

THE S I S
on
A C L I N I C A L S T U D Y
of
A C U T E A L C O H O L I C P O I S O N I N G
(with illustrative cases)
for the degree
of
D O C T O R O F M E D I C I N E
of the
U n i v e r s i t y o f G l a s g o w
by
A N D R E W R O N A L D M I T C H E L L
(M. B., C. M., Glasgow, 1889)
15, Monteith Row,
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P R E F A C E.

In the following pages the author has endeavoured to record his experience of a disease, interesting not only on account of the constancy and peculiarity of its symptoms; but also on account of the diversity of opinion to which its etiology and treatment have given birth. To the thoughtful physician whose plethora of theory is in inverse ratio to his practical acquaintance with this disease, a typical case must appear as a tragedy of real life; a tragedy, moreover, whose re-enaction, however frequent, cannot fail to arouse and concentrate his attention, as well as to enlist his best efforts on behalf of the sufferer.

Prior to the middle of the last century, the prevalent opinion of the medical profession was that the withdrawal or diminution of the supply of stimulants from one long accustomed to their abuse, was the exciting cause of an attack of delirium tremens; and that, therefore, the free administration of stimulants constituted the rational treatment of the disease. This opinion concerning its etiology still finds some support; and has, perhaps, a basis of apparent reason; but the following account of a few of the cases which I have attended, will, I

think, show this opinion to be untenable; and, therefore, that the treatment of this disease by free administration of stimulants is a deduction founded upon an inaccurate basis.

The young physician, who feels that it is essential to give speedy relief to his patient in order to retain the confidence of his employer, is not a little embarrassed by the differences of opinion concerning treatment expressed by writers on this subject; especially in relation to the use of opium and its alkaloids. Some of the earlier, as well as certain modern writers, emphatically condemn its use; others again speak with more or less uncertainty concerning it; while others consider it a useful medium of treatment.

A very considerable experience in the treatment of cases of this disease may, perhaps, enable me to throw a little light upon this important subject. With this object in view I shall describe, in more or less detail, a few of my cases; and at the end of each case I shall mention the points of interest to which I wish to draw particular attention, and from which I shall endeavour to make a few deductions which will, I hope, justify not only the writing of this Thesis, but also the aspiration of its author.

A.R.MITCHELL.

15, Monteith Row,
Glasgow,
May 24th, 1911.

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A C L I N I C A L S T U D Y

of

A C U T E A L C O H O L I C P O I S O N I N G
(DELIRIUM TREMENS)P R E L I M I N A R Y O B S E R V A T I O N S.

Chronic
Acute alcoholic poisoning - commonly known as "delirium tremens" - is the designation of a morbid condition which is due to the recent influence of alcohol upon nerve centres already predisposed thereto by chronic alcoholic irritation. This condition is almost invariably associated with co-existing delirium and muscular tremors. Indeed, the synonym "delirium tremens" has been described by Hoblyn, in his "Dictionary of Medical Terms", as "An uncouth expression intended to convey the idea of delirium co-existing with a tremulous condition of the body or limbs".

Delirium and muscular tremors, although prominent symptoms of this affection, and in some respects peculiar, are by no means pathognomonic of the disease; but are common with certain modifications, to other affections such as typhus fever, paralysis of the insane, chronic plumbism and mercurial paralysis - the "tremblement mercuriel" of the French pathologists, all of which are readily recognised by the previous history and symptoms. Dr Anstie, however, (Lancet, 1873, 1, p.374), mentions the exceptional case of a man whose death was attributed to delirium tremens; until it

was afterwards found that he had been inhaling the fumes of acid nitrate of mercury in the pursuit of his trade.

As the remarkable constancy of the symptoms and progress of this disease will be sufficiently demonstrated in the earlier cases about to be described, I shall, in order to avoid unnecessary repetition, simply utilise the later cases to illustrate points to which I wish to draw particular attention; but gradually omitting those constant details which, with certain modifications run through all of them. The nature of the hallucinations, which are invariable concomitants of this remarkable disease, varies with the individual; but there seems to be no conceivable absurdity of imagination of which the patient may not be the victim.

In the following record, the duration of an attack is calculated, as nearly as possible, from the point at which the period of mental depression ends and that of hyper-excitement, hallucinations, and delirium begins; and terminates, in cases of recovery, with the commencement of the restorative sleep.

CLINICAL DESCRIPTION.Case 1.

P.B., aged 47 years, married, a lodging-house keeper of neurotic temperament, and a native of Ireland, was first seen by me on the 3rd January, 1891. He had been an habitual drinker and was now suffering from the effects of a recent debauch. During the preceding two or three nights, his sleep had been limited to brief snatches, and these were disturbed by horrible dreams and visions. His face was pale, and his eyes, of which the pupils were normal, were lustreless and expressive of fear. His skin was moist, his hands tremulous, and his movements spasmodic. Moreover, although he answered questions intelligently, he was evidently apprehensive of some imaginary danger; and was exceedingly anxious, although quite unable, to attend to his business affairs. His pulsations, 76 in the minute, were soft and feeble in character; his respirations were 20, and his temperature was 98.7° Fah.. His foul tremulous tongue, pale and indented at the edges, was readily but jerkily protruded, and suddenly withdrawn; and, although the appetite was completely lost, he was easily persuaded to accept proffered food. He had neither thirst nor desire for stimulants; the

alvine evacuations were scanty and offensive; and the urine was high-coloured, of acid reaction, Sp. gr. 1026, non-albuminous and deposited urates. In view of the alcoholic erethism established in the brain; of the insomnia, the hepatic congestion, anorexia and unmistakable systemic depression, the indications for treatment were clear; and as the symptoms were typically those of the incipient stage of delirium tremens, I endeavoured to arrest the attack by ordering the patient to bed in a room of which the light was subdued, and from which all sources of irritation were to be removed. Alcohol was disallowed, and fluid nourishment ordered to be given at regular intervals.

Medicinally.- I prescribed a blue pill, to be followed after eight hours by a saline draught and warm drinks; and afterwards, five minim doses of dilute nitro-hydrochloric acid and tincture of capsicum in compound infusion of gentian, in order to remove, as far as possible, all irritating impurities from the circulation, to deplete the congested liver, clear the *prima via*, improve the appetite and, if possible, induce natural sleep.

On the following morning, 4th January, I found that the bowels had acted freely, and that the patient had imbibed a fair quantity of milk; but that he had passed a sleepless night, tortured by waking visions. He was, however, perfectly rational in that he answered questions intelligently; but he was quite unable to concentrate his attention on any subject, and

immediately talked of other matters. Influenced by visionary hallucinations, he cautiously raised the bed-cover, peered under it and grasped at some illusive object; then suddenly dived down and looked suspiciously under the bed as if the object of his quest might be concealed there. He was, however, easily recalled to his senses; and seemed for the moment to realise that he was the victim of imagination. The next minute, he jumped out of bed declaring that he must immediately go to attend his business; and, with movements trembling and excited, seized his trousers and bunglingly and repeatedly missed the leg, after which he was easily induced by his attendant to return to bed. The pulsations were now 96 in the minute, the respirations 24, and the temperature was 99.0 Fah.. I then prescribed bromide of potassium in thirty grain doses every two hours.

At 10 p.m. I ascertained that he had taken a considerable quantity of milk and beef tea; and that he had fallen asleep about 8 p.m., and slumbered uneasily for half an hour, after which he awoke more markedly delirious than before. The pulsations were now 102 in the minute, the respirations 26, the temperature was 100.2, and the skin was perspiring freely. The cardiac strength being well maintained, the same heroic doses of bromide of potassium were continued during the night.

On the following morning, 5th January, I learned that he had again passed a sleepless night in a state of constant delirium. He talked in a rambling and incoherent manner, business affairs still prominently occupying his attention; then, taking hold of

my hand, he gripped it as in a vice, whilst his startled gaze was fixed upon an imaginary approaching object from which he recoiled by bending backwards until he was in a condition of opisthotonos. This paroxysm endured for about two minutes until, with a hideous groan, the rigidity of his body gradually relaxed. He seemed for the moment exhausted; but soon again resumed his imaginary duties in the same tremulous and incompetent manner as before. The pulsations were now 104 in the minute, the respirations 26, and the temperature was 100°.0. His marvel-
:lous tolerance of bromide of potassium, the effect of which was apparently negative, surprised me; and although the action of the heart was all that could be expected, I stopped the drug for a few hours, and simply continued to feed him and to gently restrain his movements.

About 10 p.m., although somewhat exhausted, he was still sleepless; and from his quiet delirium, in which he seemed to be picking imaginary vermin from the bedclothes, he could be roused to a transient interest in his surroundings. The pulsations were now 116, the respirations 29, the temperature was 100°.6 and the urine contained a trace of albumen; but the tongue was somewhat cleaner. I ordered that the body be sponged with warm water, and that an ice-bag be applied to the head; moreover, as his pulse, though weaker, was still good, and he was taking a fair quantity of nourishment, he was given twenty grains of bromide of potassium with ten grains of chloral hydrate every second hour. This treatment was continued, with little perceptible change in

his condition, until he fell asleep at the end of seventy hours from the onset of the attack.

After a profound sleep of about eight hours duration, during which he perspired freely, he awoke refreshed, though weak, and free from delirium and fever. His pulsations were now 92, his respirations 23, and his temperature was 98'.6. After partaking of fluid nourishment he again slept, with brief waking intervals, for nearly twenty-four hours; after which his pulse, respirations and temperature were normal; his urine was free from albumen, and convalescence was rapid and perfect.

A point of special interest in this case was the patient's remarkable tolerance of bromide of potassium and chloral hydrate; no less than six drams of the former having been taken in twenty-four hours; and subsequently a combination of four drams of the former and two of the latter in the same period. It may be supposed that sleep was the result of diminished activity of the cerebral circulation due to the action of these drugs; but as subsequent cases will show, the average duration of an attack of delirium tremens, uninfluenced by narcotics, was reached without perceptible effect being produced. This fact raises the question to what extent, if any, these hypnotics were factors in the production of sleep; or whether it was simply the normal termination of a paroxysm which had produced mental and physical exhaustion.

An objective symptom of greater interest than importance was the transient albuminuria. This was evidently due to the general disturbance of the nervous system, as the cessation of

the one was coincident with that of the other.

The paroxysm of opisthotonos, from which this patient suffered, is not to be regarded as a typical symptom of this remarkable disease. Indeed this is the only case of delirium tremens in which I have ever seen a similar condition. Dr Aitken, however, (Science and Practice of Medicine, 1868, vol. 1, p.839), quoting from a return of admissions and deaths from delirium tremens and ebrietas in the General Hospital in Calcutta, from 1848 to 1852; and another of admissions and deaths in the Medical College Hospital during 1851, 1852, and 1853, says, "One distinct case of paroxysmal 'opisthotonos' occurred in a musician, who during intervals was able to sit up and whistle tunes."

CASE II.

P.M., aged 35 years, a native of Ireland and a Second-hand Clothes Dealer, whose father had suffered from delirium tremens, had been indulging in one of a long series of periodical excesses; and, as this was his third attack, the loss of appetite, tremulousness, and commencing hallucinations were readily recognised by his wife who summoned me to attend him on 12th March, 1891,

He was somewhat plethoric; his face was flushed and he had an anxious expression of countenance. The skin was moist; the hands and arms tremulous; and their movements were jerky and

erratic. The pulsations were 20 in the minute, the respirations were 20, and the temperature was 98°.8. The tongue was coated and tremulous. There was anorexia, and still a craving for stimulants although their imbibition caused vomiting. The bowels were constipated, the urine was moderate in quantity, amber in colour, and of acid reaction; sp. gr. 1020, non-albuminous, but deposited urates on cooling. He was unable to obtain satisfactory sleep, had disagreeable dreams, and now looked about him suspiciously as if in dread of something invisible. The case was clearly one of delirium tremens.

Treatment:- The patient was to be carefully watched and gently controlled in a room with subdued light and from which all sources of irritation had been removed. His body was to be sponged with warm water night and morning; stimulants were disallowed, but abundance of fluid nourishment was to be given at regular intervals. Medicinally:- A mercurial pill was given and followed after eight hours by a saline draught and warm drinks. After free purgation, thirty grains of chloral hydrate, with five minims of tincture of capsicum to subdue the craving for drink, was to be given hourly. After the second dose, he slept uneasily for two hours. The mixture was then continued every second hour during the remainder of the night without effect.

13th March.- The pulsations were 96 in the minute, the respirations were 24, and the temperature was 99°.0 Fah.. He had taken a fair quantity of fluid nourishment, but was garrulous,

and had the usual hallucinations of vision and anxiety concerning his business. I then modified his mixture as follows. - twenty grains of chloral hydrate, ten grains of bromide of potassium, and five minims of tincture of capsicum, to be taken every second hour. At 10 p.m., although he had taken two drams of chloral hydrate and one of bromide of potassium in twelve hours, he was still sleepless. The pulsations were now 104 in the minute, the respirations were 26, the temperature was 99.6, and the urine was non-albuminous. I then ordered that iced-cloths be applied to the head, but stopped the drugs in the meantime.

14th March:- The patient had freely partaken of nourishment, but had passed the night sleepless and busily delirious. The pulsations were 103 in the minute, the respirations were 26, the temperature was 99.3, and the skin was perspiring freely. The medicine was then resumed as before. At 9 p.m., the patient was still sleepless and delirious. The pulsations were 112, the respirations were 28, and the temperature was 100.3. He had taken a fair supply of milk, and also of beef tea containing bread-crumbs. The medicine was again stopped.

15th March:- The delirium continued unabated until the patient became exhausted. He fell asleep about sixty hours after the onset of the attack, slept about six hours, then partook of a little toast and a softly boiled egg; and again slept for several hours, after which his temperature, pulsations, and respirations were normal; and his recovery, with the

exception of some little exhaustion and muscular tremor, was complete.

This case presents the following points of interest:-

1. The attack commenced during the actual currency of the debauch.
2. After partaking of sixty grains of chloral hydrate, the patient slept for two hours. This corresponds with the experience of Anstie who is quoted as being of the opinion that the subject of delirium tremens is tolerant of chloral; and that two drams may be safely given in divided doses spread over twenty-four hours. In this case, however, no less than two drams of chloral, in combination with one of bromide of potassium, were given within a period of twelve hours without producing any appreciable effect - a remarkable proof of the tolerance of this hypnotic.

C A S E III.

P.M. - the subject of case ii -, experienced a fourth attack about four months later. I was called to see him on 21st July, 1891, and found that his symptoms were very similar to those described in connection with his previous attack. The urine, which was clear and apparently normal when passed, became turbid after standing over night, and deposited fawn-

:coloured lithates. The pulsations were 96 in the minute, the respirations were 24, and the temperature was 99°.0.

Treatment.- Having been somewhat dissatisfied with the result of his recent treatment by chloral hydrate and bromide of potassium, and his present condition being as nearly as possible identical with that which pertained to his previous illness, I regarded this as an excellent opportunity of determining, as far as possible, the efficacy of hypnotics, or, at least, the necessity of employing them in such cases. Guided by a rational consideration of the phenomena and pathology of the disease, I resolved to endeavour to sustain the strength of the patient and to remove all obstacles to sleep rather than to force it by means of hypnotics. I therefore prescribed five grains each of calomel, scammony resin, bicarbonate of soda, powdered ginger and nitrate of potash. Also a mixture containing carbonate of bismuth, bicarbonate of potash, tincture of capsicum and compound infusion of gentian. The general management was, in every respect, similar to that of the preceding attack.

22nd July.- The pulsations were 85 in the minute, the respirations were 21, and the temperature was 99°.2. The bowels had acted freely and the tongue was somewhat cleaner. He had taken a fair supply of milk and soda-water, but had not slept, and was troubled by visionary hallucinations. The surface of the body, which was moist, was sponged night and morning with warm water, and iced-cloths were applied to

the head. At 9.30 p.m., the pulsations were 92, the respirations were 23, and the temperature was 99.6; but otherwise there was little change, and the patient was easily restrained without violence.

