

acquired the power of "paralyzing" the toxins of the germs. One of the best proofs possible that very little of the toxins are absorbed during the course of tuberculosis, is that this toleration immunity acts as it does. There is no time in this disease, from the earliest period of tubercle formation till years of the process have passed, when patients are not most sensitive to tubercle bacilli toxins. Yet experience shows that that sensitiveness can be gradually overcome and tremendous doses of toxins finally given without any reaction whatever. This would not be so if the germs were giving up these same peculiar toxins through absorption. The acquirement of this protective immunity takes time, for it must come about through slow and laborious intervention of the body cells. As Hueppe says: "The body cells, because of their relatively great independence of varying conditions of nutrition, are able to cling to their inherited or acquired characteristics." The resistance to their action is, of course, relative to the extent and results of the existing toxemia. In incipient cases of tuberculosis tolerative immunity to the extent of a cure may be obtained by this specific method in two or three months, while in others past the beginning of the ulcerating stage, the fight may have to be prolonged at times for two or three years with all the possible outside helps we can muster to our aid. Hueppe's reasoning seems to show that it is the active (protective) immunity as by the direct method which we need rather than the transient passive kind, as by the indirect method. "It is the organism of the host—the cellular tissues of the human being—that reacts toward the stimulus of those bacteria or bacterial proteids or toxins with which we endeavor to heighten the resistance toward parasites and parasitic poisons." The cells eliminate this strange proteid as soon as possible.

It is for this reason that passive immunity is not lasting. The chronic nature of tuberculosis, with its incapsulation of toxic products, and its protective walls of hypertrophied and infiltrated tissues, indicates the lesser application of the transient passive (indirect serums) as compared with the staying active (direct) method of immunization. Hueppe says: "In general, however, the defensive reaction which is provoked by isopathic or specific stimuli is the stronger and more persistent, and hence often appears peculiar in kind." It is peculiar in kind and is found (as Koch, Buchner, Vaughan, von Ruck and others have surmised or shown) in the proteids from the bodies of the germs themselves. "Gamelia, Hueppe, and afterwards H. Buchner, were led to the discovery that the 'specific' poisonous substances found outside the parasites in the culture fluids were not identical with the protective substance occurring in the disease germs or their metabolic products." Petrusky, then, was wrong in his statement "that nothing will be gained by the search for new forms of tuberculin." So have men high in authority said that there was no use looking for any specific whatever in tuberculosis, for they said there were none to be found. Yet I, for one, like to think that there is more in store for us to be discovered in reference to tuberculosis than all we now know.

9. Hueppe: *Op. cit.*, p. 308.

**Dermatomyiasis.**—L. Freund reports the case of a child with impetiginous eczema, extremely malodorous. The putrid odor was finally traced to two patches on the skull, and on removing the scabs, a nest of maggots was found beneath, 32 in all. They had eaten the periosteum down to the bone.—*Weiner Med. Woch.*, December 21.

## THE IMPORTANCE OF HEREDITY AS A CAUSE OF INSANITY.\*

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Freed from the trammeling influence of all metaphysical association and disencumbered of such ideas or expressions as "soul," "sublime intelligence," "spirit," "cosmic consciousness," etc., the study of that particular form of energy to which we refer as mind or mental action grows considerably less perplexing, and permits of speculation and observation from the same point of view as does the investigation of other functions of the same class of cell structure and as we proceed in our contemplation of mind as simply a function of matter, we are struck by the resemblance of the manner and degree in which its variations depend upon variations in form and arrangement of its particular protoplasm, to the manner in which other functions are modified by similar changes in the structures upon which they are dependent.

Now, of all variations in cell structure how clear it should be to us that this one of a retrograde character depending upon faulty development of, or degenerative potentiality in, the parent cell, and which we call an hereditary defect is no exception to the rule. It is a fact that has long been disguised, however, by misleading statistical information and hidden in a maze of metaphysical and quasi-scientific theories.

If it be established then, as our major premise, that this defective function we call insanity is a variation from the normal due to heredity, then it is obvious that the anatomic defect in the corresponding structure, upon which the defective function depends, must also be due to heredity. If this is so, then insanity is not primarily a disease, as we are commonly taught, but is an inherited defect and therefore in the individual incurable, although its manifestations may be controlled and modified. This much being granted, there are many other conclusions which follow logically and which will be presented later.

