seen in a calvaria in the Warren Anatomical Museum of the Harvard Medical School (No. 4962).

In the collections of Indian remains in the Peabody Museum, the Army Medical Museum, in the Museum of the Royal College of Surgeons, in London, and of the Société d'Anthropologie in Paris, there have been found but two skulls which presented appearances in any way similar to this.

One was in the Army Museum, No. 733 of the anatomical collection, and was found in a mound in Kentucky by Mr. S. S. Lyon. There are cicatrices over the greater part of the parietal, frontal, and occipital bones. These are relatively large and deep, with comparatively abrupt edges, while there seems to be little tendency to sclerosis about the depressed portions. It seems to be more easily explained by syphilis than in any other way, but at the same time it does not present the undoubted characteristics which are required.

The other is in the Peabody Museum, No. 18264, and shows similar appearances, although not so extensive, and confined chiefly to the frontal region and parietal protuberances. Two or three deeply eroded spots are similar to those which have been observed in a case of cancer, but may have been simply the results of post mortem decay.

The evidence presented thus far does not as yet clearly prove the existence of syphilis in this country previous to the landing of the Spaniards. The conclusive proof is still to be furnished by an extensively and symmetrically diseased skeleton, or by a skull presenting a typical case of caries sicca.

EXPLANATORY REMARKS UPON NEURO-DYNAMIC MEDICINE, WITH CASES.¹

BY B. O. KINNEAR, M. D.

In speaking this evening upon Neuro-Dynamic Medicine, I propose to open my paper by three quotations from Dr. Brown-Séquard's and one from Dr. John Chapman's writings.

Firstly. Dr. Brown-Séquard states: "I consider that the knowledge of the effects of the paralysis and the irritation of the sympathetic nerve opens a new and most important field in physiology, in pathology, and in therapeutics."² Again, from his *Researches in Epilepsy*, referring to the paleness of the face in that disease, he says: "We consider it a most interesting symptom, as it leads to a very probable explanation of the loss of consciousness in epilepsy. After Prof. Claude Bernard had discovered that the section of the 'cervical sympathetic nerve' is followed by a dilatation of the blood vessels of the face, I found that when this nerve is irritated by galvanism there is a contraction of these blood-vessels, and I explained the facts discovered by the eminent French physiologist and myself, by considering the sympathetic as the motor nerve of the blood-vessels of the face. When the excitation takes place in the spinal cord, and the basis of the encephalon which gives rise to the fit, the nerve fibres which go to the head are irritated and produce a contraction of its blood-vessels.

"Of course this contraction expels the blood and the face becomes pale. . . . We think that at nearly the same

time when the origin of the branches of the sympathetic nerve going to the blood-vessels of the face receive an irritation in the beginning of a fit of epilepsy the origin of the branches of the same and other nerves going to the blood-vessels of the brain proper also receive an irritation. A contraction then occurs in these blood-vessels, and particularly in the small arteries. This contraction expelling the blood, the brain loses at once its functions just as it does in complete syncope."

The quotation from Dr. Chapman's writings runs as follows, namely:—

"It has long been known that the sympathetic nerve, called by Bichat the nervous system of organic life, presides over those processes by which the body is developed and sustained. It stimulates and controls the action of the heart, alimentary canal, genito-urinary organs, and all those processes of growth, repair, and removal of effete materials on which the continuous vitality and health of the animal organism depend. During recent years important additions to our knowledge of the functions of the sympathetic nerve have been made chiefly by Prof. Claude Bernard, Dr. Brown-Séquard, and Dr. Augustus Waller, with reference to its power of controlling the action of blood-vessels or what have been termed its vaso-moto functions.

"But as the sympathetic and cerebro-spinal nervous systems are intimately related, and indeed in some parts inextricably and indistinguishably blended both in structure and function, the nervous influence, whether healthy or not, which is exerted over the several organs of the body is twofold; hence, when that influence becomes abnormal, either in kind or degree, the most potent method of restoring it to its healthy condition would be by a dual action at once on the sympathetic and cerebro-spinal nervous systems. The physician who acquires the power of directly controlling these great controllers of the organic functions would immediately obtain the mastery over a large number of diseases." Dr. Chapman claims, and I believe truly, to have discovered this controlling power by the application of heat or cold over the vaso-motor and spinal nervous centres. The above experiments prove what I think is now the widely accepted belief: that the sympathetic ganglia control arteriole expansion and contraction, which, more clearly rendered, is to state that when irritated or hyperactively working these ganglia contract the blood-vessels under their control abnormally, when they act less forcibly than the normal standard requires the vessels acted upon dilate abnormally, either in active or passive congestion.

