial injury, perhaps scarcely noticed at the time, does the rest. In a few instances the thrombosis is secondary to an attack of phlebitis or periphlebitis. This is not uncommon in the early stages of constitutional syphilis; but in the class of case to which I am alluding at present, middle-aged men and women whose employment involves much standing, and who nearly all suffer from varicose veins with incompetent valves, the thrombosis is primary, and the inflammation around rarely of any extent.

The usual treatment for these cases, as I have mentioned already, is prolonged rest in bed with the leg elevated, and covered either with lead lotion, or with a mixture of extract of belladonna and glycerine. For some years past I have abandoned this entirely, and, instead, have at the very earliest opportunity excised the whole thrombosed portion of the vein, with the most excellent results. The wound is sound in a week, and the patient can get up cured and freed from all the risks of embolism, deep thrombosis, or recurrence. At first I limited this proceeding to cases in which there was merely a thrombosed loop or outlying pouch. But by degrees I have been led by its success to adopt it more and more extensively. In one instance in which both internal saphena veins were plugged right up to the saphenous opening, I cautiously exposed the vein, slit it open close to its termination, withdrew the clot, which must have reached almost, if not quite, to the femoral, and tied a catgut ligature around the vein immediately below its junction. The rest of the vein was then excised, and the patient left the hospital within the fortnight. Deep communicating branches the anatomical situation of which is fairly constant, if they are found to be thrombosed, should be treated in the same way. I have not found that a moderate degree of inflammation makes any difference. It begins to subside as soon as the offending vein is removed; but of course, in such a case, the wound should not be sewn up tightly, as there is sure to be a considerable amount of oozing afterwards.

I have no doubt that the same idea has occurred to many others, but, as I cannot find any mention of it in textbooks or in ordinary publications, I have thought it might be worth while to call attention to it.

THE ANTHROPOMETRIC INVESTIGATION OF HOSPITAL PATIENTS.

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THE life-history of man, as of other animals, may be described as being the resultant of the two forces—race and environment; the former representing all that man is and inherits, the latter all that he does, and in large measure explaining the characters and tendencies that he acquires. Both are of importance, and in turn both have been looked on as of the greatest significance. In connexion with medicine, half a century ago hereditary tendencies held sway as the currently-accepted causes of many diseases, and the doctrine of types was considered to be unassailable. Nowadays, when so many disorders have been traced to the action of micro-organisms—vegetable and animal—the pendulum has swung round, and in dealing with any individual patient his past and present environment is almost exclusively considered. On general principles either of these methods seems to be objectionable, as in any and every case both factors must be in action. If we cannot conceive of illness arising without the seeds, whether micro-organisms or otherwise, which are sown as a result of the individual mode of life and surroundings, so also we should regard the soil, the product of ancestral inheritance, as profoundly modifying and often doubtless prohibiting the growth of the proximate causes of disease. Such being the case it would seem probable that a comparative study of healthy and suffering individuals from the same areas would throw some light on the relative influence of physical characters and environment, as also on any mutual interactions between these factors themselves. The chief features to which attention has been drawn under the conditions of modern life are the differences which exist between the rustic labourer and the citizen artisan, the former working usually in the open air, the latter in more or less ill-ventilated workshops and but rarely visiting the countryside even for a

few hours at a time. There would appear to be a general impression that the town dweller has deteriorated in physique from his rural brethren, and that if this be the case, the problem of seeking out and removing the deleterious influences should be at once faced. It is, however, by no means clear whether in such a change we have to deal with a true degeneration of fixed racial elements under changed conditions of environment, or whether the differences in the surroundings and mode of life leads rather to the survival in predominant numbers of one race in the towns and of another in the country. That is to say, whether in reality one race does not show a greater aptitude for urban environment than another as a result either of its special physical, mental, or social qualities, or more probably from the aggregate of these. In such a way only does it seem easy to explain the constancy of the distribution of physical characters among the populations of Europe. The physical characters which have been more especially studied, and which are at present regarded as the best tests of racial differences, are head-form, stature, and the pigmentation of the hair and irides. Many more observations have been recorded of the last than of the two former characters, since the co-operation of the individual studied is not absolutely necessary, and the time required is not so long. Professor Ripley, in his treatise on the *Races of Europe*, states that the inhabitant of the city is usually longer-headed, shorter, and darker than his rural *confères*, and that in the cities of the Grand Duchy of Baden, at any rate, this difference is progressive.¹ As only a small part of the population is truly urban, recruiting constantly going on by a stream of immigration from country districts, far and near, it would be only natural that the average of the population of any given city should closely correspond with that of the area from which it receives its accessions, which Lapouge has appropriately called its sphere of attraction. That the average should differ would show the influence of a constantly-acting set of causes of the utmost importance to the social economist.

