EXPLOSIVE RAGE FOLLOWING HEAD INJURY.

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In 1899 Kaplan described the "explosive diathesis" as follows: "Following the most trivial and impersonal causes, there is the effect of rage with its motor accompaniments. There may be the most grotesque gesticulation, excessive movements of the face, and a quick, sharp explosiveness of speech; there may be cursing and outbreaks of violence, which are often directed towards things; there may or may not be an amnesia for these afterwards. These outbursts may terminate in an epileptic fit. There is an excess in the reaction, with inadequate adaptation to the situation so remote from a well-considered purposeful act that it approaches a pure psychic reflex act in the shape of an almost or entirely unmodified explosion not unlike a convulsion. The explosive diathesis is not characteristic of head injuries, but is also found in hereditary degeneration, in alcoholic degeneration, etc."

We have been unable to trace any descriptions of these cases in the literature; although many authors quote Kaplan's descriptions and refer to the "diathesis" as a complication of head injury, no cases have been described. Kaplan himself gave the above description in a paper on the part played by head injury in the genesis of mental disease; he promised to amplify in a later paper, but as far as we can find out, he never did so.

A diathesis is a constitutional predisposition; therefore a diathesis cannot be a complication of head injury. Although it may be that some of these cases have a constitutional predisposition towards exhibiting excessive rage, what is described by Kaplan is not a diathesis, but a symptom. It is a symptom that occurs after head injury, in epilepsy, in mania, in depression, and among aggressive psychopaths. It is becoming increasingly important, as head injuries become commoner both in war and peace. Furthermore, owing to the nature of the symptom, the subjects showing it are liable to come up against the law. It seemed advisable to investigate these cases with present-day psychological and physiological methods, which were not available to Kaplan.

This symptom is something different from the state of irritability which is so common after head injury; indeed, four of this series were not irritable apart from the attacks; it has an explosive element which lifts it out from the background, whether the background is one of normal mood or irritability or depression. It is a rare condition; in a series of 2,000 cases of head injury, only 10 cases exhibited attacks of explosive rage coming on dramatically subsequent to the head injury.

Case 1.—This patient, aged 34, was born in a caravan and brought up in a travelling fair, having no settled home and being taught in as many as two or three different schools in a week. He did fairly well as a scholar, considering the drawbacks he suffered, leaving school at the age of 14 in Standard VI. Since then he has spent his life in the travelling-show business, riding in the "wall of death" on a motor cycle, and running a boxing booth. It might be thought that his upbringing and mode of life did not encourage the formation of a very stable character, yet he was apparently hard-working, even-tempered, reliable, and to some extent a successful showman. He asserts he was always placid and happy-go-lucky in his dealings with other people; if he had been at all short-tempered he would never have been able to carry on in the boxing booth, as he was not a particularly skilful boxer and needed all his wits to keep off the energetic local aspirants. As it was he was frequently floored, and on at least a dozen occasions had been knocked out. There is no history of epilepsy or any nervous instability in the family.

There is no indication of any neurotic traits in his personality, though, like most nomads, he was superstitious and given to reading omens into unimportant and adventitious happenings. At the outbreak of war he volunteered for the Army, and after three months was made a corporal.

In 1927, while riding on the "wall of death" he shot over the wall on his motor cycle, hitting the left posterior parietal region of his head on the ground. He is said to have been

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unconscious for four days; he had headaches for a few days, but after a month in hospital he remained perfectly well.

His present illness dates from an accident while on duty near Newmarket on the night of December 13, 1939. He was leaning over the radiator of a lorry repairing the engine when he was suddenly aware of a screech of brakes on his left-hand side; he just had time to see two car lights almost on top of him as he turned to his left, when he was struck on the left hip by the skidding car. He remembers no more, but apparently he was dragged some 20–25 yards further down the road before his head struck part of another stationary lorry.

He had a post-traumatic amnesia of two and a half days. As he came round he was vaguely aware of the ward surroundings, but at the same time he seemed to hear a confused jumble of voices, shouts, and the noise of brakes being applied; he saw two yellow car lights and had a vivid impression of being dragged along on his back—these sensations lasted about two minutes in his own estimation before he became fully conscious. He was kept in hospital twelve weeks, making an apparently fair recovery, but still having frontal headaches two or three times a week. On return to his unit he soon noticed his first symptoms of loss of temper; he does not remember the actual incident, but he apparently became aggressive and threatening towards another man. After this incident he was sent to a mental hospital because of his extreme aggressiveness and threats of violence.

He was ten weeks in this mental hospital, where he once, shortly after admission, attacked two male nurses in a fit of temper.

From June, 1940, till his admission to the Military Hospital for Head Injuries at the end of October, 1940, he remained with his unit. He was continually up before his officers on charges of violence; the slightest provocation would make him strike out blindly, even at his superiors; two pints of beer would turn him into a dangerous maniac. In the words of his M.O., "In one of these frenzies, which I myself have seen and which I can vouch for being genuine, after only three and a half pints of beer it took four men to hold him down."

He had never been in any trouble before his head injury, and this inexplicable change in his behaviour made his M.O. suspect that he must still be suffering from the effects of his trauma. On his advice he was put to work on his own, and worked excellently on the repair of motor vehicles, but still could not brook any interference or reprimand.

Further inquiry showed that between his violent outbursts he remained his old cheerful, easy-going self, and that all, or nearly all, the explosions of rage occurred in a very definite manner, which the patient himself described spontaneously as "something like a fit."

These attacks took the following form:

(1) He would be aware of an intense feeling of restlessness and uneasiness "as if something was going to happen," which lasted two or three minutes. This feeling usually came on for no apparent reason, but might occur if someone said something which irritated him. It was, however, something subjectively much more vivid than mere irritation.

(2) He would then have an hallucinatory experience. This consisted of the sudden sound of brakes squealing, the confused noise of men shouting and the appearance of two car lights on his left-hand side, which were present even if he shut his eyes. He seemed to feel something heavy, like wheels, going over the side of his head (as far as is known this did not occur at his accident). The whole hallucination, which did not last more than a minute and probably only a few seconds, was accompanied by a feeling that the patient never liked to describe—"It's terrible, terrible, worse than anything I know; I'd sooner be dead than go on feeling like that."

(3) All this was followed by a sudden severe stabbing pain in the right side of the forehead and a "crushing, crumbling feeling on the left side of the head." During this third stage he felt unsettled, bad-tempered and aggressive; his appearance altered and he assumed a sullen, shifty look; there appeared to be some slight oedema around the eyes and of the lips, but no flushing of the face and no noticeable alteration in blood pressure or pulse rate. This stage lasted anything from half an hour to a whole day, and during it if anyone checked or annoyed him he became very violent. Usually, but not always, he had a subsequent amnesia for happenings in this period. If he was alone he would continue with his work, but might break his tools or throw them on the floor for no apparent reason. While in hospital he once tore up all his snapshots and knew nothing about it till later he found to his chagrin the torn fragments.

(4) The third stage almost invariably ended with another hallucination: he heard a vague confused jumble of voices for two or three minutes and soon began to realize that his bad temper had left him. It was frequently in this way that he would become aware that he was in the guard-room under arrest and would wonder how he got there. After the hearing of this jumbled noise he had a mild, heavy feeling across the brow for some hours.

