healing of the ulcer even in such conditions is a most tedious and protracted process.

The operation that I regard with the utmost confidence as thoroughly satisfactory for the great majority of cases is gastrectomy. There are very few cases in which it cannot be performed. It is safe to a degree that one could hardly expect. In the ten years the mortality has been 1.6 per cent., a shade lower than the lowest published death rate from Balfour's operation. The results in my hands have been excellent. I have had the following unsatisfactory experience in connexion with it: One patient has died of cancer of the stomach over five years after the gastrectomy had been performed; a second patient developed cancer of the remaining part of the stomach two years later. These two are examples of mistaken diagnosis, both clinical and pathological. One patient had to submit to a secondary operation on account of obstructive vomiting; a long loop had been left between the duodeno-jejunal flexure and the anastomosis of the bowel with the stomach. This patient subsequently made a perfect recovery. One patient from whom I removed a group of tuberculous mesenteric glands at the time the gastrectomy was being performed has had a second operation and another group of glands has been removed; this operation was done three months ago and the patient has since gained 15 lb. in weight. That is all that I can find to bring against the method of gastrectomy. No other operation gives such admirable and uniform results. I have greatly simplified its performance by introducing the "anterior no-loop" method. The jejunum is brought from the flexure across the transverse colon from left to right and applied to the divided stomach so that the proximal part of the jejunum joins with the greater curvature. This method has been followed in every case since June, 1920; there has been no death, and not the slightest untoward symptom at any time after operation, early or late. There has never been a recurrence of ulceration (apart from the two cases of carcinoma mentioned above); there has been no return of dyspepsia; there has been no sign of persistent or profound anaemia in any case in this series.

I feel, therefore, that I can justly excuse myself for not performing gastrectomy only when the condition of the patient prohibits any major operation, or when the location of the ulcer, or any other of its attributes, renders the operation quite impracticable or disproportionate to the needs of the individual case. And so far as the condition of the patient is concerned I feel fairly confident that by the most watchful care, by the performance of direct transfusion of blood once or oftener, and by the copious administration of glucose, with and without sodium carbonate, so great an improvement may be brought about that any operation that is required may safely be performed.

After all is said and done, that operation for the treatment of chronic gastric ulcer will alone survive which with the smallest risk brings about a complete subsidence of all symptoms, a permanent freedom from any recurrence of the like disease, and immunity from any disorder associated with the operation in consequence of its mechanical or physiological effects. The operation which seems destined to fulfil all these indications is gastrectomy.

How is it that the surgical mortality is so low? The patients who come for operation are often very ill; they have suffered for years; obstruction with grave inanition may have resulted; and haemorrhage on one or many occasions may have sapped their strength almost to exhaustion. It is a question of taking pains. I once heard a very distinguished surgeon say that no one could continue to operate upon even simple cases such as inguinal hernia without mortality; one or two might die in every hundred. If this view is taken, the practice of the surgeon will justify and sustain it. But if you deal with cases as units, and say, "The last case may yet die, and the next case be a desperate one which no man can save, but *this case must not die whatever happens*," you will find your practice will go far to vindicate your determined optimism and your confidence. The units saved swell into multitudes. Surgery, after all, is an affair of the spirit; it is a fierce test of a man's technical skill sometimes, but in a grim or long fight it is above all a trial of the spirit; and there are few things that cannot be conquered if a man's heart is set on victory.

The lecture was illustrated by a number of lantern slides, many of which were kindly lent to me by Professor M. J. Stewart, to whom I am greatly indebted not only for this kindness but also for the preparation of the statistics I quote from the records of the post-mortem department of the Leeds General Infirmary.

An Address

ON

SLEEP AND SLEEPLESSNESS.

DELIVERED TO THE DORSET AND WEST HANTS BRANCH OF THE
BRITISH MEDICAL ASSOCIATION,

BY

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BOURNEMOUTH.

SINCE coming to Bournemouth twenty-five years ago my professional work has chiefly been concerned with patients in the middle and later periods of life. Of these I believe the majority have presented certain decided defects in their nervous system—organic or functional. Of their troubles by far the most frequent has been the symptom of insomnia, and I hope you will bear with me when I place before you certain well known physiological facts.

SLEEP.

Sleep is a mysterious phase of all living things, animal and vegetable. Its causation in man remains an unsolved problem, and therein lies the fascination of the pursuit of a study so important, for in a true comprehension of its causation must ultimately lie a scientific understanding of insomnia and its treatment.

