ABNORMALITIES OF SLEEP.

By Major J. W. Crofton,
Royal Army Medical Corps.

Among the stresses of war lack of sleep bulks large. In the more active phases it is almost universal and its possible effect on efficiency and morale needs no emphasizing. One remedy is obvious, though often difficult to apply. Others, however, might be considered, and in this connexion I have heard nothing of the use of benzedrine, though the Germans were rumoured to employ it as a stimulant for their troops. There seems to me to be a case for using it on limited personnel in special emergencies, for instance for medical staffs dealing with sudden rushes after battles or air-raids, and I have found it efficacious in enabling the last twelve hours of thirty-six hours continuous work to be passed without undue fatigue or loss of efficiency.

There is, however, another military aspect of sleep—the disciplinary. From time to time soldiers are the subject of disciplinary action for being asleep when they should have been awake. The necessity for knitting up the ravelled sleeve of care is regarded as inadequate justification by the authorities but it is the object of this article to point out that in some cases a medical defence is admissible.

Speculations on the subject of sleep have a decent background of antiquity. Shakespeare, Dr. Johnson and the inimitable Sir Thomas Browne have contributed as much as many a modern arm-chair theorist but, of recent years, a 'leavening' of experimental and clinical fact has lightened the anecdotal dough which still envelopes the problem. There seem to me to be three findings of significance:

1. It has been many times shown, clinically in man and experimentally in animals, that lesions in the region of the grey matter of the anterior end of the Sylvian aqueduct, especially between the corpora mamillaria and the third nerve nucleus, are liable to give rise to hypersomnia [1, 2].

2. Decerebration of an animal by transection of the brain-stem results in an encephalogram identical with that of normal sleep [3].

3. Pavlov [4] has found that in dogs when a conditional reflex is established which involves a time interval between the application of the stimulus and the appropriate reaction the animals are liable to go off to sleep during this interval. He interprets this as indicating the spread of inhibition from a localized region of the brain to involve the whole of consciousness.

What construction can be put on these findings? With our limited knowledge any theory must be highly speculative but it is worth remarking that all three cases are consonant with an interruption of afferent impulses to the cortex. This is in keeping with the unstimulating circumstances in which sleep usually occurs and the legendary case of the lady who, through disease, had lost all her senses except the olfactory and only gave signs.
of being awake when she smelt her food. The supposition takes no account
of the element of fatigue, unless it be that fatigue decreases the sensitivity or
permeability of the higher centres to afferent impulses, nor does it afford
any explanation of the paroxysmal forms of sleep which are shortly to be
discussed.

Hypersomnias.—This is a condition in which sleep is abnormally prolonged
and from which it is more than ordinarily difficult to rouse the patient.
Otherwise his state is the same as in normal sleep. The breathing is quiet
and shallow, the pupils are contracted and react only sluggishly to light,
the tendon reflexes are diminished or absent and the plantar reflexes may be
extensor. It is usually due to a lesion in the region of the hypothalamus and
this may occur in encephalitis lethargica, focal vascular lesions, meningovascular syphilis or intracranial tumour. The latter may give rise indirectly
to hypothalamic disturbances by causing hydrocephalus. Head-injury and
trypanosomiasis are also mentioned in the textbooks.

Narcolepsy.—This symptom is one in which the patient is afflicted with
irresistible attacks of sleep. The attack may last from a few minutes to
half an hour or more and it is identical with normal sleep in that the patient
can be roused in the ordinary way. It often comes on in quiet circumstances,
such as might predispose to sleep but sometimes when the patient is on his
feet or in other unexpected situation. Occasionally it is possible to shake
off an attack by violent activity—but more often this is merely a postpone-
ment. The visitations may come many times a day and seriously interfere
with work.

Cataplexy is a term applied to a condition in which for a few seconds,
though he is perfectly conscious, the patient is unable to move a muscle
of his body. If he is standing he may or may not fall to the ground. The
attacks are normally initiated by an emotion of some kind, most often that
of laughter but sometimes of triumph as in one of my cases, or of joy.
Kinnier Wilson relates the story of a cataplectic who met in a crowded
street an old friend whom he had not seen for years. As he stepped forward
to greet him he was overcome with paralysis and was unable to move hand
or foot while his friend disappeared for ever into the crowd without noticing
him.

Various movements or tremors may occur during an attack and there
may be somatic accompaniments such as precordial sensations, fluttering of
the stomach, warmth and tingling all over, sweating, slow pulse and dry
mouth. The deep reflexes are abolished and the plantars may be extensor.

