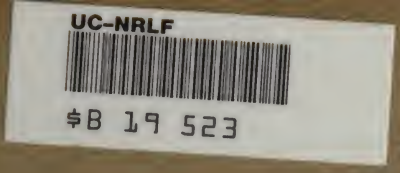

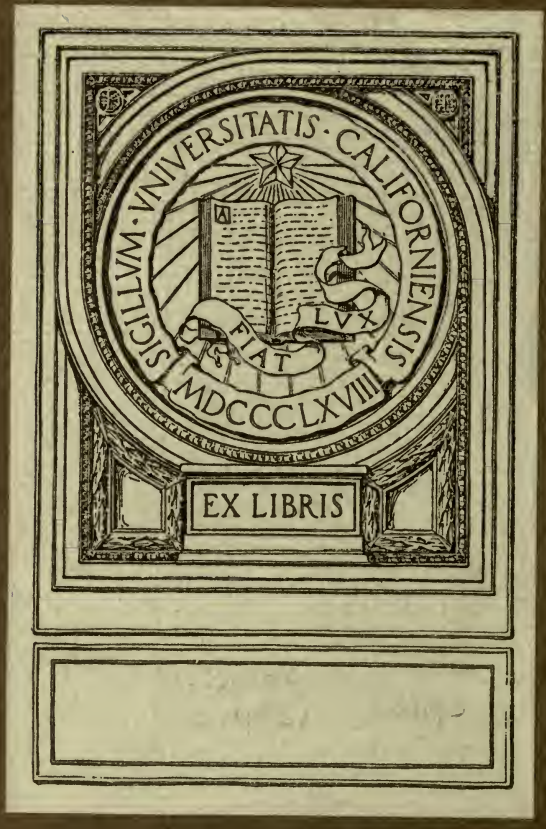
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HEREDITY AND EUGENICS

IN

RELATION TO INSANITY,

BY DR. F. W. MOTT, F.R.S.

Pathologist to the London County Asylums.

Physician to Charing Cross Hospital.

PRICE SIXPENCE.

EUGENICS EDUCATION SOCIETY,

6, YORK BUILDINGS, ADELPHI, LONDON, W.C.

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Heredity and Eugenics in Relation to Insanity.

Dr. F. W. Mott, F.R.S.,
Pathologist to the London County Asylums.
Physician to Charing Cross Hospital.

Allow me to thank the Eugenics Society for doing me the honour of asking me to fill the place of so distinguished a physician as Sir Wm. Osler, the Regius Professor of Medicine at Oxford. The subject of Heredity and Eugenics in relation to Insanity is one which I, as Pathologist to the London County Asylums, have been studying in a practical manner for many years, and the more deeply I consider the question the more I find there is to be done before we shall be safe in drawing ultimate conclusions regarding certain practical questions dealing with the prevention of insanity.

The subject of Heredity in its broad aspect is one of national importance and interest, as it affects many social and legislative questions. The interest taken by the general public in the question of heredity is a sign of social progress. People are beginning to recognise the truth of Professor Arthur Thomson's dictum: "The present is the child of the past; our start in life is no haphazard affair, but is vigorously determined by our parentage and ancestry; all kinds of inborn characteristics may be transmitted from generation to generation."

All the modern doctrines of Human Heredity were foreshadowed by the ancient philosopher Lucretius, who, in *dè serum naturæ*, says: "Sometimes, too, the children may spring up like the grandfathers, and often resemble the forms of their grandfather's fathers, because the parents often keep concealed in their bodies many first beginnings mixed in many ways, which, first proceeding from the original stock, one father hands down to the next father, and then proceeding from them Venus produces forms after a manifold chance, and repeats not only the features but the voice and hair of forefathers, and the female sex equally springs from the father's and males go forth equally from the mother's body, since these distinctions no more proceed from the fixed seed of one or other parent, than our face and bodies and limbs. Again we perceive that the mind is begotten along with the body and grows up together with it, and grows old along with it."

Sir Francis Galton, the founder of Eugenics, and to whom the nation owes so much, established the Law of Ancestral Inheritance. According to this law each germ, male or female, contains on an average representative particles or germinal determinants derived from the two ancestral stocks in definite proportions. Thus one quarter comes from each parent, one-sixteenth from each grand-parent, and one-sixty-fourth from each great grand-parent. Thus an inheritance is not merely dual, it is multiple. Galton himself recognised, however, that this law only applied to masses of people and not to individual cases, for he says: "Though one half of each child may be said to be derived from either parent, yet he may receive a heritage from a distant progenitor that neither of his parents possessed as personal characteristics." Again, speaking of Particulate Inheritance, he remarks; "All living beings are individuals in one aspect, composite in another. We seem to inherit bit by bit this element from one progenitor, that from another, in the process of transmission by inheritance elements derived from the same ancestor are apt to appear in large groups, just as if they had clung together in the pre-embryonic stage, as perhaps they did." They form what is well expressed by the word traits—traits of feature and character, that is to say, continuous features, not isolated points. The offspring of parents possess a mosaic of inheritance bearing usually a more or less similarity, yet the mosaics of character, whether bodily or mental, are not in any way identical, except in the case of identical twins. Now, there is a reason for this. Identical twins are the result of fertilization of one ovum containing two germs of identical substance, and this leads me to refer to Galton's remarkable inquiry into the History of Twins in connection with Nature and Nurture. He found that similar twins living in a different environment nevertheless remained similar in temperament and character, while dissimilar twins brought up and living in the same environment remained dissimilar; these dissimilar twins, however, were the product of two separate ova with dissimilar germs. This shows that every germ has a specific energy of its own, as manifested by a different potential inheritance.

Galton also made a statistical inquiry into good and bad tempers, and as a result of this inquiry he says: "It now becomes clear enough and may be taken for granted that the tempers of progenitors do not readily blend in the offspring, but that some of the children take mainly after one of them, some after another, but with a few threads, as it were, of various ancestral tempers woven in, which occasionally manifest themselves. If no other influences intervened, the tempers in the children of the same family would on this account be almost as varied as those of their ancestors. To recapitulate briefly, one set of influences tends to mix good and bad tempers in a family at haphazard; another tends to assimilate them, or that they shall all be good or all be bad; a third set tends to divide each family into contracted portions. These facts, ascertained by Galton, are

of great interest in connexion with the inheritance of the predisposition to nervous and mental diseases, a predisposition which is termed the neuropathic taint. Galton's law of filial regression again seems to explain many facts regarding the inheritance of feeble-mindedness as well as ability. In respect to the latter, Galton showed that only a few out of many children would be likely to differ from mediocrity as their mid parent, and still fewer would differ as widely as the more exceptional of the two parents. The more bountifully the parent is gifted by nature, the more rare will be his good fortune if he begets a son as richly endowed as himself, and still more so if he begets a son who is endowed yet more largely. But the law is even-handed, it levies an equal succession tax on the succession of badness as of goodness. If it discourages the extravagant hopes of a gifted parent that his children will inherit all his powers, it no less discountenances extravagant fears that they will inherit *all his weaknesses and tendencies to disease.*" This tendency to revert to the normal average of the race is thus a great factor in heredity. Amphimixis, or the blending of the inheritances of two individuals, is claimed by Weismann as the great factor in the production of variation and evolution, but when a functional and structural dynamic equilibrium has been established in all the organs and tissues of the body for a species and race, amphimixis would act in an opposite manner in tending to prevent the perpetuation of variation, pathological or otherwise. Change of type comes about through inheritance of modification, and many abnormalities and defects, arising we know not why, are transmitted through successive generations, and apparently are not swamped out by dilution unless they interfere with self-preservation or with marriage selection and propagation. I may cite the following as examples: Polydactylism, six fingers and six toes; brachydactylism, short fingers, lobster claw hand, white tufts of hair, various eye and skin diseases. A remarkable example of an hereditary visual defect is congenital stationary night blindness which has continued through nine generations, affecting 135 members out of close on 2,000 descendants (Nettleship and Cunier). Colour blindness, and the tendency to bleed (hœmophilia) are curious affections limited to the male sex but transmitted by the females. Then we have those tendencies to disease affecting stocks, *e.g.*, tuberculosis, rheumatism, diabetes, gout, and nervous and mental diseases, or neuropathic tendency. In the case of tuberculosis and rheumatism the tendency is shown by a weakness in defence against specific and ubiquitous microganisms. In gout and diabetes there is a tendency in the stock to disease arising from a disturbance of the bio-chemical equilibrium of the blood in relation to the functions of the organs and tissues of the body and nutrition. The neuropathic diathesis may also be due to an inherent tendency to a disturbance of the bio-chemical equilibrium of the blood and the nervous system occurs, especially in the brain, or the potential energy stored is nervous and mental diseases, a predisposition which is termed the neuro-

unstable, consequently there is an inherent failure to control its conversion into active energy as in epilepsy and other paroxysmal nervous states.

