THE NITROGENOUS TEPID WATER OF BUXTON.*

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BUXTON is chiefly celebrated on account of the great relief afforded by the use of its naturally tepid nitrogenous water to cases of rheumatism and gout, and the various morbid conditions allied to these diseases in origin and character.

The water issues from several fissures at the edge of the mountain limestone formation. It is discharged in vast quantity, estimated to be probably not less than 300 gallons per minute. The water issues at the unvarying temperature of 82 degrees Fahrenheit. It is very clear and brilliant in appearance, has a beautiful faintly blue colour, is slightly alkaline, and is charged with pure nitrogen gas, probably to the utmost possible degree. Dr. Sheridan Muspratt has estimated the amount of nitrogen as 504 cubic inches per gallon, which would shew a discharge in this water of 154,200 cubic inches of nitrogen gas per minute. It is enough that the water is surcharged with this gas, under pressure, at the depths below the surface of the earth at which the water acquires its elevated temperature.

The water is made use of in the form of baths, and it is taken internally. Other things being equal, the bath exerts a greater and more lasting effect on morbid conditions than the internal use. However used, the water is primarily a stimulant, and secondarily an alterative. It may, if used unduly, aggravate the localisations of rheumatism or gout in the first instance; but this is neither a desirable nor a necessary condition or test of eventual benefit. If used with judicious care and caution, the water corrects both the consequences and the causes of rheumatism and gout, so far as these are within the influence of possible treatment. The curative result does not bear proportionate relation to the primarily stimulating effect, or to any evident alterative influence, or to any eventual debilitating influence. As a rule, the younger the patient, the more recent the case, and the nearer to the surface the part that is affected, the more rapid and lasting is the curative result. The stronger the evidence of hereditary predisposition, the more difficult and tedious, and imperfect, the result may be expected to be. Even the external application of the water to the affected parts exercises an appreciable influence; but total or partial immersion of the trunk of the body and the limbs is commonly needful. Some persons cannot drink the water, others cannot bathe in the water, and some can only apply it locally, without excessive and undesirable effects. The use of the bath at the natural temperature is more immediately powerful than that of the same water heated to any higher degree; and the power is commonly found to be lessened in the ratio of the higher temperature. The amount of effect is regulated, also, by the period of immersion in the bath. Ten minutes may be the average time for desirable immersion; but, in some cases, one minute is found to be quite sufficient, and, in some, half an hour is not found to be too long. The course of baths may consist of ten baths, or sixty or more baths may be necessary for the full effect on the morbid condition. The effect of the bath depends closely on the amount of friction of the surface that is used during the immersion, and must be referable to absorption of the medicinal agent through the skin. The use of a mineral water charged with nitrogen appears to be the only way in which the medicinal action of nitrogen is obtainable, whatever the nature of this action may be eventually ascertained to be.

The Devonshire Hospital and Buxton Bath Charity has received since the year 1820, or in forty-eight years, 49,236 patients. Of these, about six-sevenths, or 42,200, have been cases of rheumatism. Of the total cases, 44,744 have been discharged more or less cured or relieved; and of the 42,200 rheumatic cases, 38,430 have been discharged more or less cured or relieved, only 3,774 of this vast number of rheumatic sufferers having derived no benefit from the use of the Buxton water. It must be mentioned, moreover, that these rheumatic cases have been usually of chronic character and comparatively long duration, for the relief of which all the usual means and appliances of medical treatment had been previously tried in vain.

Buxton is situated almost at an equal distance from the eastern and western coasts. It has essentially an inland climate. It is one thousand feet above the level of the sea. It is upon the mountain limestone formation, but close to its edge. The dry formation of mountain limestone extends many miles on one side of the town, and the equally dry formation of millstone grit extends many miles on the other side. It has a remarkably dry upland atmosphere and climatorial character,

notwithstanding a comparatively heavy annual rainfall. The elevation, the undulations of surface, the subsoil, and the nature of the vegetation, render the air remarkably free from fogs or exhalations from the ground, and the climate invigorating, and the district as free as geological conditions can render it from the ordinary results of damp or miasmata.

IMPERFECT DEVELOPMENT OF VERTEBRAL COLUMN: CONGENITAL PARALYSIS.

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THE following case of congenital paralysis presents some singular features, and in its history confirms the generally received opinion on a point in the physiology of development. The little patient was under my notice, more or less, since her birth.

The patient was Ellen Riley, daughter of a brewer. Soon after birth, it was noticed that she scarcely moved the legs, if at all; and that the urine was constantly dribbling away. Subsequently, it was found that the stools were not retained, but came away at short intervals. A physical examination showed a deeply depressed cicatrix, an inch in length, situate on the buttocks, over the centre of the sacrum. There was almost complete paralysis of the parts below the brim of the pelvis. During infancy, the nates were often covered with pimples and pustules, which, being almost constantly irritated by the contact of urine, ulcerated, and were with difficulty healed, unless very great care was paid to cleanliness. When she was old enough to sit in a chair, the pressure on the upper parts of the thighs and the buttocks, consequent on the position, was added to the irritation caused by the excretions. The combination resulted in the formation of large ulcers, which extended by burrowings beneath the skin, and descended so as to lay bare the muscular fibres of the region. The faint attempts made by nature to repair the damage to the surface were frustrated by the almost constant presence of the urine.

I passed interrupted currents of electricity from the sacrum through the ulcers and down the limbs. This was done about twice a week. Although no improvement in voluntary movement resulted, yet this, combined with cleanliness and simple dressing, was found a most effectual means of procuring the healing of the ulcers. Although the little patient could not feel a pinch applied to the skin of the parts below the brim of the pelvis, yet strong currents of electricity gave her pain, so as to cause her to cry.

For several weeks before death she complained of pain in the lower part of the abdomen. Fourteen days prior to death, a tumefaction was noticed, extending from the pubes to the navel. At the navel, the swelling was very prominent. The parents did not notice any diminution in the quantity of urine passed. In seven days, the tumour of the navel burst, discharging pus, followed by urine. The discharge of urine by the urethra ceased immediately and completely, and there was a constant flow of urine from the navel. That the watery fluid coming from the navel was urine, there is no doubt. The cloths applied for the purpose of catching the secretion were wrung out. The liquid resulting, when left in a vessel, underwent the ordinary urinary decomposition.

She died on August 24th, 1868, aged seven years. No *post mortem* examination was permitted.

REMARKS.—It is evident that the paralysis resulted from imperfection or arrest of development in the lower end of the vertebral cavity—of its walls and its contents. The fact that the cord occupies at first the whole length of the vertebral canal would account for the paralysis being higher up in the body than could be accounted for by the situation of the cicatrix. There is no doubt that the cicatrix was originally the seat of the deficiency; and that it represented a breach of surface—caused by the laminae dorsales not having joined at the spot—which had healed prior to birth. The injured part of the cord had in the meantime ascended in the canal relatively.

There is another point of interest in this case. It is to be regretted that the prejudices of the parents prevented the performance of a *post mortem* examination. Had one been made, I have no doubt that it would have been found that there was a continuation of the interior of the bladder along the urachus. This also is the result of an arrest of development. Dr. Carpenter, in his *Manual of Physiology*, says: "The urachus or suspensory ligament of the bladder is the shrivelled remnant of a duct, by which the uro-genital sinus (from a part of which the bladder originates) originally communicated with the allantois." This passage had been imperfectly closed; and, when the bladder became distended, nature made use of it to get rid of the urine.

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