

A neurologically more fundamental alteration is the one which accompanies various types of myelin decay, analogous to what happens when a nerve fibre is cut near enough the cell body. This condition is extensively present in "central neuritis," which is fully described in *Brain* (Part xciii., 1901). In the cases described there, the typical axonal alteration of all the largest cortical and other elements was present as a systemic parenchymatous affection and in fibre sets belonging to them the Marchi reaction showed decay of the myelin sheaths. As a terminal affection the condition deserves notice. It is summarized as follows:

1. Eight times in two hundred autopsies in which a microscopic inspection of the cortex took place a condition of bilateral changes of the nature of the axonal reaction in practically all the Betz cells was observed, accompanied by the same changes in other cell types and, where this was looked for, by decay of the medullary sheaths of some of the corresponding sets of fibres, whereas the characteristic disease of the tissue of general paralysis (gliosis, vascular infiltration, etc.), was absent. An extensive examination of large areas of the brain in three cases shows the existence of a partially systemic but widely distributed and strikingly symmetrical parenchymatous alteration of numerous nerve elements, chiefly of the cortico-thalamic connections of the motor area, the auditory radiation, the forceps, the pyramids, the fillet, the restiform body, and, to a lesser degree, the posterior columns of the cord, the intersegmental elements, and the segmental efferent motor elements. The change is that of axonal reaction in many of the large-cell types and decay of the myelin sheaths. Instead of the long descriptive term "partially systemic parenchymatous degeneration principally of the central nervous system," we propose the expression "central neuritis" in the sense of an equivalent of parenchymatous neuritis, but mainly of central distribution.

2. This alteration has been found to occur in peculiar forms of end stages of depressive disorders, near or after the climacteric period, alcoholic-senile and alcoholic-epithelial cachectic states, idiocy, and perhaps also general paralysis (Turner's case). Ordinary infectious and cachectic states do not, however, appear to form an important link in the causes.

3. Clinically, the symptoms are rather vague: after a course in which there is no suspicion of organic disorder there appear, more or less suddenly, difficulty of locomotion, increasing weakness for co-ordinated movements, rigidity and at times jactitation of the limbs, and disorders of the reflexes, often together with diarrhoea and occasional febrile fluctuations; the mental condition in this terminal episode is either that of anxious perplexed agitation, delirium, or stupor, similar to a protracted delirium tremens. The nature of the disorder appears to be an equivalent of the general type of parenchymatous nerve-cell alterations, but, in distinction from the well-known infectious and toxic types of "polyneuritis," of pre-eminently central distribution.

It is by no means certain what the real connection is between the myelin decay and the cell alteration. There are in my collection a number of cases in which it would seem that there is a beginning decay of the stainable lumps between nucleus and axonal process, or all around the nucleus with an occasional full-fledged axonal alteration (this was the case in a patient who committed suicide in an attack of hypochondriac melancholia), but without decay of myelin sheaths. The temptation is great to take these cases as initial forms and the "central neuritis" as the typical ones; but there are good reasons against such easy explanations.

The wide distribution of the change requires studies of most parts of the nervous system and warns us against a premature limitation of the attention of the alienist to the cerebral cortex only.

Intermediate between these chiefly parenchymatous alterations of nerve elements, and the prototype of real tissue disorders, such as constitute the classical picture of general paralysis, there are a few conditions, in which

the *neuroglia* plays the important part. Alzheimer has described in melancholia the existence of fibril production in the neuroglia cells of the deeper cortical layers, where the average brain shows no fibrils. He has also shown that in the cases of acute insanity which pass by without defect, such as conditions of exhaustion and delirium of fever, the glia remains essentially passive, even in very grave cases. In psychoses of intoxication, the reaction of the neuroglia is more active; even in very acute cases this can be seen by numerous mitoses, rather than by formation of fibrils for which there may be no time. In the processes of deterioration there is a decided increase of glia with growth of fibrils but apparently limited to certain parts of the cortex only. In general paralysis the well-known overgrowth of neuroglia is general; in senile dementia it shows, moreover, a tendency toward appearance in foci depending on vascular distribution; in epilepsy it implicates chiefly the surface.

We can largely corroborate these data, but we must add that excessive proliferations of neuroglia (free nuclei or satellites) around nerve cells especially of the deeper layers of the cortex have been described frequently as effects of over-heating, starvation, as phagocytosis, etc., and that it would be unwise to accept Alzheimer's first distinction before those matters have been subjected to experimental tests. In my description of this condition (*Journ. of Insanity*, vol. lii., pp. 246-249) I still shared the error that these free nuclei might be leucocytes. I cannot see more in it than a reaction to nutritive anomalies, as is especially shown by Lubimow's experiment on starving dogs.

