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AN EXPISCATION OF ACUTE DELIRIUM.

By H. C. Wood, M.D., LL.D. (Yale).

There is probably no department of medicine in which the scientific study of disease affords so little of mental satisfaction as in that which treats of insanity. The reason of this is not far to seek; as I have formerly insisted upon, the various insanities to which names have been given by authors, as though they were distinct diseases, are in great part nothing more than symptom-groups, one of these groups often containing two or more diseases, and one disease reappearing in two or more groups. As in the former time, physicians talked about dropsy as a disease, and now this alleged disease is resolved into heart, renal, and kidney affections, so at present we speak of manias and melancholias, which in the aftertime will, we hope, be resolved into various organic affections.

Our knowledge of cerebral pathology in its relation to cerebral action is so imperfect that it seems almost impossible for the alienist to get much firm ground under his feet; indeed, it still remains doubtful whether it will ever be possible to get a complete pathological basis for our study of insanity, unless, indeed, some great genius shall arise and invent new methods of investigation. The matter is made more difficult and the value of our present knowledge more problematic by the fact that we have no definite, positive proof at present that corresponding lesions produce in different individual brains the same symptoms; whilst we do know that different lesions will produce closely similar symptoms. Nevertheless, by splitting off here and there a group of cases whose pathology has been made out, we may hope little by little to obtain more and more definitude of knowledge, and continually reduce in number and importance the symptomatic disease-groups of unknown pathology.

In chronic insanity such a long time usually elapses between the commencement of the process and the death of the individual that secondary brain-alteration must continually obscure any original structural deviations; pathological study in chronic insanities is therefore more hopeless than in the active disorders. It is plain that in an attempted elucidation of the essential nature of insanity very little value attaches to reports of cases in which recovery has occurred, and in which, therefore, no pathological study has been possible. The literature of medicine teems with the reports of such cases; indeed, there has been such an accumulation that it is hardly probable that our knowledge can be advanced by further

records unless these records be directed to the elucidation of one or two clinical points which seem yet in doubt, as, for instance, the question of bodily temperature in acute mania.

Again, reports of fatal cases in which no exhaustive microscopic examination has been made are plainly of no more value than are those of cases in which there has not been a post-mortem. In fact, such reports are worse than useless, because they may well be misleading. Further, when it is remembered that it is possible for an insanity to be of toxic origin the importance of bacteriological and chemical studies of fatal acute insanities becomes manifest; but such studies are as yet very few.

It seems to me, also, a matter of great importance that a clear consensus of professional opinion should be reached as to what are the problems which are at this time next in order of discussion; or, in other words, what questions the alienist should now strive to answer.

There are commonly recognized a number of acute insanities which may for our purposes be separated into two groups: Group 1, acute melancholia, acute stupor; Group 2, acute mania, acute delirium (typho-mania or Luther Bell's mania), confusional insanity, *i. e.*, the mania which follows shock of injuries or surgical operations, febrile disease or certain chronic poisonings, such as alcohol, cocaine, morphine, etc., intoxications mania due to direct action of poisons.

The questions which seem to me to be most pressing for answer on the part of the alienist are: First, what is the relation between acute melancholia and primary dementia? Second, what is the difference between acute mania and acute delirium or typho-mania? Third, do the different manias which follow acute diseases rest upon one pathological basis, or are they of diverse nature; and if this be so, is it possible at this time to cleave off from the block one or more distinct diseases?

In the present article I do not propose to discuss the relations between acute melancholia and primary dementia, but shall confine my attention to what we may term the "manias," *i. e.*, Group 2. Among recent writers there is much difference of opinion as to the relations between acute delirium and acute mania; some teaching that the two disorders are essentially distinct, others that they are simply different grades of the same disease.

A study of the nature of acute delirium does not so closely involve a study of the relations between these two disorders as would an investigation into the nature of an acute mania. The opportunities for early post-mortems are so much more frequent in acute delirium than in acute mania that there is much greater hope of elucidating its nature than there is of discovering that of acute mania, so that the immediately pressing question seems to me to be as to the nature of acute delirium. Nevertheless, I shall discuss briefly the clinical relations of the two affections.

The symptomatic differences between acute delirium and acute mania

are found in the suddenness of the onset of acute delirium, in the rapidity of development of typhoid symptoms, and especially in the presence of a pronounced febrile reaction. In a typical case of acute mania there is, preceding the outbreak of symptoms of exaltation, usually a period of depression, and this period, it is true, is often, perhaps usually, wanting in cases of acute delirium; but it would seem certain that acute mania may develop without previous depression, and that an acute delirium may be preceded by melancholic symptoms; indeed, in the case hereinafter narrated the primary mental condition was one of depression, and the early delusions were depressive, being of persecution.

So far as concerns the mental symptoms the differences between the two diseases are therefore rather in regard to intensity than as to character. How is it with the bodily symptoms? Some writers affirm that in one disease the patient very rarely, if ever, dies, whilst in the other the natural course is toward an early death. Assuredly illogical, however, is it to base diagnostic difference on the occurrence or non-occurrence of death; and assuredly, also, cases which seem in the onset to be instances of the graver malady do occasionally recover. It would seem, therefore, that so far as the question of prognosis is concerned the difference between acute mania and acute delirium is difference in degree rather than in kind; and the question naturally arises, Is this true of all the physical symptoms so called, or, in other words, are these physical symptoms, like the mental symptoms, different simply in intensity and not in kind?