During his stay of four weeks in this hospital he had about a dozen of these attacks. He made a great effort to control himself, and when he felt an attack was imminent he would go off by himself so as not to lay himself open to any circumstances which might lead to violence. Apart from tearing up his snapshots during one attack and several times being extremely rude and threatening to the nursing staff (a trait quite out of keeping with his normal character) he did not give way to these impetuous urges. He often has the feeling that he would like to break down and cry, but he does not let himself.

Clinical examination.—His mood is cheerful, helpful and full of fun; he likes to sing and to do tricks to amuse the nurses and other patients; but at times he is sullen and argumentative, although always respectful towards officers.

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Sample of talks.—" Well, Sir, I can talk to you. It's like this. When I'm like this, I'm alright ; but when I get that feeling, honest, I'm telling you, I might be sitting quiet and a man comes up to me, say that Sergeant, and pushes me or shouts at me, and in a minute I'll straighten his face out. . . . Well, it drives you crackers, people arguing with you ; I got to slug 'em, it makes you mad. . . ."

Intelligence.—His intelligence as judged by the routine tests for memory, performances and general information was average for his education and social standing.

Personality.—He is somewhat egocentric, rather boastful, and his vanity is tickled by a little flattery. He is usually cheerful and good-tempered, and mixes well with the other patients, being well liked by everyone. He was described two years later by the Sister who looked after him as a most charming personality. He liked to be the centre of attention, and would relate to the nursing staff tales of his experiences in France, in which he always played a heroic part.

Attitude to the Army.—He enjoyed every minute of the army before the accident ; but since then everything seems to have gone wrong. He says, " I haven't had a square deal ; chaps nag at you for no reason at all, and if you say anything at all, you're on a charge." Before his accident he never resented discipline or being shouted at ; now he cannot bear having anyone over him. If any of his mates pulls his leg he flies into a fearful temper, whereas before his accident he was easy-going and " always ready to make a mug of myself for fun."

Physical examination showed no abnormality in the central nervous system or of the alimentary, respiratory or cardio-vascular systems.

Radiogram of skull normal. Air encephalogram showed slight generalized atrophy of the left frontal lobe. The body of the left ventricle is broader than the right, and the anterior part of the left frontal horn extends further forwards and upwards than the right. C.S.F. pressure 120 mm. ; protein = 35 mgm. per 100 c.c. No excess globulin. Cells = 0. W.R. negative in blood and C.S.F.

Electroencephalogram showed throughout the record bursts of high-voltage waves of great frequency, characteristic of epileptic disturbance. The pattern of the wave strongly suggests that this patient falls into the group of the psychomotor epilepsies.

This example of explosive rage raises the question of the relationship of the symptom to the previous personality. Is this symptom due to an unmasking of a previously latent trait of the personality, or is it something new in this person's make-up, such as the change in behaviour which follows epidemic encephalitis ? This patient, before the head injury, could not have been considered neurotic or psychopathic by any standards. After the head injury he showed no other changes in personality besides the explosive rage ; he remained cheerful and ready to help and amuse, pleased with himself and extroverted ; he was not bad-tempered apart from these outbursts, and he was not depressed.

Similar in all these respects is—

Case 2.—This pilot-officer, aged 31, had been educated at one of the larger public schools, and did well at work and games. He had been very successful in his career, a professional one, being the youngest man in the country to hold the particular job which he held. His wife states that he was always cheerful and never irritable. His colleagues confirm this opinion, and add that he had a particularly good memory.

He was admitted to High Wycombe Hospital comatose from a head injury, bleeding from the right ear, and with a fracture of the right tibia and fibula.

When he arrived at this hospital he still had a right facial palsy, and hearing was impaired on the right. Later his retrograde amnesia was 24 hours, his post-traumatic amnesia 19 days, with small islands within this period.

He was a difficult patient, always complaining about every little thing, such as the food, and the unreadiness of the nursing staff to fulfil immediately his many requests ; he was impatient at being in hospital. He said himself that he was now liable to tantrums which he had never had before ; he found his memory slow and very poor compared with what it had previously been. Investigation showed that the loss was for recent events only ; it was moderately severe ; for example, he could not remember the names of the nurses in the ward, although he was often told. This defect in remembering would make him irritable whenever it became obvious to him.

One day the following incident occurred : He was walking along the corridor on crutches, his right leg in plaster, accompanied by Sister. On coming to a step 4 in. high he lost his temper, becoming wildly agitated. He insisted that he could not surmount the obstacle, and that the help the Sister was giving him was useless. Two orderlies arrived, but the patient became more excited, crying and shrieking out, first that they were pushing him on his face, then that he would fall on his back, and did not they realize that he weighed 15 st.? He screamed that they were fools and quite useless, and would no one come and help him. Within two minutes he had recovered his composure, and was profusely apologetic. Similar lesser outbursts had been occurring since his admission, but before this incident they had taken the form of moods of increasing impatience and fidgetiness.

Radiogram of skull (Major Hugh Davies).—There is a Y-shaped fissure of the right parietal and temporal bones. One limb of the fracture is passing deep into the right temporal fossa.

The EEG was grossly abnormal 19 days after injury. There was a persistent rhythmic wave, with a frequency of 1 to 2 a second in both hemispheres. It was much more persistent, and had a much purer form on the right side than on the left. One week later the EEG was practically normal. There were very occasional isolated slow waves in the occipital regions, but the record

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was practically within normal limits. A fortnight later there was no change in the EEG from the previous record. It was considered within normal limits, although there were still occasional waves 2 to 3 a second, which may have been normal for him.

This patient apparently showed no abnormal aggression before the head injury; these outbursts seem to have been something entirely new. In such a case, before the head injury, there would have been no reason to suppose that this person might develop attacks of violent rage; nor would there have been reason to forecast that this form of mental disorder would be the one to which this person would succumb, given that a head injury in this case were followed by affective disorder. Indeed, as far as can be judged on the evidence, a knowledge of the previous personalities of these two cases and some of the others presented would not have led an observer to think that sufficient instability were present to cause any form of mental disorder; although it may justly be said that without a knowledge of subconscious tendencies or previous features of the personality no reliable opinion on this could be formed.

The following case can also not be said to have been predisposed to explosive rage, although his previous personality was less well adjusted to his environment than those of the former two cases.

CASE 3.—This sergeant was complaining of headaches, fits of depression and fits of uncontrollable rage.

On June 25, 1940, he had been involved in a motor-cycle accident. The retrograde amnesia was 9 hours, the post-traumatic amnesia 7½ hours. There was bleeding from both ears, nose and mouth. Five weeks after the accident he got up, and a short time later he went home.

Two days after his return, without any reason apparent to himself or others, he suddenly began to feel depressed; he wanted to sit down and cry. As the result of a trivial disagreement with his wife, he flared up and went "almost raving mad at her" for about ten minutes. He shouted and stamped around the house, hardly realizing what he was doing. Then he became aware of his behaviour and was filled with shame at his outburst. In the following week he had two further moods of depression, culminating in an outburst of rage against his wife over some trivial incident; on one occasion his wife asked him to go round the corner to get a bottle of milk; he immediately flew into a rage, asked if she thought he was the milkman, and then rushed out of the house, walking five miles before he fully realized what had happened.