We must, first of all, come to an agreement as to just what we mean by heredity. A few brief references to the opinions of some of the leading authorities will serve to show the necessity for an understanding of some sort.

The view most widely held by medical men in general, and also by authorities on this subject, among whom I might mention Régis,<sup>1</sup> Charles Mercier<sup>2</sup> and Darwin,<sup>3</sup> is that the long-established law, "like begets like," holds good for morbid states as well as normal ones. Some observers refute the statement entirely, claiming that nature seeks to avoid a transmission of morbid states and will, wherever possible, return to the normal or physiologic plane. They hold that heredity is nothing more than disease tendency. There are shades of difference in the various views included in this class; for instance, some go so far as to say that certain organs, the nervous system among them, are susceptible to the same disease that affected the same organs in progenitors. Others again maintain that disease tendency in the offspring simply means a generally defective organism that may express itself in a susceptibility to disease of any kind and in any organ.

A third view still to be considered is one, which with the first, rejects the idea of tendency to a transmission

\* Read at the Fifty-second Annual Meeting of the American Medical Association, in the Section on Nervous and Mental Diseases, and approved for publication by the Executive Committee: Drs. Frederick Peterson, Hugh T. Patrick and H. A. Tomlinson.

of morbid states, and yet does not admit with the second, that although morbid states are not usually transmitted, disease tendency may be, but holds that by heredity as applied to insanity we mean that the reproductive element of either the male or female carries with it merely an impaired potentiality. Its protoplasm is deficient in reproductive strength, and being thus defective will produce a defective organism. Kraepelin is the only prominent exponent of this theory.

In recent works upon insanity the subject of heredity is lightly touched upon, and in some, particularly the latest edition of Clouston<sup>4</sup> and also the second edition of Bevan Lewis,<sup>5</sup> no statement of the nature of heredity is presented. Weismann's work on the germ plasm, published in 1893, deals more particularly with transmission of acquired characteristics of a normal type, and does not aid us materially in the solution of this question. T. H. Kellogg,<sup>6</sup> formerly superintendent of the Willard State Hospital, gives a very good summing up of heredity. The relation of heredity to insanity is given and its modifications extensively discussed, but the author does not take any definite stand, presenting the conclusions that have been drawn from statistics of the past, and contenting himself with the statement that "it is the tendency and not the disease which is inherited, and that it is instability of the nervous system and susceptibility to mental disorders which descend from insane parents to the offspring."

Régis presents a very clear statement of his position on this question, from which I have abstracted the following: "Heredity is without contradiction the most powerful and important of all the causes of insanity. It is an original predisposition to mental alienation transmitted to children from their parents." He calls attention further to the fact that this predisposition may be not merely mental alienation in the ancestors, but there are related diseases such as eccentricity, neurosis, alcoholism, certain diathesis, consanguinity, etc. He admits along with Marcé that we may find some antecedents in nine-tenths of all cases.

The excellent article by Charles Mercier in Tuke's "Dictionary of Psychological Medicine" contains the following sentence: "The law of the direct transmission of qualities is simply that the offspring tends to inherit every attribute of both parents; inheritance is the rule, non-inheritance the anomaly." The inference from this statement and other expressions in the article is that morbid tendencies, at least, if not morbid states as well as healthy ones can be transmitted. He also devotes considerable discussion to the question of the law of consanguinity, which he calls the second law of heredity and which he states as follows: "The quality of the organization of the offspring depends on the suitability of the parents to each other," and proceeding from this premise, he advances various conclusions showing that insanity and allied defects are due, in many cases, to non-observance of this law. I think that we may take his article in its entirety as representing quite fairly the attitude on this subject of the British school of alienists.

An article refreshing in its clearness and brevity is that by Dr. Peterson<sup>7</sup> of New York appearing in the text-book published by Drs. Church and Peterson last year. He calls attention, as do very few authorities, to the necessity for investigating the presence in the family not only of insanity, but of the hereditary equivalents, and states that "it is an unstable nervous organism that is

inherited in both neurosis and psychosis." He calls attention also to the faulty manner in which the statistics of heredity are gathered, and presents for example the statement prepared by the Lunacy Commissioners of England and Wales, showing that in 136,478 admissions to the asylums their hereditary influence ascertained was but 20.5 per cent. He is inclined to agree with Mercier on the principles of heredity, and also, I take it, upon the nature of hereditary transmission, particularly in regard to the law of consanguinity.

