to the cord and is reflected to some part of the muscular system, giving rise to motion; it seems natural to conclude that continued irritation will give rise to repeated movements, that is, to spasm or convulsion. Nothing seems more simple or comprehensible on this view than chorea caused by the presence of worms in the intestinal canal, by constipation, by uterine disorders, by pregnancy, etc. It seems to me that we must admit these conditions as capable of inducing chorea, but the explanation is not so simple. If the movements of chorea were merely reflex responses to impressions made on the intestinal mucous membrane, their starting point would be the cord; and, as we have seen, the phenomena negative this supposition. Peripheral irritation, so far as it is a real cause of chorea, must act, not directly but indirectly, by inducing an asthenic condition of the sensori-motor ganglia. The closest parallel would be furnished by examples of reflex paralysis; and the mode of causation may be that by which reflex paralysis is explained, inadequate supply of blood through the action of the sympathetic on the small arteries.

The remaining method in which the nerve-centres may be brought into the state which gives rise to chorea is by the direct effects of shock, such as fright, emotion, etc. I was formerly disposed to rate the influence of fright, so often alleged as a cause of chorea, much lower than I now do. I have met with so many cases in which chorea followed some occasion of alarm, and in which I was unable to trace any other influence which might have induced it, that I cannot but conclude that shock is not uncommonly the real cause of this affection. Again, I have seen examples of this kind. On the last Guy Fawkes day, a boy, aged five or six, was pursued by a man in a mask. His alarm was such that for a week afterwards he did not cease to tremble; and, from that time, from being a strong healthy boy, with a good colour, he has become weak, pale, and spiritless. A young man came to me after the catastrophe on the ice in Regent's Park; up to that time he had been strong and well, but, after seeing this, although never himself in danger, he was seized with trembling. He could neither eat nor sleep, and became so weak as to be unable to follow his employment, and it was some time before he in any measure recovered his strength. When such effects can be produced on the general health by fear, it is impossible to refuse to believe that chorea may be thus caused. I suppose, too, that cases of insanity, attributed to sudden and violent emotion, are, some of them at least, authentic; and I should look upon chorea in the child as, in some sort, the equivalent of insanity in the adult—a similar affection of a different centre. What the precise character of this affection is, I am not prepared to say.

Although the title of this paper is the Pathology of Choreia, a few words may be said as to the treatment, this being really the end and aim of the investigation. It is not attempted to derive a special line of treatment from the conclusions reached as to the pathology, or even to deduce general principles; but it will be useful to examine, on the one hand, how far these conclusions are supported by the result of experience in the treatment of the disease, and, on the other, to seek for suggestions which may be tested by experiment.

It must be recollected always that chorea, though a disease having a long average duration, tends to a natural recovery; and it will be admitted that the average duration remains long in spite of treatment. This accords perfectly with the views which I have here given, as to the nature of chorea as a disease. If we trace it to a local morbid change, some structural alteration of the corpora striata, and thalami, whether this alteration be due to embolism or not, we shall expect that time will be required for the restoration of the part by the nutritive processes. If the movements were caused by functional irritation of the nerve-centres, whether by the blood or through the nerves, we ought to have far less constancy in duration, and very many more examples of prompt recovery on the removal of an exciting cause.

Not uncommonly in chorea, as in other diseases, the remedy last tried has the credit of a cure due to the completion of a cycle of remedial processes. Not forgetting this fertile source of fallacies, I conclude, from my own experience and from the testimony of others, that the duration of chorea can be shortened by treatment; but, I am equally convinced that the same treatment does not answer in all cases. I have given purgatives, tonics, iron, zinc, cod-liver oil, bromide and iodide of potassium, arsenic, phosphorus, conium, and have had examples of apparent or, I might say, manifest success with most. I have also seen failures with all the heroic methods of administering strychnine till its physiological effects were manifested, and of giving tartar-emetica in enormous doses.