Professor Ammon, of Carlsruhe, as a result of his investigations in Baden, formulated the hypothesis, which has since become generally known as Ammon's law, that the Teutonic race shows a special aptitude for city life. If the facts, so far as they are known, be collected into tables, this suggestion can be tested for each physical character in turn.

Head Form.

City populations have longer heads in	No difference between town and country in	City populations have shorter heads in
Baden. West, Central, and Southern France. Vienna. Munich. Madrid. Northern Italy.	British Isles. Scandinavia. Smaller towns of France and Switzerland.	Southern Italy. Spain.

Stature.

City populations are taller in	No difference between town and country in	City populations are shorter in
Belgium. Baden. Chief cantonal towns of Switzerland. Hungary. Capital cities of Russia.	Saxony. Smaller towns of France and the British Isles.	North Germany. Franconia. Bavaria. Alsace-Lorraine. Geneva. Turin. Madrid. British Isles.

Pigmentation.

City populations are fairer in	No difference between town and country in	City populations are darker in
Metz (children). Chief towns of Switzerland (adults).	Most of the smaller towns of Europe.	Germany, except Metz (children). Cities of the Rhine Valley (adults). Bavaria. Austria. Italy. Baden. Boston, U.S.A. British Isles.

The above tables show that Ammon's law is far from being universally true, and brings out strongly the relation between brunetness and urban environment. Many of the phenomena are capable of a racial explanation. The population of Europe is usually classified into three great races:

The *Teutonic*, long-headed, tall, and fair, occupying the northern part of the Continent and the northern and eastern portions of the British Isles.

The *Mediterranean*, also long-headed, but with skulls distinctly smaller in their absolute dimensions; short and very dark. They occupy the south of Europe, on the borders of the sea whence they take their name, and appear to have outliers, whose ethnic purity has been much contaminated by Teutonic intermixture in the western portions of the British Isles.

The *Alpine*, broad-headed, but otherwise presenting physical characters intermediate between those of the preceding groups. They are at present found in the highlands of Central Europe, in Auvergne, and Brittany, but their former distribution may have been more extensive.

Bearing in mind the geographical range of these racial elements, it will at once be seen that Ammon's law is only true in the border countries between an Alpine population and one of the other two races, and therein it demonstrates that a city approaches more nearly the average of the whole country than do the rural districts in its vicinity. There remains unexplained by this approach to the general mean the decrease in stature and increased frequency of brunette traits observed in most of the larger cities. It has been observed that in these the population separates itself into layers far more than is the case in rural areas, and that while the richer quarters contain a large proportion of individuals of very good physique, the poor districts contain such an excess of poorly-developed, ill-nourished persons as to lower the general average below that of the surrounding country.

Average Heights at the Ages of 20-23, compiled from Conscription Records in Paris by Vanderkindere.²

		Average Stature.	
Rich Quarters:		ft.	in.
Champs Elysées.	Europe ...	...	5 5½
Odéon.	St. Germain des Prés ...	...	5 5¼
Passy.	Auteuil ...	...	5 5
Poor Quarters:		ft.	in.
La Roquette.	Folie Mericourt ...	...	5 4½
Porte St. Denis.	Hôpital St. Louis ...	...	5 4¼
Belleville.	Charonne ...	...	5 4

In Warsaw, Zakrejewski³ found the Relation of Stature to Social Environment to be:

Environment.	Average Stature.	
	Poles.	Jews.
Rich Quarters ...	5 5	5 4
Medium Quarters ...	5 4½	5 3½
Poor Quarters ...	5 4½	5 3

Similar results have been obtained in Madrid and Hamburg.

In London, Jacobs has shown that the West-end Jews are nearly 3 inches taller than their East-end brethren, while the report of the British Association Committee demonstrated that while the average height of adults of the professional classes in this country is 5 ft. 8½ in. to 5 ft. 9½ in., that of the indoor town artisan class is only 5 ft. 6½ in. to 5 ft. 6¾ in.

In most of the towns of Europe in which investigations have been made it has been found that the richer classes are the fairer. This fact renders it possible that the marked differences noted in the statures may be in part explained by racial rather than environmental factors. On the other hand, the upper classes are exposed to few deleterious influences in urban life—they are not stinted for food or dwelling space, and pass a considerable part of each year in the open air.