If there be any salient symptomatic difference in the two disorders, it would seem to be in regard to the bodily temperature. In acute mania the temperature is generally stated not to be distinctly altered; whilst in acute delirium the fever rises to a considerable height. Krafft-Ebing lays great stress upon this difference, affirming that the rise of temperature in any case of mania to 100.5° F. indicates very strongly the presence of delirium acutum. The severe cases of acute delirium are so sudden and rapid in their course that I think they are more frequent outside than within asylums; whilst acute manias are so prolonged and so difficult of management that the great majority of cases pass into the hands of the asylum-alienists. In order to get, if possible, the experience of these practitioners upon the point in question, I have written to some of those whom I conceived to have had largest experience, and received in most instances courteous, but often not very satisfactory, replies.

Dr. Morgan Cloud, first assistant physician in the Kansas State Insane Asylum, writes: "In cases of acute mania admitted here the temperature ranges from 99.5° F. to 100.5° F. in the majority of cases; in a few cases the temperature rises as high as 103° F. for a short time only, and I am inclined to think that in these cases there is some

other cause than acute mania for the extreme high temperature, perhaps tonsillitis, bronchitis, or some similar affection. We admit very few cases of acute delirium here, but I notice a much higher temperature in such cases than in acute mania. The temperature rises as high as 103.5 F."

The most elaborate and interesting series of charts which I have received were sent by Dr. H. A. Tomlinson, superintendent of the St. Peter State Hospital of Minnesota. In this series are included—eighteen cases of acute mania in which the temperature ranged from 98° to 100.5°, except when there were distinct complications such as tonsillitis, erysipelas, etc.; only rarely in these cases was the temperature up to 100°: two cases in which without any apparently sufficient cause the temperature went up to 102°: one case in which two hours after the entrance into the hospital the temperature reached 102.2°, the rise probably having been due to excitement of coming to the hospital, especially as there were retention of urine and constipation (the day after, the temperature fell to 100.5°): one case in which without any other complication than constipation the temperature reached 102.8°, the case ending in complete recovery: one case in which the temperature reached 101°, with the result of final recovery: one case in which the temperature was almost all the time below 100.5°, but without obvious cause once went to 102.2°. (At the last report this case was not improving.)

Contrasting with these cases of acute mania the charts sent by Dr. Tomlinson, marked acute delirious mania, we find that in one case the temperature ranged from 97.2° to 103.4°; in one case the temperature reached 106.7°, death occurring a few hours after entrance; in one case, in which death occurred on the twelfth day, the temperature was almost always below 101°, once rising to 104°, and one day reaching 106.5°; in one fatal case the temperature ranged from 98.5° to 104.5°.

So far these records of acute delirious mania contrast strongly with those of acute mania, but in other cases sent by Dr. Tomlinson the temperature sheets correspond very closely with some of those of acute mania. Thus, in one case, finally ending in dementia, the range of temperature during the first nine days was from 99° to 101.5°; there was then erysipelatoid inflammation of the arm, with a rise of temperature to 105°; after this complication had subsided for many days the temperature ranged from 99° to 101.5°; this being followed by a very irregular temperature, which some days rose to 103°. In another case which ended in recovery the temperature for forty-one days ranged from 99° to 101.8°, going higher for a short time on two occasions, once directly after the patient was brought into the hospital, when the temperature reached 102.6°, and once when there was an attack of erysipelas, when the temperature mounted to 103.4°. In still another case, which also resulted in recovery, for five or six weeks the tempera-

ture was between 99° and 100.5°, shooting up, however, on two or three occasions without obvious cause to 101.8° and 102.4°.

These observations seem to me to be very strong evidence that so far as concerns the temperature no sharp fixed line can be drawn between acute delirium and acute mania. It may be argued that the diagnoses made by Dr. Tomlinson were not in these cases accurate. If this were true, it would go far to prove that clinically no positive, sharply defined diagnosis or diagnostic rules separating the two disorders are possible. The very numerous temperature sheets furnished by Dr. Tomlinson show at once how wide his field of experience and how carefully he gleans it. The result of our inquiry so far seems to be that no diagnostic difference can be made out which shall enable it to be said with positiveness in all cases: this is an acute mania; this is an acute delirium.

In attempting to discuss the pathology and nature of acute delirium it seems to me essential to get, in the first place, some solid ground under our feet and then to examine the general territory. I therefore now report the following case, which was studied with sufficient care and results to give a foundation in fact.

Mr. F. was a man of rather feeble and distinctly neurotic organization, with a tendency to worry excessively, both as to business and domestic affairs. August, 1893, he consulted Dr. Thomas Potter, who found evidence of nervous exhaustion without any very distinctive symptoms, and advised complete rest, which advice was not taken. Through the early part of September there was sleeplessness, with depression of spirits, and about the 18th or 20th Mr. F. began to be very suspicious and to express the belief that he was being watched by detectives. September 22d he was very nervous, and finally left the bank where he was employed, during banking-hours, and walked to his father's house, about six miles in the country, because, as he afterward said, he was afraid to go in the cars as he believed detectives were in the cars looking for him. On reaching home Mr. F. was in a very exhausted condition; during the following night he was sleepless, and declared to his wife that he saw lights in the windows and the faces of detectives looking into the room; finally, he got up and went down stairs, starting to go out of the house, but shrunk back because he said he saw detectives at the windows and doors, also the flashing of bull's-eye lanterns on the lawn. He was seen by me in consultation September 25th; his conversation was entirely rational; he recognized completely that the things he had seen at night had no real existence, but affirmed that he had seen them with great distinctness, and that at the time he saw them he believed in their real existence. According to the father, there had been distinct signs of mental confusion in his talk, but he had not failed to recognize where he was or the personality of his friends, except once or twice at night. The temperature was 99.5°; pulse weak; tongue relaxed and coated. During September 26th, Mr. F., while alone in his room, began to pray out loud in a broken, interrupted manner, growing louder and louder in his tone until he was screaming at the top of his voice, when his father came into the room. Mr. F. then went into a spell of furious kicking and screaming, lasting ten minutes, and

followed, according to the statements of those about him, by a prolonged muscular rigidity.