This condition leads over to reactions of the tissue as a whole and finds its prototype in the alterations in general paralysis, to be treated elsewhere. Suffice it to say that it probably represents two types of pathological changes. The more or less systemic degeneration, especially of terminations of fibres or at least their parts rather remote from the cell body; types of this are the frequent tabetiform degenerations of the posterior columns of the cord, and, in part, the degeneration of the lateral columns. The latter and the diffuse degenerations which Starlinger demonstrated with the Marchi method stand midway between this primary (toxic?) degeneration and the degenerations which depend far more obviously on disorders of the tissues as a whole, with early changes in the vessels, the neuroglia, the intercellular substance and many cells, and a general disturbance of the normal orderly stratification and orientation of the elements.

All degenerative disorders, if at least they last long enough, lead to conditions which can be used as *macroscopic indices of lesions* in various parts of the nervous system: thickening of the membranous and vascular apparatus and of the envelopes of the brain generally, and reduction of the mass of brain substance in the shape of general or localized atrophy. The conditions of the scalp, calvaria, dura, and pia are described in Robertson's "Pathology of Mental Diseases," with such detail and care that the reader can be referred to that treatise with the remark that the whole complex of data can at best be a fairly useful index in autopsies, but is not promising of fundamental clues from the point of view of true general pathology of insanity. It is too much of the nature of a side product, but as such a strikingly faithful reagent, which must not be taken too lightly. So far, however, next to nothing that would throw any definite light on the nature of mental derangements and of the actual degenerative processes that are at work in the nervous system, has been gleaned from the study of the minute anatomy of the membranes. It seems that where the disorders of the membranes occur, whether with or without mental derangement (as in simple chronic alcoholism), they are always of essentially the same type. The condition of *hemorrhagic membranes of the dura* also is not different from what is seen in chronic alcoholism, or ordinary senility, trauma, or cachexia, although it occurs more frequently in senile dementia, general paralysis, alcoholic insanity, and epilepsy, a product of retrogressive changes combined with reactive overgrowth of endothelia of the

dura, involvement and new formation of blood-vessels and organization of extravasations, and perhaps oftener connected with trauma than is usually admitted.

The condition of the *skull* is very variable. The most frequent anomalies are senile dystrophies, especially irregular or strand-like hyperostoses of the frontal bones with increased adhesion of the dura. There are no sufficient statistics available concerning these findings in those not insane.

A topic usually included in the pathological anatomy of mental diseases is the *oethematoma*. That cystic degeneration of the ear cartilage is more frequent in cachectic insane persons cannot be denied. But a careful observation of the cases under my observation has shown the hamatoma to be invariably of traumatic origin, and I have not seen a case yet in which trauma was excluded. Consequently it has little bearing on the general pathology of insanity.

The work of Robertson and that of Berkley contain extensive discussions of the *vascular lesions* in insanity. This is a chapter of pathology of the vascular apparatus in general, and apart from special disorders such as atheromatosis and the syphilitic and metasyphilitic and traumatic alterations of but little correlated value. Here again we feel the great lack of material derived from non-insane individuals for comparison, which must form the foundation. A prolonged study of these matters has made me so strongly convinced that the problems must come from the study of the living and not from the dead, that I consider a discussion of these details a waste of space and time for all who do not work on them specially.

There remain the gleanings from the nervous system in the directions of *general conformation, weight, and chemistry*. The former shares the verdict of what has been said concerning the stigmata of abnormal development. The beginnings made by Mickle, meritorious as they are as collection of facts, will be of little comparative value until we know something of familial comparability of brains, and of the determining factors in the growth of specific varieties of fissures of the brain, or, at least, until the material for comparison supplies sufficient data concerning the constitutional value of the "normal" bearers. This is so difficult and laborious a task that it will probably not be attacked very soon.

A similar statement must be made concerning the weights of brains. From the largest series of brains (that of Boyd, who compares 2,086 brains from a London workhouse with 725 brains of insane persons), Donaldson concludes that the insane are not a class with a characteristic brain weight. It is true that in senile dementia and in general paralysis a striking loss of weight is noted, and that the loss refers probably more to the frontal lobes than to other parts. But these are matters of special pathology of these two disorders. Personally I do not expect anything from the summary statements, especially those made concerning the whole promiscuous mass of "the other psychoses." Before generalization comes, even if made on such excellent observations as Forel's and Meynert's, there should be more discrimination among the mental disorders and the distribution of lesions, and some sort of a possibility to know what amount of brain matter is to be expected in an individual of definite size, age, and attainments. It is possible that Bolton's measurements of the layers of the cortex in the insane and an application of Hammarberg's cell counts will prove more fruitful.

Concerning specific gravity and even chemistry, little is available that is not much better expressed by easier methods of observation of abnormalities. There is one noteworthy series of studies on the presence of cholin in the cerebrospinal fluid, by Halliburton and Mott, which shows cholin to be in proportion with the amount of myelin decay and which may give valuable *intra-vitam* evidence in time.