The preceding roughly summarizes the evidence which has

Fig. 1.—Distribution of stature in males. The curves show the percentage frequency of each stature among the general populace, and groups of hospital patients suffering from specified disorders. The figures after each name indicate the number of individuals examined in such a group. The ordinates of the curves represent the percentage frequencies, and the abscissae the statures.

led to the conclusion that city populations show some degree of physical degeneracy or of ethnic stratification varying with the degree of environment. The present paper is devoted to a consideration of the same questions primarily in London, but with some comparisons with other districts in the British Isles. The same physical characters have been, as far as possible, recorded, namely, head form, stature, and pigmentation. Head form expressed as the cephalic index, which is the maximum horizontal breadth of the head expressed in its percentage ratio of the length from forehead to occiput.

$$\frac{\text{Breadth} + 100}{\text{Length}} = \text{Index.}$$

Records of head form and stature, which involve the co-operation of the individual observed, were made only in hospitals, on the patients themselves and some of their visitors. In the case of pigmentation further records were made from adults and children in the streets, playgrounds, etc., in the various quarters of London and other parts of the country. Whenever possible the records comprised not only a note on the condition as to illness of the individual, but also his family history, efforts being made to trace the environment of the ancestors as far back as possible.

STATURE.

The first and more important feature, stature, was noted in about 5,000 instances at various hospitals.⁴ The patients were measured standing with their backs to a scale or marked door panel, and a deduction was made for the height of the heel of the boot in those cases in which considerations of time prevented the removal of that article of clothing. In the subjoined figures will be seen curves representing the percentage distribution of stature among patients suffering from various disorders contrasted with the curve obtained from the data given in the report of the Anthropometric Committee of the British Association.⁵ It will be noticed at once that those patients suffering from disorders of the alimentary system, such as dyspepsia, flatulence, simple diarrhoea, and the like, present a curve closely resembling that of the general population, and with the same point of maximum frequency. This, of course, was to be expected, considering the very general incidence of such ailments in the pathological history of mankind. It should here be noted that throughout this inquiry Jews and alien immigrants of all kinds and their children have been excluded, so that the figures show statistics for the inhabitants of the British Isles

only. It would appear that patients suffering from pulmonary tuberculosis and cancer are in either sex shorter than the average, either of the general populace or of hospital patients *en masse*, the stature of maximum frequency being one to two inches below that shown by the curve derived from the Anthropometric Committee's statistics. Valvular disease of the heart, on the other hand, in both sexes presented more sufferers with a stature above the average.

In this connexion it may be noted that only those patients who could reasonably be supposed to have acquired the disease in adult life were recorded, in order to exclude those cases in which the heart disease might have led to a stunted growth, as such would represent merely a pathological result, and not a possible etiological factor. This exclusion also in some measure accounts for the paucity of observations on

Fig. 2.—Distribution of stature in females. The curves show the percentage frequency of stature among the general populace, and groups of hospital patients suffering from specified disorders. The figures after each name indicate the number of individuals examined in such a group. The ordinates of the curves represent the percentage frequencies, and the abscissae the statures.

this class. Anaemic women were found to present a maximum frequency of stature much above the average, a feature probably better explained by the anaemia resulting from too rapid an overgrowth than by any special intrinsic selection of tall individuals by this disease. As a fact, the pallor of the short-statured Southern brunettes has always been well known, while the ruddy complexion of the taller Northern races was a feature recorded by many observers, even in comparatively early classical times.

Although representation by curves shows well the relative frequency of different statures, and enables a rapid comparison to be made, it is open to two objections: first, that it does not give a clear representation of the average of each class; and, secondly, that it is very susceptible to the influence of random sampling.

It is obvious that curves drawn from other groups of observations might differ to a greater or less degree without the general average for the class being materially affected. This influence of random sampling can be materially diminished, if not abolished, by a study of averages and standard deviations. If the nearest unit to the average be selected as a centre, then all the other dimensions can be regarded as so many units above or below this point. The method is most easily understood by means of an example (see table showing average deviations).

Here the average stature is seen by inspection to be somewhere near 66 inches, which is taken as the centre point from which the others may be reckoned as positive (taller statures) or negative (shorter statures). The products zx and zx^2 are

then taken, and the columns added up. The sum of the first column (zx) divided by a total number of observations made (z) gives the amount to be added (+) or subtracted (−) from the centre selected by inspection, in this case + .271,

Table Showing Average Deviations.