According to the reports of the nurse, during the day of September 27th he talked rationally, ate heartily, until eight in the evening, when he had a hysteroidal attack similar to the one the day before. September 28th, during the night, his sleep had been interrupted by delusions, which continued more or less into the day, though at times he seemed rational; toward evening he again became hysteroidal. September 29th, temperature taken at midnight, 99.4°. September 30th condition not much changed, except that he either would not or could not urinate, but had to be catheterized. The evening of the 30th he became wildly maniacal and excessively violent, so that it required the combined strength of three persons to restrain him; in an hour this passed into a condition of quiet moodiness. October 1st he was quiet and apathetic; when aroused his speech was incoherent and his mental functions much confused; this confusion was especially marked in the evening and in the early night he had a sudden attack in which there was apparent unconsciousness, with widely opened eyes, dilated pupils, strabismus, clonic spasms of the right side, lasting about five minutes, followed by rigidity of the neck-muscles and clinching of the hands. A moment after this he sprang up on the bed, perfectly wild, dancing, shrieking, yelling, etc. After this time he never became rational except for about fifteen minutes on October 2d. On October 2d the axillary temperature was taken and found to be 100.2° after a paroxysm; later, 99.5°. Later, on October 2d, he talked incessantly, was irrational, refused food or to urinate. October 3d axillary temperature was taken once, 99.4°. He seemed to be getting weaker, and had one violent paroxysm in the evening; also, involuntary passages in the evening. October 4th I was requested to see him again; found him refusing food, violently maniacal, fighting, attempting to escape, struggling, requiring four men to keep him in bed. I had him removed the same day to the University Hospital. October 5th he was more quiet, but almost collapsed; much of the time there was a muttering delirium; once during the day he asked for a cup of coffee. October 6th he had irregular, alternating periods of semi-stuporous quiet, of muttering delirium, and of furious mania, with fightings and strugglings. He recognized me, however, in the evening, but could not talk rationally. The symptoms of weakness steadily increased. At 3 A.M., October 7th, evidences of collapse became very marked; from this time forward he was much of the time stuporously quiet, but whenever aroused was violent; at 1 P.M. he died in coma.

From October 4th until his death the axillary temperature registered, with all kinds of irregularities, from 100.8° to 102.8°; most of the time it was between 101.5° and 102.2°.

At the autopsy there was found extraordinary congestion of all the sinuses and membranes of the brain, with distinct serous exudation in the pia mater, and even some few very small fibrinous flakes. The dura mater, the base of the brain, and the bloodvessels were all apparently normal. Fluid was taken by Dr. A. C. Abbott, in charge of the Bacteriological Department of the Laboratory of Hygiene of the University of Pennsylvania, from whom subsequently the following letter was received:

"OCTOBER 10, 1893.

"DEAR DR. WOOD: I have not succeeded in finding *anything* either by microscopic or culture methods in the material taken from the meninges of your case on Saturday. Very truly yours,

"A. C. ABBOTT."

The following exhaustive report upon the brain was made by Dr. John Guitéras, Professor of Pathology in the University of Pennsylvania:

"The brain came under my observation after laying in Müller's fluid twenty-four hours. No gross lesion was apparent, except that the membranes were congested but not opaque. Any slight opacity present may have been made invisible by the action of the fluid. Fresh sections into the brain-substance showed well-marked congestion. The gray matter of the cortex was darker than normal, and the white substance well dotted over with red points. After hardening in Müller's fluid sections for microscopic examination were cut from the frontal lobe, the transverse convolutions, and the occipital lobe.

"The lesion found is an acute inflammation in the anterior portions of the brain. The inflammation is most marked in the anterior portions of the frontal convolutions. From thence it gradually diminishes until it is nearly absent in the occipital lobe. The inflammatory process affects the bloodvessels, the lymph-channels, the connective tissue. In these structures it is evidently a primary affection. The ganglionar system is not structurally affected in corresponding measure. In fact, the ganglion cells are generally normal, even in close proximity to vascular areas that are deeply involved. The features of this inflammatory process are peculiar, and may throw some light upon the question of the source of leucocytic infiltration in general.

"*Frontal lobe.* Vascular and lymphatic changes.

