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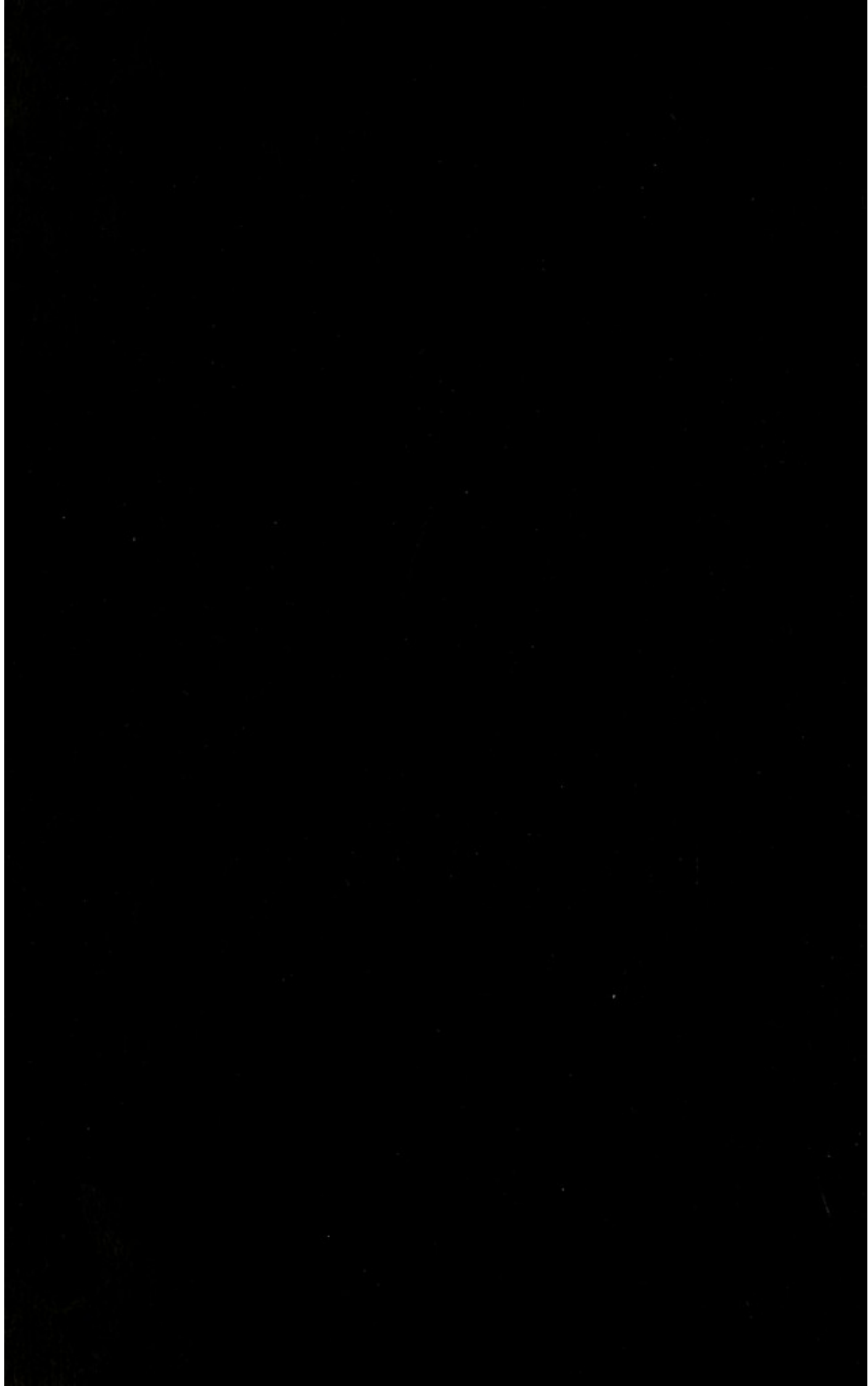
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# DREAMING.

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# DREAMING.

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## PART I.

DREAMING has been the source of much interest from the most remote times. Indeed, there is perhaps no subject that has been studied so long and continuously from so many different standpoints. Theologians, metaphysicians, and physicians form a minority of those who have attempted to invade its mystery, and to unravel its nature and essence; so far, their efforts have been attended with but comparatively little success. Dreams were early relegated to the realm of superstition, and they have not yet been completely rescued from that widespread domain.

Primitive races, with their highest cerebral centres as yet imperfectly developed by education, lived necessarily under the dominion of their emotions rather than of their will. When they dreamed of friends and ancestors long since dead, they failed to distinguish between things real and visionary. Hence dreams had for them a real existence, and they were as much, if not more, influenced by them as they were by the events of their daily lives. Ancient history teems with facts which show how largely their conduct was biassed by their dreams. Perplexed by occurrences they could neither fathom nor comprehend, they were overawed, and so grew imaginative and superstitious, as many still remain at the present day. Thus, a widespread belief in the mysticism of dreams sprang up, and it still pervades the whole world. Instigated by curiosity, and stimulated by an ambition to penetrate the obscurity that enshrouded dreams, they gradually formulated speculative theories regarding them; and it is curious to note that similar conclusions were arrived at independently by peoples separated by vast oceans and continents—by races living under the most diverse conditions.

No attempt will be made to mention the innumerable explanations that were advanced regarding dreams in the early times,—explanations that may be studied at the present day, by becoming acquainted with the beliefs that exist amongst savage and other races. It being marvellous how little these have become modified amongst those whose cerebral structures are still in a rudimentary state. Reference will be made to three only. Many supposed



that during sleep the spirit or soul left the body to roam amidst new and distant scenes, and that dreams were simply the records of these experiences. Lucretius, for example, thought that the soul could be subdivided, and that, as during sleep, a mere fragment sufficed to keep the body alive, the greater portion was free to leave the body and to perigrate as it chose.<sup>1</sup> This doubtless arose from the belief that was prevalent that the body and soul were complementary to each other, and that when the body was apparently lifeless in sleep it had been deserted by the soul. Another class conjectured that some new spirit entered the body, and that dreams were induced by its presence and workings. Plato's hypothesis was, that the air and earth abounded in good and evil spirits, and if one of these invaded a body during sleep, dreams pleasant or the reverse resulted. Pythagoras, one of the pioneers of scientific medicine, and who held a similar view, thought that they could enter into animals as well as men. Yet another section surmised that dreams were messages transmitted directly from the Almighty, and they believed them to be either symbolical or premonitory of coming events. This led to the conviction, that dreams were predictions requiring interpretation. It was a natural inference when the events occurred that the dreams foreshadowed, and one that appealed strongly to the minds of credulous people. It therefore became customary to resort to the learned to obtain an explanation of dreams whenever a satisfactory one did not suggest itself. Thus, Pharaoh summoned Joseph (who appears to have held the office of dream-interpreter to the Egyptian Court) to explain his dream. Interpreters were supposed to possess supernatural gifts. In some instances the high priest or a sagacious physician was consulted, in others the Magi. These latter sometimes sought to obtain special knowledge of dreams by such means as wearing the skin of an animal they had sacrificed to an idol, and by sleeping in a temple or under the shade of a sacred tree.<sup>2</sup> Orientals, who were fond of allegories, were particularly fascinated by dream interpretation. Amongst the Egyptians and Babylonians it became a department of occult art. Amphictyon

<sup>1</sup> The conception of the soul differs in various races. The Japanese believe it to resemble a black ball, and it is deemed dangerous to wake a sleeping person, lest the soul should not have returned. The Greeks thought it like a butterfly. The Celtic races (according to Hugh Miller) believed that it took the form of a humble bee. Mr J. G. Fraser has discussed this subject most ably in *The Golden Bough*.

<sup>2</sup> Virgil wrote,—“In the midst a gloomy elm displays its boughs and aged arms, which seat vain dreams are commonly said to haunt, and under every leaf they dwell.”—*Æn.*, vi. (Davidson's Translation). It is curious to notice the different means adopted to gain a special insight into dreams. Cockayne writes,—“The Magi had a special admiration for the mole; if any one swallowed its heart palpitating and fresh, he would become at once an expert in divination.” In Ireland, such information was sought for by sleeping upon cairns or tumuli; and in that country it was not uncommon to seek restoration to health by sacrificing an animal and wearing its skin.



of Athens was greatly famed for his skill in oneiromancy; but Artemidorus of Ephesus, who flourished early in the second century, is credited with raising the occupation into a science.<sup>1</sup> This seer wrote a book on the subject, in which he embodied the opinions of Hippocrates, Aristotle, and other savants. So widely were dreams believed to be omens, that the Talmud (which describes sleep as the sixteenth of death, and dreams as the sixteenth of prophecy) contains rules for their explanation; while Moses found it requisite to impose a penalty upon those who wickedly invented false dreams.

At the present day superstition still holds sway. There are many works treating upon dream interpretation, which are far more widely consulted surreptitiously than is supposed. Diverse customs prevail amongst different races. Some (*e.g.*, the Japanese) construe their dreams by contraries; others (as the Australian aborigines) interpret them literally; while some tribes (like the Wanyóro) make no attempt to solve them at all. Probably all uncivilized peoples, and some civilized also, endure much misery and anxiety after a terrifying or ominous dream,<sup>2</sup> for the illiterate dread the unknown. Many strange beliefs have existed concerning dreams. It was not unusual for persons labouring under disease to sleep in the temples in the hope of having Divine dreams, which were credited with highly curative properties. It was thought possible to determine the sex of children before their birth by means of dreams. Many practices still prevail for the purpose of rendering dreams "lucky," and for obviating the consequences of "bad" dreams. Sacrifices, to appease the invisible, are in many cases freely offered. It is said that dreams, like sterility in women, cost many pigs their lives amongst the Dyaks. Other tribes slaughter fowls and sheep, while the Arymara Indians pour chicha and brandy on the ground. The Chinese avoid all reference to their dreams before breakfast, and the Japanese until they have rinsed the mouth with water, and spat it out while facing the east.

<sup>1</sup> The following, which contains the last sentences of an advertisement, dated October 1712 (*Spectator*), is probably a good specimen of the wiles of one of the more recent of the craft. It, doubtless, would be efficacious in attracting flocks of credulous people, almost equal in number to that forming the swarm of bees through whose instrumentality the Cave of Trophonius was discovered:—"I interpret to the poor for nothing, on condition that their names may be inserted in public advertisements, to attest the truth of such of my interpretations. As for people of quality or others who are indisposed, and do not care to come in person, I can interpret their dreams by seeing their water. I set aside one day in the week for lovers; and interpret by the great for any Gentlewoman who is turned of sixty, after the rate of half a Crown *per* week, with the usual allowances for good luck. I have several rooms and apartments fitted up, at reasonable rates, for such as have not conveniences for dreaming at their own homes.—*Titus Trophonius.*"

<sup>2</sup> It is recorded that the Sabinda greatly dread dreams. A dreamer is kept in great uneasiness for several days after a dream. This race abstain as religiously from bathing as they do from eating fowl, because their ancestors were warned in dreams that if they bathed tempests would visit them.



It redounds to the fame of Hippocrates, brilliant as that is, that he attempted to wrest dreams from the realm of superstition, and, by regarding them from a medical point of view, to explain them on rational grounds. Imbued with the importance of the subject, he contended that particular classes of dreams should be studied with reference to the special diseases they precluded and accompanied. He expressed the opinion that "whoever then knows how to judge of all these correctly will find in it a great part of wisdom." The investigation he advocated was at once arduous and difficult, but he gained much of his own knowledge, masterly and accurate, by like patient and laborious methods. It is said that he added to his erudition by "reading the tablets in the temples of the gods, where each individual had written down the disease under which he had laboured, and the means by which he had recovered." The philosophers Democritus and Aristotle, recognising the association between dreams and bodily diseases and mental disorders, both urged a similar study. They possessed, in common with the early physicians, larger opportunities of hearing dreams in detail than pertains at present. Nowadays it is customary to follow too closely the advice of Epictetus, a Stoic philosopher of Hieropolis, who counselled that dreams should not be related, as, however much interest they might have for the dreamers, they possessed none for listeners. Galen, following in the footsteps of Hippocrates, advocated the expediency of minutely investigating dreams, that they might be utilized for the advancement of medical science. He probably took an exceptional interest in dreams, as he believed that he had gained much of his experience from his own.<sup>1</sup> Unfortunately, the advice of these skilful and sagacious pioneers has been neglected, so that even now dreams are so little understood as to be of comparatively small value in diagnosis. Happily, however, oneirocriticism, like fortune-speying, is a profession of the past, and dreams are well within the pale of scientific inquiry.

These preliminary remarks may be fitly concluded by referring for an instant to those dreams which appear to herald future events. They constantly seem to occur. A good and early example is to be found in a dream that occurred to Calphurnia, the wife of Julius Cæsar, the night before her husband's murder. She dreamed "that the roof of the house had fallen, and that he had been stabbed in her arms; and on that account she attempted, but in vain, to detain him at home." It has been attempted to explain such dreams on the theory of coincidences. Aristotle, who was favourably inclined to the hypothesis, sagaciously said that

<sup>1</sup> It is recorded that—"When Galen had an inflammation above the diaphragm he was admonished in his sleep, that if he wished to be freed from it, he should forthwith open that vein which was most apparent between the thumb and the forefinger, and take a quantity of blood from thence; he did as he was advised, and was perfectly restored to his former health."



he could not readily "either despise the evidence or be convinced by it." Sir Walter Scott thought that these dreams could be thus accounted for, and he wrote,—“Considering the many thousands of dreams which must night after night pass through the imagination of individuals, the number of coincidences between the vision and the real event is fewer and less remarkable than a fair calculation of chances would warrant us to suspect.” No one can fail to fully appreciate the wide-reaching nature of coincidence. In medical practice the development of herpes zoster, or some rare form of spinal disease, simultaneously in a man and his wife, or of the occurrence of pyelitis in a father, mother, and wife, can be only so explained. I think, however, that it falls short of accounting for all such dreams. There may be a supernatural element in dreams.<sup>1</sup> Accustomed as we are to derive our knowledge through the aid of our senses, we are apt to doubt the existence of forces which do not appeal to us through these channels, and we are prone to discredit what we cannot comprehend. In this instance, therefore, I elect to follow the example of Sir Thomas Hope of Craighall, who wrote in 1644,—“But I nather trust nor fear them, but waites on God, and observes or notes the samyn, that I may compare them with Providence, as the Lord sall pleis to mak the event appeir.”

I propose to consider dreaming from a physiological and pathological standpoint, and as it forms the nexus between the waking and sleeping states, it will be advantageous to review briefly some of the phenomena which characterize these opposite conditions.

When we are awake, in health, our mental faculties, and particularly our highest faculties, are unceasingly vigilant. Mental operations belong to a spiritual or immaterial world—one separated by a wide and unbridged gulf from that of material processes. Nevertheless they cannot manifest themselves except through the agency of the brain. Consciousness of external things can alone be aroused by impressions transmitted to the nervous structures of the brain (themselves insensitive) becoming converted into sensations and ideas through the agency of the mind. The manner in which this intercommunication between mind and matter and matter and mind takes place is unknown, and the link that unites them has been aptly described as “unthinkable.” It is a vital process that admits of no material explanation.

Mental operations vary vastly in their nature and extent. Their diversity and complexity being almost inconceivable, yet each and every particular description of mental work is dependent upon special centres in the cerebral cortex for its due performance. The multitudinous congeries of centres possess the most varied functions, but they communicate one with another, and with the special

<sup>1</sup> M. Formey thought that supernatural dreams could be distinguished by their not being initiated by a sensation, and by their not being guided by the usual laws of imagination. Veritably a fine diagnosis.



sensory and motor areas, by means of elaborate arrangements, to enable them to co-operate in a correlated manner. The study of every individual bodily function shows that it is dominated by special nervous centres and arrangements. In connexion with the special senses and muscular movements, it has been definitely ascertained that the power of recognising various delicate gradations of sensory stimuli, and of executing minute and complex movements, is rendered possible by special dominating centres in the anatomical sites known as the sensory and motor areas. Arguing by analogy, it may be fairly urged that an infinite number of psychical centres exist. Although the psychical areas have not yet been anatomically differentiated, their definite existence can scarcely be questioned. They embrace intellectual, emotional, and volitional centres. Thought, emotion, and volition excite activity in these centres,<sup>1</sup> just as molecular activity in them gives rise to distinct metaphysical phenomena. The one is subservient to the other. The highest centres, those which function consciousness, and which dominate and inhibit subordinate centres, cannot abdicate their functions while we are awake, so they require repose far more urgently than any of the others, which may rest partially by day. This they can only obtain in sleep.

