suggestion and imitation, and is then unreasoning and impulsive in its effects; this form may, by suggestion—often unconsciously—infect whole groups or assemblies of people or crowds; another kind is in part under the control of the reason. During fear the free flow of all other nervous activities are interrupted, an adjustment or adaptation which may be necessary in order to protect life. As to the locality of fear in the brain there is reason to believe that the reasoned fear out of which the most courageous and noble deeds of heroism arise has a cortical origin, whilst panic-fears are probably thalamic in origin or, at any rate, subcortical. The whole question is now being studied by a number of eminent and thoughtful men in the department of psychology as well as in that of medicine, and it is not improbable that a reconstruction of views as to the relationship of mind and body is within sight from this study.

(1) Read before the Medical Society of London.

The Management of Confusional States with Special Reference to Pathogenesis.(1) By TOM A. WILLIAMS, M.B., C.M.Edin., Washington, D.C.; Neurologist to Freedmen's Hospital and Howard University; Corresp. Mem. Soc. de Neurol. de Paris et de Soc. Med. Mentale Clin., etc.

CONFUSION is a hallmark of the effects of toxin upon the cerebrum. When very slight, special tests are required to elicit it. Interference with neuronal conductivity is the chief pathogenetic factor. The topical incidence of this is one of the determinants of the form taken by the psychosis, whether hallucinatory, disorientative, depressive, delusional, or what not. Another factor is the state of the body secretions as affected by the toxins; a third factor is the patient's psychological status, as determined by the capacity and the opportunity for experience.

Toxin may be exogenous, whether from living parasites or not, or endogenous, as from vascular stasis, malnutrition, exhaustion, endocrin disorders, or it may be dynamic, as when psychogenetic.

Bodily signs are usually present, such as reflex disturbances, tremor, circulatory disturbances, and vegetative disorders. Headache and insomnia also almost always occur. Of the latter, onirical delirium is usually a feature; it is a kind of somnambulism with partial amnesia, often of mystical character. The perceptions are feeble, and motor reactivities usually dull. That structural changes may occur when the cause of confusion is long maintained is manifest upon histological examination of the brain. But that these often permit of repair seems to be shown by apparently complete recoveries, even after years.

The management of the patient consists of, firstly: The avoidance of adding the toxicosis of the imperfectly elaborated protein which is prone to occur even with a moderate diet, because of cloudy swelling of hepatic cells induced by the causative toxin or by a similarly induced interference with renal elimination causing retention of nitrogenous substances. Lack of proper adjustment of the diet, especially in the matter of carbohydrates, leads to an acidosis which further aggravates the toxic state by interfering with proteolysis as well as with proper catabolism. The remedy for this is, of course, adequate ingestion of carbohydrate substance. The giving of alkalies, after all, has only a neutralising effect, although it is necessary in some cases. But the assistance to metabolism of the alkaline salts, especially in the combinations naturally occurring in most fruits and many vegetables is invaluable, so that these should be copiously added to the diet. Of course, sufficient water should be given, but the idea that abundance of water will either neutralise or favour excretion of toxins is untenable.

Violence, distress, or agitation should never be met by narcotics, which merely increase cerebral toxicity. These symptoms are quickly mitigated by hydrotherapy until the full effect of metabolic improvement from proper diet can show itself upon them.

Some of the cases (*International Clinics*) illustrate both the symptomatology and management of confusional states of different ætiology. The first of these illustrates a post-infectious toxic state in an individual predisposed by sclerotic blood-vessels, feeble heart, and a lack of constitutional robustness, as well as previous over-indulgence in alcohol. The toxic confusion was maintained and aggravated by the ingestion of pharmaceuticals and an excess of protein. Recovery was

accomplished by means of the afore-mentioned principles after several consultants had failed to benefit the patient.