This general statement of what the anatomical symptomatology of insanity furnishes in the line of data for a general pathology of insanity must appear negative to the one who adheres to the common belief that patholog-

ical *anatomy* is more than a possible help for pathology, or even the "pathology" itself. To uproot this superstition will be one of the first tasks of this century. It is to be hoped that with better insight the idea will disappear that the temporary fruitlessness of mere pathological anatomy implies the verdict that there is no pathology of insanity as yet. What makes pathological anatomy so valuable in many other disease groups is that the field was ready to give a frame for distinctions; and these distinctions, already foreshadowed by the clinical evidence, happened to be more easily demonstrated anatomically. But where anatomy furnishes fewer distinctions than *intra-vitam* observation does, pathology must penetrate the most promising points with relative resignation concerning anatomy. This does not imply that anatomical research is hopeless. It certainly must be carried further on the ground of a general pathology of the nervous system, and with guidance from clinical psychiatry, as an essential part of psychiatric phenomenology.

The Malpighian question "ubi est morbus," *i.e.*, where is the point of attack of the disease, urges us to look for greater clearness in the question of correlation of function with special mechanisms of the nervous system. In this direction the pathology of aphasia and of focal lesions will be of great help, and it is possible that Flechsig's data concerning the growth and maturation of the fore-brain will prove of use. On a material of forty-eight hemispheres of twenty-eight brains from the seventh month of gestation to the age of fifteen months, he has ascertained the time of medullation in various parts of the cortex (*Neurolog. Centralblatt*, November, 1898, vol. xvii., pp. 977-996) and found forty areas which can be distinguished by the phenomena of growth. It remains a task of the future to show how great the bearing of data of growth will prove to be for data of function.

For some time to come, psychiatry will have to work on the "special pathology" of the disorders that it meets. To show that this is possible is the purpose of this article; to bear it out, the task of the special articles. A more helpful general pathology depends on more accurate data of special pathology. *Adolf Meyer.*

#### V. INSANITY: GENERAL SYMPTOMATOLOGY.—

The symptomatology of insanity is as varied in its expression as mind itself. Definitions of insanity in court or elsewhere are unsatisfactory for the reason that conciseness and clearness are well-nigh impracticable. Insanity is not a specific entity; it is rather an ever-varying symptom complex corresponding to many diverse underlying disease processes. It is extremely difficult to frame a simple brief definition sufficiently comprehensive to include the great variety of mental and physical phenomena encountered in the various types of mental disease.

Briefly, insanity may be said to be a prolonged departure from the individual's normal method of thinking, feeling, and acting due to functional or organic disturbance of some portion of the encephalon. Not only does the pathological process within the cerebrum induce well-marked psychic phenomena, but certain physical changes are quite constant accompaniments of the disease. The persistence or permanence of these physical changes again depends upon whether the psychosis follows functional or organic brain conditions. The symptomatology of insanity then may be classified into two large divisions: I. The psychical. II. The physical or somatic.

It is also necessary to bear in mind that there are two large divisions of mental unsoundness, *viz.*: (a) Idiopathic insanity or the insanity of the non-degenerate, or, as Macpherson characterizes it, the insanity of the slightly degenerate, for in nearly every case of idiopathic insanity the presumption is strong that there must be an hereditary predisposition; and (b) the insanity of the pronouncedly degenerate. In the former class are found the periodic insanities such as acute mania and acute melancholia occurring in adolescent and adult life. In the latter division are found the congenitally deficient, the imbeciles, and the idiots and those moral degenerates whose vices and crimes often startle society. The insanity of the non-degenerate

rarely ever occurs until after puberty, and sometimes does not develop until the stress of adult life acts as an exciting cause. The insanity of the degenerate, on the other hand, appears in those whose minds were never normally developed owing to congenital structural brain defects. There are therefore insanities that are functional in their origin, and still other insanities whose underlying cause is some congenital or acquired structural brain defect.

The custom at one time prevailed of classifying insanity according to its etiology, at another time according to its symptomatology, especially when the symptoms represented a changed state of the feelings. Thus there was homicidal insanity, suicidal insanity, impulsive insanity, and so on ad infinitum. Morbid exaggeration of the feelings afforded a basis of classification and a nomenclature founded on the prevailing emotion resulted. Depression long continued was called melancholia, prolonged exhilaration mania. It is obvious that changes in the states of the feelings are too evanescent to be made the basis of a system of classification. Under such a method every new symptom or group of symptoms, every change in the condition of the emotions sufficed to establish a species of insanity.

Again, the etiological basis of classification is misleading because identical symptoms frequently follow causes that are entirely dissimilar, and because the symptoms of one supposed type of disease so encroach upon those of another variety that the clinical characters are not consistent and the result is confusing to the mind of the student. Moreover, in many instances the causation is so obscure and unascertainable as to render a nomenclature founded upon etiological factors alone impracticable.