Mental activity, which is inseparable from the waking state, implies a concurrent activity in the brain textures and a continuous expenditure of nervous energy. Innumerable impressions from every part of the economy and of the environment are ceaselessly streaming in upon the brain. Coincidentally potential energy is being as incessantly discharged from the cerebral structures in mental operations, and for the energizing of vital processes, muscular movements, etc. These operations are attended by wear and tear of the nervous textures, and by the deposition in them of disintegrative products in ratio to the work effected.

During this activity the brain is freely supplied with blood. Professor Mosso of Turin clearly demonstrated that a moderate hyperæmia of the brain is the concomitant of mental work. The blood-supply of an organ is *pro rata* to the work it is effecting, or, in other words, the activity of the organ rules and governs it.<sup>2</sup> It is, therefore, legitimate to argue, that the increased vascular supply

<sup>1</sup> The intellectual, emotional, and volitional faculties are disturbed and perverted when the brain textures are poisoned by drugs, such as alcohol, Indian hemp, etc.

<sup>2</sup> This is well seen in the grey matter of the brain. Its functions being of a high order, it receives a blood supply nearly five times greater than the white substance. Dr W. Ogle pointed out that the arteries of the left cerebral hemisphere are relatively larger in calibre than those of the right hemisphere. He attributed this to the greater activity of the former, and its increased functions in dominating the movements of the right side of the body. He showed that the structures of the left hemisphere are more complex in right-handed persons, and, conversely, that those of the right hemisphere are most highly developed in left-handed persons. Broca, Maragliana, and Seppili have stated that the temperature of the left hemisphere exceeds that of the right.



is mainly confined to the active portions of the brain, and is not distributed indiscriminately to every part of the organ. This hypothesis is justified on the ground that the cerebral vessels are terminal, and do not anastomose freely one with another. They are thus capable of vascularizing freely local areas, which may be called into co-operation by the association of ideas, without largely increasing the blood supply of the brain generally. It is strongly supported by the recent observations of Drs Roy and Sherrington, who write,—“We conclude, then, that the chemical products of cerebral metabolism contained in the lymph which bathes the walls of the arterioles of the brain can cause variations in the calibre of the cerebral vessels; and in this reaction the brain possesses an intrinsic mechanism by which its vascular supply can be varied locally in correspondence with local variations of functional activity.” It has, moreover, been definitely ascertained that the temperature of the scalp, which is increased by mental work, is raised in certain areas only, and not over the whole.

The expenditure of nervous energy is a rapid process, and it exceeds that of reconstruction. If the destructive processes were balanced by the reparative, *pari passu*, the need for sleep would never arise; but the former predominates in a very marked degree. The katabolic exceed the anabolic changes, consequently the one must alternate with the other. After a period of activity, of longer or shorter duration, a time arrives when a sense of fatigue, suggestive of repose, supervenes, and that is alone relieved by sleep. During sleep the processes are reversed, the psychical centres become quiescent, and molecular activity subsides. Changes, of course, occur in the cerebral cells during the recuperative period of sleep, but reconstructive processes are productive of little disturbance in comparison with discharging processes. Simultaneously the nervous structures are depurated of their waste products, and nervous energy is hoarded up. During sleep the cerebral blood-supply slackens off in obedience to physiological law, and the brain decreases in size. This is apparent in sleeping infants, in whom the fontanelles fall below the level of the skull, and rise again when waking occurs. The temperature of the skull, as well as that of the body generally, is lowered; the pulsations of the heart are decreased in number, and the blood tension is diminished. The respirations are less frequent, shallower, and more thoracic. The secretions (mostly formed under the influence of stimuli) are not formed, and if the gastro-intestinal movements do not absolutely cease, they are greatly diminished. The whole work of the economy is carried at the lowest rate of tension compatible with life.

Briefly summarized, during sleep, the brain, ganglia, medulla oblongata, and spinal cord have their functions suspended or curtailed; those which persist do so in a modified degree, and they are those which, partially resting by day, are capable of working at



night without exhaustion. Lichtenberg well said that "the masterpiece of creation must, for a time, become a plant in order to be enabled to represent for a few consecutive hours this same masterpiece of creation."

We have in these opposite conditions a starting-point for our inquiry. They are the normal alternating functions of a healthy nervous system. The one (waking) is attended by an increased cerebral blood-supply, *ubi irritatio, ibi affluxus*, a supply occurring at night, that is not only inimical to sleep, but one that is a frequent source of wakefulness. The other (sleep) is attended by a diminished blood-supply. I am not concerned at present to inquire whether this diminution be causative, concomitant, or consequent, as I am not discussing the causation of sleep. The observations of Durham, Mosso, Regnard, Hammond, Weir-Mitchell, Ehrmann, Salathé, F. Franck, and others, have placed the fact beyond doubt. Pronounced and rapidly induced cerebral anæmia is productive of unconsciousness—a truth that was known early in the second century to Rufus of Ephesus, and one that has been taken advantage of by garroters in rendering their victims helpless.<sup>1</sup> Waking and sleeping are the symptoms of cerebral activity and of cerebral rest, and all circumstances which tend to lengthen, curtail, or modify these states, initiate disturbance and mark a departure from health. Continued wakefulness (insomnia) and excess of sleep (somnolence) are symptoms of diseased conditions. A changed mental condition by day, as exaltation and depression, betoken altered cerebral states, which are invariably attended by modifications of the vascular supply. Dreams, nightmare, night-terrors, sleep-talking, and sleep-walking, indicate cerebral perturbation by night, and they are always accompanied by an augmented blood-supply to the brain.

I must here digress from my subject for a moment to briefly consider a question which has, in the past, been discussed at great length by many eminent men. It is, Does the mind sleep? Some have affirmed that it never does. Kant, Sir William Hamilton, Sir Benjamin Brodie, Sir Henry Holland, Baron von Feuchtersleben, Liebnitz, and others, thought that the mind never entirely slumbered, and they pointed to dreams in proof of their assertion. They maintained that when sleep appears to be dreamless, it is because the dreams are so evanescent as to lapse into oblivion the moment they are ended. Such faint and fugacious dreams probably often occur, but Locke, Reid, Macnish, and many others, thought

<sup>1</sup> It is interesting to view this question from the reverse side. Baron von Feuchtersleben, in writing about transfusion of blood, stated,—“The patient on whom Denis made the first experiment of transfusion in a human subject, who had wholly lost his memory, and was affected with great indolence and drowsiness, became much more lively, and his indolence vanished. His second patient, prior to operation, lay in a state of lethargy accompanied by occasional convulsions, but after injection of some calf's blood, gave every possible proof of active consciousness.”



that if dreams were constantly going on, they could not always be forgotten ; and Locke, who wrote, " We cannot think at any time without being sensible of it," was of opinion that most persons spend a comparatively insignificant part of sleep in dreaming. Many persons who are unconscious of dreaming are reminded of the occurrence by some passing incident in the course of the following day. A similar forgetfulness is by no means uncommon in waking life ; a sudden interruption of a train of thought may cause it to lapse, and considerable effort be required to recall it. Occasionally the recollection of it is brought about by some casual circumstance. Sir William Hamilton supported his opinion " that we always dream " by pointing out that he had caused himself to be awakened at different hours during sleep, and that he always awoke dreaming. It will be shown immediately that in the act of awaking the cerebral conditions requisite for dreaming are apt to be established, and that a long dream may occur in the few moments necessary to effect a complete awakening.

We have no knowledge of mind apart from the brain. Dreaming is an evidence of cerebral unrest and of disturbed sleep, consequently it affords no clue to the state of the mind during normal sleep. There are three factors to be taken into account : the mind, through which we know, feel, and will ; the brain, which is absolutely indispensable for the manifestation of mental operations and for the transmission of impressions ; and the environment from which these impressions flow. When, therefore, the brain, the medium of communication between the mind and the environment, becomes quiescent and comparatively bloodless in sleep, it abdicates its functions. The machinery becomes inoperative, and it is impossible to do more than speculate upon the state of the mind that lies beyond. Moreover, the evidence derived from the recollection of dreams is eminently unsatisfactory. Memory in waking life and memory in dream life are two distinct things. Some dreams are only remembered in subsequent dreams ; and somnambulists, who seldom recollect anything about their escapades when they are awake, often display remarkable powers of memory in their dreams. Dreams that occur in diseased conditions are better remembered than those which occur in health.

To revert now to the subject under discussion, I would mention that Dr Macnish recorded that Dr Perquin of Montpellier (1821) had under his care a female with a portion of her skull exposed. It was noticed, when she was in a dreamless sleep, that her brain was motionless, and lay within the cranium. When her sleep was imperfect, and she was agitated by dreams, her brain moved, and protruded without the cranium, forming a cerebral hernia. This observation alone was sufficient to establish the correlation between dreaming and an increased cerebral blood-supply, *ab uno disce omnes*, but Mosso and others have since amply confirmed it. Delauney and other observers have noted that the



cranial temperature is raised during dreaming. This condition differs from that of sound and normal sleep; it resembles in a faint degree that of the waking state. Dreaming is, therefore, symptomatic of cerebral activity insufficient to cause awaking; this is deduced in the same way that morbid states and disordered functions are inferred from definite symptoms.

It has been pointed out that the brain is made up of an infinite number of centres. In dreaming, some centres are slumbering while others are awake, and those that are awake do not co-operate as they are accustomed to do. This is merely another way of saying that dreaming depends upon unequal degrees of sleep. I must therefore inquire when unequal degrees of sleep occur.

Bichât<sup>1</sup> pointed out that "sleep general was made up of many particular sleeps," that it did not invade the whole of the organs at once, but that the cerebrum, sensorium, spinal cord, and the various organs and viscera, must jointly and severally repose for sleep to be sound and complete. Excitability of one or more of these systems disturbs the repose of the whole body, and dreaming or insomnia results. One set of centres in the brain are obscured after another until all are involved in oblivion. The incursion usually takes place in definite order. It first invades the motor centres, then the psychical, and then successively includes the centres of vision, of hearing, of smell, of taste, and of touch. In the process the different reflexes of the body are variously modified, and that in a manner which differs widely from the alterations that occur in hypnotic and cataleptic states. When the psychical centres are in the act of falling asleep, it occasionally happens that consciousness and unconsciousness rapidly alternate, until the latter predominates. In this intermediate stage, dreaming is so common that it has been said that we fall asleep through dream-land, and hallucinations are then prone to occur.<sup>2</sup> When we close our eyes object-consciousness is cut off; subject-consciousness, untrammelled, may be exaggerated. The mind, no longer controlled by the will from within, nor corrected from without, revels in absurdities, "wrapt in pleasing delirium," until at length all intellection terminates, or, at least, no knowledge of it is retained. Sir Walter Scott makes Elspeth say, "Eh, sirs, sic weary dreams as folk hae between sleeping and waking, before they win to the lang sleep and the sound." In this transitional stage a similar erratic disposition is noticeable in connexion with the muscular system. The motor centres in the brain fall asleep before those of the spinal cord, so that the normal inhibitory influence exercised by the former is for the time being in abeyance, and subsequent to this, and prior

<sup>1</sup> Bichât's opinion was that "dreams are only a portion of the animal life escaped from the torpor in which the other portion is plunged."

<sup>2</sup> Virgil wrote,—"Two gates there are of sleep, whereof the one is said to be of horn, by which an easy egress is given to true visions; the other shining, wrought of white ivory, but (through it) the infernal gods send up false dreams to the upper world" (Davidson's Translation).



to the subsidence of activity in the cord itself, there is a tendency to spasmodic action of the muscles, and to slight convulsive movements in the limbs, or in the whole body.<sup>1</sup>

In the act of awaking the senses resume their functions one after another, and not simultaneously. This usually takes place in the reverse order to which they fall asleep. As "the exhaustion of an organ is proportional to the intensity of its exertion," it is obvious that all the centres in the brain cannot be proportionately tired, so it follows that some which are more speedily recuperated than the rest (by responding to slight stimuli) tend to waken up before the others. During the "second sleep"—a sleep in which the slothful often indulge—dreaming is specially apt to occur. Everyone must have experienced the enervating effects of such sleep, in which the invigoration felt after the first long and sound sleep was entirely dispelled. This sleep is certainly not to be desired by those who, like Panza, have a first sleep that lasts from night till morning.

There are many grades of sleep. It may be so light as to be terminable by the slightest external disturbance, or so profound as to require a very pronounced excitation to interrupt it. For example, Dr Wendell recorded the case of a lady who was delivered of a child during sleep,—“The lady said she had dreamed that something was the matter with her, and awoke with a fright, probably the instant the head was expelled.” It seems to be extremely probable that advancing civilisation has conduced to deepen sleep. The man who sleeps in the jungle with his gun grasped in his hand cannot possibly sleep so soundly as one who is cared for even in his sleep. Sir Richard Burton recorded, in his *Travels through Central Africa*, that the attendants “excited our admiration by braving noon-day suns, and by snoring heavily through the rawest night, with nothing to warm them but a few smouldering embers. In an evil hour, compassion-touched, I threw over their shoulders a pair of English blankets, which in the shortest time completely demoralized them. They learned to lie a-bed o’ mornings.” Kohlschütter, who investigated the depth of natural sleep, found that it was deepest about the end of the first hour, when its depth decreased quickly, and afterwards more slowly until waking occurred. Sir Henry Holland wrote, it is a “series of fluctuating conditions, of which no two minutes are strictly alike.” Mönninghoff and Piesbergen, who more recently investigated the

<sup>1</sup> Mark Twain graphically describes the process of falling asleep,—“I would really doze into momentary unconsciousness, and come suddenly out of them with a physical jerk which nearly wrenched my limbs apart—the delusion of the instant being that I was tumbling backwards over a precipice. After I had fallen over eight or nine precipices, and then found out that one-half of my brain had been asleep eight or nine times without the wide-awake, hard-working other half suspecting it, the periodical unconsciousnesses began to extend their pell gradually over more of my brain-territory, and at last I sank into a drowse which grew deeper and deeper.”



subject, pointed out that the depth of sleep increased a second time after four and a half hours, and continued to grow more profound until the end of five and a half hours. The second deepening, however, does not reach the profundity of the first deep sleep. MM. Rummo and Ferrannini are apparently in accord with this opinion, for they describe a third phase of sleep as occurring at the expiry of four or five hours.<sup>1</sup> It is manifest that various disturbing agents will operate differently at different hours of the night, for reflex phenomena always bear some relation to the intensity of the excitation, the sensitiveness of the part to which it is applied, and to the depth of sleep. When sleep is deepest the lowest nervous centres are least inhibited, and the blood is probably somewhat inadequately oxygenated. As a rule, whenever the lower centres are released from the bondage of those which habitually control them, they are apt to run riot. It is under such conditions that the nervous system exhibits its vagaries, and that epileptic seizures, convulsive and spasmodic attacks, are apt to occur. Asthmatic seizures, laryngismus stridulus, croup, true and false, often supervene, and the attacks of cough in whooping-cough are prone to be most severe. Painful diseases like gout, and many having "algia" as the terminal syllable of their names, frequently make themselves apparent.

