

NOTES AND LITERATURE

HEREDITY

Recent Studies in Human Heredity.—Must the fallacy always persist that all ancient and powerful families are necessarily degenerate? As long ago as 1881, Paul Jacoby wrote a book¹ to prove that the assumption of rank and power has always been followed by mental and physical deteriorations ending in sterility and the extinction of the race. By collecting together all evidence supporting his preconceived theory, by tracing only the well-known families in which pathological conditions were hereditary, by failing to treat of dozens of others whose records would not have supported his thesis, by saying everything he possibly could that was bad about every one (following always the hostile historians), by ignoring everywhere the normal and virtuous members, he was able to present what was to the uninformed an apparently overwhelming array of proof. In regard to the injustice of this one-sided picture I have already had something to say in “Mental and Moral Heredity in Royalty,”² first published some six years ago.

A further study based upon Jacoby's unsound foundations has recently come to my notice,³ and although a well-made book containing an interesting series of 278 portrait illustrations, is necessarily quite as misleading as the older structure on which it rests. The main idea of Dr. Galippe is to show that the great swollen protruding underlip which descended among the Hapsburgs of Austria, Spain and allied houses, and also the protruding underjaw (*prognathisme inférieur*), are stigmata of degeneracy, and to demonstrate this he places beside his portraits, quotations from the writings of Jacoby.

Galippe uses no statistical methods, not even arithmetical counting, and appears to be totally ignorant of English biometric writings. His general conclusions about the causes of degeneracy (aristocratic environment, etc.) are quite as mis-

¹ *Etudes sur la sélection chez l'homme*. Paris, 1881, 2d ed., 1904.

² *Popular Science Monthly*, August, 1902–April, 1903. Also extended in book form, New York, Holt, 1906.

³ V. Galippe. *L'hérédité des stigmates de dégénérescence et les familles souveraines*. Paris, 1905.

leading and unfounded as those of Jacoby, and I fear he could not even prove that the anatomical peculiarities are really stigmata of degeneration at all.

If abnormal mouths, noses and ears are to be proved the stigmata of degenerate or criminal types it is necessary to prove by biometrical methods, a correlation between the bodily anomalies on one hand, and the existence of psychic defect on the other. Galippe does not attempt to show such a correlation.

I have taken all the cases available, and divided Galippe's portraits into three classes, those in which the "lip" is "marked," those in which it is "slight" and those in which it is "absent." I have tried correlating these 205 cases with the mental and moral grades which I had previously obtained for these individuals; but I find that any correlation must be slight and difficult to prove without much larger data. For instance, of the distinctly inferior individuals 25 show the "lip" in a "marked" degree, against 20 in whom it is "absent"; while of the notably superior persons 22 have the "marked lip" against 21 in whom it is "absent." It may be similar to the slight correlation that is now thought to probably exist between genius and insanity. But this is not like saying that genius is insanity.

Many of Galippe's portraits labeled "*Prognathisme inférier*" strike the reader as showing nothing peculiar in any way, others nothing more than a heavy underjaw, a common characteristic of the old royal personages, which so far from being a sign of degeneracy may as likely be associated with their general strength of character and determination of will.

But the most misleading side of Galippe's work, in which he also follows Jacoby, is his constant repetition of the word sterility and his frequent statements that noble and illustrious families thus find their natural end. The chief cause of this common mistake has arisen from following down, from ancient times to the more recent, the various dynasties in the male lines of primogeniture. In an appendix to Galton's "Natural Inheritance," 1889, this question is discussed, and it is there shown that *all* male lines, including the surnames of commoners, tend to diminish merely from the law of chance. This is because whenever all girls are born in any branch the name is lost absolutely, and can never be recovered. If the daughters marry and have children, the germ plasm is still transmitted, though

the name is no longer the same. The old dynasties, Plantagenet, Stuart, Romanoff, Vasa, etc., have become extinct in one sense, although not in another. If certain royal families have gone, what is to be said with regard to the following facts.