The discovery of Mendelism has opened up a new and vast field of investigation, and although so far Mendelian analysis is as yet imperfectly developed in respect to human inheritance, yet as Bateson says: "Organisms may be regarded as composed to a great extent of separate factors, by virtue of which they possess their various characters or attributes. These factors are detachable, and may be recombined in various ways. It thus becomes possible to institute a factorial analysis of an individual." How far such analysis can be carried we do not yet know, but we have the certainty that it extends far, and ample indications in supposing that we should probably be right in supposing that it covers most of the features, whether of mind or body, which distinguish the various members of a mixed population like that of which we form a part. From such a representation we pass to the obvious conclusion that an individual parent is unable to pass on to offspring a factor which he or she does not possess. Since those individuals only which are possessed of the factors can pass them on to their offspring, so the offspring of those that are destitute of those elements do not acquire them in subsequent generations, but continue to perpetuate the type which exists by reason of the deficiency. It should be explicitly stated, however, that in the case of the ordinary attributes of normal men we have as yet unimpeachable evidence of the manifestation of this system of descent for one set of characters only, namely, the colour of the eyes. Moreover, if the evidence as to normal characteristics of man is defective—which in view of the extreme difficulty of applying accurate research to normal humanity is scarcely surprising—there is in respect of numerous human abnormalities abundant evidence that a factorial system of descent is followed." (Bateson: Biological Fact and the Structure of Society.)

This may be, as Bateson claims, true for certain well defined abnormalities, *e.g.*, polydactylism, brachydactylism, xeroderma pigmentosa, or for night blindness, but as applied to the inheritance of a diathesis or tendency, *e.g.*, the neuropathic, Mendelian proportions are not shown as a rule, although there is evidence of segregation of the factor underlying the diathesis or tendency.

With this brief introduction to my subject, allow me to consider the problem of Heredity and Eugenics in relation to insanity. Let me first define my terms: Heredity has been defined by Thomson as "the genetic relation between successive generations, and inheritance includes all that the organism is or has to start with in virtue of its hereditary relation." Heredity is a relation in successive generations which is sustained by a more or less visible material basis, the germinal substance. Eugenics is the science of racial improvement by the application of the laws of heredity, viz., by encouraging the survival and the propagation of the fittest in all classes of society, and by seeking to cut off the lines of

inheritance of the unfit in all classes of society. However, we do not know enough about human genetics to predict always the fittest and the unfittest. Some of the greatest men the world has seen have sprung from the most humble and unknown stocks. Eugenics, therefore, should aim at giving every individual that is worth preserving in every class a chance of survival. A living wage, enough to ensure a sanitary dwelling and a sufficiency of nourishing food for parents and family, should be possible for every labourer and artisan. For if the rich and the intellectuals will in a progressive manner restrict their birth-rate, natural selection is deprived of its rights among these classes, and Eugenists can have no sympathy with such but rather with the masses of the people. The wealth of the nation depends upon labour, and labour demands a sufficiency to live and propagate under far more favourable conditions than now exist in our great cities, where the poorer the people and the more uncertain their wages the higher is the rent demanded for the miserable tenements in which they have to bring up a family. It is a fact, as Professor Karl Pearson keeps urging, that at the present time in Great Britain restriction of families is occurring in one-half or two-thirds of the people, including nearly all the best, while children are being freely born to the feeble-minded, the criminal, the pauper, the thriftless casual labourer, and other denizens of the one-roomed tenements of our great cities. The alien Jew and Irish Roman Catholic have large families as their religion prohibits restriction, perhaps unfairly in the case of the Irish, for the poorest classes of the population in some of our large cities are largely of Irish extraction. Professor Pearson keeps warning us that 25% of our population, made up mainly of the above-mentioned poor types, is producing 50% of our children, and if this goes on must lead to degeneracy. If the better classes will not propagate they must pay for the propagation of the poorer classes, and natural selection, aided by human effort, must encourage the propagation of the fit and the cutting off the lines of inheritance of the unfit.

In considering the subject of Heredity and Eugenics in relation to insanity, we have to ask ourselves what constitutes insanity at the present time. It is often extremely difficult to draw the line between sanity and insanity. It may, however, be asserted that a person is insane who, on account of disease or disordered function of the brain, can no longer feel, think or act in accordance with the customs and social usages of the community in which he lives. An individual is judged to be sane or insane by his conduct, but behaviour by itself without consideration of the social environment is an insufficient criterion. Every case of insanity is a biological problem, the solution of which depends upon a knowledge of what a man was born with "nature" and what has happened after birth "nurture." No child is born insane, though it may be born feeble-minded, either from actual organic disease or an inborn germinal cerebral deficiency. The former, being an acquired character, is not transmissible;

it is better to speak of such mental defects as congenital. Congenital defect is not heritable, a fact of very considerable importance in diagnosis, especially as regards segregation with the view of prevention of transmission of feeble-mindedness.

Registered Insanity in London.

The registered pauper insanity in London is 5·5 per 1,000 of the total population, whereas for England and Wales it is 3·4 per 1,000; naturally there is a widespread belief that insanity is greatly on the increase.

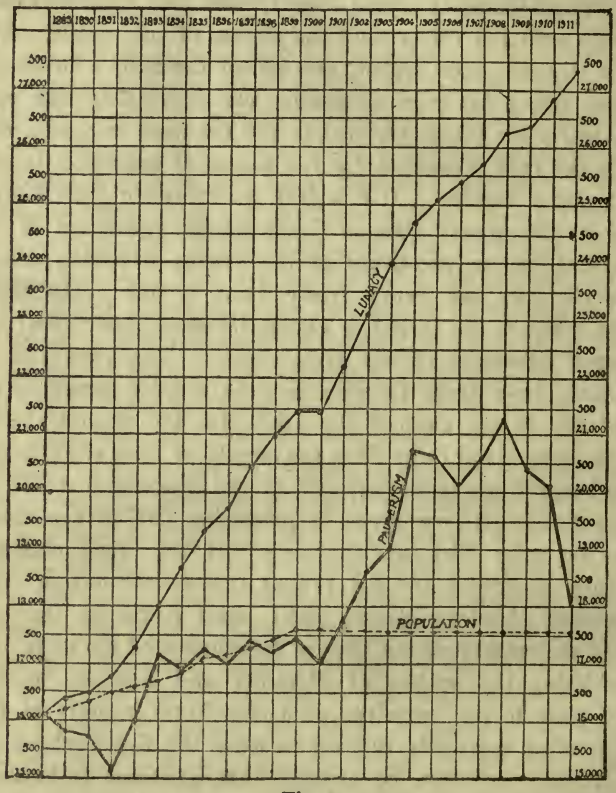

Fig. 1

If we look at the accompanying Fig. 1 it will be observed that while the population of the county of London has been nearly stationary, registered insanity has practically doubled. It will be observed that pauperism also showed a marked rise for 10 years, while it has fallen for the last three years, but although there has been this fall in pauperism during the last three years there has been a steady rise in registered insanity. It might be thought, therefore, there was no correlation between pauperism and insanity. This is not so. No doubt the fall in the curve of pauperism has been due to old-age pensions. Now, old-age pensions will not affect

registerable insanity in London the same as it will in rural and urban districts where the housing conditions are more favourable for the retention at home of old-age pensioners suffering from senile decay. Twenty per cent. of the admissions to the London asylums are old people, most of them suffering with senile decay. The great increase of insanity, in my opinion, is *apparent rather than real*, and for the following three reasons :—

Firstly, the standard of sanity has been raised; a great number of harmless idiots and feeble-minded persons who were formerly allowed to roam at large are now gathered into the London asylums through the agency of the Special Schools. The increase of accommodation for the insane has been doubled in the county of London during the last 12 years. There is not the slightest reason for supposing that insanity has doubled in a stationary population; no doubt numbers were formerly discharged as recovered on account of pressure of new cases. Correlated with the provision of adequate accommodation by the authorities, the necessity of discharging patients to make room for urgent admissions has steadily diminished in recent years; and probably this explains the fact that the number of patients discharged as recovered shows a constant and continuous diminution of numbers. According to the report of the Clerk of the Asylums Committee, out of the large mass of registered lunacy in London only 2·9 per cent. according to the medical superintendents have a favourable prospect of recovery, 5·42 per cent. are doubtful, and 92·19 per cent. are unfavourable. By thus providing such increased accommodation for the permanent segregation of incurable insanity the London County Council have been practical Eugenists, for as I shall show you, heredity is the most potent cause of insanity.

Another and very important cause of increase of asylum accommodation is a diminishing death rate in asylums from tuberculosis, dysentery, pneumonia, and other microbial infectious diseases. There is, therefore, a constant tendency to silt up the asylums with chronic incurable cases. That this is so, is shown by the fact, that at the present time nearly one-half of the inmates of the London County Asylums have been resident in asylums more than ten years. Again, at the end of 1910 no less than 4,238 patients, known to have been insane more than twenty years, were in the London asylums; moreover, such long standing cases have been accumulating during the last four years at rates varying from 125-200 per annum.