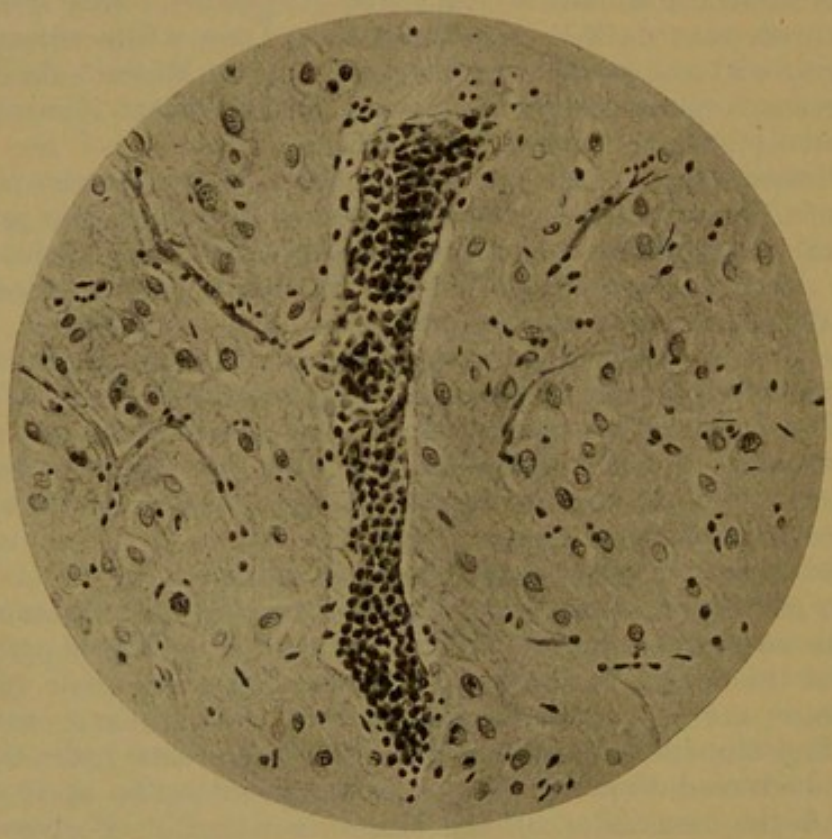
"Many of the pial vessels and of the cortex and white substance present a pronounced perivascular round-cell infiltration. This is perhaps best marked at the bottom of the sulci, but not always so. The inflammatory changes are not uniformly distributed. In the same microscopic field we find bloodvessels affected with others that are not. Some vessels may be traced, showing parietal cellular infiltration up to a certain point, and the remainder of the vessel is normal. Portions of the meninges over one convolution may show evidences of inflammation, whilst other portions are not affected or but slightly so. In the latter we notice that the perivascular spaces are wider than normal, and present isolated lymphoid cells; in the former the accumulation of these cells may form bands along the vessel, of greater width than the vessel itself, as shown in the illustration. In close proximity to one another we find, then, all stages of this morbid process. This statement applies to the deeper portions of the cortex and to the white substance as well as to the meninges, though the cellular infiltration is never so great within the brain-substance as it is in some places in the pial covering.

"The bloodvessels affected are generally distended with blood. The capillaries and smaller vessels in the brain-substance are prominent features in the microscopic field; either because of their over-distention or because of the perivascular drift of round cells, or, as is frequently the case, for both reasons combined.

"The round cells in the perivascular spaces are mononuclear lymphoid

cells of the ordinary size; some very small ones are found, and some of the larger size.

"Though we have here an opportunity to study this process in all its stages, either by comparing the posterior with the anterior portions of the brain, or even within the areas of greatest development of the lesion, we do not see anywhere any preparation for an extravasation of leucocytes. There is nowhere to be seen a peripheral drift of leucocytes within the vessels, nor any accumulation whatever of such cells in the lumen of the vessel. It is impossible, then, to conceive that these vessels, containing nowhere (exceptions to be mentioned subsequently) any excess in the normal proportion of leucocytes, should be the source of the



A bloodvessel in the deeper layers of the gray matter, engorged with blood, showing especially at the lower end clusters of round lymphoid cells.

enormous perivascular aggregation. It is very evident that the lymph-spaces in the walls of the bloodvessels are the primary seat of the cellular accumulation. When we do find, exceptionally, an excess of lymphocytes within a bloodvessel the appearances point clearly to an inwandering from the perivascular spaces. Besides the fact that in all stages the number of wandering cells is far greater outside than inside the vessel, we have direct evidence of the inward passage of such cells. The process takes place in the following manner: The lymphocyte exerts a peculiar influence upon the endothelial cells of the lymph-space and of the bloodvessel. The endothelial cell swells and its nucleus becomes paler. The swelling projects, extending around the lymphocyte in the same fashion as the uterine mucous membrane grows around the ovum. The lymphocyte is thus furnished with a coma of refracting protoplasm. This is carried forward into the vessel with the cell, bulging into the

lumen. This coma is apparent around the lymphocyte even after it has penetrated the wall of the vessel, unless several cells are found together, in which case it almost disappears. In one instance a distinct track is left in the wall of the vessel, indicating the line of passage behind the corpuscle.

"It is interesting to note that the lymphocytes exert the same peculiar influence upon endothelial cells in other localities. This is seen at times in the lymphocytes that are found in the pericellular spaces of the ganglion cells. The change in the endothelial cells, however, is by no means general. Lymphoid accumulations are found frequently in contact with endothelial cells that are in all respects normal.

"There is nowhere to be found in these tissues any tendency to liquefaction or suppuration, such as would be shown by degenerative changes, by polynuclear formations, by very close packing of leucocytes, with a tendency to softening in the centre of the accumulations. On the contrary, we find frequently in the lymph-spaces where lymphocytes are grouped together fine protoplasmic prolongations that form a fine reticulum within the said spaces.

"No bacteria or other abnormal contents are found in the bloodvessels.

"The lymphocytes are found in excess throughout the reticular groundwork of the brain-substance. They are frequently found in contact with the Deiters's cells; and one, two, or three are found in many of the pericellular spaces of the ganglion cells.

"The Deiters's cells appear to be more numerous than normal, and large sizes are more frequent than in health.

"*The ganglion cells.* These do not show any degenerative changes. The pericellular spaces are large and contain frequently one or more lymphocytes. The ganglion cell is occasionally displaced by the manipulation, and its outline is consequently somewhat distorted. This appears to be due to the serous infiltration in the pericellular spaces. The protoplasm shows no structural changes. The nucleus stains in the usual manner and the nucleolus is distinct. There are no vacuolations. The granular reticulum of the nucleus is not so pronounced as it should be. Otherwise these ganglion cells appear to be normal.

"There is no evidence of degeneration of the myeline. The picture given by Weigert's stain does not differ from that of the healthy brain. In this case it is evident that the drift of lymphocytes has taken place along the lymph channels toward certain bloodvessels.

