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THE
LUMLEIAN LECTURES

FOR 1850,

Delivered at the Royal College of Physicians, London,

BY

R. B. TODD, M.D. F.R.S.

ON THE

PATHOLOGY AND TREATMENT

OF

DELIRIUM AND COMA.

From the London Medical Gazette.

LONDON:

PRINTED BY WILSON AND OGILVY,

57, SKINNER STREET, SNOWHILL.

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LECTURE I.

The importance of fixed principles of pathology and practice in delirium and coma—Definition of delirium—Of coma—Existing views of their pathology unsettled—Clinical history of the different forms of delirium—Epileptic delirium—Cases—Effects upon the brain—Renal epileptic delirium—Choreic delirium—Case—Hysterical delirium—Effect upon the brain—Cases—Delirium in men from overwork—Puerperal delirium—Effects upon the brain—Anæmic delirium—Traumatic delirium—Delirium of typhus—Of erysipelas—Rheumatic delirium—its complication with cardiac inflammation.

AMONG the most formidable indications of disturbance of the great central organ of the nervous system, the brain, are those states which are known as coma and delirium.

These states are so destructive of the consciousness of the patient, or pervert to so great a degree his intellectual powers, that we cannot wonder that the utmost alarm should be excited in the minds of all, whether friends or medical men, who may be in attendance upon him.

And perhaps there are few occasions in which the physician stands more in need of all that self-possession which sound knowledge is most likely to impart, than when, during his attendance upon a patient, either a delirious or a comatose state should be suddenly added to his previous symptoms.

It is then that he is forced to appeal to his former experience, to guide him in his prognosis, and to direct his practice; then, too, he is compelled to examine the grounds of his principles—to assure himself as to their soundness, and as to the safety of following the course which they indicate.

The physician of a true and right spirit is no respecter of persons; with him the duty of using every exertion to save life is the same, whether the patient be high or low, rich or poor; the responsibility of saving life is the same, whatever be the condition of the individual; but in his attendance upon some patients his feelings would be more engaged than with others: and the more they are involved, the less free would be his judgment, and the more need would he have to depend upon sound and fixed principles.

On these grounds, all who are engaged in the deeply responsible duties which belong to the practice of medicine, are interested in inquiring whether, indeed, any settled views are pretty generally entertained by the best-informed practitioners with reference to the pathology and treatment of coma and delirium, and regarding the appropriate treatment of these conditions.

But, independently of all such considerations as these, it is clearly of vast importance that we should have exact views as regards the intrinsic nature of these conditions—coma and delirium.

Coma, in its most profound state, may be defined as a complete suspension of that mutual influence of the mind and of the organ of consciousness, in which, speaking physically and physiologically, our consciousness exists—a suspension which, no doubt, begins with the physical organ, and therefore involves the powers of thought and of perception, so that the comatose patient neither wills, nor feels, nor thinks, and he awakes from this state as from a deep sleep: he knows not where he had been, and he feels as if during a certain interval he had ceased to exist.

The state of delirium, in its highest degree, is a complete disturbance of the intellectual actions; the thoughts are not inactive, but rather far more active than in health: they are uncontrolled, and wander from one subject to another with extraordinary rapidity; or, taking up some single subject, they twist and turn it in every way and shape, with endless and innumerable repetitions. The thinking faculty seems to have escaped from all control and restraint, and thought after thought is engendered without any power of the patient to direct or regulate them. Sometimes they succeed each other with such velocity, that all power of perception is destroyed, and the mind, wholly engrossed with this rapid development of thoughts, is unable to perceive impressions made upon the senses; the patient goes on unceasingly raving, apparently unconscious of what is taking place around him; or it may be that his senses have become more acute, and that every word dropped from a bystander, or every object presented to his vision, will become the nucleus of a new train of thought, and moreover, such may be the exaltation of his sensual perception, that subjective phe-

nomena will arise in connection with each sense, and the patient fancies he hears voices or other sounds: ocular spectra in various forms and shapes appear before his eyes, and excite to further rhapsodies of thought.

If, then, these states of coma and delirium involve so complete a departure from the normal condition of the consciousness and intellect, and if, as experience teaches us, they are apt, one or other, to accompany diseases of organs other than those which form part of the nervous system, surely nothing can be of higher practical moment than that our views of the pathology of these states—of the precise nature of the derangement of the physiological action of the body, which is capable of producing them in their various degrees;—I say, surely nothing can be more important, practically, than that our views upon these points should be definite and settled. Such derangements as these, affecting as they do, in the most serious manner, both consciousness and the power of thought, must lie at the very foundation of our knowledge of the derangements or diseases of the nervous system.

Can it be expected that we shall be able to form any correct idea of the effects which inflammation or other disease of the brain is capable of producing, if we know nothing of the intrinsic nature of those conditions which give rise to coma or to delirium?

It may be, however, that some will say, surely there is no need for occupying time with any new inquiry into the pathology of these conditions, inasmuch as the views of practitioners upon these points are pretty well agreed. To such a remark I must reply, that it is a source of much astonishment to me, how little the views of practitioners appear to be agreed upon this subject, and to what a trifling extent these two conditions, coma and delirium, as special affections of the nervous system, appear to have been investigated by pathologists.

I have carefully looked through the literature of these subjects, and I have failed to discover anything like a full discussion of the pathology of these important affections, founded upon careful *clinical* investigations. And so far as the subject has been discussed, writers and practitioners seem to rest content with the opinion that all comatose affections and delirious states are referable to various degrees of congestion of blood in the blood-vessels of the brain, or to various quantities of fluid poured out in the sub-arachnoid cavity, or in the cerebral ventricles.

I am, therefore, not without hope, that an inquiry into the nature and treatment of these affections may be considered an

appropriate subject for these lectures, nor an unsuitable sequel to the lectures I had the honour to deliver last year upon the pathology and treatment of convulsive diseases.

I propose to consider these subjects on the following plan:—

First. I shall inquire into the clinical history of delirium and of coma,—whether they arise from disease or from the introduction of some deleterious agent into the system; and in connexion with this I shall collect what facts I can respecting the results of post-mortem examinations in fatal cases; secondly, from the facts thus collected, viewed in connexion with our present knowledge of the general laws of nutrition, and of the physiology of the nervous system, I will endeavour to deduce a view of the pathology of these affections; and lastly, I shall describe the treatment suited to the various forms of them, which is most accordant with reason and experience.

Delirium exhibits great variety as to the extent to which the perturbation of the intellectual powers has taken place,—in some instances amounting to a simple wandering of the thoughts, and an inability to fix the attention, and to maintain a continuous train of thought; in others, consisting, as it were, in an extraordinary exaltation of the thinking faculty, with an extreme excitement of feeling and temper, leading in many instances to violent maniacal paroxysms, under the influence of which the patient exhibits a degree of muscular power which is very apt to deceive the practitioner as to the extent of intrinsic strength which he possesses. So great is the difference of degree between the highest and the lowest forms of delirium—between the slight wandering, or, as nurses and patients are apt to call it, *light-headedness*, and that delirium ferox or acute mania in which the patient threatens with destruction himself and all around him,—that it may fairly be matter of question whether these two states ought to be placed in the same category as regards their pathology—whether, indeed, they may be considered as only different degrees of the same disease.

Delirium occurs under such a remarkable variety of circumstances, in such various conditions of the system, that I find it impossible to give anything like a connected view of the subject without describing the several forms of it *seriatim* as we meet with them in practice, and arranging them in the following order:—

First, I shall describe what may, I think, be properly called the *epileptic delirium*. I do not think that this form of delirium is sufficiently appreciated by practical men. It seems to me to be of fre-

quent occurrence, and that in some of those instances in which, under some sudden impulse, persons are led to commit some dreadful deed, which is opposed to the whole tenor of their previous lives, it is the sudden access of epileptic delirium which has thus disturbed the balance of their moral nature.

I shall describe the phenomena of this delirium from some cases which I have witnessed. A man, hitherto healthy, fails somewhat in health, becomes dull and melancholy—takes a gloomy view of things—but still his ill health is not sufficient to prevent him from following his usual avocation, nor is it noticed by any, save perhaps those who are constantly with him. There may or may not be some cause for this—some excess—or some mental trouble or anxiety—some altered position of his affairs.

Presently, either at night or on first waking from sleep in the morning, or it may be while he is at his usual employment or business, he becomes strange and incoherent—talks at random—mistakes things and persons—writes odd letters: in short, he displays unequivocally by words and actions that the mind is disturbed.

This state of delirium may speedily end in an ordinary paroxysm of epilepsy, with all its accompaniments, after which the patient resumes his wonted health; or it may continue for a considerable time, assuming even the characters of violent mania, with sleeplessness, exciting the utmost terror among the patient's family and attendants: it may last even for days, and then the occurrence of an epileptic fit relieves all doubts as to the nature of the maniacal paroxysm.

It may be, however, that these phenomena will occur with a patient who is subject to epileptic attacks, in which case, if the fact be made known to the medical attendant, he will have the less difficulty in recognising the true nature of the paroxysm.

And it may also happen that the delirium may pass off, or it may terminate in coma, from which the patient may waken up restored, without, in either case, the occurrence of any *convulsive* attack of epilepsy.

The delirium, in cases of this description, is in general of the most decided kind; and it often amounts to mania. The patient is wakeful, noisy, sometimes mischievous, sometimes muttering and incoherent, and unintelligible; sometimes distinct and easily understood, the subject of his ravings being determined by circumstances or events, which had previously more or less occupied his mind.

This form of delirium is not accompanied by any particular constitutional disturb-

ance; the pulse is accelerated, but not to any great extent; its range ordinarily is from 80 to 100; it exhibits no character of strength, but is often full and throbbing.

The effects of any long continuance of this delirium are to induce exhaustion,—as, indeed, is the case with all forms of delirium; and patients sometimes die suddenly, even when they may seem to be on the road to recovery. Hence they require the closest attention on the part of the attendant to prevent undue exertion.

A peculiar feature of this form of delirium is that it comes on suddenly, without previous disorder, or without warning of any kind, as the epileptic paroxysm does. A man may be in perfect health to all appearance, and within five minutes a furious and dangerous maniac. A remarkable case of this occurred to me in a medical gentleman, who was well known and much respected: he was a bachelor, about 45 years of age; he had evinced no particular symptom of illness, but suffered some degree of mental anxiety. One afternoon, having been engaged that day to dine out, he went up to his dressing-room to dress, and within five minutes his housekeeper was attracted to his room by a noise, and found him sprawling on the floor in a paroxysm of mania, shouting at the highest pitch of his voice, as if he had been assaulted by thieves. This case soon proved itself to be of the epileptic kind.

I shall mention another similar case which came under my care. A respectable, well-conducted man, about 35 years old, became, without any assignable cause, delirious at night. It was distinctly ascertained that he had not been drinking, nor had he been overworked; but his wife thought he had been depressed and dull for the three or four days before the attack. A neighbouring medical man bled him moderately, but without any effect upon the delirium. He was brought to King's College Hospital in a state almost maniacal, and it was thought necessary to restrain him by the strait-waistcoat. When I saw him on the following day, I viewed the case as likely to prove of the epileptic kind. I removed all restraint, and, although much pressed to adopt an opposite line of treatment, I gave stimulants and opium. Under this treatment the delirium greatly subsided, and on the following day the patient had a severe epileptic fit, which was followed on subsequent days by several others.

A third case is as follows:—A man, aged 24, a tailor, temperate in his habits, and previously healthy, has had a hesitation in his speech since his childhood. On the 10th of May, whilst at work, he was seized with giddiness and confusion of ideas.

He ran out of the house in which he worked, and, without knowing what he did, ran up and down the street, talking strangely. He continued in this state for a quarter of an hour, and then came to himself, feeling for some time afterwards depressed and shivering, with a mistiness before his eyes.

Next day he was attacked again with the same symptoms, but in a less degree, and he was admitted into the hospital, where, under a course of purgatives and a regulated diet, there was no return of the attack.

A country carman was walking alongside of his horse through the streets in the neighbourhood of King's College Hospital, when he was observed by the policeman on duty to look bewildered, and to be unconscious of where he was going: he gave incoherent answers, and was evidently quite astray in his mind. On the policeman interfering to bring him to the hospital, he resisted with violence, and became quite furious. In this state he was admitted, and it was found necessary to restrain him: he continued violently delirious for about twenty-four hours, and then fell into a comatose sleep, from which he recovered in twenty-four hours more, without any other treatment than shaving the head and keeping it cool, and the use of purgatives by enema and afterwards by the mouth. When this man recovered, we learned that he had never had any similar attack previously, nor was there any evidence of intemperance.

I am frequently in the habit of seeing a pale delicate lad, with large head, who about once in three months, whilst at work, is seized suddenly with giddiness and confusion of thought, followed by a delirious state, in which he talks incoherently, and his pupils become largely dilated; the delirium passes into a state of stupor and drowsiness, and considerable weakness. Purgatives and tonics appear to exercise a beneficial influence upon him, and while he perseveres in the use of steel and quinine the intervals between the attacks are lengthened.

When delirium occurs with patients subject to epileptic fits, it precedes or follows the paroxysm, or both precedes and follows it for very variable times. Sometimes the delirium ushers in the fit, and the patient is violently maniacal for some time previously; at others, the patient comes out of the fit in this state, which lasts a longer or shorter time, the duration of the delirium varying in both cases from some hours to several days.

The frequent repetition of the attacks in this form of delirium kills by exhaustion; or a single attack, if of sufficiently long

duration, may kill in the same way; or the patient may die in, or immediately after, the epileptic paroxysm: but in all cases the immediate cause of death seems to be a state of exhaustion induced by the violent exertion of the patient either in the delirium or in the epileptic paroxysm, or more rarely a state of depression accompanying the invasion of the delirium; or, in cases where there is no violence nor any convulsion, as if the immediate cause which determined the delirious state also exercised a depressing influence.

Now we must particularly notice that this delirium may pass off, leaving the patient in his normal state, with more or less of exhaustion, just as he would be after a common epileptic fit; or, if it end fatally, it leaves no lesion of the brain which is at all adequate to cause death,—no softening nor other alteration of texture. In recent cases, indeed, the brain appears quite normal, with the exception of some variation in the quantity of blood in the blood-vessels dependent on the circumstances which immediately preceded death. As a good example to show that such an apparently normal state of the brain is quite consistent with severe and long-continued epileptic delirium, I shall adduce the sequel of one of the cases to which I have already referred. The patient, Wm. Measures, was admitted in violent delirium. At the end of the second day, as this was subsiding, he had two epileptic fits, one of which lasted half an hour,—the second, five minutes. On the two following days he had a recurrence of the fits, which increased his exhaustion. In the evening of the fifth day he went off into a sleep so tranquil that the nurse did not wake him to give him the stimulus ordered for him (ʒij. brandy, om. hora), and he died rather suddenly during the night. The brain was very carefully examined after death, and no morbid appearance whatever discernible; the Pacchionian bodies were well developed, and the grey matter of the convolutions and elsewhere was pale; in all other respects the brain was one which no anatomist could regard otherwise than as healthy.

I shall have again to allude to this pallor of the grey matter as the most remarkable and the most frequent appearance which the brain presents after death from delirium. Sometimes there is with it a large quantity of subarachnoid fluid; at other times there is a total absence of that fluid: so that the pallor of the grey matter which one might be tempted to attribute to a post-mortem infiltration by the subarachnoid fluid, has really no connection with it.

Renal epileptic delirium.—In some of these cases of epileptic delirium we find albuminous urine, either only at the com-

mencement of the attack, and disappearing as it goes off,—which I take to be the least frequent occurrence,—or lasting throughout it and after it, and indicating the probable previous existence of chronic renal disease. These are true epileptic cases; but the imperfect action of the kidney may be justly regarded as a highly probable exciting cause; and so frequently do they occur, that in every instance of delirium, especially of the epileptic kind, the practitioner ought to inquire early into the state of the kidneys by careful examination of the urine. Whether a morbid state of the kidneys may properly be looked upon as the determining cause of the epileptic state and of the delirium, this is a question which I shall reserve for another part of this inquiry; suffice it now to say, that the ascertained coexistence of renal disorder with epileptic delirium is an important feature of such cases, and that clinical research leads us to regard it as an unfavourable omen with reference to the issue of the case. For these reasons I propose to distinguish this affection by the title *renal epileptic delirium*.

George Addis, æt. 43, of intemperate habits, who followed the occupation of a waiter at places of public entertainment, had been in a low gloomy state for some time, in consequence of having been robbed of a sum of money which he had saved. One evening, whilst performing his duties as a waiter, he became incoherent and odd in his manner, and let a tray of glasses fall from his hands. Soon after this he had two or three epileptic fits, and a day or two following he was sent into the hospital. On his admission he was quiet, but not coherent, rather inclined to sleep. On that day, the 1st of December, he had two epileptic fits of short duration. Next day he remained in much the same state, a little more excited, and knocked his head frequently against the wall or bed; fidgetting about in the bed, and staring about him in a vacant manner; at night he became so restless as to require the constant attendance of one person, and he was noisy. Next day he became still more noisy, appearing scarcely sensible; he was evidently unable to continue any train of thought. On addressing him loudly he would begin the answer to a question correctly, but soon pass to some other subject, or become sleepy.

On the fourth day from his admission the epileptic fits recurred, and he became comatose in the intervals, and much prostrated, and died in the coma succeeding the fit.

From the time of his admission the urine was highly albuminous.

The brain, upon careful examination, afforded no mark of disease; the membranes were healthy; the grey matter of the convolutions pale. There was slight hypertrophy of the left ventricle of the heart, and some puckering of one of the aortic valves. The kidneys exhibited an early stage of chronic nephritis.

Delirium in chorea.—Delirium occasionally occurs in the allied malady of chorea. In the cases of general chorea it is developed in the latter stages of those violent shakings which kill the patient by exhaustion.

I have met with one case of severe delirium which was ushered in by symptoms of chorea, and was successfully treated on a plan similar to that which I have adopted with benefit in severe cases of chorea.

The patient, Benjamin Channon, æt. 20, was admitted Jan. 27, 1847; by occupation a saddler; never had epilepsy, but eleven years prior to his admission had chorea, which affected his intellect to such a degree that he became almost idiotic, and was under treatment for three months in the Middlesex Hospital, leaving it perfectly restored. Seven years afterwards he had another slight attack without any impairment of intellect. A month before his admission the choreic symptoms began to reappear: the first indication being fidgetty movements of his fingers, which were soon followed by the characteristic jerking movements of the upper and lower extremities, especially those on the right side, and also of the muscles of the mouth. These symptoms having continued for a month, on the morning of the 26th of January he suddenly took it into his head that a conspiracy had been formed against him: he jumped out of bed, and rushed downstairs into the street in his night-shirt: he was with difficulty captured, and brought to the hospital in a state of furious and frantic delirium, talking and shouting out, and sometimes he would quote Shakspeare, in whose writings, it appears, he was learned; then he would sing and whistle: again he would assume an angry mood, and bite and snarl at all who came near him, and at the bed-clothes and the strait-waistcoat with which he was restrained. The choreic convulsive movements were still present, and he put out his tongue with that peculiar thrust which is characteristic of this disease.

This state of delirium lasted several days, and was accompanied with such great exhaustion that I was compelled to administer food and stimulants very frequently, and in considerable quantity. To a treatment of this kind, to which was added cold affusion twice a day for three or four days,—a plan which I was led to adopt from

the idea of the connection of the delirium with chorea,—the symptoms yielded steadily, so that in a fortnight all signs of delirium had disappeared, and in a month the choreic symptoms had completely vanished.

Hysterical delirium.—Not far removed from the epileptic delirium is that which occurs in aggravated states of hysteria, and which is well known to practical men as *hysterical delirium*, and which frequently assumes a chronic form, when it may be properly called *hysterical mania*.

The following sketch will, I think, embrace the leading particulars of the clinical history of this interesting malady:—

A girl of hysterical constitution has been somewhat out of health, without, it may be, any very prominent symptom, excepting, perhaps, headache; her spirits are more or less depressed, and she shows some tendency to hysterical paroxysms,—she may have one or two; presently she does not so readily as usual recover from one of these; she becomes odd in her manner—obstinate—talks at random—refuses food—and she is now evidently delirious, which may be accompanied with more or less of stupor and indifference to all around, or may be violent and furious: she will try to get out of bed—be mischievous—attempt to injure herself or her attendants—wakeful; and in such cases it is that the patient will act and talk in a manner apparently the most repugnant to the character and reputation she had previously enjoyed, or the real defects in her character: her real inclinations, which principle, or prudence, or cunning, had taught to overcome or conceal, will become developed, and she will be obscene or amorous, or exhibit violent hatred towards others, or other feelings to them: it may be that she will now speak the truth, which before she did not venture to do:—*in delirio veritas, as in vino veritas.*

In many instances the paroxysm of hysteria is accompanied by delirium, of greater or less intensity, which comes on and goes off with the paroxysm, or remains for some time after it, or may precede it; and this form of hysterical delirium obviously resembles the epileptic, in the relation which it bears to the paroxysm, just as the hysterical paroxysm often resembles the epileptic so closely that it is impossible to distinguish the one from the other.

This form of delirium is not often fatal. If not treated on a depressing or lowering plan, its tendency is to recover, or to pass into a chronic state, from which the patient may emerge in safety, or may become hopelessly lunatic.

Now and then we have opportunities of making post-mortem inspections of the

brain, which on such occasions afford no indications of any special lesion during life, beyond such as show that the general nutrition of the brain had been disturbed. In the case of a young lady who died after five weeks' delirium of this kind, I made a most careful examination of the brain: it looked somewhat shrunk, the convolutions small, and the subarachnoid effusion increased in quantity: the grey matter of the convolutions was slightly softened, but not more so than might be expected from its lying in contact with fluid for twenty-eight hours after death. Some of the smaller arteries penetrating the surface of the brain at the fissure of Sylvius seemed somewhat dilated; and some extremely small extravasations, less in size than a pin's head, had taken place into the mammillary bodies; not more than five or six in each.

This girl was a person of strong sexual passions, and of ill-regulated temper: she was at an early period of life left an orphan in the hands of indiscreet relatives, mistress of a small fortune, with all the ideas of the heiress of a considerable property. She was opposed successfully by her relatives in a love affair, which led to many family discussions and scenes, on which occasions she exhibited great violence. At length, after having been hysterical for some time, she exhibited undoubted signs of delirium, in which she was at times very violent; and she refused food for so long a time that it was found necessary, in consequence of her state of debility, to feed her with an œsophagus-tube. These points of the history of this case are of importance, as serving to explain the dilated state of the small cerebral arteries, which was produced, no doubt, by the frequent excitement of temper to which the patient was liable before her illness, and to the violence which she occasionally exhibited after the delirium had commenced, and the efforts she made when it was found necessary to make use of restraint.

In another fatal case, the subject of which was a young lady of 22 years of age, I found the brain and its membranes in a healthy state. The pia mater was well injected, but not more than might naturally be expected in a young person of active mind and with a well-developed brain, and the arachnoid was perfectly natural. The brain itself was as perfect a specimen of that organ, in a well-formed Caucasian female of considerable personal beauty, as I ever beheld.

The history of this case was as follows. She was of a highly hysterical diathesis, and irregular as to the catamenial function; the menses sometimes appearing too soon, at

others retarded; sometimes profuse, and again scanty. She was accustomed to live in the country, but she had recently come to town to help her sister (who was in bad health) in looking after her domestic concerns. Her sister having been obliged to leave town, she was left in charge of her establishment, the responsibility of which she seemed to feel acutely; at the same time she exposed herself to a great deal of fatigue in escorting a country friend about town "to see the lions," and going to musical parties. On the 3d of April she complained much of throbbing headache, and she had passed two sleepless nights; she suffered from loss of appetite and nausea. There was no fever. The pulse 76. On the 4th, after another restless night, the pain in the head remained, and she vomited some of her food. On the 5th there was great irritability of stomach; everything, food and medicine, was rejected. She complained of severe pain at the vertex. Pulse 64. No heat of skin. On the 6th the vomiting continued, so that she retained no food. She retched a great deal, and brought up bile and mucus. Headache intense. Sleeplessness. Pulse 60. Tongue coated. This day a dozen leeches were applied to the temples, which bled freely, and the pain in the head was much relieved, and the vomiting ceased for several hours: it returned, however, in the night, and she rejected both medicine and food.

7th.—She became talkative and noisy. There was still sickness. Pulse not above 70, and of a sluggish character. Light painful to the eye; pupils sluggish.

8th.—Delirious: in sleep talkative and dreaming. It is necessary to rouse her by addressing her loudly in order to gain her attention. There is a slight appearance of squint with the right eye, but this was probably nothing more than an increase in a natural cast in the eye, which we know is often produced in persons so formed under emotional excitement.

From this time the patient became extremely depressed. The delirium continued, alternating with a semicomatose state; and on the 12th she became almost completely comatose, retaining sufficient consciousness to enable her to take nourishment, which was rendered the more necessary in consequence of the exhaustion caused by a troublesome diarrhoea, which was probably caused by some calomel which had been given her. She died on the 14th.

I was much embarrassed in the treatment of this case by the resemblance of the symptoms to those of cerebral inflammation, which led me for some time to adopt an antiphlogistic plan, with which the

powers of the patient were not very well able to cope. The vomiting, the pain in the head, the tendency to a comatose state alternating with delirium, are symptoms generally recognised as indicative of inflammation within the cranium; but against these might be placed the absence of fever, and of quickness of pulse; the hysterical constitution, and the previous fatigue and exhaustion; all of which, taken in conjunction with the results of the post-mortem inspection, convince me that the case was one of hysterical delirium, and that it would have been better had the patient been spared all antiphlogistic treatment.

Men are liable to a form of delirium which bears a close analogy with the hysterical delirium of women, and which there can be no doubt is intrinsically of the same nature. I have seen it in over-worked professional men, in students, and in hard-working artizans, even when of temperate habits.

The following instances will serve to illustrate this form of delirium. A gentleman, of 35 years of age, a solicitor, a man of gouty habit, and highly sanguine temperament, having been unusually engaged in business of an anxious kind, was attacked with symptoms of catarrh, extending to the bronchial tubes, but neither violent nor extensive. This, however, had a most depressing effect upon him; and on the third or fourth day he became violently delirious. He knew every one around him, but could not be persuaded that his affairs were not in a ruinous condition; at the same time, however, he would devise very reasonable plans for extricating himself from his supposed difficulties. He was very wakeful, and was with difficulty restrained from getting out of bed, to take, as he said, the necessary steps for arranging his affairs. This state of delirium continued more or less for a week, and passed off with profuse sweats and long sleeps, leaving the patient in a state of great exhaustion, notwithstanding diligent supplies of support and stimulus, which were constantly administered to him.

In another instance, a young man of 25, who was pursuing the profession of a teacher of music, had been working very industriously at the studies necessary for his profession, and at the same time his mind was much engaged with religious subjects, and greatly excited by the ardent appeals of one of those preachers who address themselves chiefly to the feelings of their hearers, and aim at exciting their imagination rather than at convincing their judgment. His illness, as in the previous case, began with a catarrh of a slight kind, but accompanied with considerable prostration of

strength. Delirium became developed in a few days, and it was with the greatest difficulty the patient could be controlled. His thoughts were wholly occupied with religious subjects, evidently of the same nature as those of the discourses of which he had lately been a hearer. He imagined himself a prophet sent by God for the regeneration of mankind, and that it was necessary, prior to his entering upon his prophetic office, he should die, and that after three days he should return to life, and then proceed upon his tour of declaring his message to different people. He used to feign being dead when I was present, but was not able to keep up the appearances of death throughout the day. Having for a day or two humoured his fancy by appearing to be greatly shocked at his death, and to believe in its reality, the next day I gave him some practical proofs of his vitality, and threatened to make a post-mortem examination of him, and to open his head on the following day, unless he revived. This had the desired effect. The next day I found him restored to life, much more tractable, willing to take food, and in about a fortnight he had completely recovered, but with considerable weakness.

Puerperal delirium.—I shall next notice the delirium which accompanies the puerperal state, which resembles very closely hysterical delirium, and is no doubt essentially of the same nature. It is well known under the name of puerperal mania, or puerperal insanity; but, although this title may justly be given to some of the cases which are very chronic, it seems to me that it is quite as erroneous to say of patients who had suffered from this form of delirium, that they had once been insane, as to class among lunatics patients who had once suffered from the delirium of typhus or of erysipelas.

The clinical history of this form of delirium is told in a few words.

It occurs generally soon after parturition, and during suckling; rarely during the latter months of pregnancy.

It is most frequently brought on by some mental emotion, or by some great exhaustion,—as from a lengthened labour with a dead child, or profuse hæmorrhage, or by the debility induced by suckling in a feeble constitution.

It is apt to occur in women of hysterical constitution; but it may be developed in persons with whom the marks of that state of constitution are not prominent.

As in other forms of delirium, the mental disorder appears to be very various, from slight raving to the highest degree of fury, or from slight melancholy to a state of depression and dulness almost amounting to coma.

The greatest number of cases of puerperal delirium recover. Dr. William Hunter pointed out the very important practical fact that it is the amount of fever, or rather perhaps the rate of pulse, which may be taken as the best guide in forming the prognosis. Although I have not seen this form of delirium on an extensive scale, I have seen enough of it to lead me to believe that Dr. Gooch gives a perfectly accurate account of it, when he says that there are two forms, the one attended by fever, or at least by a rapid pulse; the other accompanied by a very moderate disturbance of the circulation; and that the latter cases, which are by far the most numerous, recover; that the former generally die. These are the cases which are in the greatest danger, and which require the most constant vigilance on the part of the medical and other attendants on the patient.

There are, however, as Dr. Gooch remarks, some other circumstances to be taken into the account of the prognosis. Thus the early appearance of the delirium after delivery, especially if it be of the maniacal kind, is more dangerous to life than its late appearance, and its being of the melancholic kind. "Nights passed in sleep, a pulse slower and firmer, even though the mind continues disordered, promise safety to life. On the contrary, incessant sleeplessness, a quick, weak, fluttering pulse, and all the symptoms of increasing exhaustion, portend a fatal termination, even though the condition of mind may be apparently improved." Dr. Gooch adds that, in the cases which he has seen to terminate fatally, the patient has died with symptoms of exhaustion, not with those of oppressed brain, excepting only one case. One of my own cases died apparently from the exhaustion caused by removing the patient from her bed, which was done with great care, in order to have her cleaned and the bed made.

In examining the heads of patients who die of this disease, we fail to discover any distinct evidence of special lesion, either of the brain or its membranes, excepting in cases where some previous disease of the brain had existed. In those fatal cases recorded by Dr. Gooch, no morbid appearance was found other than that which follows loss of blood. Esquirol makes this statement—The examinations of the bodies of those who have died, whether recently confined or nursing, after having been a longer or shorter time disordered in mind, discovers nothing which throws light upon the material cause, nor upon the seat of this derangement (tom. i. p. 244.)