It follows, from the pathology of chorea as understood by me, that different remedies should be required by different cases, chorea being a symptom, not a disease, and arising out of various conditions of the particular nerve-centres of whose disordered function it is the manifestation. The one definite indication derived from pathology is already

recognised, *i.e.*, that the disease is one of innutrition. We shall generally do good by giving cod-liver oil and iron, and, perhaps, phosphorus or arsenic. The further object or aim is greater precision in the adaptation of special remedies to particular cases.

THE SOUDAN:

JOURNEY THROUGH THE DESERT OF CHOB AND THE SOUDAN PLAINS; WATER-SUPPLY; ITS INFLUENCE ON MALARIOUS AFFECTIONS; PRECAUTIONS TO BE TAKEN AT NIGHT.

By HENRY BLANC, M.D., M.R.C.S.E., F.R.G.S., etc.,

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PART III.

ON the 16th of October, 1865, to our great joy, we at last left Massawah behind us, *en route* for the highlands, at the very time we had begun to fear, so many had been our deceptions, that to us at least would be denied the privilege of visiting those lands which a few fortunate travellers described as beautiful and strange. For more than a year, with a sighing heart, we had daily gazed upon them as they rose boldly in front of us: a few days' journey, a rough but a short march, we knew was quite sufficient to bring us to the very peak of Taranta; and our sorrow was, at first, great indeed when we heard that the Abyssinian Emperor had forbidden us to follow that route, and ordered us to enter his dominions by the north-western frontier. Political reasons—not merely a savage fancy—had been the cause that dictated those instructions. Theodore, had he marched towards the north, would have at once scared away the few rebels that had risen in the frontier of Tigré, and the road would have been safe and open; but scarcity prevailed to a great extent in the northern provinces, and, to feed his still large and hungry host, he had no alternative but to lead them towards the fertile plains of Metsha and Damot; but, at the same time, not in the least disposed to see his *hostages* fall into the hands of others, he had directed us to cross the Soudan, and enter Abyssinia by the Tschelga Pass, where, as yet, no rebel contested his rule. Four hundred miles, instead of seventy, to him was of little import; but for us, the prospect of a long journey, through malarious plains, at the most unhealthy season of the year, was anything but pleasant. However, as grumbling would have been of no avail, we looked upon the difficulty as cheerfully as we could, and at once set to work to make the best arrangements in our power, so as to secure the health and comfort of the whole party.

We had great trouble in inducing the Bedouins to hire us their camels and accompany us. Their great objection was the unhealthy condition of the country at that time of the year. A month later we could have, in a few days, collected several hundred; and, had it not been for the influence we had acquired over the local authorities, we would not have succeeded, and we would have been obliged to remain several weeks longer at the coast, as, without camels, no start was possible. We had rather a considerable amount of baggage, provisions and stores for six months, and a great many presents for the Emperor himself, or his chiefs. Altogether, we required sixty camels, led by thirty men. These, added to ourselves, the Indian servants, private followers, muleteers, etc., made up our party rather a large one.

The rain in the Soudan had only ceased about a fortnight before; and in those plains, for five or six weeks after the rains, vegetation is so luxuriant, moisture still so considerable, the sun so fearfully hot, the night comparatively so cold, that long experience had taught the natives that, of all months, October is by far the most dangerous to venture in the lowlands. Added to these unfavourable conditions, the quality of the water procurable in that tract of country must be taken into consideration. As a rule, the supply is scanty and bad; the so-called wells are often at a great distance from one another; and the water they contain owes its origin partly to a drainage of the surrounding plains, partly to a small undercurrent generally found in the undersoil of the ravines after the temporary rivers have dried up. The best wells, at least in size, are found in the vicinity of some pastoral tribe, or near some permanent villages; the remainder are little better than muddy pools. The natives have an idea that the fever and other sickness affecting to such a large extent the caravans that cross the Soudan so soon after the rains, are due to the fact that, milk being abundant at such time, the merchants and cameleers drink a great deal of sour milk. So many repeated the same assertion, that I thought there might be some truth in the popular opinion. The only mistake which they make is, that they have not examined the question in its true bearings. Sour milk, I found out from those who indulged in it, gives rise to a strong, painful, and lasting feeling of thirst; the desire for water is so great, that

the thirsty man will drink anything liquid he meets on the road. In this respect, sour milk is the primary cause of sickness; but only through the thirst which it provokes, and the quantity of bad, unwholesome water which it obliges the people to drink. As nothing can be deemed trivial in presence of real and serious danger, I propose to describe, with some details, the plan we followed, in the hope of protecting ourselves from the serious malarious diseases yearly striking down so many victims, and then examine, in a summary manner, the treatment which I adopted when sickness made its appearance amongst us.