Three or four more of these attacks occurred during these first three weeks of sick leave. He became so worried about these inexplicable outbursts of depression and anger that he reported sick. Taking his medical officer's advice, he tried going for a walk when the depression came on, but he felt anxious lest he might become violent should anyone speak to him in the street. He had had several more typical outbursts before he was admitted to hospital. They would come on only during periods of depression and irascibility. During these periods minor incidents would rouse him to heights of rage; his face would be pale, his hands and forehead would sweat profusely; his expression would be sullen and he would curse and yell. He knew no cause for the onset of the period of depression, but the actual outburst of rage did need a trigger—a small incident which would not have caused any upheaval when he was not in a period of depression. In one of the outbursts he threatened to kill another patient, and when restrained, kept hurling insults at him, and the nurses. On the following day, although self-pitying, he was still much occupied with his dislike of the other patient. The periods of irritability and depression would last from half to one hour. He had insight into the change in his behaviour, and stated that this was something quite foreign to his previous character.

Apart from the outbursts he was usually irritable. He also showed some intellectual deterioration—a factor not present in the two other cases so far described.

No family history of mental or neurological ill health.

Previous history.—He reached Standard VI at school, leaving at 14. After working as a labourer for four years he joined the regular Army at the age of 18, and became a sergeant in four years. He describes himself as having been cheerful, even-tempered and amicable; a description fully substantiated by reports from his officers.

Physical examination.—*Nil* abnormal.

Radiogram of skull normal.

C.S.F. Pr. 130. Constituents normal.

EEG was repeated on several occasions; it showed the normal 10 a second frequencies in the posterior portions of the hemisphere and in the parietal areas, where there was, in addition, an oscillation of frequency between 18 and 20 per second, of which the voltage was at times as great as that of the 10 a second frequencies. There were no abnormally slow frequencies in the record, and the response to hyperventilation was a normal one.

As it was seen that he was beginning to think he had better be discharged from the Army, it was decided to send him back to duty.

On June 9, 1941, he was readmitted. The story was that on leaving hospital he was sent on a month's sick leave by his unit. When he was at home his fits of depression and uncontrolled rage and headache became worse. The least little thing seemed to irritate him, causing him to flare up, although he always felt sorry afterwards. On returning to his unit he had seven different moves. During this time he was always reporting sick. In view of the nuisance he would be in the Army, it was recommended that he be discharged from the Service.

On the evidence concerning this man's previous personality it would not have been thought that he was excessively aggressive. We were informed that in childhood he had been treated as a semi-invalid, as a doctor had said he had a cardiac murmur, but although this may have

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interfered with a normal psychological development, it did not cause any outbursts of rage or even irritability. However, it must be admitted that in this case there was insufficient evidence about his previous personality for it to be known whether the head injury had unmasked a previously latent character trait, or if it had introduced something new into his make-up.

In these cases the head injury played an all-important part in the genesis of this symptom. The following case came under our care as he had had a head injury; but this did not play a part in causing the symptoms. It also raises the question of the possible relation of the symptom to epilepsy.

CASE 4.—Gnr. H—, aged 29, was admitted to this hospital on March 24, 1941, complaining of headaches, depression and fits. He had sustained a head injury ten years ago, when he had fallen from an apple tree on to the back of his head. The retrograde amnesia was a few minutes, and the post-traumatic amnesia about 24 hours. He states that he was kept in hospital a few months, during which time he can recall no symptoms, stating he had no headaches, although he thinks he may have been depressed. The only thing he can remember is that a few weeks after leaving hospital he had a fit. He was walking along when he fell to the ground unconscious, without any warning; he was unconscious for about 15 minutes; there was no incontinence or tongue-biting; on waking he had a severe headache, which lasted the rest of the day. He can give no details as to how many fits he had, but they occurred at any time of day or night. After the first few fits he was incontinent of urine during the attack. He was readmitted to Cardiff Royal Infirmary, where the fits were seen by the medical staff. He was told that his face twitched during an attack, and that his limbs moved. He never had an aura, and none of the fits was of Jacksonian type. He continued to have attacks until 1936—that is, six years after the injury. When the attacks ceased the headaches persisted, and have become more frequent in the last few months.

He has suffered from depression since the injury. He found that he did not want company, preferring to be alone. Often at night he would walk out into the country on his own, and there he would sit, savouring his solitude and depression. His mind was more or less a blank during these periods, and he thought of nothing in particular. He knew of no reason for his depression. He did not work for some years following the injury. He married some years ago—he does not remember how long. For about three years he was working as a cook and spending his evenings making wireless sets. During this time his headaches were severe and frequent, and he was rarely free from them.

One night, nearly three years ago, his wife asked him to stop his work and come to bed. His mind then went blank; when he awoke he was sitting in his chair and the room was full of people. Apparently he had smashed the wireless set in a rage and then tried to strangle his wife. He very nearly succeeded, but her screams brought in the neighbours. He was extremely worried about this, as he was deeply in love with his wife. He had never had an outburst of rage like this before.

One year ago he volunteered for the Army, saying nothing about his history of fits. He enjoyed the life quite well, making friends in his unit; but he still had headaches and periods of depression. There was, however, one man in the unit who did not like him and who baited him persistently. One evening this became too much for the patient, who saw red and hit him in the eye. A fight ensued, of which he remembered nothing. As no N.C.Os. were present no disciplinary action was taken. Since this affair he has been full of remorse. "He had an awful eye; it caused him great suffering, when there is already so much suffering." He brooded over this "sin." He was transferred to Brigade H.Q., but he did not like the change. He says that sugar and sausages were constantly being stolen, and he had to sit up to guard against this. He began to wonder whether there was any organized plot against him, for there were never any fatigue men to help him, the cooks were constantly being changed and so much work was thrown on him. He began to sleep badly, his depression increased and his headaches occurred daily.

Two or three months after the heavy bombing of Cardiff began he became extremely depressed. He felt that the bombing was his fault; that he had committed some sin, but he did not know what it was, otherwise he would have tried to expiate it. His insomnia became worse, and when he did sleep he had terrifying dreams. At night he lay in bed, while an unknown, unrecognizable voice spoke to him and told him he was to blame for all the suffering which was going on. His dead mother used to speak to him by day and night, telling him what to do. At night he would feel that someone was pulling his hair—"Look, you can see where it is coming out," he says, pointing to a normal head of hair. He has frequently considered suicide. Some years ago he drank a cup of disinfectant and he has been reconsidering doing this. He has some rather vague ideas of reference.

The intolerable burden of his unknown sin, the responsibility of sitting up at night to guard the rations, his insomnia and headaches, led to his being sent to hospital. On being admitted he was feeling depressed and was apathetic. He began thinking the other patients were talking about him.

Past history.—No previous illnesses, faints or fits, delusions or depression before the head injury.

Physical examination.—A depressed, anxious-looking man.

Central nervous system.—He is right-handed. Cranial nerves—N.A.D. There is moderate weakness of all movements of the right upper limb, and the tone is slightly increased. Some inco-ordination is brought out by the finger-nose-finger test. The left upper limb is normal, as

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are the lower limbs. Reflexes are all brisk and equal, and the plantar responses are flexor. There is a considerable degree of loss of postural sense in the right upper limb, and impairment of two point discrimination in the right hand.