The question of sleep has interested men of all ages. Scripture teems with reference to sleep. Poets have sung its praises, sculptors and painters have found it a fitting setting for beauty; the classical writers—Sophocles, Horace, and Ovid—all but worshipped it; nor did Aristotle nor our own Shakespeare pass it by in silence.

Under normal circumstances we spend roughly one-third of our life in sleep. It is a normal condition of the human body occurring periodically, in which there is a greater or less degree of unconsciousness due to inactivity of the nervous system, and more particularly of the brain and spinal cord. It may be regarded as the condition of rest of the nervous system, during which there is a renewal of the energy that has been spent in the hours of wakefulness, for in the nervous system the law holds good that periods of physiological rest must alternate with periods of physiological activity, and, as the nervous system is the dominating mechanism in the body, when it reposes all the other systems participate in a general condition of rest.

In all vital phenomena rest alternates with activity. The heart muscle as well as the secreting gland has each its period of repose. Nervous action involves physico-chemical changes of matter and the loss of energy. This is true even of the activity of the brain in connexion with volition, perception, emotion, sensation, and so on, so that the higher nervous centres require rest during which they are protected from the stream of impressions flowing in from the sense organs; this permits of the elimination of waste products and the recuperation of cerebral structure so as to fit it for further mental activities.

Time of Sleep.

Most people sleep during the night. The silence of the night and other circumstances co-operate to bring this about. But the advent of sleep does not necessarily depend on terrestrial phenomena—but rather on bodily conditions. Some animals sleep during the day and prowl about at night; some persons have to perform night duty and sleep in the day; bodily fatigue is the main factor in determining the time of sleep.

Just as the sensation of hunger is referred to the stomach, thirst to the throat, and breathing to the chest, so sleepiness is referred to the region of the head and neck. A sensation of weight occurs in the eyelids, spasm of the hyoid muscles causes yawning, and the head droops. A gradual obscuration of the intelligence, depression of general sensibility and special senses, with general muscular weakness, follow—and "Nature's soft nurse steeps our senses in forgetfulness."

Sleep having supervened, there are gradations in its completeness. It may be so light that the individual is partly conscious of external impressions and disordered trains of thought. This is the dream state. On the other hand, sleep may be so profound that all psychical phenomena are abolished. The first couple of hours are those of most perfect sleep. As the state of awakening approaches, sensibility becomes more acute, and external impressions are

faintly perceived, together with a sense of pleasant repose and abandonment.

The physiological changes are briefly: Slowing down of respiration, circulation, and glandular activity. The pupils contract, the eyeballs roll upwards, and the blood pressure and body temperature fall. A man of 147 lb. produces 40 calories of heat when asleep, but 112 if awake. Knee-jerks become dull and may disappear, peristaltic movements diminish, hearing and sense of smell disappear, and sensory phenomena generally fall to zero. During sleep we tend to get fat, hence the saying, "He who sleeps dines." Children require more sleep than adults. During their pre-natal existence ample sleep for the mother is absolutely necessary.

The changes in the cerebral circulation merit special notice, and here it must be noted that since the classical experiments by Durham of Guy's Hospital in 1860 no great progress by direct observation has been made, apart from the experiment of Mosso. Durham trephined a dog's skull and inserted a watch-glass and made observations during sleep, as follows:

1. The veins were not distended.
2. The brain appeared to be in a comparatively bloodless condition.
3. The actual movement of the blood was slowed down.
4. Whatever increased the activity of the blood flow in the brain tended to produce wakefulness, and whatever tended to reduce it encouraged sleepiness.
5. Exciting ideas and sensory impressions, with or without stimulation of the heart, increase the pace of the blood flow and wakefulness.

In 1881 Mosso made observations on three persons, each of whom had lost a piece of the cranial vault. One was a man of 37 years, one a woman of the same age, and a third a child of 12 years. By means of the plethysmograph, which he invented, he obtained tracings showing changes in the volume of the hand and forearm, and he succeeded in showing that during sleep there is a diminished amount of blood in the brain and at the same time an increased amount in the extremities. Further, he showed that by stimulating the skin—short of waking the sleeper—a contraction took place in the vessels of the hand and forearm accompanied by a rise of blood pressure, acceleration of the blood flow in the brain, and quickening of the heart's beat.