23rd July,- The pulsations were 96, the respirations were 24, and the temperature was 99.4. The patient had freely partaken of beef tea and milk; but had been restless and delirious during the night. Perspiration was free, and the urine was scanty, high-coloured, of acid reaction and non-albuminous. At 10 p.m. the pulsations were 110, the respirations were 27, and the temperature was 100.4. The delirium had been persistent and, although the cardiac action was good, he was somewhat exhausted, and fell asleep about 2 a.m., on the 24th July, after an attack of sixty-two hours duration. His subsequent recovery was perfect.

This case is of great interest as showing that the same individual, under conditions apparently identical, made an equally good recovery under treatment on purely rational lines, and without the aid of hypnotics. It may be supposed that the shorter course of the disease in the former case was due to hypnotic agency; but a difference of two hours may conceivably be due to other causes, such as an undiscernible difference in the relative severity of the attacks; the exact time of the commencement of the paroxysm; or of reduced power of resistance in the latter case as a natural consequence of the action of the former. It also lends

support to the opinion of Drs Ware and Wilks, that the duration of the disease cannot be abbreviated by means of hypnotics; or, in other words, that the disease will run a natural course uninfluenced by other than rational treatment.

C A S E IV.

P.M., the subject of the preceding case, was little more than convalescent when he returned "like a dog to its vomit", and was attacked for the fifth time. I was, therefore, again asked to see him on the 9th August.

There was anorexia, a craving for stimulants, which he almost invariably rejected, insomnia, suspicion, and the usual disagreeable dreams and visions. The pulsations were 82 in the minute, the respirations were 20, and the temperature was 98°9. The tongue was foul and tremulous; the bowels were constipated; the urine was turbid on standing and deposited urates, but was otherwise normal. There was no complaint of abdominal pain or tenderness; nor was he known to have suffered at any time from haematemesis or melaena. These facts are mentioned in view of the sequel.

The treatment was similar, both as to general management and medicine, to that employed during the preceding attack.

10th August.- The pulsations were 96, the respirations were 24, and the temperature was 98°8. The bowels had acted

freely; milk and soda-water had been taken in fair quantity, but he was still sleepless, and the victim of hallucinations. At 9 p.m. the pulsations were 100, the respirations were 25, and the temperature was 99.4. The skin was moist, but the patient was still sleepless.

11th August.- He had been incessantly delirious throughout the night, but had freely partaken of milk. At 8 p.m., I was hastily summoned to his bed-side, and was informed that he had been shivering and vomiting; also that he had suddenly experienced excruciating pain in the abdomen. He now lay on his back with raised knees, his face expressive of agony and anxiety. The pulsations, now hard and wiry, were 130 in the minute; the respirations, shallow and thoracic, were 45; and the temperature was 103.8. The abdomen was distended, hot, tympanitic and diffusely tender. The patient himself described it as "hard as a board". It was a typical case of acute peritonitis; and it was abundantly evident that death would soon end the scene. I applied the usual remedies for the relief of pain, but the case was hopeless. Collapse supervened, and death took place about four o'clock on the following morning; about 58 hours from the onset of the illness.

I regard this case as particularly worthy of record on account of the fact that there were no premonitory indications of the advent of peritonitis, which, on account of the suddenness of its onset, was probably due to perforation of the stomach or intestines. Moreover, although cases of

peritonitis are known to have resulted from perforation of which no cause was suspected; I have never read of, nor have I since seen, a similar termination to a case of acute alcoholic poisoning.

C A S E V.

On the 28th December, 1894, I was urgently summoned to attend Mrs. B., aged 37 years, married, and a native of Ireland. She was a hawker and dealer in-second-hand clothes, an occupation which necessitated spending much of her time in the open air. She was also an habitual tippler, but had never previously suffered from an attack of delirium tremens. The approach of the festive season had, however, inspired a heavier debauch than usual. But, as the patient had partaken of no stimulants since Christmas night, her friends were unable to understand conduct which resulted in my being called to attend "a woman" who was "supposed to have taken poison".

When I entered the room, her whole body was convulsed by violent retching and vomiting. The appearance of the vomited matter combined with the violence of the vomiting, strongly suggested poisoning; and on investigation, I found a small jar which had contained "Phosphor Paste" - a rat poison-, which seemed identical with the colouring matter contained in the vomit. Having obtained the key to the situation, I applied the usual

remedies, and the patient speedily recovered; indeed she seemed but little the worse for her experience. I think it not improbable, however, that the magnitude of the dose of poison was, perhaps, rather than my efforts, responsible for her recovery by causing early and violent emesis. Her sleep now became very imperfect and was disturbed by horrible dreams. Moreover, she became suspicious of those around her and appeared to dread an imaginary foe. Her friends, fearing further suicidal developments, again requested me to attend her on the 30th December.

I found her in the incipient stage of a first attack of delirium tremens. She was of plethoric disposition and her skin was moist. Her face, which wore the anxious expression typical of such cases, was flushed, and the eyes were lustreless with normal pupils. The pulsations, full and soft, were 90 in the minute, the respirations were 22, the temperature was 98.6, and the tongue was coated and tremulous. There were anorexia and loathing of stimulants whereof she had not partaken since her attempted suicide two days previously. The urine was scanty, high-coloured, of acid reaction, sp. gr. 1026, non-albuminous, but subsequently deposited urates. The case being clearly one of delirium tremens, I adopted the following treatment.— The patient was to be carefully guarded; but to be allowed, during the earlier stage of the illness, to move at will about the room, in order to perform her imaginary duties, or to examine objects and places of suspicion; and

thus, by humouring rather than by resisting the inclination of the patient, to assist in producing, by unrestrained muscular effort, that mental and physical exhaustion which is the precursor of healthy sleep. The light of the room was to be modified according to the effect produced upon the patient by her hallucinations; all sources of irritation were to be removed, and milk and light soup to be freely given at regular intervals; but alcohol was forbidden.

Medicinally:- A calomel purge was given, and followed, after an interval of eight hours, by a saline draught and warm drinks.

31st December:- The bowels had acted freely and a moderate supply of nourishment had been taken; but the patient had passed a sleepless night, her general condition presenting no remarkable change. I then administered a quarter of a grain of morphia, hypodermically - experience having taught me that smaller doses were quite ineffective in such cases -, and, about fifteen minutes later, no perceptible effect having been produced, a further half-grain was injected. The patient soon became drowsy and, about fifteen minutes later, fell into a sound sleep of three hours duration, during which she perspired freely. On awaking, she was restless and, as the day advanced, became more influenced by hallucinations. Her pulsations were now 102 in the minute, the respirations were 26, and the temperature was 99.8. The urine was high-coloured, of acid reaction, specific gravity 1027, and non-albuminous. I then injected, hypodermically, a grain of muriate of morphia in two successive

half-grain doses, with an interval of twenty minutes between each dose. She soon became drowsy and slept for seven hours, after which she partook of food and again slept for several hours. Her recovery was thereafter rapid and perfect, the attack having lasted thirty hours.

This case is illustrative of the following points of interest:- The exciting cause of this attack was clearly nervous shock or fright due to the extreme violence of the effects of its immediate precedent, the "Phosphor Paste" poisoning. This opinion is supported by most modern authorities, amongst whom may be mentioned Drs Fagge and Pye - Smith (Text Book of the Principles and Practice of Medicine, third edition, Vol. i, p. 793), who state that "A sudden shock to the system is exceedingly apt to act as a direct exciting cause of delirium tremens in those who are predisposed to it by intemperance". Also Dr F.W. Shaw (Butler's Diagnostics of Internal Medicine, 1904, p. 1016), who says that "Delirium tremens may be induced by sudden fright, shock or accidents".

Another point of interest in connection with this case is afforded by the treatment. With the exception of the preliminary purgative, morphia was the only drug employed. That this narcotic was effectual in shortening the course of the attack I have not the slightest doubt; but that it invariably produces this effect is by no means so evident. Indeed, some of my cases have proven so far irresponsive to its action, that evidence of the physiological action of the drug demanded its

withdrawal without the requisite sleep having been produced.

C A S E VI.

J. McM., aged 39 years, was a traveller, married, of Scottish nativity but of Irish extraction. He was tall and of athletic build, and had for several years indulged in stimulants - occasionally to excess. Indeed, he considered the giving and taking of stimulants to be essential to business success; and his frequent social intercourse with his fellow travellers in the hotel bar, or billiard room, encouraged the too easily acquired habit.

On 18th August, 1895, I found him suffering from his third attack of delirium tremens, which I treated as follows:-
 General management:- I instructed that the light of the room should be modified according to the effect produced upon the patient by his hallucinations; that he be carefully guarded and his whims humoured rather than that forcible restraint be exercised; that all sources of irritation should be removed, and that he be sponged with hot water night and morning. His food was to consist of milk, with or without soda-water; also beef-tea and soup containing cayenne pepper, to be given at frequent intervals; but alcohol was strictly forbidden.

Medicinally:- A purge similar to that prescribed in "Case #11"

was given and free purgation produced.

On the following morning, 19th August, I learned that the patient had taken a moderate quantity of milk and beef-tea, but that he had not slept. His urine being free from albumen, and his pulse strong, a quarter of a grain of morphia was injected hypodermically; and, twenty minutes later a further half grain was given, but without producing sleep. Having ordered a bitter tonic to stimulate the appetite, I called again about 10 p.m., but found him still wakeful and suffering from frightful hallucinations of vision. I again injected half a grain of muriate of morphia, and repeated the dose about twenty minutes later; but still without the desired effect. His pulsations, soft and of moderate strength, were now 116 in the minute, his respirations were 27, and his temperature was 99°.2. The pupils were greatly contracted. I resolved therefore to sustain the patient's strength and await events; and, as his hallucinations were rendered more terrifying by the darkness, I instructed that his room be kept as light as possible.

20th August:- The patient had passed the night in a state of restlessness and delirium. He had freely partaken of proffered milk and beef-tea, and had perspired copiously. The temperature was 99°.8; and, as his pulse was fairly strong and the pupils but slightly contracted, I injected, hypodermically, half a grain of muriate of morphia; but again without producing the desired effect. About 9 p.m., the patient,

who had not slept, was strongly delirious. His face, of an earthy pallor, had an anxious expression and he was evidently exhausted. His pulsations were 128 in the minute, soft and easily compressible; the respirations were 30; and the temperature was 101.4. As he had taken very little nourishment since the morning, I ordered a dram of aromatic spirit of ammonia, with two drams of good whisky, to be given well diluted; and to be repeated, if necessary, in four hours.

21st August:- The patient had fallen asleep about 8 a.m. - sixty-five hours after the onset of the attack. He slept for about nine hours; awoke somewhat exhausted, but free from delirium and fever, partook of soup containing bread crumbs, and again fell asleep for several hours, after which he speedily recovered.

It is interesting to note the remarkable inefficacy of morphia in the treatment of this case, as compared with its equally unmistakable efficacy in the last case described. No less than two and a quarter grains of muriate of morphia were hypodermically introduced into the circulation within a period of twenty-four hours; and, although the pupils were contracted almost to the size of pin points, the patient was still sleepless, and the case ran its temporal course apparently unaffected by the narcotic. I have on several occasions, observed this remarkable tolerance of morphia in subjects of delirium tremens.

The importance of the treatment of acute alcoholic poisoning

by means of morphia can, perhaps, be best estimated by the great differences of opinion to which it has given rise. In view of the interest which has been manifested by the profession in this subject, I shall illustrate my experience of the drug by means of one or two selected cases of somewhat unusual character

C A S E VII.

Mrs M., aged 33 years, of Scottish nativity but of Irish parentage, was a second-hand clothes dealer and hawker; and therefore spent much of her time in the open air. She was a multipara, plethoric and excitable, and had been delivered of a healthy child on 6th September, 1891. Two days later, 11th September, her accoucheur having been unable to be present, I was urgently summoned to attend her in the emergency. She had been an habitual tippler; but, for several days prior to her accouchement, had abstained from drink. Neither the anticipation, nor the actual experience of labour, which was quite normal, seemed to have caused her any unusual distress. Since her delivery, however, her brief snatches of sleep had been disturbed by frightful dreams; and the doctor - so said her friends - "had allowed her a half". This seems strange; but I have been actually asked, by people of a certain religious persuasion, for permission to take "a half"; the suppliant

having recently taken a pledge which, it was said, could only be broken by a doctor's permission.

The patient was now suffering from hallucinations of vision and hearing, and was in constant dread of being injured by her friends, whom she accused of having already killed her child. The lochia was normal, and there had been no rigors; nor was there any evidence of decomposing clots, pieces of placenta or membrane, suggestive of septic absorption from the parturient canal. Her face, which was flushed, had an anxious expression, and her eyes were suffused; but the pupils were normal. The skin was warm and perspiring, and the tongue was moist, pale, and tremulous. The pulse was soft, full, and rapid; and the tremors of the hands were well marked.

As the patient was unduly excited; and, with difficulty, kept in bed, I injected, hypodermically, a quarter of a grain of muriate of morphia; and, twenty minutes later, a further half grain, after which she became drowsy and soon fell into a sound sleep from which she did not awake until the following morning. She was then somewhat weak, exhausted, and tremulous; but mentally tranquil and sane; and immediately recognised me, although she had no recollection of my visit on the preceding night.

The association of this attack with the puerperal state renders the case peculiarly interesting. I have never since seen a similar case; and, although I have consulted a large number of writers on this subject, I have found no reference to any case of a similar character. It is, therefore, so

far as I have been able to discover, unique. I have met with an occasional case of puerperal insanity; but this is most common in old primiparae, and lacks the lingual and manual tremors so characteristic of delirium tremens, whilst the milk and lochia are generally arrested.

The exposure of the uterine vessels at the placental site, may possibly be regarded as a trauma, rendering this case identical with the "Delirium Nervosum or Traumaticum" of the famous French surgeon, Baron Dupuytren. But although the symptoms are practically indistinguishable, the cases differ in that the latter is merely symptomatic of a sympathetic fever of typhoid character. The previous habitual tipping of the patient was certainly the predisposing cause of this attack. The exciting cause was probably a combination of imperfect nutrition, and of systemic excitement due to parturition.

Another point of considerable interest presented by this case, in view of the differences of opinion already referred to, was its prompt and effective response to the action of morphia; a response which casts grave doubt upon the opinions of those writers who object to its employment in such cases; and to whom I shall refer later.

C A S E VIII.

C.A., aged 34 years, was a Scotsman, married, manager of an extensive business, in good circumstances, and of robust constitution. He had been long accustomed to alcoholic indulgence, and was a source of great anxiety to his wife and relatives. I had repeatedly treated him for alcoholic dyspepsia; and, in the Autumn of 1901, was summoned to attend him during his first - a severe - attack of acute alcoholic poisoning. He had been drinking until the onset of the attack, and still had a craving for spirits. He was garrulous, restless, highly excited, and tortured by hallucinations. His face was flushed, his eyes were suffused, and his skin was warm and moist. The tongue was foul and tremulous. There were anorexia, vomiting, and constipation. The urine was scanty, high-coloured, of acid reaction, sp. gr. 1025, non-albuminous; but deposited urates on standing .

The general management was similar to that already described, in connection with preceding cases, with the addition of a preliminary hot bath. Although a powerful man, and highly excited, he was easily humoured and controlled. Nevertheless, all articles of furniture, capable of being utilised as weapons for the injury of himself or others, were to be removed. The patient was to be encouraged to take abundance of fluid nourishment to sustain his strength; and cayenne pepper was to be freely added to his food in order to subdue the craving for drink, aid digestion, stimulate the appetite, subdue nervous irritability, and induce sleep.

Medicinally:- A purge containing calomel was ordered. To produce sleep, thirty grains of bromide of sodium, with five minims of tincture of capsicum, was to be taken every two hours. On the following morning, I learned that the patient's bowels had acted freely, that his stomach was less irritable, and that he had taken a fair quantity of milk and soda-water; but that he had passed a sleepless night. He was quite conscious, and easily aroused from his imaginary pursuits to take a transient interest in his surroundings. The mixture was continued as before. At night, I found him still awake and apparently uninfluenced by the hypnotic. As he had now taken six drams of bromide of sodium, I resolved to withhold the drug, to nourish him, and await events.

Next morning, as the patient had passed the night without sleep, I renewed his mixture with the addition of fifteen grains of chloral hydrate; but night found him still awake. I again withheld the mixture; ordered that cold- instead of warm - sponging be tried; that iced-cloths be applied to the head, and that he be urged to take nourishment.

