

- (25) De Quincey, *op. cit.*, p. 251.
 (26) Bernheim.—“Des Hallucinations Physiologiques et Pathologiques,” *Encephale*, 1913, vol. i, p. 508.
 (27) Ireland, W. W.—*The Blot upon the Brain*, p. 40.
 (28) *Ibid.*, p. 46.
 (29) *Ibid.*, p. 48.
 (30) *Ibid.*, p. 60.
 (31) De Boismont, *op. cit.*, p. 61.
 (32) Machen, Arthur, *The Bowmen*.
 (33) Parish.—*Hallucinations and Illusions*, p. 309.
 (34) Coriat, Isodor H.—*The Journal of Abnormal Psychology*, August–September, 1910, p. 93.
 (35) Freud.—*The Interpretation of Dreams*, translated by A. A. Brill, p. 432.
 (36) Parish, *op. cit.*, p. 83.

The Psychology of Fear and the Effects of Panic Fear in War Time.⁽¹⁾ By Sir ROBERT ARMSTRONG-JONES, M.D., F.R.C.P., R.A.M.C.

IT is an acknowledged fact that in the whole annals of mankind the most eventful period of a nation's psychology is that during which its people is passing through the crisis of war, and the history of nations, from the earliest dawn of society, presents continuous records of warlike operations. The present war, which has already lasted over two and a half years and which is without any immediate prospect of cessation, has disturbed the mind and altered the course of life of whole continents; yet all of us are agreed that it should never be possible for this “malady of princes” to occur again, and it is with the view of preventing its recurrence that civilisation (which means the united culture of all the Allies as well as of the “benevolent” neutrals) is now making a final and intense effort.

Having personal knowledge of the mental effects of the war upon the civil population, and having more recently, as Consulting Physician in Mental Diseases to the Forces in the London Command, some like knowledge as regards the military, I propose in the following paper to write on this subject in part from my own experience, in part also from that of others, as well as to record the effect of panic fear in more remote history. Looked upon psychologically, war is the manifestation of a biological law, it is the embodiment in men of a primordial and

deep-rooted instinct to be free. The present war is the outcome of resistance on the part of a ruthless and tyrannical militarism to the innately-organised determination of a people to be free, an instinct, as we shall prove, that is associated with the emotions of anger and hate as well as of fear.

The study of the emotions has commanded attention from both psychologists and physiologists, who have not only endeavoured to describe them, but to investigate their underlying physical basis. Such investigations show that the emotion of fear is closely related to the influence of the internal secretions. Prof. C. S. Sherrington has recorded experiments in which he cut off the nerve supply to the viscera in animals with the object of criticising the James-Lange-Sergi view that the emotions had primarily a somatic origin. Nevertheless, our chief indebtedness in regard to the study of the emotions still remains to Darwin and Herbert Spencer, the latter authority seeking to classify them upon their development from simple sensuous presentations of pain and pleasure; whilst Darwin investigated them through the natural history method, demonstrating the continuity of human with animal evolution both in mental and bodily characters, originating the doctrine that human progress and growth had evolved from subhuman antecedents, a view that has done more to unravel the complex mentality of man than any other.

Psychologists to-day all teach that the emotions have a physical correlative, and this aspect has been carefully investigated by Pawlow, Elliott, Cannon, and others, more especially in regard to the emotion of fear. More and more is it becoming recognised that conduct is influenced by the emotions; that in every emotion there is a cognitive, an active, and an affective experience, and that the emotions are the expressions of—or according to some are themselves expressed in—characteristic instinctive acts. Pawlow has shown the physical effects of fear upon the secretion of the digestive juices, and he concluded that pleasant æsthetic appeals to taste and smell assist digestion, the sight of appetising food making the “mouth water”; whilst vexations, anxieties, worries, and fright retard the secretion of saliva, as well as of the gastric and pancreatic juices and the bile; and it has been experimentally demonstrated that visceral responses through the sympathetic nervous system accompany all the strong emotions. During strong emotional excitement,

such as is produced by fear or pain, anger and rage, the movements of the abdominal viscera are inhibited, whilst under the influence of opposite or pleasurable sensations they are accelerated; and this is in accordance with the anatomical facts that there are two series of fibres to the visceral organs, *viz.*, one which accelerates their movements and the other which inhibits them, and it has been suggested that a scheme of classifying the emotions might be based upon their associated physical correlation. Fear, for instance, is expressed physically by the inhibition of all visceral movements; there is also a contraction of the blood-vessels, shown by pallor; there is a lowering of the surface temperatures, a "cold-sweat" pours over the body; the flow of saliva stops, "my tongue cleaved to the roof of my mouth"; the pupils are dilated; the hair stands erect; the heart beats rapidly, the respirations are hurried; there is also a trembling and twitching of the muscles, more especially those about the lips and face. A young officer, W—, who had obtained the Military Cross for bravery, told me that on one occasion when alone and in danger he was overcome by a sudden fear; he said, "Something within me seemed to pass right away," and his body began to tremble; but by an effort of will this passed off; otherwise, his feeling was to get away from where he was. Another officer, T—, who had also been decorated for valour, said that whilst he was hard at work in charge of a battery he realised that his men were falling one after another, and suddenly his legs began to shake, his body to tremble, and a "queer feeling" came over him which he hoped never to experience again, and he wished to know what this emotion was? In all danger the effect is the same, *i.e.*, protective automatic reflexes occur, and the whole effort of the organism is to obtain an "atmosphere," as Crile has called it, of "*a-noci-association*." Precisely the same visceral results as are associated with the strong emotions occur after the injection of adrenalin or epinephrin into the blood-stream; sugar is reflexly liberated from the liver into the blood for the use of the muscles, the blood is driven from the abdominal viscera into the heart, lungs, and the central nervous system; the coagulability of the blood is raised, and the arterial pressure is increased. In all the strong emotions, experiments have shown a reflex increase of adrenalin in the blood, with all the protective responses referred to; the sugar liberated helping in the muscular struggle, which is either

to assist combat or to secure flight ; a fuller circulation and a higher arterial pressure also favour this, whilst the more rapid coagulability of the blood is in anticipation of hæmorrhage during the life and death struggle. The flow of adrenalin during a strong emotion not only tends to augment the effect of the emotion, but it also helps to sustain and to prolong it, which is the very nature of our experience, as during the time we are feeling the emotion these diffused bodily changes set up by the organic and glandular activities further react upon the brain, and these reactions in their turn act as stimuli, encouraging the continued secretion of adrenalin, whilst the emotion lasts ; and in this way sustaining the necessary bodily commotion until the emotional wave gradually dies away. In the records of shell-shock cases the blood-pressure taken soon after the men are seen at the dressing stations is found to be raised, whilst there is a lowering of 20 to 40 mm. after a short rest at the base hospitals.

It cannot be too strongly insisted, that the action of the central nervous system is of the syndromic variety, the cortex being built and activated to a high degree of perfection on this unified basis, yet, although human beings are integral organisms, the mind through fright, anxiety, disease, or shock, and also in pathological states, may become dissociated, and any of its elementary constituents may be abnormally presented, and may tend to overact in comparison with the others. It is a fact of experience that any stress or strain upon one of the elements may disintegrate the whole. It would follow from this, in regard to restoration, that every factor which contributes to the welfare or the improvement of one part may also contribute to the improvement of the whole. As to the predominance of any one element of the mind we know that in the delirium of grandeur, for instance, the ideas are more vividly expressed ; they crowd the attention, although unreal ; and they are sometimes critically and logically defended against every appeal to reason.

In the delirium of depression ideas of imagined faults, groundless apprehensions of sin-committal, of impending suffering and ruin, dominate the consciousness. In dissociated emotional or affective states some of the primary emotions may hold the mind and dominate conduct, and of these fear is probably the strongest and the deepest of all. It is one which man has

experienced and recognised from his earliest stages, and also one which he has tried to avoid and to control, lest it should seize his whole personality. The fear of solitude, of being without protection, of vast distances or of open spaces; the fear of closed places or of great heights or of darkness—all of use to our ancestors—are notable instances of inherited instincts that may be revived under stress or through pathological conditions. There are also abnormal disturbances of the will power, which acts through an extraordinary large series of circuits; on the one hand, as a sudden un-reflective discharge, on the other causing complete inhibition of voluntary effort; witness for example, the hesitation of the neurasthenic to cross the road, the irresolution of him who drinks, the lack of will power to initiate action, or the disregard of prudential considerations which characterise many affections of the will. Witness also, the impulsive tendencies of the epileptic, and the equally impulsive obsessions of the paranoiac; above all may be seen the inhibition present in some cases of shell-shock, who may be deaf and dumb, and who with every apparent effort are unable to phonate or even to whisper, but who through some sudden emotional stimulus will regain speech, voice, and even, when these are lost, hearing and sight. Quite a large number of these aphonic cases are met with in the various hospitals, who suffer from no wounds, but who have experienced what may be described as awe, or the fear of some unknown or vaguely contemplated event. C—, a Canadian, could not speak and his whisper was at first inaudible, but he could write his thoughts and express his reasoned judgment, and he corresponded with his family. He heard and understood everything that was said to him, and there was no intellectual defect, but he was miserable and he looked frightened and anxious. He enlisted at the age of 43, and there was no possible doubt of his valour and courageous behaviour. He was in the Somme advance, and he had a complete memory of a shell bursting near him, and remembered being taken to the dressing station. He was shaky, with marked tremor of the hands, and he complained of frontal headache, and he had a foul tongue, with marked digestive disturbances. He dreamed terrible dreams as many of these men do. After two months he was sent to another of the War Hospitals for examination, and he regained his voice the same day. This case is typical of many more,