Of journal literature bearing upon this subject I find very little of value in the form of clear statements on the nature of insane heredity or of its degree of prevalence.

In the files of the *Journal of Mental Science* I find reference to the paper of J. F. Bristoe,<sup>8</sup> read at the annual meeting of the Medico-Psychological Association held in London in 1896, in which he gives as his opinion that 90 per cent. of the insane have insane heredity. This statement is striking from the simple fact that thus far he has stood almost alone in his assumption. No mention is made of any observations, however, that would substantiate his position. There are also one or two fairly good reviews of Weismann's doctrine, but nothing that is of much benefit to us. Volume No. 41 contains a review of an article by Charles Féré<sup>9</sup> of Paris, published in 1894, in which attention is called to the fact "that in heredity that which is really transmitted are errors of nutrition, producing different effects during the embryological period, according to the stage in which they occur. Errors of development cause a morbid predisposition. Thus, hereditary troubles or circumstances of evolution bring progressive destruction of the characteristics of the race, that is, they induce degeneration." He makes two divisions of hereditary tendency in nervous diseases, one which he calls insane heredity and one neurotic heredity.

One of the best of the earlier contributions to the study of heredity in insanity is that of the late Dr. Gray<sup>10</sup> of Utica. He takes exception to such views as those of Mercier and Régis, and quite successfully attacks the theory that morbid states as well as normal attributes are transmitted. I select a paragraph which states his position very clearly. He says: "What I wish to combat is the notion of the direct transmissibility of disease as such; the monstrous figment of scientific pessimism that the abnormalities and lesions of the human organism can acquire in such persistent and stable character as its own *vivida vis* itself, that nature puts a destructive force on an even race with the constructive in any of her operations—an idea which ought to be contrary to any philosophic system of evolution itself. If all that is claimed for morbid heredity be true it would be a cumulative process which must eventually swamp the vital energies of the world. It seems philosophically absurd to assume that a force so opposed to organic life can so seat itself in the constitution of an organism as to perpetuate itself by that organism's generating power. Nature rejects or eliminates the taint of death. No sooner do the decaying elements enter the earth than they are transformed into life-giving agents and that which is 'corruptible puts on incorruption.' The earth itself is not more surely the purifier of all corruption than is the stream of human vitality which shows its recuperative tendency, casting out and eliminating the elements that are hostile to its own existence and welfare."

Much more might be added to illustrate the diversity of views upon this question, but it is not necessary

and probably this much is uncalled for, as you all must be aware of these differences in opinion and feel, as I do, the need of a clear statement to which the most of us can subscribe. I shall return to this later and take up here, the other point of difference—degree of prevalence.

On this subject also we find a wide variety of expression. The proportion of insanity considered to be due to hereditary causes varies from 13 per cent., as reported by some of the English asylums, up to about 70 per cent., as held by some of our latest German authorities, particularly Kraepelin.<sup>11</sup> The average given by the annual reports of various institutions of this country varies between 25 and 40 per cent. I need not take the time here to discuss the reasons for this, they are so apparent. Simply, first of all, the failure to agree on the question, "What is heredity?" and second, differences in methods of history-taking.

In the first year or two of my connection with asylum practice, two things in particular made a very profound impression on me. The first was the fact that nearly every insane person presented stigmata of degeneration, or at least, deviations from the normal both as to face and figure, and also that in many of their relatives who came to visit them these peculiarities could be noticed. The other was the disinclination of patient's relatives to admit freely the existence of insanity, inebriety, eccentricity, nervousness, consumption or allied conditions in the family, and also that in many of the cases already on record in the asylum having "no heredity" written under the head of "family history" subsequent inquiry made of disinterested persons elicited information showing the presence of perhaps several cases in that particular instance. These observations naturally led to extensive reference to available authorities, and the astonishing differences of opinion alluded to above were found. It seemed to me at once, and is now quite plain, that these figures are grossly misleading, and pernicious in their ultimate effect.

After several years of observation in which a careful record of hundreds of cases has been made, I have come to the conclusion that there is a family history of defective nervous health in perhaps 95 per cent. or more of all cases admitted, at least from such a district as that in which I have gathered my facts, and I shall present here for your consideration the results shown by the analysis of the family history in 200 individuals, 100 of them being consecutive cases in which the writer has conducted the history-taking, and the other as a control observation, the analysis of the family health of 100 sane individuals of supposed normal organization.

