It is important to observe that the upper part of such an arcuate sulcus runs forwards into Flechsig's anterior centre of association; it invades the hinder part of Bolton's prefrontal area. Thus a comparative study of fissural pattern suggests that the development in man's prefrontal region has proceeded mainly upon lines already laid down in lower apes; such a study reveals as yet nothing to show that the prefrontal region is new, in the sense in which the inferior frontal region is new. This is not to say that the functions of the prefrontal area may not be those which Dr. Bolton has claimed for it; only that the distribution of cortical wasting in dementia, and of those finer pathological changes of which that wasting is the last and most striking expression, can hardly be explained upon Jacksonian principles without some reservation.

(1) A paper read at the Autumn Meeting of the South-Western Division, held at Bristol on October 28th, 1910.

Heredity and Insanity.(1) By T. E. K. STANSFIELD, M.B., C.M., Medical Superintendent, London County Asylum, Bexley.

THE subject of heredity in relation to the mental evolution of the race and to mental disease is of such supreme importance that I plead no excuse for making it the subject of my paper. It is a subject which has not in the past received that amount of attention from us as alienists which its momentousness demands. But the work of Galton, the revivified monumental experiments of Mendel, and the investigations of the school of biometricians, headed by Karl Pearson, have latterly given a great impetus to this line of study.

There is one section of the Commissioners' annual Blue-book which is always a source of great interest to me, and no doubt it is to most of you; I refer to the graphic charts showing the growth of insanity and the ratio of recognised private and pauper insanity to the population. As you are aware, the curve for private patients reached its highest point in 1879, when the ratio of recognised private insanity was 2·97 per 10,000 of the population; then it fell steadily for twenty years, so that in 1899 it was 2·73 per 10,000; since

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then it has risen again and is now 2·93, but the rise is to a great extent accounted for by a new factor which came into operation about 1899; I mean the transferring of pauper patients to the private list, where it is found that either they have sufficient means to pay the ordinary maintenance rate or they have friends who undertake to pay it for them. If this system had not come into operation all these patients would have remained in the pauper class.

As we have in London alone 468 such transferred cases—representing two-thirds of the rise—who would previous to 1899 have remained on the pauper list, I think one is justified in saying that there has been no true rise in the ratio of private lunacy, but, on the other hand, there has been a steady fall.

If we turn to the pauper curve we find that it has mounted upward at an acute angle, showing an enormous rise in the same period from 20 per 10,000 to 32·87; in other words, it has increased 64·35 *per cent.* in the same period of thirty years. *À priori* one would have expected a rise in the private class commensurate with that of the pauper, and the ratio would then have been 4·85.

The various mental factors which are commonly supposed to operate in favouring the growth of mental instability and insanity, and which we group together under the generic term "mental stress," have probably increased as much in that section of the community from which private patients are derived as in the class which fills our pauper asylums. The race of life is run at an ever-increasing speed; it does not matter whether it is the strenuous existence of the society lady in her hunt for pleasure, her search for new sensations, and her luxuriousness, or in the race for wealth in the city man, with the noise, bustle, rapid locomotion, and the infinite number of other causes, all tending to increase mental strain and nervous exhaustion. Why, therefore, have we not reaped a crop of insanity commensurate with the seed which has been sown? Instead of yielding an increased crop the land has become more barren. On the other hand, the environment of the poorer classes has been enormously improved during the period under review, and one would be justified in expecting a corresponding decrease in insanity. But instead of a decrease we have an enormous increase.

Another important factor, the growing wealth of the

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community, ought to have come into operation in swelling the ratio of the private at the expense of the pauper; but there is no indication that such is the case, unless, perhaps, some of the transferred cases I have mentioned might come under this category. I do not remember having seen or heard any attempt at an explanation of this disproportionate growth in the two ratios, but perhaps some of you may be able to enlighten me. I have often pondered over the problem, and have invariably arrived at the same conclusion, namely, that it is due to the growing appreciation of the important part played by heredity in the causation of insanity by that section of the community which sends us our private patients, and the ignoring of the fact by the class which supplies the large bulk of our pauper insane.