Post-influenzal confusion, with exhaustion.—In May, 1915, a judge, æt. 64, after a severe attack of influenza, remained very weak, and confused in mind, and began to develop hallucinations and delusions of a vague character. Several consultants were seen without result, and he became weaker and less clear mentally. The patient was in a typical condition of mental confusion. Deep reflexes were very faint, abdominal reflexes were absent; there was plantar flexion. There was no paralysis and no anæsthesia, so far as could be ascertained. The optic disc was not œdematous and showed no arteriosclerosis, but the superficial vessels had thickened coats, though the heart was small, the apex reaching only to the lower border of the fourth rib, 1 in. inside the nipple line.

Systolic blood-pressure was 102, the diastolic 60. The kidney function had been ascertained by Dr. A. Hooe to be normal, phthalein appearing in ten minutes to the amount of 30 *per cent.* and 34 *per cent.* in the first and second hour respectively. But there was a large quantity of indican and a slight trace of albumin.

The patient was taking the following diet and medication: 2 a.m., beef-juice; 3.20, ammonia; 4, red solution potassium iodide; 5.30, grape-fruit juice; 6.15, three tablets, egg, whisky, milk; 7.30, ten drops B.P., adrenalin solution; 8, ten drops solution iodide potassium; 10.20, soft toast, coffee; 11.15, three tablets caffeine, strychnine, sparteine; 12.30, ten drops B.P. solution; 1.30, beef-tea; 2.30, ammonia; 3.30, three tablets; 4, custard, cream; 4 30, ten drops B.P.; 4.45, ammonia; 5, ten drops solution; 7, egg, whisky, milk.

I considered this a case of acute exhaustion psychosis, partly toxic in character. The treatment prescribed was embodied in the following report to his physician.

As the patient is suffering from exhaustion, stimulants are contra-indicated, as the tired organ is incapable of further response to them; therefore, I think it wise to omit caffeine, the secondary effects of which increase the exhaustion.

Strychnine should not be further given either, for it merely increases the discharge, that is, the exhaustion of energy of medullary neurones.

Sparteine is a nerve-muscle poison, the effect of which in

improving cardiac activity cannot be maintained for long without greater nutritional capacity than the patient possesses.

I see no advantage in the iodide of potassium. Furthermore, the basic element of this is a strong cardiac depressant. Nor should I give the bromides during the effort to build up the patient, as they diminish metabolic processes and diminish resistance. Ammonia should be kept for emergencies only, as its effect is evanescent.

The *régime* I prescribed is as follows: 6 a.m., five grains of sodium bicarbonate in four ounces of hot water; 6.15, one orange: 6.30, breakfast, cereal and milk, one egg, crisp bacon; 8.30, massage, consisting of slow, deep pressure without friction; the purpose of this is to increase the *vis a tergo* of the circulation and thus aid the heart by saving its *vis a fronte*. Sleep, if possible.

On waking, about 9.30, five grains sodium bicarbonate in four ounces of water; 10 to 10.30, lunch, one banana, cereal, and milk; 12 to 12.30, massage, sleep: 2 to 2.30, dinner, meat and potatoes, green vegetables; 4.30, massage, followed by five grains sodium bicarbonate in four ounces water; 6.30, supper, unpolished rice and milk, one banana. Between that and midnight, massage again when the patient is awake. For midnight lunch, Graham crackers (*i. e.*, bran biscuits) and milk are desirable. The quantity of milk at one meal should not exceed five ounces. After meals, the patient should be given one capsule of "Phytin," an organic phosphorus preparation of the Society of Chemical Industry of Basle.

Beef-tea and gelatin should be omitted as containing too much excrementitious materials, which are cardiac poisons. Coffee and tea should be omitted also. A small piece of bread, with or without butter, may be taken with each meal if so desired. Water should be the drink, and should be given about one hour before each meal, but should not be restricted to that time if the patient desires it at any other.

The adrenal principle should be continued; and I think it is better given as the dried gland, say three tablets a day to start with. I think that its effect might be improved by being taken along with one tabloid of "Hormotone."