It is during the intermediate states of falling asleep and awaking that dreams most commonly occur. In the first case some centres fall asleep before the others, and in the second some awake before the rest. In both incongruity of thought may occur. They likewise happen during the periods of deep sleep, and when (from any cause) one set of centres are slumbering more soundly than the others. In illustration of these two last propositions I may mention night-terrors and nightmare. In night-terrors, which is really a dream, the little patients (usually from 1 to 4 years) awake after the first two hours of sleep in a state of violent agitation, screaming loudly, and evincing an urgent desire to get away from something (as a wild animal), that they evidently believe is attacking them. They beseech their father or mother to remove it, and fail to recognise the parent they are calling for, who may at

<sup>1</sup> The Ancients divided their nights into portions, evidently with reference to the depth of sleep. The Romans recognised six parts—*vespera*, *conticinium*, *concupium*, *intempesta nox* (profound sleep), *gallicinium*, *luciferum*. The Hebrews divided the night into four parts—6-9 P.M., 9-12 P.M., 1-3 A.M., 3-6 A.M. Forbes writes that in British Burma the people divide their days without clocks. Three of these are—dusk—"Brothers would not know each other time;" after dark, about 7—"Children feel sleepy time;" about 10—"Grown-up people lay down their heads time." Amongst the Lamongs, midnight is designated *Tenga wingi*—"The time it is well to be sleeping;" 2 A.M. is known as *Hapi semun tua*—"The time that neither young nor old are found awake." Arnold states that the Japanese divided their days into twelve periods, and call them after the rat, ox, tiger, and hare; the dragon, horse, snake, and ram; and the ape, cock, hog, and fox. Three o'clock in the morning is the watch of the ox (*ushi-no-toki*).



that very time have the child in his or her arms. It is evident that the centres of consciousness are sound asleep, while the emotional are awake and unduly active. As the former awake the children recognise their surroundings and gradually become pacified, although with their as yet undeveloped intellectual centres they cannot discriminate that their terror was caused by dreaming, and therefore it takes time to restore their confidence. In the nightmare of adults<sup>1</sup> the attack is excited by an excitation which awakes the centres of consciousness, but which is insufficient to arouse the motor centres, which are slumbering profoundly. It occurs most frequently after undue muscular fatigue,—that is, when a large demand has been made upon the reserve force in the motor areas,—and it mostly comes on during the first deep sleep. The dream is usually of such a nature as to impress the sleeper with a most painful sense of immediate bodily danger, from which he ought instantly to extricate himself. He feels as if he were bound down by some great weight on his chest. His slumbering motor centres failing to respond, his agitation and fright become very pronounced, and eventually he fully awakes, perhaps in the act of groaning or of shouting for help. In sleep-talking or sleep-walking we have examples of disparate degrees of sleep. In the former, the dreamer may answer questions intelligently, and yet be quite unconscious when he awakes that he has done so.<sup>2</sup> In the latter, untrammelled by fear, the somnambulist performs feats he could not possibly accomplish when awake, and yet he retains no recollection of them. It is a sensori-motor and sub-conscious act. The dream being conceived, it is staged so precisely that the actor is able to enact it with admirable exactness. He can perform with his eyes closed as well as open. He is unconscious of sounds or noises not associated with his conception, and he may be shaken, and may himself cough and sneeze without awaking.

I must now review some of the characteristic features of dreams, and afterwards consider some of the causes which are able to give rise to unequal degrees of sleep, and so to dreaming.

It is evident that the nature of dreams must be dependent to a large extent upon the cerebral constitution of the dreamer. Mental calibre and capacity exist in almost direct ratio to the size and quality of the brain, or, in other words, to the number and arrangement of the cerebral cells. Men of remarkable genius and ability

<sup>1</sup> Cockayne points out in reference to nightmare,—“Mare in that combination is something like Genius, Spirit; it occurs in Woodmare, which was the Saxon name for Echo.” He mentions that Themison of Laodikeia called it *Πνεγάλιαν*, or Throttler, Choker; while others called it *Ἐφιάλτης*, or The Jumper on; and he describes it as “an ugly mental struggle, and much more like an emissary from the sulfurous pit than an angel visiting from heaven.” The Karens believe that nightmare is due to “Na” sitting on a sleeper’s stomach.

<sup>2</sup> Dr Maudsley mentions an interesting fact regarding sleep-talking. He writes,—“It is interesting to note in this relation that there are some grown-up persons who, when they talk in their sleep, cannot remember their dreams, but remember them perfectly well when they do not talk.”



have been found, after death, to have possessed brains exceptional in structure and arrangement as well as in weight. Conversely, idiocy invariably exists when the cranial circumference is less than 17 inches, and when the brain weighs less than 30 ounces. Cerebral textures, like all other organized structures, undergo changes in their constitution and in their working capacity, according to their development, maturity, and decadence, and they are apt to have their functions modified, by causes which impair their nutrition and imperil their utility. The dreams of dissimilar persons, consequently, must differ very greatly. Education consists mainly in developing and establishing new centres and new communicating channels, and in registering facts in the memory, processes infinitely more easy in some cases than in others. This leads to increased and new cerebral functions. Such a developed brain is capable of transmission to the offspring,<sup>1</sup> and it becomes the source of similar tendencies and functions. These may be evinced by members of the same family dreaming the same kind of dreams at similar ages, just as peculiar movements, known to be inherited, may occur during sleep. Heraclitus of Ephesus (B.C. 500) was of opinion that,—“To those who are awake, there is one world in common; but to those who are asleep, each is withdrawn to a private world of his own.” Dreams are, therefore, largely influenced by personal equation. The late Dr John Brown, one of the most charming of writers, stated it thus,—“If the master of the house is asleep, and some imp of darkness and misrule sets to playing all sorts of tricks, turning everything topsy-turvy, ransacking all manner of hidden places, making every kind of grotesque conjunction, and running riot in utter incongruity and drollness, he must still be limited to what he finds in the house—to his master’s goods and chattels. So, I believe, it is with dreams; the stuff they are made of lies ready made, is all found on the premises to the imp’s hand; it is for him to weave it into what fantastic and goblin tapestry he may. The kaleidoscope can make nothing of anything that is not first put in at the end of the tube, though no mortal can predict what the next shift may be.” Erasmus Darwin pointed out that “a lady seldom dreams that she is a soldier, nor a man that he is brought to bed.” A man’s life and occupation must necessarily bias his dreams. Claudius wrote truly—

“The dreaming hunter still the chase pursues.  
The judge a-bed dispenses still the laws,  
And sleeps again o’er the unfinished cause.  
The dozing racer hears the chariot roll.”

It is apparent that a man who is born blind or deaf, and whose visual and auditory centres are not in use, must manifestly have

<sup>1</sup> Gratiolet has shown that the convolutions of the left hemisphere (which is supposed to be the most active half of the brain) can be distinguished when those of the right are still not apparent.



a cerebral life different from one who is in possession of all his faculties. He does not dream so frequently of visions and sounds. A man blind for many years—even half a century—may dream visual dreams, so vividly are the impressions of sight registered in the visual centres, but it is more common for him to have auditory dreams. It is alleged that the blind dream less than those who see. A man deaf may dream, in the same way, of hearing, but he more usually dreams of seeing. Dr Darwin recorded a case in which a man deprived of hearing never dreamed of persons conversing with him, but always that they talked by means of their fingers or in writing. This appears to depend to some, if not to a large, extent upon the age at which sight and hearing are lost. Heerman believed that those who lost these senses before the age of from 5 to 7 years did not, in adult life, dream visual and auditory dreams. This is in harmony with the fact that children who lose their hearing before 5 or 6 years usually become mute.<sup>1</sup> Deaf-mutes do not dream auditory dreams; at least I have not met with such a case. Again, it is obvious that the dreams of a man in average health must be unlike those occurring in one who is suffering from acute and chronic disease. Hartley noted that the “states of the body” influenced dreams.<sup>2</sup>

Dreams must of necessity be biassed by the fact that consciousness and volition are in abeyance. This constitutes the essential essence of sleep, without which slumber cannot be sound. No one who is asleep is conscious of it, nor is he able to terminate sleep by any volitional effort. He does not know, neither can he feel nor will. Obviously such a condition must exert a most important influence over dream thoughts. The centres which function consciousness being asleep, consciousness fails to guide and to direct the thoughts. Sir Walter Scott described the situation thus,—“I know no difference betwixt them (dreams) and the hallucinations of madness—the unguided horses run away with the carriage in both cases, or in the one the coachman is drunk, and in the other he slumbers.” Dreams have been compared to the thoughts of a man whose highest centres are paralyzed with alcohol, but there is this difference, that in dreaming the thoughts run on uninfluenced

<sup>1</sup> Burbach states that children do not recollect their dreams until they are 7 years old. Exceptions to this rule are probably of frequent occurrence.

<sup>2</sup> Homer recognised two classes of dreams, just as Virgil subsequently thought that there were two gates to sleep. In the *Odyssey*, Book xix., he wrote, —

“Two diverse gates there are of bodiless dreams—  
Those of sawn ivory, and those of horn;  
Such dreams as issue when the ivory gleams  
Fly without fate, and turn our hopes to scorn.  
But dreams which issue through the burnished horn,  
What man soe'er beholds them in his bed,  
These work with virtue, and of truth are born.  
Never from thence came the dire dream I read;  
Else what a joy were ours to see the suitor dead.”



and unbiassed by external impressions. A man may dream that he is the Emperor of Europe, and believe it ; such a thought occurring, even in one inebriated, during the day would be recognised as fallacious, and be dispelled, or it would amount to a delusion. Plato makes Theastetus say,—“ I certainly cannot undertake to argue, that madmen or dreamers think truly when they imagine, some of them that they are gods, and others that they can fly, and are flying in their sleep.” When our controlling faculties are in abeyance our thoughts run riot. Notwithstanding Sir Thomas Browne’s opinion that “ persons of radical integrity will not easily be perverted in their dreams, nor noble minds do pitiful things in sleep,” it is certain that many good and pious men possess tendencies that are essentially vicious—tendencies which it may have taken them years to subjugate and dominate. Such men may have dreams which shock and distress them in their waking moments. The pious and deeply religious Swedenborg experienced this. A medical man occasionally dreams of making a post-mortem examination of the body of an intimate friend, and derives much satisfaction therefrom—a satisfaction that is promptly turned into abject horror when his eviscerated friend sits up to remonstrate about the cruelty of being dissected while alive. It is, of course, much more likely for a man of unbridled passions to have vicious dreams. Lucretius pointed out that the fiercer breeds of dogs display greater degrees of rage in their dreams, and that in men the passions, like other mental states, are apt to obtrude themselves in sleep. Dominating passions and proclivities assert themselves, and make dreams the reflection of a man in his uncontrolled state. They are, as Montaigne wrote, “ true interpreters of our inclinations ”—the thoughts of what Dr Wendell Holmes would designate the innermost chamber,<sup>1</sup> bereft of dissimulation. Pythagoras thought that a “ noctuary ” (as distinguished from a diary) was useful for the purpose of examining the nocturnal thoughts. Smellie was of opinion that such a record would more effectually unfold the real disposition of men ; and Zeno thought that a man might judge of his improvement in virtue from the nature of his dreams. One of the proverbs of the Badagas is,—“ If you have a strange dream, rise and ponder over it.”

In olden days there was a prevalent belief that a man could only dream the thoughts of his waking moments. Locke, for example, wrote,—“ The dreams of sleeping men are all made up of the waking man’s ideas, though for the most part oddly put together.” Marsyas dreamed that he cut the throat of Dionysius. Dionysius, believing

<sup>1</sup> Dr O. Wendell Holmes wrote,—“ Every person’s feelings have a front door and a side door by which they may be entered. The front door is on the street. Some keep it always open ; some keep it latched ; some locked ; some bolted—with a chain that will let you peep in, but not get in ; and some nail it up, so that nothing can pass its threshold. This front door leads into a passage which opens into an ante-room, and this into the inner apartments. The side door opens at once into the secret chambers.”



that Marsyas would not have done so if he had not contemplated the act when he was awake, ordered him to be put to death. There is, indeed, much more truth in George Macdonald's remark,—“I never dream dreams, the dreams dream me.”

Wonder, the first passion of Descartes, being in abeyance, is not excited by anything incongruous, extravagant, or absurd that occurs in dreams. Everything, however improbable or impossible, is accepted as real without question, and without appealing to us as the “baseless fabric of a vision.” A very talented lady, in relating a dream a short time ago, said, “I thought it odd, but of course I believed it.” Dreamers, like lunatics, implicitly believe in their delusions. Dr Philip pertinently asked,—“Why should we be surprised at our moving through the air when we are not aware that we have not always done so? In general, there is neither time nor subject for reflection.”

The question, Is volition really in abeyance during sleep? has evoked much difference of opinion. I believe with Dr Carpenter, that there is an “entire suspension of volitional control over the current of thought which flows on automatically, sometimes in uniform, coherent form, but more commonly in a strangely incongruous sequence.” Dr Maudsley, who thinks that a certain quality of volition may be present during some dreams, writes,—“For it is certain that we may wake up suddenly out of sleep in consequence of a strong effort of volition which we have made in a dream. . . . I have been brought to the very edge of being hanged on two or three occasions in my dreams, having awakened up at the last moment before the operation was to be performed, and on each occasion I have been conscious of a determined suppression of any betrayal of fear or other emotional agitation during the preparation for the event.” It is said that Aristotle, Reid, and Beattie acquired the habit of realizing, when they were dreaming of being in great personal danger, that they were only dreaming, and deriving great comfort from the thought. Baxter, the divine, had a like faculty, and having realized that he was dreaming, he set himself to study the vagaries of his dreams, becoming at once their creator, spectator, and critic. It is probable that many enjoy a similar power. This is due mainly to the lightness of sleep, for we know that in such imperfect sleep dreams may be biassed by external impressions. This occurs at a time that the centres which function consciousness are partially awake. Most men who resolve to get up at a certain and unusual hour very frequently are able to accomplish it, but they awake from time to time during the night until the hour for rising arrives. This, combined with the common experience that it is possible under certain conditions to prolong a pleasant dream, indicates that a certain degree of activity may be maintained in the volitional centres to admit of a modified amount of volition being maintained and manifested. It implies disturbed sleep. Abercrombie related the exceptional case of a dreamer who



could terminate his dreams at pleasure. It is, however, far more common for dreamers to suffer from the lack of will power. They are often terrified by occurrences which would cause them no alarm in the waking state, for their judgment would come to the rescue. Swedenborg (who must have been a persistent dreamer, seeing that he records in his journal when he did not dream) states, a common experience, that he sometimes awoke in fright, covered with perspiration, and with his limbs trembling.

In consequence of the suspension of consciousness and volition, the lower centres that are in function, no longer controlled, are apt to be preternaturally active. The uninhibited emotional centres are unduly vigilant, and imagination is rampant. Hobbes wrote that dreams "are the imagination of them that sleep;" Hartley, that they "are nothing more but the imagination, fancies, or reveries of a sleeping man;" Feuchtersleben, that "dreaming is nothing more than the occupation of the mind in sleep with the pictorial work of fancy." This unchecked flow of thought leads to a marked magnification of everything. If there be a "space-organ" in the brain, it is assuredly slumbering soundly in dreaming, as the thoughts run on untrammelled by time or space. A trifling peripheral irritation becomes amplified into an agonizing mortal wound. The work that seems to be accomplished in dreams is stupendous in amount, while the rapidity with which it is executed is equally marvellous; and yet, as I have already said, neither the immensity nor the expedition of the labour occasions any feeling of amazement. Cicero remarked, that if we were compelled to perform all we dreamed, we would require to be bound down every night before going to sleep. De Quincey tells us that "buildings and landscapes were exhibited in proportions so vast as the bodily eye is not fitted to receive, space swelled and amplified to an extent of unutterable infinity. This, however, did not disturb me so much as the vast expanse of time. I sometimes seemed to have lived 70 or 100 years in one night, nay, sometimes had feelings representative of a millenium passed in that time, or a duration far beyond the limits of human experience." Lord Brougham wrote—"Let any one who is exceedingly overpowered with drowsiness—as after sitting up all night, and sleeping not any the next day—lie down and begin to dictate; he will find himself falling asleep after uttering a few words, and he will be awakened by the person who writes repeating the last word, to show he has written the whole; not above five or six seconds may elapse, and the sleeper will find it at first impossible to believe that he has not been asleep for hours, and he will chide his amanuensis for having fallen asleep over his work—so great apparently will be the length of the dream that he has dreamed, extending, perhaps, through half a lifetime." Lord Holland records a similar experience. Abercrombie related that "a gentleman dreamed that he had enlisted as a soldier, joined his regiment, deserted, was apprehended, carried back, tried, condemned



to be shot, and at last led out for execution. After all the usual preparations a gun was fired ; he awoke with the report, and found that a noise in the adjoining room had both produced the dream and awakened him." Dreams have been recorded which, so far from being of momentary duration, are said to have continued many days and nights. These must be received with reservation, as the differential diagnosis betwixt delusions and dreams is based upon the fact that the latter disappear, while the former continue during waking moments. Dreams, however, may continue until complete awaking occurs—that is, until consciousness is fully established. Many dreadful tragedies (suicides and murders) have been perpetrated by dreaming persons, in whom consciousness was still obscured.<sup>1</sup> Many such instances are to be found in works on medical jurisprudence, and they constitute a study of great forensic interest.