and the question arises what is the pathology of this condition? Phonation and articulation according to the evolution theory, are a late accomplishment, and are only utilised to express the emotions and thoughts. The view taken by Col. C. H. S. Myers, R.A.M.C., is expressed under two heads, *viz.*, either the blocking up of paths subserving the mechanism of phonation and articulation and producing an apparent paralysis, or the blocking up of paths that control and co-ordinate them, thus causing an ataxic or clonic or spastic functional condition. It is believed by some that the condition may be due to a functional paresis of the "habit" of breathing, *i.e.*, of muscles which subserve respiration so far as sound production is concerned, and to be a bilateral cerebral lesion. At any rate, as we shall see later, this refractory condition in the psychic mechanism may be, and often is, removed suddenly by some unexpected stimulus or through the influence of suggestion. Captain Farquhar Buzzard refers to the rarity of this condition in officers as compared with the men, and he explains this by the better education of the officers who are more able to reason and to understand, and who are thus less liable to emotional shock. A complete temporary blindness, "struck blind" as it is called, has been noticed. A soldier, E—, who was in India, but never in action, suddenly lost his sight and memory. He was brought home, but he has no recollection of leaving Bombay or anything occurring before that; but his memory of subsequent events is good. He cannot see, he has photophobia and complains of a "white haze," there are no naked eye or disc changes reported by Captain Lee in charge of him. He cannot stand or walk and is "all of a shake." Another patient, P—, was in the Somme action, he "got knocked up by waggons" and fell, he states, on his head, after which he could not open his eyes. For three hours he was blind and he cannot now open his eyes without constantly blinking, and his sight is much impaired. There is no inflammation and no pain. His mother's father is in an asylum. B— pitched out of an aeroplane and had a false landing. He has had numerous attacks of complete loss of sight. Nothing abnormal is seen, but he complains of "falling about and my eyes are so dizzy." Both these men dreamed terrifying dreams. Captain Lee informed me that many of these cases get well on "bread and milk, no smoking and no visitors!" I am not able to

recall any specific instances of the loss of smell and taste—apart from delusions. The sense of smell (and with it probably taste) is the oldest and most fundamentally established of all the senses, and subserving it is the oldest portion of the brain, *vis.*, the rhinencephalon which in the lowest vertebrates, as in fishes, practically constitutes the whole brain. This sense, described as “the sense to get and to beget,” is therefore the oldest and the most organised and the least likely to become disordered: whereas the senses of hearing and seeing are the most highly developed, and therefore the least organised, and are for these reasons the most likely to become disordered by psychic shock. The same applies to the emotion of fear. It is the oldest as well as the most intense of the emotions; before it all the bodily functions bow; and it gives rise to the greatest amount of mental dissociation when present.

Another of the conditions essentially associated with fear, *vis.*, muscular trembling and inco-ordination, is very frequently met with among shell-shock cases, and this may pass on to general convulsive seizures bordering upon epilepsy, as will be referred to in the sudden fear brought on by the Silvertown explosion in many of those who heard the noise. There is no doubt of the fright here, nor of the disturbance of consciousness, nor, indeed, of the usual results of fear which dominate the mind and draw away all the nerve potential into different efferent channels—in this instance into the sensori-motor efferent tracts. Consciousness, as we know, is a continuous dynamic process. In health there are constant intercurrent stimuli flowing from one area of cerebral activity to another, and, as the whole consciousness is a resultant of the total equilibrium of all the conscious mechanisms from organic and external receptors, when a disturbing stimulus like fear arises, the co-ordination of all the cortical centres is affected, and a discharge is produced, the most facile being that of movement through the lower motor neurons, because the discharge through movement is the most elementary and the oldest and most accustomed form of discharge, and this discharge excites other areas in more distantly related centres of the brain. Normally, the cerebral cortex, as was maintained by Gowers, is in a state of constant nervous tension, ready at any instant to respond to any stimulus, and when the discharge is effected the cortex is left in an exhausted state precisely like a “run-down” accumulator. The form of

discharge actually occurring depends upon the temperament of the particular individual ; at any rate fear is the most powerful stimulus that can be applied to effect this discharge. The antithesis to fear is hope, which is the anticipation of pleasure, and hope has been a great national asset, the vital energy imparted in consequence—to the civilian population as well as to the military—has been a considerable moral factor in our fight for liberty and existence. The psychology of the war has brought us into contact with life in a manner that no national upheaval ever has before ; the emotions of disgust and anger have been more unreservedly expressed than possibly any other emotion in connection with the inhuman, barbarous, and revolting cruelties imposed by the Huns upon the vanquished ; yet the feelings of self-sacrifice, the tender emotions in regard to friends, the love of home and of patriotism, and pride in our race have all been kindled, and the world of idealism has been roused to a degree never before experienced in our time. The study of the emotions, therefore, justifies attention, and I agree with McDougall that the inherited instincts, with their emotional side, form the basis of our mental life, and that these innate tendencies in each of us afford the truest and best solution of conduct ; in fact individual action as well as social life depends upon impulses or instincts whose nature has been determined through long periods of evolutionary development, yet which have become modified through the influence of civilisation into organised and complex impulses. The war has certainly brought the emotions into greater and clearer relief, and it has given us all a much wider psychic experience. The teaching of psychologists has been very stimulating to me, and I should wish to be permitted to refer briefly and in general terms to the views of the emotions and their bodily accompaniments. The older psychologists took the various emotions as ultimate, and they were enumerated and described accordingly. William James has called such a classification the elaboration of the obvious ; it was the cataloguing, he says, of so many entities which led to no scientific end ; for there are so many synonymous terms for the same emotion, and there are so many possible combinations of emotional states, that different terms must refer to more or less identical states, *e.g.*, hatred, antipathy, resentment, dislike, aversion, spite, and abhorrence have all the same connotation, although they appear to denote different emotional states.

It is not surprising, therefore, that such a classification has been abandoned, and in place of this James has suggested, with much plausibility if not conviction, a "physical-reflex" theory of the emotions which has given rise to great controversy among psychologists. He states that an emotion is the reaction of the brain consequent upon the excitation of afferent nerves; a number of bodily changes are set up by some exciting factor, and as a consequence of the perception of this factor and of its mental representation an emotion is the result; the emotion, in other words, is the expression of the stimulus, and the order of events is, firstly, the perception of some "exciting fact;" which, secondly, sets up reflexly some bodily disturbance, and thirdly, this commotion is apprehended or realised. It is this "apprehension" that constitutes the emotion. If the emotion be regarded as the mental result of material changes, *i.e.*, if the emotion be the consciousness of bodily disturbances, there must be, especially in the turmoil and perturbations inevitably set up by the antagonism and conflict of sensations, an indefinite number of combinations of such perceptions, and the number of the emotions experienced must thus be infinite. In James' own words, "the popular way of thinking about emotions is that the mental perception of some facts or series of facts excites the mental affection called the emotion, and that this latter gives rise to the bodily expression. My theory, he states, on the contrary, is that the bodily changes follow directly the perception of the exciting fact and that our feeling of the same changes, as they occur, *is* the emotion. Commonsense says, we lose our fortune, are sorry and weep; we meet a bear, are frightened and run; we are insulted by a rival, are angry and strike. The hypotheses here to be defended says that this order of sequence is incorrect, that the one mental state is not immediately induced by the other, that the bodily manifestations must first be interposed between, and that the more rational statement is that we feel sorry because we cry, are angry because we strike, afraid because we tremble, and not that we cry, strike, or tremble because we are sorry, angry, or fearful, as the case may be. Without the bodily state following on the perception, the latter would be purely cognitive in form—pale, colourless, and destitute of emotional warmth. We might then see the bear and judge it best to run, receive the insult and deem it right to strike, but we should not actually *feel*

afraid or angry," *i.e.*, the arousal of bodily changes leads to the emotion which is their mental interpretation in the domain of feeling.

James enunciated his doctrine in 1884 almost simultaneously with Charles Lange, of Copenhagen, and later this was accepted by Sergi in Italy. They maintain that the emotion felt is either strong or weak, according to the amount of bodily disturbances set up by the exciting stimulus. Many shell-shock cases appear to support this theory, for many of them dream terrifying dreams of trench warfare and bombs, and in them the physical conditions are associated with fear, such as those already recorded—tremors, pallor, and a cold perspiring skin; and upon awaking they experience the emotion of fear or terror, which, however, quickly subsides when they are reassured "it's all a dream." Driver F. M. T—, who had at first no fear of shells, developed a terror whilst at the Front of any approaching aircraft or high explosives. He used to dream when in hospital that aeroplanes overhead were dropping bombs on him. The nurses state that he used to wake up in sudden frights, and with his personal linen and even underbedding saturated; his body trembled and his pupils became dilated. He was only calmed when told no aircraft was near and that he was safe. In his case it certainly appeared that the bodily disturbances preceded the emotion of fear, but it is open to any critic to suggest that some unusual noise or sound heard in the ward initiated the mental emotion, and that the explanation of this emotion was the dream, the emotion bringing about the bodily changes secondarily. Stout and others maintain that the first exciting factor is the mental disturbance and that this precedes the bodily commotion, which depends upon the estimate made by the mind in regard to any particular experience. Stout holds that in each of the other departments of the mind the order of events is the same; in feeling the physical stimulus is mentally appreciated as a sensation before the bodily commotion that results from the stimulus, and in the *will* the purpose aimed at is mentally realised before the movement to obtain the desired end can be effected. McDougall accepts the view of James with modifications, for he declares the emotions to be the mental representation of instinctive bodily tendencies, *i.e.*, the emotions are the mental side of the bodily tendencies, innate in the individual,

the result of a long evolution, yet modified by development and social customs.

The instincts have long been a debatable ground for controversy, and they have received during recent years much attention from workers in the field of comparative psychology, notably from H. S. Jennings, the Peckhams, J. Loeb, and Lloyd Morgan. It is claimed by some that the instincts are merely impulsive movements directed to some serviceable end not present in consciousness, and by others that instinct and intelligence have no real distinction. Herbert Spencer urged that all movements were originally reflex, and only when these had reached a certain degree of complexity in the evolution of the race, did consciousness intervene to direct the reflex movements to a useful end, and thus purposeful and conscious movements evolved from reflex ones. In support of the evolution of intelligence from reflex acts, it is claimed by some psychologists that movements originally carried out as an explicit act of attention may, in time, become automatic. Witness, for instance, the early difficulties of the raw recruit with his drill. As a result of attention and habit these movements, when frequently practised, become so familiar that they can be carried out without thought, and once the first of the series is initiated, the rest follow automatically. It is this "automatic" character that is induced in all the individual manoeuvres of military people at the expense of initiative. It no doubt tends to make a good machine a better and a more perfect one, which is an advantage, provided there is no lack of initiative on the part of the officers to issue directions; but when the plans that have been organised are interrupted, the machine then fails to be effective, for no over-drilled individual possesses the initiative or the originating capacity to reconstruct new plans. It has been the boast of our country that our army is composed of individuals who have not been dragooned into secondarily automatic machines, but that there is sufficient initiative left on the part of the men to form what we shall later call the "collective mind," and the collective mind is the one that tends to make for the safety of the whole.

