

PSYCHIATRIC SYNDROMES FOLLOWING BLAST.

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THIS paper is concerned with a group of cases presenting certain psychiatric symptoms following exposure to the detonation of a nearby high-explosive bomb. These cases show features and present problems which appear from the current literature in this country to have received insufficient attention, or none at all. The cases to be presented are not all of equal significance, but in each there are certain common features which, from the psychiatric angle, have a definite and unmistakable organic stamp, and indicate a relationship, direct or indirect, of the syndromes to structural changes in the brain. These symptoms are characteristic in fact of a slight or moderate degree of cerebral trauma. This relationship is prone to be too easily overlooked. The reasons for this are:

- (1) The absence in many cases of a definite history of head injury.
- (2) The absence as a rule of at least a long period of unconsciousness.

In consequence, when the patient is seen perhaps some considerable time later this possibility is not considered, and the reaction is dismissed as psychogenic. That this can be done even by trained observers was demonstrated in three of the cases about to be described. All the patients except one were Naval personnel who were exposed to blast in air-raids either ashore or at sea.

CASE I.—Aged 37.

This patient was referred complaining that his "nerves were bad." On inquiry he stated that he was depressed, easily fatigued, appetite poor, bowels constipated, and that he trembled. He stated that on the night of 28.iv.41 he was engaged on Passive Defence duties. He was assisting the driver to connect up the hoses to a trailer pump. An H.E. bomb fell approximately 30 to 50 yards away. He remembers somebody shouting "Down," but he didn't hear the scream nor see the flash of the bomb. He remembers getting down on the ground, and as he did so he heard the explosion. He was not hit, but felt the blast. He rose to his feet at once and felt dazed. There was no loss of consciousness and he carried on with his duties. He felt "fairly well" until the morning when he reached home when "it seemed everything seemed to go from me; my memory went." His wife was living some miles away in the country, and the patient set out to join her. He has no memory of having crossed the ferry (which was necessary), and remembers nothing till he reached home, when he remembers getting out of a furniture van on arrival. He remembered everything clearly from the time the bomb fell till the following morning, as described. He went to bed on reaching home. His family said he looked "queer," but he does not know in what way. Since this he has felt nervous and shaky. He had no further amnesia, but complained since that his concentration was poor, e.g. he didn't remember what he read. His sleep was also poor.

Family history.—One brother had what was evidently a reactive depression following his father's death. The maternal grandmother was said to have been nervous. There were no details of this.

Personal history.—The patient was a healthy child, who, amongst other childish ailments, had developed scarlatina followed by otitis media and a mastoidectomy at 8. Beyond this no other serious previous illness. He reached Standard VII at 14 and was an average scholar. On leaving school he obtained employment in the dockyard, where he had remained up to the time of the accident. He was married and had one child, a boy, aged 10. He was evidently a stable personality. Alcohol and tobacco moderate. On examination he looked dull and depressed. He gave an impression of all-round slowness in his responses, unlike depressive retardation. He stated that he had lost interest and wanted to go on his own and not talk to people. Orientation was correct. There was some failure in retention, e.g. he failed to give an address correctly after three minutes, and in giving five figures backwards he failed in all the series given him. He failed to reproduce a simple story. He performed serial sevens correctly, but required two minutes. He stated that in performing such tests he was "not so swift" as normally, and added, "If you go to do anything quick you can't seem to do it." Neurological examination revealed nothing abnormal.

He was admitted to an R.N. Auxiliary Hospital on 18.x.41. A report from the Hospital states: "The results of mental testing on this man are as follows: His I.Q. as given by verbal test battery is 98 per cent. He attains average adult level in three separate vocabulary tests, found some difficulty in doing Koh's blocks, reached only the 12th percentile of the matrices, and failed completely in three simple sorting problems (involving the formation of fresh categories). These striking discrepancies are characteristic of moderate to severe intellectual damage."

An electro-encephalogram carried out on 12.xi.41 shows "no definite abnormality," but "several very large slow swings of potential suggestive of a labile galvanic skin condition" suggested "some emotional disturbance."

This is a case characterized by an organic syndrome and depressive features; whether the release of a constitutional tendency or reactive to his sense of inadequacy is hard to decide; probably both factors co-operate.

CASE 2.—Aged 20, single.

This rating had deserted, and because of his abnormal mental state was referred for psychiatric examination. He complained of "dizziness at times and pains across the front of the forehead" lasting two to ten minutes, and occurring several times a day. He joined the service in August, 1940. In January, 1940, he developed influenza. During the attack he became depressed, self-reproachful, unable to concentrate and had ideas of suicide. His sister was also suffering from a depression with similar ideas at this time. The patient's depression lasted until June, 1940, and gradually cleared up. By the time he joined the Navy he was quite well. He remained well until Xmas, 1940, when he again became depressed, felt he couldn't carry on, didn't care what happened to him and felt he was no good at his work. By March, 1941, he had improved greatly, but still had brief moods of depression lasting an hour or so. On April 3, 1941, he was on duty when a bomb fell outside the building in which he was working. He heard the sound of the exploding bomb and was blown across the floor. His head, he states, was struck by fragments of a clock which was knocked off the wall, and his head struck a door. He did not lose consciousness, but felt "a very numb sort of sensation" which lasted five to ten minutes. After half an hour or so he was able to pull himself together, and was able to help his mates. He noticed he was dizzy and that he was very slow in doing things. He remembers everything which happened after the bomb fell. He could not sleep that night because of "jabbing pains in his temples." He had no appetite for the next few days. The next day he felt dazed at intervals, most marked towards the evening. He felt, when he walked, that he would have liked to have gone faster, but could not. The same night he noticed that he had difficulty in speaking, because his jaws felt numb. In the succeeding days he noticed that he was more forgetful than usual, e.g. he forgot to do things he was told to do. He carried on with his duties, but at the beginning of May, 1941, he felt "tired and fagged out completely." About this time he went on seven days' leave. At home he felt he only wanted to lie in bed; he was depressed, and this continued to the day of the examination, the phases of depression lasting from hours to days. On occasions he said his mind went "blank." He became increasingly self-absorbed. He returned to duty and evidently managed to carry on. On 26.viii.41 he again went on seven days' periodical leave. This time he again felt tired and unfit for anything strenuous and kept quiet accordingly. He remembers leaving home on 2.ix.41 and boarding the 9 p.m. train to the junction. He does not remember catching the train at the junction. The next thing he remembers is being in Bournemouth five days later (7.ix.41). He states that after looking round he recognized the place. He remembered eating a few sandwiches during this period of five days, but remembered nothing else, and a vague memory of having slept at the junction. He then met one of his sisters by chance. He had a meal with her and noticed that he was very hungry. He remembers going to the station to look up the trains. He left Bournemouth later in the evening and went to London. He should have changed at Southampton, but he had no memory of having passed the junction. He remembers going into a Y.M.C.A. in London with some soldiers and staying there till the morning. He also remembers going about the town. He stated he was puzzled at finding himself in London. After a day and a night he wandered to Kingston, where he had an uncle. He walked most of the way. He couldn't remember where exactly his uncle lived, but he stated he met his aunt in the street. He stayed with his aunt one night and then went on to see a sister at Chertsey. She became worried about his state of mind and made him see a doctor. He was eventually examined at the local Military Hospital. He was brought back to the depot by an escort and charged with desertion. From the time the escort arrived he remembered practically everything, and quite realized that he was absent without leave. He said the arrival of the escort "brought him to his senses."