Stature in Inches.	Number of Individuals in Each Group (z).	Deviation from Centre (x).	zx .	zx^2 .
61	13	− 5	− 65	325
62	33	− 4	− 132	528
63	53	− 3	− 159	477
64	133	− 2	− 266	532
65	146	− 1	− 146	146
66	166	0	0	0
67	166	+ 1	+ 166	166
68	113	+ 2	+ 226	452
69	93	+ 3	+ 279	837
70	40	+ 4	+ 160	640
71	26	+ 5	+ 130	650
72	13	+ 6	+ 78	468
—	995	—	+ 271	5,221

so that the average $M = 66.271$. The square of the standard deviation is found by subtracting from the sum of the column zx^2 , all the numbers in which must necessarily be positive, divided by the number of observations, the square of the resulting dividend zx . In this case—

$$\begin{aligned} \sigma^2 &= \frac{5221}{995} - \left(\frac{271}{995}\right)^2 \\ &= 5.2162 - .0734 \\ &= 5.1428 \\ \therefore \sigma &= 2.256 \end{aligned}$$

This number is known as the standard deviation (σ), and represents the amount which has to be added or subtracted from the average in order to show the range within which the averages of other samples of the same group might fall. In this case the range would be 64.016 to 68.528.

A knowledge of the standard deviation enables the significance of the differences between any two averages to be tested by ascertaining the value. The following formula:

$$\sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}$$

If the difference between two averages $M_1 - M_2$ is greater than this, such a difference is significant of the action of some cause or other, and cannot be explained by random sampling of either or both groups of observations, the averages of which have been recorded. If the difference between the average is less than the value derived from the formula, such a difference, although it may be significant of the action of some definite cause, could also be explained as resulting from the chance distribution of individuals in the two groups under observation.

Applying this method to the statistics represented graphically in the figures, the following table is obtained:

Table showing Deviation of Patients Suffering from Certain Diseases.

Variety of Observation.	Average Stature in Inches. M.	Standard Deviation. σ .	Number of Individuals observed. N.	σ^2 N.	Significance of Difference from Average of Populace.
Males.					
General populace ...	66.97	2.567	6,194	0.00106	
Patients suffering from—					
Alimentary disorders ...	66.68	2.413	530	0.01118	
Pulmonary tuberculosis ...	66.22	2.859	1,003	0.00808	
Cancer ...	64.80	2.531	40	0.15870	
Chronic bronchitis and emphysema...	66.27	2.266	150	0.03428	
Valvular disease of the heart ...	65.94	2.283	50	0.10432	
Accidents ...	66.72	2.352	60	0.09218	
Females.					
General populace ...	62.15	2.455	379	0.01593	
Patients suffering from—					
Alimentary disorders ...	62.10	2.290	266	0.01071	
Chronic bronchitis and emphysema...	61.11	2.243	70	0.07189	
Pulmonary tuberculosis ...	61.37	2.375	500	0.01128	
Cancer ...	60.86	2.315	50	0.10721	
Organic nervous diseases ...	61.46	2.235	67	0.07455	
Anaemia ...	63.36	2.308	306	0.01832	
Valvular disease of the heart ...	61.98	2.902	50	0.16839	

Applying the test previously mentioned, it will be seen that the difference between the average stature of the general populace and that of patients suffering from pulmonary tuberculosis is 0.75", while the formula—

$$3 \sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{\mu_2}} = 3 \sqrt{.00106 + .00808} = 3 \sqrt{.00914} = .2868''$$

0.75 is greater than 0.2868, so that the difference is extremely significant. Similarly the difference between the averages of the general populace and those patients with cancer is 2.17 in., while the range of difference explicable by random sampling supplied by the formula is only 1.199 in. On the other hand, the difference between the averages of accident cases and the general populace is only 0.25 of an inch, while a difference of 0.916 of an inch could occur in the averages of samples collected by chance.

In the last column of the table the significance of the difference between the averages of the various groups and that of the general populace is recorded, the zero sign indicating that no significance at all is statistically demonstrated, the negative sign that such groups are shorter, and the positive sign that groups to which this is suffixed are taller than the general average. For this method to have any value it must be assumed that the racial constitution of hospital patients and the general populace is much the same. This assumption is justified by the fact that accident cases and the group of trivial alimentary disorders yield results not materially differing from the standard. It will be subsequently discussed whether the resulting features are to be looked upon in a causal or coincidental relation merely.