Next morning the patient was pallid, perspiring freely, and apparently weaker; but otherwise without change worthy of remark. As the pulse was still moderately strong, I continued his mixture, substituting bromide of potassium for bromide of sodium; but, as night brought no improvement, I resolved to abandon drugs in the meantime and trust to watching and feeding the patient.

Next morning there was no improvement. The abdomen was swollen and tympanitic, and the bowels had been acting somewhat freely. Moreover, the pulse was perceptibly weaker, although a fair quantity of nourishment had been taken. In view of the tendency to diarrhoea, his diet was limited to boiled milk.

At night, I was informed that he had had a convulsive seizure - apparently epileptiform - of short duration; and that diarrhoea was now well established. The stools were of a typhoid character, and suggested the possibility of enteric fever as a complication. The abdomen, as already observed, was swollen and tympanitic; but the absence of pain, tenderness or gurgling on pressure, over the right iliac region, and the course of the temperature negatived the idea.

Nearly five days had now elapsed since the commencement of the attack; and, as the patient was greatly exhausted, I ordered a dram of aromatic spirits of ammonia, with two drams of brandy, to be administered. I then resolved to ask my old friend and tutor, Professor (later, Sir Thomas) McCall Anderson, to see him on the following day. He was greatly interested in this remarkable case; and not a little surprised at the peculiarly typhoid character of the evacuations which were kept for his inspection. Notwithstanding the extreme exhaustion of the patient, he suggested that a hypodermic injection of morphia might be given; and, as I had the preparation in my pocket, but had hesitated to take upon myself the responsibility of employing it, I immediately injected a quarter of a grain of

the muriate; and, twenty minutes later, a similar dose, after which the patient soon fell into a sound sleep of about ten hours duration. He awoke refreshed, but weak, partook of food and again slept for several hours, after which he speedily recovered.

The points of interest illustrated by this case are:-

1. Its protracted duration of five and a half days.
2. The diarrhoea.
3. The epileptiform convulsion.
4. The inefficacy of the hypnotics - bromide of sodium and potassium.
5. The efficacy of morphia.
6. The innocuousness of morphia.

C A S E IX.

C.A., the subject of the preceding case, soon resumed his old habits, in consequence of which, he became restless and slept imperfectly. Thinking that a change of air would restore him, his wife and friends induced him to go to their country residence, about forty miles from Glasgow.

A day or two later, Thursday, 22nd May, 1902, I was called to see him. As he was undoubtedly in the incipient stage of another attack of delirium tremens, I instructed that he be controlled and dieted as on the previous occasion. A calomel

purgative was prescribed; and also a sedative consisting of twenty-five grains of bromide of potassium, with fifteen grains of chloral hydrate and five minims of tincture of capsicum, to be given every second hour;

On the following day there was no improvement; and, on the 24th, I secured the services of a trained nurse. His condition, however, became steadily worse, ordinary hypnotics having no perceptible effect. Moreover, the case became complicated by the supervention of diarrhoea, the evacuations having a typhoid character.

On Tuesday, the 27th, I injected hypodermically a quarter of a grain of muriate of morphia, and twenty minutes later, a further half grain, after which he fell asleep for a short time; but awoke worse than before. On the afternoon of the same day, I received a wire urgently recalling me; and, on arrival, was informed that he had had a convulsive seizure. Unfortunately, this was attributed to the morphia and fear was expressed lest it should be again employed. His previous attack, however, was accompanied by an epileptiform seizure when no morphia had been employed. As there was no means of returning to Glasgow until the following day; and, as the district afforded but little accommodation, I was compelled to accept the proffered hospitality, and remain in the house of the patient until the morrow. I had thus an excellent opportunity of observing the effect of treatment.

The patient was now perfectly delirious, his face was worn

and pallid and his strength was greatly exhausted although he had taken a fair supply of nourishment. The pulsations were 126 in the minute, the respirations were 30, and the temperature was 101.8. I then injected a grain of muriate of morphia in two successive half grain doses, after which he gradually fell into a sound sleep of about ten hours duration. I saw him repeatedly during the night. His pulse became gradually slower; and, as he perspired freely, the pyrexia steadily subsided. He was still sleeping when I left on the following morning; and, thereafter, his recovery was rapid and perfect. Points of interest, illustrated by this case, are:-

1. That this paroxysm, as well as that from which he suffered a few months previously, was of abnormal duration; viz.- six and five and a half days respectively.
2. That diarrhoea supervened as on the previous occasion.
3. That he again had a convulsive seizure.
4. That large doses of bromide of potassium and chloral hydrate failed to produce sleep.
5. That morphia elicited an immediate response.

C A S E X.

J.W., aged 48 years, married, and in business as a draper, was a man of refined disposition and of more than ordinary intelligence; but his family history was not good. His father

had suffered from delirium tremens; and a brother, an artist of some eminence, had had a similar experience. I may mention, incidentally, that two of his sons have since become slaves of drink.

I was requested to attend this patient on 3rd March, 1893. He had been an habitual tippler, and still craved for the drink which his stomach could now scarcely retain. He presented the usual symptoms, - imperfect sleep with horrible dreams, anorexia, vomiting, constipation, and tremors of the tongue and hands. His face was flushed and expressive of anxiety; his speech was thick and his movements were erratic. The pulsations, soft and full, were 80 in the minute; the respirations were 20; and the temperature was 98.7. The urine was scanty, high-coloured, of acid reaction, sp. gr. 1027.

The general management was similar to that of cases already described.

Medicinally.- Purgation was produced by means of a blue-pill, followed by a saline draught and warm drinks.

To produce sleep, a mixture containing thirty grains of bromide of potassium, with fifteen grains of chloral hydrate and five minims of tincture of capsicum, was to be given every second hour. After the third dose the patient slept uneasily for about three hours; but awoke more restless than he was before. On the night of the 4th March, I stopped the drug, six drams of bromide of potassium and three of chloral hydrate having been taken without producing the desired effect.

5th March.- The patient had been strongly delirious during

the night. His pulsations were now 98 in the minute, the respirations were 25, and the temperature was 99'6. As the urine now contained a trace of albumen, which contra-indicated the employment of opium, and as the hypnotic mixture already taken seemed unlikely to produce the desired effect, I ordered twenty-minim doses of hyoscyamus, to be taken every second hour.

6th March.— The patient was now in a state of exhaustion. His pulsations were soft and feeble—116 in the minute, the respirations were 30, and the temperature was 100'3. The urine was scanty, high-coloured, and slightly albuminous. As four drams of tincture of hyoscyamus had been taken within a period of twenty-four hours, without perceptible effect, I abandoned the drug and decided to feed the patient and await events. At noon he fell into a sleep of nine hours duration, about seventy-four hours from the commencement of the attack. He awoke mentally refreshed but feeble, partook of an egg and toast, and again slept for several hours after which he speedily recovered. The pyrexia had now disappeared, and the urine was free from albumen.

The points of special interest presented by this case, are.—

1. The family history.
- 2, The inefficacy of bromide of potassium, chloral hydrate, and tincture of hyoscyamus.
3. The temporary albuminuria.

It is worthy of note that, in the following winter, this patient had an attack of bilateral pneumonia; and that, on the

fourth day of its course, well-marked symptoms of delirium tremens developed. His constitution being greatly reduced by prolonged alcoholic intemperance and imperfect nutrition, he succumbed on the sixth day of the attack.

C A S E XI.

The two cases, which I am now about to record, are demonstrated in the same patient, and present no peculiarity of symptom or of complication; but excellently contrast the effects of treatment by sulphonal, bromide of potassium, and chloral hydrate as employed in the one; and of morphia as employed in the other.

A.H., aged 33 years, was married, and in business as a publican. He was a native of Ireland, of powerful physique and of a very excitable disposition. His business affairs had long been a source of considerable trouble from which he had endeavoured to find relief by frequent indulgence in spirits.

On the 20th September, 1904, I found him garrulous, tremulous, sleepless, without appetite for food, and influenced by visionary hallucinations. Having given instructions as to general management, on the lines already described, I ordered a preliminary purgative.

On the morning of the 21st September, I prescribed

fifteen grains of sulphonal to be taken every second hour. After the second dose the patient slept for three hours; but awoke worse than before. Three additional doses of sulphonal were then taken, but without producing sleep.

22nd September.- I ordered a mixture containing thirty grains of bromide of potassium, with fifteen grains of chloral hydrate, and five minims of tincture of capsicum, to be taken every second hour.

23rd September.- There was still no improvement in the condition of the patient; and, as he had taken six drams of bromide of potassium and three of chloral hydrate without perceptible effect, I decided to abandon drugs and await events. The patient fell asleep at 2 p.m., about sixty-eight hours after the commencement of the paroxysm, and thereafter made a good recovery.

C A S E XII.

On the 1st January, 1905, I was again requested to attend the subject of the preceding record. His condition being apparently similar to that which existed during the previous attack, I considered this an excellent opportunity of again testing the comparative efficacy of morphia in the treatment of this disease. I accordingly administered a purgative; and afterwards injected, hypodermically, a quarter of a grain of morphia, followed twenty minutes later by an additional half-

grain, after which the patient slept for four hours.

On the 2nd January, the injection of a grain of morphia in two successive half-grain doses, with an interval of twenty minutes between each dose, was followed by a sleep of three hours duration.

3rd January.- The patient had been mildly delirious during the preceding night, and was still influenced by hallucinations; but he had taken a fair supply of fluid nourishment, and his pulse though rapid, was good. A grain of morphia was again administered, as before, after which the patient slept for seven hours. He awoke free from pyrexia and hallucinations, but weak; and, after partaking of food, he again slept for several hours. The paroxysm had lasted about forty-eight hours and was followed by speedy recovery.

This patient had a third attack which commenced on the 18th March, 1906; and endured under similar treatment, for about fifty-two hours.

At the earnest solicitation of his wife, and in accordance with his own oft expressed determination, he afterwards disposed of his business; and has not, so far as I am aware, had another attack.

CASE XIII.

B. McG., aged 29 years, was a publican, unmarried, and a native of Ireland. He was tall and of athletic build, but of a nervous temperament, and had been an habitual tippler. I was summoned to attend him on 18th November, 1909. He was then suffering from a slight attack of laryngeal catarrh, which was treated in the usual manner. On the following morning his throat was somewhat relieved. His pulsations were 72 in the minute, his respirations were 18, and the temperature was 98.4. Beyond the fact that he suffered from sleeplessness and a craving for stimulants; and that he was unable to partake of food, there was little to indicate the paroxysm for which I was urgently called to attend him in the evening of the same day. He was now greatly excited and informed me that a great number of rats and mice had suddenly appeared beside his bed, out of which he jumped in a terror-stricken condition. He complained of a sensation of pricking, as of pins and needles, which simultaneously affected the fingers and toes of both sides, but especially those of the left. His pulsations were now 114 in the minute, his respirations were 25, but his temperature was normal. The tongue was moist and slightly tremulous; and the body was in a state of mild perspiration. Having obtained a sample of his urine, I found that it was of the usual high colour, of acid reaction, sp. gr. 1024, and contained a small quantity of albumen but no tube casts.

The general management was similar to that of the preceding cases.

On the morning of the 20th, I found him still sleepless and the subject of visionary hallucinations. The bowels having acted freely, a cup of hot tea containing twenty grains of veronal was ordered to be taken; and to be followed, if necessary, two hours later by an additional dose of fifteen grains. After the second dose he slept for a period of four hours, during which the pricking sensation in his fingers and toes entirely disappeared. At 8 p.m., he was still suffering from hallucinations; and his general condition was but little altered. A dose of fifteen grains of veronal was then given, but without producing sleep.

21st November:- The patient had passed a restless night, but had taken a fair quantity of nourishment. His pulsations were 120 in the minute, his respirations were 27, and his temperature was 99.2. A dose of twenty grains of veronal was then administered, after which he slept for two hours. About 10 p.m. another dose of twenty grains was given without effect. He fell asleep, however, about 8 a.m. on the 22nd, and slept, with slight intervals of wakefulness, during the remainder of the day and part of the following night.

On the 23rd, he was comparatively refreshed, although somewhat nervous; but the hallucinations had disappeared, the urine was free from albumen, and his subsequent recovery was uninterrupted and complete, after an attack of sixty-two hours duration.

This case is of special interest on account of the rarity of the perverted sensation from which the patient suffered from the onset of the attack, until he fell asleep on the following day. I was unable to discover any external cause of this condition, such as injury or undue pressure on the limbs; and, in view of the extensive distribution of the affection, was forced to the conclusion that it was due to temporary irritation of the nerve centres. As this is the only case of delirium tremens in which I have ever seen a similar condition; and, as I have been unable to find any record of a similar case, it may be assumed that it is of rare occurrence; and therefore that it can scarcely be regarded as indicating any part of the nerve centres which is specially susceptible to the protracted irritation of alcohol. I think, however, that it is a point worthy of investigation by those who have opportunity of studying the morbid anatomy of this disease - a privilege rarely experienced by the general practitioner.

This case is also of interest as showing the influence of veronal - one of the new hypnotics - upon the course of the disease.

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S Y M P T O M A T O L O G Y

In the clinical description, and subsequent record of cases, it has been demonstrated not only that an interval of varying duration commonly elapses between the withdrawal or diminution of supply of alcohol and the commencement of an attack of delirium tremens; but also that the symptoms of the affection are remarkably constant, although varying somewhat in degree. A brief reference to this interval, and an analysis of some of the more important symptoms is of considerable interest.

The interval which precedes the paroxysm, and which has been described as a period of incubation, is of varying duration, and may extend over several days. That it is by no means constant has been shown in cases II and VIII (pp. 8 to 11, and 26 to 29), wherein the attack commenced during the actual currency of a debauch.

For a period of two or three days prior to the commencement of the paroxysm, the patient commonly suffers from mental depression, restlessness, debility, and anorexia, with nausea and vomiting chiefly in the morning. There is also more or less complete insomnia; the brief snatches of sleep obtained being disturbed by horrible dreams and succeeded by waking visions. It is an interesting fact that sleepless-

ness invariably precedes a paroxysm of delirium tremens; but that it frequently succeeds delirium arising from other causes. In my subsequent remarks on alcohol as an etiological factor I shall endeavour to show that the above-mentioned interval is not, as many have believed and as some still affirm, an indication that the abstraction of the supply of alcohol is the cause of an attack of delirium tremens; but that it is a natural link between the withdrawal or diminution of supply and the onset of a paroxysm.

I. DELIRIUM.— The delirium, which is a constant symptom of this affection, varies greatly in intensity. With its advent, the sleeplessness, which characterised the preceding interval, now becomes more pronounced; and sleep is rendered impossible by the hallucinations and bustling activity of the patient. Not infrequently, the first noticeable evidence of severe mental disturbance is the fixed gaze of the patient on an imaginary object, or an expression of fear or suspicion depicted on his countenance. As the attack progresses he becomes more garrulous and more powerfully influenced by hallucinations. Commonly, however, towards the termination of the paroxysm, and as the exhaustion which precedes the restorative sleep develops, the delirium assumes a more quiet character, and the patient becomes more easily controlled. At any stage of the affection, the attention of the patient can be momentarily arrested, and even drawn to a particular

subject; but he is quite incapable of concentrating his attention so as to converse rationally and continuously concerning anything. His mind immediately returns to the peculiar hallucinations by which he is afflicted, but which he cannot explain. As the result of professional acquaintanceship with several subjects of delirium tremens, prior to and after the attacks, I have formed the opinion that the violence of the delirium varies with the temperament of the individual; or, in other words, that those of a naturally tranquil disposition are less excited during a proxysm than those of a more excitable temperament. In the former case, the patient may be comparatively quiet, and have but little to say. As he answers the questions put to him, he keeps his eyes fixed on some imaginary object which he earnestly endeavours to pick, or sweep, off his bedclothes; but never, during the course of the attack, does he manifest a violent or ferocious tendency. In the latter case, he may be very garrulous; and may, for a time, pursue a certain notion with great determination. His business affairs demand his immediate attention; but his movements are so erratic, and his power of mental concentration so imperfect, that his incapacity for work is evident. He becomes for the moment terrorised by a spectral hallucination; such as the advent of rats, devils, or other repulsive objects; and with the disappearance, more or less temporary, of his unwelcome visitors, he again resumes his business affairs; or, it may be, some other subject of interest only to himself. In some cases

his excitement becomes very great; but I have met with no uncomplicated case which I have not been personally able to control without the exercise of undue restraint.