PSYCHOLOGY OF FEAR.

Fear is a fundamental instinct, and James says the progress from brute to man is characterised by nothing more than a

decrease in the frequency of occasions for fear. Shand states that there are as many kinds of fear as there are types of behaviour initiated by it.

Fear is best described as the anticipation of pain, or a knowledge of danger which results in action. It is also described as a vestigial form of our ancestral type of mentation. The first fear must follow a preceding pain, and it presupposes a previous experience of pain. Fear thus connotes a mental state in which the future appears to dominate the present, whilst the actual present is a revived experience of the past, this experience being a painful one. It is this revival that constitutes the emotion of fear. It is fear that urges the organism to avoid a previous danger, and therefore fear has a definite biological value. The power to experience fear is necessary for self-preservation, and it is met with in early conscious life and in animals; the most easily frightened member of the herd has the best chance, *cæteris paribus*, of survival.

The apprehension of an impending danger in fear, that is, the feeling that there is a more painful state impending, is a very generalised feeling, and it has (as we shall see) a very definite bodily accompaniment. It is a very unitary and a very unique division of the affective life; too little of it leads to rashness, and too much gives rise to timidity. As S. G. Tallentyre has stated, it is not the desperado who is "careless, reckless, fearless, of what's past, present, and to come" that is brave, and it is not the man who is incapable of fear that has the highest form of courage. There are many people, like children with fire, that are not afraid, because they have never experienced fear, and there are others who are too stolid, too obtuse, or too unimaginative to feel fear. Many men in the present war, remarkable for daring, were timid and even shrinking as children, yet they became renowned for bravery in later life. Fear may be readily induced by suggestion, or by imitation, as has been seen in shell-shock cases, because there are such definite bodily commotions associated with fear, and it is certainly questionable whether many of these should be treated together, and a wise eclecticism must be exercised in arranging for their treatment together in a leper hospital! Fear may so stimulate the imagination that the mind may create fictitious objects of dread and terror, and it is these that have caused bodies of men and crowds of people to act in the

presence of danger as if infected. Cries, trembling, sudden starts, paralysis, and convulsions all form a part of the somatic picture of fear, and these are not infrequently conveyed from one to the other. Although danger may be a cause of fear, there are many instances of strong and adventurous persons who long to meet danger in order to conquer it. Peril in fact is an incentive and an inducement to courage. Captain Scott undertook to face the terrible Antarctic experiences to which he and his party bravely succumbed, because of the knowledge to be gained through peril and danger. There is no possible doubt that he realised the emotion of fear because he had made full preparations to meet it. He knew from his former Arctic travels the risks he ran and the dangers he had to face, and in spite of fear he dared to risk the voyage. To some natures fear becomes a mental tonic, but possibly other emotions, such as curiosity and wonder, help to create the motive for action. To many of our brave soldiers life without danger would be insipid and flat, and a man in perfect health does not trouble at the thought of death, partly because the uncertainty of its happening creates no fear. It is known that the weaker animals fight better when they experience fear and are driven to be at bay, and men often fight better when they are rightly afraid and have justice on their side. Fear may come on gradually or suddenly. The many slow grinding fears of a vague marginal subconscious kind are more characteristic of to-day than are the sudden isolated instances which occurred in the days of primitive man; but the stress experienced by our officers and troops was the origin of frequent instances of fear coming on suddenly and without warning; danger, therefore, more than pain, enters into the mind, and when fear is experienced either gradually or suddenly it has more power to effect dissociative dissolutions than any other emotion. It causes all other sensori-motor activities to cease; the normal inhibitions stop, and the normal reinforcements fail; immobility, irregular tremors, and in some cases complete paralysis and collapse are seen, and we can thus realise the truth of the phrase, "paralysed with fear." In the case of movements those that had become primarily useful and instinctive may become affected through the sudden shock of a strong emotion, and the mind becomes conscious of the state of tension brought about by the conflict between movements which subserve the emotion (in this

case agitation, tremors, etc.) and those which are being consciously initiated by ideas, so that an inability to move, to walk, or to stand, occurs. It is interesting to note that most of the shell-shock cases are without wounds, and these cases have almost all been "buried," "thrust," or "blown," or have been in the vicinity of suddenly bursting large shells. Incontinence of the bladder and rectum, due to stimulation of the sympathetic by a withdrawal of cerebro-spinal inhibition, have been recorded as a result of fear. In the slighter degrees of shell-shock motor phenomena, as stated, are very common, and in most of them the reflex guidance of movements is lost. Although we can rightly boast that our warriors are among the best troops in the world, there are instances within the knowledge of each of us where men in close proximity to high explosive shells which had burst have wandered away confusedly or unconsciously, and have lost their speech and memory for weeks or months, but under the influence of suggestion some have been able to recall fully afterwards the whole incidents. I have notes of cases in which Capt. William Brown, R.A.M.C., effected a complete restoration of memory through hypnotic suggestion practised early after the shock. To indicate the suggestibility of these cases I am allowed to mention the case of a patient (under the care of Major Tims, R.A.M.C.) who was out on parole one afternoon when he saw a horse fall, and without warning he himself also went down suddenly, and had to be helped back to the hospital. A sudden unexpected noise, such as an overhead train crossing the road, caused the same effect. The Silvertown explosion on January 23rd several miles away caused several patients in the same hospital to demonstrate the physical effects of fear. I consider an element of fear to be present in almost all functional nervous cases, and it is present to a slight degree normally in all actions directed by desire, and even those who read "papers" know the conflict that occurs between the wish to succeed and the risk of failure! Fear was formerly considered by our legislators to be the essential factor as a deterrent in the punishment of crime, but it is now discovered to be a wiser policy to improve the environment, and fear has also been abandoned as a deterrent in schools, for it was found that flogging lowered intellectual efficiency. Mr. Graham Wallas said that if war ceased Alpine clubs would have to be increased, as they added the zest of peril

and danger to life and assisted through fear in initiating energy and activity. Like Shand he appears to regard fear as the root-force of character. It is said that if the theologians are deprived of the use of fear as a moral agent and a deterrent from evil they would lose much of their influence for good, but Miss Mackenzie has said that the fear of exchanging this world for the unknown would lose much of its delightful sense of adventure if we knew whence we came or whither we were going. I feel most strongly that it is this fear of the unknown which is "unconscious" that is at the bottom of most, if not all, of our shell-shock cases.

One of the most painful forms of fear is the *pavor nocturnus*, or the night terrors of children between three and eight years of age, and the question has been raised whether it be somatic or of so-called idiopathic origin. Among soldiers suffering from shell-shock it is not at all uncommon in the early stages, when sleep is disturbed by horrible dreams of the parapet, of high explosives, and of Hun atrocities. So marked was this the case in one man whom I saw that he feared going to sleep—a condition named hypnophobia. The phylogeny of sleep suggests that early man may have been semi-nocturnal in his habits, and that dreams and *pavor nocturnus* were protective and prevented the long sound sleep which must have been a danger to primitive man, as he might at any moment need some sudden extrinsic call so as to act with promptness and energy.

The organic sensations enter largely into the emotions, as Bain asserts, who was one of the first to teach this, and particularly is this the case with fear. We now fear in our hearts, stomachs, livers, thyroids, and adrenals, the organic sensations being thus presented to consciousness, and a vulgar Scotch expression of the fear to act is—"I have no guts for it." Not infrequently there are met cases among soldiers where fear is associated with constantly recurring vomiting, and one was recently recorded by Dr. Colin McDowall.

We are familiar with the classical work of Sir Charles Bell upon the expression of the emotions, in which he associates fear with staring, startled eyes, dilated pupils, eyeballs largely uncovered, eyebrows elevated to the utmost, the convulsive opening of the mouth, when the tongue is seen, yet the lips conceal the teeth, and the nostril is inflated; these signs of fear

passing on to complete collapse and paralysis. He distinguishes fear from terror, which, to him, was an exaggerated fear, the appearance of Cain after the death of Abel by Metastasio being quoted as one of the best representations of these emotions in words. Terror and astonishment, in which the person is appalled and stupefied, and where he stands rooted and motionless, are contrasted with the fugitive, unnerved by fear alone, and in the act of flight. Homer thus describes horror: "Terror and consternation at that sound the mind of Priam felt; erect his hair, bristled his limbs, and with amaze he stood motionless." The fear of spiders, of snakes, or, as in the late Lord Roberts, of cats, are inherited phobias, of which about 140 have been described. They are not of the category under consideration.

RELATION BETWEEN MIND AND BODY.

It may be desirable in order to explain certain functional nervous states to consider briefly the relation between mind and body. This has always seemed to be an interesting speculative question, but we desire not to be drawn into any deep metaphysical discussion over it. Physiologically considered man only obeys his biological destiny, and physiology takes no view of intellect or of intelligent behaviour; these are outside its purview. Dr. F. Buzzard, in a very interesting paper recently published in the *Lancet* (December 30th, 1916), cites a case of functional paraplegia as the effect of a separate mental entity upon an equally separate body, and he sought for an explanation of this condition from the psychological aspect. He says these cases are "what appear to me to be essentially disorders of the *mind* in the present state of our knowledge." The suddenness of onset and the equally sudden disappearance of nervous condition certainly negative an organic origin, and tend to favour this mental entity. Dr. Buzzard states—and this is striking from a neurologist—"the more I see of these cases, the more convinced I am that an idea—a, conscious idea—plays some part in the production of all these phenomena"; also, "hysteria has its source in the mind. It is a mental disease." The experience of many who have the care of mental and shell-shock cases upholds this view, and we are not prepared to say, with so many psychologists, that mental processes consist only of sensations in juxtaposition, or of