In one feature only do these observations show any marked difference from the results of previous investigations; that is, in recording the average stature of tuberculous individuals as below the general average of the country. It might at first be said that this was due to their being derived from a study of citizens only. This is not the case; the material was entirely collected at the Brompton Hospital, which draws its patients from all parts of the British Isles, and has not the overwhelming majority of Londoners which is met with in many of the metropolitan general hospitals, the proportion last year being 61.4 per cent. from large towns and 38.6 per cent. from the countryside. It must also be noted that the only previous records, at any rate on a large scale, of stature in relation to disease have been supplied by the recruiting records of the French and Belgian armies, and from the Northern (Federal) Army during the civil war in the United States of America. These statistics are biased in the direction of undue elevation of stature from the facts that recruits deficient in stature or with other obvious infirmities were not taken before the examining medical officers at all, so that the figures given by the latter refer only to rejections from an already selected class; secondly, that the examination was in some cases obviously very perfunctory, owing to the conditions under which it was conducted and which led, as the various authorities have themselves pointed out, to more errors in diagnosis than would occur in a civilian hospital working without undue pressure. Thirdly, that these records show the statures of a number of men of a certain fixed age who are tuberculous, which is not quite the same as the stature of all adults of varying ages coming up for treatment of the disease.

The curves shown in Figs. 1 and 2 indicate that there were more tall individuals among tuberculous patients than among sufferers from most of the other diseases specially investigated. Titeca⁶ has shown that the taller classes of recruits present the larger percentage of insufficiency of thoracic perimeter, and that it is these in particular who are attacked by tuberculosis. Probably the same explanation holds good in this country, and that, while the majority of tuberculous patients are short, tall stature associated with a narrow chest is distinctly disadvantageous.

HEAD FORM.

We may next consider the relations between physical characters and disease, or, in other words, the physical characters presented by patients suffering from certain definite groups of disorders. First, the head form was recorded of 405 male in-patients at the Brompton Hospital, with the results given in the following table.

These numbers show differences which are not statistically significant, and the indices agree very closely with such other observations as have been made in England, the average indices for which lie between 77.5 and 78.5.

Head Form.

Disorder.	No.	Average Index.	Standard Deviation.
Pulmonary tuberculosis	300	77.3	2.574
Chronic bronchitis	50	77.5	2.362
Heart disease	25	78.1	2.231
Other patients... ..	30	77.7	2.256

As regards this feature the British Isles differ from the greater part of the Continent of Europe wherein the range of variation of average indices is rarely less than ten units and where a slight change of location often results in a great alteration in the head form of the populace. M. J. Knapp,⁷ in New York, thought that tuberculous patients had longer heads than the normal population, but has not published the actual numbers on which this conclusion is based. Dr. Polanski,⁸ of Warsaw, has published observations on 270 persons, half of whom suffered from pulmonary tuberculosis, while the remainder were healthy. He also concluded that the tuberculous individuals had longer heads, but his average indices:

Tuberculous ... 80.667	Standard deviation ... 2.823
Healthy ... 80.888	" " ... 2.701

present no statistical evidence of any difference between the two groups other than could be accounted for by random sampling. As regards facial form, Galton and Mahomed⁹ were unable to establish by the method of composite photography "any grounds for the belief that a special type of face predominates among phthisical patients."

PIGMENTATION.

The third character (pigmentation) can be more easily and rapidly studied than the others, as the co-operation of the individual observed is not absolutely necessary; in consequence particulars have been collected from a far larger number of patients, sufficient to enable results to be recorded and compared for a wider series of diseases. The hair and iris colour of each individual was noted according to the following scheme, the limits of each division being defined in accordance with Dr. Beddoe:¹⁰

Hair Colours.—Red; fair, including flaxen, yellow, golden, and very light browns; light brown; dark brown; black, including jet black and the very deepest shades of brown only distinguished from coal-black in a very good light.

Iris Colours.—Light, comprising all blue, bluish-grey, and light grey eyes; dark, including brown and dark hazel and so-called black eyes; and neutral, including all the remaining shades.

Fig. 3.—Percentage frequency of each hair colour among the general populace, all hospital patients, and separate groups of hospital patients suffering from specific disorders.

In Figs. 3 and 4 will be seen the percentage distribution of hair and eye colours respectively in the different groups of disorders. The results all point in the same direction. The diagrams show not only the percentage frequency of hair and eye colour for patients suffering from particular systems of diseases, but also the results for the sum total of 15,000 patients investigated and contrasted with results obtained

from observations made on 6,000 presumably healthy individuals of the lower classes in London by Dr. Beddoe. Subsequently a similar comparison is made with some 25,000 adults from various parts of London which I have personally observed.