If this diet is found to be too heavy, diminish the quantities at the commencement. If the patient suffers from the heat,

cool sponging should be beneficial; and in any case its effect upon the innervation of the vascular system is usually most beneficial: the water should be used lukewarm. The best cereals to give are puffed grains, with an occasional change to oatmeal and the brown prepared wheats, such as Ralston's. If the patient should desire any one article of food, let him have it occasionally.

When these measures were carried out, improvement was rapid; so that in four weeks the patient was able to be about, and the following term took his place on the bench, and remains well at this time.

A case seen with Dr. Hardin illustrates the fact that old age, weak heart, and debility need not denote unfavourable outcome.

The exogenous poisons, such as alcohol, may produce a confusional condition which resembles paresis. A case of this kind was sent by Dr. Aymer, of Charleston, in 1909, because of hallucinations, delusions, and violence, the result of eight days of alcoholism. The distinction was very simply made by examining the spinal fluid, so that the patient was sent home well in two weeks, even although he had shown slurring and reduplicated speech, and gross impairment of calculating power. Seven years later the patient remained well.

It is true that an occasional case of paresis very rarely has as low a lymphocytosis, but never during an acute attack of the period simulated by this patient.

The distinction was similarly made in a case due to morphine to which I was called in consequence of an alienist's diagnosis of paresis. This patient's morphinism was perhaps due to marital infelicity, for he is now remarried, and five years later remains well.

(3) The endogenous sources of confusional states are most clearly seen in hypopituitarism, as the following case shows:

Narcolepsy from hypopituitarism.—A clear-out example of the confusional state of pituitary insufficiency is that of the girl, æt. 25, referred by Dr. John Dunlop in 1911, to whom she had been sent on account of the pains in the back and dragging feeling and tenderness in the legs, in the belief that she had sciatica. There were absent-mindedness, severe amnesia, dull, heavy headache, which was sometimes bursting, and was

located deep and low in the middle of the head. Torpor would occur often suddenly, even causing her to fall. The mental confusion was most marked in these attacks, in which she felt as if intoxicated, singing and speaking absurdities. Although there was no vertigo, lines would look blurred when reading.

General and neurological examination was negative, except for increased reflexes, hypertrophy and tenderness of the subcutaneous fat, the weight having increased from 131 to 184 lb. in three months. The limbs were irregularly asymmetrical; for instance, the left knee was 16 in., and the right $17\frac{1}{8}$; the thighs respectively were $38\frac{1}{2}$ and $38\frac{1}{4}$, and ankles $9\frac{3}{4}$ and 9 in. in circumference. The femoral veins were congested, so was the conjunctiva. A neoplasm around the pituitary was diagnosed on account of the situation of the headache, torpor, the adiposis. Confirmation was obtained by the finding of visual field contractions, and deepening of the Sella turcica, as shown by the X ray.

The treatment of the case consisted of the exposing of the pituitary region to radiotherapy, applied from four different temporal points, about ten minutes every week,

Six months later, although the weight had not diminished, the headaches had, the visual field had enlarged, the reflexes had diminished, and the narcolepsy had ceased. We expected to give thyroid gland (3) in order to diminish weight, but the patient passed from observation, so we do not know if her relief continues, and are unable to supplement the preliminary report of the case made in January, 1912, in the *Journal of the American Medical Association.*

(4) Psychic disturbances, such as a powerful emotion, may cause temporary confusion; but it is doubtful if this can be prolonged in the absence of secondary somatic factors, such as impaired metabolism, circulation, and internal secretions (4).

The case which follows, however, was purely psychic when dealt with by me.

Post-onirical fixed ideas removed by re-educative psychotherapy.—A clerk, æt. 21, was referred by Dr. J. J. Richardson for advice and treatment on account of a state of mental confusion, impossibility of concentration on work, extreme depression of mind, and nocturnal hallucinations.

After he had given his name and address he began by

saying: "Do you believe in God and Christ?" and when I asked him what was the matter, he said: "It is dreadful, awful. Where am I, and what is right? It seems desecration to speak of it: if you can't help me I do not want to speak of it. Everything seems blended into one thought: all else is confusion." I then asked him how the trouble had begun, and after much questioning he succeeded with difficulty in revealing to me what had transpired.