The point I wish to emphasise to-day is that, in my opinion, the increase in insanity is not general throughout the community; that there are no indications of such an increase in the upper, middle, and intelligent working classes, but that, as I stated in my annual report some years ago, we have a mass of degeneracy in the lower ranks of the population which is increasing out of all proportion to the remainder of the population.

Feeble-mindedness, the tree upon which the bulk of the insanities is grafted, appears in all ranks of life, probably as frequently among the well-nourished and well-to-do as among the poorly nourished and over-crowded, being probably a reversion of type, a case of atavism, a relapse to a primitive condition of cerebral activity, as Sir Ray Lankester pointed out; but when it appears in the upper classes it is specially cared for and protected, and the proportion of these that marry and reproduce themselves is small indeed. Thus to a great extent they die out, whilst in the poorer classes they tend to gravitate to the lowest ranks, where they mate with their kind without let or hindrance, and reproduce a further crop of feeble-minded.

There have been in the past, to my mind, two influences which have largely operated in restricting the growth of knowledge of human heredity, one being that of the Church, which preached that propagation was the Divine command; that nothing should be placed in the way of any man reproducing his species; that man was formed by his environment.

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But it is gratifying to find that at last the Church has begun to appreciate the importance of this question with its bearing on the future of the race. The Bishop of Ripon, in his very able paper delivered before the Church Congress, in September, 1910, spoke in no uncertain terms. As reported in the *Times*, he urged that they ought to discourage marriage "among the unfit; the diseased, the feeble-minded, the alcoholic, the tuberculous, ought not to marry. Some of these should be urged by motives of patriotism to lead single lives. Others, like the vagrant, the tramp, the hooligan, should be put under restraint."

The other influence to which I refer is that of the Socialists, who insist upon the equality of all men, maintaining that man is purely the creation of his own environment; that the child of the slums, if given the same opportunities as the son of wealth, position and ability, would develop equally the same mental and physical characters. In other words, that Jack is in every way as good as his master.

It was left to Sir Francis Galton to explode these fallacies. This he did as long ago as 1869, when he published his great work, *Hereditary Genius*, which, however, as Whitham points out in his recent work, *The Family and the Nation*, has not received adequate recognition till recent years, owing to what he terms "the prevailing individualistic philosophy of life." Galton drew attention to the fact that the results of examinations such as the old Cambridge mathematical tripos showed that instead of men being born equal, as we believed in the nineteenth century, one man had natural abilities which, measured against those of some other men with similar training and opportunities, must be reckoned to be at least as thirty to one.

I have for many years drawn attention to the gravity of these questions, and have written upon them in my reports to my Committee and others, but it is only now, as the subject is becoming one of, perhaps, national importance, that the attention of the larger body of thinkers is directed to it. I feel that you are in agreement with me that the more the matter is ventilated the sooner will action be taken to find a remedy.

We have been using every available means at this asylum to obtain as complete a family history as possible of all the

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cases under treatment, but the difficulties have been very great. Quite a large number of our patients were born in the provinces, have drifted into London for various reasons—most frequently to obtain employment—and nothing is known of their early life or family history. Very commonly one finds that the husband or wife of the patient has no knowledge of the patient prior to marriage, nor acquaintance with any of the blood relations. Even when the history is well known to their friends there is often the greatest reluctance on their part to reveal the presence of mental disease, and they will often deny its existence when they have relatives actually under treatment. A flagrant example of this occurred here recently. A patient was admitted here, and the father stated on the inquiry form sent to him that there had been no case of mental breakdown in the family, although we had at the time a sister of the patient a patient here, and we knew that a brother had been a patient at another asylum.