Hair Colour.—The first feature to attract attention is that amongst hospital patients the frequency of red and black hair is much the same as among the general populace, but that there are more individuals with fair and fewer with light and dark brown hair. Considering the individual groups of diseases, two distinct types appear, the first comprising acute rheumatism, heart disease, and tonsillitis, in which the red hair is peculiarly prevalent, and in which also the fair element reaches its maximum of frequency, whereas dark brown is at a minimum; a second comprising pulmonary tuberculosis, nervous diseases, and cancer, in which dark brown and black reach their maximum absolute and relative frequency. The remaining disorders show no very special selection, but in skin and respiratory disorders fair and light brown sufferers predominate, while anaemia seems to fall slightly more heavily on the darker element.

Fig. 4.—Percentage frequency of each eye colour among the general populace, all hospital patients, and separate groups of hospital patients suffering from specific disorders.

Eye Colour.—These, as shown in Fig. 4, do not seem to yield very definite results, save that light eyes are most common in acute rheumatism and its allies, and skin diseases and brown eyes in epilepsy. These groups of affections, indeed, seemed to show a special predilection for the pure blonde and pure brunette types respectively. Tables of the combination of hair, eye colour, and stature will be found in *St. Bartholomew's Hospital Reports*.

The value of these curves may be tested by means of averages and standard deviations, as was done for stature by means of a scale devised by Mr. Gray, the Secretary of the Anthropometric Committee of the British Association. He regards white hair as zero, red and fair hair as each containing 1 unit of pigmentation, light brown 2 units, dark brown 3 units, and black 4 units. The subsequent procedure is the same as in the case of stature, and the more important results are as follows:

Hair Colour: Deviation.

Variety of Observation.	Average. M.	Standard Deviation. σ.	Number of Observations. N.	N. %	Significance from the Standard.
General populace of London (lower classes) ...	2.2975	0.7909	6,000	0.00010	—
Hospital patients (London) ...	2.2351	0.7523	10,000	0.00006	—
Patients suffering from—					
Acute rheumatism ...	1.9644	0.9471	141	0.00636	—
Tonsillitis ...	2.0618	0.7820	275	0.00820	—
Heart disease ...	2.1155	0.8457	199	0.00379	—
Chronic rheumatism ...	2.1728	0.7164	243	0.00211	—
Pulmonary tuberculosis ...	2.4410	0.8660	4,524	0.00016	—
Chronic bronchitis and emphysema ...	2.2010	0.7357	867	0.0062	—
Alimentary disorders ...	2.2354	0.7100	1,011	0.0050	—
Anaemia ...	2.2839	0.7762	720	0.0082	—
Nervous diseases ...	2.4567	0.8841	486	0.00161	—
Cancer ...	2.5000	0.8820	250	0.00311	—

The last column of this table shows the significance of the difference between each average and that of the general populace taken as a standard; the negative sign means that the group to which it is suffixed is on the average fairer, the positive sign that such a group is darker, and the zero sign that the difference between the averages is not statistically proved to be significant at all. The chief results thus obtained are entirely in accordance with the deductions made from the frequency curves, and are that the rheumatic group of affections are associated with blonde traits, while pulmonary tuberculosis, cancer, and nervous diseases favour brunettes.

RELATION OF PIGMENTATION TO DISEASE.

As it seemed to me possible that these peculiarities of distribution might be due to some chance selection or influence of environment in London, I have investigated the colours of patients in Inverness, York, Shrewsbury, Newbury, Southampton, Dorchester, Chard, Paignton, and Wadebridge, in some cases from visits paid to the out-patient rooms and wards of the local hospitals and dispensaries, and in others during *locum tenencies* in the districts. I found that, although the individual numbers were small in each case, the tendency was always in the same direction. The frequency of any given colour varied to some extent with that of the general population, but the special diseases above mentioned showed the same selection. The full details will be found in the *St. Bartholomew's Hospital Reports*, vol. xxxix, and would occupy too much space for reproduction. Further, as far as pulmonary tuberculosis is concerned, I found in the Volk sanatoria in Switzerland and the Black Forest an excess of brunettes as contrasted with the individuals met in the streets and the countryside. Similarly, in the sanatoriums for the upper classes at Davos brunettes were also markedly in evidence, a feature specially striking among those from North Germany, Holland, and Scandinavia, which are districts predominantly populated by blondes.

The next step was to ascertain whether in the areas occupied chiefly by blondes and brunettes respectively these particular diseases were especially prevalent, bearing in mind that, if physical characters had any predisposing value, it would be improbable that in any case they should be predominant to the exclusion of local differences of environment, favourable or unfavourable.