Cardio-vascular system.—N.A.D. B.P. 135/85.

Mental examination.—He is in touch with his surroundings, and on good terms with the Sister and M.O., taking them into his confidence, but he has nothing to do with the other patients. There is great depression of activity; he shuffles round the ward slowly, and spends much time sitting still or lying on his bed doing nothing. He takes a long time to respond to questions, so long that one thinks he has forgotten them. During the interview he sits bolt upright in his chair with his hands on the arms, only moving to hunt through his pockets to show the M.O. letters and photographs of his family. He eats little, and has to be encouraged or he would eat nothing. His talk is limited in scope and vocabulary, and he speaks slowly. He is always depressed and looks abjectly miserable; at times he appears bewildered.

The EEG is abnormal. There are comparatively high voltage abnormally slow waves in the posterior parietal and occipital regions. These have a frequency of three a second. A high voltage three a second wave emanated from a point in the anterior parietal region on the right side. This single outburst, together with the character of several waves, is extremely suggestive of epilepsy.

In view of his confessed suicidal tendencies it was decided to transfer him to a mental hospital.

It will be noted that this patient, who came from epileptic stock, had fits; and that the first outburst of explosive rage occurred two years after the last fit. There was no record of the patient's previous personality apart from his account, but it seems that he had not had fits or faints, and he denied any previous depression. Whether the patient would have developed his present mental disorder without a head injury it is impossible to judge. One would tend to think that the form this disorder took depended on his constitutional make-up; that the head injury brought out trends which were already latent in his personality. The attacks of explosive rage might be the manifestation of a latent aggressiveness, or they could be epileptic equivalents.

This was the only case of our series who had typical epileptic fits, and one of the three cases which strongly suggested that the outbursts of rage might be a type of epileptic fit.

The next case also comes into this group.

CASE 5.—This guardsman, aged 26, had sustained a head injury while riding a bicycle in the black-out.

He had a retrograde amnesia of seconds and a post-traumatic amnesia of three days. On waking he had a slight headache, but it had gone a week before admission to this hospital. From the moment he first came round he had noticed a persistent queer musty smell. Since getting up he felt depressed.

Physical examination.—The only abnormal sign found was anosmia.

A radiogram showed bilateral diastasis of the lambdoid sutures.

For the past three weeks he has had the following attacks—he has about two every other day: He suddenly feels a terrible hate for somebody and wants to strangle them or hit them. When it comes on he sits down in order to stop himself carrying out the impulse. He then has a terrible conflict between two parts of himself; he sees it as though he is divided into two—one part sitting and entirely ruled by this impulse to be violent, the other part standing behind and to the right of the sitting part, telling him that this impulse is wrong and must be resisted. This split between the observing and observed parts of his personality is very vivid. It lasts, he thinks, about ten minutes. During the attack he feels "as strong as a lion," as though he could easily smash a chair or two; but the feeling is that he wants to tear people to pieces, not furniture. It ends with a throbbing sensation in his forehead synchronous with his pulse; then it is gone in a flash, leaving him with a feeling of relief, but feeling weak, depressed and apathetic. He is conscious enough of being in the explosive state to wander off into the garden so as to get away from people, but he is unable to tell anyone that he is having it. He has no knowledge of when an attack is going to come on, and it makes no difference whether he is occupied or not, or what time of day it is. He is convinced that one day it will be too much for him, and that he will injure somebody. Two other patients have observed him in an attack; one reported that he was very wild-looking, the other that he was frowning. The attacks have never been precipitated by any emotional stimulus, although he is more irritable than he used to be before the head injury.

His temper is always bad after them, and remains so for the rest of the day; but on other days he is more irritated by minor annoyances than he used to be. For example, the other day somebody said he had played a wrong card during a game; he could not speak, he was so furious; he was frightened that if he had answered him back it would have led to a fight. This fury lasted about ten minutes, but he continued to feel bad-tempered all the rest of the day.

Past history.—He is an only child. His father was a strict and religious Welshman, whom he respected and of whom he was frightened. He considers that his mother spoilt him. He says that he used to be very obstinate with his mother, but he did not dare be so with his father, who, he says, had a very bad temper. His father would flare up in a second over any little thing: he might be making a chair and something would go wrong; he would then smash the whole thing. He was always strict with him and forbidding.

He is very conscious of being a mother's boy, and spoilt, and therefore timid, and he blames his mother for this with some heat. On leaving school his mates used to go around in gangs,

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playing tricks on people, getting into trouble, and calling after and following girls. He would have liked to have joined them, but his father forbade it and he did not dare. At the time, owing partly to having to stay at home instead of being with the other lads, his worrying about his belief that other people would think he was a mammy's boy became acute, and he became antagonistic towards his mother; this was increased by his not daring to disobey his father, as he wished to. Finally, before the age of seventeen, he left home on account of a quarrel with his father. He came to London and joined the Guards, as he thought it would harden him and give him the discipline he needed.

Ever since joining the Army he has had attacks of depression, coming on usually in the afternoon. During these attacks he says that at first he wants to laugh or at any rate make some noise and then to cry. He then admitted with much blushing that at these times he thinks the other men are talking about him. He had never told anyone about this before. He is quite convinced that they are doing so, as he sees them stop and look at him and then go on with their conversation; he is quite unshakeable in this conviction. The kind of things they say about him are all to do with his being a coward, being frightened and timid and having no guts. He knows that they say "He is yellow; he's really a sap; he is frightened of everybody." As they do not come out into the open he is powerless to deal with them; but at these times he longs to fight them and show them that he is not frightened. During these attacks of paranoid depression he feels somewhere near as furious and violent as he does during the present attacks. But apart from these periods, he states that he used to be mild-tempered; he seems to have been moderately successful in keeping these feelings away from the rest of his life, whereas now he feels ready to fight people all the time. Being convinced that he was fundamentally a coward, unlike other men, he was always on the look-out for a fight to vindicate his honour in his own eyes. It was chiefly for this reason that he went in for hardening and discipline, although he did not like it. Similarly he has more than once refused promotion in the Army; he felt unworthy of it, and could not see himself ordering other men about and being above others.

He later related that at the age of thirteen he went through an obsessional period; its obvious feature was that he had to touch lamp-posts and telegraph poles, and avoid cracks in the pavement. This phase seems to have become latent before he joined the Army. On questioning, he states that he always takes a long time to come to any decision, has difficulty in making up his mind and that he never acts on impulse.

When asked whether he associated his present attacks more with the feelings of temper he would have liked to give vent to when he used to think the other men were talking about him, or with the conflicts he would have over his need to touch a telegraph post and his belief that he should not do such a stupid thing, he associated them more with the obsessions; the conflicting element in both seemed to him to be similar.

After discussion of his difficulties over a period of a month he became happier and less worried about himself; but there has been no shaking his conviction that the other men of his unit used to talk about him. He now noticed that since the accident he was not quite as good at figures as he used to be, and that he could not work out quite simple sums.

The EEG showed some slow waves with frequencies of 5 to 7 a second in the right parietal region towards the vertex. Elsewhere it was within normal limits. It was repeated one month later, and a similar record was obtained. Before he was discharged to duty it was repeated in association with the water pitressin test and with hyperventilation; but no clinical or EEG epileptic activity was brought out.