In regard to the pathology of acute delirium there is not an absolute unanimity amongst recent writers, but the condition is believed by Krafft Ebing to be one of acute hyperæmia, with irritation, followed by exudation and symptoms of paralysis due to pressure upon the nerve-elements. The post-mortem appearances are well summed by R. Percy Smith in Tuke's recent *Dictionary of Psychological Medicine*, as consisting of "intense cerebral hyperæmia in the excited period and œdema in the later stage. The cellular elements are said to be swollen, opaque, granular, and to stain badly, and the pericellular and perivascular spaces to contain red or white corpuscles; and there are sometimes white lines

along the vessels from extravasated leucocytes, and occasionally small extravasations of blood in the brain-substance."

It will be noted that in the case which I have just reported the pathological changes found by Professor Guitéras are accordant with the description of Dr. R. Percy Smith. I have once before seen a similar case with similar results at autopsy, and it seems to me that it must be considered as firmly established that there is a group of cases presenting symptoms of violent mental delirium ending in death, in which the lesion is an acute peri-encephalitis. That the acute peri-encephalitis is the essential lesion is strongly confirmed by certain clinical facts. As has been distinctly pointed out by Dr. George H. Savage (*Medical Press and Register*, 1891, vol. ii.) and other alienists, some cases of acute delirium pass on into general paralysis. The lesion of general paralysis is chronic peri-encephalitis, and it is natural that the acute disorder should sometimes pass into the chronic.

Further, it is well known that locomotor ataxia not rarely ends in chronic peri-encephalitis, just as chronic peri-encephalitis not rarely has locomotor ataxia as a secondary complication. A case which I reported some years ago demonstrated that acute delirium may develop in locomotor ataxia. The clinical and pathological facts agree in showing that there is a clinical and pathological relation between acute delirium and general paresis. The conclusion just reached does not in any way involve the further conclusion that *all cases* which present the clinical features of acute delirium, and are labelled by alienists and clinicians as acute delirium, are of the nature of an acute peri-encephalitis. It does not in any way account for the production of the peri-encephalitis.

In a paper read before the Philadelphia Neurological Society in 1890 Dr. J. H. Lloyd strongly argued in favor of the view that acute delirium is really toxæmic. It is entirely conceivable that a toxic agent may produce, by a direct action upon the cells, cerebral symptoms closely resembling those of acute delirium and at the same time superinduce typhoid symptoms. Again, it is entirely conceivable that a toxic agent may produce an acute delirious condition by provoking a peri-encephalitis. For clear thinking, it is essential that the two methods of action of a poison be distinguished.

As above stated, analogy indicates that a peri-encephalitis of acute delirium may be produced in various ways. It is generally acknowledged that there may be a meningitis which is due to sunstroke or other cause not bacterial nor even toxæmic; but it is equally certain that a meningitis may be produced by some constitutional poison like that of sepsis or of epidemic cerebro-spinal meningitis. Just so, I believe, an acute peri-encephalitis may be produced by a poison or may be the outcome of an intense functional excitement or other cause not toxic.

There have been recorded a few bacterial studies of cases of alleged acute delirium. Those with which I am familiar have been gathered together by Dr. Charles K. Mills in volume iii. of the *Transactions of the Congress of American Physicians and Surgeons.* The most important case is that of Rasori—a case, however, in which the symptoms were not in absolute accord with those typical of acute delirious mania; the difference being in that the attack came on with persistent headache, irregular pupils, opisthotonos, and without fever. At the autopsy Rasori found in the sub-dural liquid a small bacillus, which he believed to be peculiar, and which injected into rabbits caused death with symptoms of acute septicæmia.

In a second case, reported by Drs. Charles S. Potts and Berlet, the symptoms occurred in a man who had used whiskey and morphine in excess, and who also was suffering from an open carbuncle. At the autopsy, in the brain cortex there were found perivascular exudation and leucocytes in the lymph-sheaths and perigangliar spaces, and cultures from the cerebro-spinal fluid made by Dr. D. Braden Kyle demonstarted the presence of the Streptococcus lanceolatus and also of the Staphylococcus pyogenes aureus and albus. Evidently this was simply a case of septic peri-encephalitis.

In another case reported by Dr. James R. Hunt, in which there was abscess of the kidney, Bacillus pyocyaneus was obtained from pure cultures from liquid in the lateral ventricle. Evidently, this again was a case of septic poisoning.

The only evidence that is at present forthcoming to show that there is a peculiar bacterial disease resembling acute delirium is that given by Rasori. In the case which I have reported in the paper no bacillic organisms could be found in the sections of the brain, and the very careful culture-experiments of Prof. Abbott demonstrated that the cerebral liquid was free from them. There was evidently no septic poisoning in the case, and it seems to me to demonstrate, as far as one case possibly can, the existence of a non-septic and non-bacterial acute peri-encephalitis. Moreover, the clinical history of the case, in the comparatively slow development of the mental symptoms, in their coming and going, in the character of the delusions, and in the early absence of fever or constitutional physical evidence of disease, seems to me almost sufficient to prove that the attack was not bactericidal. A delusion-of-persecution bacillus may not be unthinkable, but it certainly is at present unknown; and it seems to me that the conclusion is fully established that there is what may be termed idiopathic acute peri-encephalitis, constituting at least one form of the so-called acute delirium.

I do not see how any physician can read the reports of cases which have been published as instances of acute delirium without having had the suspicion strongly aroused that under this heading have been de-

scribed by various practitioners cases representing several affections. Of these diverse diseases which have thus been recorded under the one name, three types have already been considered in this article, namely, septicæmia with septic delirium, septic peri-encephalitis, and idiopathic peri-encephalitis. A fourth type seems to me to be easily discerned, namely, acute brain-exhaustion, or, in other words, a violent form of confusional insanity. It is probable that this type includes a very large proportion of the reported cases of acute delirious mania, as alienists of wide experience believe that all acute delirious mania is of this character.