Anæmic delirium.—The next form of delirium which I shall notice is that which arises from deficiency of blood, or what I

may call *anæmic delirium*. It may arise where the blood is imperfectly formed, or where the system has been subjected to great losses of blood. Thus in some cases of extreme chlorosis we meet with delirium which is apt to assume the maniacal character; and, on the other hand, it may arise in cases of profuse menstruation or menorrhagia. Some of the cases of hysterical delirium are nearly allied to this; and if the hysterical diathesis exists in a patient subject to excessive losses of blood, it will predispose to this form of delirium.

Again, many of the puerperal cases of delirium are clearly attributable to the excessive losses of blood from hæmorrhage, or from unduly active depletion by leeches or by general bleeding. Dr. Marshall Hall lays it down, and, I think, with great justice, that "loss of blood is by far the most frequent and influential source of delirium or mania occurring in the puerperal state."

A good example of this form of delirium is given by Dr. Abercrombie. "Many years ago," he says, "I saw a man who was seized with bleeding from the nose to such an extent that at last it became necessary to arrest it by pieces of sponge carried up from the fauces. Next day he was without complaint, except great weakness; on the third day he became highly maniacal; pulse generally from 90 to 100, and soft."

This form of delirium is not unfrequently preceded or followed by attacks of violent convulsions. I related a remarkable case of this kind in the Lumleian lectures of last year. The patient was a delicate woman, who miscarried, with some hæmorrhage; after this she became thin and pale. While in this state she experienced some giddiness of the head, as well as slight delirium, for which she was bled, and had leeches applied: owing to the giving way of the bandage on her arm, and the application of additional leeches to relieve the supposed congestion of the head, she lost still more blood: her convulsions recurred, and she became delirious and maniacal.

Cases of this kind will be more rare when a more general assent is given by members of the profession to the doctrine that congestion of the brain will not account for giddiness and delirium, and other signs of disturbed cerebral function.

Traumatic delirium.—A remarkable form of delirium has long been known to surgeons as apt to follow severe injuries, whether from accident or from surgical operation. Dupuytren has left a highly graphic description of this form of delirium, and gives it the name of *nervous* or *traumatic delirium*.

A man meets with a severe accident, a compound fracture, or he undergoes a great

surgical operation: for a day or two matters seem to go on well, when he suddenly becomes confused in his ideas, incoherent, and at length he becomes wild and talkative, and wakeful; refuses food, tries to get out of bed, perhaps tears off his bandages or splint; and, what is very remarkable, seems perfectly indifferent to pain, and moves the broken limb or injured part as if it were in a natural condition. Sleeplessness is a prominent feature of this delirium; and when that is overcome, as it frequently may be by the careful use of opium, the patient gets well; but sometimes the delirium is so violent as to exhaust the patient in a few days. Nor does the delirium always bear a direct proportion to the severity of the injury. Dupuytren relates the case of a young man in whom it came on in consequence of a slight injury to one of his toes, and killed him in two days.

In these cases, as in the other examples of delirium which I have mentioned, post-mortem inspection discloses no lesion of the brain or its membranes. "Neither in the cerebro-spinal apparatus, nor even in the other organs," says Dupuytren, "can we perceive any material lesion which can explain the disturbance which has taken place during life, which can afford a satisfactory explanation of the cause of death."

Delirium occurs in connection with typhus fever, with erysipelas inflammations of internal organs, as the heart and lungs, and with the exanthemata.

Delirium of typhus.—The delirium of typhus is apt to come on in the second week: it varies in its characters from a low muttering semicomatose condition to a highly-excited maniacal state. Coming on in the course of a disease, which so terribly prostrates the powers of the patients, it must be regarded as a very formidable symptom, especially when it assumes the maniacal form: for, under the influence of this state of excitement the patient is prompted to get out of bed, or otherwise to make great exertions, and thus exhaustion is produced, and not unfrequently a patient will die from sudden syncope caused by some effort he has made.

I have had many opportunities of examining the bodies of patients after the delirium of typhus; and in no instance have I been able to detect any lesion bearing upon the delirium. The brain in typhus is essentially healthy; but the condition of its blood-vessels corresponds with that of the blood-vessels every where else—namely, a state of laxity of their coats, while they contain, or appear to contain, more than their normal quantity of blood, and that of a dark venous kind; in some instances there is more or less subarachnoid fluid;

in others the fluid is absent: never is there any sign of an active morbid process, like inflammation, either in the brain or its membranes, tending to generate new matter, as lymph and pus, and to destroy existing tissue.

This form of delirium is of much shorter duration than most of those which I have already described; nor has it any tendency to degenerate into a chronic state, as is the case with the hysterical and with the puerperal delirium. Like the traumatic delirium, it seldom lasts many days, either killing the patient by exhaustion, with more or less of coma, or ending in recovery.

Erysipelatous delirium.—The delirium of erysipelas resembles very closely that of typhus, excepting in this point, that it is perhaps more frequently of the more active and violent, than of the low and muttering kind. It commonly comes on with more or less of suddenness: you leave your patient going on well; on your next visit, a few hours afterwards, you find him talkative, rambling, attempting to get out of bed, noisy, and soon he becomes so violent as to require the constant watchfulness of one or two attendants, or the restraint of the strait-waistcoat, to prevent him from injuring himself or others.

It occurs in both idiopathic and traumatic erysipelas; and is not confined to that of the head or neck, but will take place in cases in which the erysipelas is confined to the trunk, and never reaches the head. It seems more apt to occur in debilitated subjects—in patients after operations which have caused much loss of blood—and in the low and decidedly typhoid forms of erysipelas.

Patients die in it, just as in the delirium of typhus: they die suddenly in an effort, or they become much exhausted, or they fall into deep coma; but more frequently they recover, especially if care be taken to prevent them from making violent exertions, and to give them a proper amount of support. The duration of this delirium is not in general above a few days, and it very rarely degenerates into a chronic state.

The inspection of the brains in these cases shows no sign of active disease, nor any evidence, as might not unreasonably be supposed, of a state of brain similar to that of the external parts. The erysipelas does not fly from the exterior to the interior: there is no metastasis, although I should not be prepared to say that the brain is not affected by the poison of erysipelas. It is certain, however, from numerous post-mortem examinations, that the brain and its membranes of patients dying under this form of delirium, exhibit no

morbid alteration of any kind sufficient to account for the phenomena. What I have most frequently seen in this, as in other forms of delirium, has been a state of pallor of the grey matter, and an increased number of bloody points in the white matter of the hemispheres.

Rheumatic delirium.—That form of delirium which accompanies inflammation of the lung, or of the heart, occurs so commonly, if not uniformly, in the rheumatic state, that I shall describe it in connection with that delirium which arises in the course of rheumatic fever, under the name of *rheumatic delirium*.

The following description of this form of delirium accords with what I have myself seen, and what I find recorded by others:—

A patient is seized with all the ordinary symptoms of rheumatic fever, and he goes on without any untoward symptoms,—it may be for only three or four days, it may be for a week, or even later,—when the nurse having perhaps reported that he passed a restless night or two, and wandered more or less, we find him delirious, raving, talking wildly, and, as in the traumatic delirium, entirely disregarding his hitherto exquisitely painful, and still swollen joints. The tendency in these cases is to the acute maniacal state, and to wakefulness; so that frequently the patient requires restraint, and always the closest watchfulness.

As in the other acute forms of delirium, patients often die suddenly in this, evidently from exhaustion. Sometimes they quickly fall into a state of profound coma, which lasts from one to twenty-four hours, and terminates in the death of the patient. I suspect that moving patients from one place to another in rheumatic fever is apt to bring on this mode of termination; for I have had several cases in which a patient was brought into the hospital late in the afternoon, having been three or four days ill of rheumatic fever, and in the course of the night he became delirious, and then comatose, and died.

This delirium is sometimes ushered in by other symptoms, which denote a more extensive disturbance of the nervous system than delirium would do. Thus, a patient will be seized with chorea-like jactitations affecting the upper extremities, and the muscles of the face; and sometimes a condition almost tetanic is present, and more or less of rigidity and oposthotonos are produced.

Coincident with the first appearance of these symptoms, that is, either of the delirium or the jactitations, we frequently find, but by no means always, the first signs of inflammation of the pericardium, or of the

endocardium, or of one or both lungs, or of the pleura; and as the delirious state diverts the mind of the patient from the perception of all pain, it often happens that no other indications of the internal inflammation can be obtained than those of the physical signs, the rubbing sound, or the bellows-murmur, or the altered breathing sounds: and hence it has not unfrequently happened that in the midst of the great disturbance of the intellect, the inflammation within the thorax has been unsuspected, and undetected.

Judging from my own observation of this delirium, I would lay it down that it occurs chiefly in those patients who exhibit considerable pallor, whether that pallor be simply the result of the rheumatic state, or of that combined with the effects of a greater or less loss of blood. I have seen it brought on in a patient, who had previously exhibited no untoward symptom, by the application of some leeches to a rheumatic joint, without any cardiac inflammation: and I have also seen it come on after very large bleeding, both general and topical, where there was no very extensive development of the rheumatic state, and where, also, the signs of cardiac inflammation were at most indicative of but a slight endocardial inflammation. But, on the other hand, nothing is more certain than that it has come on where there has been no bleeding practised at all: and that it has got well when bleeding, topical or general, has been practised *after* the appearance of the delirium.

The inexperienced practitioner is apt to mistake these cases for inflammation of the brain and its membranes, and to treat them accordingly. The first case of the kind which occurred to me, many years ago, convinced me of the error of this view. A fine young woman, of 25 years of age, was under treatment for rheumatic fever: pericarditis was present, and detected by leeches, blisters, and mercury. On the second day after the discovery of the pericardial inflammation she became delirious and furious: her head was shaved, leeches applied to the temples, and a thorough antiphlogistic plan pursued, but the patient sank into coma and died. And the post-mortem examination showed a brain healthy, but pale and exsanguineous, with membranes devoid of the slightest indication of morbid deposit.

My friend, Mr. Henry Smith, of Caroline Street, Bedford Square, has communicated to me the following case, which occurred to him in May, 1848, and which I may mention to show that antiphlogistic treatment applied to both the heart and the head will not avert death. A Navy officer, aged 43, who had lived hard, was

attacked with rheumatic fever, complicated with pericarditis and pleuro-pneumonia, which appeared on the fifth or sixth day, and was duly detected. He was treated by leeches, and calomel and opium. In two or three days more, violent delirium became developed, for which Mr. Smith at first prescribed opium; but a physician who was called in, believing that the delirium depended on inflammation of the cerebral meninges, prescribed leeches to the head, which were applied: the delirium, however, increased, and the patient died. The heart was found covered by a thick layer of lymph, and the brain and its membranes were perfectly healthy,—the former being “white, and comparatively bloodless.”

And, moreover, these cases will die even when a very slight affection of the heart exists. I take the following from the records of the Pathological Society of London:—

The patient, a girl, 21 years of age, died on the seventeenth day of rheumatic fever, there having been no untoward symptom up to the day preceding her death. On that day she began to be restless, and to exhibit indications of approaching delirium; during the night the delirium became fully developed, and early the next morning she became quieter, as if from exhaustion, and she gradually became comatose, and died at 6 A.M. She was examined nearly thirty hours after death, and Dr. Bence Jones, whose patient she was, reports “that the brain and its membranes were rather dryer than natural, but otherwise presented nothing remarkable. No excessive congestion was found, and no effusion of blood or water.” And as regards the heart—“About two ounces of serum were found in the pericardium; the *very slightest roughness* of the surface of one auricle was observed, but otherwise there was no evidence of inflammation of the pericardium; the valves of the heart were perfectly healthy.”

And such is the history of all these cases of rheumatic delirium. It is, as with all the other forms of delirium which I have enumerated, that no morbid appearance whatever is to be found in those organs, the brain and spinal cord, whose functions are so disturbed as to mask and conceal the symptoms of more serious disease affecting other organs. Were I to rely on my own experience of these cases, and on such cases as I have met with recorded in various works, or as have occurred in the practice of friends, I would say that no organic disease—*i. e.* no inflammation, no effusion of pus or lymph—is ever met with where this rheumatic delirium occurs. But I hesitate to make this statement, because so high an authority as Dr. Watson admits

that metastasis of rheumatism to the brain may take place, and adds—"Nay, I know that it is so—that it sometimes *is so*, but not often."*

Whoever will take the trouble to read the 7th section of my friend Dr. George Burrows' excellent work on Disorders of

the Cerebral Circulation, will find there a body of evidence of the most valuable kind in favour of the non-existence of any inflammation of the brain or its membranes in this delirium. Did time permit, I could add several cases to those which Dr. Burrows has enumerated, all corroborative of the same important point in the clinical history of this disease.

* Lectures, 2d edit. vol. ii.

LECTURE II.

Gouty delirium—Delirium e potu, or delirium tremens—Delirium from the habitual use of opium—Toxic delirium, from the direct influence of poisons introduced into the system—Delirium in the exanthemata—Clinical history of coma—Epileptic coma—Abercrombie's simple or congestive apoplexy—Cases—Renal epileptic coma—Coma after scarlet fever, dropsy, and after acute dropsy—Slight attacks of epileptic coma—Paralytic strokes—Their connection with diseased kidney and bladder—Hysterical coma—Mesmeric coma—Case of spontaneous mesmeric coma—Mr. Dunn's case—Concussion of the brain, or traumatic coma—Coma from compression of the brain—Apoplexy—Can coma be caused by an increase of subarachnoid fluid?—Rheumatic coma—Gouty coma—Coma accompanying typhus and erysipelas, and the exanthemata—Coma from anaemia—Coma from poisons—Recapitulation.

I CONCLUDED my last lecture with a description of that remarkable form of delirium which frequently accompanies rheumatic fever, and which is so apt to make its appearance simultaneously with some of those severe internal inflammations—carditis, or pneumonia, or pleurisy—which so often complicate that malady.

It will be necessary for me, by and bye, to consider the question, whether this remarkable and most interesting form of delirium is dependent immediately upon the cardiac or pneumonic inflammation, or whether it is merely a part of the general constitutional disturbance. I shall, however, here allude to an important point which favours the latter solution of this question—namely, that in cases of general gout, which resembles rheumatic fever in so many points, a delirium of precisely the same kind as that of rheumatic fever occurs, running the same course, and presenting the same features in its clinical history. A man who has had one or more attacks of gout in his great toe or in his instep, becomes affected with the same disease in all his joints,—knees, wrists, fingers, and toes. Towards or at the end of the first week he becomes delirious, without any internal inflammation, and without any cessation of the articular affection, and the delirium runs a course of some days, the patient

emerging from it in safety, or dying exhausted and comatose, no trace of any inflammatory process being discoverable within the head, nor in the heart. This is one way in which gout may be said to affect the brain; and, therefore, I would distinguish it as the gouty delirium,—a feature in the clinical history of general cases of gout which, like all the other forms of delirium, the practitioner should be prepared to meet, and to deal with on fixed principles, grounded upon the most reasonable views of its pathology. And I may add, that the delirium may occur in cases where the gout is not general, but limited to one or two joints; but it more frequently occurs when the disease affects several joints.

Delirium tremens.—I have reserved for the last the reference which I wish to make to a form of delirium with which physicians are better acquainted than any other form, as being of much more frequent occurrence.

This is the delirium of drunkards—the delirium *è potu*—the delirium tremens.

I suppose there is no man who indulges largely and constantly in his potation who does not sooner or later fall into this state of delirium.

The progress of such a man may be thus described:—He drinks freely at and after dinner: in the morning, in consequence of the deranged state of his digestive organs, caused by the previous night's debauch, he feels low, languid, and out of sorts, and he is induced to have recourse to the use of stimulants,—wine or spirits, or beer; and so, by degrees, he becomes habituated to taking largely of stimulants, without being aware how much he really takes. He now becomes dyspeptic, flatulent, thirsty: he loses his appetite for food, but craves for stimulants, which supply, in a great measure, the place of ordinary food. Like Boniface, he eats his ale, he drinks his ale, and (when he can) he sleeps upon his ale; but, unhappily, he does not find it so easy to sleep now as he used; he is a long time before he can get to sleep; he is nervous, fidgetty, and restless, and a peculiar tremor is observed to accompany nearly all his voluntary movements, especially those actions which are purely voluntary, and are unaided by reflex actions. Thus, his hands tremble more or less: he cannot write

steadily: if you ask him to hold out a heavy book, or other object, you will find he cannot do so without more or less of tremor: he speaks tremulously; and, in extreme cases, the patients exhibit a marked degree of nervousness and anxiety on almost all occasions.

The deranged digestion, and the want of complete sleep, soon produce the most destructive influence upon the nutrition of the body, and especially upon that of the brain. Memory and the power of thought begin to fail; the patient loses his control over his thoughts; he is apt to wander: illusions take possession of his mind; subjective phenomena of vision or hearing are continually occurring. One who was himself a victim to this dreadful vice thus describes his experience of this stage of the progress of the drunkard:—"Hideous faces (he says) appeared on the walls, and on the ceiling, and on the floors; foul things crept along the bed-clothes, and glaring eyes peered into mine. I was at one time surrounded by millions of monstrous spiders, who crawled slowly over every limb; whilst beaded drops of perspiration would start to my brow, and my limbs would shiver until the bed rattled again. Strange lights would dance before my eyes, and then suddenly the very blackness of darkness would appal me by its dense gloom."*

At length the stomach becomes irritable, and rejects everything, or the supplies are cut off, both of solids and liquids, or the patient falls ill of some other disorder, or meets with an accident which subjects him to an antiphlogistic treatment. Now is the time when the delirium fully develops itself; the patient often becomes furious and unmanageable, and sometimes, in the paroxysm of delirium, destroys himself by jumping out of a window, or in some other way. The delirium, if not violent, is of that kind which is called *busy*; the patient picks the bed-clothes, or catches at imaginary objects floating or flying in the air before and around him.

As this delirium is clearly due to the habitual use of alcoholic stimulants, patients are apt to have several attacks of it, in one of which, sooner or later, they perish. Unless the habit is broken, the delirium will surely recur. Death is caused by exhaustion,—by epileptic paroxysms, which are very apt to come on after a long course of habitual drinking,—or by coma.

If the patient die in a first or second attack, the brain and its membranes will exhibit no indication whatever of disease; but, if he has had several attacks, there will

be signs of considerable alteration in the nutrition of the brain and its membranes. These changes are very similar to those which are found after frequent and repeated attacks of epilepsy. They consist of the following:—More or less of thickening and opacity of the arachnoid; enlargement of the Pacchionian glands; shrinking of the convolutions of the brain, and enlargement of the integyral sulci.

The tendency, in general, of these cases is to recovery; but, after repeated attacks, the danger to life is greatly increased, because of the deranged state of cerebral and general nutrition.

And it is important to remark, that, as in most of the other forms of delirium to which I have referred, a low state of the system,—the loss of blood,—powers enfeebled by a too rigid or too long continued antiphlogistic treatment,—are highly favourable to the production and the persistence of this delirium.

This form of delirium is highly interesting, because it is clearly due to the introduction of alcohol into the blood, which tends to poison the brain, and seriously to impair its nutrition. It may, therefore, be regarded as typical of a class of delirious cases, arising from the introduction of a poison into the system, and which may be designated as cases of *toxic delirium*.

The form of delirium which I have just described is very closely imitated by the habitual use of opium; the same tremulousness,—the same impairment of the powers of thought and memory,—the horrors,—are all met with, as the result of the long-continued ingestion of this drug.

When alcohol is taken into the system in large quantity at once, it produces, in many persons, a violent state of delirium, which does not cease until the greatest part of the alcohol has been eliminated.

The inhalation of chloroform, of ether, and of other substances of this kind, will produce a kind of delirium when the inhalation reaches a certain point, but which speedily passes into coma when the inhalation is carried beyond that point.

Indian hemp, henbane or hop, belladonna, conium, and, indeed, the whole class of narcotic drugs, are capable of producing, especially in some persons, delirium of this kind.

The poisons of the exanthemata, too, produce delirium; that form of delirium which often develops itself in the premonitory fever of scarlatina, measles, small-pox, is of this kind, and will often disappear as soon as the characteristic skin affection becomes fully developed; or, in some severe cases, will continue throughout all the stages of the disease, until the poison has been fully eliminated from the

* The Autobiography of J. B. Gough, quoted in Dr. Carpenter's Prize Essay on Alcoholic Liquors.

system; or, again, in others, it will show itself only in the more advanced stages of the malady, when some check has been given.

I have thus enumerated, and rapidly glanced at, the principal points in the clinical history of the various forms of delirium which the practitioner may meet with. I have described—

1st. The epileptic delirium, and the choreic delirium.

2dly. The renal epileptic delirium.

3dly. The hysterical delirium and that of over-worked men.

4thly. The puerperal delirium.

5thly. The anæmic delirium.

6thly. The traumatic delirium.

7thly. The delirium of typhus.

8thly. The delirium of erysipelas.

9thly. The rheumatic and gouty delirium.

Lastly. The toxic delirium, or that which is distinctly due to the direct introduction into the circulation of a poisonous material, of which the delirium of drunkards, or delirium tremens, is typical.

And I have been careful to enumerate them, and to designate them according to some special feature; because it is only by a careful examination of all the states which are favourable to delirium, that we can obtain all the data which will guide us to a safe generalisation respecting the pathology of this remarkable affection.

We shall, however, be in a better position to examine this question when we have collected such details as I can respecting the clinical history of coma.

And as we have seen that delirium occurs in a great variety of circumstances, and under conditions which, to a superficial observation, might appear to be essentially different, so we find coma developed under as great a variety of conditions, and (what is highly deserving our attention) which are in close analogy with those which give rise to delirium.

In speaking of coma it must be understood that I use that term as exhibiting various degrees of the same state: from that profound insensibility in which no other actions take place in the body but those which are purely physical, in which all sense and volition are suspended, to a state of hebetude and lethargy, in which the sensibilities are rendered obtuse, and the motor powers correspondingly sluggish.

Now we have, as I said before, coma occurring under circumstances in close analogy with those under which delirium occurs; and I may at once state, as simplifying what I have to relate respecting the clinical history of coma, that we have it occurring in epileptic states, or what

may be called *epileptic coma*. 2dly. We have it in hysteria—*hysterical coma*. 3dly. We have it under circumstances which have exposed the system to some severe shock, as from great injuries—*traumatic coma*. 4thly,—and here the analogy with delirium fails,—we have coma arising from *compression* of the brain, as from an injury to the skull with depression of bone; or hæmorrhage within the cranium, from the effusion of blood on or into the substance of the brain, or from fluid in large quantity poured out into the cavities of the brain. 5thly. Coma will occur—and now the analogy returns—in rheumatic fever, in gout, in severe visceral inflammations, either after or independently of delirium. 6thly. We have it after great losses of blood, either after or independently of delirium, and in states of anæmia, without loss of blood; and lastly, we have the *toxic coma*, arising from the direct ingestion of a poison—as of alcohol or opium.

Epileptic coma.—It will be unnecessary for me to dwell at any great length upon the clinical history of the epileptic coma. Like the epileptic delirium, it may occur before or after, or before and after, a convulsive fit; or it may occur without any convulsive fit, and it may be preceded or followed, or both preceded and followed, by delirium. A man may fall into the comatose state suddenly, without previous warning, and remain in it a longer or shorter time, and come out of it without having suffered any apparent mischief.

The most perfect example of this kind of coma is afforded by what Esquirol calls the *epileptic vertigo*, the *petit mal*, the epileptic paroxysm without convulsions—a form of epilepsy which is often highly destructive to the mental powers, especially when the attacks succeed each other at short intervals.

There are many instances in which men have had attacks of this kind of coma once in their lives, without any recurrence; and, the attack having occurred shortly after a meal, has been attributed to indigestion, and perhaps not without cause.

It is seldom that such an attack will take place wholly without convulsions, although they may escape the notice of bystanders. At the very commencement of the attack there will be a short convulsion of the muscles of the larynx, and perhaps also those of mastication and of the eyeballs; and it is this convulsion which determines the congestion of blood in the bloodvessels of the brain, which is sometimes found after attacks of this kind, and to which some attribute the phenomena both comatose and convulsive. In such attacks the course of events is this: a

change takes place in the brain, caused either by mental emotion, or by some physical influence; an abnormal development of the nervous force is produced—consciousness is instantly destroyed—the patient remains in an unchanged attitude, or he falls—and simultaneously with, or instantly after, the destruction of consciousness, the convulsive affection of the laryngeal muscles, and perhaps also of the muscles of mastication, takes place, and immediately subsides; the coma remaining for a longer or shorter time, and sometimes killing the patient in a very few minutes.

The condition called by Dr. Abercrombie *congestive apoplexy*, may, as it seems to me, with more propriety be referred to this state of *epileptic coma*. I shall quote one of the cases related by Dr. Abercrombie, for the purpose of comparing it with two similar cases which occurred in my own experience.

A gentleman, aged 24, had been observed for some days to be dull and drowsy, and he frequently complained of his head. Not having appeared at his usual time one morning, his friends went into his room, and found him lying across his bed, half-dressed, in a state of perfect apoplexy. The attack was evidently recent, and it was supposed that he had been seized while he had been stooping over his basin in washing. His face was rather livid, his breathing stertorous, his pulse slow, and of good strength. All the usual remedies were employed with assiduity, but through the day there was no change in his symptoms. In the course of the night he recovered considerably, so as to know those about him, but, in a short time after, he relapsed into coma, and died early on the following day, little more than twenty-four hours after the attack."

"*Inspection*.—There was a slight turgescence of the vessels on the surface of the brain; no other appearance of disease could be detected after the most careful examination. All the other viscera were in a healthy state."

The first case of this kind to which I shall refer from my own experience is one which excited much interest at the time it happened, in consequence of the great respect in which the individual who was the subject of it was generally held.

He was a tall, stout, well-made man,—had just completed his 55th year. He was well known in the scientific world, and not more admired for his high intellectual qualities than for his kind and amiable disposition. Of all the men I ever knew, there was none of whom it might be more truly said, that he was

Integer vitæ scelerisque purus.

I enjoyed the high privilege of having been

on terms of the closest intimacy with him for many years, and was well acquainted with the state of his health and constitution, which I had no reason to believe were otherwise than sound.

He was of an ardent but extremely cheerful temperament; he was anxious, and easily excited, but possessed great sweetness of temper. At the time of the fatal occurrence he held the office of Foreign Secretary to the Royal Society; a subject was under discussion at this time about which he was excited rather more than his usual evenness of temper generally permitted, or than the intrinsic importance of the matter in question justified, a circumstance which led me to apprehend that he was out of health, although I could not detect any other satisfactory indications of it. At one of the Thursday meetings of the Council, which was very fully attended, he addressed the members present briefly on the subject of discussion, but in such a manner as led those who heard him to think that he felt very warmly upon it. Shortly after he had resumed his seat, he was heard to make a gurgling noise in his throat, and his eyes were turned convulsively upwards. He was caught just in time to prevent him from falling, and was laid on the floor in a state of coma, foaming at the mouth, and breathing with some degree of stertor. There were several medical men present, and as he did not seem readily to show signs of recovery, it was judged expedient to bleed him. The blood flowed readily, but as the pulse very soon showed signs of failing, the arm was soon tied up. He never rallied from this state of coma, and died in less than a quarter of an hour after the attack.

I was present at the *post-mortem* inspection, which took place on the following day. There was not an unsound viscus in the whole body; the brain was essentially healthy, but exhibited at parts, especially where the small branches of the middle cerebral artery penetrate the fissure of Sylvius, a considerable degree of congestion. Some doubts might have existed as to the perfectly healthy state of the kidneys; but it may be certainly affirmed respecting them, that if they were at all in a morbid condition it was a very early and slight degree of chronic nephritis.

This was a case, then, which Abercrombie would have called *simple apoplexy*. It seems to me a more reasonable view to suppose it to have been one of epilepsy or epileptic coma; and although the patient had never previously shown any symptom of such a disease, yet his excitable temperament, and the strong emotions under which he laboured, and which he used great efforts to control, were quite sufficient to develope

such an attack, more especially if there had been any incipient disease of the kidney.

In a second case, where the attack was equally sudden but the event not so rapid, the distinct existence of renal disease denoted the truly epileptic nature of the attack. A respectable tradesman in the Strand had been some time suffering considerable anxiety in consequence of the depressed state of trade, and had experienced for a few days a feeling of giddiness in the head, to which, however, he paid no attention. On the evening of the 11th March, 1848, as he was walking from one room to another, he fell as if shot,—not insensible, but paralysed on the right side; he was like one who had experienced a sudden shock,—cold, depressed, with a feeble heart and pulse. He was almost instantly attended by my friend, Mr. Duncan, of Henrietta Street, Covent Garden, who is a most judicious practitioner. This was at six o'clock P.M. At that time Mr. Duncan found it impossible to do more than take a small quantity of blood by cupping from the back of the neck. At eight o'clock he became completely insensible, with contracted pupils, and breathing heavily. He was now bled from the arm to 4 or 5 oz. without any effect; and he continued in a state of profound coma, perfectly insensible, without any great stertor, until nine o'clock the following night, when he died: just twenty-seven hours after the attack.

The symptoms were such as led me to expect a clot of blood in the corpus striatum of the left side; but a most careful examination of the brain disclosed no diseased condition of that organ beyond a little shrinking. There was a great deal of subarachnoid fluid, and one or two drachms of fluid in the ventricles. The kidneys were contracted, and distinctly in the state of so-called chronic nephritis.

There is a distinct connexion between chronic disease of the kidneys and this form of coma, just as between the same form of renal disease and the epileptic delirium. The coma connected with renal disease will come on under three forms:—1. Suddenly, becoming profound and passing to a fatal termination; 2. Gradually, and also passing into the profound state; and 3rdly, in paroxysms presenting an exact resemblance to the epileptic, either of coma simply or of coma with convulsion, or of either or both accompanied with delirium. And the state of the urinary secretion varies; always, however, presenting a decided departure from the normal state, being either wholly suppressed or greatly diminished in quantity, or even increased in quantity, with low specific gravity. The more serious head symptoms will occur in those cases where the deficiency of the urine or of its solid

contents is most marked. In nearly all cases the urine contains albumen.

The cases of ischuria renalis, as it has been called, long recognised by practitioners, and graphically described by the late Sir Henry Hallford, must be referred to this variety of coma.

Coma in dropsy after scarlet fever.—The coma which comes on in dropsy after scarlet fever is of this kind:—A child has gone through a mild attack of scarlet fever, dropsy develops itself universally after two or three days, the urine is very deficient in quantity, and, after a day or two, the child falls into profound coma and dies. On examining the brain, no morbid change is discernible, excepting that the organ looks pale, in common with the rest of the body; but the kidneys exhibit the characteristic signs of the acute disease which is so common when the scarlet fever poison has been received in large doses, or imperfectly eliminated by the skin.

Coma in acute dropsy.—So, also, after acute dropsy, coma will come on, and either kill the patient or greatly endanger life, and the same appearances exactly as in the scarlet fever dropsy will present themselves; or, as is, I believe, a very frequent occurrence, an acute affection of the kidneys will supervene on a previously existing chronic affection, and kill the patient by coma in a few hours. Many a case of rapid death is, I have no doubt, due to this form of coma, the renal affection having been undetected during life, and perhaps overlooked after death. A man may have had chronic renal disease creeping on insidiously, and so long as a sufficient quantity of water has been eliminated through the kidneys, no symptom sufficiently serious to lead him to seek medical aid would occur. But presently he would be exposed to cold, or his digestive organs would become much deranged, the kidneys fail in their action, “the pitcher is broken at the fountain,” and fatal coma ensues.