Dr. Chapman believes that the contraction of arterioles is caused by hyperæmia and expansion, by anæmia of these ganglia; that undue nerve force is created by *increased circulation* in the arterioles of central nervous ganglia, and lessened nerve force by a lack of *normal circulation* in the same. He gives a confirmation of the effect of cutting the cervical sympathetic nerve in Case XLIII., page 411, *Work on Neuralgia*, thus stating that the ice, when first applied over the cilio-spinal, or cervico-dorsal, region, gave rise to a "throbbing headache" and "flushed face." I can further corroborate this result in my own case, having used the ice upon the same region to subdue a constant though not severe posterior nasal catarrh, with which I had been troubled for several years. I always used it one hour to one hour and a half after breakfast. Toward the end of this time I invariably experienced a

¹ Read before the Section for Clinical Medicine, Pathology, and Hygiene of the Suffolk District Medical Society, February 14, 1883.

² Lectures on the Physiology and Pathology of the Central Nervous System, page 140.

sensation of brain exhilaration, like that produced by champagne, minus any intoxicating effect; while my face showed a full color, similar to that produced by walking briskly in stimulating cool air. A case of very severe posterior nasal catarrh now under treatment experienced the same "brain exhilaration" after the application of the ice, but has no flushing of the face apparent, being a man naturally pale, and past the usual age of fresh complexion.

That contraction of arterioles is caused by hyperæmia of sympathetic or vaso-motor ganglia is believed to be true by Dr. Chapman, for the following reasons:—

"To make this clear I must refer to the state of the brain when asleep. The brain during sleep receives less blood than during the waking hours." Upon page 171, *Work on Neuralgia*, Dr. Chapman makes the above statement, and then relates a case by Blumenbach of a patient whose skull had been trepanned, and whose brain was observed to sink whenever he slept, and to swell again with blood the moment he awoke. The above is reported in an *Essay on Sleep and its Phenomena*, by J. M. Pinkerton, M. D., London, 1839, page 8. The same fact was demonstrated by Dr. Durham in his vivisectional experiments.¹

I will now read a few extracts from a very able article, upon Sleeplessness, its Causes and Treatment, published in the *Birmingham Medical Review*, for April, 1882, written by W. E. Green, M. D., of Sandown, Isle of Wight, England.

He says: "From the experiments of various observers it now seems placed beyond all doubt, that sleep is a condition of physiological cerebral anæmia." "Many physiologists have taught that a dilated condition of blood-vessels was the cause of sleep," and adds, "that this mistake may have arisen from the intense turgescence of blood-vessels after death from opium poisoning, forgetting that the state preceding death was coma, and not normal sleep." Further, "that Hammond, Durham, Donders, and Pflüger admit the brain anæmic during sleep, the latter observer endeavoring to explain the phenomenon by a chemical hypothesis. Fothergill also believes this, and states there are two factors causing the anæmia of the brain, while sleeping, namely, the modified blood supply, and the lessened activity of cerebral cells themselves."

Dr. Chapman says: "I have verified the truth of this discovery hundreds of times by decreasing the amount of blood in the brain." How? I will presently explain. He further states, what we all know, that "during sleep, respiration, oxygenation, and circulation are diminished; the amount of carbonic acid expired is consequently lessened, and the temperature of the body falls to an appreciable degree."

The conclusion drawn is this: "The diminution of the amount of blood in the brain and in the surface of the body, and the diminution of the functions of respiration, and therefore of oxygenation and circulation of the blood, are evidence of and, indeed, are produced by an increase in the nutrition and functional energy of the sympathetic or vaso-motor ganglia," thus meaning, although he does not say so, a hyperæmia of the same. The following sentence I place in the interrogative form, namely: The blood at night, leaving the brain and surface of the body, must go to internal organs, including nervous centres, which thus, during sleep, receive nutrition, and so a fresh supply of nervous energy for the following day's works?