I have also observed that the delirium was great in proportion as the temperature was high; the relationship between the two conditions being probably one of cause and effect.

Delirium usually terminates with the restorative sleep; indeed, I have met with no exception to this rule. According to some writers however, in some cases the patient remains for a time the subject of hallucinations or of insanity with melancholic delusions. It is an unnecessary, and almost impossible, task to relate all the mental vagaries of the subjects of delirium tremens; for, as I have already stated, there seems to be no spectral absurdity of imagination of which they may not be the victims.

II. MUSCULAR TREMORS.- The tremulousness of the muscles which, in conjunction with delirium, has given rise to the popular designation of this disease, varies greatly in intensity as well as in the extent of its distribution; and is such as may be seen in a person who is labouring under great mental excitement. In a small percentage of cases, I have been unable to discover any decided tremors; but these cases - which were rare and occurred chiefly in young persons - have an approximate substitute in that characteristic restlessness which inspires

the patient to constantly change his position as if incapable of finding a comfortable spot whereon to rest. As a rule, however, the tremors are well-marked; and are greatly intensified by definitely directed exertion; or by undue excitement such as may result from opposing the inclination of the patient. They are also considerably modified by the constantly spasmodic or jerky movements which characterise these cases; and vary from a slight tremulousness of the tongue and hands to a condition in which the whole of the upper limbs are so affected that the radial pulse can be counted only with great difficulty. They are most marked in confirmed drinkers whose nervous system has been shattered by a prolonged course of tippling; and whose habitual unsteadiness of hand, especially in the early morning, becomes partially tranquillised by the imbibition of a glass of spirits. In this class, particularly, the tremors may be recognised for several days after the subsidence of the paroxysm.

III. THE SKIN IN RELATION TO THE TEMPERATURE.- At the commencement of an attack the face is usually pale - in exceptional cases flushed -; and the cutaneous surface, especially that of the hands and feet, is cool and slightly humid. In some cases it is positively cold; but the "cutis anserina", which precedes the febrile stage of most of the eruptive fevers, is invariably absent. In the preceding illustrative cases it is seen that the temperature at this stage is but slightly above normal. As the paroxysm progresses it gradually rises,

with slight morning remissions until, in some cases, it reaches 100.5, and in exceptional cases 101.8 Fah.. Concurrently with the rising of the temperature, the facial pallor sometimes gives place to flushing, and the perspiration becomes more copious; but in the later stage, with increasing physical exhaustion and the temperature at the maximum, the pallor and anxiety of expression become accentuated although free perspiration continues. During the restorative sleep, which is the natural sequence of the paroxysm, the skin is frequently bathed in sweat, whilst the temperature resumes its normal level. This condition differs from that which prevails in the eruptive fevers, in that the perspiration increases with the temperature; whereas in the latter, the skin remains hot and dry until the acme of the fever.

I have seen it stated that this characteristic sweating is due to the constant and erratic muscular movements of the patient. This is undoubtedly true, to a certain extent, steadily progressive debility contributing to this result; but I think there can be no doubt that the more or less profuse perspiration, and also the facial pallor, are attributable, in great measure, to the mental excitement and dread which characterise the period of delirium. Under normal conditions, muscular activity causes increased blood pressure in the cutaneous capillaries, with heightened colour of the skin; and increases the functional activity of the sudoriferous glands; but in this affection, although there is almost constant

muscular movement, the supply of blood to the surface is reduced, as indicated by the pallor and coolness of the skin. Nevertheless the cutaneous exudation is very free, from which it may be inferred that the increased activity of the sudoriferous glands is, to some extent, the result of psychical influence.

IV. THE CONDITION OF THE EYES.- The eyes may be described as lustreless and expressive of that fear and anxiety under which the patient constantly labours.

Writers on this subject commonly refer to the pupils as being dilated. This condition, which is suggestive of irritation of the sympathetic nerve, is certainly common, especially towards the end of the paroxysm; but, in a considerable percentage of cases, I have been unable to discover any deviation from the normal, unless when contraction has resulted from the employment of opium.

V. THE STATE OF THE PULSE.- Careful observation of the condition of the pulse has led me to the conclusion that softness, such as may be expected to be found in cases of depressed vitality, is its chief characteristic. The pulse rate varies with the condition of the patient, and with the stage of the attack. At the commencement of the paroxysm it is commonly soft and full, the rate varying from 76 to 90 in the minute. It gradually increases, however, *pari passu* with the exhaustion of

the patient until, in uncomplicated cases, it reaches a point varying between 103 and 128, at which time it becomes small, feeble, easily compressible, and occasionally dirotous. During the restorative sleep it rapidly approximates to the normal rate and condition.

In treating of muscular tremors I have indicated that it is sometimes difficult to count the radial pulse. This difficulty can always be overcome by applying to the temporal or carotid arteries, or by direct application to the heart itself. More or less cardiac palpitation is frequently noticeable, although rarely a subject of complaint. This is evidently due, in great measure, to grave nervous disturbance and partly to mechanical pressure on the heart by a distended stomach.

VI. THE RESPIRATION.- The respiration presents no peculiarity worthy of remark. During the early period of depression, audible expiration, as of a person in distress, may sometimes be observed. This may be due to the melancholic tendency of the patient at this period of the attack; but, not improbably, it has a contributory factor in the discomfort arising from flatulent distension of the abdomen, a condition which commonly exists, but of which no complaint may be made. During the subsequent period of excitement, a little irregularity of the breathing - probably in the relationship of cause and effect - is occasionally noticeable; but the breathing has no distinctive quality, and there is no disturbance of the normal ratio between the

pulmonary respirations and the pulsations of the heart.

VII. STATE OF THE TONGUE.- The invariably disordered condition of the digestive system in cases of delirium tremens is clearly reflected in the tongue, which is jerkily protruded, usually distinctly tremulous, and suddenly withdrawn. Its appearance has been variously described by different writers. Dr A. W. Barclay affirms that it is seldom dry or brown. Dr Aitken, on the other hand, states that it is often dry and brown. Most writers, however, are agreed that it is commonly coated with a thick creamy fur.

Careful observation has convinced me that, at the beginning of an attack, it is usually foul and covered with a thick, moist, dirty-white fur; occasionally it is oedematous and indented at the edges. After the liver, stomach, and bowels have been unloaded by a suitable purgative, the coating becomes less marked; and towards the end of the attack the dorsum is somewhat dry, rough, and moderately clean; but rarely, in uncomplicated cases, does it become dry and brown.

VIII. CONDITION OF THE APPETITE.- From a consideration of the foregoing description of the tongue, which is the index of the stomach, it may be inferred that the gastric functions are imperfectly performed. This is due to direct irritation of the gastric mucous membrane and glands by the protracted use of alcohol; and indirectly, to functional disturbance of the liver,

with consequent constipation of the bowels, arising from the same cause. The chief indications of this gastric disturbance are anorexia, occasional vomiting, and flatulence.

The appetite, in cases of delirium tremens, is invariably defective; and, with few exceptions, there is not only no inclination to eat; but there is an absolute distaste for food. The patient can rarely be induced to partake of solid food; but he can usually be persuaded, by a little judicious management, to take a sufficiency of nutritious fluid, such as milk, beef-tea, light soups, etc.,

IX. VOMITING.- Vomiting is an occasional but by no means urgent symptom of this affection. It is due to an irritable condition of the gastric mucous membrane which has resulted from direct alcoholic irritation. The subjects of delirium tremens have, unfortunately, little regard for modifying conditions, such as the partaking of food before spirits; and consequently they give precedence to alcohol in order, as they say, to encourage their appetite: hence the gastric irritation and vomiting.

In the Fourth Annual Report of the Norwood Sanatorium, pp.17 and 18, Dr Hare makes the following remarkable statement.- "If the complete abstinence from alcohol is prolonged, the anorexia not infrequently passes into constant retching and total inability to retain anything on the stomach, even alcohol given in its most tempting form, for instance, iced champagne". In every case with which I have had to deal, regardless of the

patient's age, total abstinence has been imperative; but in no solitary instance have I ever seen the result to which he refers; indeed I have never found any serious difficulty in subduing the gastric irritation and consequently the vomiting.

X. FLATULENCE.- Examination of the abdomen reveals the fact that, with few exceptions, there is a considerable accumulation of flatus in the stomach and bowels. In view of the degree of abdominal distension which frequently exists, it is difficult to believe that the patient does not experience considerable discomfort; and it is certainly surprising that pain is not a more frequent subject of complaint. Probably the absence of complaint is due to the obscuring of the feeling of discomfort by abnormal mental excitement. I have already expressed the opinion that this condition is to some extent responsible for the cardiac palpitation observed in some of these cases.

XI. THIRST.- My experience of these cases differs somewhat from that of Dr Fagge, who says that there is an entire absence of desire for drink. I have found that in many cases there is neither thirst nor desire for stimulants - indeed some patients manifest a perfect loathing of spirits -; but, in about 40 per cent. of my cases, thirst or craving, more or less strong, still existed; and was taken advantage of, as far as possible, to induce the patient to partake of fluid nourishment. This

fact has been demonstrated in cases II, IV, VII, VIII, X and XIII.

XII. CONDITION OF THE BOWELS.- I have met with no exception to the rule that the bowels are constipated at the commencement of an attack; although in rare instances - hereafter mentioned - this condition has been replaced by diarrhoea at a later stage of the affection. This sluggish condition of the bowels is due to a variety of causes, of which the chief is imperfect secretion and flow of bile - the normal lubricant and stimulant of the bowels - into the intestine, as the result of disturbance of the hepatic functions by the alcoholic poison.

Amongst contributory causes may be mentioned perspiration, which has been shown to be a common symptom of this affection. It is a familiar fact that free perspiration induces constipation by reducing, pro tanto, the quantity of fluid thrown into the intestines from the circulation. The contents of the bowels are consequently abnormally dry, and their propulsion is rendered unusually difficult. Again, the appetit^e being defective, food, insufficient in quantity and probably unsuitable in quality, is ingested; and the action of the bowels is thus still further impeded.

The result of these constipating agencies is the imperfect and ineffective peristaltic action of the intestines; the intensifying of the existing digestive derangement; the reabsorption of the waste products of the system from the bowels; and the evacuating of scanty fæces, whose offensiveness indicates

that nature has failed to prevent the occurrence of putrefactive changes within the intestines.

XIII. CONDITION OF THE URINE.- The urine may be generally described as scanty, high-coloured, of acid reaction, of specific gravity varying from 1020 to 1027, and as clear when passed but depositing urates on standing.

Owing to the difficulty of collecting the urine, I have never been able to accurately determine the quantity passed in twenty-four hours; but that it was considerably below the average was beyond doubt. This is to be expected in cases wherein the skin is acting freely; the temperature above normal; and the specific gravity so high as to indicate the presence of an excess of solids. The severe nervous disturbance, from which the patient suffers, might be regarded as a counteracting influence tending to increase the flow; and, but for which, the quantity passed might be still further reduced. The presence of urates, which are commonly deposited after standing, is strongly suggestive of disturbance of the functions of the liver. Albumen occurred in a small percentage of cases; but invariably disappeared with the critical sleep.

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C O M P L I C A T I O N S

Several complications of considerable importance have occurred in connection with the cases which I have attended; and to some of these a passing reference may not be out of place. The most important are.- albuminuria, epileptiform convulsions, diarrhoea, peritonitis, perverted sensation, opisthotonos.

I. ALBUMINURIA,- Dr Fagge says that uraemic coma is very apt to occur as a complication of delirium tremens. Although this condition has not complicated any of my cases; I have met with several instances in which the renal functions were disturbed. Of the fifty-eight cases attended, six - or at the rate of 10.34 per cent. - contained a trace of albumen; but in no case were tube-casts discovered. Viewed from the therapeutical standpoint this is of considerable clinical importance; but, in view of the fact that in four out of the six cases, it developed during the paroxysm, that in none of the cases were tube-casts discovered; and that, in every case, the cessation of the albuminuria was coincident with that of the paroxysm, I am inclined to regard it as due to transient congestion of the kidneys dependant upon severe disturbance of the nervous system.

It has been suggested by Dr Hare (Fourth Annual Report of the Norwood Sanatorium for year ending 31st December, 1909, p.8) that this is a toxic albuminuria due to direct injury of the renal epithelium by alcohol in its passage from the blood. This proposition seems reasonable; but, if true, it is difficult

to understand why the albumen is not invariably present at the commencement of the attack, when it may be assumed that there is still a considerable quantity of the poison circulating in the blood; and also why the albumen disappears with the paroxysm, or, at latest, during the critical or restorative sleep by which it is immediately succeeded. Again, if the injured renal epithelium is directly responsible for the albuminuria, it may be assumed that the disappearance of the latter will be coincident with, and not until, the restoration of the former; and, as this process of repair is scarcely likely to be suddenly - and, in my experience, invariably - completed at so early a date as that on which the attack terminates, one naturally expects to find albumen for at least a day or two after the restorative sleep. This subject is, I think, worthy of careful investigation by those who have ample opportunity of pursuing it.

II. EPILEPTIFORM CONVULSIONS.- This complication occurred in only three - or at the rate of 5.17 per cent. - of my cases. Two of the seizures were experienced by the same individual, a male (see cases VIII and IX), during consecutive attacks of delirium tremens; the third occurred in a female. I could find nothing definite to account for these seizures; but it is, perhaps, worthy of remark that both individuals were of a strongly neurotic temperament; that in all three cases diarrhoea - a most uncommon complication of this affection - preceded the seizure; and that the paroxysm of delirium tremens was in every case unusually prolonged and severe. Moreover,

the mother of the female patient, as well as the brother with whom she then lived, had both suffered from delirium tremens; and the patient herself ultimately became an inmate of a lunatic asylum.

III. DIARRHOEA.- The bowels are generally in a state of constipation. To this rule I have met with only three exceptions; namely, those above-mentioned, in which diarrhoea complicated two consecutive attacks in the same individual; and was followed in all three cases by a convulsive seizure. This points to severe nervous disturbance as the probable cause of the diarrhoea.

IV. PERITONITIS.- This condition occurred in only one case (see pp. 14 and 15); and was responsible for a fatal result within twelve hours.

V. PERVERTED SENSATION.- This nervous complication is worthy of mention on account of its rarity in connection with delirium tremens. It has been described in connection with case XIII (see remarks thereon, p. 39). Beyond the fact that it was a source of considerable discomfort to the patient it produced no appreciable effect upon the course or duration of the disease.

A paroxysm of opisthotonos, of considerable interest, occurred in one case (see remarks thereon, pp. 6 and 8). It was, however, of no serious clinical importance.

DURATION AND EVENT.

The duration of the paroxysms, as indicated in the preceding illustrative cases, is variable; and, although not modified to any appreciable extent by bromide of potassium and chloral hydrate - the hypnotics commonly advocated in connection with this affection -; nor by any of the more modern hypnotics which I have had opportunity of testing, is considerably shortened by morphia, hypodermically employed. The following table shows, approximately, the average duration of the paroxysms under different methods of treatment.-

Table I.

Treatment Adopted	Cases No. of	Duration of Paroxysms Expressed in Hours	
		Aggregate	Average
Rational	5	340	68
Bromides, chloral, and other hypnotics	31	2,161	69.70
Morphia	22	949	43.13
Total	58	3,450	59.48

As the services of the physician are frequently not invoked until after the paroxysm has begun, he has to depend for his information upon attendants whose power of observation is frequently imperfect, or who may have given but little attention to details; and who are therefore uncertain as to the exact time at which the attack commenced. It is, therefore,

obvious that the average duration of the paroxysms, as shown in the accompanying table, is only approximately correct. The end of the paroxysm presents no difficulty, as it synchronizes with the commencement of the restorative sleep.