Family history.—One sister has had recurrent attacks of depression.

Personal history.—The patient was a healthy child. He states that he had suffered from fits in childhood, the nature of which was uncertain; otherwise no serious illness. He reached Standard VII at 14, and school life was normal. On leaving school he obtained work as a gardener, and remained at this till he volunteered for the Navy. He was always an anxious, sensitive individual, and was prone to think others were talking about him. Alcohol and tobacco moderate. On examination he was a heavy-looking youth of dysplastic build, who looked rather worried and depressed. He said he "did not feel very bright." Asked why, he said he was beginning to realize the mess he had got himself into. He gave the month and year correctly,

and after some hesitation the day of the week; he did not know the precise date, but knew that it was near the beginning of the month (6.x.41). His retention was poor, and he failed to repeat five digits forwards. He performed serial sevens correctly to 51, then made four errors in the remainder, taking $2\frac{1}{2}$ minutes over the test. He failed entirely to give five digits backwards, and made mistakes in elementary arithmetic, e.g. $(17 \times 5 = 84)$ and $(29 + 46)$. He repeated a simple story correctly. He said he found difficulty in concentration at times, and complained often of difficulty in finding the right word—"It's on the tip of my tongue and I fail to put it into words, though I feel I'd like to." There was no demonstrable difficulty in naming objects. He stated later, "My mind's a jumble; I can't seem to concentrate on the figures." He seemed essentially indifferent about his recent amnesia and resulting conduct, and showed a dull, apathetic attitude tinged with concern, an apathy of which he seemed aware. He had to be roused a little to reply, and all his answers tended to be monosyllabic. Whilst adrift he states that he felt no interest, and couldn't pull himself together. He said that when conversing he felt "at a dead end." Neurological examination showed slightly irregular pupils, moderately dilated, which reacted sluggishly to light (direct and consensual), and much better to convergence. Otherwise negative. Lumbar puncture on 30.x.41 yielded a clear fluid, pressure 110. On compression of jugular vein pressure rose rapidly to 240 and fell to 130 mm. The fluid showed no pathological changes. Electro-encephalogram negative. Mental testing by a battery of tests showed a gross discrepancy between his scores in the general tests and those in the vocabularies, which was regarded as "highly suggestive of serious organic deterioration." The report goes on, "This deduction is supported by the characteristic difficulty he shows in doing simple sorting problems, involving the formation of fresh concepts."

This case also presents an organic syndrome with intellectual impairment and characterized by amnesic periods and fugues. In this case also there is an associated depression probably very largely endogenous, the symptoms of which are, however, heavily overlaid by the organic condition. Whereas before his injury this rating had gone through a fairly severe depressive illness and was evidently in the later stages of a second attack when the accident occurred, the essential mood was one of apathy, which is more probably a symptom of the organic state than of the depression. Indeed it is doubtful whether in this case we are entitled to regard the later picture as possessing a true depressive component. In other words, the concussion does not seem to have activated this reaction pattern, or at any rate not conspicuously.

CASE 3.—Aged 36.

This patient was exposed to blast on a night in April, 1941. A bomb fell just outside the building in which he was working. He was blown past a door-post, hitting it as he did so. He did not lose consciousness, but felt very dazed. At first he did not know where he was. He sat down on an open box and fell into it. He asked a bystander, "Where am I?" Soon after he became dizzy, nauseated and faint. There was slight transient bleeding from one nostril. During this period isolated details of the environment of an unessential kind stood out. He remembers noticing, e.g., that a kidney basin was given him to drink from, and thinking it curious, with mild humour. His memory of this period is hazy and fragmentary. He felt too dazed to sleep. The following day he felt dazed and hardly able to do his duties. He went alone into the town two days later. Whilst there he suddenly failed to remember where he was going, whether to another Naval establishment, where he had been stationed till a few weeks before, or his present one. His state apparently attracted attention, for a passer-by stopped him and asked him where he was going. Unable to get a satisfactory reply the other called a policeman. The patient then met another Naval rating who knew him and took charge of him. For the next half hour or so he remembers nothing until he again became clear and noted that he was in another street and that the sun was appreciably lower. A further amnesic period followed, and he does not remember reaching his station. Two days later he went to a neighbouring town, where he developed a severe headache and again had an amnesic interval. He became intensely depressed and worried about his condition and contemplated suicide. He was picked up by the police and returned. He was first seen on 28.iv.41.

On examination he looked depressed and broke down into tears from time to time. Asked about his mood he replied, "I don't feel too good. . . . a bag of nerves and this pain in my head. I don't seem to be able to control myself." He was very slow in speech and related his story with meticulous circumstantiality, omitting no detail, however trivial. He was correctly orientated. He showed a slight retention defect and his performance of serial sevens was imperfect. He complained he could not concentrate on reading, also that some people's voices jarred on him and he felt he wanted to scream. His sleep was poor. C.N.S., K.J's and A.J's exaggerated. Medium tremor of outstretched fingers. P. 100, regular, moderate volume. Electro-encephalogram negative. C.S.F. was under high pressure (120) and showed a slight increase of globulin.