The male lines of all the present reigning families of Europe are carefully traced in the *opposite* direction, that is back to their earliest noble ancestors, in a most carefully compiled book by Dr. Kamil von Behr.⁴

With the exception of the present reigning family of Sweden, all have been princes, counts or dukes far into the remote past. These show from 20 to 33 generations of noble blood, in the direct male lines. The following is a list of the present royal families with the earliest authentic dates of their nobility. Anhalt 1059 A. D., Austria (Lorraine) 940 A. D., Baden 962 A. D., Bavaria 829 A. D., Belgium 1009 A. D., Denmark 1088 A. D., Great Britain 1009 A. D., Greece 1088 A. D., Hesse-Cassel 846 A. D., Hesse-Darmstadt 846 A. D., Italy (Savoy) 959 A. D., Liechtenstein 1133 A. D., Mecklenburg-Schwerin 960 A. D., Mecklenburg-Strelitz 960 A. D., Netherlands 992 A. D., Norway 1088 A. D., Portugal 1009 A. D., Prussia 1061 A. D., Reuss 1122 A. D., Rumania 1009 A. D., Russia 1088 A. D., Saxe-Coburg-Gotha 1009 A. D., Saxony 1009 A. D., Schaumburg-Lippe 1121 A. D., Schwarzburg 1114 A. D., Spain 861 A. D., Sweden 1810 A. D., Waldeck 940 A. D., Württemberg 1110 A. D. When one considers that they married practically always within their own ranks, one can easily see that the present reigning families are descended from thousands upon thousands of counts, dukes, princes, kings and emperors. That all this blue blood has not produced sterility is easily seen by a glance at the "Almanach de Gotha" or any of the books containing lists of the many children who have recently been born to royal families.

It is my own belief that much of the causation underlying historical records may be elucidated by the statistical method, if all cases for or against a certain theory be impartially recorded, and then even a simple arithmetical count be taken. The higher statistical methods (biometrical) may be useful for further refinement, but even the most simple rules of arithmetic would prevent one going quite as far astray from the truth as Jacoby and Galippe have done in their one-sided and utterly unjust arraignment of royal families. It is like picturing all million-

⁴Genealogie der in Europa regierenden Fürstenhäuser. 2d ed., Leipzig, 1870.

aires corrupt and dishonorable. Truly these slanderers of royalty, because they have a certain scientific affiliation, are all the more to be dreaded; furthermore, they cast discredit on the whole hope of any elucidation of history along biological lines.

In contrast to books of this sort, one gladly takes up several recent memoirs emanating from University College, London. In the first of the publications of the new Eugenics Laboratory, E. Schuster and Miss Elderton,⁵ to obtain data bearing on the inheritance of ability, have made a statistical study of Oxford class lists and of the schools of Harrow and Charterhouse. By analyzing the academic standing of different members of the same family, they show that the resemblance between father and son is represented approximately by the coefficient $r = .30$, in all their tables. The various coefficients for fraternal resemblance, range around $r = .40$. They are perfectly in accordance with the theoretical expectancy propounded by Galton for his law of ancestral heredity. They are also in accordance with the correlations found in "Heredity and Royalty."

Other coefficients found by Pearson and his students for various physical and psychical measurements are higher than these, ranging around .40 to .50 for parental and .50 to .60 for fraternal correlation. In an appendix to this memoir of Schuster and Elderton, Pearson takes up the question of the size of the coefficients and shows that the class lists of Oxford, Harrow and Charterhouse represent probably a selected group, in point of ability, in which case their variability would be reduced and also the correlation coefficients. After making for this a reasonable, though rough, correction he concludes that the coefficients of Schuster and Elderton are in close accord with those heretofore found by this same school of investigators.

David Heron⁶ from the same laboratory contributes a first study of the inheritance of the insane diathesis. It is indeed a "First Study" in more senses than one, for not only is it the first work on this question from the Eugenics Laboratory, but it is not too much to say that it is the first attempt to treat the whole subject in an exact and satisfactory manner from the

⁵ *Eugenics Laboratory Memoirs*. I, The Inheritance of Ability. By Edgar Schuster, M.A., and Ethel M. Elderton. London, Dulau and Co., Soho Square, W., 1907.

⁶ *Eugenics Laboratory Memoirs*. II, A First Study of the Statistics of Insanity and the Inheritance of the Insane Diathesis. By David Heron, M.A., London, Dulau and Co., Soho Square, W., 1907.

statistical standpoint. Heron, on this point, makes the following just and timely complaint.

A careful examination of the annual Reports of the Asylums of Great Britain and Ireland has led to the conviction that no data at present published would enable the statistician to reach any quantitative results as to the inheritance of any single form of brain disease. Even medical treatises as a rule go no further than stating the percentage of cases in which insanity or some other want of mental balance has been recorded in the family history. As long as we do not know the total number in each class of relatives of the insane person and the exact brain defect from which they have suffered; as long as we do not know the total number of relatives of a random sample of the sane population and the exact forms of neurosis or brain disease from which they too have suffered, any attempt at a full treatment of the "inheritance of insanity" is from the statistical standpoint idle. What advantage can possibly arise from telling us that an insane person has so many alcoholic uncles if we do not know either the total number of his parents brothers and sisters, or the percentage of alcoholic members in the same grade of relationship of a sane individual of the same social class? . . . The solution of this difficulty, and the present writer believes of many other difficulties in the statistics of insanity, is to establish a General Register of the Insane for preservation in the office of the Lunacy Commissioners.