Dreaming is not only biassed by consciousness and volition being in abeyance, and by preternatural subconscious activity, but also by the inco-ordination of the centres that are awake and in function. These enter into unusual associations. When energy is projected from one set of psychical centres to another, thought is produced. The nervous energy travels along the channels into which it is directed by the will, and so thought is coherent and orderly. When the psychical centres act automatically, nervous energy is liberated, and travels (like a stream) along the lines of least resistance. It may, however, be unable to communicate with accustomed centres if they are slumbering, and for this reason it may be diverted to unfamiliar centres. Such inco-ordination of function would well explain the absurd and disjointed aberrations of dream thoughts. The coherence, rather than the incongruity, of dreams excites surprise. It is strange that orderly thought and clear and cogent reasoning should so often result from inco-ordinating organs. Indeed, Dr Spurzheim asserted that some dreaming persons occasionally reason better than they do when they are awake. Shakespeare wrote—

" Dreamers often lie—

In bed, asleep, while they do dream things true."

It seems probable that the congruity and incongruity of dreams is largely biassed by the depth of sleep. Dante, Horace, Ovid, and Dryden all refer to the fact that morning dreams are frequently coherent and true. Beattie noted that "the Ancients thought that morning dreams came nearest to the truth." In Eastern countries this was ascribed to the gods, who were thought to ramble about at that time. Towards morning, when a number of centres (recuperated by the night's repose) resume their functions, and act in concert with one another in their wonted manner, dreams are often coherent and vividly remembered. On the other hand, when

<sup>1</sup> This is occasionally noticed in dogs ; when awakened suddenly from a short sleep they may bite their master, because they do not recognise him.



few centres are awake, and when these do not co-operate with familiar centres, extravagant, grotesque, and fugitive dreams are the result.

Dreams are often made up of old impressions and occurrences. These occurring at a susceptible age are more deeply ingrained, and therefore more prone to be tapped off in dreams, notwithstanding that they may have been long forgotten. Such dreams may depend upon the re-dreaming the dreams of childhood. It is strange that such old occurrences often present a very different aspect, and one that never suggested itself to the mind when it was involved in them. As our mental life is as continuous as that of the body, dreams occurring in falling asleep may be biassed by the thoughts of the day; similarly, the morning dreams may be influenced by any occurring earlier in the night.

Some persons have asserted that no useful intellectual work has ever been accomplished in dreams. There is, however, abundant evidence to show that occasionally new trains of thought arise, just as they do in the waking state. The most unmusical and unpoetical have dreamed of swelling strains of music and of poetical ideas. Many men who have believed that they effected profitable work in dreams have affirmed that it vanished from their memory when they awoke; others, amongst whom may be named Æsculapius, Hippocrates, Plato, Dion Cassius, Descartes, Swedenborg, Condorcet, Coleridge, and Liebnitz, were all aware of executing useful work in their dreams. Swedenborg kept a "night journal" to chronicle his dreams. Göethe also noted his dream-thoughts, and discussed them with Müller. Lord Cockburn records that Lord Jeffrey "had a fancy that though he went to bed with his head stuffed with the names, dates, and other details of various causes, they were all in order in the morning, which he accounted for by saying that during sleep they all crystallized round their proper centres." Cabanis, referring to a similar case, wrote,—“He observed not that his profound skill and rare sagacity continued to direct the action of his brain during sleep.” Men remarkable for the brilliancy of their genius are as likely to evolve new thoughts in their dreams as mediocre men are unlikely.<sup>1</sup> In some instances they may have been more awake than asleep. It is probable that new trains of thought are more likely to occur in dreams before middle age than in advanced years. New channels are not so easily formed after middle life. Consciousness is not essential for mental work. Dr Maudsley lately wrote,—“When mental processes of that kind take place in such functions as recollection, imagination, and reflection, it is not consciousness which deter-

<sup>1</sup> Dennys says that many of the principal temples in the Empire (China) owe their construction to imaginary instruction received in sleep; and Millet states that “in the time of Maharájá Rangit Singh, a dreamer pointed out seventeen or eighteen wells in the vicinity of Kot Káhir, on the right bank of the Rávi.”



mines and effects it ; we are never conscious of a thing until the thing is ; consciousness does not go before the event, it only comes into being with its accomplishment." Our subconscious centres are capable of effecting the most varied operations. For example, a medical man retired to bed one night thoroughly tired out by several nights' want of sleep. Within an hour—during his first deep sleep—he was called to see a patient. He rose and went, and in due course came back and returned to bed. Next morning, when some reference was made to his having had to go out, he had no recollection of the circumstance. On calling to see the patient, a quarter of a mile distant, he found that during his night visit he had performed podalic version easily and quickly.

This leads me to inquire, Do all dream ? Sir William Hamilton and others thought so. Plutarch, who wrote on dreams and the influence that they exerted on the Egyptians and others, early maintained, and many think rightly, that some persons never dream. For instance, Rabelais mentioned that Clion of Danlia, Theasymedes, and Villanoranus never knew what dreaming was.<sup>1</sup> Heerwagen, who investigated this subject, and obtained returns from 406 persons, found that 133 dreamt frequently, 153 seldom, and 120 were not conscious of dreaming at all ; of these, 194 could recall their dreams easily, but the rest had more difficulty in doing so.<sup>2</sup>

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## PART II.

The causes capable of giving rise to activity in limited areas of the cerebral cortex insufficient to awaken the sleeper, but adequate to arouse ideas and to cause dreams, may be divided into three groups, in the order in which it will be most convenient to consider them—1. Cerebral activity instigated by sensory stimuli ; 2. Activity inherent in the psychical centres, maintained either by erethistic or adynamic conditions ; 3. Activity excited by an altered blood supply.

1. *Activity instigated by Sensory Stimuli.*—The essential characteristic of nervous structure is that it is responsive to suitable stimuli. Acephalous animals (Landois has compared an animal

<sup>1</sup> Herodotus mentions a tribe of men, individually nameless, but collectively called Atlantians, who never dreamt, just as they never ate anything that had lived.

<sup>2</sup> It seems well established that all animals possessing brains dream. Dogs, horses, etc., give evidence of this in noises and movements during their sleep. The former were believed by Aristotle and Lucretius to hunt in their dreams. Occasionally they awake in agitation and bark fiercely, and are comforted by familiar faces and surroundings, showing that their dreams are sometimes terrifying. Animals also suffer—like the *genus homo*—from nightmare and somnambulism.



asleep to one deprived of its cerebral hemispheres) exhibit reflex functions, as well as those possessing highly organized brains. Excitations are transmitted from the peripheral cells to the brain during sleep, just as they are during waking, although in a languid and imperfect manner. When these are of moderate intensity they may not be perceived as sensations, but they may suffice to arouse activity in the psychical centres through the medium of the sense organs. Light, for example, by stimulating the visual centres may excite secondarily molecular activity in the psychical areas, and so induce dreaming. The subject of the dream may be determined or biased by the sensory organ first stimulated, and also by the particular stimulus applied. The sensory organs appear to be able, even during sleep, to discriminate varying kinds of stimuli. This capacity differs considerably in different individuals, for great diversity exists in the perceptive powers of waking persons. Dreams, consequently, are apt to be influenced by the nature of the causes instigating them. Hobbes wrote:—"Seeing dreams are occasioned by the distemper of some of the inward parts of the body, divers distempers must needs cause different dreams"—a dictum that will be approved by all who believe that "there are no accidents in Nature."

Sensory excitations, by exciting activity in the sense organs, are productive of an increased cerebral blood supply. Mosso conducted upon three persons (in each of whom a portion of the skull was wanting, which permitted the movements of the brain to be felt through the scalp) a series of observations connected with the cerebral circulation during sleep. By means of special instruments he took tracings of the movements of the brain and thoracic walls, and of the pulsation of the heart, and of the radial artery at the wrist. By the aid of the plethysmograph he estimated and registered the quantity of blood in the forearm and hand. He showed that all stimulations, however slight (insufficient to awaken the sleeper), such as a ray of light falling upon the eye, a noise, etc., are attended by contraction of the vessels of the forearm, an increased blood-pressure, and an augmented flow of blood to the brain. These changes are accompanied by a modification of the respiratory rhythm, and by an acceleration of the pulsations of the heart. More recently, Drs Roy and Sherrington, who conducted experiments with a view to determine the "vertical thickness of the cerebral hemisphere," found that stimulation of the sciatic or other sensory nerve always produced expansion of the brain, beginning immediately after the onset, and lasting a variable number of seconds after the excitation was withdrawn. They write:—"The increase in the volume of the brain which results from stimulation of sensory nerves is mainly if not entirely due to passive or elastic distension of its vessels as a result of a rise of blood-pressure in the systemic arteries." It is, indeed, through



this mechanism that sleepers are warned of danger, and that their safety is secured.<sup>1</sup>

(a.) *Vision*.—A bright light falling upon the eye may give rise to visual dreams. Radestock thought that it might cause, in pious men, dreams of celestial glory, for dreams are much biassed by the quality of the man. In the residenters in the Far West, light causes dreams of fire, which instantly awakens them in fright, experience having taught them the need for haste. In others, the dreams may be of sunny climes or of historical conflagrations. Maury recounts that he caused a light surrounded by red paper to be passed before his eyes many times during sleep. He dreamed of a tempest with lightning, with all the remembrances of a violent storm.

Subjective (?) sensations may likewise initiate visual dreams. Dr Herbert Airy believed that the ocular spectra which prelude megrim may be mixed up with the dreams that precede the attack. It is well known that these ocular phenomena can be produced by pressure on the eyelids, and that they may arise from alteration of blood-pressure on the retinae. Goëthe and Johannes Müller had the faculty of inducing them voluntarily.

It is superfluous to remark that light does not necessarily nor constantly cause dreaming. Some persons are unable to fall asleep in darkness. Many races are so terribly afraid of darkness that light is essential to obtain sleep. For example, the Japanese and Samoans dread it so much that they would rather forego or curtail their food than be without oil to keep a lamp burning all

<sup>1</sup> In animals there is usually one sense which is developed to a greater extent than the others. It seems probable that it is through this particular sense—that is capable of being more quickly aroused into activity than the rest—that animals are warned of danger during sleep. It is an arrangement designed for the preservation of life. In man this is not very noticeable, as his senses are modified materially by education; but even in his case the centre for touch seems not to sleep so soundly as the others, and to respond more speedily to impressions, so he is most easily awakened by excitations acting upon it. Civilisation has done much to deepen sleep. Savages and most animals sleep less soundly than civilized men. The senses are usually equal to what is required of them. It is not necessary for a man to be always on the *qui vive* when he knows that he is protected by bolts and bars inside his house, and by night policemen outside. Savages, on the contrary, require to be somewhat on the alert during sleep, and often their hearing is much more acute than that of their more favoured brethren. Wood states that the Hottentots (who are profound sleepers) will be aroused instantly by an almost inaudible sound presaging danger, such as the twang of a bow. In dogs the auditory centre is the most easily aroused during sleep. In deer it is the olfactory. The "winding" of a man readily awakens a sleeping deer. A most intelligent "stalker," of life-long experience in several large forests, maintains that deer do not sleep so soundly as other animals. In fowls the centre of vision is the most sensitive. Advantage is taken of this in the preparation of *paté de fois gras*. The Strassbourg geese are aroused by light from a lamp, every three or four hours, to be fed, and after their meal, and as the light is slowly extinguished, they return to roost. Hybernating animals can be roused into activity by various sensory stimuli.



night. Other peoples sleep with light burning for divers reasons; amongst these may be mentioned warmth, purification of the air, defence from mosquitos, snakes, and wild beasts, etc. On the other hand, some races have a great prejudice against sleeping in the rays of the moon; for instance, the Chinese will not do so if they can avoid it, and in these cases it is believed that the dreams which occur in such conditions are of very ill omen.

(b.) *Hearing*.—Dr James Johnstone related that a person of his acquaintance, while asleep in bed, dreamed that a man was entering his room from the window, and had broken the water jug in attempting to step over it. The gentleman started up, and seizing a pistol which was under his pillow, was about to shoot at the intruder, when, most fortunately awakening, he discovered that the supposed thief was his own servant, who, having come to call him in the morning, had accidentally broken his jug. Macnish says that the sound of a flute may invoke a thousand delightful and beautiful associations—"The air is perhaps filled with the tones of harps and all other varieties of music." A nurse, who frequently dreams of the braying of a donkey, states that this is due to the snoring of a child who has enlarged tonsils. A noise occurring in the course of a dream may change or modify the subject or current of a dream, just as a sudden or loud noise may, in waking moments, distract the thoughts of a man from the subject occupying his mind. Sometimes a sleeper is awakened by the sound of his own laughter excited by an amusing dream,<sup>1</sup> for dreams may excite pleasure and amusement as well as terror. Noises caused from storms, etc., often provoke dreams.

Subjective (?) sensations, such as those designated *tinnitus aurium*, and which usually depend upon well-marked objective causes, have caused dreams of music of surpassing grandeur. In one instance this was construed into a foretaste of eternal glory. Such sensations are a frequent source of dreams in chlorotics. There are few doctors, probably, who have not dreamed that their night-bell had rung. One retired physician was so persistently tormented with such a dream that he declared that the only miserable time he had was when he was asleep in bed.

Here, again, it must be noted that sounds do not necessarily cause dreams, neither do they disturb sleep. Aretæus long ago wrote:—"Whatever is familiar to anyone is provocative of sleep." The Æolian harp and other monotonous sounds have been employed as aids to sleep. The truckle-bed or trundle-bed, which is still known in some parts of Scotland, was introduced by the rich for the purpose of wooing sleep. Occasionally a minstrel occupied it,

<sup>1</sup> Wendell Holmes concludes his poem "The Old Man Dreams" thus:—

" And so I laugh'd—my laughter woke  
The household with its noise—  
And wrote my dream, when morning broke,  
To please the gray-hair'd boys."



and played soft and pleasing strains. Sir John Sinclair records—"It was formerly a custom, in the more remote parts of Scotland, to employ bards to rehearse to great men the verses of distinguished poets, and by these means, in some measure, the poems of the celebrated Ossian were so long preserved by oral tradition." In Greece, Russia, and other countries, this bed was similarly used. It must be observed that sleep is disturbed by some noises and not by others. Some persons hear "low" better than "high" sounds when awake, and they are most easily disturbed by such sounds during sleep. The Hottentots, who are most readily aroused by faint sounds which forebode danger (see footnote, page 23), will sleep deeply even if a gun be discharged close to their ear.

(c.) *Smell*.—For the keen perception of odours it is necessary that the fragrant particles should be sniffed into the nostrils, that they may infringe upon, and be dissolved in the secretion of the Schneiderian membrane. As mucus is not secreted in any quantity during sleep, the stimulation sufficient to cause dreams must be a powerful one. Odours frequently prevent the onset of sleep, but they do not often disturb or terminate it. Three patients, residing in Kensington, assure me that they have recently been awakened by smells prevalent in that quarter during the night, but I have met with no patient who appeared to have had dreams excited by these odours. Maury writes,—“I am caused to smell a burning match, I dream that I am at sea (remark that the wind was blowing through the window), and that Saint-Barke blew up.” This is an instance of a dream produced by complex impressions acting through the olfactory and peripheral nerves, and giving rise to associated ideas. In such instances the strongest impression usually determines the dream. Of another dream Maury says,—“I was caused to inhale Cologne water. I dream that I am in a perfumer’s shop, and the idea of perfumes doubtless awakens the idea of the East. I am in Cairo, in the shop of Jean Marie Farina.” This again is an example of an olfactory dream being converted into a visual dream, an occurrence so common that dreams are often called visions. In the Bible the terms are used indiscriminately.

(d.) *Taste*.—Hammond states that a woman who was accustomed to suck her thumb had some aloes applied to it in the hope of breaking the habit: she dreamed she was in a ship of wormwood. Lyman also relates that a few drops of vinegar placed upon the tongue caused dreams of eating oranges. Stimulations acting through this sense are often modified into olfactory dreams. A parched condition of the tongue, from sleeping with the mouth open, may cause dreaming. A lady so troubled, dreams of swallowing large substances, as false teeth or fruit stones, and she frequently finds herself, as she awakes in fright, sitting up in bed trying to withdraw them from her mouth, and not feeling them, looks to see if she has placed them on the table at her bedside.



Curiously enough, her sister, who did not suffer from dryness of tongue, was accustomed to dream of swallowing peach stones, and to awake believing that she was choking.