Recent progress in psycho-pathology, in the histology of the central nervous system, has modified our conception of the psychoses and materially changed our classification. The tendency is toward simplification. A single species of insanity takes the place of several under the older classification. The acute psychoses, melancholia and mania, are considered to be one and the same disease. Kraepelin's proposition to make the tendency of the underlying disease process, whether toward recovery or dementia, a criterion of the character of the psychosis is certainly helpful. His masterful description and separation of *dementia præcox* from the varieties of mania, melancholia, and katatonia under whose symptomatology it had so long been obscured, his demonstration of its natural history, thereby proving that its various phases are but stages of one underlying disease process, is a most valuable contribution to psychiatry. Finally, the *neuron theory*, though still a theory, is sufficiently well sustained to illumine much that was dark and uncertain.

In the following brief account of the symptomatology of insanity it is proposed first to outline the psychic phenomena that accompany disordered mentality, whether of functional or of organic origin, and secondly to portray as briefly as possible the physical changes associated with the disease, including not only those physical symptoms consequent upon disordered function but also those more permanent physical stigmata the result of transmitted long-continued structural defect.

#### I. PSYCHICAL SYMPTOMS.

Dynamic disturbance, either psychical or physical or both, is a distinguishing feature of all the psychoses. This is manifested in four ways: 1. Excitement; 2. Depression; 3. Enfeeblement; 4. Confusion. These four symptoms represent a disturbance in the general activities of the nervous system and are witnessed in both the psychical and the physical spheres.

1. *Excitement.*—States of excitement are accompanied by a heightened activity of all the nervous elements. There occurs as a result of this stimulation a marked feeling of exaltation, excessive egoism, intellectual activity proceeding to incoherence of thought and speech. There is an increased motorial activity of which we shall speak later. There are also hyperæsthesie of all the special senses. Oftentimes there is marked acuteness of

hearing, sight, and touch, which tends to heighten the intellectual and motor activities, and render the perception remarkably acute. In states of excitement the degree of stimulation may be so slight as to be scarcely perceptible, showing itself possibly in a slightly increased egoism or in an unusual loquacity with a diminished capacity of holding the attention to individual subjects or to customary pursuits, or it may extend to complete incoherence and wild furious outbursts of psychical and physical excitement. Excitement receives its fullest illustration in the psychosis called mania, but maniacal symptoms may appear at any time in the course of other forms of mental disease, as in paresis, in dementia præcox, and in the insanities of degeneration.

The neuron theory offers a plausible explanation of the condition. Diminished resistance with increased irritability of the nervous elements permits a flooding of the sensorium with innumerable sensory impressions and a consequent unrestrained outflow of nervous activity over all the efferent routes. This pathological release of nervous energy differs from normal activity in that all mental and physical action is more or less purposeless. There is a manifest inability on the part of the patient to hold the attention to definite subjects; the power to inhibit irrelevant lines of thought is so weakened or lost that discursiveness is a result. It follows that the patient laboring under morbid nervous excitement is able to accomplish little. Although busy from morning to night and frequently far into the night such individuals produce no tangible results. In its milder forms the patient is so excessively loquacious, so officious and so fussy active as to be exceedingly troublesome. In extreme states excited patients may become destructive, absolutely incapable of connected thought, and in advanced and oftentimes fatal stages consciousness becomes obscured and automatic, aimless muscular movements alone remain. These latter symptoms are usually an indication that the nervous elements within the higher cerebral levels are exhausted, their functions suspended, and uninhibited cell action within the lower levels has full sway.

2. *Depression.*—Depression is exactly the reverse of excitement. The two conditions cannot exist at the same time in the same person, although they may alternate with each other. Depression is attended with a diminished metabolism in the nervous elements. There is reduced excitability and increased resistance of the cerebral neurons. Intellectual and physical activity are both diminished. Sensory impressions are reduced in number and owing to the poorer conduction fewer sensory stimuli reach the higher brain. In states of depression the patient lives within a limited world of his own. He sees and hears less than the normal individual by reason of the high resistance to the transmission of nerve energy over either the afferent or the efferent routes. There is therefore morbid concentration upon a few impressions, an inability to escape from dominant lines of thought and to project the attention upon new or even habitual subjects. Moreover, intellectual action is painful. Psychalgia in states of depression is as characteristic as is exaltation in conditions of excitement. The patient loses hope and courage. Mole-hills seem mountains. Abasement of the ego is pathognomonic.

In extreme stages of depression as in excitement the functions of the nervous elements within the higher cerebral levels may become partially suspended. In these conditions consciousness may be more or less obscured; automatic movements and even stupor may prevail. While excitability of the nervous elements is lowered in states of depression, perversions of special sensation and local neuralgias are of quite frequent occurrence and serve to intensify the psychalgia.