Heron's own work is based upon an analysis of 331 family trees provided by Dr. A. R. Urquhart, physician superintendent of the James Murray's Royal Asylum, Perth, Scotland. The coefficient of parental inheritance is found to be about $r = .50$ and fraternal resemblance $r = .45 - .55$. These are in close accord with other physical and mental measurements. The author is obliged to make several assumptions in regard to the general population in order to complete his calculations, so that his figures must be regarded as only a first approximation. The work is certainly in the right direction and it is to be hoped that all alienists will carefully read this valuable memoir.

Miss Elderton and Pearson⁷ have published a measure of the resemblance of first cousins, especially in such characteristics as general health, intelligence, success, temper, temperament (reserved or expressive, sympathetic or callous, excitable or calm). Their correlation coefficients are not very uniform, but they show clearly enough a high degree of cousin resemblance, r

⁷ Eugenics Laboratory Memoirs. IV, On the Measure of the Resemblance of First Cousins. By Ethel M. Elderton, assisted by Karl Pearson London, Dulau and Co., Soho Square, W., 1907.

ranging around .27. The results are taken from Pearson's "Family Records" and there is something in the method which would seem to artificially increase the apparent resemblance. Different people have been asked to give their opinions about cousins whom they may happen to know. Some judges would naturally be more generous than others in their estimates. It is easy to see that, by cynicism on the one hand, and optimism on the other, many cousins would be taken in pairs out of the medium groups, where they very likely belong, and where they would lower the correlation coefficient, and placed in pairs either above or below the mean, where they would improperly raise the coefficients. Actual bodily measurements would not be susceptible of error from this source and these physical measurements they have attempted to obtain. So far, the latter records are insufficient for full publication, but as far as they go they show roughly a very high value for the coefficient r .

The authors "conclude accordingly, from the present results, that for the purposes of eugenics, cousins must be classed as equally important with uncles and aunts, and that they may eventually turn out to be as important as grandparents." One suggestion is that any scientific marriage enactments would equally allow or equally forbid marriage between first cousins, as between grandparents and grandchild, uncle and niece, or aunt and nephew.

One of their conclusions regarding alternate inheritance confirms my own general contention of alternate inheritance in mental and moral traits, a fact on which I laid so much stress in tracing the pedigree of all the royal families. They state that "a determinantal theory of heredity, emphasizing alternate inheritance, must take precedence of any theory of simple blending for the bulk of the characters here dealt with."

The next two memoirs to which I shall make reference,⁸ are especially important and timely, owing to the wide-spread prevalence of the idea that tuberculosis is an infectious disease and not especially hereditary. I have even seen it printed in large

⁸ Drapers' Company Research Memoirs, Studies in National Deterioration. II, A First Study of the Statistics of Pulmonary Tuberculosis. By Karl Pearson, F.R.S. Dulau and Co., London, 1907. Drapers' Company Research Memoirs. III, A Second Study of the Statistics of Pulmonary Tuberculosis: Marital Infection. By the late Ernest G. Pope. Adirondack Cottage Sanitarium, Saranac Lake, N. Y. Edited and revised by Karl Pearson, F.R.S., with an appendix on assortative mating from data reduced by Ethel M. Elderton. Dulau and Co., London, 1908.

type in publications emanating from public health leagues that "Tuberculosis Is Not Hereditary." I do not know on what scientific basis such a dogma rests.

Professor Pearson has found cogent proof in the first of these studies that the phthisical diathesis is just as hereditary as any human characteristic we know about. It would take too much space to completely review this paper. In a few words it may be enough to say that he does not jump at the conclusion that correlation coefficients necessarily show heredity. The question of infection through members of the same family living in close contact is discussed at length; but the analysis reveals no evidence that direct infection is in any way important, as compared to the heritable diathesis.

For instance, in his second paper on this same subject he finds that if a husband is tubercular, then there is a probability that the wife will also be found tuberculous, and *vice versa*, but this correlation is not nearly so high as that between brothers and brothers, sisters and sisters, and brothers and sisters. Yet opportunities for direct infection in the case of husband and wife are of course vastly greater than among brothers and brothers, etc., who by the time of the average age of onset of the disease (twenty to thirty years) have already ceased to live in the same households.