Such have been the observations dealing with the brain during sleep. They are of great value, yet they do not explain sleep, and the conditions observed are considered to be concomitants of sleep—they predispose towards sleep rather than cause it.

A distinguished Cambridge don defines sleep as a "withdrawal from the conflict of the world, and a temporary regression to the uterine stage." Michael Foster defines sleep as a "blank and a gap in the history of the mind." This is perhaps its best definition, if an old one. There are many theories advanced to explain how this blank and gap become established. Here are the most important:

Duval says the dendrites of the brain cell retract and break contact with the terminal afferent nerve endings that normally convey impressions from without. This is the electric theory of sleep.

Pieron says sleep is due to a toxin formed in the central nervous system during waking hours. He kept dogs awake for 300 hours, and injected fluid he found in the fourth ventricle into other dogs and produced a state of sleepiness in these animals.

Pryer imagined that sleep is due to sarcolactic acid formed during the activities of the day. This theory is unsound, as the injection of the acid does not produce sleep.

Flüger says that sleep is due to the exhaustion of intracellular oxygen due to its expenditure being greater than its intake—that, in fact, sleep is a real cerebral asphyxia.

Howell of Baltimore has advanced the theory that the vaso-motor centre in the medulla has during the day's activities kept up the general arterial blood pressure sufficiently to supply the active brain's demands. Towards the close of the day the fagged centre is stimulated less and less, because of the hush of the day's general excitement and the quiet associated with night, so that a gradual fall of blood pressure supervenes, especially in the brain, anaemia of the cerebral vessels follows, and sleep is induced.

This ingenious theory, known as the anaemic theory, may explain how the anaemic appearance of the brain during sleep comes about; but it does not prove that sleep succeeds anaemia. Indeed, we know that great loss of blood, with cerebral anaemia as a consequence, is not necessarily followed by sleep.

What, then, explains the precipitation of sleep? Is it not safe to affirm that sleep ensues when the brain cells are unmolested by psychic or peripheral stimulation, and when their substance is saturated with chemical contents that

make for cerebral repose, or dispossessed of substances that ordinarily stimulate their activity?

To make a list of psychical and peripheral stimulants would be difficult, but one may mention the tempests that sweep over the mind, such as the feelings of sorrow, fear, hate, rage, love, sense of worldly and spiritual loss, to name only a few. Of peripheral stimulants one must mention those of pain felt, or the silent but none the less forceful impulses that, unknown to our perceptions, stream onwards to the brain by way of the afferent nerve paths of our sympathetic nervous system, from pelvis, abdomen, and thorax.

As to the second factor—"the saturation of the cell contents with substances that make for cerebral repose," or the "exclusion therefrom of substances normally maintaining its activities"—others have pointed out the possibility of carbon dioxide, the absence of oxygen, the presence of lactic acid, the toxins of Pieron.

I would ask, Do the endocrine glands play a part in influencing the action of the brain cell? Take, for example, the positive effect of thyroid secretion. This causes increased oxygenation of body tissues generally, a fall in water and fat cell contents and an increased urea excretion, whilst in excess we notice palpitation, headache, and glycosuria. Such a fluid acting on the brain cell may well be expected to quicken its activities and maintain general "wide-awakeness." In myxoedema, where the thyroid fluid is absent or nearly so, we have a condition of drowsiness and torpor.

We know that as the night approaches secretory glands diminish their output, so it is possible that the brain cells tend towards a state of repose owing, *inter alia*, to the fact of the lessened supply of the thyroid fluid which we may assume occurs at night. Again, let us remember Cannon's researches into the action of the adrenal glands—their stimulation by fear, anxiety, etc.—and how, with an increased tide of adrenal secretion the sympathetic nervous system becomes in turn stimulated.

I shall not press a theory suggested by these considerations, and, leaving behind the speculations concerning the causation of sleep, will approach the subject of sleeplessness. Here at any rate we know that we can establish the condition artificially by quickening the activities of the brain cell by psychic influences, chemical stimulation, or peripheral irritation conducted by afferent nerve fibres, vegetative and other.

SLEEPLESSNESS.

Sleeplessness is always a human tragedy—great or small according to its severity. Surely it brings about the "winter of man's discontent," when not only does thinking aright in the end become impossible, but physiological processes are slowed down and often perverted or arrested.