images (which are revived sensation) held in groups by "association," and that there is no such thing as mind by itself, although, on the other hand, there are no definite proofs of its existence. Man is a purposive being, with intelligence and volition, and we realise from such complex physiological conditions as binocular vision, as we also know from the experience of effort, used in thought or during attention, that there is some kind of independent entity. But, it is replied, if there be an independent mind, why should it appear to arise only in connection with cerebral processes, and not in connection with any other processes? All are agreed, however, that mental states are associated with the activity of the nervous system, but this does not prove that they are "functions" of the brain. To think of the mind as an epi-phenomenon, a something inert lying beside matter, does not explain mental states, and it is contrary to experience and to psychological knowledge to accept this view. The view that mind is something incidental to matter—a "spark thrown off by the engine," or "a mere foam thrown up by and floating on a wave"—although held by some psychologists, is not generally acceptable. This view holds that the mind has no reaction on the brain. There is a strong conviction in the minds of most persons that there is a definite reality in mental activity and in effort, and therefore to put the mind on one side as a mere inert series of phenomena, or an epi-phenomenon, is not only inadmissible, but is belied by the experience of all who have to do with mental cases. It is true that some thinkers suggest that the whole universe is ranged on the lines of, and through, conscious experience, and that, as we know nothing of the ultimate constituents of matter, it is not impossible that matter may in the end prove to be of a like nature, or even prove to be identical with, the ultimate "stuff" of consciousness. As to cause and effect between mind and body, it is impossible to state conclusively that either factor is a cause, for the two things are not comparable, and to try to explain as an effect anything that is not commensurate with the cause is inadmissible. It is not possible to explain consciousness or awareness in physical terms, which must be in terms of movement. Moreover, the consciousness that arises from cerebral processes is not consciousness of the cerebral processes themselves, but of something not only quite different, but also outside the brain itself, and even our own appreciation

of the functions of the cerebral cortex is a reflection. The facts as we know them suggest that a physiological process always accompanies a psychological change, but to say they are parallel is not warranted, for there is no continued "point-to-point" relation between them, and to suggest "parallelism" is to favour a *mechanistic* view, or an interpretation in terms of physical analogy. It would be more true to state there was interaction between them than to suggest there was a complete parallelism, *i.e.*, when changes took place in the cortex something else occurred which was over and above material change, but true correlation was impossible, and "interaction," or the vitalistic view as opposed to the mechanistic, seems of late to be gaining ground over parallelism as an explanation of the relation of mind and body. A young Australian soldier suffering from shell-shock, and under the care of Col. Hawkins, R.A.M.C., had not spoken for several months. One day in Whitehall he unexpectedly met his brother, who suddenly greeted him after an absence of seven years. The soldier spoke from that hour. A company of about twelve soldiers who had recovered from shell-shock set off one afternoon to witness a trans-pontine melodrama, a part of the plot being the explosion of a stage bomb, which was unexpected. Five of the men instantly lost the power of walking and had to be carried home, whilst another of the party became aphonic and aphasic. Both of these examples seem to indicate the power of some entity capable of reacting upon the body, and giving rise to functional (as opposed to organic) nervous changes.

PHYSIOLOGY.

I believe it would be correct to regard the emotions as the mental interpretation of physiological adaptations for survival, for they are capable of calling up certain powers of the body into action which help the individual to live. They are thus purposive, their end being to preserve the welfare of the organism and to safeguard it against hurt or injury. Upon this view the emotions are supplementary reflexes—few of them are under the control of the will—by means of which the body is prepared for protective action. In the popular view there are usually three ways in which protective action occurs: Firstly, external precautions against cold and storm, wind and

rain, by the adoption of clothing and shelter ; secondly, action against pathogenic and other organisms and toxins through the chemical defences which are more or less innate in every individual, and thirdly, those adaptive mechanisms through the senses which help to guard the body against injury, and with these the special instincts of self-preservation through fight and combat, or flight and concealment ; each of these bodily instincts being attended with a mental side signified by the term "emotion." In every emotion there are nervous currents discharging impulses to the various muscles, the viscera and the vital organs, and it is upon the nature of these reactions that we are able to observe and to classify the instincts which are the bodily accompaniments of the different emotions. After what has been said about the relationship between mind and body, we may state, without suggesting factors of causation, that each of the emotions has a bodily accompaniment. Indeed the emotions may be regarded not only as having associated bodily states, but also as being themselves special mechanisms for reinforcing the bodily activities, for in the hour of danger the emotions, acting in conjunction with the motor mechanism and certain glandular structures, prepare and adapt the body for protective action, and when these mechanisms have been discharging for long periods continuously, or for a short period intensely, a condition of exhaustion must occur, and it is this condition that we meet in so many "shell-shock" cases.

It has been ascertained that the visceral response is the same for all the strong emotions, and there appears to be so much physical uniformity and physiological similarity among all the emotions, complex and varied as they seem, that fundamentally they may all be identical. At any rate their special differentiation must be sought for elsewhere than in visceral changes, as it is impossible to discriminate between them from their visceral associations, which, after all, are only one side of the emotions. C. S. Sherrington writes to me saying that his experiments of severing the viscera and skeletal muscles from brain influences "tended to show that the suppression of the visceral and vascular accompaniments of the emotions of rage, disgust, and fear did not suppress the occurrence of the emotions, at least not to the extent that we should have expected were William James' view of their source correct," this view being

“that the visceral and vascular reflexes by a retro-pulsion to the brain and mind gave rise to the emotions,” or, in other words, that the physiological disturbances originated the emotion, or *were* the emotion, and that we are miserable because we cry and not that we cry because we are miserable. Sherrington's experiments tended to show that although the autonomic nervous system was the organic background of the conscious life, the viscera themselves were relatively unimportant in distinguishing between the different kinds of emotions, each of which would appear to have its own bed or track deeply laid already and ingrained in the central nervous system, and each having in connection with this track a separate group of co-ordinating neurones. It would be true to state that every stimulus, physical and mental, tends to awaken (along ancestral tracks in the nervous centres) some response, through various associations that may be peculiar to the individual. As we know, each group of neurones has its own characteristic expression, and the tendency for these upon stimulation is to act suddenly and to call up separate groups of voluntary muscles. It is ascertained that a nervous current may cause a contraction in a skeletal muscle in the two to three thousandth part of a second, whereas a stimulus through the autonomic system, acting upon smooth muscle or upon a gland, takes several seconds to react. If sufficiently intense the stimulus of an emotion overflows into the more diffuse discharges of the autonomic system, thus giving rise to vague cardiac, pulmonary, and visceral perturbations with muscular tremors, such as we find so often in “shell-shock” cases. We know that strong emotions of fear, grief, anger, or rage may inhibit the flow of saliva, of the gastric, pancreatic, and intestinal juices as well as of the bile; the normal movements of the stomach and intestine also cease, and the same in a minor degree is true of the less dominant emotions. In some cases of sudden joy or of intense fear the contents of the hollow viscera may even be rejected, which shows that the influence of a powerful emotion may overwhelm the normal action of the autonomic system, and may thus entirely reverse the functions of organs innervated by it.

It has been ascertained experimentally that when the emotions of fear and rage are experienced there is an increase of adrenalin and sugar in the circulation. The blood of a caged cat tormented by a barking dog will show an increased

percentage of adrenalin (which can be detected when the amount present is a dilution of one in a million), and precisely the same occurs when the nerves to the gland are stimulated. The physiological effect of adrenalin is to restore the organism after fatigue and to cause an innervation of all nerves in the autonomic system. The effect of increased sugar in the blood is to restore and renew muscular activity, and this, when present, prepares the organism for a supreme muscular effort. The combined effect of adrenalin and sugar is to excite the heart, to contract the walls of the smaller blood-vessels, and so to raise arterial pressure, to add tone to the viscera, and to release the sugar stored in the liver, and also to activate the sweat-glands in anticipation of violent muscular movements. The further effect is to dilate the pupil (possibly the ancestral instinct for seeing distant objects), all such phenomena being physical results that fully and completely characterise the emotion of fear, which is thus demonstrated to be a protective reflex, inasmuch as these physiological effects are precisely those that prepare the body for a strenuous effort, such an effort expressing itself in active combat, conflict, or flight, the latter being essentially a struggle to be free.

Of all the emotions, fear is probably the one that most frequently rouses the autonomic nervous system into activity, and it is through this emotion in particular that nerve-potential from the central nervous system overflows into the autonomic ganglia and inhibits the functions dependent upon them. There is thus during fear a rapid and probably excessive conversion of potential into kinetic energy, which must be at the expense of the energy stored away, in part the stored energy of the cytoplasm of the neurone, and in part also that of the liver cells, the thyroid, and the adrenals. Although we ourselves realise the marked psychological distinctions between the emotions, it is true that in spite of many complexities some of the emotions seem readily to pass into others and for this reason they have been described as ambivalent. There is much for instance that is common between fear and rage. William James even says they are the same, for "we wish to kill anything that wishes to kill us," and he adds that animals which fear and flee not infrequently turn to fury and fight. McDougall states that to thwart any emotion or instinct is to excite the animal to fight and combat, and Graham Wallas

makes a great point of the transformation of an instinct, by what he describes as a "balked disposition," in which there is the discomfort or pain at not securing the object of one's desire, and the merging of this feeling into the agreeable consciousness of being able to react against the cause of pain. It is with the view of "balking" fear that popular opinion urges a timid person to regain his previous confidence by repeating under assured and safe conditions the same act that caused his fear. If a boy falls off his horse and is afraid to try again the riding-master insists he should ride the next day, otherwise there is a risk that his fear may become fixed and he may thus permanently lose his "nerve." This accords with the experience of shell-shock, which only develops some time after the original "trauma," and unless treated becomes organised. This transformation of emotions is well seen in the passing of fear into anger, with the result that hatred is engendered.

It has been asked, if fear be a protective emotion, why is it sometimes physiologically depressing or of a paralysing character, and why is it sometimes associated with a failure of the circulation and with collapse; a condition which is incompatible with activity or combat? Why, in other words, do the same emotional states pass into two opposite physical states? The answer is, that the deeper and stronger emotions as well as severe pain are occasionally depressing because this condition is of biological utility to the organism, and it is then that concealment, and not combat or flight, must be adopted if escape is to be effected; for, owing to the injuries received, an effort at flight would not be in the interest of survival or protection; but would, on the other hand, only aggravate the damage inflicted. Under these circumstances it would not assist an injured animal to attempt to escape; collapse alone would favour survival, yet, when the need for action becomes necessary, the body can be roused to all its defensive and offensive activities, as occurs in the automatic pouring of adrenalin into the blood during a strong emotional experience, results which follow equally its experimental injection into the blood-stream.