A glance at a map of the Soudan will explain, better than any lengthened description I might give, the special features of our journey. The first few days' march led us through the desert of Chob (due north-west from Massawah). On leaving that dreary, scorching wilderness, we followed a more westerly course, along ravines and valleys, afterwards to climb hillocks, hills, and mountains, until we reached the highest plateau, some thousand five hundred feet above the level of the sea. This chain—a prolongation of the highlands of Abyssinia—runs from south-east to north-west along the African shore of the Red Sea; forming a succession of small, picturesque, and altogether delightful plateaux. From the coast, the ascent is very gradual, but towards the Soudan the descent is exceedingly abrupt; at some parts so steep that the camels had to be unloaded. A few hours make a considerable difference in the climate, as more than two thousand feet separate the last plateau from the Soudan plains. We continued our westerly course up to Kassala; from that point we marched south and south-east, always wading through immense prairies, until we reached the province of Galabat, bounding on western Abyssinia, where at last a succession of hills and hillocks brought us back to the foot of the Abyssinian Alps.

Computing our journey from Massawah to Galabat, four hundred and thirty-four miles, we may advance that for such a long journey the water upon which we came was, on the whole, insufficient and unwholesome. Along the coast and the desert of Chob, forty-five miles altogether, we met with no running streams, nor with any wells. The caravans and ordinary travellers usually halt in the vicinity of the dry bed of some winter torrent; and there, at all times of the year, water is generally obtained (the quantity depending on the season of the year), by digging wells in the sand itself.

From the coast across the mountain ridge, down to the plains of the Soudan, the distance is about seventy miles. When we crossed, water was plentiful and good. Running streams, varying in size from small gurgling brooks to the beautiful river Anseba, are so plentiful, that, during that portion of the journey at least, we enjoyed the privilege of an abundant supply. But, as the weather was cool and agreeable, it was then passed by almost uncared for, whilst further on, in the hot plains, such a luxury would, indeed, have been a blessing.

From the foot of the Lookum Pass to Kassala, water was always scarce and bad. Near that city, we found pretty good wells dug in the almost dry bed of the river Gasch. A few days' journey through a barren savannah, brought us to the beautiful Atbara, the largest tributary of the Blue Nile. This was the only really good water we ever came upon after leaving the hills. From the Atbara, our route was first south, until we reached Gedaref, and from that province we followed a more easterly direction, until we reached Metemma, the capital of Galabat, where our journey, as far as the plains were concerned, was luckily at an end. Since we had crossed the Atbara, water had been more scarce than before, and, if possibly, even worse. As a rule, the wells in the Soudan are dug by the natives in the bed of the rainy season streams. During the rains, the whole country is intersected by mighty rivers; but no sooner is that season over than they disappear entirely, leaving only, as a mark of their temporary existence, a sandy and stony tract, bordered with acacias or tamarinds, and used by caravans until the following year, as the most suitable and comfortable highway across the plains.

On the coast, the highlands are so near that, by digging in the dry bed of any torrent, water will most certainly be found. In the Soudan the case is different; the more the traveller advances, the more he recedes from the mountains, and less and less will he find it possible to obtain water. By digging in the dry bed of a river, a variable supply of water will always be obtained, due, on one hand, as I have already mentioned, to a small undercurrent, and, on the other, to surface-drainage. I mean by this expression that, by digging deeply enough, water from the saturated ground will find its way into the well: this is evident from the fact that all of these wells, *after awhile*, and for some time afterwards, give a larger supply than *at first*. The wells in the Soudan are generally used to water large herds of cattle; therefore, we must also take into consideration that dung and filth accumulate to a great extent around the wells, and that for several months many thousands of natives draw water from them day and night; the consequence is, that all around them a fetid swamp is formed, slowly but undoubtedly percolating and finding

its way into the wells, and adding no trifling impure principles to the already semi-turbid water.