Comatose affections of this kind are sometimes extremely slight, and even momentary; but, however slight, they should be carefully investigated, and especially with reference to the powers of excreting the urine. Mild forms of what are called *paralytic strokes* are sudden attacks of epileptic coma, which may or may not be accompanied with paralysis, which, when it does occur, is frequently quite transient, just as the paralysis after epilepsy is. A gentleman, aged fifty-two or fifty-three, was under my care the greatest part of last summer for chronic disease of the kidneys. He appeared to be going on well, when one night I was hastily summoned to him, the messenger stating that he had had a para-

lytic stroke. I found my patient sitting up in bed, in a state of great alarm, and he informed me that just after he had got into bed he was seized with a sudden loss of consciousness, which lasted scarcely a minute, and that he felt a loss of power on the left side of his face, and there still remained a sluggishness of motion on that side, which lasted two or three days. Three months afterwards, this gentleman, having continued in his usual health during that period, while staying at the house of a friend in the country was seized with another similar attack, from which he recovered for the moment, but speedily relapsed into coma, and died in a few hours. I had no opportunity of examining the brain, but the existence of renal disease admitted of no doubt.

I have some reason to think that obstacles to the excretion of the urine at the bladder may occasion comatose affections of a similar kind. Not only "may the pitcher be broken at the fountain, but the wheel may be broken at the cistern." Last autumn I saw a gentleman of 60 years of age, an eminent solicitor in Lincoln's Inn, who, while talking with a client, received a sudden stroke, creating a momentary loss of consciousness, and a sense of numbness on one side of the face and body. I saw him immediately afterwards, and found him greatly alarmed; but, on making him keep the horizontal posture, and take some ammonia, he completely recovered, and went home to his residence a little way from town, where I saw him two days afterwards, along with Dr. Cobb, of the London Hospital. After most careful examination, we could discover no evidence of renal disease, nor any cause for his attack besides over-work in his profession. It appears that afterwards he had a repetition of the attacks, although he had given up work, and gone into the country for change of air; and it was now found out that he experienced some difficulty in micturition, owing to an enlarged prostate gland. This was relieved by mechanical means, and since then there has been no recurrence of the attacks.

In all these cases of epileptic coma, the appearance of the brain and of its membranes after death affords no indication of the previous existence of any active morbid process during life.

If the immediate exciting cause of the comatose state be of recent origin, the brain will exhibit no morbid change; if few or no attacks have occurred before the fatal one, there will be no morbid change; but if there have been several attacks previously, as in ordinary epilepsy, there will be the same changes as we see in that disease—a shrinking of the convolutions of

the brain, some opacity of the arachnoid, perhaps some adhesions between its layers, and more or less of fluid in the subarachnoid space, that fluid being the more abundant in proportion as the convolutions of the brain are more shrunk; the shrunk brain, with a large quantity of surrounding subarachnoid fluid, constituting the condition which succeeds the so-called serous apoplexy of authors. Most, if not all, of such cases (excepting where the serum has been poured into the ventricles) being probably epileptic coma, either connected with ordinary epilepsy, or with some defective action of the kidney.

Hysterical coma.—The hysterical coma is of very frequent occurrence, and sometimes resembles the epileptic so nearly, that it is very difficult to distinguish the one from the other. One character of it, however, must be especially borne in mind—that it rarely, if ever, is perfect. Even in the worst of cases, some spark of sensibility remains, which may be lighted up by loud speaking, or shaking, or the dash of cold water, or pinching, and a power of performing voluntary acts, or maintaining certain attitudes, such as walking, sitting, &c. Again, while a patient may fall into this coma suddenly, he may come out of it with equal rapidity, and without any bad effect—a fact which sufficiently shows that in this state there can be no such change in the condition of the brain as may not right itself almost instantaneously.

To the state of hysterical coma we must refer that remarkable condition which may be produced in some hysterical women, and in men and lads of similar habit, which is called the mesmeric sleep—a state in which consciousness may be wholly destroyed, and a complete coma produced—or in which a half consciousness remains, accompanied by more or less of a delirious state, in which the patient may exhibit those phenomena, and perform those strange feats of second sight, or *clairvoyance*, which have so much delighted the lovers of the marvellous. As the ordinary hysteric coma may disappear rapidly, so will this also under favourable circumstances; whilst at other times the comatose condition remains for some time, and only gradually subsides. The best proof that the so-called mesmeric state is no more than what one may call an *artificial hysterical coma*, consists in the fact that all the phenomena of it will sometimes manifest themselves spontaneously, without any apparent exciting cause; at least without any cause such as can be regarded as a mysterious influence acting from one individual to another.

On the second of April, 1843, a boy, Alfred Russon, æt. 16, was brought into King's College Hospital in a state of what

I must call *hysterical coma*, or, to connect it with phenomena otherwise produced, mesmeric coma. The only history we could obtain of him was that he had, about two o'clock in the morning, walked into a coffee-shop in Drury Lane, where he was found sitting in one of the boxes, speechless and insensible. He was handed over to the police, by whom he was brought to the hospital. The house-physician found him sitting erect on a chair, his eyes widely open and motionless, pupils dilated, and presenting an undulating motion when the candle was placed near them; conjunctivæ rather injected; countenance expressive of astonishment; respiration easy, although a little quicker than it ought to be; power of deglutition perfect; no spasm or twitching of any single muscle. The most remarkable feature was his utter insensibility to every external impression; even the roughest treatment produced no effect upon him; the splashing of cold water, shaking, pinching, shouting in his ears, seemed to make no impression. He had walked into the hospital between two policemen: whilst in the surgery of the hospital he never altered his position in the slightest degree; and after having been examined in the surgery, he walked up stairs to his ward without dragging his feet, but aided by the policemen.

After he was placed in bed he continued in the same state of insensibility to external impressions, but appeared to resist any attempt to alter the position of his limbs, and exhibited a disposition to retain the limb in any position in which it was placed. He kept for some time continually opening and shutting his mouth at regular intervals, and winked his eyes naturally, and moved his eye-balls from side to side.

At 10 A.M., eight hours after his admission, he was still insensible; his bladder became much distended, and three pints of urine were drawn off, which exhibited no morbid character, but was of low specific gravity,—1010.

He remained in this state the whole of the 2d, and on the 3d he was still found insensible, having not uttered a sound since his admission. He was taken out of bed, and an attempt made to place him in the erect posture, but his whole body became rigid, all the muscles being thrown into powerful tonic contractions: he was returned to his bed, where he lay in the same insensible state: the urine accumulated in his bladder, and had again to be drawn off.

To-day various expedients were resorted to, to test the reality of his insensibility, which ended in confirming our belief, from the appearance of the patient, that he really was insensible. Among other means employed, the soles of his feet were filliped

with a wet towel, without exciting the least indication of sensibility. A bottle of strong ammonia was held under his nostrils, but the fumes produced no effect beyond watering of the eyes; and after some time he turned away his head. He continued to lie in bed apparently unconscious, but occasionally snapping with his teeth.

On the second day after his admission (the 4th) he made signs for paper, and wrote an account of himself, stating that he had been subject to fits, and giving the address of his father, and also giving a history of himself during the day previous to his admission to the hospital. But it was very remarkable that in writing he seemed to trust entirely to the guidance of his sense of touch, for during the whole time he was writing he kept his eyes averted from the paper, with a fixed gaze directed towards the ceiling, and when a handkerchief was applied round his eyes it did not interfere with his ability to write. But we could not obtain any satisfactory evidence that he could see, or hear, or smell.

After this he began to ask for food, and ate with the most extraordinary eagerness, snapping at everything that came in contact with his lips,—even pieces of paper, which he chewed and swallowed.

In the afternoon of this day he began to see, and amused himself reading and writing, in both of which he showed himself a proficient.

He was still defective in hearing and in the power of speech; he seemed quite insensible to the loudest noises; shouting into the ear, which generally produces so disagreeable a sensation in the meatus, seemed to produce no effect upon him, either upon the common sensibility or upon the hearing. We could only converse with him on paper, and he showed great readiness in keeping up the conversation.

He continued in this state in the hospital nearly three weeks from his admission: various means and devices were tried to ascertain whether he could hear; but all who saw him, both nurses, patients, students, and visitors to the hospital, agreed in opinion that he could not or did not hear, or that if he did hear he carried on his deception in the most remarkable manner.

Nor could he be induced to speak: on one occasion I ordered him to be kept without food until he spoke, but the effect of this was merely to cause a paroxysm of hysterical crying.

Unfortunately this patient was inveigled from the hospital by some devotee of mesmerism; and he was placed under the care of a physician who unhappily misapplies his great talents to what I can regard no otherwise than as the conjurings of mes-

merism. By this gentleman he was mesmerised daily for one hour for the space of four weeks. After one of these mesmeric sittings he recovered his hearing, and in three-quarters of an hour after that his speech. I cannot help, however, expressing my belief, that, as his health had greatly improved under the discipline and treatment to which he was subject in the hospital, he would have recovered both his hearing and his speech in less time than under the mesmeric processes, which, indeed, I cannot doubt, had the effect of retarding recovery; for I can no more believe that the hysterical disposition is to be removed by the frequent repetition of the hysterical paroxysms, than I can suppose that the tendency to epilepsy is to be cured by the daily repetition of an epileptic fit.

I am confirmed in my belief that this patient would have perfectly recovered without the aid of the mesmeric mysteries, by the favourable result of another case, which we succeeded in keeping out of the hands of the mesmerists.

The patient, in this case, was a girl of 19 years of age, of a nervous temperament. She accidentally fell into a river, and was immersed in deep water for many minutes: she was taken up in a state of suspended animation. Six hours elapsed before she recovered her senses; and she continued unwell and depressed with headache for several days after the accident. Ten days after it, she had an hysterical paroxysm, and lay for nearly four hours in a state of stupor, out of which she came, deprived of the power of speech and of hearing, as well as of taste and smell, and her mental faculties quite benumbed or paralysed, as she gave no indication that she recognized any of her friends about her.

An admirable account of this case has been given in the *Lancet* for 1845, by my friend Mr. Robert Dunn, to whose kindness I am indebted for the opportunity of seeing it. The patient recovered perfectly under a treatment directed to the improvement of her physical health and strength, and is now in a perfectly healthy state.

Whatever be the nature of these comatose hysterical affections,—whether they occur in men or in women, and whether they are complicated with ecstatic or cataleptic phenomena,—the general tendency is for them to get well. Nor have we any evidence of the existence of any inflammatory or other organic lesion in the brain or other part of the nervous system in these cases. There cannot, indeed, be any doubt that they are never accompanied by an inflammatory state of the brain or its membranes.

Traumatic coma.—I shall next refer to a

form of coma which accompanies injuries and severe operations, which is well known by the name of *concussion*, when occurring in consequence of injuries to the head.

The phenomena of concussion are these:—A man gets a violent blow on his head, without any fracture or injury of the bone: he is stunned; in other words, he is rendered comatose from the moment of the injury. If the blow be not severe, he remains insensible for a little time, and then recovers perfectly; or, if the shock be great, he becomes cold, his pulse intermittent, and he dies apparently from the shock, the insensibility remaining to the last; or he remains insensible for some time, then becomes delirious, and ultimately recovers. Such is the history of concussion of the brain, or traumatic coma from shock to the brain. When you examine the brain in fatal cases, you find it in an apparently healthy state. "From such examination," says Sir Benjamin Brodie, in his valuable paper on Injuries of the Brain, in vol. xiv. of the *Med.-Chir. Transactions*, "we learn that the symptoms which are ascribed to concussion do not depend on any such derangement of the organization as admits of being disclosed to us by dissection. The brain appears to retain its natural structure unimpaired." And not only does this state of coma occur in cases of injury of the head, but also from the shock produced by severe surgical operations or other injuries.

Many years ago I was present at the operation of lithotomy on a boy nine years old. The operation was done in the ordinary way, without any untoward accident which could endanger the favourable result. The evening after the operation the child began to be comatose, with cold extremities and small pulse, and without the least indication of peritonitis. The patient continued in this comatose state for three days, and died. I examined the body with great care, but could not detect any morbid appearance except a general pallor of all the internal organs.

Severe and extensive burns and scalds create at the moment of the accident, or very shortly after, a state of more or less complete coma.

This state of coma may be due partly to the physical effect of the shock, and partly to the mental trouble of the severe fright. Such was probably the mode of death in the case of the young woman known as the Lion Queen, who formed part of the company attending Wombwell's menagerie. The case was reported in the newspapers some months ago. The girl, while playing with the tiger, vexed him, whereupon he seized her neck in his mouth, and inflicted a severe wound in the neck, which exposed

the carotid artery without injuring it. The girl, as I learned from a medical friend who witnessed the attack of the tiger, fell senseless; and, although she lost no blood, continued senseless and pale, and died in less than a quarter of an hour.

We learn, then, from these facts, that shock is capable of producing a state of coma without the existence of any active morbid process of the brain.

Coma from compression.—A special form of coma is that which has most attracted the attention of observers as affording an easy and obvious explanation of the phenomena. This is coma from compression of the brain by some new material developed within the cranium or introduced into it, or by the effusion of blood. Hæmorrhage takes place into the substance or the ventricles of the brain, or on the surface of it, and coma ensues, which is more or less according to the magnitude of the clot of blood. The brain or parts of it are evidently compressed by the large quantity of blood effused; for we have obvious marks of compression in the condensation of the neighbouring brain structure. The degree of the coma is influenced, not merely by the magnitude of the clot, but also by the situation of the effusion: thus blood effused at the base of the brain or into its ventricles will produce a greater amount of coma than if the blood have been poured out on the surface or in the substance of the hemispheres of the brain; and, moreover, a slight clot on the base of the brain, especially on the pons and medulla oblongata, while it produces profound coma, will quickly kill the patient; while a large effusion into the ventricles will likewise create profound coma, but one by no means so rapidly fatal to life.

I had an interesting illustration of this many years ago in two cases which occurred on the same day. One was a man who was convalescent from fever, and had got out of bed and assisted to make his bed, when he fell like a horse pithed, and died immediately. The second was a man in the hospital for disease of the heart, who suddenly became profoundly comatose, with great stertor, but lived many hours. In the first case a *small* clot had been effused on the pons varolii, near its posterior margin, and extending on to the medulla oblongata. In the second case a *very large quantity of blood* was poured into the lateral ventricles, and distended them both. The small clot in the first case caused rapid death, because it compressed suddenly the medulla oblongata, "the link which ties us to life," as Mr. Mayo happily terms it. The large clot caused profound coma, but was not so rapidly destructive to life, because it at first

compressed chiefly parts more immediately concerned in mental phenomena.

On the same principle, the accumulation of water in the ventricles produces coma; and in these cases we have abundant evidence of compression, in the condensation of the surrounding brain substance, the widening of the ventricles, the firmness of their walls when the cavity is laid open, in consequence of which in the recent brain they will not collapse, and the flattening of the convolutions.

So, also, the growth of a tumor within the skull; an aneurism of the basilar artery; an exostosis from the interior of the cranium; a piece of bone depressed at the seat of a fracture,—are capable of producing compression of the brain, and consequent coma.

May increased sub-arachnoid effusion cause coma?—It is a popular notion, adopted on very feeble grounds, that compression of the brain, and consequently a comatose state, may be caused by the accumulation of fluid around the ventricles. There are some very good reasons for adopting the contrary opinion, that the existence of fluid in the subarachnoid space never does compress the brain, and cannot be regarded as a cause of coma by compression.

1st. It is clearly proved by the researches of Cotunnus and of Magendie, confirmed by the best subsequent observers, that a certain quantity of fluid in the subarachnoid space, both in the cranium and in the spine, is essential to health, and that this fluid is in greater abundance in the old, where the brain has begun to shrink, than in the plump well-developed brain of the young and adult.

2dly. That in cases where the largest collections of fluid have been found around the brain, that organ has been found shrunk, not compressed: the brain has wasted, from a defective nutrition; there is no flattening of the convolutions, nor condensation of the brain substance, but a shrinking of the convolutions,—a widening of the sulci between them, without any morbid change, either one way or the other, in the density of the substance of the brain. Thus it may be laid down that the quantity of subarachnoid fluid is in the *inverse ratio of the bulk of the brain*, and that with a large, well-developed brain we shall find but little subarachnoid fluid; whilst in the small, shrunk, and wasted brain, the accumulation of that fluid is considerable.

When the wasting, or shrinking, or collapse of the brain is partial—limited to the region of two or three convolutions,—a partial accumulation of fluid will take place

in the situation of the shrunk part. A softening of a portion of the cerebral hemisphere will often cause a collapse of the convolutions above it, and thus space will be created for the accumulation of fluid.

3dly. I think it may be laid down that the accumulation of any large quantity of fluid in the ventricles, or the development of a tumor in the substance of either hemisphere, or the formation of a clot of blood there, is incompatible with the existence of a surrounding subarachnoid fluid. The pressure from within displaces the subarachnoid fluid, and prevents the secretion of it. Thus, we never find the two fluids, intraventricular and subarachnoid, existing together *in large quantity*: they may exist together *in small quantity* in shrunk, small, and ill-nourished brains, and more especially where the defective nutrition chiefly affects the hemispheres and the convolutions.

For these reasons I have long adopted the opinion that the effusion of a large quantity of subarachnoid fluid is a result—and a result probably of a conservative kind—of the shrinking or diminished bulk of the brain from some cause, and that in no case does the accumulation of fluid around the brain cause compression of that organ, nor can it be regarded as a cause of coma.

Rheumatic and gouty coma.—Coma occurs in the course of rheumatic fever and of gout. The mode of invasion of the comatose state in these affections is very analogous to that of delirium, and very commonly follows that affection—always when it takes an unfavourable course. A patient may be going on well in rheumatic fever; he, however, suddenly becomes restless and uneasy, and falls into a comatose state, in which he dies. The late Mr. Abernethy has referred to three cases of this kind which proved fatal, and he states that he found no abnormal condition of the brain. His words are—"I may also mention, that I formerly examined the brains of three persons who died in a comatose state, in consequence of the metastasis of rheumatism. In these cases no morbid appearance was observed in the brain, except some slight marks of inflammation of the pia mater." These slight marks were, no doubt, nothing more than some increased vascular turgescence of parts of the membrane.

The following case shows that every form of cerebral disturbance, delirium, convulsions, and coma, may occur in rheumatic fever without any lesion of the brain which can be detected by ordinary means of observation.

Martha Mitchell, æt. 34, was admitted

on the 18th June, 1844, with rheumatic fever, the knees and ankles being the joints affected. On the 19th she became delirious; and a few hours afterwards she had a convulsive fit, succeeded by coma and death. At the post-mortem examination the brain and its membranes were found pale, but otherwise healthy. There were marks of recent pericarditis.

The occurrence of coma is more frequent in gout than in rheumatic fever, whilst delirium seems more frequently to occur in rheumatic fever. It is chiefly in the cases of chronic gout, in which the system is attacked pretty generally, that this state occurs, and the state of the kidneys is highly favourable to its development. Rheumatic fever differs from gout remarkably, as regards the extent to which the kidneys suffer. Although in both diseases these organs are much disturbed, and exhibit a considerable departure from their normal mode of action, in gout they are apt to suffer much in their nutrition. They shrink to one half their natural size; the tubes lose their epithelium; serous cysts are developed; lithate of soda is found deposited in the tubes of the medullary portion. In persons who have long been victims of gout, whose joints are crippled, and the articular surfaces covered with a layer of lithate of soda, looking like plaster of Paris, this state of kidney is probably invariably present; and it is in such cases that we may generally expect the termination of gout by coma. Frequently the morbid state of the kidney is indicated by the presence of albumen in the urine, but it may exist without the escape of serum into the urine; the absence of that principle from the urine is, therefore, no proof that renal disease does not exist. The following case illustrates this form of gouty coma:—A gentleman's butler, about 50 years of age, had been the subject of several attacks of gout. He was admitted into the hospital in consequence of a copious effusion into one knee-joint; and his urine was found to be sufficiently copious, clear, and pale, with a small quantity of albumen. He suddenly became comatose, and died: and on examination we found a copious effusion of fluid into one side of the chest, which must have taken place a few hours before death, as I had satisfied myself by auscultation that no such effusion existed on the previous day; there were also very contracted kidneys; and the brain afforded no signs of disease.

It is possible, however, that sudden death by coma may take place where there is no evidence of the diseased state of the kidneys which I have described.

A gentleman, æt. 35, a very nervous

subject, the nervousness dating, according to his own report, from a mercurial erethism, which was brought on by a course of mercury for an ophthalmic disease. This gentleman was attacked with gout of the wrist and toes. He was treated by mild saline purgatives and small doses of the colchicum wine; this latter, however, appeared to increase his irritability, and I left it off after using it only twenty-four hours. I then gave small doses of morphia, under which he improved considerably; and on the 5th and 6th of September he appeared to be advancing quickly to convalescence. On the latter day I diminished the dose of morphia: at half-past twelve of that night he suddenly became comatose, and died in a few hours. Unfortunately I was not permitted to examine the body in this case; but I can scarcely believe that there was any extensive disease of the kidney, as the man was young, and had not been subject to many attacks of gout.

This form of coma, which for the sake of distinction may be called *gouty coma*, is doubtless nearly allied in its essence to the epileptic coma, especially in those cases in which the kidneys are attacked.

Coma in Typhus and Erysipelas.—The comatose states which accompany typhus and erysipelas are too well known to render it necessary for me to describe them. The typhoid condition is really a more or less comatose state almost from the beginning; and the same may be said of erysipelas: and in both the increase of the state of coma must be looked upon as a most unfavourable omen. When it ends fatally, death seems to ensue from exhaustion, nor can any evidence be obtained of the existence of any active morbid process affecting the brain.

In like manner we have coma, in connection with the exanthemata, both in the premonitory and in the secondary fevers. A patient who receives a large dose of the poison may become rapidly comatose under its influence, and before any eruption can make its appearance. I saw a case of this kind some years ago at a ladies' school at Hackney. A young girl had rigor and sickness, and within twenty-four hours became comatose. When I saw her she was lying on her back, breathing quickly, perfectly insensible, almost blue, and with a small rapid pulse. She died in a few hours afterwards. Scarlet fever was very prevalent in the neighbourhood at the time, and some cases of it had occurred in the school. Mr. Toulmin, who also saw the patient, agreed with me in attributing the phenomena to a large dose of the scarlet-fever poison, which rapidly prostrated the powers of life.

Coma likewise ensues in cases of anæmia from loss of blood, or from the imperfect formation of the blood, as in cases of chlorosis. Convulsions and coma precede death in animals killed by loss of blood. The state of syncope from loss of blood, or from debility of any kind, is the simplest form of this kind of coma: when bleeding is carried to a certain point, especially if the patient be in the erect posture, this state of insensibility comes on, and the patient remains in a comatose state for a longer or shorter time, and sometimes a slight convulsion occurs at the moment the faintness commences.

The sudden cutting off of a certain quantity of blood from the brain may produce the comatose state. A remarkable instance of this occurred to me in a case of which an account was published in the twenty-seventh volume of the *Medico-Chirurgical Transactions*. In this case the whole current supplied to the right side of the brain by the right common carotid artery was cut off by the sudden occlusion of that vessel through the passage of a large quantity of blood between its coats from a fissure in the aorta, which gave rise to the formation of an extensive dissecting aneurism. The patient fainted at the moment of the occurrence of the laceration, and a drowsy semi-comatose state was the most prominent symptom throughout his illness.

We have already seen that there is abundant evidence that delirium and convulsions may come on in cases where patients have suffered from loss of blood.

There can be no doubt that an inadequate supply of blood to the brain is likewise favourable to the production of a state of coma. The most satisfactory proof of this is afforded by the results of Sir Astley Cooper's interesting and most important experiments on ligature of the carotid arteries, and compression of the vertebrae in rabbits; and in some cases ligature of the common carotid artery in the human subject has been followed by coma.

Lastly, I may refer to the coma which is produced by the introduction of certain poisonous agents into the system, either through the digestive organs, or by their direct injection into the blood.

Alcohol swallowed in large dose is capable of producing a state of coma very rapidly.

But the most remarkable form of coma, of this kind, is that produced by opium. A person poisoned by opium in large dose falls into profound coma, and lies just as if the insensibility were produced by compression of the brain,—snoring, and evincing no sign whatever of sensibility; and yet, when the brain is examined, there appears no evidence whatever to justify the

supposition that the brain did suffer compression, or that it was the seat of any active morbid process,—such as inflammation.

So also, when chloroform, or ether, or other substances of the same class, are inhaled, the patient passes quickly into coma, the degree of which can be regulated exactly by regulating the quantity of vapour to be inhaled. Yet, on examining the brain after death from an undue quantity of chloroform, no morbid appearance is found which can refer the comatose phenomena to the influence of pressure, or to any active morbid process.

These are among the best-marked examples of the toxic coma, produced by the direct introduction of poisons, and they may be regarded as typical of the coma which arises from the introduction of other narcotic substances; as Indian hemp, belladonna, &c.

I have now detailed the principal facts deserving of our attention in the clinical history of delirium and coma. The analogy between the circumstances under which delirium occurs, and those under which coma takes place, is a fact of the highest interest and importance, and must be kept strictly in view in any attempt to devise an adequate theory of the pathology of these states.

From what I have stated we learn the following facts:—

1. That delirium and coma may be produced by the introduction of certain poisonous agents into the blood, either directly or through the digestive organs.

2. That a deteriorated and poisoned state of the blood is favourable to the production of delirium and coma; as in the cases of rheumatic and gouty delirium and coma, and of the delirium and coma of typhus, erysipelas, and the exanthemata.

3. That the same state or states of the brain which are favourable to the production of epileptic convulsions are favourable to delirium and coma.

4. That the anæmic state, or that state of blood in which the colouring matter is very deficient, is favourable to the production of delirium and coma.

5. We learn that compression will produce coma, but not delirium.

And lastly, that in all these cases the delirium or the coma may occur in their highest states without the slightest evidence of any inflammation of the brain, or of its membranes.

I take this opportunity of correcting the quotation made from Dr. Watson's lecture at the close of the last lecture, which, although it expressed his meaning, was not cited with perfect accuracy.

Alluding to cases of delirium supervening on rheumatic fever, Dr. Watson says:—“Such cases are, in fact, spoken of as cases of metastasis to the brain. It may sometimes be so,—nay, I know that it sometimes *is* so,—but not often.”

In quoting Dr. Watson, I did not mean to adduce his high authority in support of the doctrine of metastasis. The last two words of the passage quoted showed, as I think, that he only admitted it as the rare exception to a very general rule. But finding myself tempted by all that I had seen, and by what I could glean from others, to dogmatise that the delirium of rheumatic fever *never arises* from rheumatic inflammation within the cranium, I allowed myself to be checked by the opinion of one whose views I have the best reasons to respect, and which are justly held in the highest estimation by the profession at large.

Dr. Watson has, indeed, adduced very strong evidence in favour of the views which I advocated, and this so long as fifteen years ago, in a clinical lecture delivered by him at the Middlesex Hospital, and printed in the sixteenth volume of the *MEDICAL GAZETTE*. This lecture he has reprinted in the second and third editions of his valuable *Lectures on the Practice of Physic*.

I extract the following remarks from a note with which Dr. Watson has favoured me:—

“Many years ago (he says) a female patient of mine, who had rheumatic fever, and subsequent cerebral symptoms, died in the Middlesex Hospital, whither she had been sent, if I rightly remember, by Mr. North. Upon examination of her brain, we found unequivocal pus smeared over its hemispheres.

“It was the recollection of this single case which led me, in lecturing, to affirm, perhaps too positively, the occasional but unfrequent metastasis which you are inclined to deny.

“It is possible,—nay, I now think it probable,—that this concurrence of rheumatic inflammation of the joints with inflammation of the membranes of the brain may have been merely a casual coincidence.”

LECTURE III.

What organ or parts are affected in delirium and coma?—The brain the organ of consciousness—parts of the brain essential to consciousness—Delirium an affection of the intellect—Coma an affection of the consciousness—Seat of the diseased action in delirium—Seat of the diseased action in coma—Nature of the morbid processes which can cause delirium and coma—Influence of certain narcotic poisons in producing delirium and coma—Flourens' doctrine of a special elective affinity between certain poisons and certain parts of the encephalon—Immediate effect of one of these narcotic poisons on the brain—Congested state of the brain in poisoning by opium—Is the congestion the cause of the change in the brain's mode of action?—A certain degree of exhaustion necessary to produce delirium, in addition to a poisonous influence—illustrated by delirium tremens—Case—Evidence of poisoning of the brain by alcohol—Percy's observations—Influence of alcohol in altering the qualities of the blood—State of the urine in cases of delirium—Humoral view of the pathology of delirium tremens—Is there any inflammatory process in delirium tremens?—Analogous points in the pathology of the renal epileptic delirium—Poisoning of the blood by urea—Condition of the blood in chronic renal disease—In simple epileptic delirium the blood is probably poisoned—The same views applicable to the explanation of rheumatic and gouty delirium—to that of erysipelas and of typhus—Hysterical delirium referred to the same category as epileptic—Pathology of coma—Delirium and coma result from different degrees of poisoning—Coma likewise due to paralysis from exhaustion of nervous power—Conditions similar to those which produce delirium exist in the different forms of coma—General principles of treatment in delirium and coma—Objections to treatment by bleeding—The use of opium not applicable to all forms—Conclusion.

I MUST here briefly recapitulate the conclusions to which the facts which I have detailed in my first and second lectures have led me as regards the clinical history of delirium and coma. These are—

1st. That the introduction of certain poisonous agents into the blood, either directly or through the digestive organs, is capable of producing delirium and coma.

2dly. That a deteriorated and poisoned condition of the blood is favourable to the production of delirium and coma, as in the cases of rheumatic and gouty delirium and coma, and of the delirium and coma of typhus, erysipelas, and the exanthemata.

3dly. That the same state or states of brain which are favourable to the production of epileptic convulsions are likewise favourable to the development of delirium and coma.

4thly. That the anæmic state, or that state of blood in which the colouring matter is very deficient, is highly favourable to the production of delirium and coma.

5thly. That a shock to the brain—*concussion*—may produce coma, and likewise delirium; and that compression of the brain will produce *coma*, but not delirium.

And, lastly, that in all these cases the delirium or the coma may occur in their highest degrees without the slightest evidence of any inflammation of the brain or of its membranes.

But I must state, in addition to all this, that although, in the vast majority of instances, delirium and coma, even in their most highly developed states, occur independently of inflammation, nevertheless inflammation of the membranes of the brain is undoubtedly capable of producing both delirium and coma, and that it is often a matter of great difficulty to distinguish between the inflammatory and the non-inflammatory affections of this kind. The subject of inflammation of the brain is a large and most important one, which the time allotted to these lectures will not permit me to discuss now. I must content myself with observing that inflammation of the brain is, in adult subjects at least, a rare disease; and, therefore, that delirium and coma arising from this cause is of rare occurrence as compared with those other forms which I have described, and that the inflammatory delirium is generally of a low kind, resembling that of typhus, and has a great tendency to pass into coma; and, further, that it is frequently ushered in by vomiting, and accompanied by a marked sluggish and slow state of the pulse.