Family history.—Essentially negative.

Personal history.—Healthy child. No serious previous illnesses till the present. No history of psychopathic traits. Did very well at school. Worked as metal machinist before being called up in August, 1939. He had been five or six years in the reserve. Married happily; two children. Always a stable personality if a little over-conscientious. Alcohol moderate. Non-smoker.

This is also a case of concussion with resulting intellectual impairment. The organic con-

dition evidently released or activated a depression in large part endogenous, but again the picture of the depression is contaminated; thus his emotional lability was probably referable to the organic cerebral condition. The possibility that the depression was also in part reactive to a realization of his state must be borne in mind and receives some clinical support.

CASE 4.—Aged 23, married.

This rating was quite well until 10.i.41. He was serving on his ship and was at "action stations" aft with a fire party. An H.E. bomb struck the ship about 40 ft. from where he was, but on this occasion he felt no blast. He helped to move the wounded and assisted in combating the fire. In order to shield himself from the heat he knelt down behind the ammunition carrier and held a branch pipe above his head to play on the flames. He next saw a blue flash and remembered no more until 3-4 hours later, when he found himself on the boat deck. He was then taken forward apparently, but does not remember this as he "went off" again. His messmates, however, told him that he had played "Ukkers" with them, then lay down and went to sleep, not waking up till the next day. He sustained a contusion of his right eye for which he was removed to hospital about 24 hours after the action. In hospital he recognized the patient in the next bed to him, and spoke to him. He felt sick, dizzy, and had a headache. He felt indifferent to his surroundings and was unmoved when the sirens went; he felt he did not care if he were bombed. He was told the radiograph of his skull was negative and he felt happy and relieved in consequence. The patient did not know if he had been blown over. On coming round on the boatdeck he remembers pulling a cork lifebelt under his head as a pillow. At this time he remembered feeling as if he had fallen from a height with a sensation of seeing stars, and that he had rebounded on several occasions, as if hurtled through space. This was accompanied by a feeling of horror, and during this period he remembered seeing his face making these movements through space. He also remembers other details of this period, e.g. pom-pom fire and seeing men fall over, but he remained indifferent to it all. He gazed at it all "as if it were something new to a child." He had no desire to smoke or to do anything. Evidently there was still some clouding, or at least some alteration of consciousness during his stay in hospital, since he felt he became progressively clearer, and he began to get worried by the sirens and over his people at home. His spirits improved and he began to feel quite happy, though he suffered from frequent headaches, which persisted till the time of examination by me on 12.xii.41. These headaches last about ten minutes and are made worse by stooping, but a blow on the head clears them up after a temporary exacerbation. He made a good recovery, and two months after the action he felt perfectly fit and did not wish to consult a doctor, far less a psychiatrist. He saw further action in the ensuing months, but this did not worry him. Some time after this he began to complain of pain behind the eyes and severe headaches again. He was sent to a shore establishment pending transfer to the U.K. and whilst there improved. He reached England in July, 1941, and after some leave he was employed as a diesel driver. He performed these duties satisfactorily and there were no further psychiatric symptoms until 6.xii.41. He was given 24 hours' leave and set out for home, 20 miles or so away. He missed his bus and set out to "hitch-hike." From this point until the following Monday (48 hours) he remembers no more. He was told he had been found in a train and taken home by a friend. On arrival he did not recognize his wife or mother-in-law. They communicated with the appropriate authorities and he was brought back on 8.xii.41.

On examination by me on 12.xii.41 he was clear and perfectly in touch. His memory showed no defect except for the 48 hours' amnesia. He made a very good impression and seemed entirely genuine. He related that for some time back relations with his 19-year-old wife had been difficult. The latter was evidently a selfish, unstable psychopath, who bitterly resented the fact of her first pregnancy, since this stopped her from dancing. She frequently threatened that she would commit suicide rather than go on with it. This worried the patient intensely, since he was not strong enough to cope with her, and said she always talked him round. He was sent to an R.N.A. hospital.

Family history.—His parents were dead and he had been brought up by foster parents. His father, he stated, had never wanted him. No relevant history was elicited.

Personal history.—He was evidently a normal child, and there was no history of any previous serious illness. He reached standard 7 at school and was fond of games. He worked as a fisherman till 19 when he joined the Navy. He was evidently a stable personality and he seemed to be an excellent type of rating. He was about to be promoted to leading stoker.

After admission to hospital he evidently had another amnesic period. It was further elicited that he was struck by a piece of shrapnel. This patient, after exposure to blast and a blow on the head with a piece of shrapnel presented definite organic symptoms which entirely cleared up. He continued to serve with efficiency afterwards. Following domestic friction he developed amnesic periods associated in one case with a fugue. These were regarded as being definitely hysterical reactions facilitated by a previous organic cerebral lesion. Whether the form of his reaction was also thus determined is hard to say, i.e. organic-like symptoms, memory disturbances, rather than another pattern of hysterical reaction.

CASE 5.—Aged 25, single.

The patient stated that he was on fire-watching duties on the roof of a building in April. He had just put three incendiaries out, when the building was hit by one or more H.E. bombs.

Just before this he had turned with "feelings of awe" towards the blazing city. This is the last thing he remembered till he regained consciousness in sick quarters the following morning, i.e. about eight hours later. He had sustained multiple abrasions and first degree burns and lacerations of his scalp. He was detained in the ward until 30.iv.41, and was discharged to ten days' sick leave. Whether he was unconscious on admission to the ward is not noted in the case record. When he regained consciousness he felt faint, weak and dazed. He could not concentrate and was noticeably forgetful. This state persisted whilst on leave and as a result of it he lost a petrol lighter in the train, and whilst at home forgot to carry out various small commissions, e.g. ringing up for theatre seats. One night during this period he got up and walked about half a mile into the country, evidently in a state of altered consciousness. He said he was only "half-conscious" at the time. "He knew what he was doing, and didn't know at the same time." The wandering was evidently purposeless. He called in his doctor and complained of faintness and restlessness, e.g. he would sit down and get up and go out for no reason at all and he found he had no interest in anything. He returned to his station in mid-May, 1941, and went again on 13 days' ordinary leave. On return he was put on light duty, but felt no better. I saw him for the first time on 11.vi.41, when he complained, "I don't feel my former self; I feel weak, unable to concentrate; I sleep badly and I feel proper shaky in general."