Sleep Paralysis.—The literature is evasive about sleep paralysis and it is
usually mentioned merely in passing. It occurs either when the patient is
just going to sleep or just waking up. Without any severe imbalance or
loss of consciousness, he finds he is unable to move hand or foot and, as one
might expect, the experience is usually accompanied by a strong feeling of
anxiety. The duration is a matter of seconds or minutes and a touch is
sufficient to release him from his unpleasant predicament.
Abnormalities of Sleep

Hallucinatory States occur in sufferers from narcolepsy. They usually take place on falling asleep, being then termed "hypnagogic hallucinations," but may occur when the subject is apparently awake. They are elaborate, visual and highly terrifying at the time, though readily recognized for what they are in his normal state. They are obviously analogous with the night terrors of childhood in which the degree of consciousness and insight is very variable and of which a sense of helplessness or paralysis often forms a part. It is just as reasonable to regard as primary the access of emotion as to attribute this to a disturbance of consciousness or mobility. Indeed all the sleep disturbances I am mentioning seem to form a continuous series and to be in the same class as "normal" reactions such as being "helpless with laughter" or having nightmares or dropping off to sleep after a good dinner. In all there are changes in affective, motor and conscious processes though the emphasis may vary in the different conditions.

Somnambulism.—In this condition the patient is able to stand and walk and may show a considerable degree of integration with his environment even though partly asleep. It usually occurs in adolescents or children and is a neurotic manifestation.

Of the above conditions I need not further discuss hypersomnia or somnambulism; the former a symptom of organic, the latter of functional disease. However it is worth while saying a little more of the narcolepsy, cataplexy, sleep paralysis group. These three conditions may occur together or separately, sleep paralysis being most often an independent manifestation while narcolepsy and cataplexy commonly occur in the same patient; in fact Löwenfeld [6] suggested that an accompanying cataplexy was essential to the diagnosis of narcolepsy. Certainly cataplexy is the more obvious departure from the normal and in the soldier it would be a bold step to diagnose fits of falling asleep as narcolepsy without any other abnormal manifestation. When narcolepsy does occur alone it is said to be usually post-encephalitic.

In discussing the aetiology of the condition one must admit the evidence is somewhat anecdotal. Because a patient has once had a head injury it does not mean that his narcolepsy is due to trauma; because he is putting on weight it does not argue an underlying endocrine dysfunction. The various factors to be mentioned have merely occurred sufficiently frequently in case histories to be suspected of aetiological significance.

(1) Hereditary or familial incidence is rare. Kinnier Wilson mentions a case occurring in one only of a pair of monovular twins [5].

(2) Trauma is often mentioned in case histories.

(3) Endocrines: the onset of the condition is often accompanied by an increase in weight. Menstruation or pregnancy may increase the symptoms and hypothyroidism is not uncommon though in most cases the B.M.R. is normal [7].

(4) Epilepsy occasionally occurs in the same subject [8, 9, 10, 11, 12].
(5) Psychopathological: recently reported. One typical case is said to have been cured by psycho-analysis (Misstiegler).

(6) Local lesions: vascular, tumours, etc.

(7) Cryptogenic or unknown: as so often, the largest group.

It should perhaps be mentioned that in a few cases there seems to have been a peculiar relation between narcolepsy and epistaxis. In some cases the cessation of repeated epistaxis has been followed by narcolepsy; in others a severe epistaxis has coincided with the abrupt termination of the narcoleptic attacks. It would be idle to speculate on the exact significance of this observation but perhaps it is worth mentioning that a similar relationship sometimes occurs in migraine.

The prognosis in narcolepsy is uncertain. Attacks may continue for many years or clear up after a short time. It is said that the prognosis is best in post-encephalitic cases. With regard to treatment many remedies, varying from bromides to encephalography, have been advocated at one time or another, but it now seems established that we have two important weapons only, ephedrine and benzedrine, the latter probably the best. These of course treat only the symptoms, not the underlying cause, and must be continuously taken to avoid attacks. Individuals vary in the dosage they require. Ephedrine gr. ½ to 1 t.d.s., benzedrine 5 to 15 mgm. in two or three doses, are probably average requirements. The latter should not be given after 3 p.m. if it is not to interfere with the night’s sleep.

I have not been able to find much about sleep paralysis in the literature to which I have had access. Nowadays it seems to be regarded as a “pure” sleep disturbance which may occur in association with narcolepsy or separately. It is thought to represent a state in which consciousness is awake while the motor functions are still asleep. There must also be at least a dulling of the sensory element as a light touch is sufficient to disperse the condition. For what it is worth, one of my cases, in which the condition occurred in a patient who also exhibited epileptiform phenomena, suggests an association with epilepsy. On the other hand a colleague, free from all epileptic taint, has described to me two attacks which he has suffered during his life and I have also come across at least one other case showing a few isolated attacks. A condition approximating to sleep paralysis occurs in night-terrors in children and the common nightmare, consisting of being in a terrifying environment and yet unable to move, may be the same phenomenon on a slightly lower plane of consciousness.