The third cause of the increase of registered insanity rests with those who certify paupers. The degree of mental unsoundness necessitating asylum treatment depends largely upon the provision obtainable for nursing and taking care of incipient cases of insanity and aged persons who are suffering from senile decay. In the report of the Asylums Committee, 1910, p. 110, it is stated that as many as 4,762, or 23 per cent. of the inmates of the London County Asylums were suffering from dementia, senile and secondary; this indicates that a number of these aged persons

who were formerly treated in the infirmaries are now sent to the asylums where they can be better cared for. An inducement to send these cases by the Guardians is the fact that the Government pays the Guardians 4s. per week for each pauper lunatic. It is hardly fair, however, to cast the stigma of insanity on a stock in the case of simple senile decay.

The Correlation of Pauperism, Insanity, and Feeble-Mindedness.

The registered insane in London is 5 per 1,000, whereas in England and Wales it is only 3·5 per 1,000 (Fig. 2). On the face of it, this would

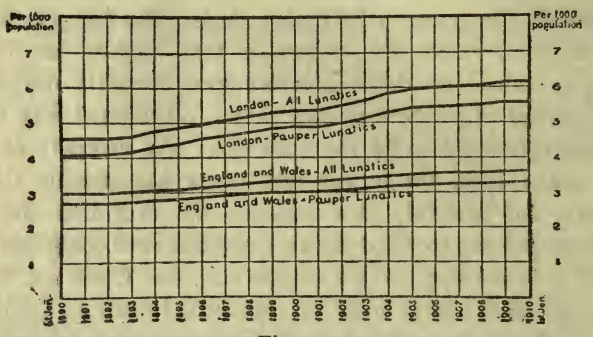

Fig. 2.

appear to show that conditions existed in London which led to insanity that were not so intense, or did not exist in the rest of the country. But more probable is it, that London during the last 15 years by doubling its asylum accommodation has gone far ahead of the rest of the country in this practical method of applied eugenics.

Nevertheless, when we compare the registered pauper lunatics in different boroughs as this table which I exhibit shows, we shall be struck not only with the variable percentage for the different boroughs of the County of London, but also by the fact that in boroughs with a poor population there is a much higher percentage. You will observe the relative low percentage of Hampstead 2·6 per 1,000, Lewisham 2·8, Wandsworth 3·5; whereas it is 7·9 per 1,000 in St. Pancras, Westminster 8·1, St. Giles-in-the-Fields and Bloomsbury 9·2, Strand 12·7. The explanation of the high percentage of these latter, excepting the Strand, is that the pauper population is largely composed of the denizens of one-roomed tenements with a low wage earning capacity, and in districts where we should, owing to improvements and the pulling down of slum property, expect a diminution of pauperism and insanity, there is no decrease, and in many instances an increase. Owing to better and cheaper means of locomotion an increasing number of the better classes and more desirable members of the lower classes, *e.g.*, artisans and those in continuous employment, have migrated to the suburbs, the result being that in many boroughs large houses, which were formerly occupied by one family of the better classes, are now converted into flats and tenements

accommodating a number of families generally very poor and relying upon casual labour. Woolwich has a relatively low percentage, 4·6 per 1,000, and I should attribute this to the fact that the majority of the householders, although not possessing high wage earning capacity, are more or less skillled artisans in comparatively continuous employment, whereas at Stepney (6·6), Poplar (6·2), and St. George's (6·4) casual labour and lower wage-earning capacity predominate, with a proportionately higher rate of over-crowding in one-roomed tenements and pauperism. It is probable that those parishes which had a high rate of registered pauper lunacy would also have a high rate of births, of infant mortality, and of tuberculosis. While yielding to no one in the desire to see temperate measures adopted for the control and regulation of the liquor traffic and the segregation of the chronic inebriate, who, in my judgment, is more dangerous to society than the lunatic; nevertheless, I am of opinion that there is no proof that certifiable insanity would diminish to anything like the extent that is fondly cherished by total abstainers if alcohol were abolished. I feel certain, however, there would be less disease and far less crime and pauperism than now exists in the general population of this country. Dr. Bevan Lewis and Dr. Sullivan, by careful analysis and tables, have shown that in the regional distribution of insanity it is difficult to trace any evidence of alcoholic influence such as might be expected if alcoholism really accounted for a sixth of the total cases of registered insanity. They have shown that inland and *agricultural* communities were the least inebriate, but had the highest ratios of pauperism and insanity; inland and maritime *mining* and *manufacturing* communities above all others were the most intemperate, yet revealed the lowest ratios of pauperism and insanity. Dr. Sullivan concludes that alcohol, as the essential cause of certified insanity, falls a good deal short of the 16 per cent. at which it is rated in the official statistics. This entirely conforms with my observations on post-mortem examinations in hospital and asylum practice. There is a correlation, however, between the wage-earning capacity of a population, pauperism, insanity, and tuberculosis. As the mentally and physically more fit migrate from the agricultural districts to the industrial centres, or emigrate, a progressively, mentally, and physically enfeebled rural population must result. Like tends to beget like, and so Eugenists should urge back to the land as one of the most pressing calls for legislation if we do not want a complete mental and physical deterioration of our rural population. It is a well-known fact that the feeble-minded are especially prone to tuberculosis, which is one of Nature's methods of eliminating the unfit. Imbeciles and idiots are often sterile, which is one mode by which a completely degenerate stock may die out, but degenerate stocks generally contain feeble-minded of all grades, the majority of which will not die out, but propagate freely, and no class of the community is responsible for registered insanity, and (at present) unregistered feeble-mindedness to such

an extent as the mentally feeble. The progeny begotten of a feeble-minded mother by a drunken father, according to my experience, is much more likely to be born mentally defective or become insane in later life than when both parents are intemperate, but neither of inherent mental deficiency. I have many pedigrees which seem to indicate that a perfectly sound stock may degenerate from a combination of pathogenic factors, viz., stress of town life, alcoholism, syphilis, and tuberculosis occurring in the progenitors in successive generations. Wage-earning capacity of the masses depends upon two factors, energy and sagacity, and the feeble-minded are usually deficient in both, but their deficiency in energy, physical and mental, is largely due to an inborn deficiency, but not always, or altogether, for owing to their low wage-earning capacity, the environmental conditions are correspondingly poor, especially is this the case with the denizens of the one-roomed tenements of our great cities. Bad sanitation, insufficient food, air and sunlight, alcoholism, syphilis, tuberculosis, and infectious diseases all conspire together to sap the vital energy of the unemployed, the casual labourer, the women, especially mothers, and the children. By no means all these people are of the eugenically unfit; many by improvement of their environment may have that restoration of vital energy which is essential for will power and the exercise of an inborn sagacity which chance, opportunity, or ill fortune has denied them. In proof of this you have only to visit such schools as Shenfield, or even Barnardo's Homes, to see that environment plays a very important part in the development of energy, sagacity, and character. You cannot make good material out of bad raw material, but fairly good material or even good material may be spoiled by a bad environment. Even an inborn virtue may, by evil surroundings, become the source of the worst vices.

The Effects of Poisons, e.g., Alcohol, Syphilis, and Tuberculosis, upon the Germ-plasm.

An important racial question is this: Do poisons, such as syphilis, alcohol, and tuberculosis, diminish the vital energy of the male and female germ prior to conjugation and cause pathological variations?