The treatment, to which I have applied the term "Rational", consists in the employment of all means whereby the strength of the patient may be sustained, and all obstacles to sleep removed; but without attempting to enforce sleep by the aid of hypnotics (see Case III).

The facts contained in the foregoing table may lead to the erroneous impression that cases treated by means of the ordinary hypnotics are consequently of longer duration than those treated on purely rational lines; but it is to be noted that some of the former - notably Cases VIII and IX - were of abnormal severity; and that, but for these, which would probably have continued for an unusual time in defiance of any form of treatment that might have been adopted, the average duration of the paroxysms would have been somewhat shorter than that of cases treated on rational lines. It is also to be remembered that an accurate comparison can only be based on the treatment of cases which are approximately identical, both as regards the constitution of the patient and the severity of the attack. It is for this reason that I have taken advantage of consecutive attacks in the same patient, in order to test the relative merits of different methods of treatment (see Cases II and III, also XI and XII).

As numerous opinions - unaccompanied by any details of practical results - have been expressed on this subject, I have contrasted the actual results of treatment by means of morphia with those obtained by means of other hypnotics, in order to emphasise the efficacy of the former and the comparative inefficacy of the latter; and, on account of the extent to which the duration of the paroxysm is affected by treatment, I have considered it expedient to insert the foregoing table in this section.

Drs Fagge and Pys-Smith (Text-Book of the Principles and Practice of Medicine, Third Edition, 1891, Vol.i, p.792) say.- "The disease almost always goes on for two and a half days without showing any tendency to subside, and then between the sixtieth and seventy-second hours it comes to an end". ----- "In some cases, particularly in those who have previously been in good health, and in whom the attack has been the direct result of a debauch, the attack terminates earlier - perhaps at the end of twenty-four hours". They also quote Dr Ware as having once known it to extend to nearly six entire days.

Dr Aitken gives the limit of duration as "seven days".

I have, personally, seen only one case in which the duration of the attack was so short as that mentioned by Dr Fagge, namely, twenty-four hours; the opposite extreme is seen in Cases VIII and IX, wherein the paroxysms were respectively of five and a half and six days duration.

The termination of these cases is usually favourable; and

is succeeded by profound sleep, which continues, with slight waking intervals, throughout the greater part of the next twenty-four hours. The patient now perspires freely; breathes tranquilly and deeply; and ultimately awakes somewhat exhausted, but intellectually clear and free from hallucinations and pyrexia, and with pulsations reduced in frequency. Convalescence is now rapid and apparently perfect. There are exceptional cases, however, in which the result is not so favourable. In one case, sleep could not be induced; and the patient passed into a condition of 'coma vigil'. with contracted pupils and low muttering delirium; death ultimately resulting from prolonged coma.

Out of the fifty-eight cases attended, four ended fatally. The particulars are as follow.-

Table II.

Number of Cases	Cause of Death	Age	Sex
1	Peritonitis	35	Male
1	Coma	37	"
2 {	Pneumonia	49	"
	"	36	"

The average mortality was at the rate of 6.89 per cent..

The fact that no females are included, is not of much significance in view of the relatively smaller number of their sex affected by the disease. It is interesting to note,

however, that three - or 75 per cent. - of the deaths occurred during the fourth decade of existence; and that one - or 25 per cent. - occurred in the latter part of the fifth. This subject is of considerable interest in view of the discrepancy in the statistics of various writers concerning the rate of mortality in connection with this disease. This discrepancy is well illustrated in the following quotation.-

Dr Aitken (Science and Practice of Medicine, 1868, Vol.1, p.838) says.- "It is hardly determined what is the proportion of recoveries to deaths; but unquestionably ' three persons out of four 'do well' ---- "Calmsil states the rate of mortality at '5 per cent'. , Bougard at '19 per cent'." ---- "The greatest mortality is between the ages of twenty-five and forty" - a statement which agrees with my experience as recorded above.

Reference to the cases which I have described makes it abundantly evident that the progressive and extreme exhaustion which characterises the later stage of the disease, as well as the convulsions by which it is occasionally complicated, may be responsible for a fatal result.

I have seen it stated that some patients, after profound and prolonged sleep, awake in a condition of prostration or delirium, which may end in death. In other cases, the acute symptoms are said to subside; but the mental aberration continues. The fact that I have not met with any of these cases, leads me to infer that they are comparatively rare.

So frequently are these patients lost to the private

practitioner who has attended them, that, in many cases, he has no opportunity of observing their future career. It does not follow, however, that they have abandoned their potations; and, as the predisposing causes are still in operation, it is beyond doubt that a continuance of the chief exciting factor is commonly followed by subsequent attacks. The subject of delirium tremens usually recovers from a first and even a second attack. Some patients pass through several with apparent impunity - the ability to withstand the attacks evidently depending upon the strength of the patient and upon the absence of complications.

The interval, which elapses between the attacks, necessarily depends upon the period, and degree, of abstention from alcohol. The shortest interval, that I have ever known to intervene between two successive attacks, is sixteen days (see cases III and IV). A patient, whom I recently attended, was said, by his wife, to have just recovered from an attack about three weeks previously. So brief an interval proves conclusively the continued existence of the predisposing causes which were in operation during the first attack; and, as the first is probably never induced in so short a time and with so little apparent cause, we may regard the first as predisposing to a second.

It is without doubt that repeated attacks reduce the will-power of the patient, and gradually induce a condition of fatuity and even of insanity. This fact is clearly illustrated in the following cases.-

A man, whose family I have professionally attended during

the past twenty years, was, until a few years ago, a prosperous city merchant, whose devotion to business was such that he could scarcely be persuaded to leave his office during business hours. He joined the Masonic Order of which he became a prominent member, and was ultimately promoted to the Chair. His excellent business capacity, and a somewhat generous disposition, caused him to be much sought after and flattered. He was not proof against the blandishments of some of his new friends, who found it frequently necessary, or convenient, to seek his advice and assistance during business hours. This was the beginning of the end. Reluctantly, at first, but gradually and for brief periods, he left his office to visit a neighbouring private bar with his friends. His absences became more frequent and prolonged, until finally his business was openly neglected. Being of an excitable disposition, he became an easy prey to alcoholic influence, with the result that he suffered from repeated attacks of delirium tremens. He became mentally weaker with each successive attack, until loss of memory, motor, and other evidences of nervous derangement gradually developed. For a time he suffered from 'diplopia binocularis', which considerably alarmed him, but did not cure him of the desire for drink. Ultimately, he developed a homicidal tendency, and was removed to a lunatic asylum. The business, of which he had been so proud, gradually declined in the absence of his personality and guiding influence; and his family, who at one time lived in affluence, are now struggling for existence.

A seamstress, who had previously appeared to be highly respectable, no sooner recovered from an attack of delirium tremens than she recommenced her potations; and, abandoning all pretensions to respectability, conducted herself in a most debased manner until insanity developed, and resulted in her removal to a lunatic asylum. Her family history was very bad; her mother and her brother, both of whom I knew and attended, having suffered from delirium tremens.

A physician who had been a confirmed tippler for many years before he sought my assistance, obstinately refused to discontinue drinking until he had a slight apoplectic seizure. Fear then compelled him to abstain; but, a few months later, he had another seizure which was followed by cerebral softening from which he subsequently died.

Safety can, therefore, only be found in total abstinence from alcohol. During convalescence the patient should be encouraged to partake of nutritious diet - tonics if necessary -; to take plenty of out-door exercise, and to abandon his convivial friends as well as his potations. Rarely, however, does he give serious attention to such advice. In the majority of cases, he promises well; but either forgets the advice received, or lacks the strength of will to follow it. He therefore resumes his potations, and prepares himself for another paroxysm of the disease.

ETIOLOGY.

This subject is particularly interesting on account of the differences of opinion to which it has given rise, and upon which differences of treatment essentially depend. It is not my intention to consider those remote etiological factors which may be, in certain cases, regarded as more or less responsible for the primary acquiring of the alcoholic habit - such as public responsibility for the existence, and consequent attractions, of public houses; also morbid, reproductive, and other conditions which cause considerable mental distress, such as cancer, pregnancy, the menopause, etc.; nor yet those conditions, such as domestic influence, by which the young may be educated or the adult worried and grieved; but rather to treat of those more direct factors, concerning which fairly reliable information may be obtained at the bedside - such as heredity, age, sex, race, occupation, and alcohol.

I. HEREDITY,- I am strongly of the opinion that heredity is a factor in the causation of acute alcoholic poisoning. This disease is recognised to be a form of neurosis (see Fagge and Pye-Smith, p.791); and has been described by the older writers as "originating from the abuse of alcoholic stimulants by those of a nervous and irritable temperament". That a 'nervous and irritable temperament' may be transmitted, is clearly proven in cases of insanity. According to Dr Finlayson (Clinical Manual, 1886, p.68), "not unfrequently the patient

seems to inherit an unstable nervous system, predisposing to all sorts of nervous disturbance, rather than leading to any one form of disease".

Drs Fagge and Pye-Smith (Text-Book of the Principles and Practice of Medicine, 1891, Vol.1, p.798) say.- "There is no doubt that preclivity to intemperance is capable of hereditary transmission. This tendency is by some writers regarded as itself a neurosis, to which they give the name suggested by Reesch, "Oinomania".

The fact that many inveterate drunkards never suffer from delirium tremens; whilst others, who drink considerably less in quantity and for a much shorter period, become subjects of repeated attacks of the disease, strongly suggests the existence of a predisposing peculiarity of the nervous system. It is not always possible to obtain an accurate family history, owing to the natural desire to conceal family defects; but in no less than four - or at the rate of 10 per cent. - of my patients, one or other parent had admittedly suffered from delirium tremens; and in twelve - or at the rate of 30 per cent. - of the remainder, parental abuse of alcohol was admitted. That this large percentage would have been much increased by an accurate and complete family history, is highly probable. In this connection, Case X (pp.31 and 32) is of more than ordinary interest. The father, as well as a brother of the patient, had suffered from delirium tremens, and two of his sons have since become the slaves of drink. These facts do not prove

that delirium tremens is hereditary; but they certainly suggest the hereditary transmission of a neurosis which is responsible for, and is represented by, a proclivity to that intemperance which constitutes the essential predisposing, as well as the chief exciting, factor in the production of acute alcoholic poisoning.

My limited experience does not justify me in expressing a positive opinion concerning the influence of heredity on the prognosis; but it may be worthy of note that the subject of Case X, aforementioned as having had a bad family history, succumbed to an attack of pneumonia, complicated with delirium tremens (pp.33 and 34); and that another, a female, having a bad history by the maternal side, became ultimately insane.

II. AGE.- A large percentage of my cases occurred between the ages of thirty and forty-five years. This does not, however, justify the belief that age plays an important part in the causation of this disease. It merely suggests either that the process of alcoholic erethism, which is responsible for exhaustion of the nerve centres, has commenced at different periods in the lives of its victims; or that certain nerve centres possess greater power than others of resisting the depressing influence of the irritant.

III. SEX.- The number of males who suffer from delirium tremens is much greater than that of females. Dr Aitken, quoting

from a return of admissions and deaths from delirium tremens and ebrietas in the General Hospital in Calcutta, from 1848 to 1852; and another of admissions and deaths in Medical College Hospital during 1851, 1852 and 1853, states that "Delirium tremens occurs in men and women in the proportion of twenty-five of the former to one of the latter; but that this difference is due to difference of habits rather than of sex".

An analysis of my cases shows a much larger proportion of females. Out of forty patients, thirty-five, or 87.5 per cent., were males; and five, or 12.5 per cent., were females. This fact cannot, however, be construed as evidence of greater constitutional susceptibility on the part of males; but is probably attributable to the fact that males are more influenced than females, by environment and business associations, to acquire habits of intemperance.

The severity of some of the female cases which have come under my care, even when the quantity of alcohol imbibed has been comparatively small, leads me to infer that the female constitution is the more susceptible. This view is supported by Dr Fagge - Vol.I, p.798 -, who states, concerning the action of alcohol upon the nervous system that "Women in particular show little power of resisting its evil effects; perhaps because those who are intemperate commonly pass all their time indoors". That indoor life is to some extent responsible for female susceptibility to the influence of alcohol is, I think, probable; but the fact that some of my

female patients, who suffered severely, led the out-door lives of hawkers, suggests that something more than mere environment - possibly a peculiarity of nerve tissue - is responsible for female susceptibility.

IV. RACE.- As my observations have been drawn for the most part from patients of Irish and Scottish birth or extraction, my experience of foreigners is, perhaps, too limited to admit of a confident expression of opinion concerning the influence of race in the causation of this disease. But that race is an important etiological factor is strongly suggested by the following statement, in which forty separate patients - representative of fifty-eight cases which I have attended-are arranged according to their nationality.

Table III.

Nationality	Cases	Percentage
Irish	19	47.5
Scottish (Highland)	5	12.5
" (Lowland)	14	35.0
English	2	5.0
Total	40	100.0

This statement clearly reveals the great predominance of the Irish element; and, if it be taken in conjunction with that of the Scottish-Highland, which is perhaps justifiable on account of their common Celtic origin, the proportion is

increased to 60 per cent. of the whole. This preponderance of the Celtic element is still further accentuated when considered in relation to the comparative population; but concerning this subject it is difficult, if not impossible, to obtain accurate details.

The analysis of the Census of Glasgow, for 1911, is not yet available; but that of 1901 reveals the fact that, out of a total population of 761,709, the number of people of Irish nativity resident in Glasgow was 67,612 - or at the rate of 8.87 of the total population. This information is obviously defective for the purpose of comparison; as the number of residents of Irish parentage, and therefore essentially of Irish origin, although not actually born in Ireland, must have been very great. As the Census provides no further information on this point; and makes no distinction between the Scottish people of Highland and Lowland origin respectively; there is no available guide to the precise proportion of the Celtic element of the population. The great predominance of the Celtic element is, however, beyond doubt; and is probably due to the naturally excitable and sanguine temperament of the Irish people, whose passions are wildly excited under the influence of drink; and who, in their zeal, love, hate and folly, constitute, as it were, a commanding and imperishable passion-flower.

Montesquieu is, if I remember aright, responsible for the statement that drunkenness increases with the degree of latitude

from the equator to the poles. Moreover, it is well known that the quantity of spirits requisite to seriously disturb the mental equilibrium of the Indian, will have little appreciable effect upon the comparatively frozen circulation of the Esquimau.

V. OCCUPATION. Prolonged mental anxiety, such as may result from the worry of business, gambling, speculating, etc., renders certain individuals of a nervous or irritable disposition, a comparatively easy prey to delirium tremens; and to the extent that occupations are responsible for such mental disturbance they may be regarded as predisposing causes. I do not refer to those ordinary occupations, such as that of the tailor, shoemaker, cabman, etc., whose environment and associations too frequently induce that habit of drinking which ultimately results in chronic alcoholism; but to such as the struggling dealer or shop-keeper, the magnitude of whose responsibilities is inversely as his ability to meet them; or it may be to the anxious publican, whose constant dread of detection in what he regards as a trivial, but illegal act, may lead to the withdrawal of his licence. The following table will illustrate my meaning.-

Table IV.

Occupations	Number	Percentage
Dealers and Hawkers, males	6	15.0
" " females	3	7.5
Publicans	3	7.5
" , Assistants of	4	10.0
Shep-keepers	4	10.0
Ledging-house keepers	3	7.5
Commercial travellers	3	7.5
Clerks	2	5.0
Labourers	2	5.0
Mechanics	2	5.0
Actor	1	2.5
Artist	1	2.5
Business manager	1	2.5
Detective	1	2.5
House-wife	1	2.5
Naval Officer	1	2.5
Physician	1	2.5
Seamstress	1	2.5
Total	40	100.0

A brief study of the foregoing table reveals the fact that the occupations, which contribute the largest number of victims, are those which create considerable mental strain and anxiety. Some patients distinctly attribute their condition to the worry of business. I fear, however, that in some cases this is simply an excuse for indulgence in a habit which is more or less agreeable to the victim. I can recall one individual who inherited an extensive business of long standing; and who, in response to my urgent request to abstain from intoxicants, informed me that it was quite impossible to successfully continue his business unless he drank with his customers. This, he said, was the only way in which he could obtain orders. But, although he continued

to drink, his business steadily declined; and ultimately it became my painful duty to find a home for him in the poor-house.