This case differs from the others already described in that the patient before the head injury had shown abnormal aggressive traits. It is true that he had never had attacks quite like these before, but he had had attacks of paranoid depression and he had shown some obsessional features. In addition to the attacks he was always ready to fight, although he and the pilot-officer of Case 2 were the only two of the series who were not actually violent towards others. There was no family history of epilepsy, and the patient had had no fits. There were features of these attacks which bring epileptic equivalents to mind; such as the suddenness of the onset of the attacks, without any obvious stimulus, occurring at any time of the day or night; the manner in which the attack passed off, accompanied by a throbbing in the forehead; the curious state of consciousness during the attacks, in which he knew he was having it but was unable to tell anyone so at the time, although afterwards he could relate the whole matter. It is also outstanding that in this case there was no environmental cause of the attacks, however slight; it is true that in the other cases the cause was, as Kaplan calls it, "trivial and impersonal," and would not pass as a cause in average people or in these people before their head injuries; but this patient's attacks would come regardless of the external environment, and regardless of whether the patient was occupied or not, alone or in company, at meals or in bed at night.

The following patient, who was sent into hospital on account of attacks of impulsive behaviour, came from an aggressive family, and had himself always had a violent temper.

Case 6.—This man, aged 32, fell off a ladder in October, 1941; he hit the ground with his right occipital region 10 ft. below. He was unconscious about five minutes. This accident was not followed by any immediate sequelae or headaches.

The following account was obtained from the patient by Major C. W. M. Whitty:

The patient was quite well until December, 1941, when he started having severe, throbbing, bi-frontal headaches. At about the same time he noticed he was becoming emotional and easily upset. He found himself crying at patriotic films, and was irritable and easily angered.

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He related that on three occasions he had become intensely angry about little things, and had behaved in an aggressive manner; he stated that he had no real memory of this behaviour. The following is an account of these three episodes:

(1) He became angry about an argument with a room-mate while dressing in his billet, and walked out into the street in his shirt and pants. Some of his friends brought him back with difficulty; he was aggressive and tried to resist. He does not remember walking out of the billet; he remembers being annoyed about something, then nothing more until he came round lying on his bed.

(2) While going into the mess at midday he got into an argument with a Sergeant. He remembers feeling very angry and "everything rushing to his head"; he came round some time later, and was told that he had attacked the sergeant.

(3) One month ago he became involved in an argument with his room-mates. He remembers being intensely angry, then nothing more until he came round sitting on his bed, feeling dazed. He was later told that he appeared dazed and had sat on the edge of the bed, complaining of dizziness for about a minute. Then he got up and started throwing his kit about; he smashed the window and hurled some of his kit through the frame.

Each of these episodes had been preceded by and followed by severe headaches.

Family history.—He states that his parents were quick tempered. To his knowledge there is nobody in his family who has ever had fits or been in a mental hospital.

Past history.—He says that he was nervous and shy as a child and used to keep to himself. He was always quick-tempered, and would quarrel with his sisters and mother. He remembers being punished for throwing things about when in a temper.

Mental examination.—He is rather restless, aggressive and sullen, and he appears anxious and apprehensive; in the ward he keeps to himself and sits by his bed all the time. He feels at times that people are talking about him and that his unit have got a down on him. He has no insight into these paranoid features, but is aware of his mood and behaviour changes. He is dull and backward.

Physical examination.—No abnormal physical signs.

Special investigations.—Radiogram of skull normal.

C.S.F. Pr. 140 mm. No block. Protein 30 mgm., 6 cells per c.mm. Water pitressin test negative.

This trivial head injury can have played no part in causing these outbursts of rage, which are obviously an integral part of his character. One supposes that this patient would have developed them had he had no head injury.

The next case, which was also observed by Major Whitty, always had an excessively aggressive personality.

CASE 7.—This patient, aged 27, was complaining of periods in which his mind went blank and in which he did not know what happened, but he had been told that he fought out.

He had taken up boxing seriously at the age of 14, at first as an amateur, later as a professional. During his boxing career he had received multiple head injuries. At 23 he gave it up on his doctor's advice; he was taking severe punishment at the time; he was counted out several times, but he states that he was never really knocked out. He had boxed three times in the year preceding admission, being knocked out in two of them. At the age of 19 someone cracked a bottle on his right mastoid region; he was unconscious seven days, in hospital 14 days, and then he discharged himself.

Five or six years ago, while working for a firm in Oxford Street, he had an argument with a customer; his mind went blank. He next remembered coming round feeling exhausted. He was told later that he had fought the customer.

Two similar episodes have occurred while in the Army. The last one occurred after an argument at a dance. He remembers turning round to see a man he had previously been arguing with, and then nothing more until he was entering his billet, a policeman asking him his name and number. He was told that he had hit out at the arguing civilian.

He states that he has suffered from periodic severe headaches, usually right-sided; these are accompanied by coloured spots and sparks dancing in front of his eyes, so that he cannot see properly. It is during these periods that he feels especially irritable, and it is usually then that he has one of these attacks; but he has had at least one without this migrainous attack. He states that his memory is not as good as it was, and that he is inclined to be depressed; when he is feeling depressed he is liable to get the attacks; then he cannot get on with anyone, and wants to be alone—"Boxing seems to be the only thing that eases me."

Family history.—He says that his father was always quick tempered; he was often knocked about by him, as were his siblings. After the age of fourteen he stood up for himself. His mother is not quick-tempered, but one sister is; she throws cups about, and is always arguing. There is a constant row in the family.

Past history.—He describes himself as always quick tempered. He left school in the top class, but has never kept to one job, as he was always sacked on account of fighting.

Physical examination.—No abnormal physical signs.

Special investigations.—Radiograms of skull normal.

C.S.F. Pr. 100 mm. No block. Protein 30 mgm., cells 2 per c.mm. Lange curve and W.R. negative.

Water pitressin test negative.

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Prominent in this case was a family history of violent temper; indeed the picture of the family environment as painted by the patient is reminiscent of the Duchess's kitchen in *Alice in Wonderland*. Taking into account this background and the fact that the patient had always been ready to fight and that he was a keen boxer, we are justified in assuming that this man had an excessively aggressive personality before his multiple head injuries. His attacks never came on without some cause, and according to the patient they only occur when he has migraine, although he did admit to one occurring without. His attacks of rage stopped quite suddenly; during the attack he would not be aware of being in this state, and he had no memory of it afterwards.

In the next case there is no evidence of an excessively aggressive previous personality; the head injury was followed by other changes in personality and by some intellectual deterioration.

CASE 8.—This sapper, aged 21, was admitted complaining of headaches.

Three months before, he had been knocked down by a car. He was still drowsy five days later—at the time the C.S.F. contained 60 mgm. of protein and 33 lymphocytes per c.mm.; there was a right lower facial weakness. A fortnight after the head injury he was still disorientated, but rational. The air encephalogram was normal six weeks after injury.

The patient states that three months after the head injury he suddenly got a desire to hit somebody or to smash something. Three weeks after the injury a nurse had come over to open a window near him; he rudely said she was not to do it; when she continued opening it, he knocked her down. Although this incident was witnessed, the patient denied knocking her down; he says he only argued with her.

While on leave three months later he was listening to a friendly argument between his mother and a neighbour; he nearly attacked the neighbour, but was prevented by his parent.