A historic instance of sleeplessness through a troubled mind is recorded in the case of Maecenas, minister of the Emperor Augustus—a philosopher, an Epicurean, patron of Horace and Virgil, once the happiest of men, he disclosed certain state secrets to his wife, who gossiped about them, and through a sense of disgrace sleep completely departed, and, worn out, he ended his days, some authors say, by suicide. Sleeplessness through physical pain is illustrated in the case of Philoctetes. This hero of the Trojan wars was stranded on the island of Lemnos, where his foot was bitten by a snake, or wounded by a poisoned arrow. He was discovered in rags and distress by friends after some years, and, according to Sophocles, had sleep restored by the god of sleep in answer to the prayers and rhapsodies of the chorus.

Shakespeare evidently suffered from sleeplessness, and described the horrors of insomnia through the mouth of Henry IV, whose apostrophe of sleep (*Henry IV*, Part II, Act III) is perhaps one of the most beautiful pieces of writing in the English language. Our own great poet Wordsworth was a martyr to sleeplessness. And one might go on giving instance after instance of wrecked lives, blighted careers, world policies altered, and millions of lives rendered cheerless because of it.

There are few, if any, human ailments requiring so fine a comprehension of our patient's individuality, his physique and surroundings, as the condition of insomnia. I will not press for an inquiry into his pre-natal history, nor into hereditary predisposition to insomnia, but I believe we ought at least to make some inquiry into his past medical history, as well as a very careful medical examination of the principal organs. It may be that such a survey reveals physical defects due to nutritional derangements, it may be endocrine gland defects, and so on. These conditions we correct if possible.

In a case of insomnia our procedure may be simple enough, but it may, on the other hand, involve much patience and the exercise of considerable self-confidence and analytical powers of no mean degree.

In the light of present-day knowledge we may assume that the area of conflict and unrest is in the cerebral nerve centres. When these centres are unstable through inherited defects we must regard the case as capable of only partial relief, whether our remedies be psychological, physical, or chemical. We may discover that a hypersensitive condition of the cortex has been brought about by fatigue, arterio-sclerosis, excessive or diminished blood pressure, toxins or excitants of various kinds—alcohol, tea, coffee, etc. Here, of course, we try to remove the causes. In high blood pressure a hot foot-bath, or a whole body bath with or without mustard dissolved in it, gives considerable relief; mustard packs to the lower limbs and abdomen may draw the blood from the brain and give a good night's sleep; massage with brushing of the body is also of use. In these cases of high blood pressure the condition of the bowel must be carefully watched and constipation prevented. Suitable intestinal antiseptics may be indicated. Where the brain unrest is due to psychic disturbances, such as a sense of loss, material or spiritual, fear, rage, hate, the treatment will depend on the severity of the case and its duration. Generally, a change of air and scene should be recommended before drugs are given.

A stage is reached in a large number of cases of insomnia such as the foregoing in which no external treatment, no change of surroundings, will avail, and we find the patient going from bad to worse, often rapidly. It is in such a case that the psychotherapist is seen at his best. If he is a student of comparative religions he may bring solace to the Roman Catholic by encouraging him to repeat certain formulas, by counting beads, and indulging in religious exercises that have a strange but potent sedative action. Patients of the reformed faith may find happiness in contemplating the promises of the gospels, the fatherhood of God, and the brotherhood of man. Others, with or without the religious sense, may find escape from the brain storms by reading books that amused or edified them in the happy days of their youth—a revisiting, as it were, of old intellectual pastures associated with the pleasantest period of life.

It is always wise to reassure such cases. Many are really drifting towards the borderland of insanity, and we must try to arrest in them all sense of fear and despondency. In some cases we advise them to sit up late, play patience, or picture puzzles. Here is a remedy I have found useful: Get the patient to switch on the light and carefully write down on a piece of paper the ideas disturbing him. This often succeeds in breaking up a disturbing train of thought. Auto-suggestion in some cases is invaluable, and hypnosis often breaks the vice if it be not too long established.

Maccenas had a physician, Musa, who, as a remedy for the terrible insomnia of his patient, recommended him to live in a villa close to a cascade. The monotony of the waterfall was the only remedy that enabled the care-worn statesman to get some sleep. Our own Wordsworth had much the same experience.

Most people suffer from insomnia psychic in origin, at some time of life, and, as every man can best fit on his own hat, so most people have a way of their own for dodging unpleasant ideas, and what helps one person may not help another.