It has been conclusively shown by G. W. Crile and those who collaborated with him, that a strong psychic stimulus produces some change in the conductivity of the cerebral arc, the effect of which is to lower the threshold of that arc; for instance, the sudden or unexpected strain which has produced

shell-shock brings about a condition of lower nervous threshold, that is, it creates an increased sensitiveness to impressions, so that a condition of marked nervousness is left, and after being "buried" or "blown up," or after hearing continuous loud sounds and unusual noises, or after a sudden fright, a lower receptivity is induced which will cause general bodily perturbation. Possibly of all the senses hearing is the most refined and delicate, certainly it is the most highly evolutionised in cultured people; and it is the one most frequently dissociated in insanity. Of all hallucinations in cases of mental disease the aural forms are the most common. This sense depends upon very specific receptors, *vis.*, the hair cells, to which the tectorial membrane responds; and there is an intimate association phylogenetically between tactile and auditory sensations; so that any sudden stimulation of the specific auditory epithelium is capable of reacting in a very general way upon the mental functions, and we find shell-shock cases to be very sensitive to any loud or unusual sounds. Moreover, the stream of impulses to the auditory nerve must also affect its vestibular branch which is closely connected with the static sense, and with the control of movement. Although the vestibular nerves give rise to no sensations, they are nevertheless closely related to the roots of the motor-oculi nerves, as well as to other motor centres in the brain stem and in the cerebellum. They thus serve to keep up the bodily balance and to keep the eyes fixed upon the same point in spite of movements of the head and body. All auditory impulses must therefore be continuously correlated with movements, yet there is no knowledge in consciousness that these movements are made or produced. I was greatly interested to see in so large a number of the cases shown on December 11th last at the Maudsley Hospital such sudden uncontrolled movement, especially when spoken to unexpectedly or loudly, and also the frequency with which one meets with nystagmus in these cases. We do not sufficiently realise how dependent bodily movements guided by habit are upon the auditory sensations, which are certainly the most highly evolutionised and the most important of all the avenues into consciousness.

As has been suggested a lowered nervous threshold is of a protective nature, being an adaptive reaction against future dangers, because in this way a minor stimulus elicits a major effect, but since a low threshold is lavish of nervous energy

recuperation must be slow, for there is in this condition of exhaustion a loss of efficiency. There is, therefore, great theoretical support for the treatment of shell-shock cases by prolonged rest. Several cases of this nature that have responded rapidly to treatment have returned in a short time when sent out again to the Front only to present the same symptoms in an aggravated form, and I am somewhat uncertain about their further utility in positions of great responsibility, although they may be an asset to the country in other spheres of action. P—, after four months at home arrived at the Front on September 29th, 1916, but three days afterwards was sent back stolid, aphonic and aphasic; and for several months since then he has required special care and treatment, and this case is only one example out of many.

It is now pertinent to enquire what the bodily conditions underlying shell-shock may be, and here at the outset I would suggest that to attribute their state to "funk" or "fear" in the cowardly sense would be as unfair as it would be untrue. A brave officer who was in the trenches for eighteen months, and who seemed to lead a charmed life, could not be accused of lack of courage when after being wounded and brought to hospital he wept without cause, and showed other signs of nerve exhaustion whenever spoken to. To state that shell-shock was the result of unconscious fright would be more correct than to attribute it to want of valour, yet this would not be the whole factor. It has been pointed out that the term shell-shock should be applied only to those cases in which there is a definite molecular nervous system lesion, the functional cases being regarded as "hysterical," but the term hitherto has been applied to all nervous states occurring among soldiers. I am personally convinced that the great and underlying cause in many shell-shock cases is to be found in the instinctive and innate sudden unreasonable fear of the "unknown" which characterises certain temperaments, often those of superior minds; certainly those whose nervous organisation is highly complex, and it is this type of mind that is soonest subjected to dissociation by fear. In them above all others does sudden fear, although not consciously realised by the individual, weaken and paralyse the functions of the body and mind, and in them also is this fear of the unknown "diversified and intellectualised." It is in this class that awe, reverence and wonder are so often associated

with fear in regard to the unknown, which to them also is mysterious, awful, and supernatural ; and it is in this class that the description of the mental state—shell-shock—as one of “ unconscious affectation ” best applies. There is a record in many of these cases of excessive fatigue, intense anxiety, insomnia, and irregularity on occasions—inevitable under the circumstances—of obtaining proper food. In some there is a lowering of the defences of the body through infection, including venereal diseases, malaria and fever ; there is in most of them an actual record of sudden fright from the effect of high explosive shells with physical concussion from the 9- and 12-in. artillery, as they themselves describe it, especially the former. All these are conditions antecedent to physical exhaustion ; but in over 30 *per cent.* of the cases the sufferers are members of neurotic families, with a history of some “ nervous breakdown ”—depression, anxiety, apoplexy, epilepsy, paralysis, or insanity in the parents, and most often, I find, in the mother. Shell-shock cases have occurred among our men from all parts of the Empire ; Australia, Canada, South Africa, and New Zealand have all contributed patients of this class who have served with the colours in Egypt, Gallipoli, France, and on the high seas, and all present symptoms of diminished nervous energy. It is a fact without any doubt that the store of potential energy is diminished by emotional and physical stimuli, and Crile has demonstrated changes in the neurones of the cerebral cortex, in the cerebellum, in the medulla, and in the cord. These neurones show a change varying from slight swelling to complete disintegration with vacuolation and atrophy of the dendrites, and although the living neurone exhibits no Nissl bodies and is of a different granular structure from that seen in microscopical laboratory preparations, yet these Nissl bodies are a convenient method of indicating the amount of destructive changes. These are described as hyper-chromatism passing into general decay with disintegration of the cyto-plasm, a rupture of the cell membrane and a dislocation of the nucleus which first becomes eccentric and then disappears. In addition to these changes in the nervous system there are changes in the thyroid, the liver, and the adrenals.

Pathological examination in an instructive case at Claybury of extreme neurasthenia with mental symptoms showed disintegration of the thyroid, with chromatolysis and a dissolu-

tion of the vagal roots, and microscopic slides of this case have been exhibited by the pathologist ; a case that in my opinion appears to bear some relation to cases of shell-shock that I have seen. The sympathetic symptoms of some of the cases examined with their rapid pulse, widely dilated pupils, precordial pains, disturbed breathing, vague abdominal discomfort and visceral perturbations, associated at times with sickness, appear to me to indicate a dissociation between the cerebro-spinal and the autonomous system of nerves. In some of the cases there has undoubtedly been an enlargement of the thyroid with the symptoms I have named, and Major Newton Pitt has mentioned to me similar cases from his own experience.

The physiology of the autonomic nervous system, distinctive as it is, still remains somewhat obscure. We know that there is an antagonism between the actions of the three great series of the autonomous ganglia within the body, precisely as there is an antagonism between the emotions that activate them ; the pleasurable emotions, for example (referred to in Pawlow's experiments), assist digestion ; whilst those that are painful, as are the strong emotions of fear, terror, anger, and rage, stop digestion. We also know, as Sherrington has shown, that in the cerebro-spinal nervous system there is in health a reciprocal balance of innervation between antagonistic flexor and extensor muscles ; so also there exists a reciprocal innervation in the functions of the viscera which are controlled by the autonomic system. As has been proved, strychnine and certain toxins, such a tetanus, can disturb this reciprocal balance of opposed skeletal adjustments, and similarly the strong emotions are potential to disturb the reciprocal action of the autonomic system. The functions of the heart, of many of the glands, and of some of the visceral muscles are performed automatically through their own intrinsic mechanisms ; whilst these and other organs also receive a further nerve supply, in part—through intercalary nerves—from the central nervous system, and in part also from the segmentally arranged autonomous system ; the latter being in three larger groups of ganglia. The first of these, related to the brain, is connected with the building up of reserve power ; the third is related to the sacral nerves, and is connected with the lower animal functions and the reflexes of the bladder and rectum, whilst the middle or the thoracico-lumbar, is connected with releasing power for

action and is antagonistic to the other two. Each of these three autonomic ganglia, has its own physiological characteristics, and each has its own special reaction to certain drugs, *e.g.*, adrenalin affects chiefly the thoracico-lumbar ganglion, which is nevertheless slow to react to atropin, pilocarpin, or muscarin, drugs which are found to have a marked influence upon the other two series of sympathetic ganglia. As the emotions act primarily through the cerebro-spinal neurones, and as their overflow runs through and flushes the autonomic ganglia, so a power is exercised from above to regulate the functions of these lower systems, along the nervous mechanism which runs down the cord in the intermedio-lateral tract. It is, therefore, possible to cause a dissociation of the two systems with consequent un-controlled, un-regulated action of the autonomic group and giving rise to the symptoms already named. One of the results of high explosives bursting with a sudden pressure of about 7,000 kilogrammes to the square centimetre, must inevitably be a percussion shock which would be conveyed with an intense mechanical force, through the cushion of the cerebro-spinal fluid upon which the central nervous system is resting, or in which it is suspended, and the injury in shell-shock cases—apart from its effect on the ears, eyes, and other organs—must be a definite molecular physical injury to the brain and cord, an injury which is super-added to that caused by the sudden emotional strain. Such a strain must be more deeply and fully felt, if the noise and mechanical disturbance were experienced for some length of time, as is often the case. To us at home it is unimaginable and inconceivable what proximity to the continued stress of high explosives must mean. We are terrified sometimes by the feeble back-firing motor car, or from the noise of a burst tyre, and we recoil petulantly and write to the *Times* if a maid whistles for a taxi—because of the strain and shock to our nerves! Let us try and faintly realise the terrifying strain that must be endured by our soldiers at the front!

It accords with the experience of those who have the care of shell-shock cases that motor inco-ordination and sympathetic disturbances are much more frequent than are sensory abnormalities. The delicate neurones of the anterior horns and those of the intermedio-lateral tract are also more liable to injury and are more likely to receive a definite trauma through per-

cussion than are the neurones of the posterior nerve root ganglia. Prof. Macphail, the Lecturer on Anatomy at St. Bartholomew's Hospital, further informs me that the protection of the spinal root ganglia is more complete against the effects of shock situated as they are in the intervertebral spaces and sheathed as they also are by dura mater extensions, than are the delicate neurones of the motor horns and the intermedio-lateral tracts. Moreover, the fine threads and fibril processes conveying afferent impulses from the periphery and connected with the spinal neurones are better preserved from shock within the cord than are the motor horn neurones with their network of anastomosing dendrites ; all of which help to explain the fact that motor and sympathetic disturbances are more common than sensory.