The patient says that at these times he feels in a terrific temper against the person; this lasts about an hour, and then stops like "the flick of the fingers." His mind keeps on saying "No, no," and it seems as though his chest and stomach are holding him back. He knows when he is having one of these rages, so that he could inform someone. He usually lies on his bed, closes his eyes, and does not listen to what is going on. He has two or three attacks a week, but he is usually able to control them without being violent. Once, he said, he had one in a shop; he had been to the cinema; he thinks there was no particular stimulus of the attack, except seeing the crowds in the shop; he says he threw his weight about, shouted so that the whole shop could hear him, made insulting remarks to the shop assistants, and was just about to smash the stall up when his mates took him off; he let himself be led away without a struggle.

He states that since the head injury he feels nervous all the time. He trembles if someone in authority talks to him, and if he has to do anything, particularly before the eyes of others, as he thinks he will not do it right. He is frightened of traffic, as he is terrified of being knocked down again. He feels he could not play football again or box. He has lost interest in reading, as he finds it hard to get the point of what he is reading; when eventually he does get the point, he loses it again in half an hour, so that he cannot take in the story. Since the head injury he has diminished libido; he finds that he cries easily, and he weeps all through films.

Previous personality.—He describes himself as having just an ordinary kind of temper before the head injury; as a child he was never rough; he says he was strong but not tough.

Mental examination.—He showed a good deal of intellectual impairment.

EEG normal.

There is no evidence in this case of a previous excessively aggressive personality, nor are the attacks at all like epileptic equivalents. Apart from these outbursts he is not irritable. He shows more intellectual defect resulting from the head injury than any other of our cases, and probably more changes in personality than the others, but Case 3 also showed marked changes in this respect.

A similar outburst in hospital brought the next case to our notice. He was a civilian, for whose notes we are grateful to Dr. Eric Gutmann and Mr. J. C. Scott.

CASE 9.—This young man, aged 19, had a motor-cycle accident five weeks before admission. For a fortnight he did not speak; when he began, he used baby talk, and only repeated a few words.

In the fifth week he pushed a nurse over in a fit of temper. A few days later he knocked a sister down and nearly succeeded in strangling her. After he was pulled off her, he cried and was most distressed at his behaviour; he kept on reproaching himself and called his victim a "hundred per cent. nurse."

Three months after the head injury he was still mildly euphoric and was still having sudden outbursts of temper. He showed some impairment of memory, and very marked disturbance of concentration and attention. At this time his retrograde amnesia was at least seven hours and his post-traumatic amnesia at least a week.

Special investigation.—A radiogram showed a large fissure in the right occipito-parietal region and a similar one in the right temporal region.

An air encephalogram showed some dilatation of the frontal horns.

The EEG showed an abnormal discharge from both frontal areas.

Five months after the accident the patient's condition was about the same. He was still very garrulous and his whole personality was coarsened. He had recently had an argument with his mother, lost his temper and kicked a chair across the room. He made childish mistakes in speaking; for example, he said "breaked" instead of "broke."

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Eleven months after the accident he showed some improvement. The people he was living with described him as "slightly quick-tempered," but there had been no outbursts of violence, and he seemed to have adjusted himself quite well to living in a community. He still made spelling mistakes, but his speech appeared normal. He scored 42 out of 60 in the Raven Matrices test, but he was not quite up to standard in the usual tests of learning and concentration.

This case was the only one of the series who was euphoric. He had obviously become childish since his head injury—a feature also shown by the next case. His intellectual impairment and personality deterioration were associated with cerebral change as shown by the air encephalogram and the abnormal electroencephalogram in the frontal lobe area.

CASE 10.—This guardsman had sustained a severe head injury, with a retrograde amnesia of 9 hours, and a post-traumatic amnesia of 14 days. When examined 4 months later there were no abnormal physical signs and the radiograms of the skull and electroencephalograms were normal.

Family history.—His father was depressed and usually bad-tempered.

Past history.—He had an unhappy childhood, which the patient attributes to his father's state of mental health. He ran away from home twice. He left school in Standard VI. He later gave up four jobs on account of having rows with the employer during his moods of depression. He joined the Guards at the age of 22, but he never liked the Army. A letter from his commanding officer, to whom he was batman, gave the man a very good character. Since childhood he has had very frequent bouts of depression associated with irritability lasting up to three days with no exogenous cause; they clear up suddenly and also apparently causelessly. During these periods the irritability may be so marked that he often has fights, and on one occasion he nearly strangled his wife. He has always been suspicious and never trusted anyone; has never had any intimate friends and has always preferred to be on his own.

Mental examination.—He is depressed and worried, restless and irritable, suspicious, and complaining of deterioration in his power of remembering. He is frightened of cars, air-raids, and any sudden noise. He is anxious about his mental condition, as he is getting into trouble on account of it. Soon after returning to his unit following accident, he was put on a charge for surliness; this was soon followed by another one for not obeying an order. When he went on leave he kept quarrelling with his wife. He said, weeping, "I don't want to do it; but I just can't help it. I had never quarrelled with my wife before."

While in hospital he would often be found on the verge of tears, and when repentant after one of his attacks of rage he would cry. His behaviour and appearance were slovenly, whereas his commanding officer described him as always very smart. He also said that he was always somewhat childish, but this feature had undoubtedly been increased since the head injury.

He had one of his outbursts about every ten days. He would gradually get more irritable and surly, until he had an outburst of rage. Then he would be most penitent. He remained friendly and helpful, although somewhat depressed and childish until the attack. For the night or two before the attack he would sleep badly. Then he might refuse to get up in the morning, and if pressed, be rude to the Sister and threaten her, using, as he once said, language which formerly he would not have used in front of his mates. In one of these he smashed all his crockery. The actual outburst needed a trigger to start it off; he was aware of this, and so would go and sit in a room alone, so as to avoid a fight.

There is no doubt that he has always been liable to moods of this sort, but the head injury has aggravated a pre-existent tendency, and converted what was an intermittent disorder into one that is now more or less continuous. The alteration in mood is severe, and of almost psychotic intensity.

In this case the head injury accentuates the basic tendencies of the subject's previous personality. This is a typical case, in that the mental disturbances caused by head injury are usually due to an accentuation of previous traits and tendencies; the subject has less control over them than before. The periodicity was a striking feature in this case; in fact, irritating circumstances which would be passed over in the few days after the outburst would lead to an attack during the irascible period; so that he reacts differently to the same stimulus at different periods. The attacks do not come on suddenly, but appear as the culmination of a period of bad temper and surliness; he is not at all excited during the outbreaks and shows no expansiveness, remaining essentially depressed until the attack is past, but this surly depression is a much milder syndrome than that of Case 4 or that of the next case.

CASE 11.—This patient, aged 27, was admitted to this hospital after five months' service in the army. His head injury had occurred in May, 1937, and was due to a car accident. He had a retrograde amnesia of three days and a post-traumatic amnesia of three weeks. On recovering consciousness he found his right arm and leg were very weak.