Thus, in his letter replying to my inquiries, Dr. John B. Chapin, of the Pennsylvania Hospital for the Insane, writes that he believes that "acute delirious mania is an acute neurasthenia or the culminating of the active nervous exhaustion ending with a psychical explosion." Dr. John Curwen, of the State Hospital for the Insane at Warren, Pa., in a letter, after detailing two cases which he believed should be considered as acute delirium, and in which great relief and final recovery were obtained by free use of stimulants and feeding, says: "My own conviction has been that these cases were the result of great nervous and physical depression giving rise to the mental excitement, and were to be treated to meet these conditions in the most active and positive manner, or death would close the scene in about ten days."

That the term acute delirium or acute delirious mania has been used to cover various conditions, and that among these conditions is a peculiar cerebral exhaustion, are further shown by the following quotation from a letter written by Dr. H. A. Tomlinson, in which he says:

> Basing my opinion on the observation of a large number of cases, I believe the term "acute delirium" a better one than "acute delirious mania," because the condition is not in any sense one of mania, although it may be added to mania, and where it is not fatal and recovery does not take place mania may follow. Acute delirium has, in my experience, occurred in the course of all forms of insanity in their early stages, but it has been independent of the insanity, a condition *sui generis*. The natural history of this condition of delirium is very similar to that of the same condition in so-called "typhoid pneumonia," or the delirium of typhoid fever where the poison has spent its effect principally on the nervous system. Where this delirium exists as *apparently* a primary form of insanity it has in my experience almost invariably been preceded by prolonged mental over-strain, shock, or physical exhaustion; and the immediate antecedents of the attack have been constipation, insomnia, exhaustion from refusal to take food, with a variable period of confusion accompanied by either exaltation or depression. In those cases dying within the first ten days we almost invariably find some degree of organic change in the kidneys or heart, besides the intense congestion of the brain and its membranes. While I was an assistant in this hospital three years ago I had seven successive cases of acute delirium, all of whom died within a week after admission. At that time, however, we had no trained nurses and the temperature-records were not accurate enough to warrant me giving them to you. In discussing these cases too little attention is given to the history of the individual before the onset of the

delirium. My experience would bear out your suggestion that *clinically there are regular gradations from mania into delirium, and from delirium into mania.*

November 6, 1889, I read before the College of Physicians of Philadelphia a paper on "Insanity Following Acute Disease," in which I supported the proposition that these insanities constitute one disease-group having a uniformity of symptoms as characteristic and as complete as is usually seen in mental diseases, and resting upon a common pathological basis of disordered brain nutrition and exhaustion without anatomical alteration sufficiently gross to be detected by our present methods of study. In accordance with this proposition it was proposed to call all these cases "Confusional Insanities," including in the group the "stupidity or primary curable dementia," of Krafft-Ebing, the "Wahnsinn" of the same author, and the "delusional stupor," "mania hallucinatoria," and "confusional insanity" of various writers. Without discussing in detail, it may be well to summarize the proofs of identity of these affections.

1. If the cases vary much in their details, the general scope of symptoms and the general course of the disorder are identical: there are always mental confusion, hallucinatory excitement, loss of mental power, with similar constitutional symptoms; the cases nearly always ending in complete recovery if there have not been pre-existing organic disease of the kidneys, arteries, or other vital organs, and when death occurs there is similar absence of lesions in the cerebral cortex.

2. A similar mental condition with similar symptoms is produced by starvation and exposure, as in shipwreck.

3. The belief that the insanity has a specific relation to the poison of the disease which it has followed involves the absurd proposition that there occur as sequela to various acute diseases a large number of distinct specific insanities which offer the same general symptoms, pursue one general clinical course, and, when death occurs, agree in their pathological results; it being, moreover, possible to have these alleged distinct insanities produced not only by diseases which are connected with the presence of bacteria or other poisons in the body, but also by the shock of surgical operation or injury at a time when there is no septic poison in the system, and even by overwhelming emotional disturbance during a healthy state of the organism.

In the short time which has elapsed since the publication of my paper upon confusional insanity a number of articles have been published. The following notes upon these papers seem to me of interest as showing in a short space the general drift of medical opinion and the difficulties which lie in the way of a clear perception as to the truth of the subject.

Dr. Henry M. Hurd (*American Journal of Insanity*, vol. xlix.) appears to believe that there are three distinct insanities following acute disease, respectively due to shock, to specific poisons, and to anæmia or nervous

exhaustion. He illustrates the first of these causations by a case which followed removal of the ovaries; the second by a case which occurred after pneumonia; and the third by a case following typhoid fever. As I read these reports they do not seem to confirm the etiological theories of Dr. Hurd.

In an article on acute delusional mania, Dr. G. W. McIntyre (*Northwestern Lancet*, vol. xiii.) differentiates acute delirium by the suddenness of onset, the violence of the excitement, the rapidity of the exhaustion, and the presence of a febrile reaction in which the temperature follows no definite course. He says it is commonly produced by shock or exhausting physical disease when the temperature gets as high as 103°.

Dr. Alex. Robertson (*Journal of Mental Science*, vol. xxxvii.) finds the essential symptoms of acute dementia to be rapid failure of mental power with hallucinations; rapidly developed stupor; emaciation; feebleness of circulation; coldness and blueness of the extremities; brown tongue, etc. It is worthy of note that Dr. Robertson has obtained good results by the application of a double skull-cap containing hot water (110°).

Mr. C. Norman (*Trans. Royal Acad. of Medicine*, Ireland, 1890, vol. viii.) states that Korsakoff, of Moscow, thinks that alcoholic neuritis often exists in connection with confusional insanity from alcohol. Norman believes that the insanity which is described by a patient's friends as having "come on out of sleep" is always confusional insanity. He quotes Salgo as saying that any case in which hallucinations occur must be rejected from simple mania, and distinguishes confusional insanity from acute mania by absence of exaltation and increased rapidity of thought—from acute dementia by absence of complete stupor.