It is a known fact that toxins weaken cells, and therefore why not germ-cells? For although the sexual cells are segregated in the body, they are of the body and nourished by the same blood and lympth, and there is consequently reason for supposing that these most potent and prevalent poisons, alcohol, syphilis, and tuberculosis, may, without killing the germ-cells diminish their specific vital energy and thus lead to various pathological conditions of the body, and especially of the nervous system. There can be no doubt that syphilis of the parents may lead to infantilism in the offspring evidenced by arrest of development of the secondary sexual characters. If syphilis can produce arrest of development of the reproductive organs, there is no reason why it should not lead to arrest of develop-

ment of the brain, and if syphilis of the parent can produce an arrest of development of the sexual organs in the offspring so that there is sterility, there is no reason why the specific energy of the germ-cells should not be affected without actually destroying them. It is an established fact that if congenital syphilis were not so fatal to infant life, the number of people suffering from paralysis of various kinds and insanity from this cause would be appalling. A blood test tends to show that syphilis is the cause of a larger number of idiots and imbeciles than was formerly believed. Acquired syphilis, and in rare cases congenital syphilis, are now acknowledged to be the cause of the most terrible form of insanity: general paralysis. This disease is fatal a few years after the onset of symptoms; heredity plays relatively an unimportant part in its causation; it affects all classes in proportion to their liability to syphilitic infection. There are no reliable statistics to show whether syphilitic infection is more prevalent at the present time than formerly; severe obvious affections are not nearly so prevalent owing probably to a racial immunity or partial immunity, but there is no assurance that the late manifestations affecting especially the brain and spinal cord are not more numerous than formerly. It is certain that with the conversion of the rural into an urban population, the more ready mingling of the town and country population, the short military service, and the frequency with which soldiers were syphilized by service in India, and other causes incidental to life in large cities with their armies of professional prostitutes and clandestine prostitutes, the possibilities of a general and widespread syphilization of the race has occurred since the development of the railway system in England. This has probably led to a partial racial immunity, and the widespread existence of the disease in a latent form. The Eugenics Education Society, recognising the great importance of this vital public health question, has endeavoured to obtain an enquiry regarding the prevalence of this disease and the effects of treatment. As the Insurance Act has wisely not deprived sufferers from this disease of medical benefits, an opportunity will shortly arise of ascertaining the prevalence of the disease, at any rate, in active form, among 15 million of the population. New methods of treatment make one have the greatest hope of combating this scourge of the unborn millions who are either killed off before birth, shortly after birth, or who later suffer from terrible diseases of the nervous system, viz., blindness, deafness, idiocy, imbecility, and paralysis. It is a notifiable disease in Scandinavian countries, and I am informed it has recently been made notifiable in Australia. Our first duty, in the hope of prevention, is the scientific study of the cause. This has not been barren, for one of the greatest advances preventive medicine has made was the discovery of the organism of syphilis by the biologist Schaudinn; this has led to experiments of the greatest value, and an outcome was a bio-chemical test whereby the syphilitic virus can be detected in the body, even when there are no obvious symp-

toms. This test enables us to detect not only the active virus, but those late manifestations of syphilis, locomotor ataxy, and general paralysis of the insane. Moreover, it confirms the view I have always maintained of the syphilitic origin of these two diseases.

A sufficient time has not yet elapsed to show whether the widespread use of the new drug, "606," introduced by Ehrlich after a long series of carefully contrived experiments, may not diminish the number of cases of this terribly fatal disease (general paralysis of the insane) and of locomotor ataxy, which is the same pathological change, affecting a different part of the nervous system.

If there were time I could give logical arguments in favour of this hypothesis, but I must be content with saying that since we now know the cause of 20 per cent. of the deaths in the London County Asylums is due to general paralysis, therefore one very important preventable cause has been discovered. Not only is it important as regards numbers afflicted by this terrible malady, but it is important because the sufferers from this disease are drawn from all grades of society, and as a rule are of civic worth; the same cannot be said of the feeble-minded.

We might add another 5 to 10 per cent. of cases of brain disease dying in asylums with softening of the brain due directly or indirectly to syphilis. In congenital syphilis it is appalling to think what a number of feeble-minded adults there would be from this cause did it not happen that when the syphilitic organism invades the brain it is fatal in the great majority of cases. The congenital syphilitic offspring of diseased parents as a rule die before birth or in early infancy. Still, the bio-chemical test that I have referred to shows that a considerable percentage of the feeble-minded may owe their defect to this preventable cause.

Neuropathic Inheritance.

Three years ago I initiated a card system of relatives who are at present, or have been discharged from, or have died in, the London County Asylums. The ball once set rolling has grown to enormous dimensions, and I have at present considerably over 3,000 cards, most of them referring to persons closely related in the direct line. There are at the present time about 750 closely-related persons inmates of the London County Asylums; namely, 3·5 per cent. of the total population. *A priori* this is a strong argument in favour of the importance of heredity as a cause of insanity, for it cannot be supposed that if we took 20,000 people from the 4,522,961 inhabitants of London for some random cause we should find 3·5 per cent. of them so closely related, as parents and offspring, brothers and sisters.

TABLE I.

Statistics of 3,042 Related Cases in the London County Asylums.

	Discharged.	Transferred.	Died.	Resident.	Total.
Males	256 19·2%	60 4·5%	392 29·4%	626 46·9%	1,334
Females	353 20·6%	59 3·4%	389 22·8%	907 53·1%	1,708
Total males and females	609 20·0%	119 3·9%	781 25·6%	1,533 5·04%	3,042

The above table shows the proportion of males to females; the latter are much more numerous; it will be observed that owing to a lower death-rate of the females, they tend to accumulate. This is no doubt due to the fact that general paralytic males are three times as numerous as females, whereas other non-fatal forms of insanity are much commoner in females. It will be observed that of the 3,042 relatives who are at present or have been in the London Asylums 1,533 still remain resident, a little more than half. I shall have occasion later to refer at length to some important deductions made from the age incidence of the first attack of insanity in these insane relatives.

Nature and Nurture.

No child is born insane, though it may be born feeble-minded either from actual organic disease or inborn germinal cerebral deficiency. The former being an acquired character is not heritable, a fact of very considerable importance in diagnosis and segregation with the view of prevention of transmission of feeble-mindedness.

We should endeavour to study every case of nervous or mental disease as a biological problem, ascertaining as far as possible what the individual was born with, ancestral inheritance (Nature); what happened during development after conception (congenital); finally what happened at or after birth (nurture). The collection of statistics and pedigrees merely relating to the question of certifiable insanity or epileptic fits is quite inadequate for scientific purposes, as the *neuropathic predisposition* manifests itself in many ways; and it is necessary to seek the first stages and less obvious conditions of degeneration in a stock. Morel, who studied this question more than fifty years ago, pointed out that nervous irritable weakness, the neurotic temperament, neurasthenic predisposition, may be the first evidence of degeneration of a stock. The inborn morbid neurotic temperament may be manifested in a variety of ways by the behaviour and conduct observed in various members of the stock. The signs of degeneracy which may be exhibited are self centred narrow-mindedness in

religious beliefs, fanaticism, mysticism, spiritism, an unwholesome contempt for traditional custom, social usages, and morality, a vain spirit of spurious art and culture, a false self-loving vanity in the pursuit of a sentimental altruism, or by eccentricities of all kinds; such signs of degeneracy are often combined with talent and even genius, especially of the constructive imaginative order; but the brilliant intellectual qualities of a degenerate are invariably associated with either a lack of moral sense or of sound judgment and highest control. Time, chance, circumstances, and opportunities play an especially important part in moulding and determining the career of a neurotic stock; circumstances and environment may favour one member and he rises on the tide of fortune to an eminent position, whereas another, unfortunate or less fortunate, but with a similar inborn temperament, dies in an asylum or commits suicide in despair.

I have often found in the collecting of pedigrees the association of insanity and suicide in a stock preceded by, or associated with, the existence of individuals possessing the melancholic, suspicious, brooding, self-centred, hypochondriacal temperament; and it is not uncommon for suicide of one or more members of the stock in successive generations to occur. Associated with these temperamental evidences of degeneracy of a stock may be chronic alcoholism, dipsomania, hysteria, hypochondriasis, exophthalmic goître, neurasthenia, psychasthenia, migraine, *petit mal*, or neuroses of an epileptic character, often unrecognised because not manifesting fits of the major form of the disease. In searching for the neuropathic tendency there are, therefore, many possibilities of missing the inborn factor of a neurosis or psychosis though a careful inquiry be made, even when aided by intelligent co-operation on the part of the friends.

Some Illustrative Pedigrees Showing Various Manifestations and Results of the Neuropathic Taint.

Fig. 3.—A. B., an alien Jew, aged 54, was admitted to an asylum for the first time suffering with involutional melancholia; he has a sister who has not been in an asylum, but, as events turned out, bore the latent seeds of insanity. The man is married to a healthy woman who bore him a large family; the first five are quite healthy, then comes a congenital imbecile

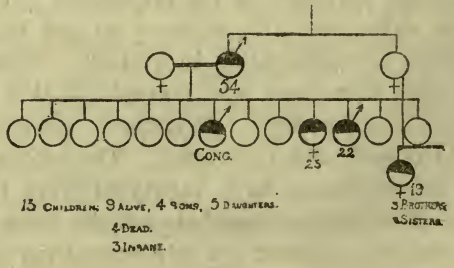

Fig. 3

epileptic (cong.), then two healthy children followed by a daughter who becomes insane at 23, then a son insane at 22, and lastly two children who are up to the present free from any taint. The sister of A. B. is married and has a family of ten, seven girls and three boys; one of the females was admitted to the asylum at the age of 19, and since this pedigree was constructed a brother of hers has been admitted, aged 24. Half-black circles are insane.

The pedigree is instructive; it shows direct and collateral heredity; it also shows remarkably well the signal tendency to the occurrence of insanity at an early age in the children of an insane and potentially insane parent.