(e.) *Touch*.—This centre, being deeply situate in the brain, probably slumbers least soundly, and so is capable of giving rise to dreams more frequently than the other senses. Tactile and thermometric impressions are transmitted by different afferent nerves. Dreams caused by stimulations acting through this sense are biassed by the nature of the stimulus and its intensity. Alison pointed out that cold is sufficient to initiate dreams. In whooping-cough the slightest current of cold air passing over a child is provocative of a severe paroxysm of the cough; it is sufficient to cause dreaming. Dr Abercrombie mentioned that Dr Gregory (who, according to Laycock, had a lymphatic temperament and a rheumatic diathesis) dreamt of spending a winter at Hudson's Bay, and of suffering much distress from intense frost. He found that he had thrown off the bed-clothes in his sleep; and, a few days before, he had been reading a very particular account of the Colonies in that country during winter. Dr Abercrombie further records that Dr Gregory having gone to bed with a vessel of hot water at his feet, dreamt of walking up the crater of Mount Etna, and of feeling the ground warm beneath his feet. Maury states that,—“A drop of water is allowed to fall on my forehead, I dream of drinking the wine of Orviette.” MacNish says that a friend who slept in damp sheets dreamt that he was dragged through a stream. Hobbes, however, thought that such conditions gave rise to dreams of fear.

Such impressions do not uniformly cause dreaming. Kerr has recorded that the people of Mashona sleep with the body so close to the fire that it is literally baked. It is said that the Jacuta men sleep opposite the fire, in a temperature 50° below zero, with their backs exposed. The Laplanders protect the back well during sleep, but they are not particular about covering the chest. Hartwig has, however, pointed out that the Bushmen are insensible to changes of temperature, and do not feel pain; inured to every hardship, they sleep, like a wild animal, in their lair or under the shelter of a bush.

Dr Reid related, “that the dressing applied after a blister on his head having become ruffled so as to cause considerable uneasiness, he dreamt of falling into the hands of savages and being scalped by them.” Tactile impressions invariably cause restlessness (sensorimotor dreaming) first, and subsequently dreaming. Mosquitos (the females) in certain climates cause much dreaming, and it has been pointed out that this is not an unmixed evil, as they render sleep light, and so assist in keeping the sleeper on the *qui vive* for enemies. Slight pain may cause dreams of agony, and that when it is so trivial as to be imperceptible by day. Dreaming of pain in a localized region has been followed in some days by a carbuncle,



boil, or other lesion. Neuralgic pains, insufficient to awaken the sleeper, may cause like dreams. Pain, arising from deep suppurations and other grave lesions, may, when sleep ensues, cause frightful dreams. Dr John Brown in *Rab and his Friends* describes most touchingly Ailie, who was drawing near her end after excision of the breast, dreaming that the pain in her breast was due to its being uneasy with milk, and sitting up to suckle her only child, dead 40 years before.

Tactile excitations do not always cause dreaming; on the contrary, they have been used as aids to sleep. Amongst the Hindus and the Chinese, it was a sign of prosperity to keep attendants to tickle or rub the soles of the feet until sleep ensued; and the monotonous stroking of the skin has been much practised in this country to woo sleep.<sup>1</sup>

Subjective sensations in the skin frequently cause dreaming. Hebra and Kaposi, in discussing *pruritus universalis*, write:—“It influences their dreams in the most varied and extraordinary shapes. Sometimes the poor fellow believes he is stroking his favourite dog, and as this pleases the dog, he goes on stroking till he uses his nails freely. He gets quite out of breath with scratching, and cannot by any means abstain; then he wakes up suddenly and finds that his favourite hound is his own skin, and proof that he has really only been scratching this in his dreams is afforded by the number of smarting and burning excoriations. Another time he dreams that he has to rub or polish the floor or to scrape the walls. The visions are always analogous, and concern his own diseased skin.”

Disturbing impressions may arise in innumerable ways. Disorders of the uterus and ovaries may initiate excitations, which, projected during sleep, may cause dreaming. The victims of uterine and ovarian affections, and floating kidney, are often depressed, hypochondriacal, and neuralgic during waking; they are likewise afflicted with dreaming.

Any interference with the respiratory movements normal to sleep is productive of dreaming, particularly when they are quickened and their freedom embarrassed. Nightmare has been caused by a cat lying upon a sleeper's chest; it has likewise resulted from sleeping with an arm lying awkwardly across the chest. It, as well as dreaming, is often met with in hysteria, gout,

<sup>1</sup> Captain Cook, in his *Travels*, described a custom of inducing sleep that he met with in his last voyage, when staying at Tongataboo as the guest of Futtafaike. “When supper was over, abundance of cloth was brought for us to sleep in, but we were a good deal disturbed by a singular instance of luxury, in which their principal men indulge themselves. Two fat women performed the operation, which is called ‘tooge tooge,’ by beating briskly on his body with both fists, as on a drum, till he fell asleep, and continuing it the whole night, with some short intervals. When once the person is asleep, they abate a little in the strength and quickness of beating; but resume it if they observe any appearance of awaking.” The women relieved each other by turns.



etc., that have flatulent distension of the stomach and intestines (which impedes respiratory movements) as a symptom. Greisenger thought that accelerated respiratory movements accounted for dreams of flying, and slower respiration for dreams in which the sensation occurred of being drawn down from a height. Acute diseases of the thoracic organs may be precluded by dreams, and in pneumonia these may presage delirium. In emphysema and pleuritic effusion dreams are frequent; they are usually accompanied by sensations of oppression, suffocation, or nightmare. Dreams so frequently precede a paroxysm of asthma, that it is often possible to predict the occurrence. In phthisis pulmonalis dreams of a terrifying nature precede all other symptoms; they correspond in the course of the disease to the diurnal euphoria known as the *spes phthisica*. They are most troublesome in those patients who have a tendency to become bronzed. Night-screaming occasionally occurs. In advanced cases of consumption the respirations may be quickened when sleep is deepest. Dreams, like cough and other disturbants, have a tendency to slow them. The dreams are usually vivid and rapid; at times they are so distressing as to make the patient try to keep awake, rather than run the risk of dreaming again during sleep. Laryngismus stridulus would appear in some instances to be provoked by dreaming. Turbulent emotions suffice during the day to excite it.

Dreaming is associated in the minds of the populace with indigestion; it is said to be of "indigestion bred." There is certainly a very intimate connexion between sleep and digestion. After the ingestion of a full meal the stomach receives a large blood-supply, and its movements become active. Co-incidentally the brain is depleted, and a tendency to sleep ensues. During sleep the digestive apparatus becomes ex-sanguine, peristaltic movements abate, and the digestive fluids are not secreted. All abnormal impressions may excite dreaming. Hunger, arising from digestion being completed too long before going to sleep, is a frequent source of dreams. When digestion is not completed before sleep ensues, it is apt to be arrested. Food not digested is subject to the same laws that govern organic matter exposed to the influence of warmth, moisture, and air. Chemical changes supervene, gases are formed, and derangements are instituted. A heavy meal shortly before going to bed may prevent the onset of sleep, or if sleep ensues it is disturbed by dreaming and restlessness. Eventually sleep is terminated by the stomach making a supreme effort to complete digestion. In less marked instances, as in atonic dyspepsia, dreaming and restlessness suffice to disturb sleep sufficiently to admit of increased vascularization and innervation for the completion of the digestive processes. Unsuitable foods taken at improper hours invariably give rise to sleep disturbance. During the first half of existence, when the work of the economy is carried on with a surplus of energy, dreaming from digestive de-



rangements are less frequent than in the latter half, when digestion is effected with increasing difficulty. To avoid dreaming, greater care is necessary, after middle life, in eating and drinking, as Holmes wrote:—"Fifty or thereabouts is only the childhood, as it were, of old age; the gray-beard youngster must be weaned from his late suppers now." In the strife of daily life the nervous system is unduly strained, and the use of artificial and complex foods, as well as various poisons, has become more prevalent, digestive complaints are consequently on the increase. Dreams from this cause are often the bane of existence. Regarding idiosyncrasies, every year of waning life adds to their number. One year, mushrooms require to be added to the list; the next, some other equally inoffensive article of diet. It is not that such things are difficult to digest, but failing powers, and some peculiarity in the constitution, render many persons increasingly intolerant. Many know that they cannot partake of such common articles of diet as milk, eggs, cheese, shellfish, mackerel, onions, radishes, etc., without having their sleep disturbed by dreams. The majority of persons who exhibit such idiosyncrasies are either gouty or neurotic. Occupations necessitating constrained postures and tight lacing often cause dyspepsia and dreaming. Tight lacing cannot be justified on the same grounds as the "hunger belt" so often used by savages to assuage the cravings for food which they cannot obtain.

Dreams are even more troublesome in cases of intestinal dyspepsia, particularly when the liver is implicated. Assimilation being imperfect, the brain cells, partially starved, grow irritable and responsive to slight stimulations, this often results in dreaming, restlessness, and insomnia. According to Albers, dreams from this source are often made up of "distorted forms," and it is astonishing how often patients labouring under these ailments describe the hideousness of distorted monsters that afflict them in sleep and fill them with fear and agitation. In constipation of the bowels like dreams are apt to occur.

Intestinal worms give rise to impressions which cause dreams. In children the peripheral nerves being relatively larger, they convey impressions more quickly and amply than those of maturer years. It is from this cause that convulsions arise reflexly in young children,—an occurrence seldom, if ever, met with in the adult. Worms give rise to sleep disturbance and dreams, and occasionally they may excite nightmare, night-terrors, and somnambulism. Grinding the teeth and restlessness are likewise frequent concomitants. Children are peculiarly sensitive to all impressions during sleep, and as their mental life in their earliest years is not one of activity, their dreams are usually of peripheral, and not of central, origin. Colic and like spasmodic seizures cause dreams. Heerman states that abdominal colic gave rise to a dream, that a preparation was being made of his sympathetic



nerve. If sleep be obtained in the intervals of colic it is usually dream-laden.

2. *Activity inherent in the Psychological Centres maintained either by Erethistic or Adynamic Conditions.*—Wolfius and many others believed that dreams were always reflex, and resulted from sensations arising from stimulations. This is not the case; they frequently arise from other causes. Their origin is often central and not peripheral, although the latter may act as a "trigger," or as the exciting cause.

I have already stated that sensibility is the characteristic property of nerve cells. When these respond normally to suitable stimuli, and discharge their energy in ratio to the intensity of the excitation, they may be said to be inherently strong and healthy, and to possess what Haller described as "tone of fibre." To enable them to discharge these functions they require periodically (in sleep) to store up nervous energy. This is represented by the potential force required to re-arrange or build up the molecules, and it is effected in such a way as to render them unstable and responsive, without being hyper-responsive.

Cells primarily or congenitally feeble, or secondarily debilitated by unhealthy conditions (such as excessive functions or defective nutrition), display their enfeeblement in an incompetency to accumulate nervous force. Their molecules are re-arranged in a preternaturally unstable manner, so that their latent energy may be discharged in response to trifling excitations. Such cells are designated explosive. Dr Clouston, writing lately in this Journal regarding such cells, said,—“If this bad quality resides in a motor centre, we are apt to have convulsions, hysterical motor acts, chorea, and exaggerated reflexes. If it exists in an emotional centre of the brain, we are apt to have explosions of temper and morbid cravings set up.” Such cells are a fruitful source of dreams.

In the early days of mental overwork, before insomnia supervenes, dreams of the daily work are of frequent occurrence. Herodotus probably had this class of dreams in his mind when he made Artabanus say to Xerxes,—“Dreams in general originate from those incidents which have most occupied the thoughts during the day.” In ordinary intellectual work some psychological centres are called into activity, and these receive an increased blood-supply. When this particular occupation is changed for another, a fresh group of centres is brought into requisition, which in their turn grow hyperæmic, while those first in use become quiescent, and resume their comparatively bloodless state. These are healthy physiological processes. When mental work of an arduous and engrossing kind is pursued, certain centres are kept in active function, and in a hyperæmic condition for long periods. At first, the reserve of nerve force being considerable, this is repaired during sleep. If the strain be long and severe, the vaso-motor



nerves dominating the arterial vessels being inhibited during long hours grow parietic, and are unable, on the cessation of work, to cause the arteries to contract, so these sites continue hyperæmic. An erethistic condition being established, the man is impelled to work, and can think of nothing but work. He cannot in the early stages get to sleep easily, and when he does, it is to dream of his work. Eventually insomnia ensues. Southey, who was well acquainted with this sequence, sagaciously wrote,—“Be sure when you dream of your subject to lay your work aside for a few days.” In childhood, dreams of lessons should always suggest overstrain; conversely, so long as a child has no such dreams, the question of overwork need not be entertained. Dreaming from mental strain is becoming more prevalent. Mental occupations being more remunerative than manual pursuits, they are more sought after, and in many cases by those totally unfitted for them. Hence the increasing frequency of nervous disorders.

Sudden and severe mental shock or fright is often followed by dreams, which tend to recur night after night. They are almost invariably concerned with the cause of the fright. Shock impresses the nervous system most unfavourably, and it modifies in some cases the functions of the brain. In less acute cases, such as those depending on emotion, as worry, grief, anxiety, etc., activity is maintained in the emotional centres, equivalent to that in the intellectual centres in overwork. There is, however, this difference, that the depressing influence is much greater. There is much truth in Professor Cleland's remark, that “The amount of subsequent mental action set up by a sensation has no quantitative relation to the sensation, and therefore none to the amount of energy liberated by the stimulus.” Mosso showed that the blood-supply of the brain was increased by emotional activity. The fontanelles in children bulge outward in fits of temper. Tanzi and Schiff stated that the cranial temperature was raised. The effects of these emotions are most felt by the “sympathetic,” whose emotional centres are weak and impressionable, *locus minoris resistentiæ*. Dreams thus originated are invariably connected with the source of the grief or anxiety. Lucretius wrote—“Kings take by storm, are taken, join battle, raise a loud cry as if stabbed on the spot.” Some persons believe that the predisposing cause of Jacob's dream was the circumstances and grief attending his departure from his father's house. Dr Abercrombie has recorded that a man and his wife dreamed a similar dream the same night. The possibility of this is apparent if they were both anxious about some event. Burbach has shown that similar dreams may be dreamed by many persons the same night, provided that their mental occupations and sleeping conditions are alike. Emotional dreams in children correspond to night terrors, to which I have already alluded.

It will be gathered that continuous psychical and emotional



activity indicates hyper-excitability in the cerebral centres, which is an evidence of exhaustion and not of strength.

In cerebral neurasthenia, characterized by exhaustion and irritability of the brain, dreaming and sleeplessness are present in about three-fourths of all cases. The causes which lead to this condition being manifold, the dreams differ in quality to a corresponding extent. The implication of the nervous system is well seen in the exaggerated reflexes. Such patients may have hallucinations when they close their eyes to fall asleep, but they usually get to sleep, to dream, and perhaps to awake dreaming in the course of two or three hours. The process of re-arranging or re-constituting the molecules in the cells seems to be effected in a preternaturally unstable manner. This permits them to respond to trifling stimuli, which results in dreaming and often in awaking. Neurasthenic conditions have a paroxysmal element, they evince a strong tendency to recur from slight causes. The earlier attacks, which may be little noticed, are accompanied by dreaming. The later, which are presaged by dreaming, have wakefulness as a marked symptom. If the dreaming in the latter be taken as an index, it is possible, by judicious management, to avert the recurrence of the neurasthenia.

Hysteria and its allied diseases are amongst the penalties of advancing civilisation; although it was known in remote times, it is seldom seen amongst uncivilized tribes. In hysteria the functions of the nervous system are deranged. Dreams are prone to occur, and they are determined by the cerebral condition and by the depth of sleep. The emotional centres are unduly active, the volitional are enfeebled. Sensation and motion may be modified. The correlation between the psychical, motor, and sensory functions is disturbed. Such patients exhibit manifold evidences of perverted functions. They are full of vagaries which they are unable to control, they are hypersensitive to sensory stimuli, and they originate subjective sensations which begin everywhere and end nowhere. In some instances they sleep badly,—not much more soundly than they do by day when they are engrossed with day dreaming. They are subject to dyspeptic attacks and other complications which may disturb sleep. In falling asleep they may have hallucinations, and these are sometimes so terrifying as to make them afraid of sleeping. Their mental condition is projected into the night, and they dream wild and absurd dreams which impress them greatly. Macario records the case of a woman who became aphonic from dreaming of a mute man.