During ether narcosis he had felt that the world had reverted to nothingness: that in consequence he could not reach God and Christ, and longed for death, so that he could escape this terrible nothingness. Everything seemed blurred in that one thought, which kept recurring in spite of his prayers to God. "It seemed a curse to be brought into the world to suffer that awful mental pain; it seemed like after-death lasting a million years."

For the next week or so he had gone about suffering terribly seeming as though he would go insane if he could not return to God. A lecture on evolution seemed a desecration. He would wake at night, having dreamt the experience again, trembling with fear of his future.

Examination showed no physical disturbances.

Therapeutics.—He was treated by a full, though concise explanation of how thought is disordered by the perversion of brain chemistry during narcosis (1); how the feeling-tone may also be thus depressed, and how the distortion of impressions during a sad feeling-tone phase resulted in his hallucinatory concept of chaotic annihilation. It was explained that this concept was based upon morbid percepts caused by the ether, and therefore should not prevail over rational explanations of common experience and good sense. Many illustrations of toxic and mystic thought were related, and comparison drawn with his own case (1). He was asked to write out the inferences he drew from the facts presented to him, and he was referred to a clergyman for an explanation of his theological doubts. This, however, he did not receive, and I had to resume treatment without this assistance.

He made a rapid recovery (2).

Anxiety causing exhaustion, which produced mental confusion.—A woman, æt. 35, was referred by Dr. Ada Thomas because she became disturbed about some botanical investigation she had

conducted successfully, which she could not apparently finally formulate, although she had made a preliminary report to the satisfaction of superiors. She would keep on starting experiments, but they did not seem to go right. She felt dazed and as if everything was out of joint. The work seemed easy, and yet she could not accomplish it. As there was neither insomnia nor loss of weight, she felt that her trouble was psychological. But her reflexes were exaggerated, her hand trembled, her eyeballs were prominent, with congested lids, and the breath was very foul. However, she persisted that it was temperamental, as she had had an attack as a teacher some years before, and thinks that she was prone to it as a child. She was hyper-conscientious, and had too much ambition for her strength.

Though her blood-pressure was only 128, her diet was lacking in succulence, and she had been taking extra milk, but without causing constipation. Thinking that improved metabolism might help her, I prescribed a week's vacation, with golf, a more succulent diet, and a mixture of hormones. In a few days the blood-pressure fell to 105, diastolic 55, and she "felt like doing nothing at all and without mind," so that the golf was stopped and she was put to bed. Whereupon the blood-pressure, after five days slowly rose to normal, the reflexes diminished, the tissues were firmer, but the pulse-rate mounted to over 100, going to 120 sometimes, and slight exophthalmos appeared, with the sign of Mœbius. There were no sweats, the breath was less foul; she felt clear mentally. Mixed hormones were stopped. She was then given secretogen and advised to return to work the next week, which she has accomplished satisfactorily since (5).

Chronic Confusion.

(5) That a great many cases of *chronic* mental alienation supposed to be idiopathic are in reality toxicogenetic is becoming clear (9). Most significant is the autopsy material of the Massachusetts State Hospital, in which every case of 100 carefully studied showed kidney lesions (10).

When confusion becomes chronic, internment is usually imposed, often with a diagnosis of dementia præcox, which is regarded by Régis as merely the chronic form of the mental confusion of Chaslin. From Kraepelin's rubric, Régis (11)

excludes cases of constitutional origin, usually the hebephrenics, which undergo rapid involution at puberty. The others, he maintains, begin with an acute attack of mental confusion due to toxin, usually show catatonia, and often end in dementia. Otherwise, there is a gradual failure, with delusional formation, inversely proportional to the rapidity of the dementia, and, finally, a permanent defect.