In the 100 consecutive cases of the insane there were 31 showing direct insane heredity, 35 showing collateral insane heredity, a total of 66 per cent. Of the remainder, 14 showed direct or collateral neurotic heredity, this including epilepsy, inebriety, the so-called nervous types, etc., and 8 gave a history of direct or collateral consumption, the total being 89 out of 100. Then, there are many instances where there are combinations of these conditions, for example, there were 11 cases in which neurotic and insane heredity were combined, 12 in which consumptive heredity and insanity were combined, 7 in which consumptive and neurotic heredity were combined, and 4 in which there was insane, consumptive and neurotic heredity, so that in the 100 cases presented for analysis there was insane heredity in 66, neurotic in 38, and consumption in 31. In 3 cases out of the 100 there was a history of parents being first cousins.

Of the 11 cases not included in the analysis, there being in the family history none of the conditions tabulated, one came of a family in which 6 died before the age of 12 months was reached and two more were still-born—the father, it is said, died of apoplexy. Two more presented very decided stigmata, both physical and mental, and the father of one died under 40, apoplexy being given as cause of death. Three more presented family history in which cancer or apoplexy had existed. There remain then just 5 cases out of the 100 with family history perfectly clear of all these conditions, and of these 5 none have prominent stigmata, 4 are well and one is still under treatment. In the tabulation of all these cases note was made of the patient's age, sex, social state, form of psychosis, and result of treatment, but as these items do not affect my conclusions I need not refer to them here.

Turning now to the analysis of the 100 presumably normal individuals we find no direct insane heredity, but 3 cases of collateral insane heredity, 14 of direct and collateral neurotic heredity and 22 of direct or collateral consumptive heredity. Consumptive heredity was combined with neurotic heredity in 7 cases, so that the total number with consumptive heredity was 30. The parents were not related in any case. This observation of the family history of the normal individual was made upon asylum nurses and attendants to the number of 150, 100 consecutive cases being taken for analysis.

On finding, in our investigation of insane heredity, the great discrepancy between our results and that of other observers, it was thought that possibly if inquiry regarding the family health of the normal individual were made to the searching extent that was made in the ones of the insane individual it might be found that even in the family of the sane, conditions resulting in insanity or degeneracy might be found to a surprising extent. The asylum attendant was regarded as a proper subject on which to make this observation, as he has been reared under the same geographical conditions and social influences as are the patients. The possible difficulty of getting accurate and unreserved returns was at once realized, and in order to meet this we sent printed forms to each attendant arranged in such a way that he could indicate the health of each individual in his family, both ancestral and collateral members, simply by making check-marks opposite points indicated. The instructions read that names need not be signed, nor any indication of the reporter's identity be given. We have every reason to believe that the reports made are truthful and that as far as possible they are complete, certainly as complete as the histories of the insane individuals presented in this analysis. It is fair to assume, perhaps, that the asylum nurse or attendant is superior in nervous organization to the average man or woman of our district, as a high standard of health in our probationers is insisted upon. I do not know though that this should weaken the force of deductions made from the comparison of their family health with that of the insane, for they represent the very class in which insanity does not develop. It is so extremely seldom that a relation of an attendant or an ex-attendant is admitted as a patient that it is a matter for especial comment.

Let us return now to the question of the nature of hereditary influence. This is something that does not as yet admit of conclusive ocular demonstration, but can be narrowed to a small compass by inductive and deductive processes. I shall content myself for the present by offering for discussion what is scarcely more than a tentative statement of the view I hold and which in

some respects is an expansion of the idea embraced in the last of the three theories alluded to above.

1. All defectives must necessarily have derived a defective something from their ancestry.

2. This is probably a protoplasmic defect in one or both of the reproductive elements and is not necessarily a disease or even a disease tendency, but may consist merely in a lack of inherent power to grow to a normal or full development. Both disease and disease tendency may be transmitted in utero from the mother, but such is not hereditary.

3. The defect in the reproductive cell depends upon deficient or deranged innervation in the parental organism, which in its turn is due to hereditary defect or acquired derangement of various sorts, but all acting on the cell through the nervous system of the parent.