In the evolution of the acute functional psychoses depression and excitement are not now considered to be specific disease entities but parts of one and the same disease process. In the natural history of these psychoses melancholia or depression is considered to precede excitement, and in those cases in which excitement is the prevailing feature a brief initial stage of depression is said to

occur. As long ago as 1865 Sankey declared that "mania and melancholia are simply stages of one disease," and called attention to the fact that Griesinger, Guislain, and Neumann had all advanced the opinion that classification based on the expression of the emotions alone was unscientific.

It is a fact that the two conditions, excitement and depression, both representing dynamic disturbances of such wide diversity, do succeed each other with such ease and frequency in the same person that one is constrained to feel that the underlying pathological condition is the same, only attended with varying emotional expression. Identical causes may lead to depression or excitement, or to both states in succession. Whether depression will be brief and excitement long, or vice versa, will depend upon whether there are increased irritability and diminished resistance of the neurons or whether there are lowered irritability and heightened resistance. There is a psychical reason why depression should precede excitement in the acute psychoses. Before alienation is fairly established, prior to the actual development of delusion and other intellectual derangement, the patient himself realizes the fact that something is wrong. Consciousness, being neither clouded nor exalted, discloses to the patient the fact that he neither thinks with his accustomed vigor nor feels the same as in health. Discomfort, dissatisfaction, induces mental distress which, though transient in many instances, is nevertheless real and constitutes the preliminary psychalgia characteristic of all the acute functional psychoses.

3. *Enfeeblement*—mental weakness or dementia—is, as its name indicates, a reduction of all the mental faculties from their normal vigor. There is diminished metabolism in the nervous elements. Retarded conduction along the various neural paths is an early symptom. There is a blunting of sensation. Fewer sensory impressions reach the higher brain through the different afferent routes, and those sensations that are transmitted from the periphery are so delayed in their passage as to make the interval between the external impression and realization in consciousness noticeable to the observer. Oftentimes several seconds elapse before a stimulation at the periphery reaches the higher brain levels. In like manner the passage of nervous energy over the efferent routes is similarly delayed. The mandates of the will are slowly and feebly obeyed. Reflexes are retarded or obscured. The intellectual processes are slow. The attention, the will, and especially the reasoning power are all diminished.

Mental enfeeblement is usually secondary to some antecedent psychosis. Generally speaking, all forms of mental disease that do not recover terminate in varying degrees of dementia. Cases of acute primary dementia so called are usually preceded by antecedent psychical disturbance, or occur in individuals possessing an hereditarily neurotic constitution. Ordinarily mental enfeeblement occurs either as a result of congenital defect (imbecility, idiocy) or it is the termination of an acute functional psychosis, or finally it may be secondary to structural brain change the result of traumatism, arteriosclerosis, embolism, apoplexy, and the like.

The diminished irritability and retarded conduction of the nervous elements in dementia differ from similar conditions met with in depression. In dementia there is an actual degeneration of the neural paths, while in melancholia there is merely a temporary suspension due to functional disturbance. In dementia the cell structure within the higher brain levels undergoes deterioration. Consequently the lower levels are left to act without direction. Automatic action and the more purely vegetative functions of the nervous system supplant intelligent purposive action. Marked trophic and peripheral motor symptoms occur; to these reference will be made later.

Mental enfeeblement may succeed acute functional insanity quite soon and progress very rapidly, or it may appear tardily after many attacks and progress only to a slight degree, there remaining stationary for many years. Its early appearance after an acute functional psychosis

and its rapid progression to extreme mental reduction depend upon constitutional idiosyncrasy. In some individuals the nerve centres resist this tendency to secondary degeneration, while in others they succumb quickly.

One characteristic of the mental reduction of dementia is that it does not affect the mental faculties equally. Quite frequently some faculties are intact while others are noticeably damaged. Mental reduction usually occurs in the inverse order of mental evolution. Those faculties that are the last to appear in the natural process of growth are very apt to be the first to deteriorate in the dementing psychoses; moral and volitional stability show evidence of weakening before there is marked change in consciousness and perception which represent an earlier stage in the process of mental evolution.

4. *Confusion.*—Prominent among the dynamic disturbances of the central nervous organism in insanity is confusion. In health the nervous system is a delicately adjusted mechanism composed of numerous individual elements functionally associated with each other in groups. These groups are still further associated with others even more remote, and all are in a state of equilibrium. Excessive action in one area encounters resistance from adjacent or remoter tracts with which it has been associated, so that the entire mechanism works harmoniously toward a given end. In states of depression there is increased resistance with diminished irritability of these nervous elements; in states of excitement there are diminished resistance and increased irritability; in states of enfeeblement, diminished irritability and conduction due to general deterioration of cell structure. In confusional states there is a dissociation of the different nervous tracts. Limited areas are cut out as it were. Neural pathways that in health were intimately associated are no longer correlated. The result is the utmost confusion in thought. A certain degree of confusion characterizes every variety of insanity. In confusional insanity there is profounder disturbance.