On examination he was depressed and complained of failure of grasp. He showed no improvement, and on 17.vi.41 he was admitted to an R.N.A. hospital, from which he was discharged on 21.vii.41. On return he was little if at all improved, but in the subsequent weeks there was some improvement, notably in his memory and powers of concentration, e.g. he was now able to read and retain what he read and was no longer so forgetful. On Monday, 20.x.41, he was referred to me again because on the previous evening he had been arrested on a charge of assault, for which he had to appear in the local police court. He gave the following story: On 19.x.41 he went on night leave at 19.00. He went alone to a public-house in the town. He intended to have a "quick one" and go on later to the cinema by himself. Whilst in the public-house he was invited to play darts, and did so. He drank, he said, two pints of stout, and denied that he became drunk. He remained in the public-house until 22.00, having abandoned his intention of going to the cinema. During the evening he had "a little quarrel." He couldn't remember what it was all about. He left the public-house at 22.00, and outside he assaulted one of the party with his fist. He thought he was fighting a German, but he could not remember the episode clearly. The police arrived and he was arrested. He said he was surprised that he should have been arrested and not the other man. He said he was filled with a "sudden hate" for the German. He said he had been drinking little for the last two years and even less for the last six months, as he found that it upset him more easily. He said he could formerly tolerate a good deal of alcohol.

On examination he was two days out in the date and said he felt "strange": "It's like being in a dream." A report was sent to the magistrates pointing out the possible etiological connection with the effects of blast, as the result of which he was discharged.

Family history.—Essentially negative.

Personal history.—He was a healthy child and there was no history of any serious previous illness. He reached Standard VII at 14 and did well. On leaving school he trained for the Merchant Service, but left it at his mother's request to work for a time in a shop. He wanted to go to sea again, however, and joined the Navy. He had evidently had a fairly stable personality. He was cheerful and rather rollicking and fond of "creating fun and sky-larking," for which he was known throughout the ship. He was in the concert party of his ship. He had acquitted himself admirably during the first raid on the Lofoten Islands, just before his injury. He seemed on the whole a good type of Naval rating. Following his acquittal he was admitted to an R.N.A. hospital on 20.x.41. He was given a battery of tests similar to those mentioned (Wechsler, Verbal Emergency, Koh's blocks, etc.). The report reads: "This man rates highly in all tests; there is no evidence of organic deterioration."

This man, after exposure to blast, presented an organic syndrome associated with a depression which may have been reactive. These symptoms cleared up entirely, but left him with some degree of intolerance to alcohol, as a result of which a change of consciousness, a transient twilight state (pathological drunkenness) supervened and whilst in this state he committed an offence. There had been evidence of his liability to clouding or changes of consciousness during the period when his organic cerebral symptoms were still in evidence.

CASE 6.—Aged 19.

On a night in April this patient was engaged in fire-fighting in the open near a large building when two bombs, one H.E. and the other D.A., dropped about 15-20 yards away from him. He heard the whistle and crouched down. He then heard the explosion and was blown by the blast against a wall. He did not injure his head and he did not lose consciousness. He remembered running round putting out incendiaries soon after this. In fact, he remembered everything clearly that night. Later that night he became "terribly scared." He was admitted to hospital, detained overnight, and the following day went on 14 days' ordinary leave. A week or so afterwards he complained of insomnia, difficulty in concentration and nervousness.

I saw him for the first time on 11.vii.41. On examination he looked dazed and tired. He spoke slowly and monotonously. He complained that his thinking was not as clear as normally,

e.g. at mathematics. At times he broke off and appeared to lose his train of thought. He stated that he followed a lecture at first quite well, but after a time he became listless and apathetic and seemed to take no interest in it. His memory of his leave was hazy and fragmentary. Indeed he appeared to have difficulty at first in recalling where he had spent it. He showed difficulty in repeating five digits backwards, but succeeded with the fourth series. Otherwise there was no evidence of gross intellectual disturbance by the usual tests. He complained of restlessness and inability to settle, and of extreme anxiety over the possibility of the recurrence of air raids. On duty days he had had nausea and vomiting once or twice, evidently an expression of this morbid anxiety. He complained that his sleep was poor. Neurological examination revealed nothing abnormal.

Family history.—Essentially negative.

Personal history.—The patient was born and educated in Australia. He was a healthy child. Beyond childish ailments he had had scarlet fever at 11, followed by a mastoid infection and probably nephritis. He did well at school, and in October, 1939, entered the R.N.E.C. He had always been an anxious boy, and in childhood showed a degree of hypochondriacal pre-occupation which still persisted (fear of cancer). As a child he was a little spoilt. He was unmarried. This patient presented mild organic cerebral symptoms after exposure to blast. He reacted to his experience with severe anxiety, a pattern for which an indication was to be found in his constitutional make-up. The anxiety, however, in this case was regarded as predominantly reactive.

CASE 7.—Aged 24.

This rating was asleep in the early hours in July, when an H.E. bomb fell outside the house. Evidently the ceiling fell on top of him. He was removed to hospital immediately. On examination at 05.15 he was conscious and lay placidly in bed. He cerebrated slowly (*sic*) and could remember nothing of the explosion. There were no signs of injury. Physical examination revealed slight tenderness in the right upper quadrant of the abdomen, and there was a haemorrhage in the right tympanic membrane. At 09.00 his bladder was found to be up to the umbilicus, and he could not pass water—30 drachms of urine were withdrawn by catheter. A note is added: "Still unco-operative and catatonic; limbs stay in any position." At 09.30 he was conscious and rational, but answered questions very slowly. He stated that the roof had fallen in on him. He complained of headache and pains in the right knee. No perforation of the drumhead was found, and no evidence of any injury. At 18.00 he still answered slowly and lay in "a dream-like state."