In hypochondriasis, the functional cerebral disorder causes certain centres to originate subjective sensations of visceral and peripheral disorders, and others to be hypersensitive to sensory stimuli. For instance, dreaming is often caused by laxatives which cause no pain or discomfort. Cerebral cells so perverted in function, and so preternaturally perceptive, are productive of a



distorted consciousness when awake, and of dreaming and sleep disturbance at night. The dreams, like the subjective sensations, are apt to be "fixed." They frequently terminate sleep in the early morning—the patient awaking in great terror, covered with cold sweat, trembling, and in many cases in abject misery.

In epilepsy (which is closely allied to sleep-talking, sleep-walking, nocturnal incontinence, etc.) dreams occur, and usually they are alarming in their nature. Tragedies have been committed by epileptics under the influence of dreams, and they retained no recollection of committing the violent acts. Nothnagel has suggested that dreams may act as the exciting causes of nocturnal epilepsy. In some instances sleep-walking alternates with epileptic seizures.

In insanity the functions of the highest centres are enfeebled and deranged. Emotional activity predominates. Each variety of mental derangement is attended by nutritive and circulatory changes. Dreaming is often the first symptom of the disorder. These aberrations of thought are dispelled on awaking. Eventually they are projected into the waking state and become delusions. In general they exercise a very prejudicial effect on the sufferers. They deter them from falling asleep lest they should recur, and they haunt them by day. Hallucinations, auditory and visual, are wont to occur in the acts of falling asleep and of awaking. The nature of the dreams differs with the kind of madness. In melancholia they may be sad and depressing; in mania, vivid and terrifying; in general paralysis, grandiose, both as regards quality and quantity. In each they may vary with the daily condition. A fixed dream recurring night after night should always suggest, at least, the probability of incipient insanity.

(3.) *Activity Maintained by an Altered Blood-Supply.*—Dreams from whatever source are always attended by an increased cerebral vascular supply. For all practical purposes, it might be stated, that primarily or secondarily they are excited by an alteration in the blood-supply, either as regards the quantity or the quality, the access or the egress. Healthy cerebral cells are extremely sensitive to their environment. They are dependent for their nutrition upon the integrity of the bloodvessels and of the pericellular and perivascular spaces. They speedily evince the effects of any interference with their nourishment. Cells inherently weak resent it much more rapidly.

Alterations in the cerebral circulation arise from causes interfering with the normal rhythmic action of the heart, from alterations in the lumen of the arteries, capillaries, and veins, leading to modifications of blood-pressure and venous stasis, and from variations in the quantity of the blood transmitted. Abnormal vascularization is inimical to sound sleep, for amongst the essential conditions of normal sleep are a heart beating quietly and slowly, and a lowered arterial tension. A heart beating with abnormal



strength and frequency causes hyperæmia of the brain. It propels an excess of oxygenated blood, which, in its turn, maintains cerebral activity. Pain, increased temperature, and excitations, acting through the sensory nerves and centres, quicken the action of the heart. A feebly acting heart, one capable of being easily inhibited, vascularizes the brain imperfectly and in a halting manner. It permits of venous stasis, and of an increase of lymphatic fluid to compensate for the absence of arterial blood. Some of the worst cases of sleep disturbance are due to what may be called cardiac neurasthenia. In all diseases of the heart, but particularly in dilated conditions, as in mitral and aortic diseases, and in aortic aneurism, sleep is often much disturbed. When such patients sleep they start, twitch, and dream short and horrible dreams, and in many instances they awake in fright. They are subject to visual hallucinations. Nightmare is common, and it has been suggested that it is the cause of some of the deaths which occur during sleep in heart disease. It has also been advanced as a cause of heart disease. Macario has recorded the case of a young woman who died from heart disease after a series of terrifying dreams.

In pericarditis, with effusion, dreams are often very distressing, and they are of a suffocative description.

Cerebral hyperæmia causes an increased sensibility to impressions, and when pronounced it leads to hyperæsthesia. This is always provocative of dreams and sleep disturbance. In dentition, wakefulness, and restlessness, and night-terrors are of frequent occurrence. Meningitis in children is presaged by recurring dreams. Slight and local hyperæmia, such as occurs in hypermetropia, is a fruitful source of dreaming.

In passive hyperæmia of the brain, that accrues from causes which impede the return of blood to the heart, the blood accumulates in the veins and is useless for nutritive purposes. The nervous textures being starved become feeble and irritable. This condition is instigated by many cardiac and pulmonary diseases. Dreaming is then more common than wakefulness.

Anæmia of the brain may depend upon a blood-supply deficient in quantity and quality, or both combined. An inadequate blood-supply entails a smaller supply of oxygen.<sup>1</sup> Anæmia may result from hæmorrhages, enfeebling diseases, poisons, etc. The symptoms which characterize it closely resemble those which characterize hyperæmia. It is necessary to discriminate between these opposite conditions.

Defective aeration of the blood acts practically in the same way as a lack of oxygen. Börner, who made observations on this subject, found by covering the mouth, and almost occluding the nostrils

<sup>1</sup> One is prone to forget the gigantic nature of the processes which are in constant operation in the body. Professor M'Kendrick has pointed out that the absorptive surface for oxygen presented by the red corpuscles of man "is equal to that of a square having each side about 56 yards."



with bed-clothes, so as to induce slight asphyxia, that the patients awoke in nightmare, declaring their dreams had been terrifying. In diseases in which the blood is not adequately aerated—that is, those in which there is venosity of blood—spasmodic seizures, as attacks of dyspnœa, are apt to occur when sleep is deepest. Dreams are also of frequent occurrence then. For example, in children, adenoid growths in the back of the nasal cavity and pharynx may induce attacks of dyspnœa, and these may be complicated with night-terrors. In adults beyond middle life, the blood becomes more venous, consequently they are more sensitive to the quality and quantity of air in their sleeping apartment, and dreams are not uncommon from this cause. Females, who exhale less carbonic acid than men, are the most sensitive in this respect.

Alterations of arterial tension give rise to sleep disturbance and dreams. It is from this cause that dreaming is so common in chronic Bright's disease of the kidney. Inequalities in arterial tension, such as arise from local vaso-motor disturbances, lead to dreaming.

Various contaminations in the blood give rise to various diseases. The quality of the blood has been little studied in comparison with the quantity; the researches of G. Hayem are full of interest as indicating the breadth and depth of the unexplored field. In the case of chronic poisoning with such definite poisons as mercury, lead, copper, etc., we see the effects markedly in the altered nutrition of the skin and of the nervous system. While different poisons affect these in various ways, they all cause dreaming in the early stages; this is succeeded by wakefulness, and by still more marked nervous symptoms. Poisons like alcohol, opium, belladonna, and cannabis indica, are all more or less calmative, and so productive of sleep; but if they are used for any length of time they so alter the nutrition of the cerebral structures as to cause dreaming, and occasionally pronounced wakefulness. The dreams differ in their character with the nature of the poison. Many drugs recommended for the induction of sleep have been lauded for not causing dreams. It would be more correct to say that in adequate doses they induce sound sleep, for the great majority of hypnotics given in doses sufficient only to produce partial, and not complete repose of the cerebral structures, cause dreaming.

It is widely known that the ingestion of tea and coffee, in certain persons, is provocative of dreaming and sleeplessness.

Blood contaminated with a luxus of waste products, such as occurs after inordinate exercise, often causes nightmare and dreams.

In subtle diseases, as scurvy, in which the blood is not only laden with waste products, but is wanting in other essential elements, dreams are early symptoms. In all the continued fevers and exanthemata, to a greater or less degree, dreams presage the other symptoms, and they are the starting point of delirium. In no cases can the transition from the one to the other be so well



studied as in febrile diseases. All diseases having high temperature as a symptom are accompanied by dreaming. The cerebral cells speedily resent their over-heated environment. In children slight disturbances suffice to raise the temperature, and that is followed by dreaming and restlessness. In intermittent fevers alarming dreams are usually present.

Blood contaminated by small quantities of peccant matter, such as bile and urea, gives rise to dreams. In rheumatic and gouty affections dreams are seldom absent, and they mark exacerbations of these states.

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### PART III.

It must be apparent that dreaming occurs as a symptom in the vast majority of mental and bodily disorders, and that it is almost co-extensive with the nosology. In many instances it appears to precede the onset of diseases, and therefore it has been regarded as a precursory symptom. In reality, it ensues synchronously with the disorder. For example, it is constantly spoken of as a premonitory symptom of apoplexy. It is, however, merely the nocturnal expression of an altered cerebral condition,—one that is characterized by day by loss of memory for recent events, by displays of emotion, of irritability, and of childishness. It is the outcome of an anæmic and shrinking brain; one in which the arterioles are gradually tending to become obliterated, and the larger arteries to become hard and resistant. These latter do not respond, as they ought, to the influence of the vaso-motor nerves. They fail to moderate the blood-supply to the extent necessary to admit of sound sleep, and so some cerebral activity persists, and dreaming results. The onset of the majority of maladies is insidious; one often fails to perceive symptoms which attend slight functional derangements, and such derangements may ensue, disappear, and recur, until they become pronounced ailments, involving textural changes. It is in such early and incipient states that dreaming seems to occur without any exciting physical cause. It may be asked how disorders, so trivial as to be imperceptible during the day, can initiate dreaming at night? By day the symptoms arising from such causes are units amongst a multitude of impressions constantly streaming brainwards; at night, when external stimulations are reduced to a minimum, they practically act like one solitary excitation. The same phenomenon is noticeable in the external world. Lying awake in the stillness of the night, one can hear the chiming of a distant clock that cannot be discerned amidst the hum and noises incident to the day. It is because dreaming arises in these initiatory stages that it derives its chief interest and importance.

Dreaming occurs in the earliest stages of many acute diseases;



it precedes all the other symptoms, but it is usually soon replaced by others of a graver nature, as restlessness, insomnia, delirium, tremor, and coma. In many functional disorders, which fall short of inducing wakefulness or other symptoms of disease, it is often a solitary and troublesome symptom, and one of great value in attracting attention to ailments that might otherwise escape observation. In such cases, the cause being rightly elucidated and treated, the dreaming disappears. When that is effected, one can realize the wisdom of Sir Thomas Browne, who thanked God for happy dreams as well as for good rest.

I must now briefly refer to the effects of dreaming, the diagnosis of dreaming, and the treatment of dreaming.

*The Effects of Dreaming.*—These may be practically summed up as the effects of the cause on which the dreaming depends, plus those due to dreaming. The latter resemble closely those that ensue from the want of sleep, and to these only shall I refer. The loss of a single night's sleep is attended by symptoms of marked enervation; that of several nights' sleep by serious consequences. This is intelligible when we consider that the voluntary curtailment of sleep for an hour every night for a year is equivalent to the loss of forty-four nights' sleep of eight hours' duration. During that time the cardiac pulsations are approximately 210,000, and the respiratory movements about 90,000, more frequent than they would have been during sleep. In health the recuperative effects of sleep are recognised in the morning by the vigour and *bien-être* that attend awakening. It indicates plainly that the bodily textures have been able to effect their repair. Some persons awake after a sufficient number of hours' sleep, worn, jaded, even exhausted. Their tissues have been unable to accomplish the necessary depuration and recuperation. In dreaming sleep is imperfect, the cerebral textures continue their functions; potential or latent energy is expended, instead of being hoarded up and accumulated.<sup>1</sup> The enervation caused by dreaming is only less in degree than that brought about by want of sleep. The dreamer, having expended his strength in cerebration, instead of recuperating it in repose, rises in the morning miserable and dejected, more tired than when he went to bed. Many persons know no other mode of awaking.<sup>2</sup>

<sup>1</sup> The Chinese, who pay much attention to sleep, believe it requires ten nights' sleep to make up for the loss of one. Amongst the Egbas, who recognise the reparative influence of sleep, the ordinary morning salutation is, Did you wake well? Dalyell wrote that the privation of sleep was the choicest means used in Scotland for the discovery of witches. Macnish pointed out that the enervating influence of loss of sleep is taken advantage of in taming young animals. Concerning wild elephants he wrote, "The animals, when first caught, are studiously prevented from sleeping; in consequence of which they, in a few days, become comparatively mild and harmless."

<sup>2</sup> Boswell, the prince of biographers, wrote that he longed for the discovery of a remedy that would enable him to rise without pain, that would dissipate his *vis inertia*, and give elasticity to his muscles.



Restlessness adds to the exhaustion. During sleep, muscular relaxation (except in the sphincters) is complete. Contracted limbs, as in the late rigidity of hemiplegia, relax up to a certain point; in dreaming, paralysed limbs move and twitch, and tremor has been known to begin under such conditions. The effects of dreaming are tolerably uniform. There is usually a marked loss of flesh, the essence of emaciation being the preponderance of decay over repair. The skin becomes altered in appearance. It becomes dry, and loses its suppleness and translucency. This was early recognised by Sanctorius, and it was well known to the ancient Hindoos. All the bodily structures are mal-nourished, but the skin and nervous system suffer most, and almost in proportionate degree. This may be due to the brain, spinal cord, and skin being developed from the same embryonic structure—the epiblast. All the organs suffer from enervation; the heart grows irritable, palpitates, and beats haltingly; digestion is languidly and imperfectly performed; the muscular strength is so palpably deteriorated, that the diminution can be estimated by the dynamometer. The caligraphy is often impaired.

Persons who have distressing and terrifying dreams awake agitated and feeling cold and shivery, bathed in cold perspiration; often their alarm is such that they are afraid to fall asleep lest the dreams should recur. They consequently curtail sleep by voluntarily struggling against it. Coleridge and De Quincey have well depicted the horrors of such dreams. The latter is said to have awakened on one occasion shouting, "I will sleep no more." Such dreams exert a very prejudicial effect upon the patient; they leave permanent impressions on the mind. Men and women of the strongest intellect and of the greatest courage are appalled—such people as would be ashamed to confess the fact even to themselves. They affect still more injuriously those who have "weak" nervous systems and those who are emotional. Such dreams tend, under these circumstances, to become projected into the thoughts of the day, and they have culminated in delusions, and in suicidal and homicidal acts. In cases of incipient mental derangement, in which the highest mental faculties are somewhat in abeyance, terrifying dreams are specially injurious. Bucknill and Tuke write,—“The mainspring of insanity is emotion of all kinds. This, stimulated by phantasy and emancipated from the control of judgment during harassed sleep, may be more profoundly moved than at any other time.”

Dreaming, therefore, no matter how it be instigated, tends, when it continues night after night, to undermine the bodily strength and to lessen the resisting power of the body.

*The Diagnosis of the Causes of Dreaming.*—This consists in the diagnosis of the causes themselves. Some assistance is occasionally gained from considering the nature of the dreams. I have pointed out the connexion that exists betwixt sensory stimuli and cerebral



activity, and the subject of the dreams they originate. The sequence in such cases can be readily followed, for it is easy to comprehend that dreams so instigated should be biassed, to a certain extent, by the active centres. It is different when dreaming arises from visceral disorders, defective metabolism, and in states in which the blood is more or less laden with peccant matters. Such blood acts upon all the psychical centres generally, and not on one set of centres more than another, at least, so far as is known. A gouty patient thus describes her dreams,—“In my usual dreams I am wandering through great cities, with wide, long streets, grand buildings, crowds of people, often looking for some one, or going through a great palace (often the same) with splendid rooms full of pictures, sometimes finding new unknown apartments up long stairs.” Another gouty patient has never had a serious illness of any kind without dreaming of some people whom she seldom sees, and who enter in no way into her daily life. During the day she may feel quite well, and be unconscious that she has dreamt this dream during the night, until she is reminded of it by some accidental or passing incident; she then knows she is going to have an illness, and under these circumstances she has never escaped one. Conversely, she has often felt indisposed without having had this dream, but the ailment speedily passed off. She is a lady of the finest mental calibre, one absolutely devoid of whimsical or fanciful tendencies. This would seem to depend upon the inhibition of certain centres in sleep, permitting unusual associations to be formed, and then automatically tapping off memories of this family. It is curious to hear her say,—“I have not had that dream.” In such cases the implication of the skin is more pronounced than usual. The complexion may be muddy and dirty, and the pigmentation under the lower eyelids considerable.