There is not only an incapacity for what Berkeley calls the "power of serial thought," but there is more complete interruption of the intelligence. There may be exaltation and depression alternating with unusual rapidity in the same case, transient hallucinations, delusions very imperfectly developed, obscuration of the personality and consciousness, and finally automatism.

It is now generally recognized that the confusional insanities are all of toxic origin. The toxins of alcohol, of puerperal and other fevers, of septicæmia and those that are developed from auto-intoxication are supposed to have a special affinity for the nervous system. Macpherson contends that toxins may even have the power to "select certain physiological neuron groups for attack." One group may be stimulated, another depressed. He concludes: "In normal conditions excessive functioning of one group of neurons is physiologically interfered with by the inhibiting influence of opposing nerve currents, but where this, owing to the irregular pathological nature of the process, is impossible, there result confusion of thought, disturbance or loss of the idea of personality, uncertain and impulsive action, and many other anomalies depending upon the intensity of the poisoning of the cortical cells, and the area of the elements involved" ("Mental Affections," Macpherson). Homicide and suicide are occasionally attempted by persons in the toxic confusional state following alcoholism. Amnesia, submergence of the normal personality, and automatism usually characterize such acts. An analogous condition is met with in the *epileptic state*.

In each one of the conditions just outlined the ideation is fundamentally different. In states of excitement there is exaltation of the ego,—a feeling of expansion predominates. In states of depression there is abasement of the ego,—painful ideation prevails. In states of enfeeblement there is deficiency of ideation varying from the slightest impairment to the profoundest dementia according to the extent of the central cell deterioration. In confusional states there is disconnection of thought, a blending of all the symptoms encountered in the three preceding condi-

tions due to the toxic interruption of function in certain brain areas.

Among the early noticeable and most persistent symptoms of acute or chronic insanity are those special disorders of the intellect—delusions, hallucinations, and illusions.

*Delusions* are so universally prevalent in nearly every species of insanity, are so persistent and striking a feature in the majority of cases that in the past and occasionally at present they are regarded as a proper legal test of the disease. In 1800, at the trial of Hadfield, Mr. Erskine proposed the substitution of delusion for Lord Hale's absurd wild-beast test of insanity. He said: "Delusions, where there is no frenzy or raving madness, is the true character of insanity." This, however, like many other legal tests, is fallacious, for many cases of alienation exist in which no delusions can be detected.

In the early stages of mania and melancholia and in incipient dementia there may appear marked disturbance of the feelings, failure of judgment, and inability to appreciate the proper relations of things, but no evidence whatever of delusion. Such patients are manifestly elated or depressed, they may be extremely active in business, undertaking too many schemes, making foolish purchases or sales contrary to their previous good judgment; they may in countless ways manifest an inability to adjust themselves to the conditions of their environment, and yet on the closest examination fail to disclose a single delusion. These cases are often puzzling to the general practitioner and the laity generally. They may be very troublesome and even dangerous and require the restraints of a hospital, but their coherence of thought and speech, the absence of delusion, and their general good appearance tend to obscure the real condition which is one of failure of the higher mental processes. Notwithstanding the untrustworthiness of delusions alone as a test of insanity and responsibility, they are still in the majority of cases a striking evidence of intellectual derangement. When proven in court they are always convincing to judge and jury.

Delusion may be said to be a belief in some person or something that is impossible in the nature of things or that is inconsistent with the circumstances of the person who believes it. A man believes his legs are made of glass, is afraid to walk, run, or jump for fear he would break them. This would be a belief in something impossible in the very nature of things. Or a poor, ignorant laborer believes himself to be president of the United States, which would be a belief entirely inconsistent with his circumstances and condition in life. The difference, if any, between an insane delusion and a sane erroneous belief is that the sane person can be convinced of the falsity of his perception, while no amount of argument can persuade the insane man of the error of his delusive conceptions. As well might you attempt to dispel the pain from an inflammatory joint by argument as to induce the insane patient to give up his delusions. Regis insists that "there is not, properly speaking, any essential difference" between delusive conceptions of the insane and the errors of the sane, and that the delusion is separated from mere error only by its causes and consequences, which give it a pathological character never possessed by the other" (E. Regis, "Practical Manual of Mental Medicine").

Delusions are the direct product of insane reasoning. They are false conceptions arising within the disordered mind of the patient either as a result of inco-ordinated central cell activity or in obedience to perverted peripheral sensory impressions. The patient, as a result of his impaired reasoning and without the slightest evidence, believes that his dearest relative is his worst enemy, or a sensation of numbness and prickling in the hand leads him to infer that some one is charging him with electricity from a battery.