¹ See the Guy's Hospital Reports, etc.

To answer how Dr. Chapman has reduced the quantity of blood in the human brain. By covering with hot water, at a temperature from 115° to 125° F., the sympathetic ganglia of the cervico-dorsal region. Why is this effect produced? According to neuro-dynamic medicine, heat thus applied stimulates to hyperaction the vaso-motor ganglia, by causing the blood to flow in greater quantity through these centres, thus producing a contraction of the capillary arterial system under their control. Dr. Chapman has demonstrated this in hundreds of cases. I have done so in many. To illustrate:—

Mr. B. A case of neuralgia of the left side of the face—supra and suborbital; quite extensive swelling of left cheek, with much heat; throbbing of temporal arteries upon both sides; face flushed and hot upon right side also. During the first eight hours after I saw him two grains of morphia were administered without the slightest relief to the pain, but rather a steady increase of it, for two hours, after the last dose of the drug had been taken. At the end of this period he asked me if I could not in some way relieve him soon, as the suffering was "unbearable." I filled a lumbar ice-bag of Dr. Chapman's half full of hot water and applied it over the cilio-spinal region. In fifteen minutes the pain was relieved, the throbbing ceased in the temporal arteries in thirty minutes, and the patient slept for four hours, waking with slight face and headache; but the swelling of the left cheek already much reduced.

A second application gave him rest for the night.

Before the heat was used the second time he was given a dose of calomel and bismuth, as he had been "living high," and the attack was doubtless produced by indigestion.

In a second case of neuralgia of the occipital and temporal regions of the head, with the same arterial throbbing conditions, the hot water, similarly applied, at once relieved the pain and produced sleep. In several cases of insomnia, with hot head, and without it, I have used hot water over the cervico-dorsal region with the one invariable result, the production of sleep.

If heat so applied does not cause the sympathetic ganglia to become hyperæmic, thus act more forcibly, and so contract the arterioles and the brain, how then can it act, applied over this region, and only so, to give rise to contraction of these blood-vessels? They certainly do contract in cases like those quoted.

If not caused by congestion of the centres controlling the arterioles, what is the reason for such action?

Is there a further explanation or a more reasonable one?

To enter a little more deeply into this interesting inquiry, I refer to a case published by me in the *Boston Medical and Surgical Journal* for August 10, 1882. It was that of a child three weeks old, who for this period of existence had seldom ceased to cry, suffering constantly with flatulence and constipation. The infant slept little, and its feet were cool; that is, not naturally warm. During these weeks I used all available medical means in the way of laxatives and purgatives, with but very temporary benefit. I then used ice in a very small bag, over the baby's dorso-lumbar region, the nurse holding it in place until the ice melted. The baby stopped crying during the first application, appearing comforted. The feet soon became warm, and in ten days the bowels were acting freely and regularly.

Here the sympathetic centres were over-acting; thus the circulation of the blood through the contractile elastic or muscular coats of the intestine was feeble; also through the legs, as shown by the cool feet. The ice acted by causing a general dilatation of the arterioles controlled by the centres over which it was placed, the muscular or elastic coat of the bowel was nourished, and peristaltic action, which had been *nil*, ensued, the constipation being cured as the result. The baby is two years old, and the disease has never recurred. Now it was a very curious fact that when I first used the ice to this child the temperature of the back, over and near to the dorso-lumbar region, was very distinctly higher than that over the spine above or below this region. I remarked upon it at the time, to the nurse, not then realizing its importance.

Was this in an infant a proof of congestion of sympathetic centres? It seemed so to me, for, at birth, the three centres of ossification of the vertebræ are united, and the spinous and transverse processes are not really rudimentary; therefore between the surface of the back and the spinal cord and sympathetic ganglia there would be but a few lines distance, so that the heat produced by an active congestion of these centres might very well be felt directly above them. I state this fact as an interesting one, and put the conclusion to be drawn from it in the form of a question.