The recurrence of the same dream night after night is usually due to an erethistic cerebral condition, such as occurs in worry, hypochondriasis, and insanity; and, on the other hand, it is seldom the result of sensory stimuli, for the reason that these are rarely in constant operation, and if they are, they are not perceived after a time. There are, of course, exceptional cases. A medical friend tells me that he was afflicted in his early years with a dream that he was being shot. A cannon appeared to be discharged and to threaten him with instant death; but when the fatal moment should have arrived, the danger seemed to subside, and always in a similar way. This dream was often repeated several times during the same night. He ascribes this to his father (who slept in an adjoining room) snoring in Cheyne-Stokes rhythm. The recurrence of a dream is very suggestive in children of an impending attack of meningitis, and in adults, of insanity. A frightful dream becoming “fixed” is of serious import, and it is usually the precursor of mental derangement. It resembles in a marked manner



a "fixed" hallucination, and a "fixed" delusion, of waking moments.

Considerable assistance is derived in the diagnosis of dreaming from considering the sex, age, occupation, etc., of the patient in whom it occurs, just as this is helpful in the diagnosis of insomnia.

(*α*) *Sex*.—Females dream more than males, because they often sleep more lightly. Their nervous textures are more delicately constituted, and therefore they are more easily disturbed by sensory stimuli. They consume less oxygen, exhale less carbonic acid gas, and they pass less urine and urea than males. They often dream from sleeping in an atmosphere deficient in oxygen, or in one contaminated by the products of respiration, etc. Although they are less liable than males to sthenic inflammations, and to attacks of acute gout, they are more prone to suffer from obscure and indefinite symptoms that only yield to gouty treatment, and it is astonishing how frequent dreaming is in these states. Females are peculiarly apt to suffer from neurotic diseases, in all of which dreaming occurs. They dream most at puberty, during the menstrual periods and pregnancy, and at the menopause. Whenever dreaming supervenes in the child-bearing period, it should always lead to an inquiry into the state of the uterus and ovaries. The unmarried dream more than the married, girls more than boys, and the feeble than the strong.

(*β*) *Age*.—The old dream more than the young, and the young more than the middle-aged. In infancy tissue metamorphosis is rapid. This is indicated by the amount of urine and urea excreted. Sleep, long and sound, is therefore urgently required for the recuperation of the nervous system. The brain grows with such rapidity that it attains five-sixths of its full size in the male and ten-elevenths in the female at the age of seven. During this period the blood-supply is proportionately great, and dreaming may arise from circulatory derangements. In infancy the bloodvessels are relatively large, and the vascular tension "low." The nerves are likewise large, and project impressions readily. Convulsions may arise from the irritation caused by intestinal worms, and unfortunately these convulsive seizures may continue to recur long after the expulsion of the worms. Dreaming is most frequently excited by peripheral causes, and it may be associated with sleep-talking and restlessness. The young possess small resisting power; they are, unfortunately, affected by all pernicious influences, such as improper sleeping conditions, by increased bodily temperature, etc. Dreaming and sleep disturbance are amongst the earliest signs of an impending ailment; indeed, the onset of the disease may be fixed by the sleep disturbance. Dreams in infancy take, to a greater or less extent, the form of night-terrors. The highest cerebral centres in the young are, like those of the savage, undeveloped. They resemble closely the highest development that occurs in animals in the lower scale of existence, and is always



more or less associated with a dread of the unknown and with very limited inhibitory powers.

In youth, during the period that new centres are being constantly established by education, boys and girls often dream from over-work and over-training, and they occasionally walk in their sleep. Neurotic diseases, such as chorea, epilepsy, are apt to follow.

At puberty the mind and body participate in rapid evolution. New instincts arise, and the whole physique is changed. The aorta (up to that time smaller in calibre) becomes almost equal in size to the pulmonary artery, while the heart grows rapidly, and practically attains double its former size. In the course of this transition the equilibrium of the nervous and vascular systems is liable to be perturbed, and there is a proclivity to neurotic and other diseases in which dreaming is a common symptom.

In middle life, when decay and repair are balanced, all expenditure of energy, in excess of the ordinary income, is apt to be followed by sleep disturbance and dreaming. At the menopause, momentous and vast changes occur; the whole reproductive apparatus is metamorphosed from a condition of nervous and vascular activity into one of repose. This frequently gives rise to a train of symptoms, of which dreaming is the least important.

After middle life the aorta grows larger in calibre than the pulmonary artery, and the blood is often more venous. Dreaming, like asthmatic and similar seizures, is apt to be induced by the lack of oxygen in the bed-room. Neurasthenic conditions, metabolic derangements, and the use of tea, tobacco, alcohol, etc., in excess, are all frequent causes of dreaming.

In old age both sleep and waking are less perfect states,—the former is not sound, and the latter lacks intensity. The textures of the body generally tend to degenerate, metabolism is effected slowly and imperfectly, and nervous energy is accumulated with difficulty. The bloodvessels lose their elasticity and grow hard. Dreaming most frequently arises from an altered cerebral nutrition, and from digestive and circulatory troubles.

( $\gamma$ .) *Occupation*.—Brain workers are liable to erethistic conditions of the psychical centres, and they frequently dream from that cause. Those who work with their hands (in healthy surroundings) do not dream much. Savage races who spend their lives in sleeping and in looking for their food and eating it, may dream either from hunger or from a surfeit of food. It is probable that they have better powers of digestion than their more favoured brethren, and that is an aid to good and dreamless sleep. Many occupations are unhealthy and conduce to dreaming,—*e.g.*, workers amongst various poisons, as lead, mercury, copper, phosphorus, etc. are subject to dreaming; indeed, dreaming is one of the very first symptoms caused by these deleterious agents.

( $\delta$ .) *Temperament*.—Neurotics dream more than those of the



sanguine and lymphatic temperaments. Indeed some dream so much that they assert they never sleep at all. Their nervous system dominates the other systems, and they are given to fatigue it by close and continuous application to work. They are usually anxious. They are prone to acquire habits—habits they find it difficult to overcome,—amongst others, those of dreaming and wakefulness. They tend to break down under strains and to grow neurasthenic, in which condition sleep is often more or less disturbed. Amongst neurotics dreaming may be inherited, particularly from the maternal parent, and especially by the younger members of a family.

The sanguine, who are subject to circulatory derangements after middle life, dream from such causes. Some are large feeders, and dream from dyspeptic derangements. Many are gouty, and so possess idiosyncrasies to food and medicines.

The lymphatic often suffer from gastric and hepatic disorders, and these give rise to dreams.

(*ε.*) *Posture.*—Posture during sleep exerts a considerable influence on dreaming. Lying on the back is, as Hippocrates pointed out, a frequent cause of nightmare. Confucius cautioned against sleeping in this posture, as it was that of the dead.<sup>1</sup> In some forms of cardiac and pulmonary disease it initiates dreaming and dyspnœal attacks. In the latter the bronchial secretion finds its way into the larger bronchi, and that gives rise to disturbing impressions. The dorsal posture, by inducing hyperæmia of the lower portion of the spinal cord, is apt to excite concupiscent dreams. The sitting posture, although compulsory in some thoracic diseases, is most undesirable in health. Some sufferers from nightmare are compelled to adopt it. Dr Abercrombie, quoting from Dr Gregory, “mentions a gentleman, who, after sleeping in a damp place, was for a long time liable to a feeling of suffocation whenever he slept in a lying posture; and this was always accompanied by a dream of a skeleton which grasped him violently by the throat. He could sleep in a sitting posture without any uneasy feeling; and, after trying various expedients, he at last had a sentinel placed beside him, with orders to awake him whenever he sunk down. On one occasion he was attacked by the skeleton, and a severe and long struggle ensued before he awoke. On finding fault with his attendant for allowing him to lie so long in such a state of suffering, he was assured he had not lain an instant, but had been awakened the moment he began to sink. The gentleman, after a considerable time, recovered from the affection.” A constrained posture may give rise to dreams of being bound down by chains; too heavy bed-clothes, to dreams of being crushed by a heavy weight. Awkward postures occasionally cause dreams of skimming down a flight of stairs or of falling over a precipice. Wundt

<sup>1</sup> Emin Pasha mentions that in Wanyóro the corpse is laid on its side, as is usual in sleep.



thought that the latter dream was due to an unconscious extension of the sleeper's foot. Many persons are unable to sleep except in a particular posture, and if, through restlessness, they depart from that position, they dream. Dr Gould writes,—“I am very sensitive to the mal-position of the body during sleep. Pressure upon a nerve-trunk is with me extremely prone to produce the phenomenon known as ‘sleep’ of a limb. For this reason I sleep upon a hard bed, and I can sleep in but one position, upon my back without pillow, and without flexion of any limb. If by accident these conditions are broken during sleep, I have as a result a peculiar experience that has happened repeatedly and all through my life. My dream first takes on a tinge of impending danger until I become aware that I must waken myself. The labour of doing so is both powerful and painful.” This is a good example of sensory stimuli causing dreaming.<sup>1</sup>

Delauney thought that dreams occurring when lying on the left side were more intelligible and coherent, and that they related chiefly to recent events. He evidently believed that the left hemisphere is the portion of the brain most concerned with intellectual operations, and that its activity would be excited by the greater blood-supply it would receive when in dependent posture. On the other hand, he believed that dreams occurring when lying on the right side were more changeable, full of exaggeration, and

<sup>1</sup> The great majority of persons lie upon either side, the larger proportion preferring the right side, while probably one in every five assumes the dorsal position. According to Turner, our early ancestors did not lie prostrate, but, like the modern Germans, only half-reclined, propped up by an enormous pillow. Fosbooke states that the ancient Saxon pillow was high and full, and very stiff and hard. The custom of assuming peculiar postures in sleep appears in some cases to be inherited. It is thought by many persons that sleep is improved by lying with the head directed towards the north, to allow “the magnetic currents pervading the globe to exert a certain influence on the iron contained in the body.” I am quite satisfied (except through the imagination) that this does not affect sleep in any way. It is curious to note the customs that prevail in other countries. Miss Bird mentions that in Japan “the head must on no account be turned to the north, because that is the position of a corpse after death.” Wise stated that the Hindus must lie with the head turned towards the east, or rising sun; or south, towards *Yama*, where the person goes after death, and where is the residence of the gods. Care is taken not to turn the feet towards their father, or mother, or superiors. Hughes states,—“It is usual for Muslims to sleep with the head in the direction of Makkah. . . . Abu Zarr relates that on one occasion he was sleeping on his belly, and the Prophet saw him, and, kicking him, said, O Zundub! This way of sleeping is the way the devils sleep. . . . Abbab says he saw the Prophet sleeping on his back, with one leg lying over the other; but Zâbri says the Prophet forbade that way of sleeping.” The Kaffirs lie with the body stretched out at full length. The Bosjesmen and the Hottentots curl themselves up like balls. Wood says that the latter “often sleep so close together and in such attitudes that it is difficult to distinguish the bodies.” Fraser quotes from Bastian, that the priestly king Kukulu (who lives alone in a wood at Shark Point, near Cape Padron, New Guinea) is obligated not to quit his chair, “in which he is obliged to sleep sitting, for if he lay down no wind would arise, and navigation would be stopped.”



concerned with past events. I have not been able to verify these conclusions. They accord with the observations of Professor Ball, who pointed out that the right hemisphere is more intimately connected with the emotions than the left. He adduced in evidence that emotional excitement is more frequently met with after right hemiplegia than after left hemiplegia.

(ξ.) *Meteorological Influences.*—Every one realizes the influence of fine, bracing weather, and of dull and depressing weather, on the mental condition. This influence continues to operate during sleep. Sudden changes of weather, such as occur from change of wind, rise or fall of barometric pressure, rain, etc., cause neuralgia and other neurotic attacks. They often cause dreaming. Many persons are exceedingly sensitive to such changes during sleep. I lately saw a gentleman who could with the greatest accuracy write, on awaking, the changes that had taken place during the night from the nature of his sleep. Certain variations caused him to dream, others terminated his slumbers. Sir Henry Holland wrote, —“Removing these sources of error as far as possible, I have found that any sudden and considerable fall of the barometer produces in many persons a sort of lassitude and drowsiness, followed by restlessness and uneasy sleep, and frequently a state of laborious dreaming.” Pliny and Aristotle recognised that dreams were most common in spring and autumn, when equinoctial disturbances occur.<sup>1</sup>

It is widely known that a residence at the seaside, particularly on the shores of the Mediterranean, sometimes affects sleep prejudicially, and leads to dreaming and wakefulness, just as residence in high altitudes (about 7000 feet) is apt to affect sleep injuriously. The “mal des Montagnes” is a well-recognised disease. In tropical climates the effects of heat are displayed in headache and langour during the day, and in dreaming and sleeplessness at night.

(λ.) *Habit of Dreaming.*—Sleep is a chronometric habit of a most manifest kind. Every one possesses a habit of sleep peculiar to himself, and this differs vastly in different individuals. Some have a good sleep habit, others a bad one. Probably three out of every five persons sleep soundly and well, and the other two sleep poorly and dream. In a certain proportion of the latter it is the habit that is solely at fault. The influence of habit upon sleep may be illustrated in many ways: one or two examples will suffice. Some persons appear to maintain their health and vigour with a much less amount of sleep than others. They have the power (or habit) of concentrating their sleep. Of course there is a point beyond which they cannot limit it with impunity. Despite many notable exceptions, Wesley was probably near the mark when he asserted that a man could not retain his full vigour for a year

<sup>1</sup> Jorgensen mentions that the Malagasy pay much attention to their dreams, and ponder over the natural causes which may induce them. They have come to divide them into spring, summer, autumn, and winter dreams.



with less than six hours sleep a night. On the other hand, some have a faculty for sleeping for unlimited periods, a habit decidedly pernicious, and one that tends to the induction of disease. Again, many aged persons rise early in the morning; having acquired the habit early in life, they are unable to relinquish it in advanced years. The much-praised habit of early rising, except when the hour of retiring is proportionately early, is not one to be commended for its own sake. The old Persian kings, who were awakened early in the morning by specially appointed officials, did not achieve great things in consequence. Many people who usually sleep well have their rest seriously disturbed when they spend a night in a strange bedroom, although it may be much more comfortable than the one in which they are accustomed to sleep. The very fact that the conditions to which they are habituated are modified is enough to disturb their repose.<sup>1</sup> The sensitive suffer most in this respect—they are exceedingly dependent on their habit and on their sleeping conditions.

Dreaming that has once been excited may continue long after the cause has disappeared, and it may recur from time to time from the most trivial causes. This is particularly true in the case of neurasthenics. Locke related an instance, and a far more common one than is generally supposed, of a man who never dreamed till he was 26 years of age, when an attack of fever initiated dreaming. A dreaming habit, once contracted, is, like every other bad habit, difficult to overcome and eradicate. We have plenty of evidence of this in other conditions. Neuralgia, *e.g.*, such as is connected with ovarian diseases, continues and recurs long after the ovaries have been extirpated. Paroxysmal cough behaves in the same way; cough, which ensues after whooping-cough has disappeared, is apt to be paroxysmal. Catarrhal discharges exhibit the same tendency; and it is well known that attacks of epilepsy, asthma, hiccough, and sneezing, all possess a paroxysmal element, just as restlessness in children becomes a habit, and may persist and recur long after the cause which provoked it has been removed.

In some instances dreaming recurs in a most inexplicable manner, and if its import be neglected it deepens into persistent insomnia; on the contrary, if it be properly managed, the sleeplessness is averted and health is established. In other cases it

<sup>1</sup> Reference has already been made to some customs which prevail amongst various peoples, who appear to be able to accustom themselves to sleep under the most unlikely conditions. Sinclair records that the Russians sleep best when the chest is kept cool. In different countries sleep is made subservient to fashion. Many tribes of South Africans, Abyssinians, etc., pay great attention to hairdressing, and rather than run the risk of disarranging it, they sleep with their neck over a wooden crutch. Widows amongst the Australian aborigines wear caps of pipeclay, and sleep well in them. The people of Besikaona put up their hair with fat and beeswax every four or six weeks; and Shaw says they use no pillow, and they sleep better on the lumps of macadamized-looking material than they do without them.



exhibits no such tendency, the dreaming merely becomes persistent, and apparently is unceasing; while those who are subject to attacks of wakefulness have a return of their insomnia without any preliminary dreaming. There are many dreamers who never suffer from insomnia, just as some of the most sleepless persons do not know what dreaming means. The habits seem to be distinct.