We now proceed to inquire whether any adequate theory of the pathology of delirium and coma can be formed in the present state of our knowledge, both physiological and clinical? This inquiry involves

answers to these queries:—1. What part—what organ—is affected in delirium and coma? 2. What is the nature of the affection, and is that affection the same for each and all those various forms of delirium and of coma which clinical study teaches us are apt to occur?

With regard to the first question, it is quite clear that we cannot assign any other seat for these remarkable states than the nervous system: nor can we locate them in any other part of the nervous system than in that part which is connected with the actions of the intellect, and with that reciprocal influence between mind and body which constitutes consciousness. Can we assign them their seat in the spinal cord? Certainly not; for we know that mental phenomena are completely independent of the spinal cord. The mind may act even when the connection between the cord and the brain is cut off, of which we have many proofs both in clinical observation and in physiological experiment. The removal of the hemispheres of the brain will destroy the phenomena of thought and of consciousness; but the spinal cord may be taken away piece by piece, leaving intact the centre of respiration, and mental phenomena will continue unaffected, save so far as concerns the partial affection of consciousness which necessarily must result from severing the connection between the encephalon and those parts of the body whose nerves are implanted in the separated portions of the spinal cord. We are conscious of the existence of our limbs through the connection of them with the spinal cord, and the connection of the spinal cord with the brain. So long as the trunks of the nerves of a limb are implanted in a state of integrity in the spinal cord, and so long as the connection between the cord and the brain is intact, so long will the consciousness of the connection of that limb with the body remain,—so long will the mind continue to have the feeling of the connection of that limb: and it is remarkable that that feeling may be fallacious; for it will exist even after the limb has been amputated, if only the conditions which I have mentioned are present—namely, the integrity of the trunks of the nerves, and of their implanted roots. Nor can it be got rid of even after a long interval of years has elapsed from the time of the amputation. The nerves of the limb are the media of connection between the organ of consciousness, or, in other words, the centre of sensation and the limb; and the trunks of the nerves contain in them every fibril which is destined for every point of the limb,—for every fibre of its muscular system. So long, then, as these fibres are intact as regards their nutrition

and their central implantation, so long are these conditions sufficient to uphold the feeling or consciousness (fallacious though it be) of the presence of the limb, and of every part of which those fibres form an integral and most important portion.

Early last winter a girl was admitted into King's College Hospital, in whom I had the opportunity of observing the effects of the gradual separation of the spinal cord from the brain.

When she was admitted she was suffering from a paralytic state of the left arm and leg, which in many respects resembled that form of paralysis which we often see in hysterical women, so that I was led at first to regard it as a case of hysterical paralysis. I soon, however, discovered a swelling at the upper part of the cervical region of the spine, and a distorted state of the neck, owing to a paralysed state of the muscles of one side, and the consequent disturbance of the equilibrium between the antagonising muscles of the opposite side. It was then found that all the muscles of one side were paralysed which are supplied with nerves below the level of the second vertebra of the neck—the cervical muscles, the intercostals, the abdominal muscles, and the muscles of the extremities. After a little while the paralysis began to affect the muscles of the right side of the body: the right arm first, then the leg, then the intercostal and abdominal muscles; the breathing became extremely feeble, and in parts of the lungs the most attentive auscultation could not detect any respiratory murmur. At length the breathing fell considerably in frequency, and it took place by gasps, at intervals of twenty seconds, the only muscles which seemed to retain any power being the sterno-mastoid and the trapezius, which are supplied by the spinal accessory nerve. During all this time the mind remained clear and free from any delirium, although during the greatest part of it fully three-fourths of the body was withdrawn from the controlling power of the will.

In this case the *medulla oblongata* was severed from the spinal cord by the gradual compression of an enlarged odontoid process, over which there was a considerable growth of cartilage, which no doubt, by a rapid development, contributed to the ultimate rapid extension of the separation.

It is impossible to conceive a more remarkable instance of "dying by inches" than was afforded by this case. The severance of the spinal cord from the *medulla oblongata* took place in the most gradual manner, and therefore without any of that shock to the nervous centres which is so apt to complicate the results of physiological experiments. It was most in-

teresting to witness how slowly, and by what small degrees, the connection of brain and trunk was being dissolved, and how instantaneously death took place, by the annihilation of respiration, the moment the last connecting link gave way. Yet, up to the time when respiration became so impeded that the blood was imperfectly aerated, consciousness and intellectual power remained.

The brain or encephalon, then, is that part of the nervous system which is most directly and most intimately connected with the mind—upon which the mind exercises a direct influence, and which, in return, exercises an influence upon the mind.

Yet the brain itself is a most complicated organ in man and the higher animals; and therefore we shall have to inquire what parts of this organ are essential to a normal manifestation of the intellectual actions, and to the maintenance of consciousness.

Time would fail me were I to enter upon a full physiological discussion of these points. I must content myself with stating that there are the most conclusive reasons for regarding the convolutions of the brain as that part which is connected with intellectual change—as “the centre of intellectual actions.” It is the part of the brain which is most intimately connected with, and most readily affected by, the mind; and it is that layer of grey or vascular matter so intricately folded upon the surface of each cerebral hemisphere which is the seat of those unceasing changes which thought may produce, or which may excite thought. It is, therefore, reasonable to believe that any departure from the normal condition of this centre would create a corresponding disturbance or derangement of the intellectual action; or, if we admit that the mind may be disturbed primarily and independently, as I think must be admitted, then it may be stated that that primary disturbance of the mind may derange and disturb the nutrient actions of this centre.

Consciousness is feeling: the simplest act of sensation indicates consciousness—such an act is the most simple condition of consciousness; any intellectual act is also an indication of consciousness. “When I smell a rose,” says the late Mr. Mill, “I am conscious; when I reason, I am conscious; when I remember, I am conscious; when I believe, I am conscious; * * *” “If we are in any way sentient, that is, have any of the feelings whatsoever of a living creature, the word conscious is applicable to the feeler, and consciousness to the feeling.”

It is important further to remark, that “the sensation is not the object of consciousness different from itself, but a par-

ticular sensation is *the consciousness* of the moment; as a particular hope, or fear, or grief, or resentment, or simple remembrance, may be the actual consciousness of the next moment.”

In order, then, to understand the physiological conditions necessary for the maintenance of consciousness, we must analyse a simple act of sensation. When I smell a rose, what are the physiological phenomena? First, there is an impression made upon the sentient nerves; secondly, the change wrought in these nerves is propagated to the centre of sensation; and thirdly, this change produced in the centre of sensation *must be perceived* by the mind in order that a true act of sensation shall be accomplished. Thus, in the act of sensation we have two classes of phenomena—one physical, proceeding from periphery to centre; the other mental or intellectual, by which all physical change is recognised. The impression of the odoriferous particles on the olfactory nerves, and the subsequent change in the centre of sensation, is the physical part; the perception by the mind of that change is the mental or intellectual part. My mind may be occupied with some engrossing subject at the time the rose is presented to the organ of smell: the physical phenomena will, nevertheless, take place; odoriferous particles will impinge upon the olfactory nerves, and the change will be produced in those nerves, and in the centre of sensation, but the mind being occupied with some other object will not perceive the change in that centre, and therefore there will be no sensation: I shall not be conscious that such an object was presented to the organ of sense.

Thus, then, for this simplest act of consciousness, the co-operation of two parts of the brain is necessary—namely, the centre of sensation, or that part which is destined to receive sensitive impressions, and the centre of intellectual actions. The failure of the right mode of action of either of these will prevent the completion of the act of sensation. Either the physical part may fail, or the mental part.

When a man is brought under the influence of chloroform, he is incapable of sensation—partly because the centre of intellectual actions is paralysed by the influence of the chloroform, and partly because the nerves are similarly affected.

But when a man in traumatic delirium is insensible to the irritation which must be created when he moves the injured or broken leg, or in rheumatic delirium, the rheumatic joints, he is so because his centre of intellectual action is entirely engrossed with the rapid train of ideas and fancies which occupy his mind; and therefore he

does not perceive the irritant change which must be produced in the nerves of the limb by the movement and displacement of the injured part.

Now the centre of intellectual actions is the hemispheric lobes of the brain or the convolutions: the centre of sensation is, as I have shown in my Lumleian lectures of last year, and also elsewhere, the optic thalami and their downward continuations, the olivary columns of the medulla oblongata, and the posterior horns of the grey matter of the spinal cord.

These, then, are the parts which are concerned in consciousness; and an affection of either or both of a certain kind must more or less affect the consciousness: an affection of the centre of sensation, by cutting off the object of consciousness—an affection of the intellectual centre, by impairing or destroying the power of perception.

An affection, however, of the centre of sensation *alone* cannot impair or destroy consciousness, because still the centre of intellectual action remains intact. Such an affection may destroy particular kinds of consciousness; but still there remain thinking, belief, memory—all which are acts of consciousness, although the evidence of their integrity rests chiefly with the individual himself. But an affection of the intellectual centre may impair or destroy consciousness even although the centre of sensation remain uninjured in any way; for it is evident that no impression, however vivid, upon the centre of sensation, can become a sensation, if the action of the intellectual centre be suspended, and the power of *perception* be thus destroyed.

Thus, then, we arrive at this conclusion, that to impair or destroy consciousness, the part of the brain which must be injured or suspended in its action must be the hemispheres—the convoluted surface—either alone or in conjunction with the centre of sensation—namely, the optic thalami and their downward continuations.

Now delirium is an affection of the intellect: coma is an affection of the consciousness.

The seat of diseased action which may cause delirium is, therefore, the centre of intellectual actions—the convolutions of the brain—or such parts as are so intimately connected with them that the nutrition of the one cannot be disturbed without the disturbance of that of the other.

The seat of the diseased action which may cause coma is the same centre; with or without the centre of sensation; or the morbid process may begin in the centre of sensation, destroying certain kinds of consciousness, and may extend to the intellectual centres, making the coma complete.

From this circumstance, then, namely, the sameness of the seat of the morbid changes which are capable of producing the two states of coma and delirium, we obtain some clue to explain the remarkable analogy which we have observed to exist between the two affections as regards the circumstances under which they are apt to occur.

Having thus fixed the seat of the morbid processes which cause delirium and likewise coma, we come next to inquire what is the nature of those morbid processes.

We may obtain, I think, very satisfactory information upon this subject by referring to the circumstances under which the various forms of delirium and coma occur.

1. We know that the inhalation of chloroform and of ether will cause both delirium and coma; that the ingestion of alcohol, of opium, of Indian hemp, and other narcotic drugs, will cause delirium and coma.

A moderate dose of any of these poisons will cause delirium: a large dose will cause coma.

It seems necessary for the production of these morbid states that the poisonous material should find its way into the blood; and we know that their direct introduction into the blood is the most effectual way of creating the two states.

In such cases, then, the cause of the delirium and coma is clearly humoral. A poison circulates in the blood which has an affinity for the vesicular nervous matter of the brain, and which, therefore, disturbs its nutrition. No part is more obnoxious to the influence of any poisonous agent which may be circulating in the blood, as the vesicular matter of the convolutions of the brain; for no part is more abundantly supplied with blood-vessels. The pia-mater which lies in contact with the whole of this undulating surface is a membrane of blood-vessels from which innumerable minute vessels penetrate the vesicular matter. A piece of this grey matter of the convolutions successfully injected, appears perfectly red, from the multitude and the proximity of the blood-vessels; and there is no other vesicular matter in the brain except that of the laminae of the cerebellum which is so largely supplied with blood-vessels.

It was Flourens, so far as I know, who first broached the ingenious idea of a special elective affinity between certain poisons and certain parts of the brain, whereby he explained their tendency to act primarily and specially upon one part in preference to another. Thus alcohol will act primarily upon the cerebellum, and give rise to the unsteady gait of the drunkard by impairing the co-ordinating power of that centre: carried to a higher dose it affects the intellectual centre and causes delirium, and

ultimately coma. Belladonna affects primarily the centre of sensation, and particularly the special centre of implantation of the optic nerves: whence the dilated pupils and the amaurosis which arise from the use of this drug; and afterwards, the belladonna, having paralysed the centre of sensation, destroys the powers of the intellectual centres, and causes coma.

Now what is the immediate physiological effect of a large quantity of any of these narcotics on the brain?

On examining the brains of persons dead of poisoning by opium or by belladonna, the vessels of the brain are found turgid with fluid blood.

It is this congestion, some will say, which causes first the delirium, and afterwards the coma. The effect of the opium is to cause congestion: the effect of the congestion is to compress the brain.

But this explanation will not bear the test of careful examination. The congestion is rather the effect of the injury done to the brain and to the blood by the opium, whereby the attraction of materials from the blood, suited to the nutrition of the brain, is retarded, and ultimately stopped. Now this force of attraction between the blood and the tissue is a powerful agent in the maintenance of the capillary circulation: when, therefore, it is impaired, the blood moves slowly and feebly through the capillary system, and there is need of increased force on the part of the heart to keep up the circulation at all. Hence, then, in cases of this kind, the congestion is due to the condition of the blood itself,—in fact to its contamination by the poison which has been introduced into it.

Nor can we discover in the brain tissue itself any evidence of its having undergone compression, such as one might fairly look for as the result of over-distension of the blood-vessels.

Furthermore, if we look at the mode of accession of delirium tremens, we shall find that there is another condition requisite for the development of the malady besides the ingestion of alcohol. This is an exhausted and depressed state of the whole system caused by the withdrawal of the stimulus, or by the use of antiphlogistic remedies, or by the loss of blood, or by the privation of food.

I shall give a good illustration of this in a case which occurred to myself. I had on several occasions attended a gentleman of high professional position for illnesses brought on by the use of brandy and wine in undue quantity. These illnesses always consisted in attacks of vomiting, with tenderness of the epigastrium, and more or less of sleeplessness. I found that the best means of correcting these symptoms was

by small doses of calomel and opium,—starvation,—iced water.

He had one of these attacks the end of last year, which yielded very readily to the treatment pursued, in the course of three days, and on the fourth day I allowed him a mutton chop and one glass of wine. I should have been more liberal in my allowance had I known that during the previous night he had threatenings of the horrors. In the evening of the day on which he had the chop and wine,—the first food of a substantial quality which he retained on his stomach for some days,—he began to have illusions, to fancy he saw persons in the room, and to see black-beetles crawling over him. This, however, passed off, and he slept for an hour or two. When he awoke, the illusions came on stronger than before: he got up in a rage, and went to his servant's room adjacent, collared him, and accused him of introducing strange men into his room for the purpose of robbing him. The delirium now manifested itself in full force, but yielded very readily to the free administration of alcohol and opium.

A preliminary condition, however, necessary to the development of delirium tremens is a deterioration of the blood by alcohol. No doubt exists now that in cases of poisoning by alcohol the alcohol enters the blood, and by a very rapid absorption. It seems certain that alcohol is one of those substances which is directly absorbed into the bloodvessels of the stomach without undergoing any change in that organ; for MM. Bouchardat and Sandras have detected it in the veins of the portal system; and Dr. Percy has added to our knowledge the important and interesting fact, that alcohol appears to have a special affinity for nervous matter, for he found it in animals poisoned by alcohol in the brain, in large quantity, and in considerably greater proportion, than in an equivalent quantity of blood,—a highly significant fact, explanatory of the injury done to the nervous system by the habitual use of stimulants of this kind in undue quantity.

When alcohol is taken into the system, then, it enters the blood directly unchanged, and it is eliminated partly as alcohol,—at the lungs, at the liver and the kidney, for Dr. Percy detected it in both those fluids. Now at each of these places it must injure the blood,—at the lungs, by attracting a portion of the oxygen which ought to go to the blood itself, thereby diminishing the oxygenation of that fluid,—at the liver and kidneys, by interfering with the eliminating power of those organs for their appropriate materials; for there can be no doubt, from the frequent occurrence of

disease of the liver and kidneys in habitual drunkards, that it must materially affect the nutrition, and therefore the secreting power of those glands.

But as the alcohol is eliminated only in very small quantities at the three points I have mentioned, it is highly probable that it undergoes chemical change in the blood; that it attracts the oxygen of the blood, and becomes converted into carbonic acid and water. Thus it would rob the blood of some of its oxygen,—it would supply carbon in perhaps deleterious quantity,—and it would increase the quantity of water. This increased proportion of water in the blood would seem to be by no means favourable to the natural changes of the blood itself, by which I mean more particularly those connected with the development and growth of the blood particles,—especially the red particles.

Hence we so commonly find habitual drinkers pale and flabby, as if their blood contained too much water and too little colouring matter; and, in the absence of any satisfactory analysis of the blood of such persons, it may be stated that the fluid is probably defective in its solid ingredients, especially its colouring matter, and contaminated probably by some of the principles of the bile and urine, and by some other compound derived from a depraved secondary assimilation of the brain.

We are as yet greatly in want of sufficiently numerous and accurate analyses of the blood and urine in this as in all the varieties of delirium. Dr. Bence Jones some years ago pointed out that in cases of delirium tremens the discharge of phosphates by the urine is almost completely suspended; but these observations were made upon very few cases, and I am not aware that they have received confirmation from subsequent observers. In a few analyses of the urine of patients labouring under chronic epilepsy, and addicted to habits of intemperance, made for me by my friend Mr. L. Beale, jun.,—than whom I know no more competent chemist,—I have not found a deficiency of phosphates, but rather an increase. But this is clearly a point requiring extensive and minute investigation, great precaution being used as to whether the phosphates discharged are due to any peculiarities in the food, or to any excessive waste in the nervous matter, of which phosphorus forms an important ingredient.

I think I have now stated enough to enable me to enunciate a theory of the pathology of delirium tremens. I would lay it down, then, that it is a delirium essentially humoral in its origin,—due to a perversion of nutrition, and especially of the nutrition of the brain, by the slow and constant in-

gestion of a poison—namely, alcohol; and that the poisonous element which contaminates the blood, and which is left free to exercise its destructive and irritating influence upon the brain, when the powers of the system are exhausted, and the blood impoverished by bad living, and the employment of depressing remedies; that this poisonous material is a compound partly of alcohol itself, partly of some material derived from a depraved destructive secondary assimilation of the brain itself,—a material analogous to, if not identical with, that which probably is apt to be developed in the blood in epilepsy, and which by its periodical accumulations gives rise to the paroxysms of that disease.

This view of the pathology of delirium tremens will, if carefully compared with what we know of its clinical history, afford an adequate explanation of that disease. The peculiar affinity of alcohol for the nervous tissue explains the early signs of enfeebled nervous power manifested by habitual spirit drinkers; the assumption of the existence of a poison in the blood distinct from alcohol, but generated in consequence of the habitual ingestion of that fluid, will explain the production of the delirium in the absence of the accustomed alcoholic stimulus; and the control which experience tells us may be obtained over the delirium by giving new supplies of alcohol, and by opium, indicates that the peculiar state of the blood which is generated by a long continuance of an enfeebled and depraved nutrition is highly favourable to the production of the phenomena.

Moreover, we find in this view of the pathology of delirium tremens a satisfactory explanation of the absence in recent cases of all signs of lesion of the brain, and the presence in cases of long standing of morbid changes precisely resembling those seen in chronic epilepsy. The ingestion of alcohol, even in large quantity, does not produce acute inflammation of the brain: it exalts the nervous power—it excites the battery to its highest point,—but it does so at the expense of an extreme waste of the nervous material, and of the generation of a new matter, which is deposited on the membranes and among the bloodvessels, giving rise to those opacities and thickenings of the membranes which are found in the advanced stages of this disease, as well as of epilepsy. I have several times examined the opacities of the arachnoid membrane, which are found in cases of this kind, and have always found them to consist of an accumulation of a fatty material analogous to what we find in the coats of arteries, and which is deposited in the tubes of the kidney, or in the cells of

the liver, and which sometimes takes the place of the true sarcous or fibrinous element within the sarcolemma of the muscular fibre.

Let me now inquire whether any of the other forms of delirium which I have described will admit of a similar or analogous explanation to that which I have given of delirium tremens.

That form of delirium, which most closely resembles it, is the renal epileptic; and this affords very striking points of analogy with delirium tremens as to the circumstances which accompany its development.

Thus, the blood is the seat of a long course of chronic poisoning due to the defective action of the kidneys and the insidious chronic disease of those organs—due, also, perhaps, to the ingestion of deleterious materials; for the subjects of this disease are frequently addicted to intemperate habits both in eating and drinking.

There is a prevailing opinion that the blood is poisoned in cases of this description by the accumulation in it of urea which the kidneys are unable to eliminate. The foundation of this view was the celebrated experiment of Dumas and Prevost, which consisted in the extirpation of the kidneys from a dog, which afterwards died with symptoms referrible to disturbance of the cerebral functions, and urea was discovered in large quantities in the blood. A similar result followed a repetition of the experiment upon dogs, cats, and rabbits, by Mayer, and also by Vauquelin and Segalas; and in every case urea was found in abundance in the blood. Now there can be no doubt, that, in a large number of the cases of chronic disease of the kidney, urea is prone to accumulate in the blood; and it is highly reasonable to suppose that when it reaches a certain point in quantity, or when the blood assumes a certain degree of poverty favourable to the exosmose of its poisoned serum among the elements of the tissues, then the signs of poisoning appear—in the delirium, or in the coma.

Very recently, my friend, Dr. Owen Rees, whose opinions are entitled to the utmost respect, has cast a little doubt upon this view of the poisonous effects of urea, by the narration of a case in which there were no symptoms of poisoning, but the poison was present: a larger quantity of urea was detected in the blood than he had ever found before in a case of Bright's disease. But Dr. Rees throws out a suggestion that probably a certain tenuity of the blood is necessary to ensure the poisoning influence of the urea. In this view I fully concur, and believe that the particular exception to which Dr. Rees referred was caused by the state of the blood; for all analogy shows

that a poisoning influence will take place more rapidly with a thin blood than with one of normal density.

Dr. Christison, indeed, had already referred to cases, in which the urea was present in the blood without any poisonous effects. But these were exceptional cases; and there is no reason to deny that the tolerance of the poison might have been due to a peculiarity in the blood itself.

In the recent epidemic of cholera we had too many proofs of the connexion between imperfect excretion by the kidney and delirious and comatose affections. How many were the cases of individuals who, having weathered the dreadful storm of the early and more violent symptoms, afterwards passed through delirium and coma to death; poisoned in some cases in a manner strikingly similar to that by opium, and always connected with the defective action of the kidneys! And how rapidly, and even suddenly in many instances, were the symptoms removed by a free discharge of urine! In these cases I apprehend there can be no doubt that the poison was urea.

The view, then, that urea accumulating in the blood may poison the brain as alcohol and as opium do, appears to me to be a highly reasonable one.

The characters of the blood in cases of chronic renal disease have been well studied, and these are identical with those which we infer to belong to the blood of patients labouring under delirium tremens. They are, an increased proportion of water—a diminution of albumen—a diminution in a very marked manner of the red particles. This condition of blood is very favourable to serous transudations through the parietes of the vessels, and very unfavourable to the removal of effete matters from the tissues. The exosmose from the blood-vessels would doubtless be immensely in excess of the endosmose unto them.

Thus, we have in this form of delirium a chronic gradual perversion of nutrition,—the developement of a poison in the blood,—an impoverished state of that fluid: all, conditions which we have seen to exist in delirium tremens.

There can, I think, then, be no doubt that the pathology of delirium tremens, and of the renal epileptic delirium, is essentially the same.

Nor does it appear to be at all unreasonable to view the *simple* epileptic delirium as of the same nature,—that is, due to a contaminated and impoverished state of the blood. In the Lumleian lectures last year I brought forward several facts and arguments to show that both chorea and epilepsy are diseases of humoral origin; that the epileptic paroxysm is probably caused by the accumulation of a morbid

matter in the blood, which excites the polar force of the nervous matter of the brain, and so may give rise to delirium, or convulsions, or coma. If this morbid matter be determined in certain quantity to the centre of intellectual action, we have delirium; if determined at the same time, in the same, or in greater quantity, to the centres of emotion and of sensation, we have convulsions and coma.

The hysterical delirium is much of the same nature as the epileptic,—just as the hysterical paroxysm is nearly allied to the epileptic fit, and often so much resembles it as to render the diagnosis a matter of considerable difficulty. There is no one of the nervous diseases which more clearly belongs to the class of humoral diseases than hysteria. It would be easy to adduce a host of facts in proof of this statement. Nor can we ever, in the most aggravated states of hysteria, ascertain the existence of any morbid process in any part or parts of the body which can at all account for the phenomena. It is common to attribute them to a sympathy with the uterus; but there are objections which appear to me to be fatal to this doctrine. First, the organ which is supposed to be thus capable of disturbing the nervous system is but poorly supplied with nerves, and has a very slight connection with the nervous system; secondly, in many of the cases of even the most severe hysteria, the uterine affection is *nil*, or of a very trifling nature; thirdly, we have an affection of precisely the same nature in men, without any derangement in the generative organs, or, at least, without such derangement as may be viewed as the cause of the nervous symptoms.

The uterus, however, may be, and often is, a source of contamination of the blood. There may be a great drain from the uterus by excessive menstrual flux, which impoverishes the blood; some of the morbid secretions formed at the uterus may re-enter the circulation, and so contaminate the blood: or, again, the ovaries may be defective in their action, and so matters which ought to be separated at each catamenial period may remain in the circulation, and contaminate the blood. In this way the generative organs become a source of much disturbance to the general nutrition of the body. But, besides all this, there is frequently in hysteria a very imperfect action of the digestive organs, and the liver and kidneys are much deranged; and the moral state into which patients of this kind are apt to fall is very favourable to maintaining this enfeebled state of the digestive function, and of general nutrition.

It is not, therefore, in any degree, an unreasonable view of hysterical delirium to

attribute it to a similar or analogous state of the system to that which produces epileptic delirium.

It will not be difficult to apply the same reasoning which has led me to these conclusions respecting the pathology of the epileptic and hysterical delirium, to that of the rheumatic and gouty forms of delirium.

In the latter state the recent researches of Dr. Garrod render it highly probable that in every instance lithic acid exists in the blood in such quantity as to justify our regarding it as "poisoned" by that material, or by some compound of it. What is the nature of the poisonous material in the rheumatic states we have yet to determine; but it cannot be doubted that some analogous matter to that of gout is present in the blood. In both states the aspect of the patients denotes a certain poverty of blood, which is greater in the more advanced stages of the diseases, and which is also more manifest when bleeding, and other active antiphlogistic measures of treatment, have been pursued.

In the case of a robust man, on the third day of rheumatic fever, who had not been bled, and with whom no active antiphlogistic treatment had been adopted, the red particles had fallen to less than 100 in 1000 parts; and, when we consider the pallor of patients in the advanced stages of this disease, it cannot be doubted that its tendency is to impair the regenerating power of the red particles.

If now we add to this, that in rheumatic fever the symptoms of delirium generally occur simultaneously with the lighting up of an inflammation of the heart, we shall be led to compare the sudden appearance of delirium in rheumatic fever, under these circumstances, with the sudden appearance of delirium tremens under the influence of exhaustion.

The effect of inflammation of the heart, more especially when it assumes the form of pericarditis, must be to weaken its power,—to induce a state of imperfect palsy. This, indeed, must be the case, unless we suppose the heart to be exempt from the laws which influence other muscles. We often have proof of this in the weakened, depressed, intermittent state of pulse which accompanies and betokens the first invasion of pericardial or endocardial inflammation.

Thus we may lay it down that the delirium of rheumatic fever is due to the brain being supplied with an impure blood which tends to derange its nutrition, and that this derangement of nutrition will take place in a more decided manner if the heart be enfeebled, so that the blood is feebly propelled, and the brain is imper-

fectly supplied. A similar derangement of nutrition affecting the centre of emotion (the region of the corpora quadrigemina) will give rise to those choreic convulsive movements which we know sometimes accompany the first invasion of delirium, or occur independently of it.

The cerebral battery being excited by a thin watery blood, deficient in its colouring matter, and perhaps also in some other of its staminal principles, and which at the same time contains a poisonous element, it is easy to understand how it will exhibit more rapid and active chemical and physical changes; and consequently will develop the nervous force with a rapidity and force which disturbs the mind, exciting repeated and irregular acts of thought, and refusing to be controlled by it.

In gout we have likewise the deranged state of blood, especially in the more aggravated cases—as in the asthenic gout: there is the same pooriness of blood, with deficient colouring matter, and the blood is poisoned by lithic acid, or whatever other material it may be which forms the *materies morbi* in this disease; and, although in these cases we have not the acute endocardial or pericardial affections which are apt to occur in rheumatic fever, the heart's power is very apt to be weakened, as if the nutrition of its muscular structure were much enfeebled, or from chronic valvular disease interfering with the circulation through the heart. Intermission of the pulse is a frequent symptom of a gouty state of the system; nor is it by any means a necessary attendant upon valvular disease, but will manifest itself in cases where the valves are perfectly sound. In such cases it would seem to arise from some impairment of the innervation of the heart or of the muscular force of the heart—due, probably, to the depressing influence of the gouty poison.

Thus, then, I would lay it down that in the rheumatic and gouty forms of delirium, the disturbance of the brain's function is due to the depression of the heart's action, caused by inflammation in the one case, and by the depressing influence of the poison of gout in the other. The state of brain which causes delirium in these cases is a state of irritation arising not from sympathy with the inflammatory irritation of the heart, but, as Dr. Watson and Dr. Burrows express it, from a disturbance of the cerebral circulation occasioned by embarrassment of the heart's action; and I would go farther, and say that not only is it due to an embarrassed action of the heart, but to the circulation with diminished force of an impure and impoverished blood through the brain.

And to the same cause,—namely, an im-

perfect supply of blood, and an impure and impoverished state of that blood, and to a consequent exalted or depressed polarity of the nervous centres,—would I attribute all the other abnormal nervous phenomena which accompany these rheumatic and gouty affections: the choreic and the tetanic convulsions,—the coma; for such a view is more in accordance with the production of these affections in ordinary chorea and tetanus, and, on this account, more reasonable, than that which assigns them to a peripheral irritation propagated along certain nerves to the nervous centre in which they are implanted, and also because the evidence to prove that such a peripheral irritation really exists in every case, is very imperfect.

It will be remembered that delirium is apt to take place in rheumatic fever, when the internal inflammation is pleurisy or pneumonia, without any cardiac inflammation. Here the element of the embarrassed heart's action is wanting, unless we suppose that a severe pleurisy or pneumonia would embarrass the action of the heart. And again, it occurs when there has only been slight endocarditis, and when there has been no internal inflammation at all. So that we may infer, that the element of embarrassed heart's action is less important in the production of the nervous phenomena than that of an impoverished and poisoned blood.

In the delirium of erysipelas and of typhus fever we have the blood poisoned by the erysipelas or the typhus poison, and impoverished during the period of incubation of the poison, and in many instances by influences deleterious to health existing prior to the reception of the poison, which, doubtless, rendered the patient a more ready prey to its destructive power. Hence, then, the pathology of these forms of delirium must be regarded as essentially the same as that of the others to which I have referred. And the more depressed the patient is at the time of the introduction of the poison, and the poorer the condition of his blood, the more likely will he be to suffer from delirium.