Delusions always partake of the character of the prevailing emotion. In states of excitement expansiveness characterizes the delusions. There will be delusions of wealth, great power, and a general feeling of elation. In

depression exactly the reverse occurs. The delusions will be of painful character; there will be belief in specific imaginary acts of wrong-doing that are to be followed by terrible temporal and future punishments. Delusions are of infinite variety and so numerous as almost to defy enumeration. They may be persistent or evanescent. The longer they last the less likely they are to disappear and the surer is the evidence of permanent mental derangement. The systematizing of delusions, the development of a few persistent false beliefs grouping themselves around one or more central dominating conceptions, are evidences of an underlying brain disturbance and consequent chronic incurable insanity. Thus a delusive belief in enemies who are making every effort to defeat personal success in life, this delusion crystallizing itself around a central conception of self-importance and worth entirely inconsistent with the facts, is symptomatic of paranoia.

*Hallucinations*.—Hallucinations are false perceptions projected outward and referred to some one of the peripheral organs of special sense. They correspond with delusions in that they originate within the person's mind and owe their origin to disturbed activities of the neurons and a consequent inability on the part of the patient to correct the wrong impressions. They differ from delusions in that they always concern some one of the special senses. The brief definition of Ball is sufficiently explanatory: "Hallucination is sensation without an object." A person sees smoke issuing from the register in the wall when there is nothing of the sort; he hears a voice addressing him when there is no voice to be heard. The accepted theory of the origin of hallucinations is that they are partly psychical and partly physical. They may entirely originate within the mind, or they may be initiated by morbid peripheral activity in some one of the special sense tracts. Dissociation of the cerebral nerve cells prevents erroneous impressions from being corrected, and the result is a false perception referred to the peripheral organ in which the stimulation originated. Hallucinations like delusions are usually influenced by the character of the prevailing emotion. The exhilarated patient hears voices giving him information of pleasant import, or has beatific visions; the depressed patient hears words of ill omen or has visions of a painful, distressing character. The paranoiac who is convinced that enemies are conspiring against him to injure him and prevent his success in life usually hears the voices of his foes, can actually recognize what they say, or smell and taste the poisons they have placed in his path. Hallucinations serve to intensify delusions and contribute to the psychic pain or pleasure of the patient. In the evolution of insanity delusions appear first; hallucinations are a later symptom, which would seem to indicate that they are chiefly psychical in their origin and owe their existence to the dissociation of neural pathways.

*Illusions*.—There is little real difference between hallucination and illusion, both are deceptions of the special senses. Strictly speaking, an illusion is a wrongly interpreted sensation. A man sees a tree with its branches swaying in the wind, his disordered mind interprets the spectacle to be a many-armed giant waving its arms and hands. There is an actual sensation which is perverted by the imagination to mean something entirely different. Owing to the dissociated action of the cerebral areas impressions received in the higher brain through the channels of special sense cannot be corrected. They remain as persistent evidences of the dominant beliefs of the patient. As in delusion and hallucination the character of the illusion will be modified by the prevailing character of the disturbance, whether it is of exhilaration or depression.

**THE WILL**.—Impairment of volition is an early psychic symptom of insanity. The will is not a specific entity; it is rather a complex resultant of past experiences and idea associations modified, stimulated, and directed by education, environment, and hereditary predisposition. On the purely physical side the will is nothing more than the reflex motor realization of the strongest sensation. Owing to the intimate association of volitional selection

with consciousness, by which we are made aware of a power within us to choose between one or more courses of action, we say that a sane man possesses a free will power. We say that he *can* decide between several courses of action submitted to him. By reason of this power he is said to be responsible for his acts. No matter how arbitrary the law of association of ideas may be nor how rigidly such associations may dominate the will we do feel that every sane man has the power within him of selection. This power is weakened in insanity, and is one of the very earliest symptoms of mental disease. The knowledge of right and wrong may exist, but "the power to choose the right and avoid the wrong" may be impaired or wholly lost. The status of the will power is, therefore, a most important question in all criminal cases in which insanity is suspected or urged as a defence for crime. In all such cases the real test of responsibility is not a knowledge of right and wrong, but the power to choose between two courses of action. If a person has not such power by reason of insanity, then his act is the product of his disease and he is not responsible. The general practitioner who ordinarily sees cases of insanity in their inception before they come under the observation of the specialist, should be familiar with the importance of volitional impairment in the insane and its relation to knowledge of right and wrong.

The fact is, insanity and irresponsibility, or at least modified responsibility, are nearly if not quite synonymous. Certainly it is true that no form of insanity exists in which there is not modified responsibility. Not only does the insane man reason from wrong data, but the power to see things in their proper relationship is impaired. His mental perspective is distorted. The inability to make rational comparisons and to exercise the power of choice are the earliest symptoms of mental disease. The capacity to distinguish right from wrong, either in the abstract or in any particular case, is not lost until the insanity is far advanced. Such loss is one of the later manifestations of pronounced functional and organic brain disturbance. To state arbitrarily, therefore, that responsibility depends upon a knowledge of right and wrong is decidedly unscientific.