This conception of heredity would, of course, extend the list of conditions that may result in insanity, or other defective states of the nervous system. In its greatest breadth it means that any condition operating upon the development of the parental cell, and which has the effect of impairing, even in the normal individual, its nutrition and so its potentiality, will result in a defective ovum or spermatozoon and so in defective progeny. It would include all such conditions as overwork, dyspepsia and other serious defects in assimilation, wasting disease, neurasthenia, abuse of the sexual function, and in fact, a list so long that we can not discuss it all here. It rejects the idea that morbid states are transmitted through the cell itself, questions the possibility of morbid tendencies being so transmitted, and maintains in short that the various manifestations resulting from what we call heredity are due simply to a *weakened* reproductive element. This view is based principally on the following thoughts:

1. The overwhelming evidence that Nature everywhere seeks to eliminate the abnormal, and that as stated by Dr. Gray, the assumption that morbid states could be transmitted per ovum would be at variance with the fundamental principle of evolution itself. On the other hand, the theory that the defect in the fertilized cell is simply a lack of developmental force is quite compatible with established biological facts and is antagonistic to none.

2. If we assumed that by hereditary defect was meant that certain organs of the descendant were impaired by reason of corresponding defects in the same organs of ascendants, we should have to prove that certain portions of the blastodermic protoplasm developed into certain organs, or, in other words, that differentiation anticipated segmentation. Now we know that this is not true, because differentiation is largely a matter of position of the cell, for experiments with ova of both vertebrate and invertebrate show, for instance, that the nervous system can be made to develop from either the upper or the lower surface of the egg, depending on which side is up; then how could any particular section of its protoplasm serve as the object of hereditary disease selection? Embryology furnishes further proof along this line that can be adduced if necessary.

3. A careful analytical study of stigmata of degeneration shows that in the various deviations from the normal there is very seldom any marked resemblance to corresponding features in the parent, but on the contrary a marked deviation from the ancestral type is seen. We do find, however, on every hand evidence to support the theory I have offered, for what are stigmata of degeneration but deficiencies and inequalities in development combined with occasional reversions to lower type, all of

which are the logical results of impaired potency of the germinal cell.

4. If the defect is one of impaired force, then the result of this impairment will be seen at the point most remote embryologically from the generating force. This point is the neuron; here we find the highest type of cell development. There is no further cell division, no further differentiation.<sup>1</sup>

Before proceeding to my conclusions, let me say that they, of course, depend not on the analysis of the 200 cases presented, but upon many times that number, the time at my disposal not permitting more extensive tabulation. I must admit that facts I have gathered from the study of degeneracy have also influenced me not a little.

If you grant me that heredity, as I have defined it, is the fundamental cause of 90 or 95 per cent. of insanity, then:

1. Insanity is not a disease, but a congenital defect, the manifestations of which appear from time to time as irritation is applied. There are some very apparent exceptions to this, consisting of a small percentage of cases in which physical or mental stress is so great as to be in itself sufficient.

2. If insanity is such a condition, then it is, in the individual, practically incurable and must be met, if met at all, before it has existence. In other words, we must not wait for the appearance of the individual before we set in operation our therapeutic measures. Let me explain here that I do not call a remission of a year or so, or indeed several years, a cure. It might be remarked that on this theory there are derangements of many organs of which the same might be said regarding recovery, so that it is simply a juggling of terms. It must be remembered, though, that a disorder affecting, for instance, the cortex of the kidney may be compensated for by other tissue and its results are scarcely seen for years, while a disorder of much less extent in the cortex of the brain will in a short time wreck a life completely.

3. If this deduction as to curability in the individual be true then the question of the treatment of the acute stages of insanity sinks into insignificance beside the great problem of controlling heredity.

The State of New York is much engaged at present with the question of psychopathic wards. We have just had an appropriation in Michigan for such a ward at the University Hospital. These are much needed additions to the teaching armamentarium and will be welcomed as such by all, but the trend of editorial expression regarding this is in emphasis of another phase of the question, viz., the possibility of some world-startling discovery as to the cause and hence the cure of insanity. Now, this is, to put it mildly, ill-advised. As a student, I was taught just such nonsense, and I entered the field of psychiatry filled with vague ideas of "reflex eye strain," "reflex pelvic irritation," possible microbic origin in the cerebrospinal fluid, and a host of other things equally unimportant—but of heredity very little. Those of us who are living with the insane recognize these and other exciting causes of insanity—recognize them at their true value and treat them. The care of the acute case is comparatively a simple problem. At the Michigan Asylum at Kalamazoo we are enthusiastic in our efforts for the restoration of the restorable, and it happens to be my privilege to care for this class. I can not lose sight of the fact, however, that many of the cases we proudly dismiss as cured return to us, in a few years at the outside, after having bestowed upon the community several more to take, in a decade or two

hence, the places in the asylum once occupied by their progenitors.