It will readily occur to any one disposed to object to these views of the pathology of delirium, that the traumatic delirium is not so readily explicable on these principles. What connection, it will be asked, is there between a compound fracture and a poison in the blood? how can a capital operation in surgery develop a poison in the blood?

I think, however, that it may be affirmed that in cases of severe injuries, fractures, burns, and operations, the elements which, in the forms of delirium we have been considering, contribute to the development of

the delirious state, are present. Many of the patients who suffer in this way have been free livers, and have their blood more or less contaminated by gouty or rheumatic, or, in younger subjects, by scrofulous matter. Moreover, the shock of the operation, or other injury, the loss of blood, the confinement consequent upon it, the low diet and antiphlogistic treatment which may have been adopted, enfeeble the heart's action and impoverish the blood. It is well known that traumatic delirium is much more apt to occur in persons who had previously been addicted to habits of intemperance, or in persons of damaged constitution and enfeebled health, than in sound and vigorous subjects.

Pathology of coma.—If these views be admitted respecting the pathology of the principal forms of delirium, there will be no difficulty in determining the true pathology of the corresponding forms of coma, excluding the traumatic variety and that from compression.

We exclude these forms, because their cause is clearly local. In the one case the suspensor of the action of the brain is due to the influence of shock on the nervous matter. For a certain time, varying in duration according to the violence of the injury sustained, the vital changes of the brain seem to be suspended: they then recover themselves more or less gradually. A similar phenomenon often occurs in physiological experiments. In pithing a frog, if the operation be done rapidly and roughly the animal remains perfectly motionless for some time, no reflex motion whatever can be excited by any mode of stimulation. The animal lies in this state for a certain time, when its reflex actions return, the paralyzing influence of the shock caused by the division of the spinal cord having passed away.

Again, in the coma from a depressed fracture of the skull, or from an effusion of blood or serum, the cause is clearly local, as is shown by the rapidity with which it passes off when a surgical operation has been successful in elevating the depressed and compressing bone, and by the incurability of the cases where a large intracranial hæmorrhage is the compressing cause.

But in all the other varieties of coma the close analogy of the clinical history points to a close analogy of cause and of pathology: and this is clearly shown in the toxic delirium and coma. A poisonous agent capable of exciting delirium, when administered to a certain extent, will produce coma, if given in a larger dose; and it may be stated that *all* the poisons capable of producing delirium will also cause coma. Take, for example, chloroform: in the early stages of its administration we

have delirium; in the later, when more chloroform has been given, coma: so, also, alcohol; so, likewise, opium, stramonium; and the same remark applies to all those agents which exercise a direct action on the brain.

Coma, then, is a higher degree of poisoning than delirium. In the latter case the poison simply irritates, deranges the nutrition of the brain, so as to cause an abnormal and irregular mode of action of that organ. In the former case it paralyzes.

If, now, we admit the humoral nature of the epileptic and hysteric paroxysms, and that the epileptic and hysteric forms of delirium are the result of a disturbed nutrition of the brain by some poisonous matter in the blood, it is clearly highly reasonable to view these forms of coma as but higher degrees of disturbed nutrition from a larger dose or a greater virulence of the poison.

And this reasoning so obviously applies to the rheumatic and gouty coma, that it would be quite superfluous to occupy time with further remarks upon them.

Only admit the humoral view of the various forms of delirium, which I have described, and the explanation of the corresponding varieties of coma follows as a matter of course.

And I must here observe, in concluding my remarks upon the pathology of delirium and coma, that, so far as I know, no explanation has as yet been given of them, so comprehensive and so accordant with the striking analogies in the clinical history of the various forms of those affections, as this, which I may designate the humoral view of the pathology of delirium and coma.

On the Treatment.—I had hoped to have been able to have reviewed the various modes of treatment proposed or adopted for these affections; but the limited space of time allotted to these lectures compels me to confine myself to a very brief reference to one or two important points.

And, first, I would remark that the facts which I have elicited as to the non-inflammatory nature of infinitely the greatest number of cases of delirium and coma, denote how unnecessary is the antiphlogistic treatment in most of them, and how mischievous it may be in most of them.

And, as to the employment of general or local blood-letting, it is a practice not to be justified by anything in the clinical history or the morbid anatomy of these affections, unless perhaps in the truly inflammatory forms, or where some inflammatory complication may exist. I would here remark, that bleeding tends to the produc-

tion of that state of blood which is favourable to the development of the comatose or delirious states. It has long been recognised by various observations upon the quantitative analysis of the blood, that bleeding tends to increase the water, to diminish the specific gravity of the serum, and to diminish in a very marked manner the amount of the coloured corpuscles,—to induce, in fact, a state of blood highly favourable to the exosmose of its fluid parts among the tissues, and which is apt to produce a special variety of delirium and coma (the anæmic), and which, it is reasonable to conclude, would be very apt to increase the intensity of other forms of delirium and coma.

I was anxious to ascertain the effect of repeated bleedings upon the blood in a case where food has been at the same time freely given; and accordingly I tried the following experiments, with the kind and able assistance of my friend Mr. Lionel Beale. A large and well-nourished dog, apparently in perfectly good health, was fed daily on two pounds of meat and a quart of milk. He was bled on four successive days to the extent of six ounces each day, and the blood carefully analysed. The blood drawn in the first bleeding on the 6th of April contained, in a thousand parts, 142·85 corpuscles, 2·42 fibrin, and 783·79 water. That taken by the second bleeding (on the 7th April) exhibited a diminution of the corpuscles to 113·54, and an increase of the water to 810·89, and of the fibrin to 4·72. On the third bleeding (April 8th) the corpuscles had fallen to 110·58, and the water had increased to 815·18, the fibrin being 4·34. And on the fourth bleeding the corpuscles were 106·96, the water 813·04, and the fibrin 3·99.

Thus, notwithstanding the high feeding, the obvious and marked tendency of the withdrawal of blood from the system is to increase the water and diminish the corpuscles, while the fibrin is evidently not reduced, but rather increased.

So much for bleeding. Generally speak-

ing, however, an antiphlogistic system is inapplicable in delirium and in coma. We have ample confirmation of this in the results of experience in delirium tremens. I believe practical men are now pretty well agreed upon this point. And what applies to delirium tremens applies also to all the forms of delirium. The approach of delirium should be the signal to the practitioner to look to the support of his patient: this is particularly the case in the delirium of rheumatic fever and of gout, and in that of erysipelas and typhus.

I must add one word before I conclude, as to the use of opium. In certain forms of delirium, the cautious and watchful use of this drug is of the utmost value; in others it is attended with danger. It appears to me that in those cases of delirium which have a tendency to pass into coma, opium should be avoided, or used with the greatest caution; whereas in the wakeful delirium it is of great value, and may often be employed very freely, not only with impunity, but also with great benefit. In the epileptic and hysterical delirium, and in that from gout, opium, if used at all, must be employed with great caution. On the other hand, in the delirium of rheumatic fever, and in that of anæmia, in the traumatic delirium, and in delirium tremens, it is invaluable, of course with certain restrictions.

I regret that the time allotted to these lectures obliges me to conclude here my rapid survey of the pathology and treatment of delirium and coma. Much more might be added to what I have said, especially as regards the treatment; but I shall be content if I have succeeded in calling the attention of the profession more particularly to the intrinsic nature of these affections,—a subject which does not appear to me to have received from them all the attention which their importance deserves; and I conclude by thanking you, Mr. President and Gentlemen, for the kind and patient attention with which you have received my remarks during these lectures.

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A Sequel
TO THE
LUMLEIAN LECTURES.

ON THE TREATMENT OF DELIRIUM AND COMA,

Delivered at King's College Hospital.

[REPORTED BY MR. LIONEL S. BEALE, MED. ASSOCIATE, K.C.L.]

LECTURE I.

Recapitulation of the conclusions arrived at in the Lumleian Lectures—Delirium and Coma not inflammatory in the vast majority of cases—Congestion not a cause of delirium or coma—Diagnosis of the different forms of delirium—Assisted materially by the fact of the rarity of inflammation of the brain in the adult—The few cases in hospital practice—also in the Registrar-General's reports—Symptoms of inflammation of the brain—Diagnosis of the various forms of non-inflammatory delirium from each other.

GENTLEMEN,—I have lately been giving, as most of you are perhaps aware, some lectures at the College of Physicians, on the subject of delirium and coma. In these lectures I have endeavoured to collect and arrange the most important facts in the clinical history and morbid anatomy of these diseases; and from these premises, with due attention to certain points in the physiology of the brain and nervous system generally, it has been my object to deduce conclusions with respect to the intrinsic nature of delirium and coma; or, in other words, to frame a reasonable view of the pathology of those affections.

The conclusion at which I arrived in these lectures was, that, in the vast majority of cases, delirium and coma essentially depended upon different degrees of derangement of the nutrition of those parts of the brain, which may respectively be called "the centre of intellectual action and the

centre of sensation." It may, indeed, be said that these symptoms are produced by different degrees of *poisoning* of the nervous matter which constitutes these centres, whereby their normal action is disturbed. If the poisoning occurs only to a certain extent, delirium is produced; but if to a greater extent, coma will result. Thus if you notice the effects of alcohol upon the system, as we have too many opportunities of doing, you will observe that when the alcoholic potations are limited to a certain point, delirium occurs, the person becomes loquacious and merrily drunk; but if a larger dose of the poison (as it must be called) be imbibed, he becomes stupidly, or, as it is frequently termed, "beastly drunk," or, in more scientific phrase, *comatose*.

You have also frequent opportunities of observing these two degrees of the operation of the same poison in patients to whom chloroform is administered prior to surgical operations. After a few inhalations, the patient becomes delirious, talks incoherently, laughs very much, and offers considerable resistance when attempts are made to hold him. In a short time, however, if the administration of the chloroform be continued, all resistance ceases, the muscles become relaxed, and the patient lapses into a state of profound insensibility or coma; and that coma will become more profound the more chloroform you give, so that death may be caused by its continued administration.

In several constitutional affections the

brain suffers in its nutrition, or its healthy functions are interfered with by the influence of various morbid poisons: of this we have examples in the frequent occurrence of delirium and coma in typhus fever and the exanthemata, in erysipelas, rheumatic fever, and gout, in epilepsy. Hence I was led to describe the various forms of delirium and coma under the respective names of typhoid, of rheumatic, of gouty, of erysipelatous, of epileptic delirium and coma, &c. These various forms of delirium and coma resemble in all essential points those which may be brought on by the introduction into the system of such poisons as alcohol, opium, and the whole class of narcotic poisons, &c. From this we may infer, that a morbid matter, generated in the human body, or communicated from one person to another, as the poison of typhus, of the exanthemata, of erysipelas, &c. may disturb the centres of intellectual action and of sensation; these poisons having a special affinity for those centres; as Flourens suggested that some of the narcotic poisons exercise primarily a special influence on particular parts of the brain; as belladonna, which causes blindness and dilatation of the pupil, by acting primarily on the centre of implantation of the optic nerves; alcohol, which impairs the power of the co-ordination of movements, by affecting the cerebellum; or opium, which causes contraction of the pupil, by exerting its particular influence on the centre in which the third pair of nerves is implicated.

Again, Dr. Percy has shown by chemical analysis, that, in cases of poisoning by alcohol, the brain contains more of this stimulant than any other texture in the body; so that it would appear that the nervous matter exercises a particular attraction for this substance, and has a greater power of separating it from the blood, than any of the other tissues.

Whatever theories we may adopt with respect to the causes of delirium and coma, clinical examination clearly shows that, in the vast majority of cases, there is no evidence that they arise from any inflammatory state of the brain. I should say, speaking very roughly, that, of twenty cases of delirium or coma, one might depend upon inflammation; for one case depending upon inflammation, you have nineteen others arising from causes of a non-inflammatory character; in other words, for every hundred cases of delirium and coma, which you meet with, not more than five will be inflammatory in their nature. And it may be further deduced from the facts of the clinical history which I have collected, that congestion takes no part in the production of delirium or coma—congestion, that state to which many are so prone to ascribe the

most various, and even opposite affections of the brain. If a man be giddy, the giddiness is said to depend upon congestion; if he has a headache, the pain is referred to the same cause; if he be delirious, congestion is the cause; if he be comatose, it is because the brain is congested. Nor has any advocate of this view, so far as I am aware, ever attempted to explain, what seems an obvious contradiction, namely, how a raving delirium may be caused by the same pathological condition (congestion) which would produce an apoplectic coma.

Undoubtedly, as I have before observed, in the vast majority of cases we shall find that delirium and coma are not produced by an inflammatory or by a congested state of the brain; it must, however, be borne in mind, that now and then we do find that inflammation of the brain or its envelopes does cause delirium or coma, though these cases are indeed few when compared with the number of cases which cannot be ascribed to such a cause. When the practitioner is called upon to treat a case of delirium or coma, he must first solve the problem, whether, in this particular case, the symptoms are dependent upon inflammation of the membranes or substance of the brain, or whether it is produced by a peculiar condition of the system not in any way connected with inflammation.

At the College of Physicians I was unable, from the great extent of the subject, to enter at length on the consideration of the treatment of these diseases, and I therefore propose to discuss that part of the subject here in the present and two or three other lectures, and to illustrate my remarks by reference to such cases as may occur to us.

Before, however, I speak of the treatment of the various forms of delirium and coma, it will be necessary that I should occupy a little time with some remarks upon the subject of the diagnosis,—not only of each form of delirium or coma from the others,—but especially of the inflammatory from the non-inflammatory forms of delirium and coma.

In this latter diagnosis, it is plain that we derive great aid from the clinical fact to which I have already alluded; namely, that the vast majority of cases of delirium and coma are clearly not dependent upon any inflammatory process in the brain—upon any process which leads to the formation of lymph or pus, or to the ultimate disorganization or total destruction of the tissues affected.

And we derive further help, in the diagnosis, from the fact (which, I think, cannot be doubted), that inflammation of the brain (whether of the membranes or of the cerebral pulp) is a rare disease, excepting in

quite young children. It is seldom met with, both in hospital and in private practice, excepting at those early periods of life when it is associated with a strumous state of constitution.

Many of you have been attending the wards of this hospital, with the most laudable regularity, for the last twelve months or more, and you must have remarked how rarely does delirium or coma occur in consequence of inflammation of the brain, compared with the great number of cases of the same affections which result from other causes. Looking back to my case-books for the last ten years, I am surprised at the small number of cases of inflammation of the brain which I am able to collect. The reports of the Registrar-General also lead to the same conclusion, and tend to show how rare are cases of inflammation of the brain. These cases are classed in the reports under the term *Cephalitis*; a term which, although not free from objection, has at least the recommendation of being comprehensive, for it is applicable to inflammation of any or all the textures which form the head. Seeing, then, the comprehensive nature of this term, we may expect that all cases having any pretension to be called cases of inflammation of the brain or of its membranes, are included in the report.

Now the cases of cephalitis are very few in number. The first week in January during a series of ten years, from 1840 to 1849, gives a maximum of 16, and a minimum of 9, deaths from cephalitis, the average being 11 per week, in a population of two millions, and with an average mortality of about 1100. In the third week of the same month, during the same ten years, we find just the same weekly average; and at later periods of the year there is little or no difference as regards the number of deaths from cephalitis. I think, moreover, that the number of deaths from cephalitis already mentioned may be taken as perhaps representing more than really do occur from that cause, for there is a decided tendency to refer symptoms to inflammation, and there is an undoubted fondness for the termination "itis" in the nomenclature of disease. We may therefore assume that cephalitis is often said to kill people, when really there has been no inflammation at all, and that the reports are more likely to exhibit an over- than an under-statement of the cases of cephalitis. If, moreover, we remember what a fatal disease inflammation of the brain is, we may infer that, all things being considered, we may derive from the reports of the Registrar-General a pretty accurate account of the actual number of cases of cephalitis which occur in each week, among a popu-

lation peculiarly exposed to causes likely to disturb the brain.

Hence, then, there being the strongest reasons for concluding that inflammation of the brain is a rare disease, we are justified in holding the opinion that delirium and coma, in the vast majority of instances, are non-inflammatory affections, but that occasionally they depend upon, or are associated with, inflammation of the brain.

What, now, are the symptoms which, in any given case, would lead us to affirm that the patient is suffering from inflammation of the brain? I shall enumerate these symptoms in the order of their frequency and importance.

The first symptom which I shall mention, because it is of very frequent occurrence, and ought to excite very strong apprehensions in the mind of the medical attendant, is *nausea* and *vomiting*. It comes without any assignable cause; sometimes the patient vomits without any previous warning, and quite irrespective of any food he may have taken into his stomach, or of any previous derangement of his digestive organs, or, indeed, of any previous marked disturbance of the general health.

Secondly, we meet with pain in the head as a very frequent symptom, which, however, exhibits a good deal of variety in its characters. Sometimes it is acute, and fixed in its situation; at other times dull and indefinite. It is more intense and better marked in proportion as the disease is seated nearer the surface. It is most intense in inflammation of the dura mater, and least severe in inflammation of the cerebral pulp. When the inflammation arises from a syphilitic taint, the dura mater is very frequently affected; and in such cases the pain in the head is not uncommonly accompanied by a tenderness of the pericranium in the position of the pain.

Thirdly, sluggishness of the pulse is a frequent accompaniment of even the most intense inflammation of the brain. The pulse may fall as low as 50, or even 40, or it may continue to beat at the rate of 60 or 70. It may be sluggish without being particularly slow. The artery strikes in a heavy sluggish manner, not rapidly or sharply, but conveying the sensation as if it impressed a larger surface of the finger than usual. Generally, however, in cases of inflammation of the brain, the pulse is both slow and sluggish, and the heart's action heavy, the beats not succeeding each other rapidly.

Fourthly, we have delirium tending to coma. In inflammation of the brain the delirium is generally of the low and muttering kind. You seldom or never have wild frantic delirium when there is inflamma-

tion of the brain. The descriptions given by systematic authors of what is called *phrenitis*, appear to me to have no foundation in clinical study—at least, if that affection be regarded as a form of inflammation within the cranium. In inflammation of the brain there is, along with the delirium, a more or less comatose state, which gives to this form of delirium a close resemblance to that which comes on in typhus fever. Indeed, some cases of inflammation of the brain so much resemble typhus fever, that it is exceedingly difficult, or quite impossible, to distinguish between them, until the disease is so far advanced as to afford some special characteristic symptoms. As an instance of this I will relate a case which occurred in the hospital last March.

A woman, about forty years of age, of fair complexion, with red hair, was brought up from the surgical wards on the 8th of March, apparently suffering from typhus fever. The tongue was dry, and covered with a brown fur, the pulse rapid and weak, beating 120 in a minute, and there was great prostration, so that she was ordered stimulants; and in still closer resemblance to typhus or typhoid fever, she had severe diarrhoea, with a tympanitic state of the abdomen. She was now in a heavy stupid state, and could not give any satisfactory account of herself.

The next day delirium of a low and muttering character came on; she passed her motions under her, and complained of great thirst and headache, which was not distinctly referred to one point of the head.

On the 10th she continued much the same, muttering, delirious, and comatose. The pulse now became sluggish, and fell in frequency. This symptom, with the continuance of the delirium, unaffected by stimulants, which generally exercise a beneficial influence in the delirium of typhus, excited my suspicions of inflammation within the cranium. The head was ordered to be shaved, and cold applied; and the stimulants were diminished to one-half. Such was the prostration, that I did not like to withdraw them altogether. The next day the pulse became still slower; a very marked paralytic state supervened; the tongue was protruded to the right side; both pupils were dilated, but the left much more so than the right. Soon afterwards a decided paralysis of the right arm and leg, accompanied by a rigid state of the muscles of the arm, occurred, the coma became profound, and she died in the evening.

Upon a post-mortem examination being made, a large quantity of loose flaky lymph was found effused into the arachnoid sac

of the left side, covering the upper and inner surface of the left hemisphere, the left side of the falx, and extending on the outer surface of the hemisphere to the level of the base, but ceasing there abruptly, so that not the smallest particle of lymph was found on the arachnoid of the base. An accumulation of fluid had taken place in a cavity, circumscribed by lymph, on the outer side of the left ventricle, near the position of the fissure of Sylvius. The fluid which had accumulated here compressed the brain on the left side, and formed a complete depression on its surface. This was the cause of the paralysis with rigidity, of the right arm and leg.

I mention this case to show you the great difficulty of distinguishing a case of inflammation of the brain from one of typhus fever, before the disease has made a certain advance; and I must confess, that if a similar case were to occur to me again, I should find the same difficulty in forming my diagnosis.

The first symptom which led me to suspect inflammation of the brain, was the alteration in frequency of the pulse. On the first day it was 120, on the second 112, and it then fell to 50 or 60. The inequality of the pupils and the paralytic state very soon confirmed this suspicion.

Fifthly, I may notice *coma*, which generally accompanies or follows delirium, and which is a more constant symptom of inflammation of the brain than delirium. Delirium of the low muttering kind, passing readily into coma, without any evidence of diseased kidney, or of impediment to the excretion of any other gland, affords strong presumptive evidence of the existence of inflammation of the brain.

The last symptom to which I shall refer as accompanying inflammation of the brain, is *paralysis*, which occurs under a great variety of circumstances as regards degree and locality. Occurring in connection with the other symptoms I have detailed, it is a sure indication of the presence of destructive disease within the cranium. It is obvious, however, that it must vary considerably in extent, according to the extent and position of the inflammation. You may have a slight paralysis affecting the levator palpebræ and some of the muscles of the eye-ball; or a hemiplegia, perfect or otherwise, but frequently exhibiting a more or less contracted state of the muscles of the paralytic limbs.

The paralysed limbs are sometimes affected at intervals with epileptiform convulsions, more especially when the inflammatory process is seated on, or very near, the surface of the brain. In rare instances, in young subjects, such partial convulsive movements may pass into general convul-

sions: otherwise, I apprehend that general convulsions cannot be regarded as a feature of the clinical history of inflammation of the brain.

Thus, then, that form of delirium which is accompanied with nausea or vomiting, pain in the head, or a slow sluggish pulse, and has an obvious tendency to the comatose state, or passes quickly into coma, and especially when accompanied or succeeded by paralysis, may be justly viewed as having its origin in inflammation within the cranium,

more especially when there is no evidence of disease of the kidney.

Excluding the delirium which originates in inflammation of the brain, the diagnosis of the other forms of delirium from each other is comparatively simple, certain salient points in the history of each affording generally obvious indications of the nature of the delirium. On these points I shall touch when I describe the treatment of each form of delirium or coma; to which subject I shall proceed in my next lecture.

LECTURE II.

Distinction between true delirium tremens and delirium e potu—Analogous distinction in cases of opium-poisoning—Treatment of the milder form of delirium tremens—Case—Treatment of the more intense form—Mode of feeding—Means of restraint—Influence of persuasion—Case—Use of opium—Morphia—Quinine and opium—Tartar emetic and opium—Cold—Chloroform—Cases.

GENTLEMEN,—I propose now to proceed with the treatment of the various kinds of delirium; and I shall take first that of delirium tremens, not only because it is that form of delirium which you have the most frequent opportunities of witnessing in hospital practice, but also because the treatment which is best suited to it is also in a great degree applicable to most of the other forms of delirium.

By delirium tremens I mean that state which comes on sooner or later in all persons addicted to habits of intemperance. Many practical men recognise two kinds of delirium tremens; but it would, as it seems to me, be more correct to consider these as two distinct forms of delirium, closely allied, however, inasmuch as they both may arise from intemperance.

The first is the true delirium tremens of drunkards, — *delirium ebriosorum*; the second is the delirium from alcohol,—the *delirium e potu*, which may occur in a man who is habitually the most temperate. As I go on you will see the importance of this distinction.

The one occurs in a habitual drunkard, —the other may occur in a person drinking for the first time. One is frequently the precursor of the other.

If a temperate man be led to drink excessively, the second form soon comes on, arising from the poison of alcohol interfering with the healthy action of the brain; but if he become a habitual drunkard, he is subject to attacks of the true delirium tremens, under particular circumstances. In this case, however, the poison is not alcohol, but a compound formed of alcohol and perhaps some morbid matter generated in the system.

The true delirium tremens is the delirium of a man who, having long indulged in his cups, has by some means or other been depressed, or prevented from taking his accustomed amount of stimuli.

The delirium e potu is the delirium of a man whose blood has become charged with alcohol: it is a case of active poisoning, the poison being alcohol: but we know this cannot be the case in the delirium of drunkards, because the exhibition of alcohol in some form or other is known by experience to constitute a most important part of the treatment of the disease; as if alcohol, within certain limits, were an antidote to the poison which disturbs the nutrition of the brain.

If these distinctions be correct, it is obviously of vast importance to recognise clearly the two maladies, as an essentially different treatment would be required. In the one case you have to deal with delirium supervening upon a disease in which the powers of life have been greatly impaired by a course of slow poisoning: in the other you have to oppose by your treatment the mischief done by the introduction of alcohol, and to eliminate this poison from the system.

You have very much the same difference in cases of opium-poisoning as in that of poisoning by alcohol. Habitual opium-eaters are liable to a form of delirium which closely resembles the true delirium tremens, and which, like it, is apt to come on when they are deprived of their accustomed supply of opium. But the rapid administration of opium in large quantity will excite a state of delirium which very speedily passes into profound coma. In the one case, the administration of a certain quantity of opium, or of some other sedative, is essential to the cure; in the other case, the introduction of any more opium into the system would inevitably destroy the patient, or greatly increase his peril.

It is important to observe that these two kinds of delirium may be mixed: they may occur in the same patient at the same time. A man, habitually intemperate, whose blood is already poisoned by the peculiar poison of delirium tremens, and who has had the horrors, and many other of the symptoms of delirium tremens, sits down to a bout of drinking, and alcohol enters his blood in large quantity. Thus he becomes at once the subject of two states, of which, however, the delirium e potu would evidently predominate. In such cases the treatment evidently becomes much compli-

cated, and it would obviously be desirable to eliminate the free alcohol from the system before you can deal with the delirium tremens.

I shall now proceed to the consideration of the treatment of the true delirium tremens, which we meet with very commonly in hospital practice, both in a mild and in a more intense form.

I. The milder form of the disease is characterised by the occurrence of horrors, hallucinations, tremor, vigilia. In such cases the patient fancies he sees demons, or dragons, or insects creeping over his bed, or flying in the air; he is suspicious, and thinks every body is combining against him to do him some injury; or he dreads some impending evil, and fancies himself about to die, or to fall into misfortune. With some or all of these symptoms there is more or less of tremor accompanying the voluntary motions. If you ask the patient to hold out his hand, he does so with a remarkable and characteristic tremor: this tremor interferes greatly with the due performance of many acts which require a nice muscular adjustment: he cannot hold and direct his pen properly: he is a long time about buttoning his coat or his breeches, or tying his cravat: to pick up a pin, or neatly insert it into any part of his garments, is quite beyond his power. So also if you make him shut his eyes strongly, or protrude his tongue, you witness the same characteristic tremulousness in those actions. He finds it difficult to obtain sleep, and if he does sleep it is only for short periods, frequently being waked up in a fright by horrible dreams, or with nightmare. With all these symptoms of disturbance of the nervous centres, the patient's skin is moist, often perspiring freely, his tongue is clean, and his pulse soft, and not quick.

In every case of this kind it is important to remember that the balance of nutrition, so to speak, is disturbed by some cause,—either by the want of proper food, from loss of appetite or from the inability to procure it, as we often find with our poor hospital patients; or by the impairment of the functions of the stomach, through the repeated use of stimulants, so that the patient is unable to retain or digest nutritious food.

The great object of treatment, therefore, is, to restore the balance of nutrition and to procure sleep, in which, if you succeed, you cure your patient in a very few days. It generally happens in these mild cases that the discipline, the regular hours, and the care to which the patients are subjected in a hospital, restore them to health with very little medical interference.

I shall best illustrate what I have said upon this subject by relating the particulars of the following case, which occurred in the hospital.

Henry Arden, æt. 29, admitted on the 2d of last July. It appeared that his health had been good until nine months ago, when he suffered from some indisposition the nature of which he could not explain. He professed, however, to have derived great benefit from drinking porter early in the morning. From this time he acquired the habit of drinking large quantities of porter, the average amount being, according to his own confession, from four to five pints daily.

Two months before his admission he began to suffer from dyspeptic symptoms, with loss of appetite, for which he was treated as an out-patient at the hospital. From this time we may date the derangement in the balance of nutrition. The medicine prescribed for him on the 29th of June seems to have caused some nausea. He left off taking his porter: in his own words, he felt something rise from his chest to his head, and this sensation was accompanied by a disturbed state of consciousness, under the influence of which he fancied himself to be walking about the house, opening the windows, and gazing upon a succession of figures which passed before him holding lighted tapers, and which at other times assumed the appearance of shadows flitting by the window, and every now and then looking into his chamber. This was the commencement of the disturbance of the cerebral functions. These hallucinations continuing, he was admitted into hospital on the 2d of July.

On admission he exhibited the characteristic tremors in all his movements,—pallid countenance,—sleeplessness,—and the hallucinations which I have described,—all the usual signs of incipient delirium tremens. From the 29th of June to the 2d of July he had not closed his eyes in sleep.

Now this patient was simply put upon a regulated diet: he was allowed a pint of porter daily, and a moderate quantity of meat, and was ordered half a grain of morphia every night.

On the night of his admission he slept for the first time for four nights, and also on the subsequent nights, and on the 5th all hallucinations had disappeared, and the tremulousness was less. On the 12th he was quite well in every respect, excepting that some degree of tremulousness remained.

This case afforded a good example of one of the many forms which the hallucinations that haunt these patients are apt to assume. It is an interesting but difficult

problem to enquire what it is which determines the particular nature of the hallucination in each case;—in some degree, no doubt, the peculiar temperament of the individual, and also, perhaps, the bent of his thoughts and inclinations in his sane condition: but we cannot enter upon this subject now.

Cases of this kind, as I have already said, are of very frequent occurrence in the hospital; and we also frequently find that regularity of diet and proper food are sufficient to restore the balance of nutrition. We should, however, bear in mind that in all cases of delirium tremens it is of primary importance to procure sleep for our patient; and for this object I confess that I know nothing so effectual as opium given in the crude state, or in the form of tincture or morphia; or, should you have any reason to suppose that the preparations of opium disagree, you may try some other sedative remedies—camphor, hyoscyamus, hop, &c. &c. Should anti-phlogistic remedies be given in these cases? We have no inflammation to subdue, and therefore there is no need for remedies of this class; our main point is to restore nutrition by means most germane to the digestive organs. And I would here guard you against following any routine practice in the use of purgatives. If you have any reason to believe that your patient would receive benefit from a slight purge, by all means prescribe accordingly; but if his bowels are regular, there can be little use in giving him active purgatives.