The recovery of some of these cases, even after long periods, is in harmony with the conception of Régis that a factor outside the cerebrum itself is at work. This is in no way antagonistic to the finding of lesions in the brain itself by Southard (6), for we know that toxin can produce neuronal damage. A most remarkable recovery of a confusional state of seventeen years' duration was recently reported by a Pennsylvania psychiatrist; and I myself (12) have reported one of recurrent maniacal confusion of toxic causation, which was completely removed when we prevented the auto-toxæmia of excessive eating, which at each alternate menstrual period produced an acute confusional attack, with rise of temperature, leucocytosis as high as 30,000, lasting for ten days or so, and leaving the patient quite normal in the intervals.

(6) It is less well known, however, that an acute mental confusion sometimes occurs in consequence of secondary syphilis (14). In this there is always found an intense congestion of the meninges, and there is consequently an abundance of lymphocytes in the cerebro-spinal fluid, which is not always the case in chronic endarteritis; although even here some meningitis is the rule and the fluid shows an increase of cells (15).

(7) In this place I do not consider in detail the mild, recurrent chronic confusion which is often an accompaniment of, and sometimes substitute for, recurrent headache. That it is also a toxic phenomenon seems clear from the study of a considerable number of cases (17) where successful management is based upon a view of their pathogenesis more precise than those hitherto set down without adequate thought by most authorities. The following is an example:

Marked confusion due to metabolic migraine resembling petit mal (7).—A bacteriologist, æt. 30, was referred to the writer in the spring of 1912, by Dr. Paul Johnson, because of attacks he called "bilious" (but not preceded or accompanied

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by constipation), which produced headache, preceded by numbness and prickling in the fingers, followed by dizziness, mental confusion, and foolish talk of paraphasic type, without loss of consciousness. These attacks had occurred every two or three months since the age of twenty-two; they were of very short duration; there were no scotomata, but they were formerly accompanied by vomiting. The headache was of the splitting kind, lasted all day, and was followed by dulness and slowness of thought the day following. The capacity to concentrate his thoughts was increasingly impaired, even between the attacks. He was at times irritable. He had no bad habits, and, apart from these attacks, he was well and strong. He received a blow on the left side of the head as a boy, and there was still a dent in the left parietal region, upon which side the headache more often occurred. He had a large appetite, which he said he controlled, but he ate meat thrice a day, although, he said sparingly. The blood-pressure was not raised, and reflexes and sensibility were normal.

Treatment and progress.—He was given the low protein "standard" diet. He wrote the writer the following winter: "Since I have reduced the amount of protein in my diet and, increased the quantity of vegetables, I have had no recurrence of those spells." Dr. Johnson informed the writer that he remained well to date, over five years later.

Therapeutic Summary.

(8) The treatment of confusional states should be easily gathered from the foregoing. It should not be a merely empirical dietary and effort at elimination, but should ever be directed towards combating the ætiological factor of the confusion. Thus, when the kidney is at fault, nitrogenous food must be diminished; so, also, when the liver (8) is disturbed. When exhaustion has occurred, nutrition must be ample. When the internal secretions are disordered, it is to these that attention must be directed (13). When psychological factors are at work, they must be met with psychotherapy. Physiological irritability must be counteracted not by depressants or narcotics nor by forcible restraint, but by hydrotherapy, fresh air, and non-stimulating food. Even in patients violently disturbed, the death-rate where narcotics are used is much greater than when psysiotherapy is employed alone, *e. g.*

Gregg says, in recounting their experience at the Boston Psychopathic Hospital:

"The result of the eliminative treatment of the delirium with relative freedom and hydrotherapy, and a minimum amount of medication, far excels in effectiveness the usual treatment by restraint and depressant drugs in cases of the symptomatic psychoses, including alcoholism.

"Every general hospital should be provided with the facilities for treating properly cases of delirium. Such facilities should include isolation wards where quiet is not essential, and continuous bath apparatus for hydrotherapy."

Very striking is the difference in the death-rate among fifty cases of delirium tremens in five general hospitals, comprising ten cases from different hospitals in New York, Philadelphia, Baltimore, and Boston. These were treated by depressants and showed a mortality of 26 *per cent.*, while ten cases from the Boston Psychopathic Hospital were without mortality, in spite of the fact that they were older and more complicated.