Taking the various groups seriatim: Acute rheumatism, as Sir William Church¹¹ has pointed out, is especially prevalent on the coast of Cumberland and in the Isle of Man; two of the tallest, fairest, and most purely Norwegian districts in the British Isles. Another area in which this disease is prevalent is along the Severn valley in Hereford and Shropshire, amidst a fair population who present rufous traits to an unusual extent, the very characters noted in the diagram of hair colours as being specifically related to rheumatic disorders.

The several diseases which are unfortunately classed together under the head of circulatory system diseases, by the Registrar-General, have somewhat different pathological histories, which tend to obscure the points at issue. Heart disease, which forms the majority of deaths in this section, is in large part a result of rheumatism, and is with this correlated with blood traits, but several other diseases, as aneurysm and arteriosclerosis, have no such history, no special relation to pigmentation or stature. Cumberland, Westmorland, and Northumberland, for correspondingly placed areas show higher rates than Wales. East Yorkshire, Lincoln, Norfolk, and Suffolk, have higher rates than Essex, which is similarly situated. On the other hand Hereford has a higher rate of mortality, although a darker population than Stafford or Worcester. The Welsh borders, however, although dark, have, it should be noted, an unusual high proportion of red-haired individuals. Striking instances occur of increased mortality in fair areas, adjoining those with a darker population, for example, Pembroke and Gower, which are fair, have high rates, while the adjoining and darker Narberth and Llanelli have low rates. A prominent line of high mortality spreads inland from Southampton Water across the Hampshire and Berkshire Downs, corresponding to the fairest population in the counties.

The maps of mortality from nervous diseases show a close similarity to those of physical characters. The highest rate is seen in Wales; Cumberland, and Westmorland, with a similar environment, but a blonde population, show a mortality below the average. The Orkneys, Shetlands, and Hebrides present very low mortalities, in agreement with their blonde-

ness, and it is interesting that Dr. Beddoe has recorded of the two former that it is the dark members of the community who suffer from nervous disorders.

The maps of pulmonary tuberculosis show a definite relation to those of physical characters, brunetness being associated with a higher mortality. The contrasts previously noticed between Wales and Cumberland, the east and west, still appear. There is again an increase in the Pennines and in the brunette area north-west of London, while low areas of mortality extend inland from the Wash and Southampton Water.

Dr. Beddoe has summed up his many years' experience by saying: "Although local situation, varieties of social habit, occupation, and the like, obscure in Britain anything like racial tendency, it would appear that the Gaelic and Ibero-Keltic stocks are, *cæteris paribus*, rather more subject to phthisis than the Saxon or Scandinavian." Cancer shows a slightly greater prevalence in areas occupied by dark-haired populations, but the evidence is not so clear as in the preceding instances. The subject of geographical distribution will be found discussed at length in a previous paper,¹² the general conclusion drawn being that both in this country and on the Continent it lends support to the deductions drawn from the characters of hospital patients.

If physical characters have any etiological significance, it might be supposed that these would also influence the course and result of the disease. To endeavour to test this I tabulated the hair colours of 1,257 patients suffering from pulmonary tuberculosis at the Brompton Hospital, classified according to the result of treatment:

Pigmentation: Relation to Results of Treatment.

Result.	Average Pigmentation.	Standard Deviation.	Number.	σ^2 — N.
Much improved ...	2.4518	0.8837	270	0.00289
Improved ...	2.4769	0.8934	543	0.00149
In statu quo ...	2.5347	0.7986	144	0.00443
Not so well ...	2.6048	0.9087	167	0.00494
Died ...	2.6015	0.8311	133	0.00519

This table indicates an apparent gradation of increased brunette traits on passing from a favourable to a fatal result, and so far would support the view that this character, perhaps not *per se* but as an indication of the inherited constitution of each individual, had some definite importance. However, from the numbers as yet available for investigation, this is not mathematically demonstrated, though it must not be forgotten that, on the other hand, it is not denied. The results may have been due to random sampling, or they may not. I have collected a few similar statistics from other diseases which would appear at first sight to support the value of pigmentation as an index of constitution, but which are so few in number as yet as to be without significance. Further research on this subject would probably yield results of great interest, such large numbers being required as to render collective rather than individual investigation necessary.

Percentage Distribution of Result for Patients Suffering from Tuberculosis of Each Hair Colour.

Hair Colour.	Result.			Total Number.
	Much Improved and Improved.	Not so Well; In Statu Quo.	Died.	
Red ...	75.0	20.0	5.0	40
Fair ...	72.5	18.7	8.7	161
Light brown ...	60.7	28.6	10.7	338
Dark brown ...	64.9	23.3	11.1	593
Black ...	58.1	30.6	11.2	125

REFERENCES.