To sum up the very important question of the water-supply from Massawah to the north-west frontier of Abyssinia, we find—1, that for forty-five miles along the coast it is indifferent; 2, that for seventy miles across the mountains it is good; and, 3, that with the single exceptions of the wells in the river Gasch, near Kassala, and the Atbara, *for the remaining three hundred and nineteen miles, it is altogether bad*.

From travellers whom we had questioned on the subject, and from the reports of the natives, we had, previously to our departure, arrived at a very correct knowledge of the water-supply which we should find on our journey; and as, in my opinion, in malarious districts the quality and origin of the water should always be considered as the first and most vital question, I consequently recommended to our party the necessity of protecting ourselves, to the best of our ability, against this serious and unmistakable cause of the several deadly affections so justly feared, and so frequent in the plains which we would have to cross.

The simplest plan, when practicable, was never to drink any water at all—I mean water in its natural condition, without its having first been boiled and filtered. Mr. Rassam adhered but partially to this rule; but Mr. Prideaux and myself never touched a drop of water except in the shape of tea, coffee, or chocolate, from the day we started from Massawah until we reached Metemma; and neither of us, though in other respects we were submitted to the same influences as the remainder of our party, suffered from a single day's sickness.

Our mode of life was the following. Let us suppose an ordinary day's march. At three or four A.M., one of us would rouse the servants and cameleers; and, whilst these were busy loading the camels, our Indian followers prepared for us and themselves some tea or coffee: this, with a piece of dry biscuit, we never failed to take before starting. We usually marched until nine A.M., when, the sun becoming very hot, we had a tent or two pitched, and we rested during the great heat of the day. When possible, we refreshed ourselves with a cold bath. Unfortunately, many times water was so scarce that we could hardly manage the simplest ablutions. At about one or two P.M., we made our breakfast and luncheon—a very simple meal—soup, fresh or preserved, being the most important and easily swallowed dish. Meat we cared but little about; as a rule, it was bad; but we enjoyed very much preserved vegetables or fruit. Mr. Prideaux and myself divided between ourselves a bottle of claret which we had taken immense pains to cool. By three P.M., the last camel generally started, and we followed, soon passing them with our fast-ambulating mules. At sunset we halted, to allow, before dusk, the camels to come up to us; and, during that half-hour, made our dinner and supper on some cold meat and biscuit, Mr. Prideaux and myself drinking, between us, a bottle of beer which we had cooled as we came along, by tying it on the shady side of the saddle, well wrapped in a large towel, occasionally soaked with some water which we had carried with us for that purpose. During the night, dew fell heavily, and, compared to the day, the cooler atmosphere appeared quite cold. Often we would travel until the morning-star shone in the east; and we seldom halted before two A.M. Without waiting to feel a chill, we would, soon after sunset, put on for the night a light cloak, and take about half-an-ounce of brandy in a little cold tea.

I can well understand, from personal experience, the Chinese mode of putting certain offenders to death by preventing them from sleeping. I have endured a good deal in one way or the other, both on our journey and whilst guests of our late friend King Theodore, but even the worst circumstances through which we had to pass cannot be compared to the dreadful feeling of having to keep awake, on a stumbling mule, night after night. All of us would have given anything to be allowed to lie down on the grassy prairie, and sleep away, leaving camels, presents, even the letters, to find their way to Abyssinia without us. Those at home who make a night of it at a ball or party, should try a few in the Soudan—every now and then tumbling from the sleepy mule, now and then walking as a last resource, and anxiously inquiring from the guide the distance to the halting-place, or sleeping for a few minutes until the last camel passes by, taking care to have a servant at hand to pull up the sleepers if necessary; and many would better understand the joys of rest and the value of sleep as a restorative. In our case, we were often so thoroughly exhausted by the time the word “halt” was given, that no sooner was the cow's hide spread on the ground than we would fall into the quietest and sweetest slumber, although hungry lions were roaring only a few yards from us.