I saw him for the first time on 9. vii. 41. There was no outward abnormality, and consciousness was clear. He was correctly orientated and performed serial sevens without an error in 30 seconds, and gave five digits backwards. He stated that following the explosion his memory for the immediately ensuing events was dim and fragmentary. He remembered, e.g., that somebody gave him some clothes. He stated that at first he had been unable to speak, his vocabulary was limited to "Yes," "No," and "All right," that he had the right word in his head and couldn't produce it. This must have been very transitory, since no record of an aphasia after admission to hospital was made. The whole reaction had evidently cleared up. There was then no evidence of aphasia. He seemed a very good type of man, who gave his history clearly and straightforwardly.

Family history.—Essentially negative.

Personal history.—He had been a healthy child. There was no history of serious previous illnesses, no history of psychopathic traits. He attended a secondary school, where he did well. He had been working as an acetylene burner and maintenance engineer for an oxygen plant when he was called up for service in May, 1940. He had seen some action at sea without ill-effects. Married; no children. Evidently a stable personality. Alcohol and tobacco moderate.

This is a case in which, following exposure to blast, the patient evidently went into a semi-stuporose state with clouding of consciousness. There was a transient disturbance of memory, and evidently a very transient motor aphasia (unconfirmed). The evidence of catatonic phenomena immediately afterwards is interesting, but the observations were not made by a psychiatrist.

CASE 8.—Aged 20.

This patient was sheltering in the basement of a house when an H.E. bomb fell nearby. Part of the ceiling of the room where he was evidently fell in and he was buried in the debris. His memory for the immediately ensuing events is hazy, but he remembers finding shelter later that night elsewhere. He stated that his memory for the following ten days was imperfect, and he was noticeably forgetful. Thus he forgot to notify the authorities of his change of address, and when required he could not be found.

I saw him for the first time on 7. iv. 41, i.e. about a fortnight after the incident described. On examination he looked dazed and bewildered, and all his movements were slow. When the raid was mentioned he showed much anxiety, became tense and restless, and wept. He was aware of this loss of control, and complained of it spontaneously. Asked how he felt, he replied, "A little bit depressed sometimes." He made an impression of childishness and dependence. He complained that his sleep was variable and his appetite poor. There was a coarse tremor of the outstretched fingers, but beyond this nothing abnormal was found in the C.N.S. Pulse 108.

Family history.—His father was unstable and alcoholic, and had been divorced by the patient's

mother. One sister had had a mental illness at 15, in which she was depressed and attempted suicide.

Personal history.—He had been a healthy child and there was no history of previous serious illness. He entered the Merchant Service before the war, and joined the R.N.R. in 1938. He was called up in November, 1939, and had seen some action without showing any symptoms. He had done quite well at school. As far as could be judged he had seemed a fairly stable person before his present illness. He was engaged to be married.

This case shows a relatively mild organic reaction, and except for the memory disturbance and perhaps the slowness and emotional lability it would have been regarded as a psychogenic reaction.

One other case will be briefly mentioned by way of contrast. This was a writer, aged 34, who had panicked during an air raid and become speechless, i.e. he found it extremely difficult to get the words out. He also had nausea and diarrhoea, and could eat nothing at first. He described his recovery of speech as a "thawing out." He had not been exposed to blast, and the reaction was regarded as a purely psychogenic primitive reaction of terror in a sensitive, anxious, hypochondriacal psychopath.

DISCUSSION.

Following the researches of Zuckerman (1941) into blast lesions it would appear necessary to exercise caution in attributing symptoms developing in those cases near whom a bomb has exploded to the effects of blast alone. According to this worker, the primary effects of blast will be experienced only very close to an explosion, except with large bombs, the primary effects of blast are unlikely to be experienced more than 20 ft. from the bomb. Secondary effects produced by the patient being thrown against a hard surface might in these cases be complicating factors. These statements were made, however, chiefly in relation to supposed blast injuries to the lungs, and not to the nervous system. His experiments on monkeys showed, however, no change in the brain itself, although haemorrhages were found around the spinal roots.

All the cases described here had been in close proximity to the explosion of an H.E. bomb. The first case gave the history most free from objection, no history of having been struck on the head by any solid body, no history of unconsciousness, no retrograde amnesia, and until the following morning no history of post-traumatic amnesia. Yet in addition to this period of amnesia he later showed a degree of intellectual deterioration. The seventh case showed a haemorrhage in one tympanic membrane which would suggest a blast effect; on the other hand, his history of the ceiling falling on him is necessarily vague, and it cannot be excluded that his head was perhaps struck by a fairly heavy piece of plaster, or even wood. This patient's symptoms cleared up in a few days. The sixth patient claimed to be entirely clear that his head had not struck, nor been struck, by any solid body. His organic symptoms were again relatively mild, and far overshadowed by the constitutional. These clear-cut histories, however, do not obtain in the other cases. The second patient recalls that his head struck a door, and that he was also struck on the head by fragments of a clock. These may have been heavy enough to cause physical trauma in the ordinary sense. This could not be verified. The third patient was blown past a door; there was no history that his head was struck by this, but it may have been. The fourth patient did have a head injury in the ordinary sense—it was struck by a piece of shrapnel. The history of the incident in the fifth patient is entirely obscure as to these essential details, although he also suffered from scalp wounds, and accurate details in the case of the eighth patient were also not forthcoming. It would be rash to assume, however, that there was no injury to the head of the usual kind in either case. It may be that blast effects were complicating factors in all these cases, but this cannot be certainly established in any of them. It is open to doubt indeed whether under the conditions (enumerated later) of an actual air raid it will ever be possible in such cases as these to obtain an accurate history and thus to determine what influence the blast had if any. Only in those cases where unobjectionable blast effects were observed in other tissues, e.g. lungs, would it appear possible to speak with reasonable certainty, although here again direct primary effects on the nervous system might be difficult to establish. It is of interest to note the occurrence of intellectual impairment in the first case (as stated the most significant from this point of view). Such post-concussive deterioration is stated to be relatively uncommon in young people, where, in fact, an associated cerebral arteriosclerosis

is not also present (Bowman and Blau, 1940). It may very well be that the cases described here are merely examples of head injury of the usual kind and this is fully realized. The importance of the subject, however, makes it desirable to offer this as a tentative and heuristic contribution to the problem of blast injuries. It is important that the organic aspect of several of these cases was overlooked by others in consequence of the atypical history, and because such cases may be fairly common in heavily raided areas, and if bombing is renewed more will be seen, it has seemed desirable to record them, especially since early treatment might well have prevented many of the later manifestations.