4. If my major premise be correct it defines the limits in certain directions of the function of the pathological laboratory as an adjunct to the study of the etiology of insanity. For several years pathologists, neurologists and others have been telling us that every asylum should have a laboratory for the purpose of working out the cause or causes of insanity, and many asylums have, in consequence, established laboratories where both time and money is spent in a frantic effort to be doing "pathological work," and which in many instances has no bearing upon the great problem. Now, it does not seem to me that the microscope can reveal to us the cause of insanity if we already know it. The pathological anatomist can in time give us as good a description of a neuron congenitally defective, as he does now of a diseased one, and that, of course, will be interesting. There is, in fact, considerable work being done in this line at present. But the usefulness of the asylum laboratory, I am inclined to think, will be found to lie in the direction of investigation of deranged metabolism and of errors in the process of elimination, this including the nature and extent of its effects upon nerve tissue, rather than in the consideration of deterioration changes dependent upon dementia.

5. Finally, if the facts so far presented have not inflated values, our work upon this question is very plainly cut out for us. It is already evident that of the two questions—prevention of insanity and the care of the insane—the writer attaches chief importance to the former. The consideration of prophylaxis, although not coming within the scope of my paper as indicated by the title, still must follow naturally and the matter seems so urgent in its demands upon our attention that I can not refrain from outlining one or two suggestions.

The increase of insanity can be regulated both by legislation and education, and the feebleness of effort being made at present along either line does not do justice to the severity of the case. The question of legislative control is a problem far too knotty for me, and I shall dismiss it briefly.

No doubt there is a large class of defectives that is fit only for legislative control; it can not be reached by reason, but I think it is safe to assume in general that when legislative efforts of the prohibitionists have made such little headway against the craving for alcohol, all similar efforts directed against the control of a much stronger passion will be found correspondingly more futile. The question of legalized mutilation comes in properly here, and I mention it simply for the purpose of inviting discussion, having upon the subject no clearly defined idea myself.

When we come, however, to the question of education, there is much to say and more to do. Little is being accomplished, not very much attempted, with this remedy, and it is the one of all that will in the end be found efficient. There are several lines of action that might be suggested.

1. The asylum or hospital for the insane should be for its district the source of constant effort towards the promulgation of truth regarding the influence upon progeny of heredity and of errors in living. This effort should be in the form of popular articles in the papers of the district, not at infrequent intervals, but appearing regularly, and in such form as to command attention and thought. The medical officers of the asylum should be as actively employed as possible in what I might call medical missionary work throughout the district. Not

a month should go by without a popular lecture delivered in some portion of the district by an asylum man.

2. A more important place should be accorded the study of insanity in our medical colleges. The teacher should be, in every case, a man who has had previous asylum experience of, at least, four or five years, and should have at his disposal for clinical instruction a department for the insane such as is now proposed in many localities, under the name of psychopathic wards.

3. The general practitioner could be reached frequently and effectively by papers presented in the meetings of local medical societies. It is very seldom, indeed, that we ever notice any paper upon this subject at such gatherings, and those that are presented deal with treatment rather than with etiology.

The subject of prophylaxis is, of course, too broad a one to be adequately presented at this time, and in conclusion I have only to say, that not until we recognize more generally the fact that insanity is but one of many symptoms, that the disorder itself is defective organization and that prophylactic control is the only control, will any *real* progress in psychiatry be made.

#### REFERENCES.

1. Régis: Practical Manual of Mental Medicine, 1894.
2. Mercier: Tuke's Dictionary of Psychological Medicine.
3. Darwin: Origin of Species.
4. Clouston: Mental Diseases, 1897.
5. Bevan Lewis: Text-Book of Insanity.
6. Kellogg: Text-Book of Mental Diseases, 1897.
7. Church and Peterson: Nervous and Mental Diseases, 1900.
8. Bristoe: Heredity in Mental Disease, Journal of Mental Science, October, 1896.
9. Féré: La Famille Neuropathique, Journal of Mental Science, January, 1895.
10. Gray: Heredity, American Journal of Insanity, 1884.
11. Kraepelin: Psychiatrie, Sechste Auflage.
12. Adami: On Theories of Inheritance, with Special Reference to the Inheritance of Acquired Conditions in Man, New York Medical Journal, June 1, 1901.