- ¹ Ammon, *Die Geschichte einer Idee*. ² *Bull. Soc. d'Anthrop. de Bruz.*, 1887. ³ Quoted from Ripley, loc. cit. ⁴ For details see *St. Bartholomew's Hospital Reports*, vol. xxxix. ⁵ British Association, Southampton, 1883. ⁶ *Bull. Soc. d'Anthrop. de Bruz.*, 1887. ⁷ *New York Medical Record*, 1897. ⁸ *Zeit. f. Tubercul.*, Bd. vi, Heft 2. ⁹ *Guy's Hospital Reports*, 1881. ¹⁰ *Races of Britain*, p. 4. ¹¹ Clifford Allbutt's *System of Medicine*. ¹² *St. Bartholomew's Hospital Reports*, vol. xxxix.

(To be continued.)

MEMORANDA:

MEDICAL, SURGICAL, OBSTETRICAL, THERAPEUTICAL, PATHOLOGICAL, Etc.

CHRYSOIDIN IN TRYPANOSOMIASIS.

I HAVE read with much interest the report of Koch's address in the BRITISH MEDICAL JOURNAL of November 26th. I note that so far the best results as regards treatment have been got by the use of certain aniline dye stuffs—namely, trypan red and malachite green. I would suggest that a somewhat similar substance, known in commerce as chrysoidin, and manufactured by Merck of Darmstadt, be given a trial. I confess this is merely a suggestion, unsupported by any proof of its value; but my advocacy of its use is to some extent based on experimental work in directions other than that of trypanosomiasis.

Some years ago I found that chrysoidin, the hydrochloride of di-amido-azo-benzene ($C_{12}H_{11}N_2HCl$), was extremely lethal to fish, even in very dilute solutions. Further, of all the dyes used in experimenting, it seemed to have the greatest penetrating power, appeared to pass very readily into the blood stream, and undoubtedly possessed a marked affinity for the central nervous system, staining the brain and spinal cord a brilliant yellow colour. Although so toxic to fish and to other low forms of life, comparatively large doses could be given with impunity to rabbits. Its toxic action probably depends on its being an azo compound, but its effects were very similar to those of methylene blue. It proved, however, more poisonous and more speedy in action.

As methylene blue is known to benefit cases of bilharzia disease, I asked Captain Ensor, E.M.C., to give chrysoidin a trial in that distressing condition, and he has already reported favourably on two cases thus treated. Now, methylene blue is certainly somewhat toxic to the parasites of malaria, so that possibly chrysoidin may be found beneficial in cases harbouring protozoal blood parasites. I intend to employ it if I can succeed in inoculating laboratory animals with the cattle trypanosomes I recently mentioned as having been found in the Soudan.² So far I have failed to do so, and it is in the hope of inducing others who have greater opportunities to give chrysoidin a trial that I send this communication to your JOURNAL.

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PANCREATIC INFANTILISM.*

IN Dr. Byrom Bramwell's journal, *Clinical Studies*, for January, 1903, p. 157, and in the same journal for July, 1904, p. 348, will be found descriptions of a case of Pancreatic Infantilism. To these descriptions I owe the capability of being able to fully diagnose the case I wish to describe. The patient is a girl of 18 years. Her complaint, as stated by her parents, is that "For about seven years she has grown none; all her life she has been troubled with diarrhoea; what she passed was of a foamy, oily nature, very large, and floated."

Family History.—Father living and healthy; all his people are healthy. Mother died of "galloping consumption," was only ill for about three months; had one miscarriage, and two full-term children, of which one is my patient. The other is a boy, who enjoys good health, and is well grown.

Personal History.—From infancy she was troubled with diarrhoea; was sleepy and heavy, but never dull in intellect, though at times she would talk to herself. She was easily tired, and did not incline to walk much. She always ate well, but never thrived. She was always considered a "pretty child," and was well formed, save for enlargement of abdomen. The parents, after trying some remedies, and finding little benefit result from them, left her alone. She grew slowly till about 11, and from that till 18, her friends say, grew none.

Examination.—I found her to be bright in appearance and in intellect. She looked to be about 9 years old, instead of 18. The only abnormality I could see was the enlargement of the abdomen. This proved to be due entirely to flatus. The skin was healthy looking. Pulse normal, but small and weak. Temperature normal. Heart and lungs healthy

¹ *Journal Royal Army Medical Corps*, November, 1904.

² *BRITISH MEDICAL JOURNAL*, November 26th, 1904.

* Read at a meeting of the Ulster Branch of the British Medical Association on October 5th, 1904.