The current literature will now be briefly considered. Mira (1939) mentions a malignant type of anxiety which appeared to be due to actual physical damage to the brain. These patients showed anguish, perplexity, lack of spontaneous activity, answered questions monosyllabically and appeared unable to concentrate, associated with accelerated pulse and respiration, increased tendon reflexes and concentrated urine. Later, pyrexia, jaundice and abdominal symptoms appeared, followed by death. The C.S.F. was normal, but of increased pressure. Post-mortem swelling and haemorrhage of the brain were noted. He used the provisional term "psychorrhexis" for these cases. So far I have not seen nor heard of any such clinical picture in this war. He states further that where amnesia occurred in those near whom a bomb had fallen it was generally due to organic cerebral happenings, and in some cases it was associated with aphasia. Lumbar puncture was performed in all cases coming from the front line with mental disturbance. Increased intracranial tension, slight meningeal haemorrhages and other findings could thus be recognized. Hadfield and Christie (1941) described bilateral symmetrical subarachnoid haemorrhages over the occipital lobes in a case of fatal blast injury to the lungs. Pegge (1940) states that the majority of cases brought in from the site of a bomb explosion showed changes of consciousness ranging from complete unconsciousness or stupor to a mildly dazed state. In those not unconscious or stuporose there was often some amnesia. He mentions uncontrolled emotional behaviour, and weeping. His case 5 has certain features in common with some of those described in this article.

Atkin (1941) mentions a case of blast shock in a woman, aged 52, who complained of blankness over her head and inability to think of anything or to speak naturally. After the bomb exploded she felt dazed. Another of his cases after being flung to the ground by a bomb could not recall the circumstances in detail, and another after a period of unconsciousness developed a "post-concussional syndrome."

Hemphill (1941) records two cases of so-called blast reaction. Both showed restlessness and one a severe confused state. He thinks a degree of cerebral contusion to have been responsible for these states.

Harris (1941), on the other hand, saw no cases of confusional states in those exposed to blast.

Brown (1941) describes cases of acute emotional shock in those evidently exposed to blast with signs of terror and considerable restlessness which he regards as a psychogenic fear reaction. He mentions no organic features in his cases nor does he discuss the possibility of the co-operation of organic factors, though one of his cases (No. 6) suggests an organic component.

Hubert (1941) describes psychogenic stupors following enemy action, bombing and shelling, in which he failed to find any evidence of organic injury to the C.N.S. or anything suggestive of concussional or post-concussional syndrome. He speaks of a post-stuporose state of complex type of which timidity and bewilderment were ingredients. Again the co-operation or interweaving of organic features did not suggest itself in any of his cases. Some evidence therefore is forthcoming from the literature of organic symptoms following exposure to blast, in the absence of a history of any head injury. In the cases presented here the evidence of the existence of an organic reaction is shown by (1) residual intellectual impairment, (2) memory changes, (3) less certain evidence of slight and transient aphasia in two cases, and (4) occasional changes in the C.S.F. It may be noted that the electroencephalogram whenever carried out was negative. It will be found convenient to consider these symptoms along with their psycho-pathology under these headings:

- (1) Intellectual impairment.
- (2) Memory disturbances.

- (3) Changes of consciousness.
- (4) Emotional changes.
- (5) Motor or psychomotor phenomena.
- (6) Certain other organic and probably organic symptoms.

Because of the unity of psychic life, a strict schematization is naturally impossible.

(1) *Intellectual impairment.*—A degree of this was present (whether transient or permanent it is impossible in all cases at this stage to say) in at least six of the cases as demonstrated by the usual clinical tests, and in certain instances by specialized tests designed to elicit slighter degrees or finer shadings. The various tests used are mentioned in the case records. The degree of dementia was never gross and was not always obvious except in such test situations. Subjectively it was characterized by complaints of forgetfulness, lack of concentration and the like. The picture was consonant with that of a moderate to slight degree of structural cerebral damage, or derangement—an opinion which was confirmed by two other trained observers.

(2) *Memory changes.*—These form by far the most striking part of these syndromes. The changes found were of different types. In some an imperfect memory for the events immediately following the explosion was observed (Cases 3, 4, 5, 7 and 8). In Case 6 this hazy, fragmentary memory was noted during the following days, and in Case 3 a dimness and uncertainty of memory lasting from the time of the explosion till some days later. The second group of memory changes is by far the most striking. This consisted of periods of global amnesia. Such amnesiae may have, *inter alia*, a definite medico-legal significance which will be discussed later. Examples of this were found in Cases 1, 2, 3 and 5. The amnesia in Case 5 was regarded as peculiar. Forgetfulness and failure of retention have already been mentioned. Memory disturbances of one kind or another were found in all the cases. The absence of a retrograde amnesia in all cases is to be particularly noted.

(3) *Changes of consciousness.*—Since none of the patients was observed immediately after the incident it is impossible to give a first-hand objective description of the state of consciousness at that time. Subjectively, the patients reported that after the explosion they felt "dazed" or had "a numb sort of sensation." There is abundant evidence from several of the patients that consciousness was clouded, and this is regarded as the cause of the fragmentary and hazy memory. In no case, with the possible exception of Case 5, was there a history of actual loss of consciousness.

