occasion a vaccine was used which, though insufficient to kill the controls, destroyed on the seventh and eighth days those whose tissues had undergone local irritation, so that we must conclude that our interference had converted an otherwise innocuous dose into a lethal one.

(To be continued.)

III.—DREAMING.

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(Continued from page 910.)

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.1 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.2 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.3 Cold feet must be guarded against.

1 Pettenkofer 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.

2 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.

3 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,
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 Esquimaux and other races. 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.

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, "Somnia ut sit levis, sit tibi cena brevis."

The state of the skin and of the emunctories require attention, 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."

1 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."

2 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.
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 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 primae vicie 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 Naturae 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, cannabinum tannate, camphor, camphor-monobromide, codeine, lavender, valerian, gelsemium, oil of chamomile flowers, chloralamide (?), sambul, etc. In all reflex dreaming the bromides act with much certainty, sambul 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 anaemic conditions of the brain the remedies 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 seguro, 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 unremitting. 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 aftereffects. 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 sambul.