When he returned to work he was troubled by headaches, and started drinking gin to ease them; this led to his being sacked from his job on account of drunkenness. He then had several changes of job, and he could not settle down. His memory is definitely worse than before the head injury; he may go into a shop and have to leave, as he cannot remember what he went in for. If he tries to concentrate on a book or anything he gets a headache and his attention wanders. If he is reprimanded over anything he will brood over it for a long time. He states that he has been very much more irritable since the accident. He threw up one job in a fit of temper, telling the boss to put away his own bus if he was not satisfied with the way he did it. He admits that his marriage was not a success owing to his behaviour; he kept on losing his

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temper and telling his wife to clear out. He finally assaulted her on account of a rather vague suspicion that she was going out with his father; for this assault he received one year's imprisonment. He frequently used to attack his father, his wife, and his dogs.

He described himself before the accident as quiet and conscientious. He would be depressed at times for several days on end, especially when he felt the responsibilities of his work were too much for him; but he says he was cheerful on the whole, and he thinks that he did not show his depression much. He had periods of fairly heavy drinking, alternating with periods of relative abstinence, but he did not relate these to mood-swings. He denies any periods of elation. He admitted to always having been quick tempered, "but nothing came of it."

Mental examination.—His mood is described in his own words: "I'm just resigned to things, but I do not allow myself to brood." In hospital he showed explosive outbursts of violence, particularly on two occasions after he had managed to obtain some alcohol.

Physical examination.—The right pupil is larger than the left, both reacting normally. There is a slightly increased tone in the right limbs, and a slight tremor of the right arm; small movements are very clumsy on the right; all reflexes are increased on the right.

Radiogram of skull normal. Air encephalogram normal. His EEG showed scattered slow low-voltage waves in the right occipital region.

Progress notes.—On March 29, 1941, the following message was received from the Chief Constable, Halifax: "On the 19th of March he was brought before the Halifax Borough Court charged with unlawful wounding, and he was remanded for one week in custody, for mental observation and a medical examination. On the 21st of March he hanged himself."

The following case also came into collision with the law, on account of this symptom.

CASE 12.—The patient complained of headaches, dizziness, and outbursts of bad temper.

Five years ago he fell from a height of 20 ft., hitting his head on an iron girder while bricklaying. He had a retrograde amnesia of a few minutes, and a post-traumatic amnesia of three weeks, with islands after 24 hours.

He had no headaches, but felt a little dizzy when allowed up. After six months off work he tried to return to his former job of brick-laying, but he found that when he climbed a ladder, he felt faint and had to come down.

He loses his temper much more readily than he used to before his accident. Now the least little thing annoys him, such as someone shouting; but he also gets in a fury without any apparent reason. About five months ago he hit a policeman with whom he had just been having a friendly argument. About two months ago he lost his temper with the cook; he fought him and knocked him against a pot of boiling fat, which scalded them both. About ten weeks ago he saw some soldiers fighting in the street and so he joined in and knocked one of them out.

He has had these impulses to attack people only since his head injury. His mother states that he is a completely changed character.

Raven Matrix test: 23 out of 60—mental age of 12. Physical examination: B.P. 160/90. Bilateral ptosis—probably congenital. EEG normal.

DISCUSSION.

After reading the notes of the above cases, it is clear that they do not form a homogeneous group. There was no particular type of case which, following head injury, would be liable to develop this symptom. While it is obvious that injuries of similar severity do not cause the same mental effects, it could not be shown in all cases that the subjects who developed this symptom had a predisposition towards it, and that they had lost some of their self-control owing to the head injury. This may be due to insufficient information about their personalities; but three of the series (Cases 2, 8 and 9) had never shown any evidence before of being excessively aggressive; and we have seen a case—not included in this series, as he exhibited no explosive rage—who showed, during the period of unconsciousness and uncontrolled behaviour, great affability, charming good manners, friendliness and a tendency to joke; but when he had left the period of amnesia and had become rational, he was very irritable, excessively aggressive, boorish, and always ready to snap at his friends; his uncontrolled personality was quiet and friendly, but his "normal" post-traumatic personality was abnormally aggressive. That this symptom is sometimes due to a general loss of control of giving vent to emotion is shown in some of these cases by an equivalent loss of self-control in other ways; most conspicuous is a tendency to dissolve into tears. Of two cases with excessive manifestation of aggression before injury, Case 6 complained that he had noticed himself becoming emotional and crying at the cinema; Case 10 was unable to talk about his outbursts of rage towards his wife without weeping; after each outburst he would weep with shame, and often on other occasions he would be found in tears. Four of these twelve cases showed obviously aggressive personalities before head injury (5, 6, 7, 10); three did not (2, 8, 9); in the rest there was insufficient information on which to base an opinion. Case 5 had always been irritable during

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the attacks of paranoid depression, and had wanted to fight his imagined persecutors and had always been pugnacious. Case 6 described himself as always quick-tempered, and related many episodes from his childhood of being punished for throwing things about when in one of his rages. Case 7 had been a boxer since the age of fourteen. Case 10 had always had moods of agitated depression associated with irritability, which were apparently endogenous. On the other hand, Case 2 was said by his wife to be always cheerful and never irritable; she had never seen him in a temper before; this opinion was confirmed by his colleagues. Case 8 stated that he had had an ordinary kind of temper before the head injury; he had never been rough, and had never really lost his temper before the injury. Case 9, according to his parents, had always been easy-going and cheerful, and had never shown outbursts of temper.

This symptom is not necessarily the culmination of a phase of irritability; not all cases were irritable. Case 1 was always cheerful and ready to amuse; Case 7 was cyclothymic, having the attacks only during the depressive phase; Case 8 was calm and apathetic; Case 9 was childish, cheerful and euphoric. In nine of the series some stimulus, however slight, was needed to start off the attacks; in one case the stimulus was merely the emotions aroused on seeing the crowds in a shop. But in three (1, 5 and 9) the attack was unrelated to the external environment. In Cases 3 and 10 the outburst of rage would occur at the height of a period of depression; at this time a stimulus would set off an attack which at any other time would pass unnoticed.

Half of these cases were depressed; in some this symptom itself was apparently a main cause of the depression; the patients were horrified at their lack of self-control and were alarmed at the possible legal consequences, and they were frightened that they were becoming insane.

Seven of the series showed intellectual deterioration, four showed none. One case only (9) was euphoric.

Six cases had normal electroencephalograms, six had abnormal ones; but there was no localizing site of abnormality or type of encephalogram common to this type of case.

Not all these cases had had very severe head injuries; Case 3, for example, who came to hospital on account of this symptom, had a P.T.A. of only a few hours, and Case 4 had a P.T.A. of 24 hours. In Case 6 the head injury could have had only a very minor precipitating effect in causing explosive rage, if indeed it had any. But the average length of P.T.A. was seven days, indicating that these were severe cases; in seven cases it exceeded a week and in four two weeks.