We have all, I dare say, met cases of psychic origin where, despite every artifice, the demon of insomnia had the best of it. Then comes the time for judicious drugging and external treatment. For the pressing need of sleep I have found that an hour's gentle massage at bedtime, immediately preceded by 3 grains of veronal and at the end of the massage period 10 grains of aspirin in hot milk, gives good results. Massage sometimes irritates, and when this is so must not be continued. Reading by a nurse is sometimes a fair substitute, provided her voice is soft and manner of reading monotonous.

In cases of weak heart 25 grains of chloralamid in an ounce of brandy may be given instead of the veronal, repeating the dose in three hours if necessary. With all its drawbacks I have found paraldehyde in 2-drachm doses with yolk of egg very effective in bad cases. Others doubtless have found other drugs quite as good.

When the insomnia is due to cerebral unrest originating at a distance from the cortex and with the impulses conveyed thereto by the nerves of sensation or those of the special senses the remedies are obvious. We remove when possible the causes of pain, the sources of cold, heat, sounds, and so on; and of course in actual painful conditions, in cases not

complicated with renal or bronchial defects, opium will suggest itself.

A case of insomnia that impressed me greatly was one due to neuralgia of the extremities. Luminal in 5-grain doses was the only drug that not only relieved the pain but gave several hours of refreshing sleep. The drug can be given dissolved in hot water or in a cachet. It is best to begin with doses of 2 to 3 grains and repeat three or four hours later in the night if necessary. Cases of insomnia due to pain require careful watching. Many such patients in time lose the sense of pain measurement, and undoubtedly exaggerate the degree of pain felt in order to get stronger and stronger remedies. It is an unsafe policy to leave drugs likely to poison within the reach of such patients.

For some time I have been interested in Professor Langley's researches into the sympathetic nervous system, now known amongst physiologists as the vegetative nervous system. An authority on the subject tells me that he believes that during sleep afferent impulses proceed towards the central nervous system along the vegetative nerve paths, just as they do during wakefulness. We are hardly guilty of forcing our imagination if we assume that herein may be found a new field for inquiry. I submit as a hypothesis that may explain a certain type of cerebral unrest not otherwise accounted for, that, unperceived by the individual, certain impulses from the thoracic, abdominal, or pelvic vegetative nervous system do reach the brain cells and upset the physiological processes there that otherwise would make for repose and sleep. One is the more confirmed in this point of view by remembering how sleep may be brought about by remedies directed to relieve certain thoracic, abdominal, and pelvic conditions, in which no actual pain is felt—for example, certain types of heart affections, indigestion, gastric and intestinal in origin, and pelvic irregularities, and so on. Anyone who has studied the calming effects on the central nervous system brought about by correcting the functional diseases indicated must be driven to the conclusion that here we may sometimes find the real cause of disturbed sleep. The phenomenon of nightmare must not be lost sight of in the light of this theory.

It is well to bear in mind that where the disturbance is not due to the nerves of common or special sensation we may find the vegetative nervous system at fault, and if so our prognosis is good. In quinine hydrobromide Dr. Langdon Brown believes we have a drug with specifically sedative action on the sympathetic nervous system.

In the foregoing remarks I have tried to pigeon-hole, as it were, the causes that give rise to sleeplessness. The nerve cells, then, may be disturbed by psychic forces within them, by forces chemical and physical around and penetrating them, by disturbing forces that sweep along the afferent nerves of general and special sensation, as well as those silent and unperceived impulses that proceed along the sympathetic nerve paths. The cell having been disturbed, sleeplessness ensues.

I think a close analysis of the causes of sleeplessness will help us to make fewer mistakes in treating the condition, and at any rate it is worth while to aim at isolating as far as we possibly can the chief factor at work in any given case. Often acting alongside this chief factor may be found other subsidiary and less aggressive influences at work. The latter we must deal with in turn; but the wolf nearest to our patient's heels is the most dangerous, and we will do wisely to destroy him first.

REFERENCE.

¹ *Journal of Experimental Medicine*, vol. ii, p. 313.

INSTRUMENTS LEFT IN THE PERITONEAL CAVITY:

AN ANALYSIS OF 44 UNPUBLISHED CASES.

BY

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My interest in cases in which solid objects have been unintentionally left in the peritoneal cavity was aroused by having on two occasions to operate for their removal; perhaps I may mention that in both cases the foreign body had been left in the abdomen by someone else. The notes of the two cases mentioned are as follows:

CASE I.

A patient, aged 50, was sent to me because her doctor had found a sharp foreign body in the canal of the cervix. She had consulted