It seems that this alteration of consciousness persisted in one or two of the cases for days or even months afterwards. In Case 3 the patches of amnesia appeared to be related to a fluctuating grasp of the environment as in a delirium, a failure adequately to register and synthesize his perceptions. This state came into prominence when the patient was brought into contact with the bewildering bustle of the city, to which it is considered because of the organic cerebral lesion he was unable immediately and adequately to adapt himself. The periods of clearness were possibly the result of more challenging demands from his surroundings, e.g. the necessity for giving his name and address to a stranger, or else to spontaneous fluctuations in his state. It may be noted that these symptoms appeared after a full day's work, when the influence of fatigue may have proved an additional causal factor. In Case 2 this condition evidently lasted for months. A psychogenic component may have been involved. In no case, except possibly in Case 8, was there evidence of an hysterical personality. All the other patients except the second seemed stable before the blast experience and had excellent records. It is possible that in Case 2 an hysterical motivation to avoid returning to what to him seemed excessive demands on his capacity may have been facilitated here by the cerebral lesion. There was, however, no evidence of this.

The amnesia in Case 1 is interesting in view of the period of clearness after the explosion. Case 5 is of interest in that some weeks after the incident he had a dissociative sleep-walking experience, and an increased liability to alteration of consciousness while under the influence of alcohol. Case 4 seems entirely different. Here we have a man with a history of cerebral lesion (whether entirely due to blast or partly to head trauma by shrapnel is hard to say) who makes a perfect recovery. Some months later, during a period of personal strain, he exhibits a typical hysterical fugue with amnesia. It seems permissible here to implicate

the cerebral lesion as having prepared the soil in this formerly stable individual for the emergence of hysterical phenomena under stress. Whether the hysterical mechanism utilized just this form for the manifestation because the way to this had already been shown must remain an open question. The whole relationship of psychogenic phenomena to organic lesions is raised there, but its discussion in present circumstances would lead too far afield. In none of the cases, even in this one, does the release of a preformed constitutional hysterical mechanism appear to be involved.

(4) *Emotional changes.*—These call for special mention. Besides associated, probably constitutional, depressive features all more or less typical, two types of affective changes are observed: (1) Affective lability and (2) apathy. Of these, the second was much the more impressive. Lability was observed in Cases 3 and 8. In Case 3 it was somewhat difficult to disentangle from his coexistent depression. Both patients were deeply distressed at this symptom, over which they felt they had no control. Apathy was more frequent and requires fuller consideration. It was noted in Case 1, at the time of the examination, who said he had lost interest. Here, again, the symptom was difficult to evaluate in view of his associated depression. It was particularly evident in Case 2 on examination. Case 4 gave a good description of his state after the incident. He felt indifferent to his surroundings and had no fear of future bombing, and felt he did not care if he were bombed. During the action he gazed at it all "as if it were something new to a child." He had no desire to smoke or to do anything. Case 5 stated that some weeks afterwards he had no interest in anything. Mention may be made here of the classical observations of Bälz in the Tokyo earthquake of 1894. Whilst this was in progress around him he stated: "I stood there, and regarded all the dreadful happenings around me with the same cold attention with which one follows an absorbing physical experiment." He also said he had no sense of his own personal danger, nor of the danger to his relatives. "All the higher, affective life was extinguished," such higher feelings as sympathy, etc. His consciousness was entirely clear throughout, in contrast to the cases mentioned here. There was in Bälz's cases no question of a cerebral lesion. The third patient noted isolated details of the environment, e.g. the oddity of a kidney basin as a drinking vessel in a similarly apparently detached way.

Bonhoeffer (1916) made similar observations during the last war in psychogenic fear states. Hoche (1917) also noted apathy of indifference in those exposed to blast in air raids over Freiburg in the last war. Recently, Larkworthy (1941) reports that similar apathy has been observed in men in ships damaged by underwater explosions. Uninjured men made no attempt to escape from flooding or damaged compartments. He noted this apathy in himself and others after a heavy naval action. He adds that he found it hard to concentrate and "so easy to go and sit in a corner and think of nothing in particular." He also mentions that as a result men are often unjustly blamed for inefficiency. On the other hand, a relative absence of apathy in a series of physically injured air-raid casualties was noted by Grant and Reeve (1941).

In view of the foregoing one must therefore be cautious in regarding this apathy as an organic symptom. It may be a vasomotor effect in those cases where it occurs immediately after the blast. But in those where it persists for perhaps weeks or months afterwards it may be a symptom of cerebral lesion. Whatever its origin it is typical of the cases under discussion.

(5) *Motor or psychomotor changes.*—These phenomena are also typical. The general slowing down which these patients showed is a little hard to characterize. It is for the most part evident objectively and is also complained of by the patient. It was present on examination in Case 1, where the patient appeared generally slow in all his responses, like a gramophone set at slow speed. He said: "If you go to do anything quick you can't seem to do it." In the tests he said he was "not so swift." Case 2 complained that when he walked he would have liked to have gone faster but could not. In Case 3 this slowness was very evident, and associated with a meticulous circumstantiality which will be mentioned further below. Cases 6 and 8 also showed this slowness. This retardation looks entirely different from the depressive. It lacks the sticky, "coagulated" quality of the latter. Whether it is entirely due to a brain lesion is hard to say.

(6) *Other symptoms.*—Mention has already been made of the extreme circum-

stantiality in Case 3. This was outwardly exactly similar to that found in so-called epileptic dementia. Every detail, even the most irrelevant, was included in the story and a very long time was required to elicit the history. It is impossible to say whether this symptom was organic or not. In Cases 2 and 7 there was a history from the patient of symptoms suggestive of a motor aphasia. This was clearest in Case 7, but no aphasia was demonstrable on examination. In Case 2, just after the explosion the patient stated that he had difficulty in speaking because his jaws felt numb. This was most probably a difficulty in articulation. He complained that at times he had difficulty in finding the right word: "It's on the tip of my tongue and I fail to put it into words." Again no dysphasia was demonstrated on examination. The so-called catatonic features said to have been shown by the seventh patient immediately after admission to hospital were not observed by a psychiatrist. They are only recorded in passing. An examination of the C.S.F. was unfortunately only done in one or two cases. The only changes of much significance were found in Case 3.