#### DISCUSSION.

DR. EDWARD E. MAYER, Pittsburg.—I wish to enter a decided protest against some of the essayist's views. It seems to me that if we viewed the subject from his standpoint, we would relegate the treatment of insanity and the treatment of the insane to where it stood fifty years ago. I am entirely opposed to such nihilism and pessimism, especially in this aspect of medicine. I believe, of course, that heredity is the most potent cause of insanity, but as far as I know it is not the only factor. It seems to me that environmental causes deserve a little consideration. Hereditary causes are often sought for too persistently; physicians attempt to trace cause to effect through generations widely separated and ignore the other factors which are in play. If we agree with Dr. McGugan's views, then the superintendents of our insane asylums should simply be regarded as boardinghouse-keepers, and we must say to 95 per cent. of the insane: "You were unfortunate in your birth and we can do nothing for you." I believe that at least some of the acquired psychoses are curable and do not harm the descendants. Furthermore, I think the statement that heredity is the cause of insanity in 95 per cent. of cases is not in accordance with the consensus of opinion on this subject; that proportion is too high. Authors vary in their statistics between 4 and 90 per cent. in giving heredity as the cause of insanity. Statistics of course are deceiving and the results depend upon the views of the statistician. It seems to me also that to neglect such factors as environment, civilization, syphilis, alcoholism, and toxic conditions requires some explanation.

DR. RICHARD DEWEY, Wauwatosa, Wis.—Recently, in this state, an attempt was made by the legislature to prevent the marriage of any one who was afflicted with insanity, epilepsy and certain other diseases. Such laws at least call the attention of the people to the importance of these matters, even if but little is accomplished by them in a practical way, and that it is to be feared is their chief utility. People palpably affected are not likely to try marriage, and others can not be prevented.

DR. T. D. CROTHERS, Hartford—From my experience with persons who are addicted to the use of alcohol and drugs, I



have become firmly convinced that heredity is not only a potent factor in these conditions, but also in insanity. I believe that in a large proportion of these cases there is a strong predilection toward insanity, or alcoholism and the abuse of drugs which is acquired from their forefathers. I believe this is present in from 60 to 70 per cent. In the cases of alcoholism which I have collected, the habit is distinctly traceable to one or both parents in this proportion.

DR. C. A. DREW, Massachusetts—If I understand the essayist correctly, he advocates educational methods for the correction of the hereditary elements of insanity, and general hospital methods—the rational treatment of all abnormal states of the blood and derangement of the different organs—for the correction of contributing factors. In this I heartily agree with him. I do not agree with one of the speakers that the paper contained any statement advocating a return to old methods—or hopeless methods. It is well to look the facts squarely in the face, and the facts concerning heredity which Dr. McGugan has collected and presented in his paper harmonize, I believe, with the observation and experience of those who have most carefully studied the causative relation of degenerating neurons and insanity.

DR. H. S. DRAYTON, New York City—To a certain extent I agree entirely with the reader of the paper, but I am not with him in all his conclusions. I think the discussion of this subject will prove somewhat analogous to that on criminality as carried on in the conventions held in Europe during the past eight or ten years. Some years ago the school of Benedict and Lombroso was in the ascendant regarding the status of the criminal, the proposition that a man was a criminal by reason of his brain organism being enunciated by that school. In the more recent discussions, however, I have noticed a decided change in the attitude of anthropologists, and the point has been accentuated by Manouvrier and others that after all it was not so much the heredity of the individual as the environment in which he was brought up from childhood that had to do with the criminal evolution in conduct and life. I am willing to accept heredity as a prime factor in many conditions of our mortal career, but I think that environment should be regarded as an equally potent factor, and even more potent in determining action on any given occasion. I believe in giving the individual, however low born, a chance for improving so that the beneficial effects of education and a proper milieu may offset the drawbacks of his birth and childhood's surroundings, and so favor his evolution toward good. That this evolution is possible has been demonstrated by the results obtained in many institutions in Europe and in this country. The authorities of the Burnham Farm at Albany, which was established for the purpose of reclaiming reckless and vagabond boys, have been encouraged by the happy effect of the training given there. Many that were deemed incorrigible were found amenable to discipline and instructions that are judiciously administered.