In the acute and grave cases measures may be required more drastic than those employed in the cases I have related. Such are: rectal irrigations, saline injections, intravenously or *per rectum;* but these with caution, lest chlorine retention on account of renal hypofunction, by causing œdema, should aggravate cerebral incompetence; hyperhydrosis by electric-light baths or hot-packs; or even bleeding or rachiocentesis.

References.

(1) See author, "The Origin of Supernatural Explanations," *Journ. Abnor. Psychol.*, 1915, and *Med. Record*, 1916.

(2) Compare the cases related in my "Prevention of Suicide," *Amer. Journ. Insanity*, 1914.

(3) "The Syndrome of Adrenal Inadequacy," *Journ. Amer. Med. Assoc.*, December 9th, 1914.

(4) See author's "Psychogenesis and Internal Secretions," *Montl. Cyclopæd.*, 1911.

(5) Regarding psychogenetic disease, see author's Cleveland lecture on "Treatment of Psychogenetic Disorders." See also "Spurious and Genuine Psychotherapy," *Illinois Med. Journ.*, October, 1914, and *Med. Press and Circ.*, January, 1916, and the fourth case in this article. See also "Prevention of Suicide," *Amer. Journ. Insanity.* "Psychogenetic Disorders in Childhood," *Journ. Abnorm. Psychol.*, 1912; *Wash. Med. Annals*, 1912; *Amer. Journ. Med. Sci.*, 1911; *Post-graduate*, 1912. "Treatment of Hysteria," *Journ. Amer. Assoc.*,

November 9th, 1914. "The Traumatic Neurosis," *Amer. Journ. Med. Sci.*, 1915, and *Journ. Criminal Law*, 1916.
(6) Southard and Canavan.—*State Board of Insanity Reports*, 1915.
(7) "Treatment of Epilepsy in Accordance with Pathogenesis," *Interstate Med. Journ.*, April, 1915; *Rev. Neurol. and Psychol.*, March, 1915; *Med. Record*, 1915.
(8) *Soc. de Biol. de Paris*, 1903–1906.
(9) *Massachusetts State Hospital's Reports*, 1915.
(10) *Ibid.*
(11) *Congrès des alienistés*, Paris, 1904, and in *Précis de Psychiatrie.*
(12) "Concerning Diet in Nervous Disorders," *New York Med. Journ.*, 1912.
(13) *Med. Record*, 1917.
(14) Author, *International Clinics*, 1909, Ser. 20, vol. i.
(15) See Vincent, *Thèse de Paris*, 1909, and author, *Med. Record. Path.*, "Progress of Tabes and Paresis," 1909.
(16) At Detroit Session of *Amer. Med. Assoc.*, June, 1916; *Therapeutic Gazette*, April, 1917.
(17) *Journ. Amer. Med. Assoc.*, 1916.

(1) Condensed from paper read before the American Medico-Psychological Association, 1916. Published in full in *International Clinics*, 1916.

Clinical Notes and Cases.

Some Notes on Battle Psycho-neuroses. By E. FRYER BALLARD, Captain R.A.M.C.(T.), Medical Officer in Charge of Mental Observation Wards, Second Eastern General Hospital, Brighton.

THERE is nothing new in the symptoms comprising the syndromes—generically dubbed "shell-shock"—arising from the circumstances of battle. But to those of us who have had large numbers of these cases passing through our hands, new ideas have been suggested, or the confirmation of old theories brought home.

It is not proposed to describe symptoms in detail in this paper, nor to give statistics as to the percentage of cases showing tremors, mutism, or what not—we are all familiar enough with the symptoms of hysteria, neurasthenia, etc.—but to study the question broadly, if briefly, from the ætiological standpoint.

First of all it may be said at once that loss of consciousness from physical or atmospheric concussion due to "blowing up" or burial is, in the vast majority of cases, merely the last straw in the production of the psycho-neurosis.