Dr. H. Maudsley once said that all the symptoms of insanity could be witnessed in the effects of alcohol upon the brain, and I would almost venture to apply the simile to the symptoms shown in shell-shock and which may be witnessed in the course of general paralysis, caused by a definite injury to the cortex through spirochætosis. The extreme cases of shell-shock are without doubt those with definite physical injuries to the cerebral neurones, although in the lighter forms there may be no appreciable anatomical lesion. How far these are produced by purely mental causes it is impossible to state, but to summarise the causes of shell-shock at least five views have been advanced: (*a*) Sudden fear, terror, or fright, acting as an emotional stimulus ; (*b*) hypothyroidism ; (*c*) hyperthyroidism ; (*d*) the inhalation of poisonous gases such as carbon monoxide or phosgene (carbonyl), causing disintegration of the red blood corpuscles and hæmorrhages ; and (*e*) an actual molecular physical lesion due to sudden and extreme pressure and resulting in a dissociation between the cerebro-spinal and the sympathetic systems. As Mr. Ernest Clarke has stated, this pressure may be positive or negative, and may cause acute compression or decompression, as was seen at St. Bartholomew's Hospital after a Zeppelin raid, when some windows were blown in whilst the others were blown out. Mr. Clarke has himself seen an eye completely destroyed at the front by being extruded out of its socket during the bursting of a shell. I do not wish to dogmatise upon the ætiology of shell-shock, and whatever the cause may be, the prognosis must depend upon the amount of

injury received by the neurons. The condition is without doubt one of acute exhaustion, and recovery should be complete provided the physical changes have not extended to the extrusion of the nucleus and to the destruction of the neurone.

We now come to the unreasonable fear which seizes upon one or more in an assemblage of persons, and to this the term "panic" has been applied. It is an infectious feeling of fear, experienced not infrequently when there is no real danger; yet an animal or a man seems to be endeavouring to escape from some apparent danger. A child is afraid of the dark or a man of ghosts. Something which cannot even be in consciousness may act as an instinctive stimulus of fear, or something which enters into consciousness but has not before been associated with fear or danger, such as a sudden noise or some rapid movement. The purposive end of all fear is to escape from danger, whether the feeling of fear be personal, or relating to property, or other objects we care for, and the fear continues, unless controlled, until the end is attained.

Panic, from *πανικός* (Liddell and Scott, p. 1170), has been defined as any sudden or unreasonable fear or terror without a visible cause, and at Sparta shrines were erected to *φοβός* (fear), *Γέλως* (laughter), two demons or spirits whose power was, nevertheless, not greatly felt in that city (*Manual of Greek Antiquities*, Gardner and Jevons, p. 15 *et seq.*). It is recorded that the people of Selinus, in Sicily, always ascribed a victory to fear (*Greek Votive Offerings*, Rouse, p. 96) and that Pan, like other gods who dwelt in forests, was greatly dreaded by travellers, to whom he sometimes appeared and whom he startled with sudden awe and terror. Hence any sudden fright without a visible cause was ascribed to Pan, and was called a panic fear (*Smith's Classical Dictionary*, Pan).

PANICS IN BATTLE AND WAR TIME.

In the earliest records of war, in which opposed armies came to actual personal conflict, it was extremely helpful to be able to rely upon the emotions of terror, and mysterious and hidden influences were frequently summoned to create these and to excite panic. We know from the Biblical records of antiquity, when war occurred about 1000 B.C. (II Chron. xxiv) between

Egypt and Assyria, how the effects of plague and panic destroyed the army of Sennacherib.

In the battle of Salamis, B.C. 480, a naval battle fought off the coast of Attica, between the Persians under Xerxes and the Greeks under Themistocles, Artemisia, the wife of Xerxes, behaved with such incredible feats of bravery that he exclaimed the men behaved like women but the women acted with the courage of men. Yet a panic seized upon Xerxes and his troops, for, as Grote says (vol. iv, p. 484), "and the Greeks themselves made ready for a second engagement, but they were relieved from this necessity by the pusillanimity of the invading monarch, in whom the defeat had occasioned a sudden revulsion from contemptuous confidence, not only to rage and disappointment, but to the extreme of alarm for his own personal safety." Artemisia, yielding to panic, escaped in one of her own vessels, sailing under the Greek colours, and in order to deceive her pursuers she set fire to one of the Persian ships, so that the enemy chase was relinquished. Another later instance of a naval battle was at Actium, B.C. 31, between Cleopatra and Marc Antony on the one side and Augustus Cæsar on the other. The fleet of Cleopatra was twice as numerous as that of Cæsar, but just at the decisive point panic-fear seized upon Cleopatra while in no actual or personal danger, and she took to flight. The whole Egyptian squadron followed suit, and Antony, seeing Cleopatra pursued, yielded the victory to Cæsar. The effect of this panic proved to be the ruin of Antony and Cleopatra, and Egypt from that time became a Roman province.

At the battle of Marathon, a village in Attica, B.C. 490, an epoch-making victory was gained mainly through the intrepid valour of the Greeks under Miltiades, led by Aristides and Themistocles against the Persian army. The Persians outnumbered their antagonists by more than ten to one. The aid of the god Pan also greatly contributed to victory, for according to Herodotus, Pan assisted the Athenians to strike causeless fear and terror into the Persian forces, who fled to their ships to escape the pursuit of the Athenians. So pleased were the Athenians with their god Pan that they dedicated a grotto for his worship, and they established the Lycean festivals to commemorate the victory.

At the battle of Cunaxa, near Babylon, B.C. 401, between the rothers Artaxerxes, who led the Persians, and Cyrus, the

younger, who commanded the Greeks, the Greeks, although victorious, lost Cyrus their leader, and this led to the "retreat of the 10,000." We have it recorded by Xenophon (*Anabasis II*), who was not only present, but who organised and led this marvellous retreat (caused by the inutility of the expedition—now that Cyrus was dead—to try and replace Cyrus on the throne of Persia) that a panic occurred at night during the commencement of the retreat. The whole camp was a scene of clamour, dispute, and even of alarm. Early the next morning Clearchus ordered them under arms, and, desiring to expose the groundless nature of the alarm, caused the herald to proclaim that whoever would denounce the person who had let the ass into the camp on the preceding night should be rewarded with a talent of silver. This seems to have been a standing military jest in order to make the soldiers laugh at their past panic. The battle of Cunaxa brought the Persian Empire to the brink of destruction, and in this battle, probably more than any other, the dominant influences of conflicting emotions are seen in their unreasoning effects upon conduct, *viz.*, the over-weening ambition of two brothers and the retreat of a victorious army.

A useful psychological stimulus was practised by the Greeks as is now done by our more modern warriors. They shouted maxims or songs to animate themselves, and their commander had to possess a loud voice in order to strike terror into his own troops or into the antagonists. Some of us may have experienced the help which is obtained by thus diverting trains of thought from sombre to gay, as when our spirits are down or our minds are preoccupied with serious thoughts we seek other attractions, or turn our minds to some diversion. Since the war the theatres and cinemas have never declared such dividends, and history only repeats itself, for the night before Waterloo we have the record of a grand ball, at which our war chiefs were present.

Following the evolution of Greek warfare came Roman methods, and the latter were warriors even from the earliest days of the Roman Republic. The Romans appear to have been nearly always at war. During the first five hundred years they were at war with the different states of Italy, and for the next two hundred with other nations. Every Roman citizen had to enlist for the public service, and the ages of recruits varied between seventeen and forty-six. In order to kindle enthusiasm before going into action, the Roman generals

harangued their soldiers from a tribunal of earth heaped up locally and the trumpets sounded the march, to which the soldiers responded "To arms," the shout being useful for the rush to the charge as well as for the purpose of terrifying their opponents. Our own brave warriors to-day relate similar tactics when clearing the parapet for the forward rush, and the Anzacs had the same methods in the Dardanelles.

ENUMERATION OF WAR PANICS.

Many of the battles recorded in ancient history demonstrate the great part taken by the emotions in war.

At the battle of Chæronea, in Bœotia, B.C. 338, when Philip of Macedon was victorious over the confederate armies of Athens and Thebes, two points of great interest may be mentioned: firstly, the infectious courage and the striking valour and intrepidity of the young boy warrior Alexander, who afterwards became Alexander the Great, the master of Europe, Asia, and Africa, and who died at thirty-two; secondly, the effect of panic-fear even upon the greatest orator and statesman, Demosthenes, who, when he saw the rout of the Athenians, threw down his arms and fled with the rest. He was unable to practise what he preached, and it is said of him that when, in his flight, his robe was accidentally caught in a bramble, he imagined some of the enemy had laid hold of him, and he cried out, not "Kamarad," but its equivalent, "Spare my life"!

At the battle of Plataea, a town in Bœotia, B.C. 479, when the Greeks delivered Greece for ever from Persian invasion, the whole Persian army, on the death of their general, Mardonius, was seized with panic and took to flight, and it is stated that panic either "flees or it breaks." No Persian king ever appeared with a hostile force beyond the Hellespont after the battle of Plataea.

At the battle of Issus, B.C. 333, a town on the borders of Syria, in Silicia, fought between Alexander the Great and Darius, King of the Persians, Darius leapt from his chariot in a fit of panic, fearing to fall into the hands of the enemy. The troops, observing this, also fled and threw down their arms and made off. In this battle was decided not only the fall of Darius, but also the ruin of his empire.

At the battle of Pharsalia, in Thessaly, B.C. 48, between

Pompey the Great and Julius Cæsar, Pompey's great army was defeated. The cry of Pompey's troops was "Hercules the Invincible," while Cæsar's men called out, "Venus the Victorious." Pompey, who had adorned the temple of Venus with many spoils, feared that Cæsar would be aggrandised at his expense and he forced the battle, but through a panic-fear that Cæsar had ordered the enemy's face should be attacked, and seeing the visages of his troops wounded and disfigured, the panic ended in a rout, and Pompey's army fled in great disorder.