On the other hand, we can be perfectly sure that if there is no insanity or mental defect in the family we are not told that there is, but rather the fact of a sound heredity is emphasised.

It is, therefore, obvious that the fallacies when dealing with statistics in insane heredity are all on one side, and that any figure put forward must invariably understate the case.

A careful search of the records of this asylum since its opening has been made, with the following results:

	Number of patients admitted.	Family history of mental defect ascertained.	History of mental defect denied.	No family history obtained.	History of parental alcoholism only.
Males .	3,561	690	723	2,007	161
Females .	3,600	965	1,006	1,457	102
Total	7,161	1,655	1,729	3,464	263

If we exclude all the cases in which a family history could not be obtained, we have 3,697 cases remaining where it was obtained, and of these 44·76 *per cent.* gave definite information that one or more members of the family had suffered from mental disease or were mental defectives, and a further 7 *per cent.* had a history of alcoholism in one or both parents.

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We have no less than 563 patients in residence who have one or more blood relations who either are or have been under treatment in an asylum. We have 50 instances of father and son; 56 of father and daughter; 34 of mother and son; 77 of mother and daughter; 49 of brothers; 69 of brother and sister; 69 of sisters. There was one instance of father, three sons and one daughter; one of father, two sons and one daughter; two instances of father, mother, and son; one of father, mother, son, and daughter; one of three brothers and two sisters; six of father and two sons; five of mother and two sons; three of mother and three sons; three of two brothers and one sister; one of four brothers; seven instances of three brothers. We have sixty patients where grandfathers were insane, and forty-one with grandmothers insane. One patient was recently admitted whose father and mother had both died in the insane wards at the workhouse, and three of whose daughters have been insane.

I will not weary you by giving you a list of the insane collaterals, of which we have collected a large number. The above figures are compiled from statements made by relatives, by the patients themselves, or by the relieving officers of the various parishes. We are endeavouring to verify them, and have done so in a large percentage of cases. This is a comparatively easy matter when dealing with the relatives in other London asylums, but the cases quoted include all the out-county cases. When grouped according to the numbers of known cases of insanity occurring in a family the figures are:

2 in a family	. . . .	404 times
3 „	. . . .	26 „
4 „	. . . .	4 „
5 „	. . . .	twice
6 „	. . . .	once

The more persistent we are in our inquiries the bigger the list becomes.

The criterion, it must be remembered, in all cases has been certified insanity, and no attempt has been made to bring in cases of recognised insanity in the relatives as observed in the consulting room and the visiting room, or as it appears in the correspondence with the relatives of the patients—unofficially recognised insanity, with which you are no doubt familiar. The

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periods at which insanity associated with heredity tends to develop in members of an insane stock are the physiological epochs of life: puberty and adolescence, childbirth, and the climacterium, and the form of insanity is frequently almost ridiculously identical. Feeble-mindedness is almost invariably the foundation upon which the insanity is built. I have been struck by the fact that quite a large number of general paralytics have a history of heredity.

In order to deal with the subject on Mendelian lines, it would be necessary to have a complete history of all the supposed normal members of each family. This might be comparatively easy in any asylum which receives its patients from sparsely populated districts, where the family history may be readily traced for three or four generations. But when dealing with cases from a densely populated area such as London, and with patients of the pauper class, seldom, if ever, can any information be obtained of even the whole of the members of the present generation.

An important fallacy to contend with in endeavouring to trace insane descent on Mendelian principles would be that insanity does not develop at any definite period in life, and therefore a potentially insane member might appear as a normal member at the moment under examination, and shortly afterwards appear in a true character. Again, an apparently normal member of an insane stock may go through life without developing insanity, because the environment may not have been such as would favour its development, yet would pass on to his or her progeny the characteristics which cause them to develop the disease possibly in early life.