II. We have now to consider the treatment of the more intense or the confirmed delirium tremens. The patient has passed through the stage in which the horrors occur, and is now in a state of restless, and more or less violent delirium. In deciding upon the appropriate treatment of such cases as these, we must look in the first instance to the immediate cause which has disturbed the balance of nutrition. We shall find this to be either that he has been deprived of food by dire want, or that his stomach has become so irritable that he rejects everything that he takes. I say it is important to determine the cause of this disturbed nutrition, because our first endeavour must be to induce our patient to take nourishing food. This will be easily enough effected if the patient had been deprived of food from necessity, or if his appetite had been impaired; and it is best to administer the food in small quantities at a time, but frequently repeated. An ounce, or an ounce and a half, of mutton-chop may be given every two or three hours; or small quantities of some good animal broth or soup. The most difficult case

to deal with is where the stomach has become extremely irritable, and rejects the food. Under such circumstances the greatest nicety is required in the administration of nutriment. If the stomach will not bear solid food or animal broths, milk may be given, the caseine of which may serve for solid food; but it must be given in small quantities at a time, and it may be combined with lime-water, or sometimes even with very small quantities of some alcoholic stimulant—brandy, rum, and gin, it being generally better to select that stimulant which the patient has been accustomed to drink. The patient may be able to retain nourishment of this kind if given in tablespoonfuls, or even teaspoonfuls, at a time, while, if larger quantities were administered, vomiting would ensue.

At the same time, we may with advantage attempt to allay the irritability of the stomach by other means likewise—as by giving ammonia in effervescence, or the common effervescing draught of soda or potash, or by prussic acid given with or without effervescing medicines; or we may have recourse to a very useful and effective remedy—kreosote combined with morphia, in small doses in the form of pills. Iced water, or small quantities of the pure Wenham Lake ice, will allay the irritable stomach when other means fail. Counter-irritation over the region of the stomach may be also employed with benefit—as mustard poultices, or flannels wrung out of hot water and sprinkled with turpentine.

The mucous membrane of the stomach is no doubt in these cases sometimes in a state of actual inflammation, or nearly approaching to it, although less frequently so than many suppose; and it may be desirable to apply leeches to the epigastrium; but, as a general rule, it behoves us to be cautious about taking blood in these cases.

I need scarcely add, that in all cases where the stomach is highly irritable it is very important to have the bowels freely evacuated, either by purgatives or by enema.

Let us now suppose that your patient, not having slept for many hours, is in a state of delirium so violent that he cannot be kept in bed, and is with difficulty kept from injuring himself or others; how are we to act in such a case?

There are three points to which your attention must be especially directed:—

1. The due administration of nourishment.
2. The means of restraint.
3. How to procure sleep.

I have already sufficiently considered the first point, and shall only add, that whatever the nature of the delirium, this point is primary and paramount.

2dly. With regard to the question of restraint, it is obviously of the greatest importance that the patient should be restrained from injuring himself and others, and that he should be kept in a horizontal posture, as not tending to exhaust, and most favourable to sleep; but I caution you from being tempted by the solicitation of the friends or attendants of the patient, to use the straight waistcoat in any case in which it can possibly be avoided: although, in one sense, secure, it is a bad practice.

Undoubtedly the straight waistcoat is a very effectual means of restraining the patient, and is the best means you can use if restraint were your sole object; but as you likewise want to procure sleep, and to preserve strength, you will often find its use incompatible with those objects. It is far better to provide one or more attendants, who, by careful watching, kind persuasion, and the influence which the presence of a superior force exerts even over a delirious patient, will succeed in keeping him quiet without personal restraint.

If you watch a patient tied down by the straight waistcoat, you will at once see what is the main objection to it as a means of restraint. You will perceive that the patient is continually using the most forcible efforts to extricate himself from it. The pressure upon his arms and legs excites in his mind the idea that he is held down by persons who are sent to torment him, and thus his delirium is kept up or increased, and he uses all his might to free himself from his imaginary tormentors. These efforts are generally accompanied by violent perspiration, and are followed by extreme exhaustion; and they are obviously greatly opposed to any efforts we may make to procure sleep and to restore the balance of nutrition.

Sometimes, however, it is right to notice, the "restraint by watching" does not succeed so well as the straight waistcoat. You may remember a remarkable instance of this which occurred lately in a patient upon whom Mr. Fergusson performed the Taliacotian operation for a new nose; this man was brought up to the physicians' wards with erysipelas and violent delirium; he was extremely loquacious, and the presence of others kept up his tendency to talk incessantly.

In this case, after having tried the watching plan for a day or two, we gave it up, and applied the straight waistcoat, at the same time isolating the patient by surrounding his bed with screens. The attendants were removed, and no one came near him except the nurse, who every now and then gave him food or medicine. This plan was immediately and perfectly successful.

It is in cases of this description that it is often useful to put a patient into a padded room in which he cannot injure himself, and leave him there in complete solitude and darkness. We have not the means of adopting this practice in ordinary hospital or in private practice; but it may be imitated to a great extent. The obvious objection to it is suggested by the proverb—"out of sight out of mind"—namely, the danger that the attendant may neglect to give the supplies at proper times, from not seeing the patient or being in the same apartment with him.

We may sometimes succeed in quieting a delirious patient by calling in the aid of some friend, or other person known to possess considerable influence over him; and it is well to bear this in mind as a valuable expedient when other means fail.

Two or three years ago I was called to see a law student, of intemperate habits, who was living in lodgings; he was suffering under violent delirium tremens. The patient obstinately refused all food and medicine, and no persuasion that his medical and other attendants could use seemed to have the slightest weight with him. The delirium took the turn of the most ardent religious excitement, and the patient being a Roman Catholic, was continually on his knees, praying unceasingly, and with the most extraordinary volubility of tongue, to the Virgin Mary. Knowing the influence which the Roman Catholic clergy often acquire over particular members of their flocks, it occurred to me to call in the aid of the priest in this case. He came, and was closeted with the patient for a very short time, and when we were admitted, we found, to our great relief and satisfaction, that a most wonderful change had taken place, and that our patient had become quite tractable and obedient. He took food and opium, and speedily recovered.

3d. To procure sleep there is no remedy, as I mentioned before, better than crude opium or laudanum. Theory recommends these preparations because they are known to contain all the active principles of the opium, and therefore the chances of obtaining the sedative and narcotic influence are greater with opium than with morphia. Practice recommends them, because in many persons opium is not so liable to disagree with the stomach as morphia. Many people have the idiosyncrasy of being influenced by morphia as by an emetic. I have seen morphia produce as severe an emetic and nauseating effect as if the patient had taken tartar emetic. I may refer here to the case of a lady for whom I occasionally prescribe, who is so susceptible of the emetic influence of this drug, that she immediately detects it in whatever dose it

may be given, or however it may be concealed. And opium, although it cannot be said to agree perfectly with her, does not produce the same nauseating effect.

When you give opium, do not be timid with it. Give a full dose at once, two or three grains, or a drachm of the tincture, and be guided by the progress of the case as to the frequency of its repetition and the amount of the subsequent doses.

The combination of camphor with opium frequently counteracts the unfavourable, and promotes the sedative influence of the latter. But I know no combination which, generally speaking, answers better in delirium tremens, especially where there is much depression, than that of quinine with opium. One or two grains of quinine, with from ten to thirty drops of laudanum, given every four, six, or eight hours, often answer extremely well.

Many practitioners, and amongst them some whose opinion is entitled to the greatest respect, have recommended a combination of tartar emetic and opium, and place great faith in this admixture; but I think a fallacy may exist here, in the fact that opium undoubtedly modifies and controls to a great extent the action of tartar emetic, so that in fact, whilst administering the two drugs, we may in truth be simply giving opium. If you could always succeed in limiting the influence of the tartar emetic to its simply alterative effects, there would be no objection to its use, as its action on the skin would materially assist in eliminating poisonous matters from the system, but its depressing influence does positive harm, and is not always so readily counteracted as is desirable. For this reason I seldom or never have recourse to this combination.

Another expedient which you should keep in view, as a means of quieting delirious patients, is the application of cold to the head, either by a bladder of ice or by the use of the cold douche. Both, you must remember, are powerful agents, and tend to produce depression of the heart's action, which may be carried to such an extent as to kill the patient, if the douche be applied too powerfully, or the ice be kept applied too long.

Sometimes, when we have persevered with opium for some time, the pupil becomes contracted, and yet the patient does

not sleep. In such a case are we to persist in giving opium? I think a very contracted state of the pupils ought always to be taken by the practitioner as a strong indication against the further use of opium, and that then he may have recourse to other sedatives. Under such circumstances I incline to think we have a most valuable resource in the administration of chloroform by inhalation, but I have not as yet had sufficient experience of its effects to justify me in speaking very positively respecting it. I shall relate to you three cases, in which its use was followed by the most happy results.

The first case was that of a man in the hospital, who had been two days under treatment, and had taken plenty of nourishment and opium, and the pupils were so contracted that we were afraid to persist in the use of the latter. I therefore determined to try the inhalation of chloroform, and had it administered while I was in the ward, taking care to feel the pulse during its inhalation. The man was soon under its influence, and slept continuously for 22 hours, only waking once during this time to take nourishment. The report in the case-book states that this was the first sleep the patient had had for five days. He soon got quite well.

The second case likewise occurred in the hospital: opium, although not tried so long as in the first case, failed to produce sleep: chloroform was administered; the patient slept all that night, and the next morning was perfectly quiet, and soon went out restored in health.

A third case occurred in private practice, in a patient whom I saw with Mr. Simon. He had been treated in the most careful and judicious manner previously to my seeing him, and opium had been freely given without causing sleep, whilst it produced contracted pupils. It was now a question as to the propriety of administering chloroform, and I had no difficulty in agreeing with Mr. Simon to give it. It was accordingly done, although to effect it we had to use force: the patient slept soundly after it, and recovered very speedily.

But I find that I have already trespassed too much upon your time. I must, therefore, reserve several other points connected with the treatment of delirium tremens till our next lecture.

LECTURE III.

Recapitulation—Cautions respecting the use of chloroform—Treatment of delirium tremens when the patient refuses food—Use of the stomach-pump—Chloroform—Bleeding in delirium tremens—Opinion of Esquirol and of Sutton—Mercurial Treatment—Dr. Gerhardt's treatment by stimulants only—Treatment of the cases tending to coma—Prognosis in delirium tremens—Treatment of the delirium e potu—Of the traumatic delirium—Of the delirium of pneumonia—Cases—Mode of treatment.

GENTLEMEN,—When we last met I discussed at some length the treatment of delirium tremens, having, as you will recollect, drawn a distinction between the true delirium tremens of drunkards and the delirium e potu which may immediately follow a debauch in a habitually temperate man. And I considered the treatment of the true delirium tremens under two forms—namely, the milder kind, and that of a more highly developed character; and I laid down the proper treatment for the latter when the disturbance of the balance of nutrition was caused by privation of food from want or depraved appetite, and when caused by a highly irritable state of stomach, which rejects all food immediately it is taken. I endeavoured to point out that the most important points which should engage the attention of the practitioner were the restoration of the balance of nutrition, and the employment of mild and careful means of restraint, in order to prevent the patient from injuring himself or others; and lastly, the adoption of means to procure sleep: and stated that, on the whole, nothing was so useful in the vast majority of cases as opium, in some shape or other. In severe cases, however, where opium had failed, and you may think it unsafe to push it further, I mentioned that you would find a valuable resource in the inhalation of chloroform; and I described three cases in which that practice had proved eminently successful.

I must now take this opportunity of impressing upon you certain cautions which it is very necessary to observe with reference to the use of chloroform. These are—

1. That during its administration you

must always keep your patient in the horizontal posture.

2. That, whilst the patient is inhaling, you should watch carefully the state of the pulse; and, if you should observe any marked alteration of an unfavourable kind in its strength or frequency, you should instantly desist from administering it.

3. That you should always examine the heart previously to the inhalation; and, if there be any decided disease of that organ, you should not administer it at all. Chloroform is a very depressing agent, and it should therefore not be used without great carefulness on the part of the practitioner.

I may also add, that it is important, when possible, not to administer chloroform to a patient shortly after he has taken food, as under such circumstances the chloroform is very apt to excite an emetic effect, which would greatly embarrass the practitioner in his course of treatment.

There is a symptom, which patients affected with delirium tremens sometimes exhibit, much more difficult to combat than sleeplessness—namely, the obstinate refusal to take food. This is a most unfavourable symptom; and when it is present in a very marked manner, the prospect, both for the patient and practitioner, is most gloomy, because that first and most important indication in the treatment of the case—namely, the restoration of the balance of nutrition, cannot be fairly fulfilled.

In such a case we must devise some means of conveying nourishment into the system, either by persuasion or by force. One good plan is to give enemata of some highly nutritious broth, such as strong beef-tea. I frequently order a quarter, or half, or even a pint, of strong beef-tea, with ten or fifteen grains of quinine, regulating the quantity of the liquid by the probable facility with which the patient would retain the enema. Food may also be administered by the stomach-pump and œsophagus tube. For both these methods of giving nourishment force must be employed: less force will be required for the former than the latter, and therefore it is well to give a trial to the enema plan first. It will not do alone for any length of time, and therefore you will be obliged to have recourse to the œsophagus tube. The ob-

jection to the use of the stomach-pump and the œsophagus tube is, that in some cases great resistance is offered by the patient, and his struggles are apt to cause great exhaustion: and more than once I have seen unfavourable results follow this treatment; but in many cases you have no alternative.

In a few cases of this kind I have made the patient inhale chloroform, and, while he was under its influence, given food by introducing a spoon carefully into the mouth to the back of the throat, so as to excite the muscles of deglutition. The food conveyed to the back of the pharynx, within the grasp of the posterior pillars of the palate, produces reflex action of the constrictors, and is immediately swallowed. You must be careful, in giving food in this way, not to give a large quantity at once, as you thereby run the risk of making the patient sick.

An important question, as regards the general treatment of delirium tremens, is as to the propriety of bleeding. Is it necessary or desirable to bleed, either generally or locally, in such cases? Upon this point practical men are pretty well agreed, that bleeding is a bad and highly dangerous practice; and both reason and experience combine in support of this opinion. For in this delirium there is a marked tendency to the deterioration of the blood by increase of its water and a diminution of its colouring matter: and we know that under a bleeding system this tendency becomes augmented, and so the disturbed nutrition of the brain increased and perpetuated. Moreover, there is nothing in the pathology of the disease which would warrant us in blood-letting; for we have it ascertained on the most incontestable evidence that there is no inflammation or congestion to combat by such means. Again, experience shows that bleeding is followed by unsatisfactory results. If you bleed in violent delirium, you generally add fuel to the fire, and you increase the violence of the delirium; unless, indeed, you take away so much blood as to produce extreme prostration, which destroys the force of the patient, and from which he is not likely to rally.

Upon this point, I will read you a passage from Esquirol, one of the best and most practical writers on insanity, and whose opinions were founded upon a most extensive experience and observation.

Speaking of the state of fury, or of furious delirium, Esquirol makes the following remark. "The furious," he says, "have been bled without its being perceived that the loss of blood only increased the evil—and that it calmed the patients only when it deprived them of the power of re-

action necessary for the resolution of the malady."

This, then, is the opinion of the experienced and judicious Esquirol, as to the value of bleeding in cases of furious delirium. How many are the cases of delirium tremens which are very much of this kind! To this I may add, that Sutton, one of the earliest and best writers on this disease, who had unusual opportunities of witnessing it among the smugglers in Kent, gives express cautions against the practice of depletion by bleeding, founded upon his own experience and observation of the dangerous consequences which follow it.

You will ask me, if there are any circumstances likely to occur in delirium tremens which might justify our having recourse to bleeding, either general or local? To this I must answer, that I know of no combination of circumstances in a case of true delirium tremens which would induce me to recommend general bleeding with a confident expectation of benefit to the patient; but when there is a constant fixed pain in one part of the head, and that of a severe character, which does not yield under the ordinary treatment, you will then be justified in local bleeding, by cupping, or by applying leeches, but under such circumstances, you will obtain generally more decided and more lasting benefit by the application of blisters, or by establishing counter-irritation by some other means.

We may inquire further, are there any special grounds which favour the adoption of the mercurial plan of treatment in this form of delirium? Are we, as many do, to combine calomel with our opium, and to push it to ptyalism? To this I answer, that there is nothing in the pathology of the disease to call for this plan of treatment; that I have treated many cases with the most perfect success, without one grain of calomel; and that if you give mercury to cause salivation, you will only thereby delay your patient's period of convalescence, without, in the least degree, diminishing his chance of a second attack; on the contrary, you will rather increase his tendency to a relapse, by weakening his powers of nutrition. Indeed, I know of no good reason for the use of calomel in this disease, excepting in combination with purgatives, in cases where we have reason to think that the liver is sluggish in its action.

In fine, in the treatment of the ordinary cases of delirium tremens which you will meet with in practice, I cannot too strongly impress it upon you, that the most important point is to uphold the strength of the patient, in which, unless you can succeed, all your other remedies will prove

useless. In confirmation of this, I may here mention, that Dr. Gerrardt, of Philadelphia, as I learn from Dr. Wood's excellent book on the Practice of Physic, pursues with great success a purely stimulating plan of treatment in delirium tremens, to which alone he trusts; he gives, in all cases, an ounce to two ounces of brandy, every two, three, or four hours, according to circumstances; and by following this plan he has reduced the mortality from this disease in the large hospital at Philadelphia, from one in eight, to one in thirty-nine. This is a very important statistical fact in reference to the treatment of delirium tremens, and affords valuable support to the advice I have given you. I am not, however, prepared to trust to this treatment alone, nor to give up the use of opium and of other remedies.

In some cases of delirium tremens there is a decided tendency to a comatose state, which you must be prepared to deal with. In such cases, the rule to uphold the powers of the patient as much as possible applies equally with the others; but it is plain that you will have to give up the use of opium and all other sedatives, as tending to increase the coma. It is in the cases in which there is this tendency to coma that we are called upon particularly to inquire into the state of the secretions, especially into that of the urine: in many such cases albumen will be found in the urine, indicating that the tendency to coma depends on the non-elimination of the urea and other elements of the urine, in consequence of an unhealthy state of the kidney. Under such circumstances you will find it beneficial to apply blisters either to the back of the neck, or to the head, and to keep the blistered surface discharging, in order to promote the elimination of the poison; at the same time, and with the same object, we should promote the action of the skin and bowels as much as the strength of the patient will permit.

Prognosis.—Before I leave the subject of delirium, I must say a few words as to prognosis. The friends of patients always expect, and most reasonably, that you should be able to speak to them pretty confidently about the probable issue of a case, and will be sure to ask for your opinion on this subject. But independently of this, for your own satisfaction in carrying out the treatment, it is important that you should have some guide to enable you to form a correct judgment as to whether the symptoms point to a favourable or unfavourable issue. The more exhausted the patient is, and the greater is the tendency to coma, the more unfavourable will your prognosis be; the greater the number of previous attacks, the less likely is the termination

of the disease to be favourable. A first, second, or third attack is rarely fatal; all after the third are more likely to terminate in death. The state of the pulse, too, is an important guide: a very quick, running pulse, more especially if it be small and feeble, with weak sounds of heart, constitutes a most unfavourable sign; and this is particularly so, if the frequency of the pulse is not at all reduced by nourishment and stimulants. On the other hand, a pulse of moderate quickness, between 90 and 100, and regular, may be taken as a most favourable omen. Another point which will guide you in the prognosis is the readiness with which sleep comes on; if it comes on quickly, and in obedience to a small quantity of opium, nothing can be more favourable; but if the patient resists the opiate influence, the case is less promising. You should likewise notice the amount and violence of the delirium. It is better to meet with a case of violent delirium, which is readily controlled by treatment, than with a case in which the delirium, although not violent, is chronic, and seems not to yield to remedies. The very furious cases, if protected from injury, and well supported with food and stimulants, generally do very well; on the other hand, if the patient continues wakeful, fidgetty, talkative, although not violent, your prognosis will be less favourable. The absence of organic disease of the liver, kidneys, or membranes of the brain, must be regarded as a favourable point; and, of course, the presence of such disease would justify an opposite conclusion.

Delirium e potu.—Let me now speak of the treatment of cases suffering from the *delirium e potu*, a state which, we have seen, is in many respects essentially different from that of the true delirium tremens. A patient is brought into the hospital in a state of violent delirium, talkative, perhaps singing or hollowing, and requiring considerable restraint to hold him down; and we find, on inquiry, that he has been drinking, and we have evidence of that in the odour of alcohol from his breath. The long continuance of this state leads to coma. Now in these cases, which are examples of direct poisoning by alcohol, the great object of the treatment is to promote the elimination of the poison without unduly depressing the vital powers. This may best be done by emetics, purgatives, and sudorifics. You would give emetics, if you had reason to believe that there was alcohol still in the stomach, or indigested food. Nauseating doses of tartar emetic are useful in reducing the force of the heart's action, and in promoting free diaphoresis. It must be in cases of this kind, and not in those of true delirium tremens, that croton oil has been, as

I have heard, used with great success by some practitioners in the country; I have no experience of it myself. It may be that such a practice would tell well in the mixed cases.

A sudden splash upon the head and face and chest with a large quantity of cold water often exercises a decidedly sedative influence; but if this fails, you need not have the same difficulty about using mechanical restraint in this as in the cases of true delirium tremens; and then you will find it useful to keep cold well applied to the head.

In these cases local bleeding may be sometimes practised with advantage; but it should always be tried with caution, and you should bear in mind that the poison of alcohol is apt, when given largely and quickly, to leave behind it a state of depression, which bleeding is apt to increase. In many of these cases there is a highly irritable state of stomach, due to a state of mucous membrane which is probably inflammatory, and brought on by the direct influence of the alcohol. When this is the case, of course you will not give such remedies as tartar emetic, but you will direct your treatment to the irritable state of the stomach. Counter-irritation by mustard to the epigastrium; ice or iced water in small and frequently repeated quantities; cold drinks; prussic acid,—will very generally succeed. If these means fail, then try leeching the epigastrium, morphia and creosote, effervescing draughts with potash, soda, or ammonia; and it is very important to keep up a free action of the bowels, which may best be done by small and often-repeated doses of sulphate of magnesia, dissolved in water, which of themselves tend to relieve the irritable state of the stomach.

In cases where the true delirium tremens is complicated with the delirium e potu coming on after a debauch, we must endeavour to restore the balance of nutrition in order to cure the delirium tremens, and also apply the proper remedies to relieve the delirium e potu; we must, in fact, combine, as far as possible, the two forms of treatment.

Treatment of traumatic delirium.—Closely allied to delirium tremens is the traumatic delirium, that kind of delirium which comes on soon after an injury, perhaps within a day or two after an operation or severe accident. As physicians we do not often see this disease, but you may, now and then, have opportunities (less frequently, however, I think, now than formerly), of observing it in the surgical wards after accidents or operations. A patient suffers a compound fracture of his humerus or femur, and is brought to the hospital, where the limb is set *secundum artem*: the patient seems com-

fortable, and every thing goes on quite favourably; but in the night he becomes delirious and violent, tearing off his splints and bandages and jumping out of bed, careless of his broken limb, and exhibiting a complete insensibility to pain, probably in consequence of his mind being fully occupied with the subject of his delusions. This state of delirium is most to be feared in persons of intemperate habits; but it may come on in the most temperate. The shock of the accident alone is sufficient, even in a temperate man, much more in one whose blood is poisoned by alcohol, to disturb the balance of nutrition, so as to derange the healthy action of the brain.

This condition was first described by the celebrated Dupuytren, and he pointed out the great power which opium, given so as to procure sleep, exercises over the delirium. During the treatment care must be taken to uphold the strength and to administer nourishing food and stimulants; and this precaution will be the more necessary when the habits of the patient have been intemperate. Perhaps the chief reason why this delirium is less frequently met with now than formerly, is because surgeons are more alive to the importance of upholding the strength of their patients, and also because they have given up the absurd system of a previous antiphlogistic treatment preparatory to severe operations. I remember when bleeding and purging were regularly practised as a matter of course, to prepare patients for the ordeal of an operation and its after process—a practice which has about as much to recommend it, as the habit which many country folks still have of being bled at the spring and fall of the year. If you see any tendency towards this state in a patient whom you may be attending after a severe injury, you may give opium to ward off the attack, as a prophylactic, and you will thus succeed in saving your patient from a dangerous illness, and yourself from a very troublesome case; and in your management of severe injuries you should keep in mind the liability to this form of delirium; if the delirium comes on in a patient soon after a severe injury or operation, you must trust to opium and support to restore him to a quiet mind. The opium may be given by the mouth or by the rectum as a suppository, or by enema. Dupuytren affirmed that this last mode of giving opium was the most efficacious, and he explained its greater efficacy in this way,—that when opium is placed in the rectum it is directly absorbed, while if swallowed it is subjected to the influence of the juices of the stomach, by which its activity is impaired. This explanation, however, will not hold; for whether the opium is introduced into the stomach, or

into the rectum, its absorption is similarly effected—namely, by the bloodvessels. It requires no special digestion previous to absorption; it is simply dissolved, and so absorbed. In the rectum it is likewise dissolved and absorbed. When administered by the mouth, it may interfere with the digestive power of the stomach upon the food, and so disagree with the patient; but when introduced into the rectum this is not likely to occur.

Is there anything to justify antiphlogistic treatment in these cases of traumatic delirium? I should say, certainly not.

Delirium in Pneumonia.—From the consideration of traumatic delirium we naturally proceed to that form of delirium which accompanies internal inflammations: and I shall only have time to-day to speak of the delirium which frequently arises in the course of an attack of pneumonia. A patient is admitted into the hospital with all the physical signs of pneumonia: he goes on very well for two or three days, then becomes restless and wakeful, appears astray when spoken to, answers incoherently, and perhaps jumps out of bed and attempts to walk as far as his strength will permit him: this is a highly developed state of such delirium.

Are we to infer from these symptoms that there is inflammation of the brain, and treat the patient accordingly? We know from clinical examination that we must not. The delirium arises from cerebral exhaustion consequent upon the pneumonic state. The delirium is not necessarily in proportion to the extent of the pneumonia, but is directly proportionate to the *debility* of the patient. A small amount of pneumonia may exhaust one man; while another, with the same or a greater amount of disease, may be but little affected. A man, who was admitted into this hospital about six months ago, and whom many of you may recollect as having died of pneumo-thorax, came to my house one morning complaining of shortness of breath, which he had been suffering from for several days. I sent him to the hospital, where I soon after examined him, and found half of one lung hepatized. This patient had been able to continue his occupation, and it was with great difficulty he could be persuaded to remain in the hospital. Another man would have been completely prostrated with even a less amount of disease, and might have been delirious.

We have had two cases of delirium coming on in pneumonia lately in the house, to which I may refer you to illustrate the treatment of the disease. The first was that of a lad named Heeley, 18 years of age, in Rose ward, in whom the pneumonia was of the low and typhoid

kind, but limited to the lower part of one lung. There was great dulness below the angle of the scapula, with bronchial breathing and bronchophony, and he expectorated rusty-coloured sputa. He was admitted on the 21st of May, when he was ordered beef-tea, wine, chloric ether, and liq. ammon. acetat.: the pulse was 100, and the respiration 40.

On the 22nd he began to be delirious, tried to get out of bed, and was unable to answer questions properly: his wine was increased from four to twelve ounces. The delirium continued throughout the 23d; the pulse was 96, and the respiration 46: he had passed a restless night. Half an ounce of brandy every hour, and four grains of quinine every three hours, were ordered. On the 24th the report says that he slept well, that the delirium had ceased, and that the pulse had fallen in frequency. The pneumonia had not extended, but, on the contrary, it was beginning to be resolved, and returning crepitation had commenced. On the 25th he was better: pulse 80; respiration 31; and on the 31st he was convalescent, and took meat. The next day the respiration was found to be quite natural, so that in the course of seven days, by the stimulating treatment, this patient was brought from a state of high delirium to convalescence, and the lung from a state of complete hepatization to perfect resolution.

The second case is that of a woman named Darwin, æt. 27, in the Lonsdale ward at present, both of whose lungs are affected with inflammation; and there is some reason to believe that pleurisy is also present. In this case, although there was extreme prostration, and both lungs were inflamed and hepatized, and there has been much less delirium than in the case of the lad Heeley, in whom only one lung was inflamed, and that only in part. I attribute this to the fact that she was put upon stimulants immediately on her admission, and the delirium was never allowed to make progress. In the case of Heeley the delirium gave way to the treatment, while in the woman's case it was prevented by the treatment from arising.

The development of delirium is a sign that the powers of the patient are failing under severe disease, or under the treatment employed for its cure. If, then, you are combating the inflammation with active antiphlogistic and depressing remedies, you must modify or change your treatment, and give nutritious food and stimulants.

Now, I may here remark that some art is required in the administration of food and of stimulants; and it is to the neglect of proper management in the mode of their administration that I attribute the failure of

this treatment in some hands. You must take care to give your food and stimulants in such a way as will be most likely to secure their easy and quick digestion: it is when they are not properly digested that they disagree and occasion increase of fever; but when fully and quickly digested they cause no derangement of the system. Now the best mode of giving food and stimulants in order to ensure their easy digestion, is to give them in small quantities at a time; and by the frequent repetition of these small doses a large quantity may be given in the day, with very little effort on the part of the digestive organs. If, for instance, you determine to give six ounces of brandy in the day, and a pint of beef tea, you should divide these quantities, so as to give a small portion every half hour, or every hour, or every two hours, and with the utmost regularity, according to the urgency of the case. In cases of debility it is very important that the patient should be supplied with support very frequently, and not be allowed to remain any length of time without it. Hence you should order from two drachms to half an ounce or more of brandy, or other stimulant to be given every half hour, or hour, according to circumstances.

The best indications that such a mode of treatment agrees well with your patient are derived from the state of his digestive organs. If he have a moist or clean tongue, and is free from flatulence, and the stomach or bowels are not distended, and if at the same time the pulse does not increase in frequency, then you may infer that the food and stimulants are duly di-

gested and assimilated. But if the tongue be foul or dry, and show no tendency to clean; if there be flatulence or sickness, and the fever and the rate of the pulse are increased, then there is something wrong in the quantity or quality of the food and stimulants, and it behoves you to find this out and correct it.

As a general rule it is not desirable to give opium in delirium with pneumonia, because it has a tendency to increase the congestion of the lungs. However, there are other sedatives which may be given without this danger, such as camphor, hop, henbane. Quinine is often very useful in this form of delirium; and it appears to me to be especially indicated where there is profuse sweating. In such cases I have seen the most striking benefit follow the administration of two or three grains of quinine three or four times a day, with or without acid.

There is one other remark I wish to make, bearing upon the delirium of pneumonia. It is that in the early treatment of the pneumonia, we should act with the same caution and circumspection as we should use in the treatment of a patient who had suffered a severe injury. You must bear in mind that your patient may yet suffer from delirium, and guard against it by not being too actively antiphlogistic at first, and by taking care to allow a sufficiency of nutriment. Remember, that as a patient with compound fracture has to undergo an extensive process of reparation, so also has the patient with a hepatised lung to pass through a process of repair which must draw to a certain extent upon the vital powers.

LECTURE IV.

Termination of two cases of pneumonia reported in the last lecture—Delirium of bronchitis—Treatment of rheumatic and gouty delirium—Cases—The delirium of erysipelas—nature of erysipelas—treatment—Means of prevention of the delirium—Case—Advantage of the stimulant treatment in preventing secondary deposits—Cases—Sudden coma and death in erysipelas—Cases.