The cases presented here are not all of equal value or significance in demonstrating the existence of organic symptoms. They present a graduated series from No. 1, where there was evidently exposure to blast alone, with a resulting organic syndrome, to Case 8 where the history was less clearly detailed, and where the symptoms seemed preponderantly psychogenic. In all the other cases the etiology was not entirely pure, and in one case (4) there was definite evidence of associated head injury by shrapnel. The history, however, in every case was different from the usual one of ordinary head injury, even the milder forms, e.g. the patient sometimes retained a clear memory for the subsequent events, and the so-called traumatic automatism appeared later. Also there was no evidence of retrograde amnesia in any of them. It may be recalled that patients 2, 3 and 4 had headaches for a time afterwards. It seems particularly important to stress the organic nature of these cases in view of the widespread tendency to regard them as psychogenic or functional. With regard to these cases, the structural-analytic approach is particularly fruitful, and indeed essential for their correct assessment. It is important, using Birnbaum's terminology, to separate the pathogenic from the pathoplastic, the organic "obligatory" phenomena from the constitutional or psychogenic. In the summary of the cases it will have been observed how often the organic symptoms were associated or interwoven with others, e.g. depressive. This was particularly evident in Cases 1, 2, 3, 5 and 6. As has been mentioned, such symptoms seemed to predominate in Case 8. Thus there was evidence in Case 1 of a depression, most probably a reaction to his state. In Case 2 there was also evidence of a hereditary constitutional tendency to depressive illness and the patient was recovering from an endogenous depression when exposed to the blast. In this case it is open to question whether his later depressive symptoms were the result of an activation of this endogenous pattern, or were not again largely reactive, the pattern of his reaction being established by his constitution. This is, of course, largely a theoretical question. In Case 3, a formerly "syntonic" stable individual became acutely depressed, again possibly largely reactive, but having regard to certain personality traits, a not entirely unexpected mode of response. Indeed it would be possible to regard his previous personality as on the depressive side. The relation in Case 4 of an apparently hysterical amnesic fugue to a previously damaged brain has been discussed above. In Case 6, an extreme morbid anxiety, again reactive, but having roots in the personality, tended to dominate the picture. The role of constitution as a whole is of no less importance here than in other psychiatric syndromes. There are those (I have met several) who have been just as much exposed to blast as some of these patients, but who show no psychiatric reaction whatever. This might depend, to some extent, on the physical peculiarities of blast effects, or again to the actual absence of head injury of the usual kind.

Prognosis.—The period of observation in these cases has been so short that little can be stated definitely under this head. What the ultimate future of the first patient will be is hard to say. He has returned to work, but it is uncertain whether the degree of intellectual impairment will persist or not. The same is true of Cases 2 and 3. The third patient has been invalided from the service, and it seems likely the second one will be too. The cerebral symptoms of the fourth, fifth and seventh cases entirely disappeared, though whether a tendency to alteration of consciousness under external stress or toxæmia in the second of these and a

liability to further hysterical symptoms in the first will persist is unknown. The seventh case made the best and quickest recovery.

The variable duration of symptoms in the different cases is evident. Prognosis may depend to a large extent on the promptness of treatment. Cases 1 and 2 were later in coming under treatment. Cases 4, 5 and 7, which did well as far as their cerebral symptoms were concerned, were treated at once. Accordingly it is urged that every case exposed to blast should be referred to hospital with a view to psychiatric observation forthwith, regardless of whether there are obvious symptoms or not. Examination there should include (1) searching investigation for the existence of organic symptoms, with detailed neurological examination, (2) investigation of the C.S.F. as recommended by Mira, (3) an electro-encephalogram, and (4), in case of death, an autopsy by a competent pathologist. The subject is of importance, and it is desirable during a relatively raid-free period to consider it in detail with a view to making the necessary arrangements.

A word must be added on the medico-legal significance of these cases. Clearly, an offence might be committed during one of these clouded periods of which the patient had no subsequent memory. Such a defence might be derided by a civil court or by service authorities, especially the latter, in view of the usually thin pretext of so-called hysterical amnesia, which is the sheet anchor of many service offenders. Cases 2 and 5 illustrate this medico-legal significance. It was reported to the court that the second man had been exposed to blast, that it was possible that some of these reactions were due directly or indirectly to actual brain damage, and that in the present state of our knowledge the man should be given the benefit of the doubt. This opinion the court accepted, and the man was discharged. Larkworthy's observations may be recalled here.

Treatment.—Only a few words can be added under this head. A logical treatment on the analogy of that of cerebral trauma in general, and in the light of the experience afforded by some of these cases in particular, suggests at least a fortnight's complete rest in bed with appropriate sedation, and the general measures in the treatment of head injury. A coexistent or subsequent constitutional or psychogenic syndrome demands treatment on the usual psychiatric lines.

In conclusion it should be added that the whole subject of these psychiatric blast syndromes is still too new for us to have acquired an adequate perspective. We are still at the stage of collecting the facts. This, however, is often a matter of some difficulty, owing (1) to the circumstances in which the patient is first seen, the stress of action, the necessity for dealing rapidly with the cases, the frequent lack of a competent observer, the usual lack of objective history, fatigue of personnel, etc.; and (2) the transience and variability of the picture, so that when the psychiatrist does see the patient, perhaps some time later, many if not all the clinical phenomena may have disappeared. This furnishes an additional reason for bringing these patients under expert psychiatric supervision at once.

SUMMARY.

- (1) Eight cases of psychiatric reaction to blast have been presented.
- (2) Evidence has been adduced in support of the view that in the cases described a structural cerebral lesion was responsible for the basic symptoms.
- (3) No conclusive evidence was forthcoming that this lesion was the direct effect of bomb blast alone; in all the cases except two it was impossible to separate the effects of an associated ordinary head injury, even although from their history this head injury would often appear to have been trivial.
- (4) In the one case in the series, where the inference of a pure blast effect would seem to have the strongest support, ordinary head injury could only be excluded with reasonable probability, and in the circumstances of a particularly heavy air raid, such injury might have been overlooked.
- (5) The possibility of damage to the nervous system by the direct effects of the blast wave without damage to other structures is not excluded.
- (6) The symptomatology has been described and the clinical picture analysed. The importance of the structural-analytical approach has been pointed out.
- (7) The organic nature of these cases is liable to be overlooked, with damaging results to the patient.

(8) Comments on prognosis and treatment have been added and also on their medico-legal significance.

(9) The desirability of further careful psychiatric study of these cases is indicated and the minimal examination outlined. The necessity of competent psychiatric observation at the earliest possible opportunity has been stressed.

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