*Treatment of Dreaming.*—The cure for dreaming consists in rendering sleep more perfect. To effect this it is necessary to secure equality of repose in the cerebral cells, by arresting molecular activity that is inseparable from mental operations. This accomplished, the dreamer becomes unconscious of thought, and oblivious to impressions of an ordinary kind; in short, he sleeps, and does not dream. Sleep exerts a beneficent influence over the body; it restores the stamina of the nervous textures, and re-establishes their healthy functions, such as sleep. Thus the dream habit is broken, and a good sleep habit is induced. Cellular tranquillity is best secured by the alleviation or removal of the causes that originated and perpetuated the unrest. These we have seen are many and diverse. Accuracy of diagnosis is therefore essential to successful treatment. Without a clear knowledge of the lesion, treatment must be faulty and the results disappointing. On the other hand, an accurate acquaintance with the therapeutic properties of hygienic and medicinal remedies is equally required. It is speaking within the mark to affirm, that the majority of cases of troublesome dreaming can be successfully managed by indirect measures, and without the use of drugs—by becoming “a skilled waiter and a helper of Nature.” When that can be accomplished, in the words of Celsus, “the best medicine is none.”

It will be remembered that I divided the causes of dreaming into three groups. The treatment will be best considered in the same manner, although not in the same sequence.

(1.) *Dreaming depending upon Sensory Stimuli.*—In these cases the conditions of sleep, as regards warmth, ventilation, light, etc., of the bedroom, must be carefully considered. To good sleepers these may be of little consequence. A cowboy in the Far West needs no Tyrian purple to woo repose; he can lie on the ground, with his saddle for a pillow, and slumber as dreamlessly as the seven sisters of Ephesus. On the contrary, a bad sleeper is materially affected by his surroundings, and it is therefore necessary to secure the absence of external stimulation so far as is possible. This is equivalent to administering a hypnotic, as it admits of cerebral repose, and of a diminution of the cerebral blood-supply. The neurasthenic, the gouty, and the rheumatic are probably the most sensitive to their sleeping arrangements.

The temperature of the bedroom should be about 58° Fahr. The old and young are easily disturbed by marked variations of temperature during sleep. Thorough ventilation without draughts



should be obtained. Many stoves—at once scientific and practical—are useful for the purposes of ventilation and heating. A man, who is spared to reach the allotted span of life, spends, in its course, a quarter of a century in his bedroom, a much longer time than he spends in any other given place. It is therefore desirable that it should be the most thoroughly ventilated room in the house. Air contaminated with carbonic acid is a frequent source of dreaming, particularly after middle age. Its toxic effects are evident in the morning in languor, headache, etc. Travellers affirm that they sleep more soundly and dream less in the desert than anywhere else. Those who sleep in camps state a like experience. The fact that more oxygen is absorbed during sleep is a strong indication of the necessity for pure air.<sup>1</sup> No one doubts that sleeping in impure air is one of the most pregnant causes of disease; dreaming is the warning note of the unhealthy conditions. It seems hardly necessary to suggest the avoidance of sleeping in a room papered with arsenical paper, nor in one contaminated with sewer gas, etc., both of which give rise to dreaming as well as to graver symptoms.

Smells, light, and noises should be excluded. The bed must be comfortable so as not to give rise to excitations. When sleep is deep—as when nocturnal emissions occur—a hard bed acts beneficially.<sup>2</sup> The bedclothes should be warm and at the same time light. The nightdress loose and preferably of silk, linen, or cotton. A flannel dress may cause dreaming by producing congestion and irritation of the skin.<sup>3</sup> Cold feet must be guarded against. Savages have found by experience that they must keep their feet warm to sleep well. They invariably sleep with their feet to the camp fire. Sleeping-sacks are in common use amongst the

<sup>1</sup> Pettenkoffer and Voit stated that of the total carbonic acid eliminated during twenty-four hours, 58 per cent. is given off during the twelve hours of the day and 42 per cent. during the twelve hours of the night, whilst 67 per cent. of the oxygen taken in is absorbed during the twelve hours of the night and 33 per cent. during the twelve hours of the day.

<sup>2</sup> Beds are differently made by different people. The Scotch make their beds in a different manner from the English. This subject has come within the range of practical politics. Special instructions were laid down for the making of the king's and queen's bed in the reign of Henry VII., and these directions were prescribed with even more minuteness in the reign of Henry VIII.

<sup>3</sup> Habit has much to do with this. Many races sleep naked. Pinkerton says that the Laplanders go naked to bed, even in extreme cold weather. The clothes that they wear by day serve as a bolster. Palmer writes concerning Australian tribes:—"Black boys, used to wear clothes for years, invariably take off everything when they go to bed, however cold the night may be, thereby following out an old instinct." The Abyssinians wrap themselves up in the "quarry" they wear by day. Married persons pack themselves up together. "They seat themselves side by side, the man on the woman's right hand, and place the short end of the quarry under them. The long end is then thrown over their heads, and under its shelter the garments are removed. The quarry is rolled tightly round the couple, and they are ready for repose."



Esquimaux and other races.<sup>1</sup> Some reference has already been made to posture. No posture should be assumed that interferes with the free movements of the heart and lungs, or that involves distortion of the bony structures. Old people, those of sanguine temperament, and the subjects of thoracic disease, often sleep best with a high pillow. Some anæmic and delicate persons rest most soundly with a low pillow; also some subjects of aortic regurgitation.

It is important that those who dream should take regular exercise in the open air, particularly in the case of those whose work is chiefly mental. Exercise in the evening, when the air, like that of the morning, is crisp, is specially useful, being attended by an increased flow of blood to the muscles and integuments, and a corresponding depletion of the brain, while arterial tension is diminished. During exercise waste products are formed (chiefly lactic acid and creatine) in moderate amount. These appear to favour sleep. I must dissent from a recent writer who thinks sleep is caused by these products, and vaunts exercise as a cure for insomnia. Sleeplessness is not to be cured by such a simple formula. Sleeplessness + exercise does not = sleep. On the contrary, exercise in excess is productive of dreaming, nightmare, and wakefulness. For centuries it has been noted that excessive exercise acted as prejudicially as healthy and moderate exercise did beneficially.<sup>2</sup>

The food should be proportionate to the body and to the strength of digestion, and particularly when dreaming depends on dyspeptic derangement. The last meal is important in relation to sleep. If it be a heavy meal, it should be partaken of from three to four hours before going to bed. The stomach should neither feel the effects of too long abstinence, nor ought it to be struggling with a burden. When it is necessary to take a late meal, it should consist of food that can be readily absorbed into the system. There is much truth in Cheyne's remark, "*Somnus ut sit levis, sit tibi cæna brevis.*"

The state of the skin and of the emunctories require attention, that their activity may be maintained. The liberal use of water and vigorous rubbing is needed. Some cases do not improve until the skin becomes natural, and it is easy to comprehend the benefits that occasionally follow hydro-therapeutics, when the intimate relation that exists betwixt the skin and the nervous system is remembered. Climatic change is often of great value in improving a sleep habit. This is brought about by the altered physiological conditions influencing favourably the affection upon which the

<sup>1</sup> The Botocudos, who lead a nomadic life and sleep without covering, often sleep "in the ashes of the fire kindled to cook the last meal."

<sup>2</sup> Many races, particularly those who are afraid of darkness, nightly resort to dancing and drum and tom-tom playing to frighten away the evil spirits that threaten them. The moderate exercise doubtless conduces to sleep.



sleep disturbance depends. In considering the therapeutics of a climate, it is wise to be guided, to some extent, by the previous experience of the patient as to sleep, for unless he sleeps well no improvement will follow. Empirical knowledge must be utilized, for as in asthma the most unlikely places sometimes suit best, and these may be discovered accidentally. A patient who consulted me some time ago had all his life been a bad sleeper and great dreamer. He spent many years of his life endeavouring to find a place in which he could sleep well. He travelled through every country in the globe, and lived in high altitudes, moderate elevations, and at the sea level; in great cities, in the desert, jungle, and on upland plains; in temperate as well as in tropical regions. Neither on sea nor on land could he sleep well or long. Accident led him, after he had abandoned his search, to a village on the French coast. There he slept perfectly for three months. As he could not remain there permanently he left it, and co-incidentally his dreaming and sleeplessness returned. The same results are not constantly obtained by the same patient. A friend who was obliged to remain a night in an Italian town slept excellently. Years afterwards, when afflicted with wakefulness, he left this country for that town to regain his sleep habit. He never slept worse. It is only fair to add that mosquitoes and barking dogs were partly to blame. Usually localities in which people sleep soundly when in health are the best suited to them when they are ill.

The *primæ viæ* must be carefully attended to, that any derangement may be remedied, for dreaming will not cease so long as the derangement continues. Laxatives must be carefully given, as in some neurasthenic conditions they *per se* give rise to dreaming and sleep disturbance.

All excesses on the part of the patient must be abandoned, and the excessive use of tea, alcohol, tobacco, etc., given up. To relieve him of the discomfort and effects of disturbed sleep by means of drugs, if that were possible, would allow him to continue his baneful practices, and eventually bring him to greater misery. A patient craves to be relieved without having his mode of living interfered with, he dislikes the ordeal of relinquishing long-formed habits; but it is essentially necessary that he should be advised to "obey Nature," and desist from breaking her laws. That attained, the *vis medicatrix Naturæ* will accomplish the rest.

When dreaming still persists, recourse must be had to some medicinal agent that will secure cerebral repose; but these must not be freely nor indiscriminately employed, for the drugging of the cerebral cells, except within the narrowest limits, will cure few cases, and it will render many worse. The resulting state is that of the original condition *plus* that of the drug employed. To pursue such a course is to emulate the traditional tactics of the ostrich, and it disposes of the diagnostic value of dreaming. There



is more than a grain of truth in Carlyle's remark, "What can men do for a man? Nothing so handsome in these degenerate days as to leave him alone." The benefits, however, to be derived from medicines, in suitable cases, are very considerable. Drugs which act on the nervous system do so in a manner peculiar to themselves—they act specifically on certain portions of it. If one was limited to one drug to combat all the disturbances of sleep, that drug would require to be opium, for it alone acts on all portions of the cerebro-spinal system. It affects the cerebrum, basal ganglia, medulla oblongata, spinal cord, and the peripheral nerves and their endings successively. In consequence it is, in the majority of cases of dreaming, far too wide-reaching in its operation, while the after-effects are many. Belladonna acts in an entirely different manner, and it can be classed as a hypnotic chiefly from its action on the peripheral nerve-endings, so modifying sensory impressions as to admit of sleep. It is therefore necessary to select a drug with reference to its specific action, and with reference to the lesion to be alleviated. When, for example, dreaming depends on peripheral irritation or excitation, it is sufficient to employ a remedy that will act on the nerve terminals so as to lower their excitability, and on the nerves themselves so as to lessen their conductivity. Such a remedy will arrest dreaming and permit of sound sleep, just as certainly as one acting primarily on the cerebral cells. Amongst such drugs may be mentioned aconite, belladonna, atropine, hyoscyamus, stramonium, cannabis indica, cannabis tannate, camphor, camphor monobromide, codeine, lavender, valerian, gelsemium, oil of chamomile flowers, chloralamide (?), sumbul, etc. In all reflex dreaming the bromides act with much certainty, sumbul being a valuable adjunct.

In all painful and spasmodic affections, which more commonly induce insomnia than dreaming, remedies of the same class are to be selected, and in addition exalgin, antipyrin, antifebrin, all of which possess decided analgesic as well as hypnotic properties, while they are followed by few disagreeable effects.

(2.) When dreaming results from alteration in the blood-supply of the brain, either as regards its quantity or its quality, besides attending to many of the foregoing general conditions, it is necessary to administer remedies, chiefly tonics, whose properties act on the great centres in the medulla, and through their agency quiet the heart and give tone to the bloodvessels, so as to diminish the force and volume of the blood current; or, on the other hand, remedies that increase the number of blood corpuscles, and promote the excretion of certain poisonous products from the blood.

In hyperæmic conditions of the brain, purgatives and derivatives must be employed, while aconite, the bromides, and chloral hydrate may be suitably prescribed. They lessen the blood tension and relieve restlessness. In anæmic conditions of the brain the



bromides must be avoided, and tonics like iron, arsenic, strychnine, and phosphorus, combined with the occasional use of belladonna, morphine, and alcohol, administered. In excessive action of the heart, due to weakness or hypertrophy, cardiac medicines such as digitalis, strophanthus, convallaria majalis, caffeine, with or without morphine, may be used; or in a different class of cases, aconite, amyl nitrite, chloral hydrate, and the bromides may be employed. In prescribing hypnotics it is often advantageous to note the arterial tension, and to combine them, when the tension is "high," either with alkalies, aconite, etc., it being remembered that the great majority of hypnotics lower the vascular pressure. When the tension is "low" the depressing hypnotics, as chloral hydrate, should be avoided, and those used may be mixed with some alcohol, digitalis, or caffeine, to guard their effects. Again, when there is an increased body temperature, hypnotics that lower the temperature, such as chloral hydrate, should be selected.

Disorders depending on defective metabolism must be remedied when they cause dreaming. In syphilitic dreaming, mercurials and potassium-iodide are called for; in gout, lithium bromide; in rheumatism, the salicylates, quinine, or oil of winter-green; and in malaria, full doses of quinine are the best hypnotics.

(3.) When dreaming depends on inherent activity in the cerebral cells, as occurs in overwork, worry, etc., it is of some consequence that these persons devote at least an hour before retiring to conversation, or some recreation, to allow the hyperæmia of the cerebral textures to subside. Hufeland counselled that the cares and burdens of the day should be laid aside with one's clothes. Old Burton relates that Ptolemy, king of Egypt, "had posed the seventy interpreters in order, and asked the nineteenth man what would make one sleep quietly in the night; he told him, 'the best way was to have divine and celestial meditations, and to use honest actions in the daytime.'" In adults and in children who are given to dreaming too much attention cannot be paid to the promotion of mental happiness and comfort. Pleasant and happy feelings are conducive to thorough and rapid nutrition of the nervous system, whereas depression and misery cause it to be slowly and imperfectly effected. He who would sleep well and dream none must go to bed "*animo securo, quieto, et libero.*"

In such cases pure hypnotics are of great value, as they are in those instances in which dreaming is due to habit, and in that which tends to recur. They admit of the disorderly habit of sleep being overcome, and of a new habit being formed. They render the anatomical substrata quiescent, and the machinery necessary for thought and consciousness being lulled, repose is enforced. A new habit becomes ingrained into the nervous structures, and sleep becomes once again a sub-conscious and automatic act. The usefulness of hypnotics lies mainly in such cases; in the others



it amounts to the treatment of a symptom, and not of the disorder itself. According to Lauder Brunton, "hypnotics may probably lessen the functional activity of the cerebral cells—(1), by causing their protoplasm to contract, and thus interposing a barrier of paraplasm between it and the oxygen brought by the blood; and (2), by lessening the affinity of the cells for oxygen by diminishing their alkalinity, or by entering into actual combination with them for a time, and thus altering their chemical relationships." If hypnotics are administered for any length of time they overcome the dream habit, but they form another, that of drug-taking, which is often insatiable and unrelenting. Such a line of treatment is inadmissible under any conditions except in the pronounced insomnia due to pain from incurable diseases, when it is required to make the process of dying as easy and comfortable as possible. Drug-induced sleep is pathological, and not true therapeutic sleep, therefore it should not under ordinary circumstances be evoked except under well-considered restrictions, particularly in the case of neurotic patients. I have found it most useful to employ hypnotics nightly for four nights, then every alternate night for four times, and subsequently once a week for a month.

The question arises, Which is the most suitable hypnotic to employ? Opium, as I have said, is too far-reaching in its action; it is sufficient to act on the cerebral structures alone, therefore a pure hypnotic is all that is necessary. For many years chloral hydrate was the remedy I invariably prescribed, but synthetical chemistry has enabled the pharmacist to compound many remedies which act as efficiently, and are attended by fewer after-effects. The chief difficulty at present is to keep pace with the new substances brought forward. Amongst those I have found paraldehyde and sulphonal more efficacious than chloral hydrate. Urethane and chloralamide are very useful. The dose must be quite as large as that given for insomnia. When arterial tension is "high" a full dose is required; when "low" a smaller dose suffices. Their action is always augmented by a warm bath at bedtime. In children, I have found bromide reliable, and in the aged, stimulants, camphor, hop, and sumbul.