GENTLEMEN,—In my last lecture I spoke of delirium connected with pneumonia, and related to you a case in illustration of the good effects of the stimulating plan of treatment, which is the plan I advise you to follow when you meet with a case of delirium coming on in the course of pneumonia. The boy Heeley got well under this plan; and after three days the hepatized lung had begun to resolve, and in seven days complete resolution had taken place, and on the tenth day he was restored to complete convalescence.

I mentioned a second case to you,—that of a woman named Darwin, in whom there was double pneumonia, with extreme prostration. We were very anxious about this case when we last met; but I am now able to say that the treatment has proved completely successful, and that the patient is now proceeding quickly to recovery. In this case the delirium did not go beyond a slight wandering at night; and I attribute the almost total absence of delirium to the fact that the stimulants were early and freely administered.

On the 12th of June we found this woman with complete hepatization of the lower two-thirds of the right lung, and slight pleuritic effusion, with a very feeble pulse of 130, and the respirations numbering 44. She was ordered beef-tea and chloric æther. The bowels were opened, and a blister applied to the right side. On the 13th the signs continued the same, with the addition of fine crepitation, which was audible beneath the mamma in front; indicating that the inflammation pervaded the entire thickness of the lung from behind forwards. She was now ordered six ounces of wine daily. In the afternoon of this day she became so low, and sweated so profusely, that I ordered three grains of quinine in pill every fourth hour, and increased the wine to half an ounce every hour—namely, twelve ounces in the day.

On the 15th she began to expectorate very slightly. The physical signs were unchanged in the right lung; but on the left side, beneath the scapula, there were bronchial breathing and bronchophony, denoting hepatization of the lower half of that lung behind. A turpentine stupe was applied to the back, and half an ounce of brandy was given every hour.

On the 16th large crepitation began to be audible at the base of the left lung; and on the 18th returning crepitation was audible in both lungs. On the 20th the breathing in the left lung had become quite pure. On the right side there was nothing abnormal audible but slight blowing expiration at the base, which soon disappeared.

Thus, in this case, in three days the pneumonia had begun to resolve; and in eight days the lungs had become natural, excepting such a condensation of the right lung as produced the slight expiratory blowing.

The delirium of bronchitis should be dealt with in every way as the delirium of pneumonia. Depression of the vital powers favours the occurrence of delirium; and bronchitis is, generally speaking, a very depressing disease. If, therefore, you should be attempting to cut short the inflammation in a case of bronchitis by active antiphlogistic treatment, you may look upon the occurrence of delirium as the signal for you to alter your treatment, and to adopt a stimulating plan. There is a great tendency in the delirium of bronchitis and of pneumonia to pass into coma; and, unless prompt means are adopted by the physician, the patient dies. This tendency to coma is certainly greater when antiphlogistic remedies have been used. When coma comes on, you must not relax in giving support; indeed, the failure of the pulse or of the heart's action may induce you to be more active in the administration of stimulants: but, in addition to this, you will probably find great benefit from free counter-irritation, by mustard or blister, or both, to the back of the neck; and it may be necessary to shave the head, and apply a blister to the scalp.

Sometimes, but very rarely, the coma coming on suddenly in this way may arise from a sudden effusion of blood upon or into the brain. We had an example of this last week, in the case of a man of 50 years of age, who was admitted into

the hospital suffering under bronchitis, and in a state of active delirium, having been ill about four days. He was a man of intemperate habits, and had probably suffered from privation: however, the bronchitis alone would have been sufficient to have so far disturbed the balance of nutrition as to bring on active delirium. After he had been in the hospital a few hours he became suddenly comatose, and died in a state of profound coma. On examination, it was found that a considerable effusion of blood had taken place into the arachnoid sac, which had diffused itself over both hemispheres. There was also chronic valvular disease of the heart, and there were deposits in the vessels at the base of the brain.

This, then, was a case in which there was a combination of symptoms of a nature calculated to occasion a good deal of embarrassment to the practitioner. The man was intemperate; he had old heart disease, and also severe bronchitis, which greatly impeded the circulation through the lungs. This impeded state of the circulation through the lungs no doubt tended greatly to congest the venous system of the brain as of other organs. And his cerebral arteries being diseased and brittle, it was not difficult to explain their giving way under the increased pressure which they must have sustained from the retarded return of the blood to the right side of the heart.

The case afforded strong temptation for the use of the lancet, or for the abstraction of blood by some other means. But he came to us too late for the adoption of any such measure; and if it were likely that antiphlogistic means would have done him any real good, some change for the better would have ere this shown itself, for such means had already been adopted before his admission in very free purging, to which he was subjected for thirty-six hours. The delirium began on the third day of his illness, and continued until within three hours of his death.

Undoubtedly in this case there was congestion of the brain: but the cause of the congestion was not in the brain, but in the bronchitis; and the best way of relieving the cerebral congestion was to relieve the bronchitis, for which the best remedy was free counter-irritation and moderate support. It is plain that opium was inadmissible, in consequence of the pulmonary congestion.

On the whole, I do not know that we could have done better in this case than what Mr. Jordan did when the patient was admitted,—that is, to have abstained from bleeding, and given moderate support, and applied counter-irritants to the chest. Had he been bled, with the rapid weak pulse

which he had on his admission, he would still probably have died of the coma which arises from a deficient supply of blood, or from the supply of a watery blood.

Rheumatic and gouty delirium.—I shall now proceed to speak of the treatment of the rheumatic and the gouty forms of delirium.

Rheumatic delirium generally comes on suddenly in the course of rheumatic fever, and is frequently *coincident* with pericarditis and endocarditis. I say it is *coincident* with the cardiac affection, and not necessarily related to it as effect to cause; because the amount or severity of the delirium bears no proportion to the intensity of the inflammation; for we may have slight peri- or endocarditis with severe delirium, or we may have slight delirium with extensive inflammation of the heart; and we know well that the cardiac inflammation often exists without the delirium. The severity of the delirium is, however, in proportion to the debility of the patient. When you have a very watery state of the blood, or where the blood is deficient in colouring matter, and when, also, perhaps, the blood is much charged with the rheumatic poison, you have a condition highly favourable to the production of delirium.

The rheumatic delirium undoubtedly occurs more frequently in those cases of rheumatic fever which have been treated by bleeding; and probably because bleeding makes the blood watery, and diminishes its red particles. When I was in the habit of bleeding in every case of rheumatic fever, as I used to do some years ago, a much larger portion of my patients were attacked with delirium than now, when I never bleed in this disease: indeed, now I find it difficult to meet with a case of this form of delirium to show you.

Now let us suppose that you are asked to see a patient who had been labouring under rheumatic fever, and who has suddenly become delirious, with or without difficulty of breathing. From what you now know of the clinical history of the disease, you would at once examine the state of the heart, whether there were any symptoms referable to that organ or not. Let us suppose that you find, as in the majority of cases you will do, a rubbing sound, showing the existence of pericarditis, or a bellows sound, indicative of valvular disease or of extreme anæmia. What are you to do in such a case as this? The patient is quite delirious, tosses about the bed-clothes, talks wildly, tries to get out of bed, and will not be restrained.

Although there is inflammation of the

heart here, and none of the brain, yet I can assure you that the symptom which demands most urgently your first attention is the delirium; and that whatever may be your theory as to the relation of the delirium to the affection of the heart, the interests of your patient demand the instant adoption of means to quiet the state of excitement into which he has passed. Important and serious as is the affection of the heart, as compared with the delirium, it is just now of no moment; for if the delirium be allowed to continue, there is great danger of the patient dying suddenly from exhaustion.

Fortunately, however, we have in opium a remedy equally applicable to the cardiac, as well as to the cerebral affection. In these cases you must give opium to produce sleep, just as you would do in traumatic delirium or in delirium tremens. Opium thus given will quiet not only the brain, but the heart also; and it no doubt exercises a favourable influence on the inflamed serous membrane likewise, checking the spread of inflammation and promoting its resolution.

At the same time, you will find it useful to apply a blister to the region of the heart, and to promote a free discharge from the blistered surface. But avoid bleeding, whether general or topical, if you wish to get your patient through without untoward symptoms, and reserve all other depressing treatment until the symptoms of delirium have passed away. During delirium you must also be careful to administer support, because the very existence of delirium makes great calls on the powers of the patient, and he therefore requires to be freely supplied with nutritious matter easy of digestion, and with stimulants. You need not be deterred from giving opium, and administering support and stimulants, by the fear lest such treatment should increase the cardiac inflammation; the experience of many cases convinces me that under this plan the heart becomes less irritable, the pulse slower, and the cardiac inflammation becomes circumscribed, and it tends to terminate by resolution or adhesion rather than by the effusion of water. On the other hand, if you persist in an antiphlogistic plan, you keep up or increase delirium, you exhaust the powers of the patient, and effusion is apt to take place into the pericardium, whereby the heart's action may become seriously impeded.

If this treatment be commenced early, and pursued effectually, it is rare indeed for the patient to go wrong.

It may, however, be objected to this plan, that patients have been bled, and nevertheless have done well. Undoubtedly this is

the case, and I could refer you to several cases of this description: but although the antiphlogistic plan has been pursued up to a certain point, you will generally find that the obvious exhaustion of the patient has suggested, sooner or later, a change of treatment. But how many cases are there which have ended fatally under the antiphlogistic plan! I might easily collect a considerable number. The first case which arrested my attention as to the inefficacy of the antiphlogistic treatment was one of a young and handsome girl, who had severe rheumatic fever, in the course of which she became highly delirious, and at the same time showed the signs of pericarditis. I treated her for acute arachnitis: the head was shaved, cold applied, mercury freely given, leeches applied to the temples, and the full force of an antiphlogistic treatment was brought to bear upon her. She died; and on examining the head I found the membranes of the brain free from all signs of inflammation, but pale and bloodless.

The treatment of this form of delirium by antiphlogistic means is, in my opinion, as inexpedient and as dangerous as that of delirium tremens by a similar plan; and we are not justified in assuming that the practice is safe or desirable because cases have got well under it.

I have but little to say upon the delirium which accompanies acute gout, because the remarks I have made upon the rheumatic delirium are equally applicable to it. I shall content myself with stating that, while the delirium is essentially of the same nature as the rheumatic, it has a greater tendency to pass into coma. While, therefore, our treatment ought to be in all other respects of the same kind, we must not be so ready to administer opium as in the rheumatic delirium; we should wait to observe whether there is any marked tendency to coma. I had a well-marked example of this form of delirium in one of the College porters, a stout lusty man, who used to attend the gate. After having had several attacks in the great toe, he had a very severe attack of general gout, resembling very much rheumatic fever, but without any inflammation of the heart. He became violently delirious, so much so as to require restraint. I was called to him in this state, and prescribed stimulants, and treated him much in the same way as if it were a case of delirium tremens; but I did not give him opium. He took hyoscyamus, and after a time, as there appeared to be no tendency to coma, I ordered him small quantities of opium. He soon improved, and got rapidly well.

In the delirium of rheumatism and gout we occasionally meet with cases of sudden

death from exhaustion: the patient, after an effort, suddenly falls back dead. Hence, when delirium shows itself during rheumatic fever or acute gout, the attendants of the patient should be warned of this danger, and distinctly instructed to watch the patient closely, so as to prevent as much as possible all exertion, and to keep him in the horizontal posture.

One point I wish particularly to impress upon you is, that as in pneumonia, and in cases of severe injury, you may prevent the delirium, so also in rheumatic fever and in acute gout you may keep it off by avoiding extreme antiphlogistic measures, under the idea of cutting short the disease. I am convinced it is an erroneous notion, to which careful clinical observation gives no countenance, that such a disease as rheumatic fever may be cut short by a bold stroke of the lancet. There are mild cases as there are severe ones, and it is not easy to distinguish the one from the other at their onset. The practitioner, therefore, who bleeds as a matter of routine, will often meet with cases which will *appear* to have been cut short by such a practice. And even if you do cut short the disease by the sudden abstraction of a large quantity of blood, it will be at a tremendous cost to the patient, involving years of subsequent delicate health.

Our object in the treatment of these cases should be, not so much to cut short the disease by debilitating the patient, but carefully to guide him through the malady, promoting the elimination of the morbid poison, and at the same time protecting his powers against its depressing influence. By this mode of proceeding we do not pretend to cut short the disease, but we shall guide our patient safely through it, and shall much shorten the period of his convalescence.

The delirium of erysipelas.—The next subject to which I shall call your attention is the mode of treating the delirium of erysipelas. I know no disease the pathology and treatment of which are more worthy of the careful consideration of the practical physician or surgeon than erysipelas, as it is a malady of very frequent occurrence, and very severe and destructive in its nature. The question of the treatment of the delirium of erysipelas involves the consideration of the treatment of erysipelas itself. I refer here of course particularly to the idiopathic erysipelas, which comes under the observation of the physician; but the remarks I have to make will apply equally to the phlegmonous form which you will meet with in the surgical wards, for the two forms of the disease are of essentially the same nature.

Let me begin by stating what appears to me to be the most reasonable view of the nature of erysipelas, and the most consonant with its clinical history. Erysipelas is produced by the introduction into the system of a morbid poison, generated in the body under certain circumstances, or derived from another individual affected with the disease. A patient who has received an injury may generate the poison of erysipelas in his own person by exposure to certain deleterious influences; or he may, under similar circumstances, generate this poison in his own body, even when he has not received any wound, in which case we call the erysipelas *idiopathic*. Or whether wounded or not, he may imbibe the poison from some one labouring under the disease, even without actual contact.

The poison of erysipelas, like that of measles, of small-pox, of scarlet fever, &c., has its special habitat,—that is, it shows a proneness to affect certain tissues to the exclusion of others; and it attacks specially the skin and the gastro-pulmonary mucous membrane, sometimes affecting the throat first, and travelling outwards to the skin; at other times taking the contrary course. This poison produces other effects than mere cutaneous inflammation; its introduction into the blood causes a fever of a very depressing nature, and this amount of depression bears no constant relation to the extent of the cutaneous inflammation. A large dose of this poison may kill a patient in a few hours, causing at the same time only very trifling local disturbance, such as a trifling redness of the throat. Generally speaking, however, it requires many days for its elimination, during which time the patient exhibits the local and constitutional symptoms with which you are familiar.

Like the other morbid poisons to which I have alluded, the poison of erysipelas exhibits secondary and tertiary effects: secondary effects in the formation of abscesses in various parts of the body, and even in parts which may not have been affected by the cutaneous inflammation; and tertiary effects in chronic inflammation and induration of various glands, and the deposition of scrofulous matter.

What is the most reasonable and the best treatment of erysipelas? have we any means of eradicating the poison by a bold stroke at the onset of the disease? Slight cases—or, in other words, cases which have imbibed only a small dose of the poison—will quickly recover, with little or no medical treatment; and such cases, when treated early by a bold antiphlogistic measure, will appear to have been cut short. But, in the majority of cases, when a large dose of the poison has been imbibed, I believe that

the disease must pass through a certain course, that the poison will produce its specific effects, and that the principal business of the practitioner is to uphold the powers of the patient so as to limit as much as possible the destructive influence of the poison. In such a case you can no more think of extracting the poison by some active stroke of treatment, than you can think of eradicating the poison of small-pox or scarlet fever under similar circumstances. Any one who would, now-a-days, think of such a thing in these maladies, would be set down as having lost his senses. We have no means of extracting the poison; we must, therefore, endeavour to guide our patient through the various stages of the fever it excites, into port, or we must find some antidote for it, which, when introduced into the blood, may counteract its depressing and destructive effects.

There is no treatment which appears to me to be so generally applicable and so safe in cases of erysipelas, as that which we call the stimulating treatment—by support by means of nutritious food in the liquid form, and by bark, or ammonia, or chloric æther; nor is there anything which seems, in some cases most strikingly, to act so much as an antidote to the erysipelatous poison, as alcohol, given either as brandy or wine, or beer, but more especially as the first.

In all cases of erysipelas, then, my practice is first to evacuate the bowels, when necessary, by such means as will not occasion any undue depression, and then to give nutritious food, easily digestible, with stimulants, as brandy or wine. I adjust the quantity of these according to the urgency of the symptoms, keeping, however, to this rule—namely, to give small quantities very frequently, and at short intervals, rather than larger quantities administered occasionally. This is, if I may use the expression, the staple of my treatment: to it I add such medicines as ammonia, bark, &c.; but if the stomach be irritable, or the patient opposes or is disgusted with the administration of so many things, I prefer giving up the drugs and trusting to food and brandy only.

Patients treated in this way from the beginning do not often become violently delirious. When delirium sets in in erysipelas, it may be taken as an indication that our patient wants more support and more stimulus; and the more quickly and freely you give them under such circumstances, the sooner you will subdue the delirium. If freely given just at the beginning of the delirium, you may check it completely. Of this I had a remarkable example last summer, in the case of a

clergyman, a robust man who came to town with his family to see the lions. He caught cold, as he thought, from sitting one hot day, with a north-east wind, near an open window in an omnibus. That evening he had a severe rigor, and vomited. I saw him soon after, and found some redness of the mucous membrane of the nose, spreading outwards on the skin. I immediately suspected erysipelas, and the next day confirmed my suspicions, as the redness had extended over the nose. He was moderately purged, and to his surprise I allowed him two or three glasses of port wine at once. Under this treatment he seemed to go on well for a couple of days. One night I was led almost by accident to visit him at a very late hour; and to my surprise he was looking strange, talking rather wildly, and wanting to get up and go out. I immediately called for the brandy bottle, and gave him a large dose of it, which seemed to quiet him; and I left instructions with the nurse to give him smaller quantities at short intervals through the night. Next morning I found that he had slept through the greater part of the night, and that the delirium had completely ceased.

In cases which show a tendency to coma, it is often advisable to shave the head and apply blisters freely to the scalp or back of the neck. Nor need you be deterred from applying blisters, by the fear lest the blistered surface shall become the seat of new erysipelas. As a rule, it is not desirable to give opium in the delirium of erysipelas, unless the delirium is decidedly of the active and wakeful kind; on the whole, however, the other narcotics, as henbane, camphor, hop, are safer than opium.

The stimulating treatment in erysipelas not only saves the patient from delirium, or cuts it short when it appears, but it shortens the period of convalescence, and, what is very important, it seems to diminish the tendency to secondary deposits. We have had many cases in the hospital which exemplify this remark. You may recollect a very severe case of erysipelas last winter in Lonsdale ward: the patient was quite delirious, and there was afterwards a tendency to coma; nevertheless, this patient quickly recovered, and had no secondary abscesses: she was treated by stimulants from the beginning. In Augusta ward, also, we had a similar case about the same time, which was treated in the same way with a like result. The clergyman's case, to which I just now alluded, afforded another example of the absence of secondary deposits under stimulating treatment, although the erysipelas extended over the whole scalp. His wife, on the other hand, who caught the disease from him, had a

very irritable stomach, and could not take stimulants; and she had an abscess in one of the upper eyelids. In the case of a young lady whom I attended in the spring, along with Mr. Bowman, with severe erysipelas, there were no secondary abscesses; she was treated by brandy and nourishment from the beginning; and I could enumerate several other instances in which this desirable result followed the stimulating treatment.

Now and then it will happen that an erysipelatous patient will rapidly become comatose, and die in spite of all our remedies. There was a man in Sutherland ward a short time ago, affected with erysipelas, who appeared going on very well for some time, but suddenly he became comatose, and died, and we could not make out any reason for his death. The only reasonable explanation that I can offer of the sudden change for the worse which sometimes occurs in these cases, is derived from the well-known tendency they have to form pus, which, accumulating at some point, may find its way through the ulcerated coats of some small vein, and thus enter the circulation, producing coma and complete prostration.

I shall conclude this lecture by referring to two cases as examples; the one to show the rapidly fatal influence of the poison of erysipelas, and that the extent of the cutaneous affection bears no relation to the effects of the poison on the system; the other to illustrate the good effects of an early stimulant treatment.

The first case is that of a man named Collins, *æt.* 27, who was admitted into the hospital about three weeks ago. He had always been temperate in his habits, and enjoyed good health, with the exception of an attack of erysipelas two years previously.

On the 28th of April he noticed a small pimple on his nose, which increased rapidly in size, and on the first of May, having been exposed to cold, he was seized with shivering. He entered the hospital on the 3d of May. The inflammation had spread on the nose and great part of the face and the eyelids, but not so as to close the eyes. He was ordered five grains of carbonate of ammonia every three hours. On the 4th he was evidently much lower; several pustules full of pus had formed upon the nose; but the erysipelas had not spread. Brandy was ordered to be given freely, and chloric æther added to the ammonia. That night, however, he began to breathe quickly, and became comatose, and died on the fourth day from the rigor. It is very probable that had stimulants been administered from the first in large quantities, this patient might have been saved. I confess

that when I first saw him I was not impressed with his being in so low a state.

Upon examination we could find no evidence of inflammation or of any other morbid state of the membranes of the brain; but there were recent adhesions on the right side of the chest, and, as commonly happens, there were signs of recent inflammation of the mucous membrane of the bronchial tubes. This case shows you how rapidly a man may be knocked down by a large dose of the poison, although the external signs by which the disease is distinguished may be very slight.

The second case to which I shall refer is that of Jones, *æt.* 44, which terminated favourably, although in some degree placed under less favourable circumstances than the former.

This man's habits were intemperate. When admitted, he had very extensive erysipelas of the head and face; the eyelids were closed; the tongue dry and brown. This was on Saturday, the 27th of April. He was immediately ordered chloric æther; beef-tea, two pints, and brandy, two ounces per diem. On the 28th and 29th no material change had taken place. The brandy was increased to six ounces on the former day.

April 30.—On the evening of the 29th he became extremely restless and delirious, and it was with great difficulty that the nurse and some of the convalescent patients in the ward could keep him in bed. His allowance of brandy was doubled, half an ounce to be taken every hour, and half a drachm of chloric æther every two hours.

The next day (May 1) it was reported that the pulse had fallen to 92 from 100, and that the delirium had ceased. On the 2d of May he was reported to have passed a very good night without any opiate, and was perfectly rational. The pulse had fallen to 76: this was a most favourable sign. It is especially auspicious when the pulse falls in frequency while the patient is taking stimulants.

From this time this patient recovered rapidly, without the occurrence of any purulent deposits.

This case shows how, by increasing the amount of stimulants, you may subdue active delirium and shorten convalescence; for on the 4th of May this patient was well enough to eat meat. The attack began on the 27th of April, so that in seven days he passed through the various stages of a severe attack of erysipelas, and became convalescent.

At our next meeting I propose to consider the treatment of the delirium of typhus fever, and the delirium of hysteria and of epilepsy.

LECTURE V.

Treatment of the delirium of scarlet fever and other exanthemata—The delirium of typhus or typhoid fever—two forms—Nature of typhus fever—outline of its treatment—use of stimulants—local treatment in the delirium—blisters—Dr. Corrigan's plan—use of opium—Dr. Graves' plan of tartar emetic and opium—Treatment of hysterical delirium—Case—use of opium—restraint—Treatment of puerperal delirium—prognosis—Case.

GENTLEMEN,—I shall not occupy your time with any lengthened discussion of the mode of treatment best adapted to control the delirium which sometimes accompanies scarlet fever, measles, and other exanthemata; because I think I may state with confidence that this delirium is in all essential points the same as that of erysipelas, and that in your treatment of the former you must be guided by the same principles as would direct you in managing the latter.

I now proceed to consider the treatment of the delirium of typhus fever. In all low forms of fever delirium frequently manifests itself; and this is particularly the case in the course of typhus fever, and of typhoid fever also, if you choose to adopt the opinion of those who admit the existence of two distinct forms of disease: the one a fever of low type, characterized by a tendency to ulceration of Peyer's glands and diarrhoea—the *typhoid fever*; the other, the *true typhus*, a contagious disease, with brown tongue, great prostration, and without the tendency to diarrhoea. This is not the time to discuss the question whether two such distinct forms of fever really do exist. I must content myself with using the term typhoid delirium generically; for in both states of fever we meet with delirium of the same character, which requires the same kind of treatment, but we notice it under the two following forms:—

1st. Delirium of the low and muttering kind, in which the patient lies on his back, constantly muttering to himself, apparently unconscious of what is going on around him, but capable of being roused by loud speaking.

2ndly. Delirium of the active kind, in which the patient is very restless, wakeful, talkative, wanting to get up, and requiring careful watching, and perhaps restraint.

When the delirium is of the active and wakeful kind, it generally comes on quite suddenly; but the low form of delirium, which is the most common, comes on very gradually, being first noticed perhaps at night as a slight wandering, then the next night becoming more marked in its characters, and afterwards continuing through both day and night.

Now delirium in fever, of whatever kind it be, is a very serious symptom, and demands the closest attention from the practitioner. Its occurrence generally denotes great depression of the vital powers, and it is of itself calculated to increase exhaustion, especially if the delirium be of the active kind.

In considering the treatment of the delirium of typhus, we shall do well to look a little into the nature of typhus fever itself, as in a former lecture I referred to the chief points in the nature of erysipelas while discussing the treatment of the delirium which accompanies that disease. Typhus fever, then, may be said to arise from the introduction into the system of a special morbid poison, capable of being generated in the human body, and of being communicated from one person to another, although possibly this may not be the only way in which the poison may be propagated. The severity of the symptoms produced by the imbibition of the poison varies much in different cases, depending upon the dose of the poison which has been imbibed, and perhaps, also, upon the condition of the patient at the time of the imbibition, and likewise upon the nature of the poison itself; for doubtless this may vary at different times, and so give rise to that variety in the nature of different epidemics to which most practical men bear testimony.

The morbid poison is eliminated from the system through certain channels, as the skin and mucous membranes; but, like the poison of erysipelas, scarlatina, and many others, it exerts an influence on the condition of the system, which is generally of a very depressing kind, and this continues until the poison is eliminated, or its influence exhausted by some change which it may undergo in the blood.

This seems to be the view of the nature of typhus fever which is most consonant with reason and experience. If it be true,

we can scarcely expect that any means we can devise will cut short the fever, or rapidly eliminate the poison from the system. We must deal with the disease as we would with erysipelas, scarlet fever, small-pox, and support our patient while the fever runs its course, guarding him as much as we can against the destructive influence of the poison. And as this poison is apt to cause great depression, the chief business of the practitioner will be to devise the best means of opposing this depressing influence. This may be best done by giving food, of a nutritious kind, in such a way as may be most easily digested, and will occasion the least irritation of the digestive organs. It will generally be found necessary to administer stimulants, and I think that it is unwise to postpone this part of the treatment long; on the contrary, I prefer giving stimulants *early*, as, by so doing, the necessity for giving them largely is generally avoided. Throughout the whole course of the fever, the greatest pains should be taken to husband the strength of the patient by good nursing, and by instant attention to every want. He should never be suffered to do anything for himself, nor allowed to get out of bed; he must be raised or turned in bed when necessary, and he must be fed as you would an infant. Too much importance cannot be attached to these apparently trivial matters in the management of so serious a malady as typhus fever. Many a patient has lost his life for want of these necessary attentions,—either from the culpable neglect of them on the part of attendants and nurses, or from his inability to obtain them.

If the bowels are confined we should give a purgative which will act very mildly, or they should be opened by enema; and, in giving medicine for the bowels, we should never lose sight of the danger there is in all these cases of the supervention of a troublesome and debilitating diarrhœa. It never can be necessary in typhus fever to purge, or to do more than keep the bowels in such an open state as will assist digestion.

In consequence of the liability of Peyer's glands to be affected with ulceration, strong purgatives may do great mischief, by increasing the inflammation, and perhaps exciting ulceration, which may end in perforation of the intestine and fatal peritonitis. On the other hand, it is very necessary to provide for the due evacuation of the intestinal canal, not only to promote the digestive powers and the due absorption of the food, but also because, if the secretions are allowed to remain in the bowels, they will themselves excite irritation, and interfere with the due elimination of the poison.

All men of experience agree that it is

right and necessary to uphold the strength in typhus fever, but differ as to the best mode of effecting this object. Some only give nutritious food, others think it necessary to combine stimulants with it. My own experience has led me to the conclusion that stimulants are necessary in the vast majority of cases. I have never seen any ill effects arise from the early administration of stimulants; and, on the other hand, I have often had occasion to regret that the use of them had been too long delayed. Moreover, this fact weighs much with me in inducing me to give stimulants early,—namely, that if a patient seem overstimulated, nothing is easier than to pull him down, and that pretty quickly; but if he be insufficiently supported and stimulated, it is often of extreme difficulty to build him up: *hic labor, hoc opus est*. And with reference to the administration of stimulants, I have only to repeat the rules which I gave you on former occasions. Do not give large quantities at a time; do not embarrass the patient, but begin with small quantities frequently repeated. Give wine first, and then, if necessary, change to brandy, or some other spirit. Chloric æther is one of the best medicinal stimulants: it may be given in half-drachm doses every three or four hours, or more frequently if necessary, alone, or in combination with five or six grains of carbonate of ammonia.

Such is a brief outline of the general plan of treatment to be pursued in typhus fever. If, now, we find that delirium sets in in the course of the fever, what is to be done? Ought this to lead us to alter in any way our mode of treatment, and to adopt new and different measures? Whatever be the nature of the delirium, we must, I think, deal with it as part and parcel of the fever, and view it as an indication of a more depressed state of the system calling for an increased amount of stimulants, or a change in the nature of them, and for greater diligence in the administration of nutritious food.

Is there any necessity for local treatment directed to the head when delirium comes on in the course of typhus fever? Nothing is more certain than that there is no inflammation of the brain in typhus fever, not even when delirium occurs: there is, therefore, no need for active local measures on this account. Some years ago a theory was put forward by a distinguished physician of this town which ascribed typhus fever to inflammation of the brain; and this gained some support from the fact that inflammation of the brain frequently takes on the characters of typhus fever, as was the case in a patient whose history I related to you in a former lecture. But the experience of nearly all practical men

in all countries tends to show that there is no connection between typhus fever and inflammation of the brain.

You will say, however, that, though there is no inflammation, there may be congestion. Undoubtedly this is the case; but the congestion is not peculiar to the brain: it is only part of a general congestion which affects the capillary system of the whole body, and is probably due to the presence of the typhus poison in the blood, which weakens the forces by which the blood is moved in that system of vessels. To relieve this congestion, therefore, ought we to resort to local depletion? Upon this point you must be guided by the circumstances of each particular case, bearing in mind that in so enfeebled a state of the capillary circulation the mere taking away of blood is seldom of much use. What is most needed under these circumstances is something to stimulate the capillary circulation, so as to promote the flow of the blood, which tends to stagnate in the fine bloodvessels. Now for this purpose the application of blisters to the shaven scalp is most useful; and you will often find it a better plan to apply several small blisters to different parts of the scalp in succession, than to apply one large one. Sometimes, however, you will not have time to wait for this process; the patient has a strong tendency to coma, or is actively delirious, and at the same time his strength is rapidly on the wane. When this is the case you must apply one large blister all over the scalp; and you will find Dr. Corrigan's plan a very good one—namely, to cut the blister plaster into strips, and to lay them over the scalp as you would strap a man's leg, so as to bring the blistering material into contact with the scalp at every point.