The relation of this symptom to epilepsy is raised by Cases 1, 4 and 5. These cases had shorter P.T.A.s than the average of the series, the longest P.T.A. being two and a half days. In Case 1 the attacks always occurred in the same form, which the patient himself described as " something like a fit." Suddenly he would get a feeling of apprehension and restlessness, without an environmental cause; this was followed by an hallucination accompanied by a feeling of great terror or dread, defying description. Then came the explosive rage, with a peculiar sensation in the left side of the head. There was an amnesia for this time, during which he would perform actions typical of epileptic automatism. As the attack went off he would have a vague auditory hallucination. The EEG was typical of epilepsy. Case 4 was the only one of the series having typical epileptic fits; two years after his last fit he had the first attack of explosive rage; here there was a family history of epilepsy. In Case 5 epileptic equivalents were suggested by the suddenness of the onset of the attacks coming out of the blue, and the attacks going off after ten minutes with a throbbing sensation in the forehead synchronous with his pulse. The attacks would leave this patient irritable and bad-tempered, incidentally, unlike Case 10, whose irritability would be relieved by the outburst. Cases 1 and 4 had EEGs supporting this diagnosis; the EEG of Case 5 a few months after the injury was normal. But this case does not fall so readily into the epileptic group as the two others. In these three cases the attacks would come on without any environmental cause or provocation. With the possible exception of Case 5 we regard these cases as epileptic, and the outbursts of rage as a manifestation of " sudden excessive rapid discharges of grey matter " to quote the words of Hughlings Jackson. Case 5 showed the typical features of a compulsion neurosis; but the sudden onset of the attacks was unlike the usual dilemma of an obsession, although

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most obsessional conflicts are based on aggression; the patient himself thought that the attacks were more nearly related to his earlier touching compulsions than to his periods of paranoid depression.

Only two of our cases (2 and 5) did not have to be restrained from hitting people; in Case 2 the outbursts were never so severe that any violence was shown; the patient merely shouted and became very agitated; in Case 5 the patient had an intense conflict in his mind, but to outward appearances nothing was ever noticed except that he wandered off with a wild look. In this case and in Case 10, during the attack the patient's personality retained an observing factor in consciousness, so that he was not totally involved in the rage; in the other ten cases there was no room in consciousness for any emotion or thought except rage, so that the subject was quite uncontrolled and made no attempt to control the emotion.

From a forensic point of view these people may well be considered as persons who are insane at the time of the attack. An act of violence committed during epileptic automatism is not considered punishable, as the epileptic is considered unmindful during that time of the consequences of his acts; certainly the same must be said for these cases which suggested epilepsy. For it is thought that the pathological state of the brain causes the violent act, and not the subject, and that without this pathological state the subject would have acted otherwise. But it must not be assumed that in all cases of epilepsy the subject is powerless to resist the attack. The phenomenon of an epileptic being able to avert a Jacksonian attack in various ways has been well known to mankind since the time of the ancient Greeks. Penfield (1938) has shown that during electrical stimulation of the cerebral cortex on conscious subjects "the demand of an electrode is not always irresistible." Although stimulation of area 4 or 6 of Brodmann produces a movement which the patient cannot inhibit, stimulation of the brain of an epileptic patient at a distance from the motor cortex sometimes produces what he describes as a desire to move a certain part. By making a conscious effort he can prevent such movement." But even allowing for this possible power of inhibition, the fact remains that the epileptic, owing to his cerebral disorder, has these impulses which normal people do not have. At the time of the attack he is considered insane and unable to distinguish right from wrong.

But the epileptic exhibits abnormal behaviour not only at the time of the attack; and this behaviour is typical of epilepsy, and, it would seem, due to the epileptic diathesis. Ribot (1896) characterized the epileptic personality as follows: "Even in periods of calm, the universally noted psychological traits reveal a sombre, morose, irritable, but above all, irascible disposition." From electroencephalographic studies we now know that epileptics usually have subclinical attacks, and that the epileptic "in periods of calm" may show an electroencephalogram that is pathognomonic of his disorder. The difference between the electroencephalogram of the epileptic at rest and the epileptic during a convulsion is one of degree; all intermediate stages between the two electroencephalograms can be found. From the clinical point of view, too, it is doubtful if a line can be drawn between the state of epileptic furor and that of the epileptic equivalent; and, as we have seen, it is rather arbitrary whether one places epileptics with explosive rage in one category or the other. Norwood East (1926) states: "There would seem to be no doubt that epileptic furor may result in crime which is remembered when the epileptic has become his ordinary self. . . . My own experience is that the epileptic act of automatism is not remembered, and I derive support in this from the views of Savage, Maudsley, Mercier, Pietersen, Jelliffe and White." But we consider that too much weight should not be given to this question of amnesia. During epileptic twilight states the subject may be aware that he is in an abnormal state of consciousness, and he may remember afterwards full details of that state, including his feelings. He can be given poetry to learn during this state, and he may be able to reproduce it when he has returned to his usual state of consciousness. The psychological processes of registration and retention continue normally in many cases of so-called "organic" amnesia; the disorder is usually in recall; this disorder is also the only one in hysterical amnesia. Confirmation of this can be had by obtaining the forgotten material under hypnosis or barbiturate hypnosis in cases of head injury, metrazol or electrical convulsions, or Korsakow's psychosis. In hysterical amnesia the happenings during a state of automatism may be unobtainable by any means, or they may be reproduced under hypnosis; and in

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epileptic automatism the same applies. Just like the irascible mood of the epileptic, the twilight state may go on for days. Bleuler (1937) describes the affect of the two conditions as follows: "Particularly common are the epileptic equivalents associated with anxiety or rage, which may lead to brutal acts of violence towards himself or others. . . . Also the moods . . . of which the irascible are the most notorious; in these the patient is irritated by everything that occurs and behaves in such an aggressive manner that conflicts are unavoidable." It seems, then, that if the epileptic is considered not responsible for his actions at the time of the attack on account of the pathological state of his cerebration, he should have a good case for showing that for the same reason he is not responsible at other times either. The question whether the patient would have committed the act of violence had he not had an epileptic fit is surely insufficient; it would seem necessary to ask, would the patient have committed the act had he not been an epileptic? The man's make-up itself might then be considered adequate excuse for his criminal act.

If epileptics can escape responsibility for their acts in this way, then the man suffering from a traumatic cerebral lesion should doubtless come into the same category.

If he shows personality changes, lack of emotional control, or intellectual loss, he should have no difficulty in convincing a jury that at the time of a possible assault he should be considered insane and incapable of distinguishing right from wrong. But a man who was known to have had previously a markedly aggressive personality would have more difficulty. Four of our series would certainly come into this group. These cases would be hard put to it to show that the attacks of explosive rage were due to cerebral damage. But if the attacks are not due to cerebral damage, they are symptomatic of a pathological mental condition; it can reasonably be argued that any person exhibiting this symptom is not of sound mind at the time of committing the act, and that this unsoundness of mind overrides reason and judgment, obliterating the sense of right and wrong. For it would be invidious to declare that epileptic cerebration is exempt from the censure of the law, whereas other pathological processes causing the same results are not accorded the same privileges.

The disposal of our cases shows that the prognosis regarding these patients becoming useful members of the community is bad. Four had to be invalided from the Army; one was returned to light duty for home service only: one had to be sent to a mental hospital; one later committed suicide in prison, where he was detained on account of wounding with violence; one was sent to a neurosis centre, whence he was boarded out of the Army; three were returned to full duty as A1; one, a civilian, took a few months before he returned to work, and then he was still liable to fits of temper.

Summary.

Twelve cases of head injury suffering from attacks of explosive rage are described. The relation of this symptom to various recognized disease entities and its forensic implications are discussed.

Owing to their military duties in different parts of the world, one of the authors was unable to see the later stages of this paper; therefore he (J. M. McGregor) is not responsible for the discussion or the views expressed.

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