Finally I should like to quote four illustrative cases, all of whom I saw within a few months at a Middle East hospital.

(1) An Australian Aircraftsman aged 20 came up to out-patients complaining that for two years he had been subject to irresistible attacks of sleep. He was worried that he would get into trouble if he was found asleep at work. There was no relevant family history. He had suffered from asthma at the age of 12 but this cleared up and he had had no trouble since. The attacks might come on any time of day but usually under restful conditions. He could sometimes postpone them by getting up and walking...
Abnormalities of Sleep

about but they nearly always came on in the end. At the time I saw him he was having attacks every few days and might have two attacks in the day. During the same period he noticed that sometimes when he was laughing his muscles all "seemed to relax" and for a few seconds he was unable to move. There were no abnormal physical signs. He had been fully investigated in Melbourne at the onset of the attacks and I sent him into an Australian hospital where investigations were also negative. Ephedrine was entirely effective in his case and when I saw him again six weeks after discharge from hospital he was having no attacks at all.

(2) A Staff-Serjeant, aged 28, complained of overwhelming attacks of sleep for four years. There was nothing relevant in his family history; he had had pneumonia and appendicitis but never asthma or urticaria. Shortly before he began to have the attacks he had been hit on the back of the head by a cricket ball. He had been dazed, and though he did not lose consciousness, he discontinued play for the afternoon. At first the attacks only occurred every month or two but recently the tempo had increased until he was having one or two a day. He was an engineer in civil life and had often fallen asleep while writing a report, waking up to find the pencil scrawling across the page. The attacks usually came on under quiet conditions and had attracted sufficient notice for him to be threatened with dismissal. He had joined the Army partly in the hope that a more active life would improve his condition. The hope was not realized; the attacks had become more frequent. They tended to come on especially while he was riding as passenger in a truck. This particularly distressed him as the passenger was supposed to act as look-out for hostile aircraft and it ill-behoved a Staff-Serjeant to be found asleep at his post.

He was occasionally able to avert attacks by getting up and walking about. He had two other types of attacks. In one the attack began with drowsiness, then his head fell to the left, the left arm and side trembled and he was quite unable to move at all for two to three minutes. It always came on when he was sitting down and usually when he was tired; at home after a long day's work, in the Army usually after a long rough ride in a truck. It rapidly went off if his friends sat him forward. This type of attack had also occurred for four years, at first every month or so, recently about once a fortnight. The second type was usually associated with a feeling of triumph or satisfaction; after making a good joke, getting the best of an argument or when administering a rebuke. His whole body would suddenly "go all limp" for one or two seconds, though he rapidly recovered and had never fallen. These attacks were rarer than the other two.

He had had headaches for years, occurring about once a week in civil life, usually starting in the afternoon and relieved by sleep. They were unrelated to the attacks, were situated behind the eyes or in the vertex and were throbbing in type. There were no accompanying visual phenomena. The headaches had been worse since serving in the desert. He had vomited quite often in the last few months, always at night, perhaps two to three times in the night and sometimes for several nights running. Thereafter he might have no trouble for weeks. He was an intelligent, talkative, rather argumentative young man, revealing no abnormal physical signs on examination. His C.S.F. was normal, Kahn and W.R. negative and X-ray of skull showed no evidence of old fracture. He had no cataplectic attacks in hospital but had regular narcoleptic attacks, normally at about 1030 and 1830. The latter lasted a minute or two to half an hour and were quite unrelieved by benzedrine.