In an elaborate paper, Dr. John Ferguson, of Toronto (*Alienist and Neurologist*, vol. xiii., 1892), gives analyses of large numbers of papers upon insanity after surgical operations and fevers, and records a number of cases. There does not seem to be much in these papers necessary to comment upon, except that the idea is brought forward by several of the writers that the insanity is really septic. Dr. Theodore B. Hausen says "it is scarcely an exaggeration to say that if in the first week of the puerperium a psychosis in the form of an acute confusional insanity with hallucinations appears, without the occurrence of another non-puerperal acute infectious disease, and without preceding eclampsia, one can be sure puerperal infection is present, even when fever and other physical symptoms are not discoverable by a thorough examination." Clouston also seems to be in favor of the septic theory; and Olshausen divided puerperal psychoses into: 1, those after septic conditions, the infection-psychoses; 2, those after post-partum hemorrhage and during lactation, the exhaustion-psychoses; 3, those following eclampsia, when there is uræmia or some other impurity of blood, the intoxication-psychoses.

The differences of opinion in regard to the question of confusional

insanity which are shown in the abstracts just given, and which certainly exist among alienists, seem to me to be largely due to the failure on the part of many to apprehend certain thoughts and generalizations. It is plain that in septicæmia there may be a delirium which may simulate a form or stage of confusional insanity, although it is not dependent upon any disease of the brain cortex, but is due to the direct action of the poison or poisons in the blood upon the cerebral nerve-cells. What is true of septicæmia is undoubtedly true also of uræmia. As septicæmia and uræmia frequently occur during the puerperium, puerperal septic and uræmic deliriums are far from rare phenomena.

Further, the cases which I have abstracted from the article of Dr. Mills prove definitely that there is such a thing as septic peri-encephalitis; so that it cannot be gainsaid that after childbirth either septic delirium or septic peri-encephalitis may occur, and may very well be spoken of as puerperal mania.

Cases of the characters just spoken of constitute evidently the infection-psychoses and the intoxication-psychoses of Olshausen. Their existence in no way disproves the occurrence during the puerperal state of true confusional insanity. I suppose the exhaustion-psychoses of Olshausen include cases of the latter character; but it would be a mistake to suppose that the puerperal confusional insanity must necessarily be preceded by any apparent great exhaustion or by any violent extraordinary cause of exhaustion like a post-partum hemorrhage. The emotional and physical disturbances of childbirth may well produce a confusional insanity, since they are in many cases incomparably more severe than minor operations, such as excision of the breast or the sewing-up of a ruptured perineum, which are occasionally followed by mental disease.

Moreover, although the condition of the brain-cells which underlies confusional insanity may be produced by other than toxic causes, it seems to me indisputable that it may also be produced by toxic disturbances of nutrition. This is well seen in delirium tremens, a disorder which is getting more and more to be recognized as a variety of confusional insanity. The mental disturbance of delirium tremens cannot be due to a direct action of alcohol in the blood or in the nerve-tissues at the time of the breaking-out of the disease. The "horrors" of the drunkard is the beginning of delirium tremens, and if the cerebral manifestations of the horrors or of the delirium tremens were due to a direct action of the alcohol, then they should be intensified, not relieved, by further doses of the poison. Evidently the symptoms are the result of nutritive changes in the ganglionic protoplasm which have been produced by the poison. In other words, the symptoms are only indirectly caused by alcohol. As acts alcohol, so in all probability may septic poisons act; as there is an alcoholic delirium

and also a confusional mania which we call alcoholic, because it is indirectly caused by alcohol, so also are there in all probability a septic delirium and a confusional mania which is the secondary result of septic disturbance of nutrition.

The variations that occur in the symptoms of confusional insanity are certainly great, but does not almost every disease vary symptomatically? I suppose every practitioner of medicine has followed cases to the end in which after recovery he has been at a loss to say whether he had or had not to deal with such a comparatively simple affection as typhoid fever. Considering the complexity of the brain, the symptomatic variations in confusional insanity are not greater than are those of typhoid fever. More than this, owing to the fact that exaltation and depression of the cerebral cortex produce such similar symptoms, some cases of confusional insanity can scarcely be distinguished clinically (without the history of their whole course) from acute peri-encephalitis, and yet post-mortem examination shows that the lesion of the brain is essentially diverse. As proof of this fact I append the history, with autopsy, of a case in which the insanity followed the operation for laceration of the perineum, a case in which there were no symptoms of septicæmia at any time, a case in which the perineum had completely healed before the mental aberration became pronounced, and many days before the first febrile symptom was manifest, a case in which the autopsy proved the absence of any inflammatory lesions of the cortex. The contrast of this case with the one previously reported in this paper is sufficient to show how two cases of brain-disease closely resembling one another may have entirely diverse lesions.

Mrs. M. K., aged fifty-five years, widow, with one child living. Operated upon by Dr. Goodell for laceration of the perineum, December 2, 1892. Operation required about one hour, but the temperature during the following days did not rise above 99.6°. Ten days after the operation she voided urine naturally for the first time. The bowels were costive, but there were no other complications, and the mental condition of the patient appeared to be normal, though she seemed a little quiet. Twelve days after the operation it was noticed that the mental condition was changing, the patient becoming morose and refusing to take food. During the next five days her mental condition became more decidedly affected; she became suspicious, believing that the nurse and the patients in the ward were plotting to injure her son and to interfere with her own money affairs; even her son could not pacify her, and at times she appeared not to recognize him. She progressively became more and more disturbed, getting out of bed, insisting on walking around the ward, not recognizing where she was, moaning and wringing her hands, and at times talking rapidly and incoherently. Her temperature during the last five days before she came under my care, on the twenty-first day after the operation, varied from 98° in the morning to 99° in the evening; the pulse from 72 to 92; the respiration was steady at about 20; the sleep was much broken, and the patient

very frequently got out of bed at night; the bowels were constipated, but were kept open with Rochelle salt.