It is a mistake to believe that, because people are travelling through a hot country, they must necessarily drink a great deal. Those who take but water, or are otherwise careless about their diet, drink more and more, until they never feel satisfied. We cannot be astonished that in such cases sickness is not long in making its appearance. Once accustomed to drink but at meals, I never felt thirsty. When we first

started on our journey, I carried with me a couple of soda-water bottles, filled with cold tea; but I soon found out that when once I tasted a drop I could not stop until all was drunk, and then I suffered a great deal from thirst. I therefore made up my mind to overcome the first feeling and desire to drink, and not give way to it. It was not difficult, and, after a few days, I can truly say that I never once felt so thirsty as to suffer from it.

Although Mr. Rassam occasionally took a glass of beer in the evening, and generally added a few drops of brandy to the water he drank, and, moreover, took every precaution possible to secure water in its purest state, he nevertheless, in my opinion, did not sufficiently abstain from it. The result was that, after a while, he suffered from fever; however, under proper care and treatment, he soon regained his former health, and, taught by experience, he was more careful in future, and more cautious in the selection of the water he used.

We have here the case of three Europeans placed exactly under the same circumstances. All three had resided for a certain number of years in the East; and, considered individually, Mr. Rassam was, at starting, the strongest of the three; Mr. Prideaux, although in good health, somewhat anemic, from a long residence at Aden; and myself in rather indifferent general health. We all three lived very moderately; and in every other respect, except the question of water, we were exposed to the same influences, and followed exactly the same mode of life. *Two out of the three, throughout that long journey, never touched a drop of water in its natural state, and came out triumphant from the trial.* The third, who only partially adopted the same rule, suffered in health. This proof would be almost sufficient to warrant the assertion I made as to the baneful influence of the water. However, it will appear even in a more striking light when we come to consider the question of our servants and followers, who all of them suffered in various degrees from some malarious sickness or the other, according to their neglect or observance of the directions we gave them as to the precautions they should take regarding the water they drank on the journey.

In their case, the total abstinence from water was hardly practicable. We told them plainly of the danger to which they exposed themselves. They listened with due submission, agreed, but few strictly followed our advice. Many of them took tea and coffee morning and evening, soup at dinner, and only after their meals a few mouthfuls of the best available water. Those were the best off, and, on the whole, sickness in their case was not very severe. Others totally discarded our advice, and drank often and freely of any water they met on the road. These suffered severely from fever, diarrhoea, or dysentery, and several nearly paid with their lives their stupid obstinacy and foolishness.

We were well aware that to expect tired and thirsty natives to await the time required to boil tea or coffee would, in the majority of instances, prove a failure. We therefore always endeavoured to obtain, as soon as possible, on a halt, the best water the locality could afford. As long as the wells were not too deep, we never used those which we found in existence, but at once set a party to work and had a well dug for drinking purposes, the old wells being used only for the camels, mules, horses, etc. But, as we proceeded further inland, the wells increased gradually so much in depth that at last it was beyond our power to dig fresh ones with the limited time and labour at our disposal. The plan we adopted on those occasions was the following. We selected amongst the several wells one or two where the surrounding ground was less swampy, and less impregnated with dung and other filth. A few men were made to remove all the water in the wells at the time, along with all filth and rubbish, and wait until it was partially filled again, when this water was also baled out; and it was only after the second water had settled down that we allowed it to be drawn. We had several filters with us, and they were, of all things, the first unpacked and in readiness; every one could use them if they preferred; but, except the Indian servants, no one seemed to understand their value. We had also brought with us a certain number of water-skins; and whenever the water-supply was good, or when necessity obliged us to carry water with us, as none would be found for many miles, they were filled and carried on camels. When the water was clear, as from the Atbara, apart from a rather disagreeable, greasy, and leathery flavour, a day or two of travelling did not spoil it much; but when the water so carried was, in the first instance, indifferent, a couple of days' shaking on camels' backs did not improve either its taste or qualities. To the great surprise and dismay of many travellers, they find that, after a couple of marches through a desert, or tropical plains, the water-skins are more or less empty; leakage, or dishonest natives, are at once accused. Let however, on such occasions, the little water remaining in the skin be poured out and examined; the mystery will then at once be explained. A constant filtration and evaporation of the fluid takes place; a fact easily ascertained by placing one of the water-skins in the shade, and

exposing it, at the same time, to the influence of the hot winds, when the water will be found to be almost cold. If the skins be not well prepared, and well coated with tallow, there soon remain, out of several gallons, but a few pints of a thick, dirty fluid, as disagreeable to the taste as it is unwholesome. It was after we had been obliged to use, for several days, water of that description, that sickness was most severe and prevailing.