Fig. 4.—A very comprehensive and interesting pedigree obtained for me

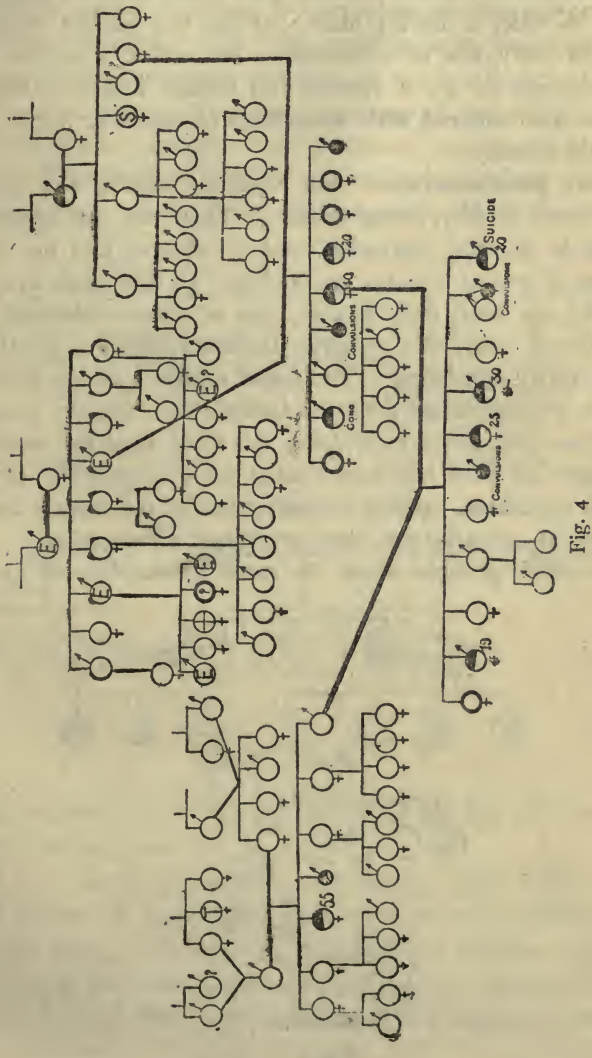

Fig. 4

by Dr. Wilson White, showing the result of marriage of a nearly sound stock in which the temperament was, generally speaking, of the sanguine type; there was only one member insane at 55; she was unmarried; her four sisters, who were all married, had some healthy, grown-up children. The brother himself, perfectly sane and healthy, married a woman descended from stocks in one of which there were many members suffering with epilepsy (E.); indeed, her father and her grandfather suffered with it. On the maternal side there was suicide (S.) of an aunt and insanity of a grandfather; most of the members of this stock were of a melancholy, brooding temperament. The result of the mating of these two neuropathic stocks is shown. There were nine children, of which three, marked with deep, black-rimmed circles, suffered with some form of neurosis, a male congenital imbecile, a healthy male who has five healthy children, a child who died in early life of convulsions, the patient's mother who became insane at the age of 40, a female who became insane at the age of 20, two females also suffered with some form of neurosis, lastly, a male who died in early infancy.

The next generation shows the result of mating this unsound stock with an almost healthy, sound stock. There are not as many unsound members as in the last generation, and we observe that the four members that became insane at 19, 25, 30, and 20, all had their first attack at a much earlier age than their mother, one of these committed suicide and two were found dead; this pedigree illustrates well the signal tendency to the occurrence of antedating. The sound members of the stock apparently inherited their temperament from the father's side, and the one member that is married has quite healthy children; this looks as if the unsound elements of this degenerate stock had been cleared out by segregation of the unsound germinal determinants, causing intensification of the disease and occurrence of the onset at an early age, thus preventing propagation.

Fig. 5.—This pedigree shows the result of marriage of first cousins, in

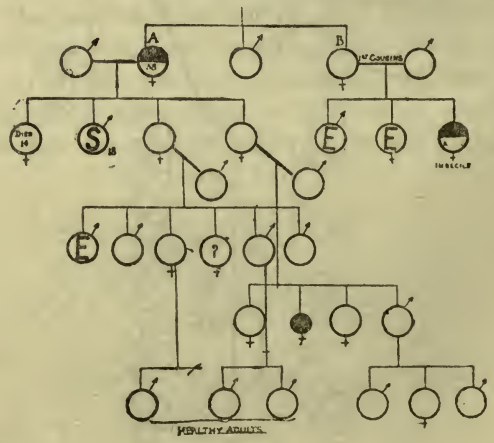

Fig. 5

both of whom there was a latent neuropathic taint. The family consisted of three individuals, two sisters, A. and B., and an elder brother who was married but had no family.

B. married a first cousin, and although neither of them was insane nor epileptic, yet they had two children epileptic and one a congenital imbecile; this terminated the stock on that side. That there was latent insanity was shown by the result of the marriage and the fact that a sister became insane. A., however, married into a healthy, virile stock; she became insane at 38, although living many years after she never recovered, the exciting cause was the death of a son by suicide (S.) at 18. There were two daughters who became mothers of families, the eldest son of one suffered with a marked epilepsy, but no other evidence of neuropathy was shown in this generation. The taint seems to have disappeared, inasmuch as there are healthy, grown-up members of the fourth generation.

Fig. 6.—A pedigree illustrating marriage of first cousins. A genius was the product who married a healthy woman, and the family consisted of an eldest son, committed suicide (S); a second son, epileptic (E); a daughter, healthy, unmarried; and a fourth son a genius. This man was a genius,

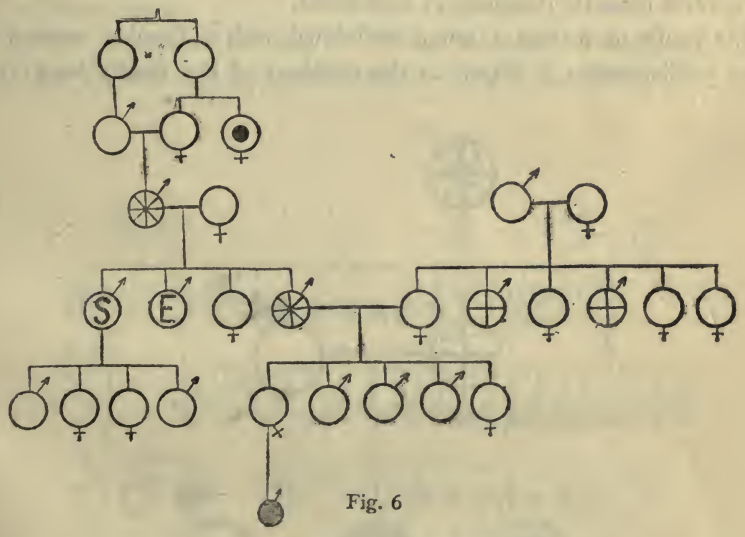

Fig. 6

but had an extremely well-balanced mind; all his five children are healthy in spite of collateral insanity.

Fig. 7.—A family of drunken and insane people. The figures with half black circles are insane; the same with the cross indicates drink and insanity; the circles with only a cross indicate excessive drinking. The two stocks show a marked difference; one side the maternal is practically free from any taint; almost every member of the paternal stock is unsound.

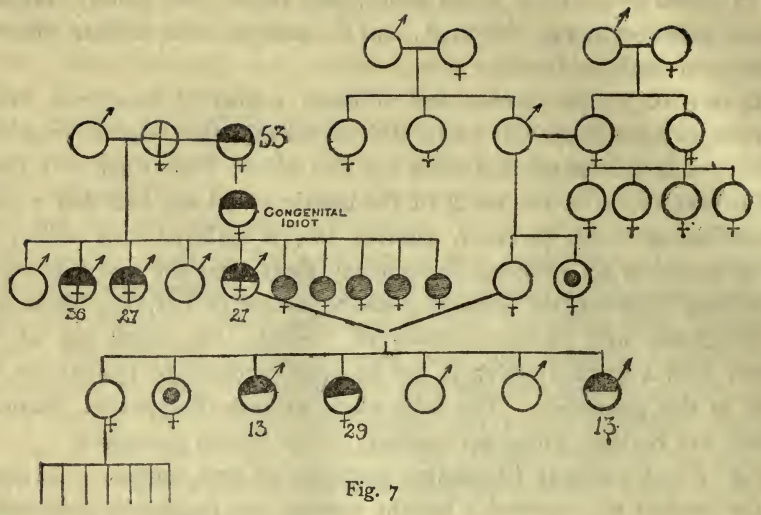

Fig. 7

The degeneracy commenced with a drunken woman whose sister died, age 53, in Colney Hatch Asylum, where she had been 20 years; she had a congenital imbecile daughter in Leavesden.