The abstract of notes taken after her transference to my ward is as follows:

Twenty-second day after the operation. Very noisy last night, had to be removed from the ward. Her speech is now incoherent most of the time; she talks incessantly, and when she can be understood it is concerning some one persecuting her son. When aroused actively she answers questions rationally, but immediately rambles off into a confused babble. She is very restless, tries to get out of bed whenever she is left alone, but has brief snatches of sleep at intervals. Urine scanty, darker in color than normal; specific gravity 1025; slight trace of albumin, no casts.

Twenty-third day. Under anodyne patient slept quietly most of the night. The treatment is nourishment by liquid food as much as she can be made to take, but she fights and refuses to take food. Hyoscine, gr. $\frac{1}{100}$; morphine, gr. $\frac{1}{6}$; chloral, gr. 10, every eight hours.

Twenty-fourth day. Patient about in the same condition; under the narcotics, which have been varied *pro re nata*, she has been quiet. She has taken large quantities of milk and eggs, with stimulants.

Twenty-fifth day. Patient in the early part of the day very restless, but slept quietly for several hours after a hypodermic injection of hyoscine and morphine; then passed into a semi-comatose condition. During the day she was quiet except when aroused by feeding or other procedure, when she showed some signs of irritation; no paralysis, no disorder of the pupils, no stiffness of the muscles of the neck, and no evidence of local brain irritation; as the day progressed the stupor deepened. Food was taken better, and apparently digested very well. The mucous membrane of the mouth became very dry, the tongue fissured and was heavily coated, the breath very offensive. Urine passed involuntarily. When left to herself was absolutely quiet, but when disturbed would groan and toss about.

Twenty-sixth day. Mental condition about the same. Urine examined: specific gravity 1025, contained pus, albumin, and casts, hyaline and pale granular. Digitalis and stimulants were used freely. Toward night a decided change took place; the respiration became frequent, the face very pale, and the coma more marked.

Twenty-seventh day. Condition about the same. Repeated careful examination of lungs failed to detect any physical signs of pneumonia. Heart-sounds normal. At times she is quite restless, tossing her head from side to side, flexing her legs, etc.

From this time until death, which occurred on the twenty-ninth day, the pulse gradually failed, and toward the last the whole surface of the body became cyanosed. Digitalis and strychnine were given hypodermically, liquid food and whiskey freely.

With much difficulty an autopsy was procured. On opening the skull there appeared to be some excess of blood in the sinuses, but there were no gross lesions either in the brain membranes or the brain-substance. The brain was put in Müller's fluid, and after hardening was given to Professor John Guitéras, who reported upon it as follows: "Sections for histological examination were cut from the frontal lobes, the transverse convolutions, and the occipital lobe. The result of this

examination is negative. A number of sections from the several areas is submitted. They represent fairly well healthy brain-tissue. The methods of staining employed were ammonia-carmine, gentian-violet, hæmatoxylin, and eosin, and Weigert's myeline stain."

Unfortunately, in the case just reported no bacterial cultures were made, and, in so far, the record is imperfect. The history of the case, however, makes it highly improbable that there was any bacterial poisoning. The symptoms during life were those of confusional insanity, and in that coincided entirely with the etiological history. It is also unfortunate that a portion of the brain was not hardened in osmic acid, as possibly some lesions of the ganglionic cells might in this way have been made out. Nevertheless, the record is sufficiently complete to show that there was no peri-encephalitis and that there was no lesion in that brain discoverable by the ordinary methods of investigation. The case was evidently one of confusional insanity.

In attempting to sum up the result of our expiscation of acute delirium it becomes apparent that the deductions to be drawn are of two kinds: first, those which appear to be certainties; second, those which appear to be probabilities. The conclusions which seem to be established are: That cases of the so-called "acute delirium" are of various characters, representing several different diseases; that leaving out of sight septic, uræmic, and other intoxications, cases of which have undoubtedly in the past been recorded as acute delirium, there are two distinct diseases described as acute delirium—first, *acute peri-encephalitis;* second, an acute affection, probably primarily centred in the ganglionic cells, but without lesions that can be demonstrated by our present process.

Of the *acute peri-encephalitis* there are, again, several forms: one especially due to the presence of septic organisms in the brain itself, and therefore to be designated as acute *septic peri-encephalitis;* one in which there are no organisms, in which the cause appears to be emotional strain or other functional excitement, and which may therefore be known as acute *idiopathic peri-encephalitis.* If the observations of Rasori be correct, there must be a third peri-encephalitis, due to the presence of a special organism, and therefore worthy of rank among the peculiar fevers or germ diseases.

The conclusions which are to mind probably, but not firmly, established are, that all manias of an acute type which are not intoxication-neuroses and are not due to the presence of organisms in the blood, are divisible into two affections: first, mania proper; second, confusional insanity, and that each of these diseases becomes, when in its most severe form, an acute delirium. Thus, there would be, first, *acute mania* —that is, mild acute peri-encephalitis, known when in its severest form as *acute delirium*—that is, violent, usually fatal, peri-encephalitis; second,

confusional insanity, without demonstrable lesion, but probably the result of changes in the ganglionic cells themselves, constituting in its severest form an *acute delirium*, also without demonstrable lesion, but, in fact, due to an exaggeration of the unknown ganglionic or other alteration present in the confusional insanity.

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