The theory that partial insanity necessarily or usually implies responsibility is based upon fallacious reasoning. One error, as has been so often stated by alienists, lies in the fact that partial insanity is not so limited in its effect on mental operations as the lay mind conceives it to be. Limited delusions and isolated morbid ideas may be only a small portion of the symptomatology. They are noticeable phenomena, but must not be considered to represent all that is morbid. Because the insane person manifests only one or two delusions, talks coherently and intelligently, and transacts business correctly, it does not follow that his mind is sound on all other relationships outside the one or two prominent delusions that he may exhibit. Their unfortunate possessor is usually damaged in all the higher mental processes, such as the judgment and the moral perceptions, and, particularly, in the exercise of the will power.

While apparently sane on all other topics and able to talk connectedly on every-day matters and transact his routine business, he may be so dominated by certain prevailing ideas as to be wholly unable to resist certain acts, because in his own disordered mind they are justified by the facts in his individual life. These are the insane people who are most dangerous. It is not the turbulent maniac, full of incoherence and noisy destructiveness, but the quiet secretive paranoiac, who moves around amongst people in his daily avocations, who may spread destruction in his path.

The man who is, as the lawyers say, "partially" insane may know that his act is wrong and a punishable offence, but in his disordered reasoning he will argue that the facts justify the deed and it will be impossible to convince him to the contrary. So distorted is his perception of the proper relations of things, so overwhelmingly exaggerated is his own morbid egoism, that he will feel impressed with the justice and absolute necessity of his act

and will usually assert that, when others know all, his conduct will be sustained. The reasoning of the partially insane mind is nearly always utterly inconsistent. But the laity usually commit the blunder of expecting and insisting that the partially insane mind will reason exactly as does the sane mind.

In every case of suspected insanity especial effort should be made to ascertain whether the criminal act is the result of morbid reasoning or is the product of mental disease. If the act is the outgrowth of disordered reasoning, if the man's judgment is so enfeebled that he cannot properly estimate the natural relations of things, if his will power is so enfeebled that he cannot resist the powerful pressure from within that impels him to the deed, then the act may be said to be the product of his disease and is not criminal, no matter how clearly he may understand the nature and quality of the act, whether right or wrong in the eyes of the law, or how coherently and intelligently he may converse on ordinary topics, and plan and effect an ingenious escape from detection.

The ruling of Chief Justice Doe in the famous New Hampshire case of *The State vs. Pike* has acquired an international reputation because of its manifest conformity with clinical and pathological facts. Judge Doe decided that there is no legal test of insanity; each case must be decided on its own merits. The basic facts are that insanity is a mental disease; the product of mental disease cannot be a crime; tests of mental disease are matters of fact, and whether the defendant has a disease and whether his act is the product of that disease is a question of fact for the jury to consider.

**MEMORY**.—Memory like will is not an individual entity, a specific faculty existing by itself. There is organic memory and psychological memory. Organic memory is simply the organization of functional activities in certain neural pathways. Such memory is subconscious. Psychological memory is more complex. It is organic memory plus consciousness. Every activity within the lower centres that is associated with cell activity in the higher brain is undoubtedly accompanied by a registration in consciousness which will be fleeting or permanent according to the intensity and duration of the corresponding metabolism in the supreme centres.

In insanity psychological or conscious memory will be variously affected. In the acute psychoses the functioning of those higher centres that are identified with mentality and consciousness may be so intense that a rigid recollection of all that has transpired during the illness will be preserved after the attack is over. Or dissociation of cortical areas may be so marked that little or no recollection is preserved. In all those mental diseases in which the structural cell integrity of the higher brain is affected memory will be weakened according to the extent of the deterioration. In the different varieties of dementia, in paresis, in senile insanity amnesia is a striking symptom and in its progressive increase marks the advancing steps of the disease process. In senile dementia particularly is the retrograde failure of memory noticeable. In this disease those events of later life which have received the briefest organized registration are the first to disappear from memory, and the occurrences and associations of early life which are represented by a longer and more complete organic registration are the last to disappear.

Amnesia characterizes all subconscious states. All diseased conditions associated with automatism are invariably followed by an almost total amnesia. Post-epileptic automatism or the so-called *epileptic state* affords a good illustration. Many crimes have been committed by epileptics while in this condition. Undoubtedly such individuals at the time of committing these acts are subconscious, and as the higher brain centres have no participation whatever with the lower levels from which they are temporarily dissociated no registration in consciousness occurs and there is no psychological memory of the act.

In acute melancholia cerebral dissociation occasionally