(3) A Serjeant, aged 37, complained of attacks of inability to move, occurring while falling asleep or waking up. One younger brother had fits
as a child and another brother had died of "something to do with his head." There was nothing relevant in his past history but it was of interest to note that for years he had had occasional attacks of violent palpitations of sudden onset. I never had an opportunity of seeing an attack but the story suggested they might be paroxysmal tachycardia. The present attacks had been occurring since 1930. They took place usually just as he was going to sleep or waking up and began with a roaring noise in his head, followed immediately by inability to move a muscle. If he had phlegm in his throat he was unable to cough it up. The paralysis lasted, he thought, a few minutes and was accompanied by considerable anxiety and conscious effort to move. Suddenly he would be able to move a limb and it seemed to him that his pent-up effort escaped with a shriek as he recovered normality. Actually no one in the ward ever heard him shout so this was probably imaginary. No particular factors appeared to precipitate the attacks, which at first were only occasional but recently had occurred as often as three in ten days. He also complained that, since 1939, he had had occasional "blackouts" while walking along or during conversation. In the latter case he would lose the thread of the discourse for a moment or two. These attacks occurred about once in three weeks. He was admitted to hospital where nothing abnormal was found in his central nervous system, except for absent ankle-jerks, and all investigations were negative. He had a number of attacks of sleep paralysis in the ward, from one of which he was roused by a light touch though this felt to him "like a sledgehammer." Treatment with luminal diminished their frequency and he was discharged to attend as an outpatient. He has been seen twice and has had two attacks suggestive of major epileptic fits. In this case the sleep paralysis would appear to be an epileptic phenomenon.

(4) An Aircraftsman in the R.A.F., aged 29, complained of attacks of paralysis for twelve months. His sister was of a nervous disposition and one brother had beeninvalided from the R.A.F. with nerves. He had been nervous as a child, "afraid to go down alleys by himself," but he had a good work record as a baker, confectioner and cook. He had reached Standard 7 at school and had been "an average scholar." His previous medical history included three attacks of pneumonia, appendicectomy and mastoidectomy. He had always been tongue-tied. The attacks of paralysis were of a year's standing and had first come on two days after his ship was attacked in convoy by a German raider. His ship had been hit and he was one of a number of volunteers who had gone below and worked for about five hours to keep her from flooding. The attacks were of two types. The first might come on at any time, whether he was lying or sitting or walking. It began with loss of power in his left arm, followed rapidly by the same thing in his right and in the rest of his body. He would sink to the ground and, if he were holding a cigarette, was likely to burn his clothes or himself. His eyes would close but he was quite conscious and knew what was going on around him. The attacks lasted at first a few minutes only, later ten to fifteen minutes. They were unaccompanied by any symptoms referable to the autonomic system and he had never hurt himself though he said that he had had sometimes only just missed falling on a stove in the cookhouse. The attacks had occurred about three times a day before admission to hospital but had been much less frequent since. The second type of attack occurred when laughing or with any feeling of surprise, especially a pleasant one. His knees gave way and for a few seconds he sank to the ground, thereafter rapidly recovering himself. He stated also that when doing any monotonous job he tended to drop off to sleep for a few seconds though he could almost always abort
Abnormalities of Sleep

this by getting up and walking about. Since the war he had dreamt a lot and had frequent nightmares from which he often woke up wanting to shout but unable to. On going further into the history one or two other relevant facts were elicited. Before leaving home he had got "a girl into the family way" and was anxious to return to England to do the right thing by her. He had had a friend in the R.A.F. who had had similar attacks to the patient's first type, starting, however, with turning of the head, and this man had been invalided out of the Service. He had never come across anyone with attacks of the second type but he was a boxer and the peculiar sagging at the knees (which he vividly illustrated) was associated in his mind with the boxer's collapse when knocked out. He had had a certain amount of frequency of micturition, but no polydipsia and his weight had shown no marked deviation from normal. Although when I saw him he had been some weeks in hospital no M.O. had seen one of these attacks so that a decision had to be arrived at by study of the history and his mental make-up. No abnormal physical signs were elicited, except for a slight stammer, and the C.S.F. was normal. The more the patient was questioned the more well defined became his story and his behaviour when shown to a clinical meeting—"I suffer from three types of attacks, etc."—definitely stamped him as hysterical. We were unable to elicit any clue as to how the idea of the attacks related to emotion had originated in his mind but their nature and that of the first type seemed to be respectively conditioned by his knowledge of another case and his picture of how a boxer collapses when struck. I quote this case as a nice exercise in differential diagnosis but it seems generally agreed that a psychogenic etiology is rare in cataplexy.

I hope I have said enough to suggest that cases in which disciplinary action is being taken for sleeping on duty should not be cursorily dismissed from the medical point of view but a careful history should be obtained with special reference to the possibility of accompanying cataplectic attacks. At the same time leading questions should be as far as possible avoided as they may be seized on with avidity by the hysteric or the sufferer from pendulosis plumbi.

I wish to thank Colonel H. G. Peake, late R.A.M.C., O.C. of a Middle East General Hospital, for permission to publish the first three cases and Major Craigie, O.C. of a Middle East Psychiatric Unit, for permission to publish the fourth. I am indebted to the Director of Medical Services in the Middle East for permission to publish the paper as a whole.

REFERENCES.