VI. ALCOHOL.- Alcohol, gradually introduced into the system by a protracted course of intemperance, is, however, the essential predisposing cause of this disease; and, moreover, occupies the anomalous position of being also its chief exciting factor. According to Dr Barclay and W. Howard, Esq. (Helmes and Hulke's System of Surgery, 1883, Vol.1, p.210), "It is to be remembered that the disorder is not brought about by a first debauch; that a necessary element in its causation is the habit of dissipation.

A protracted course of intemperance has, without a single exception, been the precedent of all cases that I have attended; as well as of several which were immediately removed for treatment, but of which I have preserved no detailed record.

Prior to the middle of last century, it was generally believed that this disease had for its predisposing cause the protracted abuse, and for its exciting cause the withdrawal or diminution of the supply, of alcoholic stimulants; and that, therefore, the administration of alcohol constituted the rational treatment of the disease. The truth of the first part of this proposition has been abundantly proven in my experience; but that withdrawal or diminution of the supply of stimulants is the exciting cause is clearly negatived by Cases

II and VIII (pp.11 and 26); wherein the attack commenced during the actual currency of a debauch.

It has also been demonstrated (Cases V and VII, pp.19 and 25) that the premonitory symptoms of an attack may follow immediately upon great systemic excitement; and before any effect could possibly have resulted from the abstraction of stimulants. In this connection it is interesting to note that Dr Roberts (Theory and Practice of Medicine, 1909) mentions as an etiological factor,- "Suddenly cutting off the supply from a person accustomed to excessive indulgence: especially if old and debilitated." Drs Fagge and Pye-Smith (Principles and Practice of Medicine, Vol.I, 1891, pp.791-2) , after referring to the old-time belief, say- "The experience of those who have the management of prisons and other institutions where abstinence is enforced, has demonstrated that this does not in itself bring on an attack, even in the most intemperate".

The fact that, in all my cases, the protracted abuse of alcohol has been the invariable precedent of the recent debauch, or of the systemic excitement, which may be regarded as the immediate exciting cause of an attack, leads me to infer that the neurosis, which is responsible for symptoms and prognosis so uniform as those which have been demonstrated in the cases described, is the toxic result of chronic alcoholic erethism of the nerve centres, through the medium of the circulation. But, on the other hand, to assert that the removal or diminution of the supply of the irritant is responsible for the morbid

attack - the explosion of nerve force - is, in my opinion, as unreasonable as to affirm that the removal of an ignited torch from a barrel of gunpowder will create an explosion thereof; or that the recognised rational treatment of all morbid conditions - the removal of the cause - is erroneous. Analogically, too, the effect of the hypodermic introduction of morphia, in such cases, is clearly seen to be proportional to the quantity introduced into the system; and that the withdrawal of the supply never intensifies the effect.

The idea that withdrawal, or diminution, of the quantity of the excitant, is responsible for an attack which does not develop until some time after the abstraction or reduction of supply, is probably due to the fact that the nervous system has already become, as it were, saturated with the poison; or that a certain degree of nerve - irritation has been produced; and that, beyond that point, an equal effect is produced upon the patient by gradually diminishing quantities; an effect which compels him to withdraw gradually from the evident cause of these systemic disturbances - gastric, nervous, and muscular - which really represent the premonitory symptoms of an attack. Thus, a certain point in the toxic process having been reached, the patient becomes conscious that increasingly smaller doses of stimulants create systemic disturbance; and is compelled, by the effect produced, to gradually reduce the quantity taken until more or less complete abstinence is produced. The interval which elapses between the abstraction

or diminution of the supply of alcohol and the commencement of an attack of delirium tremens may therefore be regarded as a natural link between the two events; indeed, it indicates the existence of the requisite predisposing constitutional condition on the one hand; and constitutes a premonitory symptom of the actual attack on the other. If this be the true explanation of the belief that abstraction or diminution of supply of alcohol is the cause of an attack of delirium tremens; it may be assumed that the mere withdrawal of supply is not responsible for an attack; but that the attack had actually commenced before the supply has been withdrawn.

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D I A G N O S I S.

The previous history of prolonged abuse of alcohol, and the principal symptoms and course of this disease, are so characteristic as to render its diagnosis comparatively easy. As a rule the history is easily obtainable - the patient, or his friends, or both, readily affording the requisite information. In exceptional cases it may not be obtainable; or there may, conceivably, be a desire to conceal the tippling proclivity of the patient; or, perhaps, ignorance of the extent to which he has indulged in the convivial glass. In these cases, some guidance may be obtained from a knowledge of the degree of temptation to which he has been exposed in the pursuit of his business, or in his social relationships. If, in addition, there is a history of anorexia with, it may be, vomiting in the morning; and especially if associated with extreme tenderness of the calves on deep pressure - indicative of the existence of peripheral neuritis - there is strong presumptive evidence of previous prolonged intemperance.

Having ascertained the existence of the principal predisposing factor, the diagnosis is rendered easy by the recognition of the more important and prominent symptoms in the order of their development; namely.- digestive derangement; restlessness and insomnia; the peculiar delirium; the tremulous and spasmodic movements of the muscles; the steadily progressive debility and depression of the vital powers, with their causative conditions and indicative symptoms - the

principal of which have been depicted in the clinical description (pp. 3 to 8), and explained or enlarged upon in the subsequent analysis of symptoms (pp. 40 to 52).

There are, however, several diseases with which delirium tremens may be confused, and of which the following are the more important.-

I. MENINGITIS.- This disease resembles delirium tremens in that it may be due to intemperance, that there is delirium, restlessness, insomnia, pyrexia, and digestive derangement with constipation.

It differs from delirium tremens in that it is commonly introduced by a rigor; the delirium is usually of a more violent character, the skin hot and dry, the pulse hard, and the temperature higher - perhaps 104°0 on the third day. There are also severe headache, aggravated at intervals, contracted pupils, intolerance of light and sound, immediate and persistent vomiting of food, more marked thirst, and in the later stage, there may be evidence of paralysis.

II. PLUMBISM.- This condition, which is of common occurrence amongst workers in lead, produces a form of delirium with tremors, sleeplessness, constipation, and, in some cases peripheral neuritis. It differs, however, from acute alcoholic poisoning in the following important respects.-

1. The previous history is not one of prolonged intemperance; but of exposure to the influence of lead; as in the

case of painters, plumbers, etc.; or of those who have been in the habit of drinking water or other fluids which have been exposed to the influence of leaden cisterns, pipes, or vessels.

2. The delirium is chiefly at night; whereas, in cases of acute alcoholic poisoning, it is continuous both day and night.

3. The tremors resemble those caused by mercurialism; and, although affecting the arms, hands, lips and angle of the mouth, rarely affect the tongue.

4. There is a single wavy line of dark specks - the characteristic blue line - in the tissue of the gums around the teeth; and the patient has commonly suffered from colic and wrist-drop, with wasting of the muscles.

There are other minor points of difference, but the preceding are perfectly distinctive.

III. MERCURIALISM.- It is difficult to realise that this disease may be mistaken for delirium tremens; but that such is the case has been shown by Anstie (Lancet, 1872, I, p.734), who mentions the case of a man supposed to have died of delirium tremens, until it was afterwards discovered that he had been inhaling the fumes of acid nitrate of mercury in the pursuit of his trade.

This affection resembles delirium tremens in that it produces tremors, delirium, and sleeplessness; but differs in the following sufficiently distinctive respects.-

1. The previous history is one of protracted inhalation of mercurial fumes, or of absorption of the oxides of mercury -

as in the case of quicksilver miners, gilders, and others.

2. The tremors are peculiar in that they are accompanied by numbness or tingling, and loss of muscular control; and that they commence in the upper-limbs, and gradually, and with increasing severity, involve all the voluntary muscles of the body, with the exception of those of the eyeballs. They cease, however, during sleep, or when the patient is in the recumbent posture, except in the later stage of the affection, at which period there may also be headache and delirium. In severe cases the tremors may be accompanied by salivation, ulceration of the gums, and loosening of the teeth.

In delirium tremens, on the other hand, the tremors appear simultaneously in the parts affected - chiefly the hands, arms, and tongue -, and are unaccompanied by paresis, salivation, ulceration of the gums, loosening of the teeth or headache; moreover, the delirium appears early, and the course of the disease is short.

3. Sleeplessness succeeds the tremors of mercurialism; but accompanies those of delirium tremens.

IV. GENERAL PARALYSIS OF THE INSANE,- This disease resembles delirium tremens in that it causes mental derangement and tremors, and that alcohol is frequently a contributory cause; but it differs therefrom in the following important respects.-

1. Abuse of alcohol does not, in itself, create this disease. It is supposed to be due to a combination of causes;

such as sexual excesses, hard work, great mental excitement, and the abuse of alcohol. X

2. The mental derangement develops gradually during several weeks or months; and is commonly accompanied by impairment of memory, indecency of conduct - regardless of consequences -, and indifference to personal appearance.

3. The speech becomes indistinct or hesitating; and the protruded tongue is not only tremulous, but has an uncontrollable oscillating movement.

4. The pupils are commonly contracted, unequal, and sluggish.

5. There is progressive paresis; in most cases, convulsions; and, later, dementia and paralysis which terminate fatally in from one to two and a half years.

Delirium tremens, on the other hand, has the abuse of alcohol for its essential cause; the delirium develops rapidly without previous impairment of memory, etc.; the speech is unaffected; the tongue is tremulous but not oscillating; the pupils are equal and uncontracted; there is not paresis or general paralysis; and the attack runs its course, and usually terminates favourably, in a few days.

V. CHRONIC ALCOHOLISM.- This disease resembles delirium tremens in that it is due to the influence of alcohol; that it produces mental derangement, a tremulous condition of the limbs and tongue, disturbed sleep, and digestive derangement; but it differs therefrom in the following respects.-

1. Morning nausea or vomiting is of regular occurrence, and diarrhoea is frequent. The former sometimes occurs in delirium tremens; the latter very rarely.

2. The mental derangement is gradually and very slowly progressive during a long period; and commonly terminates in melancholia or mania.. It is totally different from that of delirium tremens; in which the characteristic hallucinations and active delirium develop, run their entire course, and terminate, as a rule favourably, in a few days.

3. The tremors, which are most marked in the morning, are often subordinate to the will, and are temporarily removed by a morning dram. In delirium tremens they are uncontrollable, continuous day and night, and unaffected by the imbibition of alcohol.

4. There are vertigo, headache, and sometimes pains in the back and limbs; The eyes are red and suffused; and the cheeks and nose are reddened by numerous stigmata or by a condition of 'acne rosacea' - conditions not usually found in subjects of delirium tremens.

VI. DELIRIUM EBRIOSUM.- This condition resembles delirium tremens in that it is due to alcoholic intoxication, and that it produces mental and gastric derangement; but differs from it in that it is the result of a single fit of intoxication - in which the alcohol acts as a direct poison -, or of a brief course of intemperance, during which the patient drinks inordinately, until loathing of alcohol, and a fit of vomiting, bring

about his recovery. Moreover, during the paroxysm, the patient's conduct is frequently indecorous, violent, and even homicidal; conditions rarely seen in cases of delirium tremens.

VII. DELIRIUM NERVOSUM OR TRAUMATICUM,- This disease was thus designated by the famous French surgeon, Baron Dupuytren, and has been regarded by some as identical with delirium tremens; but, as the name suggests, it occurs in nervous debilitated subjects as the result of injuries; such as fractures, wounds, or burns. It certainly occurs in persons of intemperate habits; but the exciting cause is not alcohol; but as already indicated- bodily injury: hence its occasional occurrence in hospitals.

VIII. MANIA TRANSITORIA.- This condition of transient madness may have alcohol for its exciting cause; but it differs from delirium tremens in the following particulars.-

1. Alcohol is not essential to its causation.
2. The mental derangement is of the most acute character.
3. The paroxysm commences suddenly, and without warning, and passes off in from a few hours to a day or two.
4. It most frequently occurs in persons of "insane temperament", who may have previously suffered from sunstroke or from injury of the head.

IX. ACUTE MANIA.- This disease also resembles delirium tremens in that it may be due to the influence of alcohol; and that there may be hallucinations of vision and hearing, unfounded

dread, insomnia, restlessness, anorexia, constipation, lack of power to concentrate energy, and progressive debility; but it differs from delirium tremens in the following respects.-

1. Alcohol is not an essential factor in its causation.
2. The characteristic tremors are absent.
3. The temperature is normal throughout.
4. A preliminary period of melancholic depression, lasting from a few weeks to several months, is suddenly succeeded by one of maniacal excitement which lasts for a period of four or five months, with intervals of apparent improvement. The maniacal symptoms disappear slowly; and are succeeded by a protracted period of mental exhaustion and depression which frequently ends in permanent imbecility, with a tendency to recurring attacks of insanity.

Delirium tremens runs its whole average course within three days, and terminates in sleep from which recovery is usually rapid and perfect.

X. ACUTE DELIRIOUS MANIA.- It is unnecessary to detail the points of discrimination between acute delirious mania and delirium tremens; as the history, course, duration, and event are quite as distinctive as those of acute mania; the chief difference being a condition of prostration - somewhat like that of enteric fever -, with slight elevation of temperature during the delirious stage of 'acute delirious mania'; and more decided loss of self-control in 'acute mania'.

XI. TYPHUS.- This disease is associated with delirium and tremors; but it is easily distinguished from delirium tremens by the probable history of infection; the flushed cheeks; the injected eyes; the hot skin; the dry, brown, tongue, and lips covered with sordes; the high temperature and its definite course; the typical eruption; the late development of the delirium - fourth to eighth day -; the critical sleep about the fourteenth day; and the absence of any history of previous alcoholic indulgence.

Delirium tremens may be complicated with, or to some extent simulated by, inflammatory or febrile diseases: such as pneumonia, erysipelas, the specific fevers, and acute rheumatism; but the history, course, and symptoms of these conditions are as distinctive as those of typhus - already briefly described - and, therefore, render either recognition, in cases of complication -, or diagnosis, a matter of no difficulty.

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T R E A T M E N T .

In the preceding record of cases, it has been demonstrated that a protracted course of indulgence in alcohol is the invariable precedent of an attack of delirium tremens; and also that the actual paroxysm has been either excited, or recently preceded, by a debauch. It may therefore be assumed that some of the poison is still circulating or lodging in the system, and that its immediate removal must be the object of treatment. It has also been shown that the patient invariably suffers from disturbance of the digestive functions. This is due, in part, to the direct action of the irritant on the mucous membrane of the stomach, to hepatic congestion, and to disturbance of innervation of the digestive organs. Moreover, the soft and frequently dicrotic pulse becomes increasingly rapid and feeble; and the skin is moist and not unfrequently bathed in perspiration. The above-mentioned conditions respectively create and indicate that systemic depression and exhaustion which characterise the disease, and which steadily increase until, in normal cases, the paroxysm terminates in restorative sleep.

The treatment must therefore be directed to.-

1. The maintenance of the strength of the patient.
2. The elimination of the poison from the system.
3. The early production of sleep.

These indications have been observed in the treatment of the cases recorded; but, in view of the diversity of opinion to which the treatment of this remarkable disease has given rise,

the management of the cases described has been, to a certain extent, experimental; and therefore a few additional remarks, in explanation and justification of some of the methods adopted, may not be out of place.

GENERAL MANAGEMENT.- During the paroxysm, the patient is undoubtedly insane; and it is, therefore, important that he be confined in a room which is well-secured; as an imaginary danger may be responsible for a sudden, but brief, period of frenzy, during which he may endeavour to escape through any unsecured aperture. All sources of mental and physical irritation must be removed; also every article of furniture which may be regarded as a lurking place for an imaginary foe, or which may be utilised as a weapon for the injury of himself or others.

The patient must be under the constant supervision of, at least, one capable and prudent custodian, whose duty it is to firmly but gently control him; to endeavour to allay his fears; to humour his whims and fancies; and to interpose between the patient and any possible source of danger. In view of the invariable and progressive cardiac weakness, and consequent tendency to heart failure, it is important that the patient be freely supplied with fluid nourishment - milk, clear-soups, beef-tea containing bread crumbs, eggs, etc. - at frequent and regular intervals. It is also advisable that he be kept in bed; but, on no account, should undue force be employed to accomplish this purpose. I have seen it stated somewhere that fatal convulsions have frequently resulted from cerebral

excitement due to the patients' struggles for freedom.