Three other and great decisive battles of antiquity may be quoted in which the great Carthaginian general was engaged. The first was the battle on the margin of Lake Thrasymenus, B.C. 217, when the Romans were trapped and terrified by the clash of arms and the shouts of Hannibal's men, and could not escape from the enemy or flee on account of the mist. The second, the battle of Cannæ, B.C. 216, where the Roman troops under Æmilius and Varro, although twice as numerous as the Carthaginians, were surrounded and defeated after unparalleled bravery; and the third, the battle of Zama, near Carthage, B.C. 202, when Hannibal at the end of the second Punic War, was overthrown by Scipio after a struggle lasting over seventeen years. The panic, the rout and the confusion caused by elephants and horses and war chariots, and the final scene when Hannibal attacked the enemy in front and his own troops in the rear, presents a picture to us of the terrible destruction of the Carthaginians and the complete desolation of the highest seat of learning and culture, as well as of the most prosperous commercial city of the ancient world. Standing on the Byrsa, or citadel of ancient Carthage, the writer felt that the world had lost invaluable treasures, noble buildings and a world-famous library through the supremacy of Rome, and that the tender emotions had undergone an enormous strain when it was contemplated that the home of St. Augustine and the first and greatest seat of Christianity in North Africa had been razed to the ground, practically nothing remaining of what was once the mightiest city in the world. As Lamarck has said the least progress cannot be realised without causing panic and pain among the people, and in the history of the wars of our own country, we have specific instances of the occurrence of panic-fear. In Holinshed's *Chronicles of England, Scotland and*

Ireland, vol. iii, 1808, pp. 54-5, it is stated that panic seized the French army in the Battle of the Spurs, 1513. This was fought at Guinsgate, near Terouenne, in the campaign of the English under King Henry VIII in person and King Maximilian of Flanders. The allies had formed the siege of Terouenne and a body of French cavalry came up to relieve the town. The allies advanced in order of battle but the French seeing them were seized with panic, put spurs to their horses and fled without a blow. At the battle of Gravelotte in 1870, there were no less than three serious panics which resulted in the French army being surrounded.

There are numerous records in Mommsen's *History of Rome* of similar panics occurring in classical literature, and Macaulay, in his "Lay of the Battle of the Lake Regillus," a legend of ancient Rome, which portrays the panic-fear caused by the sudden appearance of Castor and Pollux upon white horses, describes the physical effects of fright in his well-known stanzas.

PANIC IN TIME OF WAR AND PESTILENCE.

As Dr. Leonard Guthrie writes to me, "panics and orgies of every kind occurred in the time of great plagues as well as during war and amongst the inhabitants of countries during political crises or upon invasion." Grote, in his *History of Greece*, vol. iv, p. 276, gives the record of panic in Athens during and after the plague, B.C. 430, which occurred during the Peloponnesian War. Fifteen years previously a similar visitation had been witnessed in Rome.

The plague in 1499 in our own country caused such a panic that Henry VII moved his Court to Calais, and the plague which depopulated Oxford in 1506 and described as the "sweating sickness," caused the same panic-fear.

The Plague of London, a description of which by William Boghurst, apothecary, in 1665, edited by Dr. Frank Payne in 1896, gives details of this devastating epidemic, which began in 1664 and only ended with the Great Fire in 1666. Out of a total population in London of under half a million, one-fifth was removed by the pestilence. Pepys gives an account of the panic which ensued. He remained, he says, at his official residence, the Navy Office, in Seething Lane, as did the Lord

Mayor at his, and he met "hardly twenty people from one end of Lombard Street to the other and not more than fifty on the Exchange." A week later, Evelyn, coming up from his house near Deptford, found the line of streets through the City to St. James' Street nearly empty of people, the shops shut, and many coffins at the doors of houses awaiting burial. Nearly all the clergy, magistrates, and (sad to relate) every doctor are said to have fled along with the richer classes in general. Among the doctors who remained were two men eminent for their investigations and research, *vis.*, Glisson (of Glisson's capsule), and Wharton (of Wharton's duct). As would be the case to-day, several high personages of the Court stayed in town to carry on the public business and were afterwards presented with silver cups by the King. As we know, the educated man is less subject to blind panic than the ill-informed, for, as one's experience widens, fewer circumstances excite us; as we build up our conceptual system, we gain the mastery over our outer world, and the means at our disposal for modifying situations which thwart our activities and which give rise to emotions of anger, fear, grief, and pain are infinitely increased. Moreover, as we gain knowledge the situations which further our tendencies to react quickly and impulsively to outward stimulations do not excite us as they did through lack of knowledge. When our conceptual system, so to speak, was less determinate we acted impulsively and suddenly. The educated and experienced learn to expect less of the world, and there is the compensation that as we continue to learn, our emotions tend to take on subtler forms, which do not involve bodily commotion or the physical accompaniments of emotions, to the same degree.

Possibly there is no argument that conveys so much conviction to the average mind as the arithmetical argument, especially when an appeal is made to the pocket. This is possibly the reason why financial crises cause so much fear and anxiety. We have many records of commercial panics, so often caused by over-speculation, as in the South Sea Bubble, and in the crash following John Law's banking scheme in France, both in the year 1720. Since then, in 1879, the City of Glasgow Bank failure brought ruin upon many families, and in 1890 the Baring crisis occurred, when the financial stability of the city was saved by the Bank of England, and in this war when the present Prime Minister, then the Chancellor of the

Exchequer, saved the country by his "moratorium." Minor panics have quite recently occurred among the lesser people through the suspension of the Birkbeck and the Penny Banks. Ever since the beginning of the war there have been several small panics, the last being the depression in industrial securities on the American Exchange, when Germany made her sinister offer of peace. Political crises are always attended with some degree of panic-fear. Revolutions, whether in empires, kingdoms, or republics are all accompanied by their special panics, as we frequently witness in the Republics of South America.

Dealing with the electoral franchise is always a sensitive task, and even in Athens when the franchise was restricted during the reign of the oligarchy, this gave rise to acute panic and terror; private assassination was practised on such an extensive scale that important persons perished by a special and secret systematic murder, carried out by unknown hands, and so great was the fear that no man dared to demand an inquiry into the death of his nearest and dearest relative; dismay and disturbance became general and panic-fear became universal (*Grote's History*). The Reign of Terror in France in 1793, when Robespierre demanded the death of the King, and when, in his triumph he established the Convention, witnessed the sacrifice of the lives of hundreds of the most eminent men and loyal citizens. The cruelties and the terror and the savage unreason during this short administration of which Robespierre was the head, terminated in his own destruction and it ended when he himself was guillotined.

In civil life Col. F. N. Maude, in *War and the World's Life*, p. 408, relates how at the crisis of the Fashoda incident, for instance, some one in Portsmouth incautiously dropped a remark as to what might happen, if war really ensued, to the inhabitants of Shanklin and Sandown in the Isle of Wight. As Col. Maude says, the facts had been apparent to everyone ever since the batteries for the defence of the Bay were erected, but no sooner was the suggestion of danger made than it was taken up by the local press, when a complete exodus of ultra-nervous residents occurred from these favoured spots. As compared with this may be contrasted the behaviour of Portsmouth itself with its inhabitants better educated in military and naval affairs. A particular group of dwellings placed directly

behind certain batteries never lost their selling price nor lowered their rents, although every shell fired by an enemy and passing over the guns of the battery would of necessity find a final billet in the drawing-rooms or best bedrooms, yet no one can suggest that Portsmouth is not kept sufficiently alive to the possibilities of modern warfare. Col. Maude also refers very aptly to the "resultant thought wave" of Gustave Le Bon, who stated that the latent consciousness of what is best for the race generates the crowd impulse, and though Maude wrote before the war, he very clearly anticipated what has come on since. This "dominant thought wave" is the voice of the crowd, and is not often possessed or appreciated by the ordinary leaders of men, although Napoleon possessed this instinct of quickly appreciating national instincts as well as the power to sway the multitude, and he had the gift of "tuning up" his army to receive the "resultant thought wave" and to act in the presence of the enemy in the name of the national instinct and without panic. It is given to few men to seize the "dominant thought wave" and to impress this upon a people. Oliver Cromwell, Wellington, and Grant, in addition to Napoleon, possessed this gift. This "collective will power" in my opinion, based only upon my slight reading of history, is the most uncertain and unreliable instinct, and it has well deserved the opprobrium attached to the conscience of a committee which is described as a mathematical paradox, "the result being less than the sum total possessed by its individual members." Rightly has a "crowd" or in other words a "fortuitous assemblage of individuals," earned the reputation of being the most cowardly thing conceivable, the most unstable unit; as under the influence of panic, otherwise its "dominant mental state," men will commit acts of almost unimaginable tyranny, cruelty, or poltroonery. Indeed, the perpetration of an act of cruelty tends to continue the emotion of anger and rage which kindled it, because this perpetration is the bodily accompaniment of the emotion; and the bodily commotion which constitutes the expression of the emotion, being continued, tends to prolong the emotional situation. It is upon this theory of the irradiation of an emotion by bodily changes that panic is increased by flight and grief is intensified by sobbing. It is in order to avoid the occurrence of panic that a "crowd" is disciplined and trained to be cohesive, recruits are taught to give attention, to shoulder arms, and to

obey at the word of command, and as all military commanders insist the behaviour of a "trained" crowd is absolutely predictable, whereas the conduct of the other is uncertain and may be demoralised. It is a mere matter of changing emotions; and this fact is perfectly true, for during the Reign of Terror some who were the most odious as well as the most ferocious relapsed afterwards into becoming the most innocuous and peaceful; quite unable to explain their temporary aberration. There are, therefore, two kinds of crowds, the one organised into a solid cohesive whole, and the other whose units remain a mere collection of fortuitous and separate items, ready to form dissociated, uncertain, and disconnected "will powers." It was the boast of Napoleon about his trained army that it was more noted than any other army in the world for extraordinary heroism displayed by its individual members under the eyes of their comrades. Again and again, surprises were effected; bridges were crossed under fire, although only a couple of beams would be left of them and positions would be taken which neither the British nor the Russians nor the Austrians believed to be assailable by mortal man. Even the psychology of a trained army is to some degree a variable factor for some commanders, as do the Germans, instil into their battalions the dominant thought of cohesion by orders from without and not from among the troops themselves, whereas it has been our boast and that of the French that when our men are face to face with a great difficulty, their resourceful intelligence instinctively sees what should be done and there is thus created at the time from among themselves and from within the essential and successful "collective will power."