The result of mating a sound individual with a drunken woman with insane predisposition is shown in the members of the family born: a son

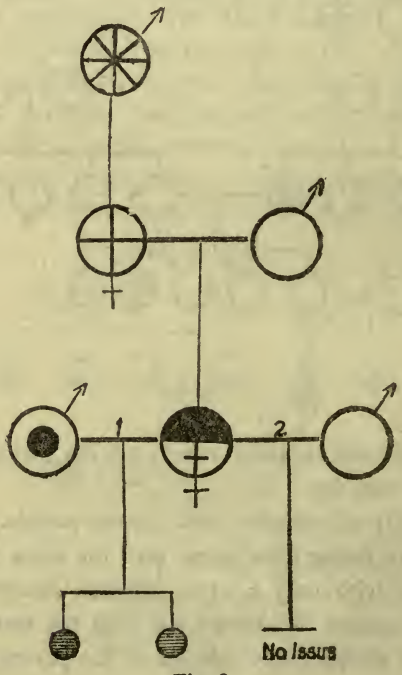

Fig. 8

healthy, then two sons who were insane at the ages of 36 and 27, then a healthy son, then another son who also was insane at 27, finally five children who died in early life, probably through the neglect of a drunken mother, indicated by small, shaded, circular figures. One member of this drunken and insane family married into a healthy, sound stock. Seven children were the fruit of this marriage; of these, two sons and a daughter were normal and three were insane, two of them having become insane at the age of 13. The clear circle with a black centre indicates bodily disease.

I used to give this pedigree as an instance of drink causing insanity, but after the establishment of the card system of relatives I found the notes of the sister of the drunken grandmother; she was an inmate of Colney Hatch for 20 years. It sometimes happens that the one is taken and the other left, and it would have been a benefit to society if the drunken progenitor of this degenerate stock had been taken.

Fig. 8.—The ending of a degenerate stock is illustrated in this pedigree. A very distinguished man had a dissolute daughter, drunken and immoral (figure with a cross); she had a daughter who behaved in a similar manner, was married twice, then became insane; by her first husband she had two children born dead.

Fig. 9.—A pedigree showing pauperism, fecundity, insanity, and infant mortality. Shaded circles indicate infants dying in early life.

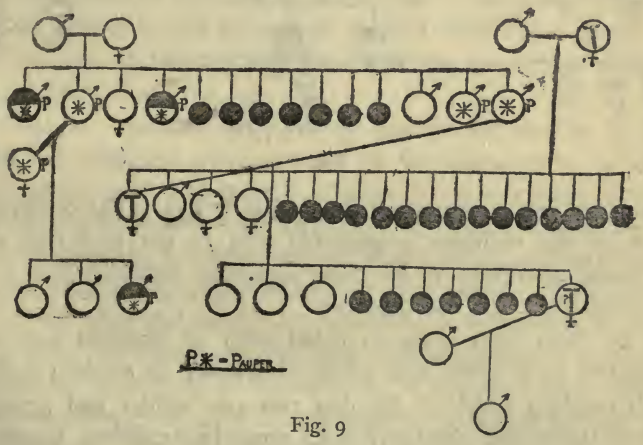

Fig. 9

Fig. 10.—A pedigree showing pauperism, insanity (black half circles), and blindness in four generations (Lidbetter.)

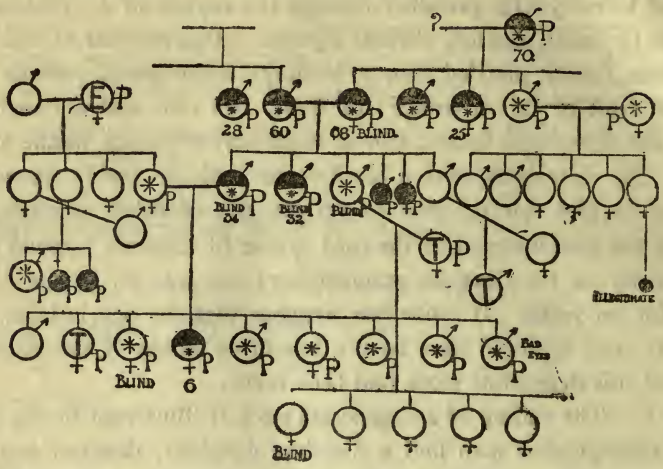

Fig. 10

Figs. 11, 12, and 13.—Three pedigrees to illustrate "antedating"; the onset of insanity in the offspring is shown to occur at a much earlier age than in the parents. These pedigrees also illustrate extreme cases of hereditary transmission of the neuropathic taint; as a rule not more than one insane

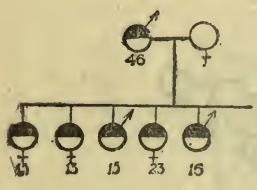

Fig. 11

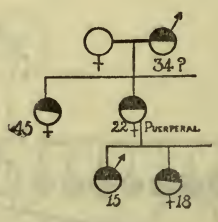

Fig. 12

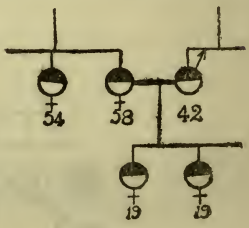

Fig. 13

offspring of an insane parent occurs in four or five. The occurrence of insanity in all the children is probably due to the fact that there is a double insane inheritance in all these instances, although it is only shown in one completely, and one partially.

Fig. 14. Two total abstainers, but born of drunken parents (circles with cross and with direct and collateral insanity in stocks (black figures), give birth to eight children, the first two are healthy and grown up, the second with numerous children; then come two children (shaded circles) dying in early life, followed by a son and two daughters (black figures) all suffering from dementia of adolescence, and lastly a healthy daughter with children. What we want to know is this: have all the unsound elements been segregated out? This can only be ascertained by following up the children of the sound or apparently sound members.

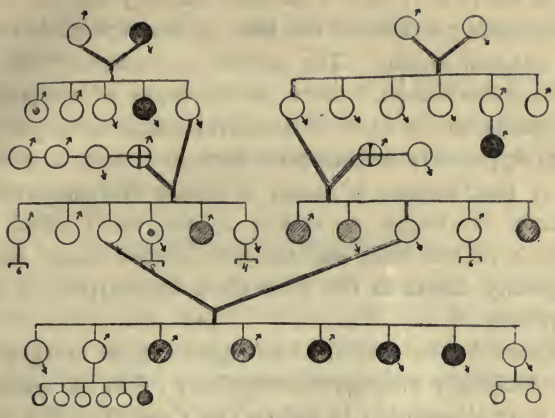

Fig. 14

The Importance of Ancestral Inheritance.

Everybody knows the value of coming from a good stock or a bad stock, and in judging whether an individual who is insane should marry and propagate or not it is absolutely necessary as the study of a large number of pedigrees shows that we should consider (1) the nature of the insanity, and (2) what was the cause. Certain forms of insanity are much more likely to be transmitted than others either in the same form or still more frequently in some other form indicative of the neuropathic taint. The card system of relatives which I shall refer to in detail, investigated for me by Dr. Edgar Schuster showed that epilepsy, recurrent insanity, and delusional insanity are especially liable to be transmitted in the same form, but general paralysis, which is now recognised as an organic brain disease due to syphilis, is not due to heredity, and the cases consequently do not figure largely in these relative cases.

In considering the question of marriage and propagation a study of these relatives and pedigrees convinces me of the importance of looking back into the stocks and ascertaining whether there are many lines of defective heredity, and whether with some lines of defective heredity there are lines of sterling worth, for often enough with insanity and epilepsy we find great talent, even genius and members of civic worth. The very fact that a person would come and consult the physician as to whether he should marry or not is a sign of civic worth and high moral character, and in giving advice we should be guided by a consideration of the stock into which he or she proposes to marry. If there is a neuropathic tendency in that stock, marriage into it should be discountenanced, for I shall show you that the chances of insane offspring arising are much greater. Let me illustrate my remarks by two pedigrees, one is that of a man of genius and remarkable mental stability with a bad collateral heredity (Fig. 6), the other is that in which pauperism, tuberculosis, and blindness in successive generations occur.

(Fig. 10.) It would have been a national calamity had the former not been allowed to propagate; to cut off the lines of propagation in the latter would have been a national benefit. The popular expression, "He comes from a good stock or a bad stock," then, is the result of experience and quite scientific according to the laws of ancestral inheritance, yet now and then even from an apparently unknown or even bad stock a great man arises. Are we to say that because a parent is insane that therefore the children must necessarily be insane or useless to the race? God forbid! The parents of some of the most eminent men became insane and genius with insanity frequently occurs in the same stock indicative of a variation from the normal average.

The great point in any scientific investigation is not to try and prove something, and to avoid any propagandist tendency; thus the question of alcohol and insanity is an illustration in point. The Council of Fifty in Massachusetts investigated the number of patients admitted to asylums in which there was an alcoholic history; it was then suggested that they might investigate the number of total abstainers, it was found that they were as numerous. The scientific way to approach this question is to carefuly investigate the pedigrees of patients admitted, selected not because they show a large number of members of the ancestral stocks as being degenerate or insane, but selected because a complete family history can be obtained for three generations.