According to Drs Fagge and Pyc-Smith (Principles and Practice of Medicine, 1891, Third Edition, Vol.I, p.796), "If he should be very troublesome in wanting to get out of bed, the question must be entertained whether he should not be tied down!" Dr Latham (Dictionary of Medical Treatment, 1908, p.7), states that forcible restraint is to be avoided; and the patient to be kept in bed by the simple exercise of tact.

With rare exceptions victims of delirium tremens may, by judicious management, be induced to remain in bed. Occasionally, however, in the earlier stages of the paroxysm, when the patient has been unusually obstinate, I have obtained excellent results by allowing him, under close supervision, to move at will about his bed-chamber (see Case V, pp.17-18); thus avoiding that dangerous cerebral excitement which is the natural consequence of his struggles for liberty; and simultaneously assisting in producing that mental and physical exhaustion which invariably precedes the restorative sleep. In the later stages of the paroxysm, the case presents no difficulty as the patient is more or less exhausted, and is easily induced to remain in bed.

A fact, by which I was early impressed, was that some patients suffered much more intensely from terrifying hallucinations in the darkness than they did in the light; and that by abundance of light, their terror was considerably modified. I therefore make it an invariable rule to modify the light of the room according to the effect produced upon the patient by his

hallucinations. This source of irritation usually disappears, to a great extent, as the paroxysm progresses; and, *pari passu* with its disappearance, the light should be gradually subdued to the point of darkness. This view is supported by Drs Fagge and Pye-Smith (Principles and Practice of Medicine, Third Edition, Vol. I, p. 796), who state that "The gaslights are to be turned down, and in the daytime a dark cloth is to be hung before the window, unless the patient should be terrified by the hallucinations which visit him in the dark". On the other hand, Dr Latham (Dictionary of Medical Treatment, 1908, p. 7) unconditionally affirms that the room is to be "kept in comparative darkness", a view which, with slight modification, is held by many writers on this subject.

As the aim of the physician is the reduction of cerebral excitement, and thereby of the determination of blood to the brain, I think there can be no question of the wisdom of lighting the room, when darkness intensifies the excitement of the patient, and thus increases the liability to convulsions and coma.

In order to remove alcoholic and other impurities from the circulation it is important to encourage diaphoresis and diuresis. It has been clearly indicated, in the cases described, that the quantity of fluid excreted by the kidneys is diminished; but that its specific gravity is increased; or, in other words, that the weight of solids excreted is inversely as the quantity of fluid. Thus nature establishes an approximate balance which is rendered favourable to the patient by invariably

free cutaneous exudation; and is greatly encouraged by the free imbibition of fluid nourishment, which is, with rare exceptions, the only kind of food of which the patient can be induced to partake.

A preliminary hot bath, followed by frequent sponging of the body with warm water, is serviceable, not only as a diaphoretic but also as a sedative to the nervous system. Unfortunately, a bath is in many cases unobtainable; but warm sponging is within the reach of all.

Some patients suffer from thirst and readily partake of fluid nourishment; others, again, have decided aversion to food and drink of all kinds; but, as a rule, are easily induced to partake of milk - with or without soda-water -, beef-tea, light soups, café au lait, etc.; which should be given at frequent and regular intervals, and varied according to the inclination of the patient. In exceptional cases, an extremely irritable stomach is unable to retain a sufficiency of food; but this condition I have always overcome by means of a purgative or a rectal enema, followed by a gastric sedative; such as carbonate of bismuth with solution of hydro-chlorate of morphia; and the application of a sinapism to the epigastrium. If this treatment fail, the question of feeding by means of nutrient enemata or through a nasal tube must be considered.

M E D I C I N A L T R E A T M E N TTHE INFLUENCE OF MEDICINES ON THE COURSE AND DURATION
OF THE DISEASE.

The cases which I have recorded have been selected in order to represent as faithfully as possible, the influence of medicines on the course and duration of delirium tremens.

That many cases of this disease are curable by purely rational treatment, and without the aid of hypnotics or narcotics, has been amply proven in my experience. This fact is well illustrated in Case III (pp. 11 to 14), wherein the patient, whom I had treated about four months previously (see Case II, pp. 8 to 11) by means of large doses of chloral hydrate and bromide of potassium, made a perfectly satisfactory recovery without the aid of hypnotics, under conditions apparently identical with those which pertained to the previous attack.

The medicines chiefly recommended for the production of sleep in cases of delirium tremens, are bromide of potassium, chloral hydrate, opium, and its alkaloid - morphia. I have shown that a short period of sleep is commonly produced by a few doses of the bromide, and also of chloral; but rarely, if ever, have I observed that the restorative sleep speedily and indisputably resulted from their administration, although given in what may be regarded as poisonous doses. It may be supposed that, had they not been employed, recovery from the attack would have been delayed; or that a favourable result was

rendered more likely by the brief period of sleep which commonly followed their administration. Strange to say, however, my experience does not definitely justify the former proposition; but it is difficult to believe that there is not a modicum of truth in the latter, as the period of sleep obtained necessarily implies a temporary cessation, or at least reduction, of nervous excitement and heart-strain, and a correspondingly improved prospect of recovery.

Concerning the narcotic influence of morphia, however, I am disposed to speak with more confidence. It is a remarkable fact that some cases of delirium tremens run their course apparently uninfluenced by this drug; whilst others respond so readily to its influence as to leave no room for doubt as to its efficacy in cutting short the duration of an attack. The occasional inefficacy of morphia, as well as the remarkable tolerance of the drug manifested by subjects of this disease, is clearly demonstrated in Case VI (pp. 20 to 23), wherein two and a quarter grains of the drug, hypodermically injected into the circulation within a period of twenty-four hours, produced well marked evidence of its physiological action, but failed to induce sleep. On the other hand, its remarkable efficacy in certain cases is shown in Case VII (pp. 23 to 25), wherein the hypodermic injection of three quarters of a grain into the circulation of a patient, who was strongly excited, was speedily followed by the restorative sleep. Again, in Case VIII (pp. 26 to 29), sleep promptly followed the injection of half

a grain of morphia; and, although it might be supposed that the exhausted condition of the patient would soon, of necessity, be followed by sleep, I had no doubt whatever that the drug was responsible for the immediate terminating of the paroxysm.

The inefficacy of bromide of potassium and chloral hydrate, and the unmistakable power of morphia is further demonstrated in Case IX (pp. 29 to 31), wherein the cessation of the paroxysm was undoubtedly due to the influence of the last mentioned. And finally, in Case XII (pp. 35 and 36), the influence of morphia in controlling and shortening the duration of the paroxysm is indisputably proven.

In view of these facts, I feel justified in affirming that the duration of 'some cases' is apparently uninfluenced by medicines; but I am unable to agree with Drs Ware and Wilks, who believe that 'the duration of the disease cannot be shortened by means of drugs,' and that a certain time is requisite for the subsidence of the commotion; as I have proven to my complete satisfaction that many cases respond more or less readily to the influence of morphia, and that their duration is certainly abbreviated by its use

I. PURGATIVES.- The employment of purgatives in cases of delirium tremens is of considerable importance. As already indicated in the cases recorded - and to this rule I have met with no exception - the digestive system is disordered; the liver is congested, the stomach is usually irritable, and the alvine evacuations are scanty and offensive. Moreover,

alcoholic and other impurities are circulating or lodging in the system, as the result of prolonged intemperance and imperfect performance of the excretory functions, with consequent auto-intoxication due to re-absorption of the waste products of the system. The result of these conditions is more or less complete anorexia, and imperfect assimilation of food; and, as these are in some measure responsible for the general systemic depression so characteristic of these cases, they probably constitute an important factor in the causation of the disease.

The object of treatment must therefore be the immediate removal of those conditions which are responsible for anorexia, imperfect nutrition, and consequent systemic depression. Hence the importance of commencing the treatment of all cases of delirium tremens with a purgative; such as a blue pill followed by a saline draught and warm drinks - or the calomel, etc., powder (see p.12) -, in order to remove, as far as possible, all irritating impurities from the circulation, to deplete the congested liver, clear the prima via, arrest the process of auto-intoxication, improve the appetite, and aid in the production of natural sleep.

According to Dr Aitken (Science and Practice of Medicine, Vol.I, Fifth Edition, 1868, p.840), "In 'some cases' purgative remedies are indicated from the first". W.T.Gairdner (Clinical Medicine, p.271) is quoted as saying, - "These cases are known by the flushed, bloated appearance, the very foul tongue, the mawkish, peculiar odour of the breath, the fetid discharges from

the bowels, and the history of a recent surfeit of eating as well as of drinking".

The foregoing quotations suggest that purgative remedies are required only in those cases which answer to the above description. I have seen many cases of delirium tremens which did not present a 'flushed and bloated appearance'; nor did they afford any 'history of a recent surfeit of eating'; but, as already stated, I have never, personally, met with an exception to the rule that the treatment of all cases of delirium tremens should be commenced with a purgative. Amongst modern writers who support this view may be mentioned Dr Latham (Dictionary of Medical Treatment, 1808, p.7-8), who recommends that all cases be commenced with a dose of calomel.

II. ALCOHOL.- The exhibition of the habitual stimulus - alcohol - in the treatment of cases of delirium tremens, has been the subject of considerable diversity of opinion. This fact is sufficiently illustrated by the following quotations.-

Dr Harper (Physician's Vademecum, New Edition, 1837, p.188) states that delirium tremens "is a disorder of innervation, which is best and most effectually relieved by the exhibition of the habitual stimulus, with or without sedatives".

Encyclopaedia Medica, Vol.II, 1899, p.456.- "Alcohol should be avoided as much as possible in the treatment of delirium tremens" ---- "Still, it is of value in a few severe cases with marked prostration, and especially in such cases when complicated with pneumonia".

The treatment of delirium tremens by means of alcohol, as advocated by Dr Harper, was evidently based on the opinion, prevalent in his time, that the exciting cause of the disease was the sudden withdrawal, or diminution of supply, of the habitual stimulus from one whose nervous system was in a condition of exhaustion or irritation due to the protracted abuse of alcoholic liquor. If this supposition be correct there can be no doubt as to the wisdom of treating the disease by means of the accustomed stimulus. I have, however, not only endeavoured to disprove this theory - see discussion of alcohol as an etiological factor (pp.72-74) -; but have clearly demonstrated, in the cases recorded, that alcohol is not only the essential predisposing cause of delirium tremens, but is also its chief exciting factor; and, as the aim of all rational treatment of disease is the removal of its cause, it follows that the exhibition of alcoholic stimulants is based on a wrong principle; and, therefore, that they ought to be entirely withheld from all ordinary cases. Moreover, the fact that the reduced condition of the system is partly due to defective nutrition, clearly indicates the necessity of withholding the habitual stimulus; as the quantity of food taken is inversely as the quantity of alcohol imbibed.

In cases of extreme exhaustion with threatened cardiac failure, and in those which are complicated with pneumonia, the question of employing stimulants is one of considerable importance as well as of difficulty. As recovery is dependent

upon the assimilation of a sufficiency of nutritious food, impairment of the appetite and process of digestion must be avoided as much as possible; and therefore in view of the influence of alcohol on these conditions, its exhibition must be a subject of the greatest care. In cases of threatened cardiac failure, good results are obtained from the use of a diffusible stimulant such as aromatic spirit of ammonia - with or without brandy - freely diluted (see Case VIII, p.28). Ether in half-dram doses has been recommended for this purpose. It possesses the advantage of being not only a diffusible stimulant, but also a narcotic. As an antispasmodic it is also of considerable service, as it stimulates the movements of the stomach, and expels the flatus which is a frequent source of abdominal discomfort, and even of pain in exceptional cases.

The various forms of alcohol have their advocates. Dr Latham recommends as much as ten ounces of pure whisky in twenty-four hours in severe cases of cardiac failure; but, in mild cases, one to three pints of stout as a stimulant and aid in producing sleep. Anstie advocates the administration of as much as an ounce and a half of old port wine every hour. The injection of a twentieth of a grain of strychnine, every three hours, has also been suggested for severe cases.

My clinical experience of delirium tremens, complicated with pneumonia, has been limited to two cases; both of which were treated with brandy administered at regular intervals. The first (see Case X, pp.33-34) was one of bilateral pneumonia,

which became complicated with delirium tremens on the fourth day of the attack, and had a fatal termination two days later. The second case was that of a powerful man, aged 37 years, who had an attack of pneumonia in January, 1904. The right lung was extensively involved. His pulsations were 124 in the minute; the respirations were 42; and the temperature was 104.2. Symptoms of delirium tremens developed on the fourth day of the attack; and, as the heart showed marked evidence of weakness, half an ounce of brandy was ordered to be taken every third hour. On the seventh day, the pneumonia and delirium tremens simultaneously subsided, the subsequent recovery being quite normal. This limited experience does not justify me in expressing a definite opinion concerning the influence of alcohol on such cases. Stimulants were similarly employed in both cases; but to assume that the fatal termination of the former case was due to the influence of alcohol, was not more reasonable than to affirm that the favourable result of the latter was due to the same cause. It seems quite probable that the result in both cases was not due to, but in spite of, the alcohol.

III. THE COMPARATIVE MERITS OF OPIUM AND MORPHIA.- As the production of sleep by means of opium and, to a lesser extent, of its alkaloid, morphia, has been a prolific source of conflicting opinion, the following quotations, representing the opinions of various writers, will serve to show the great interest which has been centred in this subject, as well as

to emphasise the difficulties which beset and confuse those who have had no practical experience of the treatment of this disease.

Dr Aitken (Science and Practice of Medicine, Vol.I, Fifth Edition, 1868, p.839) "The two most fatal errors which can be committed in the treatment of delirium tremens are either to bleed the patient or to give him opiates. The greatest number of cases of those treated by opiates are apt to terminate by convulsions and coma (Morehead, Peddie, Law, Cahill, Laycock)" "If it be true also that opium and alcoholic stimulants singly are to be deprecated in the treatment of delirium tremens, à fortiori in their combination their is a two-fold danger; ----it is a course of treatment attended with much hazard, and which, when systematically followed is certain of leading to unfortunate results (See Morehead's Researches on Diseases in India; also "Notes on Treatment of delirium Tremens" by W. Hanbury, 33rd Regiment, in Madras Medical Journal, July, 1863)". Dr Aitken further states (p.840) that "Opium may be administered with safety and advantage only in protracted cases----, 'in moderate doses, and given only at the later stages'".

In direct contrast with the foregoing, and supported by the accumulated experience of later years, is the following quotation from Dr Bristowe's Theory and Practice of Medicine (Fifth Edition, 1884, pp.607-8).- "We cannot help thinking that more power for harm, and less power for good than it deserves, have latterly been attributed to opium----. "It is better to

to administer it 'from the beginning in large doses'----and to repeat the medicine in smaller doses at intervals of an hour or two, if sleep be not induced".

The immediately preceding quotation is supported by the following from Drs Fagge and Pye-Smith's Text-Book of the Principles and Practice of Medicine (Vol.I, 1891, p.794).-

"Sir Thomas Watson recommends that three grains of solid opium should be administered as soon as the bowels have been cleared out by a moderate purgative; and that if at the end of two or three hours the patient should show no inclination to sleep, one grain should be given every hour afterwards until the result is attained". The same author supplies the following statement, which places morphia and opium in the same objectionable category.-"Dr Wilks" states that "he has many times seen persons suffering from delirium tremens sent to their last sleep by opium, and the same result has followed the subcutaneous injection of morphia".

In contrast with Dr Wilks' statement is the following by Dr Barclay (Holmes and Hulke's System of Surgery, Vol.I, 1883, p.214).- "The hypodermic injection of morphia is a valuable remedy, and many cases may be cut short at the outset by the administration of some easily digestible food accompanied by a hypodermic injection of morphia".

According to Dr Latham (Dictionary of Medical Treatment, 1898, pp.7 - 8), "The course of the disease is not much influenced by medicines".----"In some 'cases' morphia is necessary

in quarter-grain doses, hypodermically, every three hours. If no effect produced after four such doses, stop it and then try the effect of chloral".