Being aware of dangers which may spring from a wrongful application of cold to the spine, by errors in diagnosis or carelessness in searching for contra-indications to its use, I have proven in a number of cases that ice applied over the proper regions will warm cold extremities as well as restore to full power paralyzed legs, which paralysis has been due to congestion of vaso-motor centres, with improper nutrition of muscles and the "motor nerve centres" controlling them, as a consequence, giving rise thereby to paralysis of the part. I refer to Case I. reported in the Boston Medical and Surgical Journal for August 10, 1882. This patient had a partial paralysis of the right leg, which was restored to normal action in three weeks, the result being permanent, the leg having been paralyzed for a year previous to treatment.

CASE II. is that of a hackman, who came to me October 12, 1881. He had been upon a tremendous spree, which lasted a week. Then he was seized with numbness in the right arm and leg, which frightened him so much that he at once stopped drinking. During the few days following the arm became better, but the leg grew very cold to both sensation and touch, with almost entire loss of muscular power. He was able to stand upon it, but the flexors of the thigh were quite useless, and he had to drag it after him. Both leg and thigh were so cold as to feel like that of a corpse, showing a strong contraction of arterioles throughout. I told him to return home and soak the diseased extremity in very hot water four or five times a day, for half an hour at a time. He returned next morning saying that the parts remained warm for a few minutes after each hot bathing, but soon became as cold as ever. I then applied the dorso-lumbar ice-bag for two hours, and told him to use the ice over the dorso-lumbar region eight hours each day. Two days afterward he walked into my office with a warm limb, and power already much restored to the previously paralyzed muscles. Ice was used as before for the next ten days, from six to eight hours per day,

when the patient was able to renew his vocation, finding no difficulty now in mounting to his seat on the hack, or in exercise of the leg in any other way. Ice was continued twice a day until the middle of December. It has not again been applied, and the patient has remained well to this day, able to fulfill all his duties.

This is a remarkable instance of the sedative action of ice over hyperacting vaso-motor centres, restoring thereby anæmic circulation to its normal condition, and overcoming the motor and sensory paralysis caused thereby.

One other noticeable illustration of restored circulation by spinal ice application.

I. S., a mechanic, working in a piano factory in Cambridgeport, Mass., consulted me in March, 1882, suffering with chronically cold arms, legs, and body. There was constipation and feeble digestion, vertigo constantly increasing, and unfitting him for work. In the hottest summer nights he said that he had to cover himself with seven or eight blankets to keep warm and obtain sleep. Ice was applied from the fourth cervical to the last lumbar vertebra during four hours each day. He returned in a week, stating that he now slept quite comfortably under one blanket; his appetite was large, and his head entirely relieved from dizziness; the bowels were moving regularly. Improvement steadily advanced, and the man has had no further trouble. I saw him in November last, when he informed me that he was "quite well," with constantly warm hands, feet, and surface of body; no head trouble, and in every way healthier and stronger.

These cases illustrate, according to neuro-dynamic medicine, a hyperæmia of vaso-motor or sympathetic centres, as also in the case of the baby referred to.

Having become more and more convinced of the power of this system as a truly scientific medical remedy, I have at the same time realized the danger, through the very power of the treatment, of its application in cases which contra-indicate its use, so that in those patients upon whom it is used for severe, acute, or chronic troubles a very careful diagnosis should be made, as well as a searching inquiry into the history of the patient's former illnesses. To illustrate this caution, and demonstrate again the power of ice to produce vaso-motor paralysis, and heat vaso-motor contraction, I will close my paper by relating to you the history of another case.

The patient, a young man, had suffered severely for several years from spermatorrhœa. He was very anæmic and nervous. In six months' time the disease was much relieved, and the general physical condition greatly improved. He now caught a succession of severe colds, affecting the bronchial tubes. Each acute attack of the bronchitis was treated by heat between the scapulæ, with relief to the congestion of the bronchial arterioles (showing contraction thereof) in a very short time, and a free flow of mucus, which was easily expectorated. Since these attacks the patient has been unable to use ice above the lumbar region for the original trouble, because if placed over the last four or five dorsal he soon begins to breathe hard, and experiences a sense of suffocation and weight in the inferior lobes of both lungs. I have little doubt that asphyxia would be produced if the ice were used over his dorsal region for any length of time, from the vaso-motor paralysis induced.