This has been most successfully done by Dr. Hill Wilson White, formerly at the Manor Asylum. The pedigrees he has obtained show conclusively that we must judge the right of a patient to propagate who has had an attack of insanity by a full consideration of his pedigree. Certain pedigrees which I have are of interest in relation to the question of alcohol; they are numerically insufficient to draw any conclusions, all we can say is they are indicative of a devitalisation of the germ when chronic poisoning occurs in successive generations. (Figs. 7, 14.)

Statistics Relating to 3,118 *Relatives.*

They show the following facts:—

1. In the insane offspring of insane parents, daughters are much more numerous than sons.

2. Amongst insane members of the same family (brothers and sisters) sisters are more numerous than brothers.

This may be correlated with the fact that more women are in asylums than men. There are several reasons for this: general paralysis, which is a fatal disease, is three times more frequent in men than in women; the recoveries in women do not bear the same proportion as in men. Now, why should women be more liable to become insane than men? I will briefly summarize the causes which, in my opinion, are operative:—

1. The physiological emergencies connected with reproduction, *i.e.*, the

menstrual periods, child-bearing, and the cessation of the period of reproduction, the climacterium.

I would also add as an important and perhaps the only cause in many instances the enforced suppression by modern social conditions of the reproductive functions and the maternal instincts in women of an emotional temperament and mental instability.

Anticipation or Antedating.

Dr. Maudsley has observed that Nature tends to mend or end a degenerate stock. Now, how could Nature best end or mend a degenerate stock? Obviously by segregating in a relatively few germs all the unsound elements, leaving the others as it were free. The accompanying figure 15 helps to explain this theory.

Assuming the intensity of inheritance is constant for each chromosome or other unit of germ-plasm, but to vary with the number of the germinal units tainted, we have as a result of the mating of these two tainted stocks all degrees of manifestation of ancestral characters from perfect normality to the most profound disease. The more numerous the tainted germinal units the greater will be the chance of the disease appearing in the offspring. On the other hand, the oftener reduction, with its possible random arrangement, has occurred—*i.e.*, the greater the number of generations—the less will be the chance of any particular character finding a place in the inheritance (Nettleship).

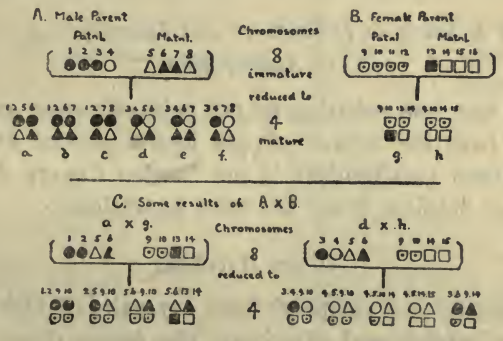

Fig. 15

A—represents the male parent; his immature germ-cells have derived their chromosomes, germinal determinants or representative particles (Galton) from his father and mother, and they are respectively represented by different figures. The eight germ-mature chromosomes are reduced to four during maturation, two from each parent; the figures a-f indicate the combination of two maternal with two paternal, all diseased, but in different degrees and modes. B—represents the female parent, in which there is an inherited taint, but only to a slight degree, coming from the maternal side; in the mature germ-cells only one containing number 13 will be tainted. C—shows some of the results which may arise from the conjugation of A X B.

Certainly this idea of the scheme explains certain facts which have been observed in the pedigrees I have shown; it shows why the offspring of

parents derived from two tainted ancestral stocks are more likely to suffer with an intense form of the disease; it shows also why more of the offspring are liable to be affected, and it shows why a certain proportion of the offspring may escape entirely; but according to the hypothesis thus advanced it does not explain why only relatively few of the offspring are tainted as compared with the numbers born, even though there be convergent neuropathic inheritance, that is, the germinal determinants of both parents may be largely tainted and yet fewer offspring are affected by the disease than would be expected. In neuroses and psychoses it is not a disease that is transmitted but a predisposition or tendency, and some other factor than the inborn is required to produce the disease. If we ask ourselves the question: How could Nature best purify an unsound stock? the obvious answer would be to cause coalescence or crystallization out of the unsound germinal determinants into a few of the offspring, leaving the germ-plasm of the others free. This would not only purify the stock by segregation but by concentration in one or two offspring; it would lead to intensification and anticipation of the disease. The diseased offspring would be unfit for the struggle for existence and propagation. In putting forward this coalescence theory of similar diseased germinal determinants, I may mention in support of it a statement made by Galton in his great work on Natural Inheritance. In the process of transmission by inheritance elements derived from the same ancestors are apt to appear in large groups, just as if they had clung together in the pre-embryonic stage, as perhaps they did.

Statistical Data Relating to Inheritance and Insanity, especially in Relation to Anticipation.

Six months ago data referring to 508 pairs of parent and offspring had been collected from the records of 464 insane parents whose 500 insane offspring have been also resident in the London County Asylums, and in these the age of the first attack has been ascertained.

Direct Heredity.

The following table is compiled from 217 pairs of father and offspring and 291 pairs of mother and offspring. The figures denote the percentage of cases whose first attack occurred within the given age periods.

TABLE I.

Age Periods.	Father.	Offspring.	Mother.	Offspring	
Under 20 years... ...	1·4	26·2	0·6	27·8	
20-24 ,, ...	0·4	18·0	3·4	15·7	Adolescence.
25-29 ,, ...	1·4	18·0	4·4	18·2	
30-34 ,, ...	9·6	13·0	7·8	13·4	
35-39 ,, ...	11·5	7·3	9·2	10·0	
40-44 ,, ...	9·2	6·4	10·3	5·8	
45-49 ,, ...	14·3	6·0	12·0	3·7	Involutional Period.
50-54 ,, ...	17·5	0·9	12·3	2·4	
55-59 ,, ...	13·8	3·7	14·0	1·7	
60-64 ,, ...	10·1	—	11·6	1·3	
65-69 ,, ...	5·0	—	8·8	—	
70-74 ,, ...	4·6	0·4	3·1	—	
75-79 ,, ...	0·4	—	1·3	—	
80 ,, ...	0·4	—	0·6	—	

This table is represented graphically in the subjoined Figs. 16 and 17, the abscissae representing the age periods and the ordinates the percentage of cases whose age at the time of first attack falls within the given periods.

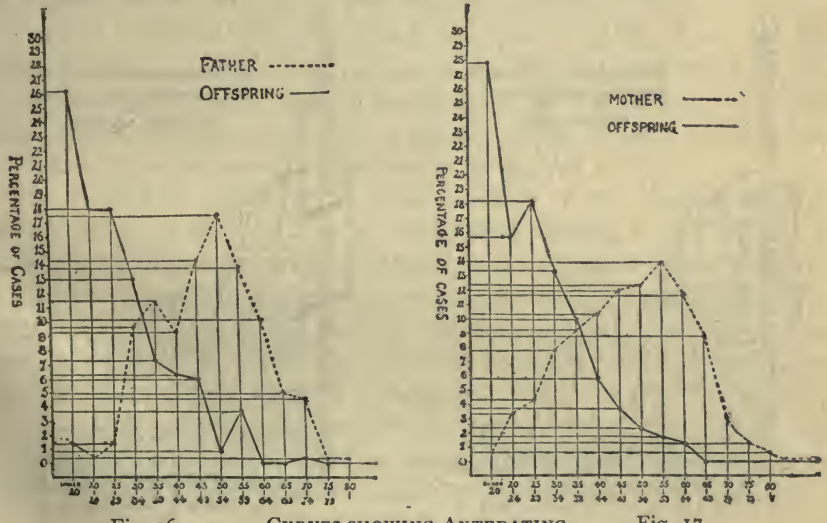

Fig. 16. CURVES SHOWING ANTEDATING. Fig. 17.

Figs. 16 & 17 represent diagrammatically the age incidence of first attack in parents and offspring. The first peak in the curve of the parent is due to the incidence of a larger number of cases of general paralysis in the male as compared with the female at this age period. It would be much more marked were it not for the fact that the cases of general paralysis among relatives are not numerous comparatively with other forms of insanity. This is as we should expect, for it is an acquired disease, and heredity plays a far less important part in its etiology than in the true insanities. It will be observed that the parent curves, male and female, attain their maximum in the involutional period. There is an obvious difference in the male and female

parent curves. There is a greater incidence of insane mothers under 30 than fathers; this is due to puerperal cases, of which there were a fair number. These figures (16 and 17) are constructed upon the data contained in Table I. The abscissae represent the age periods and the ordinates the percentages of cases whose ages at the time of attack is first given.

Collateral Heredity.

The following table is compiled from 193 pairs of uncles and aunts with nephews and nieces in which only collateral heredity is manifested, and 231 pairs of uncles and aunts with nieces or nephews, in which are included those instances where one or both parents of the nieces and nephews are also insane. The figures denote the percentage of cases whose first attack occurred within the given age periods.