Dr Munro (Manual of Medicine, p.836) says,- "Opium should be avoided".

In view of the remarkable antithesis of opinion between those writers who regard the administration of opium as one of the most fatal errors that can be committed, and those who advise that it be used in doses ranging from moderate, to what may be regarded as heroic, as in the case of Sir Thomas Watson; it may not be out of place to consider briefly some of the sources of danger which are inseparable from the use of so valuable a narcotic.

The danger of employing opium in cases of delirium tremens depends, to some extent, upon the fact that it arrests the functional activity of the salivary, gastric, and intestinal glands; and thereby intensifies those conditions of anorexia and constipation which are the usual concomitants of such cases, and which it is the object of treatment to remove.

It has been demonstrated (See cases recorded) that mental and physical exhaustion invariably precedes the restorative sleep; and, as the aim of rational treatment is the obviating of the former and the early production of the latter, the importance of stimulating the appetite and of creating healthy peristaltic action of the intestines - and conversely, of avoiding, as far as is reasonably possible, those agents which

are antagonistic to these desired conditions -, cannot be over-estimated.

It may be said that the arrest of the salivary secretion constitutes a contributory source of danger, by intensifying the already existing thirst and craving for stimulants so common in cases of this kind. This, however, is scarcely to be regarded, per se, as an unmixed evil; because, whilst alcohol can be, and is, withheld from the patient, advantage may be taken of his thirst to supply him with abundance of fluid nourishment wherewith to sustain his strength and ward off a fatal result.

I have seen it asserted that opiates, by increasing cerebral congestion, deepen the paroxysm, and thus increase the liability to inflammation, convulsions, and coma. If, however, as Whittle says, opium induces sleep by simultaneously reducing the functional activity of the cerebral cells, and producing a condition of cerebral anaemia in which the arteries and veins are empty; it may be assumed that this source of danger may be minimised by administering the drug in sufficiently large doses at the commencement of the paroxysm, and before the patient has become exhausted, so that the duration of the stage of congestion and exhilaration may be reduced to a minimum, and that of cerebral anaemia and sleep facilitated. If, therefore, opium be employed, I am disposed to favour its early administration in large doses as recommended by Sir Thomas Watson and Dr Bristowe; rather than in smaller doses by which the period

of cerebral congestion and excitement, with possible serious consequences, is indefinitely prolonged.

The administration of large doses of opium followed by smaller doses at short intervals, introduces us to what is, perhaps, the chief source of danger, namely.- the liability of the drug, especially in its solid form, to accumulate in the stomach and bowels, and to undergo sudden and extensive absorption; thus superadding opium - to alcoholic - poisoning. The danger arising from this source is obvious, as it is impossible, when administered by the mouth, to determine the exact quantity of opium circulating in the blood at a given time. It may, however, be minimised not only by the regular administration of laxatives in order to maintain a moderately free action of the bowels, and thus to remove, to some extent, the cause of intestinal accumulation of the drug; but also by limiting the quantity of solid opium administered daily to four grains, which is regarded as the minimum poisonous dose for an adult. It would probably be preferable to administer a corresponding quantity of opium in liquid form - such as the tincture, the wine, or the liquid extract. But whatever form of the drug be employed, its effect must be carefully watched; and it must be immediately withheld if the pupils become strongly contracted.

Although I have endeavoured to indicate how the sources of danger, arising from the employment of opium, may be avoided, or at least minimised, let it not be supposed that I am favourable to its administration in these cases. On the contrary,

I am in perfect agreement with those writers who condemn its use; but I disagree with those who place morphia - the principal alkaloid of opium - on the same objectionable plane.

In view of the fact that morphia possesses nearly all the advantages of opium, without the disadvantages to which I have referred, and which are inseparable from the latter, I find it difficult to understand why opium is ever employed in the treatment of delirium tremens. The danger arising from the use of opium, when administered by the mouth, is obviated by employing morphia hypodermically. Not only are disturbance of the stomach and constipation of the bowels less marked; but the quantity of the drug circulating in the blood is definitely known, and acts so rapidly that the attendant physician can personally await, and observe, its effect. Moreover, the possibility of poisoning, due to sudden absorption of any local accumulation of the drug, is exceedingly remote. Indeed, an extensive experience of the treatment of these cases has convinced me that morphia is of great value in the treatment of this disease; and that, when carefully employed, in accordance with the method hereafter described, danger is reduced to a minimum, and the maximum of benefit is obtained. For proof of the utility of morphia in the treatment of delirium tremens, see remarks (pp. 91-92) on the influence of medicines on the course and duration of the disease.

I have already demonstrated that certain cases do not satisfactorily respond to the action of morphia, as in Case VI

(pp. 20-23), wherein two and a quarter grains of morphia, introduced into the circulation within a period of twenty-four hours, failed to produce sleep. It is, however, rare to meet with cases which do not respond more or less readily to the action of the drug; and in many cases the response is so definite, and complete, as to prove conclusively the efficacy of morphia in the treatment of delirium tremens. The failure on the part of the drug to produce the same desirable effect in all cases, is not clearly explicable. Not improbably idiosyncrasy plays an important part in the matter. I have observed, however, that plethoric patients yield the most satisfactory results; and, if it were possible to determine exactly the relative quantity of blood circulating in the system, it might, possibly, be demonstrated that the effect produced by the drug was in direct ratio to the degree of existing plethora. This result seems to be uninfluenced, as much as might be expected, by the degree of excitement from which the patient suffers; as illustrated in case VII (pp. 23 to 25), wherein a plethoric woman, labouring under great excitement, fell into a sound and restorative sleep soon after the hypodermic injection of three quarters of a grain of morphia.

I think it not improbable that the more effective action of morphia on plethoric subjects of delirium tremens, is due to the greater influence of cerebral anaemia - rapidly produced by large doses of the drug - on nerve centres which have been accustomed to an excessive blood supply. I am not aware

that the more effective response of plethoric subjects to the action of morphia has ever been observed or discussed by previous writers; but I regard it as a point of considerable interest and importance in the treatment of acute alcoholic poisoning.

IV. MORPHIA.- As already indicated, Dr Latham advises that morphia be administered, hypodermically, in quarter grain doses every three hours; and that, if four such doses fail to produce the desired effect, chloral be tried. My experience of these cases has convinced me that when morphia fails, neither chloral nor any other hypnotic that I have ever employed, is likely to succeed. I am of opinion that the best results are not obtained - as suggested by Dr Latham - from small doses repeated every three hours; but, rather, by rapidly introducing into the system an effective quantity of the drug.

The method by which I have obtained the best results is as follows.- As soon as possible after a purgative has been administered, I inject, tentatively, a quarter of a grain of hydro-chlorate of morphia into the upper-arm. This quantity has never produced the desired effect in any of my cases; but it has the virtue of doing no perceptible harm, and of revealing the possible existence of any peculiarity of constitution which may contra-indicate its use. If, after a period of twenty to thirty minutes, no obvious effect has been produced, another half-grain dose is injected. This is occasionally followed by the restorative sleep (see case VII, pp.23 to 25).

Much more frequently, however, the patient sleeps from two to four hours (see cases V, IX, and XII). About twelve hours later, if no untoward symptoms have developed to contra-indicate the use of the drug, another half-grain may be injected, and followed, if need be, about twenty minutes later by a similar dose. Not infrequently, this proves effectual (see cases V, and X, pp.16 to 20 and 29 to 31). If, however, sleep be not induced it is to be noted that one and three-quarter grains of morphia have been introduced into the circulation during a period of twelve hours, and that the pupils are now strongly contracted. It is therefore essential to exercise great caution in the further administration of the drug. The patient must, meanwhile, be well supplied with fluid nourishment; and if at the end of twenty-four hours - by which time the effects of the drug have in great measure passed off - the patient be still wakeful, with no evidence of cardiac failure or other adverse conditions, another grain may safely be administered, in two successive half-grain doses, in the same tentative manner as before. This usually produces the desired effect (see case XII, pp. 35-36, also subsequent attack referred to p.36). If this fail, and it be considered advisable to continue the use of the drug, twenty-four hours must be allowed to elapse before again employing it; and, as the patient is assuming the exhausted condition which is the invariable precursor of sleep, it must be used with the greatest discretion, and in doses not exceeding a quarter of a grain,

the effect of the drug being, meanwhile, carefully watched.

The method of treatment above described is applicable to those cases which come under the notice of the physician at the commencement of the paroxysm, and which are free from albuminuria; but must be modified to suit those cases in which the disease is already advanced before treatment is begun .

I have frequently observed that, about three minutes after the morphia has been introduced into the circulation, the patient retches slightly after the manner of the early morning retching of pregnancy. This, which I have learned to regard as a favourable sign, is commonly followed by a satisfactory result.

Walsham says that, when bromide of potassium, chloral, and morphia fail, success may sometimes be obtained by first inducing insensibility by chloroform, and following up its effects by the subcutaneous injection of morphia. He admits, however, the danger of this procedure; and states that it has been responsible for three deaths at St Bartholomew's alone in seven years. The treatment of delirium tremens by these means is objectionable for the following reasons.- The disease being essentially one of exhaustion of the nerve centres with marked cardiac weakness, the depressing influence of chloroform on the cardiac ganglia is apt to produce sudden paralysis of the heart. Again, when the patient is in a condition of insensibility, the effect of what may be regarded as a safe dose of morphia may be obscured by the chloroform; idiosyncrasies, if existant, cannot be detected; and when the effects of the chloroform

disappear, the patient is likely to be still wakeful and uninfluenced by the morphia. If, however, a large initial dose of morphia be injected during the period of insensibility, a fatal result can be in no way surprising.

V. APOMORPHINE.- This drug, which is another alkaloid of opium, is certainly a potent narcotic; but, as it must be given in full doses in order to be effective, its administration is attended with grave danger. It is important that the patient be in bed before injecting the drug, as its action is so rapid, and the emesis produced is so strong, that the patient may be sleeping before the cessation of the intermittent diaphragmatic spasms. Hence the importance of carefully watching the patient, lest asphyxia supervene. I am not aware that any fatalities are recorded as having resulted from the use of this drug; but severe collapse is said to have followed its employment in full doses. I am, therefore, strongly opposed to its employment in cases of delirium tremens; as the nervous exhaustion and cardiac depression which are the usual concomitants of this disease, render its administration peculiarly dangerous.

VI. BROMIDE OF POTASSIUM AND CHLORAL HYDRATE.- So prominent and protracted is the part which has been taken by these drugs in the treatment of delirium tremens, that I have faithfully endeavoured to illustrate their influence, both separately and in combination (see cases recorded); and to contrast their effects with those produced by morphia. The comparative inefficacy - as well as the tolerance - of the former has

been, I think, so clearly demonstrated (see also remarks on the influence of medicines on the course and duration of the disease pp.90-91), that I think it unnecessary to make further reference to these drugs.

Amongst the drugs which have played a less prominent part in the treatment of this affection, are the following.-

I. BROMIDE OF SODIUM.- This drug has been advocated; but beyond the fact that its action upon the heart and stomach is considered, respectively, less depressing and irritating than that of bromide of potassium, I have found no practical benefit from its use. Its inefficacy as a hypnotic, in these cases, is clearly demonstrated in case VIII (pp.26 to 29), wherein six drams were taken within a period of twenty-four hours; thus affording evidence of the patient's remarkable tolerance of the drug, but failing to produce sleep.

II. HYOSCYAMUS.- This drug has also been recommended; but I am unable to speak favourably concerning it. In case X (p.33), no less than four drams of the tincture were taken, within twenty-four hours, without perceptible effect. The alkaloids hyoscyamine and hyoscine have also been employed. Dr. Latham says that the latter, used hypodermically in doses of a hundredth to a fiftieth of a grain, is of service 'in some cases'.

III. BELLADONNA.- This drug, employed in two minim doses of the tincture every two hours, was an old-time remedy. Its

action is somewhat similar to that of hyoscyamus; but, as its narcotic effect is decidedly inferior, it cannot be regarded as an effective means of treating cases of this disease.

IV. STRAMONIUM.- This drug, having properties identical with those of belladonna, was similarly employed; and was said to answer well in cases characterised by violent, noisy delirium and complete sleeplessness.

V. TARTRATE OF ANTIMONY.- This drug was used in severe cases, about the middle of last century, not for the purpose of forcing, but rather of favouring natural, sleep, by reducing excitement and causing nervous, muscular, and mental exhaustion. It has been commended on account of its diaphoretic effects; but it is doubtful if the nausea and cardiac depression caused by effective doses, justify its use in the treatment of this disease; as the stomach is frequently irritable, and the appetite is invariably defective. Moreover, the cardiac action is one of progressive weakness; and entirely lacks that sthenic condition, with vascular excitement and bounding pulse, in which this drug is so valuable. Besides, as the recovery of the patient greatly depends upon the quantity of nourishment taken and assimilated, it is of the utmost importance to avoid all drugs that impair the action of the stomach and thereby the appetite. Aconite and ipecacuanha were employed with the same object in view; but were considered inferior to antimony.

VI. CANNABIS INDICA.- This drug has also been employed. As compared with opium, it has the advantage of not disturbing the stomach, and is said to improve the appetite; but it has the disadvantage of creating a much longer period of excitement- a condition which is attended with so much danger in these cases.

VII. DIGITALIS.- This drug was employed, in large doses, by Mr Jones of Jersey; but, as a means of treatment, does not find favour with the profession. Dr Whittle says that the discreet physician will not adopt this treatment until all others fail, especially as the disease is apt to terminate suddenly and without warning.

VIII. CAYENNE PEPPER.- This was recommended by Kinneer, and is, in my opinion, an excellent auxiliary to treatment; not so much on account of its slight narcotic effect, which is not to be despised, but on account of its action on the atonic stomach. It increases the secretion of the salivary and gastric glands, thereby improving the appetite; and simultaneously tends to subdue the craving for alcohol, thus conducing to a favourable result (see its application in cases recorded).

IX. SULPHONAL.- This drug, which is of more recent origin than those already mentioned, is, in my opinion, a fairly efficient hypnotic, and comparable to a certain extent with chloral hydrate and bromide of potassium. Its effect has been

demonstrated in case XI (pp. 34-35), wherein the administration of thirty grains, in two successive fifteen-grain doses, was followed by sleep of three hours duration. Unfortunately, however, the further exhibition of three similar doses was quite ineffectual.

X. VERONAL.- This is an excellent hypnotic (see case XIII); but, although I regard it as one of the best of the new hypnotics, my experience of its effects - limited to three cases, of which the above mentioned is a fair example - does not justify me in classing it with morphia. Dr Frus Moller reports having treated ninety-four cases of delirium tremens by means of veronal in the Fredereksberg Hospital in Copenhagen, with apparently better results than I have obtained.

Two new hypnotics 'Trional' and 'Isopral', are regarded with some favour in the treatment of this disease. It is reported that the hypnotic action of the latter is twice as powerful as that of chloral, to which it is chemically related, and that its after effects are much less dangerous.

Careful observation of the treatment of fifty-eight cases of delirium tremens, of which those recorded are a fair selection, has satisfied me that morphia, as a narcotic, has afforded by far the best results; and that, when employed hypodermically in accordance with the method described (pp. 105 to 107), it is a most valuable remedial agent. Its direct introduction into the circulation obviates, in great measure, stomachic disturbance;

and the rapidity of its action enables the attendant physician to personally observe its effects - thus greatly reducing the element of danger. Moreover, the interval between the doses admits, if necessary, of the administration by the mouth of stomachics to improve the appetite by stimulating the gastric glands and promoting digestion, a process which might be greatly retarded if large and regular doses of hypnotics were simultaneously taken into the stomach.

It may be urged that the effort to cure the disease by means of morphia may lead to the formation of the morphine habit. This is certainly a matter of grave import; but I think that if the drug be used as I have suggested, the subject scarcely merits serious consideration. I am doubtful that the condition of the patient admits of his fully appreciating the seductive influence of morphia; and it is quite unnecessary to inform him what drug is being employed. Moreover, as the physician himself introduces it into the circulation, and personally observes its effect, the possibility of creating the morphine habit is exceedingly remote.

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F I N I S