The question of assortative mating comes in to explain a certain amount of this observed correlation between husband and wife. Assortative mating is a convenient name for the tendency of like to mate with like, aside from any question as to what causes may bring about the similarity in question. It is a popular belief that tall men marry short women, and blonds are attracted by brunettes, but the truth of the matter seems to be quite the reverse. In nine series of physical characteristics the correlations of resemblance between husband and wife have been found to range between $r = .20$ and $r = .28$. For physical characteristics nine series show a range between $r = .11$ and $r = .48$, with an average of $r = .24$.⁹ The correlation coefficient for insanity between husband and wife is $r = .30$.

"Unless, therefore, any characteristics show a relationship between husband and wife markedly greater than .20 to .25 it would be very

⁹"Second Study of the Statistics of Pulmonary Tuberculosis," cited above, p. 22.

difficult to assert that this resemblance is due to other causes than those assortative processes which have just been shown to produce quite a sensible degree of resemblance in husband and wife."

Pearson is "prepared to accept with some reservation a sensible but probably not very large infective action from the available statistics of pulmonary tuberculosis." The question of assortative mating is an important one, and a knowledge of the amount to be allowed under various circumstances seems to me to be a necessary adjunct for recorrecting all the correlation coefficients of heredity which have so far been obtained by the London workers. Their coefficients agree fairly well, but they are all distinctly higher than the theoretical—fraternal are about .50 to .60 instead of the theoretical .40; paternal .40 to .50, the theoretical being .30; and so with the most remote relationships, especially the first cousin resemblances.

It is evident that if assortative mating be in general the strong force that Pearson has shown it to be, then it must in most investigations raise the correlation coefficients for heredity. To make this clear—tall fathers have on the average tall sons, though their average height is less than that of the fathers, due to the principle of regression, but now if it happens that all the tall fathers have tall wives, then the sons will get an added height from the influence of the tall mothers and will seem to resemble their fathers more than they do from the real paternal influence alone.

Among royal families assortative mating is a disturbing factor is at a minimum, for here the marriages are so often arranged by others than the parties most concerned, or are the result of some important state policy, that the question of individual selection is nearly, though I believe not quite, eliminated. This may be the reason why the coefficients for heredity found in the study of royalty are so much nearer the theoretical.

It may be well, in closing, to say a word about the general question of correlation coefficients as affording a proof of the influence of pure heredity. It may be asked—do the coefficients really prove anything more than a general resemblance between relatives? May this not be due to heredity in some cases and to environment in others, or a combination of both, in most cases? Personally I do not feel that the coefficients alone afford all the desired proof. Analysis of the material, separating the cases into classes in which environment has had greater or less time

to act,¹⁰ or into classes which are known to have lived in different environments, or comparing contrasted children within the same family, with contrasts in the ancestry of these (alternate inheritance) or other schemes which seek to find measurable influence of the environment factor, are, some or all, necessary for any final proof.

What the correlation coefficients *do* show is this, that if heredity be the great preponderating force, creating individual differences between man and man, the coefficients that have been found are in substantial agreement with what they should be.

Further refinement is wanted, especially as to the effect of assortative mating, and the shape of the curve of distribution for psychic characters, when selected classes are taken.

Mendel's laws, so important to the horticulturists, and to the breeder of superficial traits in fancy strains of domesticated animals, has not been shown to have any bearing on human heredity, at least as concerns important characteristics.¹¹ The general rough principle of alternate inheritance in human heredity, leads, however, to the hope that a further study of this question may bring out certain "unit characters," more or less marked, so that here in the end there may be harmony between the two unfriendly schools, the Mendelian and the Biometrical.

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ORNITHOLOGY

Riddle on the Cause of the Production of "Down" and other Down-like Structures in the Plumages of Birds.¹—A connection is here traced between the rate of growth and the character of the

¹⁰ This method is employed by E. L. Thorndike in his excellent study of the "Measurement of Twins." *Arch. of Philos., Psychol. and Scientific Methods*, No. 1, New York, 1905. Also in some of the University College, London memoirs.

¹¹ It has been claimed to govern the inheritance of certain rare anomalies, albinism, abnormal hands, etc., also eye color (C. B. and G. C. Davenport, *Science*, Vol. XXVI, p. 589) and facial peculiarities of Red Indians when crossed with the Scotch (G. P. Mudge, *Nature*, November 7, 1907).

¹ Riddle, Oscar. The Cause of the Production of "Down" and other Down-like Structures in the Plumages of Birds. *Biological Bulletin*, Vol. XIV., No. 3, February, 1908, pp. 163-176.