TABLE II.

Age Periods.	Collateral Only.		Collateral and Direct.	
	Uncle or Aunt.	Niece or Nephew.	Uncle or Aunt.	Niece or Nephew.
Under 20 years	5·2	20·7	5·2	25·5
20-24 ,,	3·1	19·2	3·4	17·7
25-29 ,,	6·2	18·6	7·8	19·0
30-34 ,,	12·9	17·1	14·3	15·1
35-39 ,,	11·9	12·4	12·1	11·2
40-44 ,,	11·3	12·4	10·4	4·3
45-49 ,,	12·4	2·1	12·1	2·6
50-54 ,,	14·5	2·1	2·1	1·7
55-59 ,,	7·7	1·5	8·6	2·1
60-64 ,,	8·8	—	8·2	—
65-69 ,,	1·5	0·5	1·7	0·4
70-74 ,,	1·0	—	1·3	—
75-79 ,,	3·1	—	2·6	—
80 ,,	—	—	—	—

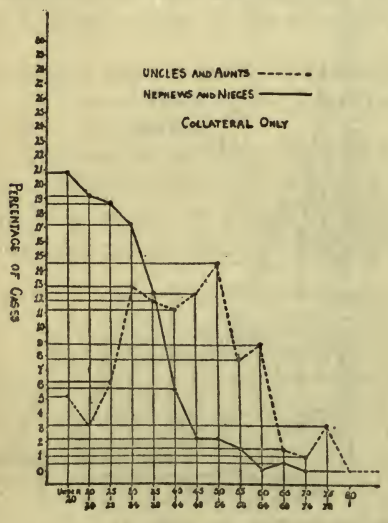

Fig. 18

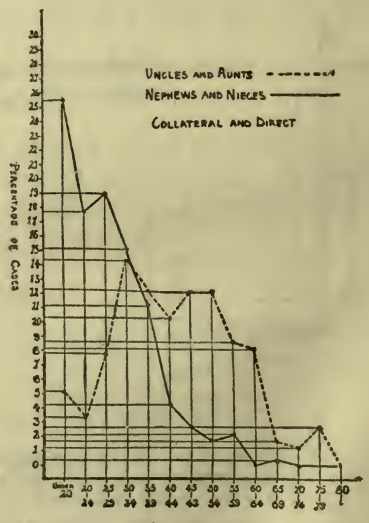

Fig. 19

Fig. 18 shows the curves of uncles and aunts and nephews and nieces constructed from the percentages in Table II. Fig. 19 shows the curves of uncles and aunts and nephews and nieces, including those cases where one of the parents was also insane, so that there is direct and collateral heredity. It will be observed that there is a considerable difference in the offspring curves. When there is only collateral heredity there are a far larger number of offspring in which the first attack occurred in the later periods of life. There is antedating, but it is not nearly so marked as is shown in Fig. 19; nor is it nearly so marked as in parents and offspring, Figs. 16 and 17. These figures are constructed from the data contained in Table II.

This tendency of certain diseases to occur at an earlier age in the offspring of diseased parents was termed by Darwin "antedating" or "anticipation," and I have found, as the above statistics show, that there is a singular tendency in the insane offspring of insane parents for the insanity to occur at an earlier age and in a more intense form, either as congenital imbecility or the primary dementia of adolescence, an incurable disease; not that all the cases are of this nature, but a large proportion of them. First let me call attention to certain facts regarding the age at first attack in 508 pairs of parents and offspring. Some of the parents had more than one insane offspring; there were only 464 parents. You will observe that 47·8% of the 500 offspring had their first attack at or before the age of 25 years, and as you see in the curves of parents and offspring the liability to the child of an insane parent becoming insane tends rapidly to fall. (Figs. 16 and 17.) Now, besides the fact that this shows Nature's method of eliminating unsound elements of a stock, it has another important bearing, for it shows that after 25 there is a greatly decreasing liability of the offspring of insane parents to become insane, and therefore in the question of advising marriage of the offspring of an insane parent is of great importance. Sir Geo. Savage recently said that this statistical proof entirely accorded with his own experiences, and that if an individual who had an hereditary history had passed 25 and never previously shown any signs he would probably be free, and he would recommend marriage.

Another important fact was elicited, viz., that in 58·8% of the 508 offspring of insane parents the first attack in the offspring occurred at an age 20 or more years earlier than in the parent. Similar tables and curves (Figs. 18 and 19) compiled from 193 pairs of uncles or aunts and nephews and nieces show the same fact but not to so marked a degree.

As a leading article in a recent number of the *British Medical Journal* refers to this question of anticipation tending to the ending or mending of a degenerate stock being used as an argument against measures being taken to prevent the propagation of the unfit, I particularly desire to impress upon my audience the fact that I have always laid great stress upon the necessity of segregating congenital imbeciles now that Nature, by man's aid, does not kill them off as formerly. Moreover, it is highly desirable to follow up those members of the family who are sane, and particularly those who are discharged as cured, in order to see whether Nature has really mended that degenerate stock.

Recurrent Insanity and Propagation.

One of the great arguments advanced for sterilization has been that recurrent cases of insanity breed lunatics between their respective dates of admissions to asylums. I have no doubt this is the case, but before Parliament would consider such a procedure it would require the strongest and

soundest evidence that life segregation or sterilization would appreciably diminish the numbers of the insane.

I have endeavoured to ascertain some facts relating to this question. The inference that can be drawn is that about one-fifth of the recurrent cases or approximately one-twentieth of the female admissions have children after their first attack of insanity and of 31 such cases examined, 73 children were born after the first attack of insanity in the parent. A number of these were cases of puerperal insanity. I am unable to give exact figures as to the fate of these children, but a good proportion of them died in infancy, and the majority of them would be too young to decide which might become insane.

Recurrent insanity and epilepsy, with which it is closely allied, in relation to hereditary transmission, is one of the most important problems requiring scientific investigation by complete family histories and construction of pedigrees, and I can conceive no more important work on the relation of heredity to insanity than the following up, systematically, the history of children born in the sane intervals of cases admitted to the asylum and subsequently discharged.

From the statistics of relatives a computation has been made of the proportion of offspring who were born after the the first attack of insanity in the parent; it was found that 46 offspring out of 581 were born after the first attack of insanity in the parent, *i.e.*, 7·9%. That is to say, in the case of 529 insane parents, the birth of only one-twelfth of their 590 offspring would have been prevented by sterilization or life segregation of the parent after the first attack of insanity. These figures refer to the offspring which become insane, but there are a large number of offspring who do not become insane, and these would be cut off if life segregation or sterilization were adopted.

Single and Dual Neuropathic Inheritance.

Every pedigree is a study in itself and occupies a whole book if systematically carried out as regards inheritance of characters, and the classification of the same is a matter of considerable difficulty. We have not enough systematic pedigrees yet to form precise data and conclusions upon, but perhaps I may be permitted to refer to indications from the examination of pedigrees of three generations which I have obtained myself and combined with those obtained by Dr. Wilson White and Dr. Daniel. I will divide them into two groups:—

Group 1. Those with a double pathological inheritance, that is, both ancestral stocks show insanity, feeble-mindedness, drunkenness, epilepsy, suicide, or nervous disease of various kinds, direct or collateral, within two generations. In these 18 families there were 116 children born alive, and 100 reached adolescence, and among them were 39 insane, suicides, or sufferers with nervous disease, and 61 apparently normal. Thus 39% of

the offspring reaching adult age were affected. But these are probably selected pedigrees, and are not numerous enough to draw definite conclusions from.

Group 2, in which there was an insane inheritance on one side only. Ninety families were examined. Of 384 children born alive 40 died in early life; there were 33 insane, suicide, or nervous disease, and 311 normal. Thus 9·6% of the offspring reaching adult age were affected.

The conclusion which possibly might be drawn is that a child born of a dual neuropathic inheritance stands on an average a chance of being insane four times as great as where only one stock is infected. This, however, applies to the mass and not the individual.

It might be argued that there are a certain number of imbeciles who could be allowed all social privileges excepting reproduction; this would be on the ground that they could pick up a living, and sterilization would in no way interfere with their doing this. The objections are: The cry of one law for the rich and another for the poor; and the legalisation of an operation that is fraught with many hidden social dangers. I often think that a number of people who are crying out about the monetary burden of supporting the unfit are themselves not doing their duty to the race. Many have no children or they restrict the births; moreover, one does not find the numbers in a family increase with the income. When *hereditary health* as shown by longevity, fertility, and mental stability in a stock is regarded as a greater asset for happiness in the family and the nation than hereditary wealth, then will be the time for the rich and comparatively prosperous to suggest the desirability of sterilization of the insane *paupèr*. For no one supposes that it would be carried out in all classes.