DR. JOSEPH F. ROBINSON, Nevada, Mo.—We are often asked what is the cause of insanity, and as the result of eight years' study of this question I have come to regard heredity as a very important factor. "Like produces like," not only in the animal kingdom, but also among human beings. This is something we must all admit. In getting the history of an insane patient, I have frequently noticed a disposition on the part of friends or other members of the family to hide or distort the real facts regarding the occurrence of other cases of mental trouble in the family. This should be borne in mind in connection with the statistics on this point. I regard insanity as a mental manifestation of a physical disorder in persons who have an inherited predisposition toward mental diseases. In such individuals the soil is ready for the seed.

DR. F. SAVARY PEARCE, Philadelphia—Last year this Section was besought to uphold certain members of the profession in New York in their petition that the New York State Pathological Institute should not be discontinued. We upheld them in their request, and no one can underestimate the value of the work done in New York and in other laboratories throughout the country. While their services are most valuable in connection with asylum work, I think that physiologic chem-

istry is really paramount, and it is in that field that the greatest discoveries in connection with insanity will be found.

THE CHAIRMAN, DR. TOMLINSON—The most of the work in the pathology of insanity has been done by neurologists, and they have paid too much attention to the morbid histology of the brain and too little to the natural history of mental disturbance. In 1895, in Boston, I read a paper before the American Neurological Association on "The Transmutation, Coexistence and Concurrence of Insanity and Phthisis," and gave the statistics derived from a study of the patients in the hospital at St. Peter. The statistics went to show that our patients who died from phthisis were the children of insane or neurotic parents; while those among our patients who were the children of the tuberculous did not die from phthisis. In some families there was a concurrence of insanity and phthisis, and in some patients coexistence of both forms of degeneration. I think that the problem of heredity has been befogged in discussion by the widely different conceptions of what is meant by the term, and this confusion exists especially in the relation of heredity to insanity. If development teaches us anything, it is that heredity really means some condition existing in the parents which results in bringing into the world an individual of limited potentiality, and this unequal limitation may involve a particular structure or those which are similar in function. The frequent involvement of the nervous system, even where the weakness in the parents involved some other part of the organism, is probably due to the well-known law of degeneration, that those structures which are the most highly developed and complicated are the first to be involved. There must be something besides the syphilis, alcoholism, other disease or traumatism to produce insanity, and that something is the limited cerebral potentiality of the individual. It does not necessarily follow that he must be the child of insane parents. He may have been born of syphilitic, epileptic, gouty or tuberculous parents, who, on account of the impaired vitality which results from the presence of these diathetic conditions, have given birth to a child of limited cerebral potentiality. The children of the insane are, as a rule, unstable, while the children of those who are the victims of diathetic conditions are defective. These latter may become actively insane, but usually progressively degenerate. The former may never be insane, but tuberculous instead.

DR. ARTHUR MCGUGAN, Kalamazoo, Mich.—Replying to Dr. Mayer, I admit that I may seem pessimistic, but we must face facts as we find them. I firmly believe that heredity is the fundamental cause of insanity in 90 per cent. of our cases, or even more, and I wish to emphasize this point for the proportion reported is not "estimated," guessed at, or borrowed from the observation of others, but is based upon the results of my own long-continued and carefully recorded observations. It is not to be assumed with Dr. Mayer that, were my conclusions accepted we must retrograde, but rather that we shall look forward to new and broader fields, for progress must always rest upon truth, not sentiment. Neither is it to be assumed that insanity not being a condition presenting hope of permanent cure we should relax our efforts in the care of the individual. I wish to state in this connection that we have at the asylum with which I am connected and on my service, a special hospital building for recent cases where all the so-called "sanitarium methods" of treatment are provided for and used; indeed, we are most enthusiastic in our efforts for the restoration of these unfortunates, but upon the reappearance of normal mental action we do not felicitate ourselves that we have produced a cure; it is simply a remission. Realizing then so clearly that cures are few and far between, the same management of the patient is directed to be carried on at his home after discharge or parole is ordered with special reference to the prolonging of the remission. I quite agree with Dr. Drayton in regard to the importance of environmental influence upon the children of degenerates. The restoration of the family line to a normal plane would require probably as many generations as it took to reduce it to its present abnormal condition. This is a practical application of the study of heredity and is an expression of the frankest optimism.