If you should see any clear reasons for taking away blood, you may best gain your object by having it done by expert cupping from the temples. The rapid application of the well-exhausted cupping-glass may act as a stimulus to the capillary circulation, and promote the flow of blood through it.

When the delirium is of the restless and wakeful form, are we to give opium? As a general rule, we must be extremely cautious in the use of opium in typhus fever. We know that opium tends to produce the same effects as the typhoid poison—namely, to favour capillary congestion; therefore, by giving opium, we should only aggravate one of the great evils of the typhoid state. There is another reason why opium should not be administered in fever—namely, that it tends to clog up the secretions, and so to prevent the elimination of the morbid poison, which is an object we are desirous of promoting.

Nevertheless, when the state of congestion is not obvious, and the powers of the patient are not very low, I have seen the very best effects derived from the administration of one or two doses of opium well timed.

You will often find it necessary and most useful to give opium by enema in those cases of diarrhœa which often occur in typhus, or, if you will, in typhoid fever. This is a practice which I always follow, and with the best results, never to allow the diarrhœa to get ahead, but to keep it down by the frequent administration of small enemata of starch, sometimes, if the diarrhœa be urgent, repeated twice or thrice a day, with five, ten, or twenty minims of the tincture of opium. Dr. Corrigan, who has had great experience in the treatment of fever in Dublin, states that the application of not more than two or three leeches to the temple is often of great benefit in promoting sleep; and he was first led to adopt this practice by observing that spontaneous hæmorrhage from the nose was followed by sleep in some cases. Dr. Graves lays great stress upon the advantages of combining tartar emetic with opium: he says that the antimony prevents the too narcotic effects of the opium, whilst the junction of opium with antimony promotes the sedative influence of the latter, and guards the system against its depressing power.

Are we to be deterred by the occurrence of delirium from the continued use of stimulants? The mere occurrence of delirium need not deter you from the continued use of stimulants: on the contrary, in some cases it should incite you to give them more freely, in larger and more frequent doses. But in all cases their influence upon the pulse will serve you as a useful guide; and if you find that under stimulants the pulse does not quicken, but improves in quality, and more especially if it diminishes in frequency, you may continue the use of stimulants.

Hysterical delirium.—I shall now call your attention to the treatment of that form of delirium which is apt to occur in cases of hysteria—namely, hysterical delirium. A hysterical girl begins to form strange fancies: she becomes obstinate and perverse, and it is with great difficulty that she can be managed. Perhaps she may refuse to take food, and conceive a great dislike to some of her relatives, and refuses to see them. Sometimes we can detect no obvious immediate exciting cause for these symptoms beyond the existence of a chronic hysterical state; but in the great majority of cases, however, while the hysterical diathesis is present, the patients have been

exposed to some causes of depression. Such is the case with a girl of the name of Walker, now in the hospital, who is suffering from this form of delirium. She belongs to the hard-worked and ill-paid class of needle-women who have excited so much interest of late. For some time past she has been sitting at her needle for many hours a day, getting no air nor exercise, and feeding badly. She is a Roman Catholic, and an enthusiast in religion, and has been led by her religious views to practise a considerable amount of asceticism, which, in addition to her privations from poverty, have contributed much to increase her depression. In this girl there was at first no violence, but she was continually sighing, and seemed always in a melancholy mood; sometimes reciting hymns to the Virgin, at others praying fervently, imagining herself in chapel. She frequently spoke of her father and mother, without having any definite notions as to where they were, or seeming to know that one of them was dead. She could seldom be engaged in conversation, and could give no satisfactory account of herself, and she exhibited great reluctance to take food. In addition to the other causes of depression I have mentioned, she has been irregular in her catamenia; and on the last occasion, a few days before she became delirious, she had a very profuse discharge of blood, which weakened her extremely.

Sometimes patients suffering under hysterical delirium are extremely violent and mischievous, and even furious, using the most coarse and even obscene expressions. Often there is great wakefulness, which threatens to exhaust the patient.

In cases of hysterical delirium we generally meet with disturbed uterine functions; the catamenia are affected in some way, being too copious, or perhaps deficient in quantity or altered in quality; the intervals of their recurrence may be very irregular, or many months may pass without the patient having menstruated: sometimes, on the other hand, they recur too frequently. Leucorrhœa is also often present in these cases to an extent which produces extreme weakness. Under such circumstances, when a patient is exposed to privations, or from loss of appetite is unable to take food in sufficient quantity, or receives some severe mental shock, delirium is very apt to show itself. Moreover, young women, and especially those of the hysterical diathesis, are extremely apt to neglect all attention to the action of the bowels, which alone must seriously injure the general nutrition. It is not uncommon for such young women to suffer from a confined state of the bowels for many days, without exciting attention from them.

Thus, with deranged catamenia, confined bowels, irregular habits, capricious appetite, mental anxiety, often ill-regulated thoughts, and in the lower classes inadequate food and over-work, it is no wonder that a depraved nutrition should be produced sufficient to disturb the balance of the nervous system, and the due action of the mind.

In treating a case of hysterical delirium we must set ourselves diligently to discover the causes which have produced the deranged general nutrition upon which the delirium mainly depends. We must relieve constipation, without using violent means calculated to depress. If the catamenial or leucorrhœal discharge be excessive, it must be immediately checked by suitable remedies, among which, I think that the frequent use of cold water by hip baths is among the best. Careful attention must be paid to improve appetite and to help primary digestion. Hence we shall derive most benefit, generally speaking, from the combination of tonics, mineral acids, and purgatives, and sometimes from the use of chalybeates.

It is of great importance to devise some good means of administering food according to the particular circumstances of each case. As to the use of stimulants, it is difficult to lay down rules of even frequent, much less of general, application: in this part of the treatment our best guide will be derived from the peculiarities of each case: sometimes it is better to give them, and sometimes to withhold them. The state of the digestive organs, the previous habits of the patient, the effects which stimulants produce upon her, will in general afford us great help. To these I may add the rate of the pulse; a quick pulse, of 110 or upwards, indicating the need of stimulants; a slow pulse, below 90, denoting that they are not necessary. But this you must always bear in remembrance, that starvation will not answer in these cases, nor will antiphlogistic measures: such means always tend to aggravate the delirium.

In the treatment of these cases a great deal is to be done by moral means. Very frequently it is desirable that the patient should be isolated from her friends: by this I do not mean that she should be sent to a lunatic asylum; on the contrary, in a large number of instances such a course would be injurious to the patient, both at the time and subsequently. We have no more right to send a patient labouring under hysterical delirium into a lunatic establishment, than to place a patient affected with the delirium of erysipelas or of typhus there. We have no good grounds for classing these cases, more especially the

more acute ones, with ordinary cases of insanity; and we should be careful to avoid stamping a young woman with the reputation of having been once insane. The delirium in these cases is as much dependent on the disturbed state of nutrition which constitutes the hysterical state, as the peculiar delirium of erysipelas or of typhus depends upon the peculiar fever excited by the respective poisons of those maladies. The patient then, as I said, should be isolated from her friends, and be placed under the care of a kind and attentive nurse, who will keep a constant watch over her, attending carefully to her wants, and restraining her by firm but kind influence from doing what is injurious or mischievous.

Mechanical restraint is highly objectionable in the hysterical delirium, and should never be practised unless when there is an absolute necessity for it. It excites opposition, and irritates the temper of the patient often to a very serious extent. You have lately had a good opportunity of observing its injurious effects in the case of the girl up stairs. She had been treated much on the plan I have already described, with tonics, good diet, and shower bath; but she had got into the habit of wandering about from ward to ward, and the nurse was unable to control her. I directed her to be kept to her bed, and isolated from the other patients by surrounding the bed by screens. Still she could not be kept quiet; and I then allowed the nurse to tie her feet to the bed. This irritated her very much, and the next day we found her much worse, and her delirium much increased. All restraint was then removed, and since then she has been gradually improving.

The same rules which I laid down as to the employment of restraint in cases of delirium tremens, are applicable to the question of using these means in other similar cases. We must be guided by the symptoms which arise in the course of the disease, being always slow to adopt restraint.

Puerperal delirium.—I shall conclude this lecture by a brief allusion to the treatment of another form of delirium, nearly allied to the hysterical—namely, the puerperal delirium. A puerperal woman is in much the same condition as a woman affected with excessive leucorrhœa, or with any other exhausting disease tending to deteriorate the general health. She is exhausted by the efforts of parturition, or her vital powers are depressed by some condition consequent on the puerperal state.

When speaking of hysterical delirium, I omitted to mention that there are two classes, differing from each other in their results.

1. A class of cases in which the pulse is very quick, varying from 120 to 140.

2. Cases in which the pulse is usually below a hundred.

In these two classes the prognosis is very different. If the pulse be quick, and continue quick despite of support, stimulants, and tonics, the prognosis is in general unfavourable; on the other hand, if it be below 100, and show no tendency to become rapid, the case may be looked at more favourably. By far the greater number of the cases of hysterical delirium belong to this latter class, and by far the greater number get well. Now it is just the same with puerperal delirium. We find two classes of cases distinguished by the difference in the rapidity of the pulse, and which affords the same prognostic indications as in hysterical delirium. The existence of these two states of pulse in puerperal delirium was long ago pointed out by Wm. Hunter and by Gooch.

The general treatment of puerperal delirium must be conducted on much the same plan as that which I have laid down for the hysterical. Almost always some exhausting influence has been in operation, or there has been some severe mental shock. You must combine a soothing and strengthening treatment with moral management, and remove as far as possible all causes of mental excitement, as well as of bodily depression.

When you have to deal with a case in which the pulse is extremely rapid, you will generally find it necessary to be very diligent in the use of stimulants and of nutritious food; and indeed your ultimate success in the treatment of the case will much depend on your patient's ability to digest and assimilate these aliments.

We had a good example of the good effects of this treatment in a case of this kind of delirium, which occurred in the hospital last November. The patient's name was Mary Tilley, and she was only twenty years of age. Although in this case the pulse reached the high number of 160, and continued at that rate every day, accompanied by extreme debility, the patient did well. The delirium had been brought on by excessive hæmorrhage after parturition. The patient stated that on the third day after the birth of the child she passed something as large as a child's head, having the appearance of black currant jelly—a tolerably good description of a large clot of blood: this was followed by suppression of the lochia, great prostration, and delirium. When she was admitted, the tongue was covered with a brown fur; she was delirious, talked very much in her sleep, and frequently jumped out of bed, and exhibited a certain strangeness and wildness of

manner; her pulse was 160, and the respiration 40. She was placed upon a freely stimulating treatment, with ammonia, and wine, and beef-tea; for several days she took half an ounce of wine every hour. On her admission the pulse was 160, and respiration 40; the next day it had not diminished in frequency: during these days she was taking half an ounce of wine every hour. On the 14th (the third day after admission) the pulse fell to 130, but the delirium continued. She was sleepless; talked a great deal, and fancied some one was coming to take her away and kill her. The quantity was now increased to an ounce every hour. On the 17th (the sixth day after admission) she was reported to have slept well, and the delirium had considerably subsided. The pulse, however, was still 130. On the 19th she had improved still further, and the pulse had fallen to 120. I now gave her quinine (the tongue having become clean) in doses of two grains

every fourth hour. On the 20th the pulse was 108. The quantity of stimulants was now gradually diminished, and on the 8th of December the pulse had fallen to 88, and from this time she rapidly convalesced.

You must deal with these cases of puerperal delirium in much the same way as you deal with cases of erysipelatous or typhoid delirium, because in all these conditions the patient suffers from a state of exhaustion detrimental to general nutrition. In puerperal delirium, however, we may give opium with great safety: in violent cases, in which sleep could not otherwise be procured, I should not object to administer chloroform, bearing in mind the cautions to be observed during and after its inhalation, which I mentioned in a former lecture.

It remains for me to discuss the treatment of the epileptic delirium: this, with some remarks on the treatment of the various forms of coma, I propose shall form the subject of my next lecture.

LECTURE VI.

Hysterical delirium in men.—Treatment of epileptic delirium—Diagnosis of epileptic delirium—Epileptic delirium a prolonged epileptic paroxysm—can it be cut short? Bleeding—Moral treatment—Treatment of coma—Diagnosis of apoplectic coma.—Treatment of traumatic coma, of epileptic coma, and of the other varieties of coma.

GENTLEMEN,—In my last lecture I directed your attention to a case of hysterical delirium, now in King's College Ward; I refer to this case now, in order that I may tell you that this patient is going on very favourably under the plan of treatment which we have adopted; namely, paying due attention to supporting her strength with nutritious diet, and isolating her from other patients in the ward by placing screens round her bed, at the same time exercising a firm but mild moral influence upon her, without mechanical restraint.

I must here allude briefly to the treatment of that form of delirium which we now and then meet with as apt to occur in men who have been very hard-worked: over-worked, either as students, or in their professions or other callings, or who have drawn too largely on their powers by habits of dissipation, especially when sexual excesses have been conjoined with them. In such persons, I say, we now and then meet with a form of delirium which often passes under the name of brain-fever; this delirium is closely akin to that of hysteria in women; indeed, the state into which men bring themselves by overtaxing their powers is very similar to, if not identical with, the hysterical state in women, and the delirium which is developed in the course of it is therefore most probably of precisely the same nature.

The occurrence of a delirium of this kind in men forms an interesting feature in reference to the pathology of hysterical affections, inasmuch as it clearly shows that the hysterical is not a condition especially connected with the peculiar characters of the female sex, but that, under circumstances analogous to those which are apt to produce it in women, a similar state may be brought on in men.

Men who addict themselves to masturbation, or to excessive sexual indulgence, become affected with nervous symptoms precisely of the same nature as those which are so common with hysterical women. They become effeminate in appearance and habits; and often, if I may so speak, more effeminate even than women. In such men you may witness the hysterical paroxysm as complete and as intense as any that may be seen with women. Men of strong sexual passions, even although they may be kept under proper restraint, when exhausted by other means, as by undue mental exertions or anxiety, likewise become hysterical, although to a less extent than when the exhausting cause has been sexual.

The hysterical states, then, in both men and women, may be regarded as pathologically the same. The very same rules of treatment which I have laid down for the management of the hysterical delirium of women are applicable to that of the hysterical delirium of men; namely, careful attention to the support of the patient's general nutrition and to the state of his digestive organs, moral management, isolation as far as may appear advisable according to the particular circumstances of the case, which also, rather than any general rules, must guide you as to the use of sedatives, tonics, and stimulants.

Treatment of epileptic delirium.—I have not yet had an opportunity of speaking of the treatment of that most interesting form of delirium which I have ventured to designate *epileptic delirium*. It is met with in persons subject to epileptic fits, or it may occur in persons who have never had a fit, but who are disposed to epilepsy, and may have the complete epileptic paroxysm at some future time. Epileptic delirium may come on before or after a fit; it usually comes without any forewarning, and having lasted a certain time, passes off,—why, we cannot tell. Many of the cases which are designated *acute mania* are most probably of this kind. In many such cases epilepsy may be found to have affected some members of the patient's family. So also the cases of the so-called

phrenitis are examples of epileptic delirium. Now it is obviously of great importance to be able to diagnose a case of epileptic delirium, and to draw a clear distinction between it and the several forms of delirium which I have described.

For the purpose of this diagnosis you must avail yourselves of both negative and positive evidence. By the former you will be able to exclude the various other forms of delirium which I have enumerated. The history, and the absence of certain obvious phenomena, will denote that it is neither erysipelalous nor typhoid, nor pneumonic nor rheumatic; and the absence of certain other symptoms, as pain in the head, sickness, sluggish pulse, and the non-existence of the tendency to coma, will point out that the symptoms are not due to inflammation of the brain or its membranes. Then you must satisfy yourselves that it is not delirium tremens; in which you will again derive much aid from the history of the patient, and from ascertaining whether he has been intemperate in his habits or not; also from the absence or presence of the peculiar tremor in the voluntary actions, and from the character of the delirium, which in delirium tremens is generally of the busy kind. You will further inquire whether the patient's delirium may not be of the hysterical kind, to which I referred in a former lecture; whether he had not subjected himself to exhausting influences, sexual or otherwise, and so given rise to the delirious state.

Having thus determined that the delirium under which your patient labours is not to be referred to any one of these varieties, it is highly probable that it must be of the epileptic kind; and you must now look for some positive signs to prove that it is so. The aspect of the patient will afford some help: there is, in these cases, a peculiar haggard, wearied aspect of the countenance, with dilated pupils, which should always excite your suspicions as to the epileptic nature of the disease. The character of the delirium is also to be taken into account; it is almost always of the noisy and violent kind; the patient is uproarious, to use a common expression, wakeful and talkative. Then, if previously the patient have suffered from regular epileptic paroxysms; if the delirium have been ushered in with a fit; if epilepsy be distinctly a feature of his family history; if the convulsive fit have occurred in the course of the paroxysm of delirium,—any or all of these points will assist you greatly in determining the epileptic character of the delirium.

What, then, is the appropriate treatment for a case of epileptic delirium? Have we any royal road to cut short the paroxysm, and bring the patient quickly to his senses?

I fear that we can no more cut short this maniacal paroxysm, than we can cut short the convulsive fit of epilepsy.

Indeed, the paroxysm of delirium may be looked upon as a prolonged epileptic fit. It is a fit in which the disturbance of cerebral nutrition is mainly limited to the convolutions of the brain. In the ordinary convulsive fit, the parts of the brain which are affected are probably the tubercula quadrigemina and the hemispheres: in the delirious fit, *without convulsions*, the latter parts alone are affected. In some of the milder cases of epileptic disease we see this isolation of the mental affection and of the convulsive very conspicuously. Thus, we observe in some cases that the paroxysm consists only in a momentary loss of consciousness, from which the patient instantaneously recovers; while in others it consists of sudden convulsive starts affecting the upper or lower extremities or both, and which, when the latter are affected, are sometimes so severe as to throw the patient down. Yet in many of these the patient retains his consciousness perfectly undisturbed. You have examples of both of these states now in the hospital; one in Sutherland ward, in the man whose skin was darkened by a course of nitrate of silver, which he took before his admission. This man has the smaller fits of loss of consciousness, momentary faintings, of which he will sometimes have several in the course of the day. The other case is a lad of Jewish parents, who has the convulsive startings to a very great extent, sometimes fifteen or twenty times a day, and frequently with great violence; but he assures us that never, in even the most severe of them, by which he is thrown down with violence, does he lose his consciousness. This lad, however, has also the regular and fully developed fits, but not more frequently than once in three or four weeks.

It is not, then, unreasonable to suppose that if you may have a short and very temporary affection of the intellect and consciousness, you may also have a prolonged affection of them, constituting the epileptic delirium, which may be ushered in by a regular fit, or which may be determined by a regular fit.

Now I apprehend that no one, now-a-days, will pretend that we have as yet discovered any mode of cutting short the ordinary epileptic convulsive paroxysm. Many means for this purpose have been proposed; such as putting salt in the mouth, pressure on the carotids, bleeding, splashing with cold water, but none have been followed with any degree of success which justifies us in adopting them. I do not say that you may not, if you fancy, try the more harmless of them, such as the salt, and the cold water; but anything which interferes with the cir-

ulation is dangerous, and must not be tried on light grounds.

I do not believe, then, (to answer the question which I just now proposed), that we have any sovereign means of cutting short the paroxysm of epileptic delirium; and, therefore, I regret to say, that very much of the advice I have to give you on the management of these cases must consist of cautions to you as to what you ought not to do, rather than of positive instructions as to what you must do.

We have, in fact, in the treatment of a case of this kind, to guide our patient through a prolonged epileptic fit; to support his powers until the excitement of the paroxysm passes off, and to guard him against injury. Time is the great element in his cure, and the clinical history of similar cases gives us the best assurance that the paroxysm will in time, if we do not allow the patient's strength to be exhausted, exhaust itself. Our treatment, then, must be mainly *supporting* and *expectant*, with due attention to the ordinary functions of the digestive organs.

And now I must tell you what you ought not to do.

In the first place, as we have the most satisfactory evidence that there is no inflammation of the brain in these cases, you need not harass your patient by the employment of antiphlogistic remedies. You must not bleed him: there is no necessity nor demand for this practice: it often increases the violence and the duration of the ordinary epileptic paroxysm, and it also tends to increase and prolong the delirium, as it does in other forms of delirium. Neither is it advisable to bleed locally, either by leeches or cupping,—or, if you think it prudent to yield to the solicitations of friends, take care to be very sparing in the quantity of blood you take away. When the pulse is strong and slow stimulants are not required; your patient will be better without them: but when the pulse is weak, vacillating, irregular, and more especially when it is quick and running, then stimulants carefully given will prove advantageous. You may shave the head; and, if it be hot, apply cold applications, but in such a way as not to depress the heart's action. This will give the patient and his attendants something to do, and enable you to proceed the more comfortably with your expectant plan. You may likewise apply small blisters in succession to the scalp, but do so without irritating the patient much, and desist immediately if it seem to have that effect. The moral treatment is particularly to be noticed here, as in many cases it proves of great benefit: all causes of excitement

should be carefully avoided. As to restraint, you must exercise the rules I mentioned in speaking of delirium tremens. All means must be taken to prevent the patient from injuring himself; but the gentler the means employed (provided they be effectual) the better. Upon this point I should be glad, if I had time, to read to you some extracts from Dr. Conolly's valuable lectures on the treatment of acute mania, published in the *Lancet*; but I advise you to peruse them for yourselves—to read, mark, learn, and inwardly digest the wise and humane cautions there given as to the management of these cases.

Sometimes there is extreme wakefulness, and you cannot get the patient to sleep. What are you to do? Avoid opium, generally speaking: if you give a sedative at all, let it be hyoscyamus or hop. Sometimes the cold douche or the shower-bath prove very effectual in inducing sleep. The head may be placed out of bed, and cold water poured upon it from a height, or it may be very freely sluiced with a large sponge. I have seen chloroform of great use where opium had utterly failed: but you must bear in mind the same precautions with regard to its use as to the use of opium; do not give it if you can do without it. Any other drugs which you administer should be of the tonic kind, of which the most useful are the metallic tonics, as zinc and iron, or you may give bark or quinine.

Of the treatment of coma.—The advanced period of the session warns me that I must bring these lectures to a close. But I have yet to speak of the treatment of the different kinds of coma. Fortunately, it will not be necessary for me to occupy your time at much length with this subject. I have in the course of these lectures adduced the strongest evidence that, in the great majority of instances, the state of coma is but a more advanced stage of the same essential condition as the state of delirium. Therefore, much of what I have said of the treatment of the various forms of delirium will apply to that of the corresponding forms of coma.

Now, in speaking of the general treatment of coma, I must exclude the apoplectic coma; by which term I mean coma produced by extravasation of blood, or by pressure of some other kind upon the brain,—as from fracture of the skull with depression of a portion of bone. I must likewise exclude that comatose state which arises from inflammation of the brain.

In dealing, then, with any particular case of coma, you must assure yourselves,

in the first instance, that it is not coma from pressure, and that it is not coma from inflammation of the brain. I need not dwell here upon the symptoms of inflammation of the brain, as I have already sufficiently discussed that subject in a former lecture; but I shall make a few remarks as to the diagnosis of the coma which is brought on by effusion of blood within the cranium.

This diagnosis is by no means always easy: with the greatest precautions, you will now and then find yourselves mistaken,—so closely do the symptoms of one kind of coma often resemble those of another.

The points to which you must look are—

1st. The history of the case.

2d. The mode of accession of the coma.

3d. The state of the pupils.

4th. The existence of a paralytic state.

In most cases of apoplectic coma there have generally been some threatenings beforehand; such as pain or uneasiness in the head, giddiness, *muscæ volitantes*, tinnitus aurium, or other subjective phenomena of the senses. You will be particular to inquire about these points. The coma of apoplectic effusions always comes on more or less suddenly. The sudden supervention of coma in a man previously healthy affords a strong presumption in favour of the apoplectic nature of the coma; and this is especially the case when there have been no convulsions, no mental excitement or emotion, previous to the attack, and when epilepsy does not appear in his history. A dilated state of the pupils generally accompanies the apoplectic coma; but as this is very common, even to a greater extent, in epileptic coma, it gives us no efficient aid in the diagnosis. When, however, one pupil is dilated, and the other natural or contracted, we may have strong suspicions of injury of the brain. This is especially the case if the coma be accompanied or preceded by paralysis of one side of the body.

When the apoplectic effusion takes place in the vicinity of the third pair of nerves, tearing up the brain more or less, a highly contracted state of the pupils is apt to take place.

The sudden occurrence of a hemiplegic paralysis simultaneously with the state of coma affords a strong indication that the cause is an apoplectic effusion. Even with this symptom, however, you will occasionally be deceived. In the Lumleian Lectures I referred to a case of this kind, in which there were sudden hemiplegia and profound coma, and after death I was unable to find a clot in the brain.

In investigating cases of coma you must

be most careful to inquire into the state of the renal and hepatic secretions. When either the liver or the kidneys fail, the patient becomes comatose. The liver may fail either from actual non-elimination,—the elements of the bile remaining in the blood,—the liver having lost its power of attracting them out of it,—or there may be some mechanical impediment to the flow of the bile, either in disease of the ducts themselves within the liver, or in some stoppage of the hepatic or common ducts outside the liver. The hepatic derangement shows itself plainly enough in the jaundiced state of the patient. When the kidney is at fault I need not tell you that you will find the evidence of it in a careful chemical microscopical investigation of the urine.

The former history of the patient affords the most valuable and important guidance in the diagnosis of the various forms of comatose affections. You must inquire into the state of the patient previous to the occurrence of the coma, and must consider whether he has been the subject of epilepsy, gout, rheumatism, hysteria, or renal disease; as the coma may arise from any of these conditions. You should also inquire into the previous habits of your patient, as to intemperance, taking opium, &c., as coma may arise from the presence of opium or of alcohol in the system.

You must, then, before you fix upon your line of treatment, be satisfied that the coma is not apoplectic,—that is, from pressure; and also that it is not due to the presence of opium or of alcohol in the system.

Excluding these, the coma may be traumatic, from shock, producing simple concussion of the brain, or it may be epileptic, or renal epileptic, or hysterical, or rheumatic, or gouty. I shall not dwell upon the diagnosis of these forms of coma from each other, but proceed to refer briefly to the treatment of each.

First, then, as to the *traumatic coma*. This is that state which surgeons describe under the name of concussion of the brain. We have unquestionable evidence that it is not a state of inflammation, or of active disease of any kind, but simply one of suspension of the powers of the brain due to the shock occasioned by the injury. We do not know exactly what the precise condition of brain is in this traumatic coma. It is, however, a state analogous to that of sleep, in which the natural actions of the brain are depressed rather than exalted: to use an expression borrowed from the Stock Exchange, they are *below par*. In the milder cases, as when a patient is simply *stunned*, recovery takes place quickly and perfectly without any medical interference. Why

should not this be the case with the more prolonged cases, in which the stunning effects of the injury last considerably longer? Indeed, I do not know why it should not; and I believe that in the great majority of cases this state of coma passes off spontaneously, just as it does in the slighter cases.

Are we, then, in cases of concussion of the brain, to content ourselves with looking on, and to do nothing? I believe that the opinion is rapidly gaining ground that this expectant method,—this system of non-interference,—is the best. Upon this point, however, I speak with diffidence, and must refer you to the great surgical authorities. I shall only add, that most of those with whom I have conversed on this subject have expressed themselves most favourable to this plan. Among them I may especially refer to my friend and neighbour Mr. Bransby Cooper, whose large experience at Guy's Hospital entitles his opinion to great weight. In conversation upon this subject, he likened the state of coma after concussion to a state of sleep which has a distinctly reparative object and effect.

Most of you will remember the case of a woman who was thrown from a window by her husband, not long ago admitted into one of the surgical wards. This woman had very decided traumatic coma. At first it was thought that some depression of bone had taken place; but it was soon found that the injury was limited to the external table of the skull. This patient recovered completely and most satisfactorily under a treatment which was mainly of the expectant kind.

Then do I advise you absolutely to do nothing in these cases? My advice is, to attend to the functions,—relieve the bowels by mild means, support the system without stimulating the patient, unless great debility calls for more active support; and, that you may not appear to the friends of the patient to be absolutely inactive, shave the head, apply cold to it, or, if there be no contra-indication, apply a small blister now and then.

Formerly all these patients used to be bled, almost as a matter of course, and with the view of anticipating the inflammation which it was expected would follow upon reaction after the shock. But this idea of inflammation following reaction rests upon no good ground: it was suggested by the occasional occurrence of delirium after this form of coma, the delirium being supposed to indicate a state of inflammation. We now, know, however, that delirium is by no means a certain indication of inflammation within the cranium, and more especially delirium arising out of

coma. Delirium *passing into* coma would be a more likely indication of an inflammatory affection.

You will ask, are there no circumstances which justify bleeding in cases of traumatic delirium? I cannot take upon myself to answer this question in the negative. I do, however, say that it appears to me a very unmeaning practice to bleed *in anticipation of* inflammation; and that you should wait for some decided symptom, some good evidence of inflammation or of congestion, before you subject your patient to the risks which arise out of the loss of blood.

Treatment of epileptic coma.—The epileptic coma is the most common form of coma we meet with; and here, likewise, the expectant mode of treatment, with moderate purging, answers better than any other. This condition presents many analogies to the traumatic coma. The brain experiences a shock from the epileptic discharge. The shock is generally followed by a longer or shorter sleep, from which the patient awakes up relieved, and often with no other symptom than a feeling of exhaustion. We do not find that anything cuts short the attack. Bleeding depresses the heart's action, and is favourable to the development of the epileptic state, and therefore it cannot tend to cut short the coma.

Epileptic coma, like traumatic coma, may go on for a very considerable time, and yet the patient will perfectly recover. As an instance of this kind I will refer to the case of Eliza Williams, a girl of 13 or 14 years of age, who was admitted into Augusta ward on the 26th of March last, in a state of profound insensibility, which continued till the 30th, a period of four days, and for a week afterwards in a less profound degree.

In this case the treatment was of the expectant kind. We kept this patient's bowels open, and attended to her general nutrition, taking care to avoid any causes which might operate injuriously on her. She recovered perfectly; had several epileptic fits afterwards, with coma of very short duration, and left the hospital much improved in her general condition.

There are, however, cases of coma in which more active treatment than this is required; as, for instance, in cases of coma arising from rheumatic fever, gout, or scarlet fever, or in coma arising from poisoning by urea, in diseased states of the kidney. In such cases it is very necessary to do something more than watch; your treatment must be of the eliminating kind, such as blistering and purging; at the same time, it is necessary to uphold the

powers as far as the digestive organs will admit. When you have reason to believe that the blood is poisoned by urea, as in renal disease, you will frequently find the hot-air bath of service; and you must give drastic purgatives, such as elaterium, or the compound powder of jalap, or the *Iberis amara*. In fine, as a general rule in the treatment of the comatose state which does not arise from pressure, you must bear in

mind what I think I have made out in these lectures,—namely, that delirium is the slighter degree, and coma the more aggravated condition of the same state; hence, in a great measure, the treatment of the two conditions must be similar; for coma and delirium differ from each other in degree, the former being only an advanced stage of the latter affection.