It is a curious fact, however, as Bateman, in his *Mendel's Principles of Heredity*, points out, that nearly all the abnormal features (except those which are sex-limited) that have been yet positively shown to follow Mendelian rules in man are dominant to the normal, and if any inference at all can be made from the statistics so far compiled here, it must be that insanity is in general agreement with other abnormalities in its mode of descent, and is usually dominant to the normal, *i.e.*, it usually descends directly from parent to offspring.

The fact of segregation was the essential discovery which Mendel made, as is pointed out by Bateman, and to my mind this fact throws a light upon the occurrence, *de novo*, of some

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forms of insanity in an apparently normal stock; for insanity must be looked upon as a composite disease and not as due to any one individual factor. It is easily conceived, therefore, that the father and mother may each contribute factors which, assembled in the offspring, bring about the condition which we know as insanity, and which there remains as dominant in the future progeny of that branch of the stock.

The importance of environment alone, using the term in its widest sense, in the production of insanity is, in my opinion, much over-stated, though I fully agree that it may furnish a suitable nidus for its development and growth, for, as Sir Ray Lankester points out in his statement on heredity in relation to feeble-mindedness to the Royal Commission, severe life-conditions and insufficient food usually produce in those who survive those conditions a relatively high development of brain-power.

As I have already remarked, the vast improvement which has taken place in environment during the last century has not resulted in a proportionate decrease in insanity; on the other hand, the ratio of recognised insanity to the population has steadily increased, and it might be argued with considerable apparent truth that these improvements—increased rates of pay, reduced hours of labour, our present Poor-law system, our advances in medical and hygienic knowledge, our schools for the feeble-minded, our modern dietary, and our modern treatment of insanity—leading, as they do, to a reduction of the struggle for existence, lessened natural selection, increased ease and luxuriousness of living, the prolongation of life for members of a weak and unsound stock, and, above all, a lessened mortality among their children, tend to mental degeneracy of the race. In other words, our present load of insanity is the penalty for our western civilisation.

The question at once arises—How are we as a nation to overcome the evil and stem the flow of this rising tide? I think the answer is, Prevent the propagation of the feeble-minded and of the recurrent insane. The recommendation of the Commission on the Feeble-minded to form colonies where the feeble-minded should be compulsorily detained is a very excellent idea in theory, but I am firmly convinced it would prove a failure if put into practice. They would be rate-supported and therefore would have to be under the control of

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lay representatives of the ratepayers, who would be called upon to adjudicate as to the fitness for detention or discharge of each individual.

You all know how difficult it is at the present time to satisfy a committee of laymen as to the necessity for the detention of the feeble-minded hooligan or erotic imbecile after they have been converted into quiet, industrious members of an asylum community by treatment and the influence of an environment in which they have not the opportunities of exhibiting their peculiar propensities, especially when the friends are persistent in their demands for the patient's discharge.

Yet how much more difficult would it be in a case of pure feeble-mindedness, where there has been no grave moral or social breach prior to admission, and where the industry of the patient would be of the utmost value in assisting to maintain possibly old and decrepit parents. The cost to the nation would be enormous.

I very much doubt whether it would be possible to manage a colony of feeble-minded where there is no prospect of their ultimately recovering their freedom. The hope of release is constantly with the patients, even in an institution of this kind, and I believe it is that hope alone which enables us to give them a reasonable amount of freedom and to induce them to occupy themselves. Without it such an institution must become at once a prison and not a hospital—a prison without hope.

To my mind there is but one remedy, and that is sterilisation.

(1) A paper read before the Autumn Meeting of the South-Eastern Division, held at Bexley Asylum on October 5th, 1910.

The Sterilisation of the Insane.(1) By E. FAULKS, M.R.C.S., L.R.C.P., Senior Assistant Medical Officer, Bexley Asylum.

GENTLEMEN,—The subject which I purpose bringing up for discussion to-day appears to be one which is well suited to debate by such a meeting as this. The various proposals are comparatively new in literature, and more so in open debate by learned societies. It is a matter which you, as mental experts, are eminently fitted to give valuable opinions

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