If I have insisted upon many details concerning the water-supply, it is because I believe it to be the most important question for all travellers; the one that should, before any, be taken into serious consideration; and the neglect of which will baffle all the other more or less important precautions that should also, at the same time, never be omitted.

Each of us had taken with him a small folding, very light iron-bedstead; and we made it a rule, from which we seldom departed, never to sleep on the bare ground. Even when too tired and sleepy to wait for our beds, we used, on those occasions, a thick-tanned cow's-hide, always carried with us tied on one of our servant's mules—all the servants and followers were also provided with similar skins and blankets. Every one slept in the open air; every one wrapped up, native fashion, face and all, in a good thick blanket. The nights were cold compared to the day; the average, from noon to two P.M., being, in a tent pitched in the shade of some tamarinds or other large leguminosæ, 105; at sun-rise, from 69 to 72. The great change in the temperature was most marked an hour or so before sun-rise; and, if we intended to halt for the day, and slept a little later that morning, had we not taken care to be well covered on going to rest, we would, no doubt, have suffered from the sudden change. Covering the head is not to be neglected. The blanket forms a kind of respirator, and modifies, no doubt, to a certain extent, the night-air, so much more dangerous than in the day-time, when effluvia are kept down by the heated winds. No doubt the little iron bedsteads were very valuable; and often, if the place seemed rather unhealthy, we waited patiently for them. A few feet above the ground, the effects of malaria are less; and this fact should, when practicable, always be considered. Our tanned hides were wide and large, and covered a certain extent of ground around us. On a morning, when they were removed, although the spot on which we had laid down had seemed perfectly dry, the hide was usually quite damp on the side that faced the ground.

Dew often falls so heavily towards morning in the Soudan, that everything around us was quite wet; and, had we neglected our blankets, we would have been alone to blame had we awoke feeling sick and feverish.

THE CASE OF A YOUNG GIRL WHO IS SAID TO HAVE FASTED FOR THE LAST SEVENTEEN MONTHS.

By J. LEWIS, M.D., Carmarthen.

SARAH JACOBS, aged 12 on the 17th of next month, is the daughter of a farmer residing in the parish of Llanfihangel-ar-Arth, Carmarthen-shire, and is the third child in a family of seven. All the other children are healthy. The farm is situated in a valley having a south aspect, and it is near the lower part of the valley. There is humid land on the west side of the house. The house itself is straw-thatched, with one storey. The room occupied by the girl is on the ground-floor, and is of moderate size. The floor is of mortar composition, and is not covered with boards or matting. There are two bedsteads in the room—one occupied by the girl's parents, and the other by herself. Her bedstead is rather low, and so placed in the room that no direct light falls on the girl; and this has been the position of the bed for the last twelve months. There has not been any fire in the bedroom from the commencement of her illness.

The alleged facts respecting this girl are, that she has not swallowed any food whatever since October 10th, 1867; and that she has not swallowed any water or any other fluid since the end of December 1867.

Previous History of Sarah Jacobs.—She was healthy as a child, and remained so until February 1866. At that time she passed through an attack of scarlatina, which spread through the family; and, although no medical treatment was adopted, all the children recovered. After about a fortnight's confinement to the house, she was quite well, and went to a neighbouring school. About February 15th, 1867, she first complained of pain in the epigastric region; and one morning, on getting up, she complained to her mother of having some frothy bloody fluid in her mouth. What the source of this was, could not be ascertained. On Sunday, February 17th, the epigastric pain, which was chiefly in the left side, became agonising, and continued until the evening, when,