As a "corrective" to the panic-fear, the so-called "*serre files*"—*i.e.*, non-commissioned officers in rear of the fighting lines—had absolute orders in the old Prussian army to drive their halberts through the body of any man who attempted to quit the ranks and we hear of something similar to this to-day in the German lines. It is the knowledge of certain death behind them that keeps some of the Germans forward under the stress of fear and terror. As Col. Maude with a true insight into psychology says, the best method of preventing panic, and of dealing with it when it has occurred, is to present to the imagination an even greater danger if the moment of terror is yielded to, and the lines tend to falter or break. As all of us know, panic not only

occurs among men but also in animals, from the Gadarene swine to the prairie cattle, and this takes place when the "herd instinct," as Wilfred Trotter calls it, becomes weakened or injured. As in men, it is not necessary that each member of a crowd should see or scent the danger; one does this and gives the warning note to the rest which rush and follow it. Among the civil population there have been many exciting causes of fear since the outbreak of the war in August 1914. My experience at the London County Asylum at Claybury has been territorially to the East of London, and therefore the part first traversed by Zeppelins, and I have noted a considerable number of patients—both men and women—whose relatives and friends assign the cause of mental breakdown to the fear of conditions brought about by the war. The sudden shock and the fright and terror experienced from Zeppelin raids have contributed their quota of mental breakdown. At any rate during the first two years of the war out of over one thousand admissions into Claybury, there were received over ninety women and more than half this number of men who were suffering from various forms of insanity associated, I think, definitely, with the war. Of 130 cases at least 21 patients were ascertained to have their insanity connected with Zeppelins. The form of insanity mostly associated with the Zeppelin raids was of the depressed variety, and some of the sufferers were semi-stuporose and rigid, as if from fear, and almost all recovered that were of this type. In one case the house the patient lived in was burnt down, in another a house near to the patient was destroyed by an explosive bomb, one patient was elderly and without protection, and could not face the danger or the noise of which she was most apprehensive; one had lost her mother through the explosion, and another fell into a hole made by a bomb whilst returning from an adjoining theatre, all due to fright. A not infrequently assigned cause was the "enlisting" of a *fiancé* or of a son or husband, but this, of course, was before compulsory service, and it is interesting to relate that compulsion put an end to "joining the forces" as an assigned cause. I am convinced that apprehension or an anticipated fear, which constitutes worry and anxiety, is far more frequently a cause of insanity than a sudden shock may be. The one is an enduring stress and the neurones do not get a chance of complete restoration as they might do in most cases of sudden shock. "Nervousness about

the war" was an expression much more frequently used as causing a mental breakdown than was a "sudden shock."

In addition to panic from disaster on land and in the air, there are panics through losses by ship-wreck on lee-shores, and there are disasters in the open sea that have their panics and possibly some of the worst of these were due to fires at sea. The panic that ensued on board the "Princess Alice," when so many lives were lost in consequence, is an instance of a pleasure steamer going down in the Thames with a loss of life of about 700, most of whom could have been saved had it not been for the panic-fear. The sinking of the "Titanic" is an example of the opposite mental state, perfect order being maintained, and "ladies first" was the last order which the cool captain and a disciplined crew and collected passengers all respected. The sea when giving up its dead will have many tragedies of "courage as well as cowardice" to relate.

The theatre panics are too well known to need a reference. Public authorities realise that theatre audiences are among the worst material to yield to panic-fear, and they have insisted upon adequate means of escape under penalties. The feelings of the audience in a theatre are often so worked up by plays, dramas, and tragic performances that panic-fear soon spreads beyond any control or direction. Fires in public places, on account of the concomitant distress, excite much fear; such as occurred in a house at Eton College (after which a sympathetic message was sent by the King and Queen), at Colney Hatch Asylum, and the great City fire at Cripplegate in 1898.

Earthquakes are always accompanied by panic because the disturbances are on so vast a scale, and so uncontrollable through human agency, that means of relief are inefficient to cope with the distress, and instances of these are familiar to all. Mrs. Somerville relates how thousands of persons passed the night on which an earthquake was predicted in London in their carriages and in tents in Hyde Park at the beginning of the last century.

I have been interested to know how far the emotions, especially those of fear and terror, have been portrayed in art, for Lecky states (*Rationalism in Europe*, p. 250, one of the most subtle, and, at the same time, most profoundly just criticisms), that it was the custom of the Greeks to enhance the perfection of their ideal faces in sculpture by transfusing into them some

of the higher forms of animal life, and in the origin of the emotions and their proper study we must proceed to their earliest appearance in animals. It is in the god Pan that the human features approach as near as human features can to the characteristics of the brute. Busts of Jupiter manifest a resemblance to the lion, and this is one of the distinctive marks of Greek sculpture; the two natures, human and animal, are fused into a harmonious whole, quite unlike the Egyptian methods where no effort was made to soften this incongruity. On the other hand, Mr. Arthur H. Smith, of the British Museum, writes to me: "The Greeks were very reticent in the expression of emotion and feeling. In the various friezes of combat the scales are small, and the treatment of the faces is on conventional lines. The exception to this is the great frieze on the altar of Zeus at Pergamon." The original is in Berlin, but I have had access to photographs which depict with marvellous expression the whole of the emotions of terror, fright, fear, anger, and hate upon these colossal figures.

In the Uffizi at Florence there is the sculptured representation of the destruction of Niobe's children, showing all the tender emotions as well as those of terror, pity, grief, sympathy, appeal, repulsion, fear, and terror, but possibly in the main more sorrow than fear. The sculptured Laocoon in the Vatican also represents the emotions of fear, pain, and convulsive struggle. In this piece of statuary, as Lecky states, are "traces of mental anguish exhibited with exquisite skill, and without contorting the features or disturbing the prevailing beauty of the whole." In the "Dying Gladiator" of the Capitoline Museum there is also portrayed the last agony of a brave warrior repelling the adversary to the last breath.

Because the facial expression so often reveals the emotions better than do spoken words I recently wrote to Mr. C. H. Collins Baker, the Director of the National Gallery, asking him what pictures in the National Collection in his opinion best represented the views of painters upon the Emotion of Fear, and he very kindly gave me much assistance. He referred to a study called "Horror," by Reynolds, painted from himself for Mrs. Siddons' "Tragic Muse." In this picture the eyebrows are drawn, the eyelids somewhat contracted, and the face is tense, the mouth is open and fixed, as if hissing the "Hymn of Hate." A picture of the destruction of Niobe's children by

Richard Wilson shows almost a complete scale of the sadder emotions, fear passing into resignation, complete collapse, and paralysis. Some of the figures are in a beseeching and suppliant attitude, the others crouching and terrorised, guarding themselves with uplifted right arm, and others serene but with clenched fists. Another picture is the "Plague at Ashdod," by Poussain, representing this city, which belonged to the tribe of Judah, and was on the south-east coast of the Mediterranean. To the right of the picture are the steps of the great temple of Dagon, in which the image of Dagon fell when the Ark of the Lord entered. The shattered idol is seen on the ground. It was here that the host of Sennacherib was practically wiped out, his army of 185,000 Assyrian troops being destroyed in one night, through the intervention, we are told, "of an Angel of the Lord." In the middle of the picture is the dead mother and child lying on the ground over whom the father is weeping. One figure is a suppliant on the steps of a temple, another is a fleeing child, and the others exhibit fear, terror, horror, and disgust, whilst another figure is compassionate and pitying.

In Carracci's "Christ bearing the Cross and appearing to St. Peter" there is a mingled representation of awe, surprise, and fright, or as Mr. Collins Baker states some emotion between fear and amazement. St. Peter is rigid with fear, "petrified" would be an appropriate term; the eyes are staring, the hair rough and bristling, and the face stern and fixed; the uplifted left hand appears to half repel the object of his surprise and terror, yet the bent knee indicates an attitude of humility and reverence. In the *Transfiguration* by Duccio are shown the central figure self-realised, but with Moses and Elias on each side, and the expressions are characteristic of awe, wonder, and fright, whilst the surprised disciples are painted underneath with expressions of curiosity commingled with deep reverence and fear. Lastly, there is a work by Ercole Grandi, dating back to the fifteenth century, of the Conversion of St. Paul, with Jerusalem in the distance. The apostle in the centre of the picture is dismounted from his white horse, but is gazing at the vision of the Christ in the skies. He is in an attitude of fright or of shock, possibly of resignation and collapse through fear. The group round him shows the crowd to be in a panic of awe, some of the figures appear to be attempting to escape in bewilderment and others to be in attitudes of amazement and fright.

Some of the pictures in the Guildhall Collection which I visited through the courtesy of Curator Mr. Temple showed fear in a marked degree. The murder of David Rizzio, painted by Opie, shows Rizzio being murdered in 1566 by the Scottish nobles in the Queen's room at Holyrood at the instigation of Darnley, who holds the Queen back. The approval and surprise of Lord Douglas, the anger and determination of the murderer, the beseeching attitude of Rizzio and the horror of the Queen, the fear of Darnley who restrains the Queen from intervening are all the portrayal of strong emotions. Another picture by Opie, the "Assassination of James I of Scotland" is a strong portrayal of the murder of the King in his own house at Perth by Sir Robert Graham and his fellow conspirators. The horrified and terrified aspect of the Queen with wide staring eyes of horror and surprise, the fearful resignation of the King, with fixed eye, rigid attitude and the left arm stretched out in self-defence; the clinging affection of the collapsed Lady in Waiting who had placed her own arm through a bolted staple as a bar, to prevent the entrance of the murderers, are all pictures of the emotions. The banquet scene in "Macbeth" by D. Maclise shows Macbeth fearful and pallid, the right hand clutching the seat, the left flaccid yet repelling the ghost; Lady Macbeth, the stronger mind of the two, defying the audience and fearless whilst the spirit of Banquo is appearing; and, lastly, there is the picture of Edward III at the siege of Calais in 1347 after the surrender of the city, when the lives of the citizens were spared at the express wish of the Queen. The need and want, the suppliant attitudes, the kindly doles and help, and on a mild scale some of the horrors of war, are shown by the brush of Sir John Gilbert; this and another by him "The Fight for the Standard" picture the *mêlée* of an actual combat which does not occur in the warfare of to-day.

I have carried on this paper to a greater length than was anticipated, because of its historical application and the reference to the views of artists and sculptors. It only remains for me to repeat in conclusion that fear is something more than an avoiding reaction or an elementary reflex. It is a protective emotion and the most fundamental of the emotions on account of its highly self-guarding value, and it is common to man and animals. It is of two kinds, one kind may be induced by

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

(¹) Read before the Medical Society of London.

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

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

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