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SOME ACCOUNT OF THE HOT SPRINGS OF ARKANSAS

Communicated in a letter from A. J. Wright, esq.

to Dr. Samuel A. Cartwright, asking for information.

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(Dr. Cartwright says that he has been in the habit of requesting intelligent patients, willing to take the trouble, whom he sends to the various watering places, to communicate to him an account of the effects of the water upon them, and whatever other truths they may extort from Nature by their own experience and observation, with a view of adding something to the general stock of medical knowledge, which is very deficient in regard to American medicinal springs. He thinks this letter of Mr. Wright contains more useful information in regard to the Hot Springs of Arkansas than any account heretofore published. Ed.)

Hot Springs, Arkansas.

Dr. Samuel Cartwright, New Orleans, Louisiana:

Dear Sir - The trip to this place, except in midsummer, is not an unpleasant one. There are tri-weekly first-class packets running to Napoleon, and comfortable little boats thence to Little Rock, whence extra coaches may at all times be had to transport passengers by easy journeys, at reasonable prices, over good roads to the Springs.

In giving you so much of the information asked for as I may be able, excuse me if I insert matters with which you are already familiar.

On many of the old maps two ranges of mountains are marked, running east and west, parallel and distant from each other eighty to one hundred miles, but the whole western and north-western part of the State is so thickly studded with numerous hills as to resemble one vast mountainous tract or group of mountains, of which no geological survey has ever been made. The whole abounds in minerals, and especially in mineral springs. No doubt is entertained but that the deep shafts, crumbled furnaces, and mining implements found among them are the traces of DeSoto and his followers. (See remarks.)

You strike these hills soon after leaving the Arkansas river at Little Rock, after which you do not leave them. The Hot Springs are situated about six miles from the Ouachita*, near the point where that river emerges from the range of mountains in which it rises. Thereabouts, the hills, from 400 to 700 feet above the level of the valleys, are composed almost entirely of silicious rocks of various colors, greenish, red, etc., but chiefly white. The streams, which are numerous, including Hot Springs Creek and the Ouachita, here about 250 yards wide, all run on beds of slate stone - somewhat irregular and broken, and often protruding near the margins in thick shelving masses very precipitous; their sides, and all that portion of the valleys not washed out by the torrents, being covered with broken quartz rocks, of all sizes, which the elements have been crumbling down for ages. The soil is thin and flinty, supporting, however, a growth of pines and some varieties of oak. At the summits, the quartz is piled in high irregular sharp-edged blocks, forming, often, perpendicular precipices, but without any trace of volcanic action. It seems that in the disturbance which protruded these vast masses of quartz through the slate, the disturbing or central fire did not reach the surface here. Bits of mineral heavy with iron, and apparently cooled on the surface into beautiful globules, found about half a mile from the Spring mountain, were often shown in proof of an extinct volcano, but they are well known by geologists, and indicate the reverse, being, in fact, the substance commonly called bloodstone. Iron ore is found scattered among these hills, and one or two large masses of it on the Spring mountain, which, like the others, is almost wholly composed of flint, freestone, and quartz of all sizes.

But its westerly side, to the height of 80 or 90 feet, is covered with, or is apparently composed of calcareous tufa from out of and over which the springs run. This tufa, blackened and made porous by the weather - heated in some places by the overrunning water and lying in rounded shape, as if cooled in rolling down - is regarded by the vulgar as another proof of igneous origin; the undoubted fact being, that the springs ordinarily deposit this very substance in gutters and in excavations made for the purpose, to the extent, in most cases, of about one-eighth of an inch annually - a few days sufficing to obtain a coating of it in an excavation - and that the whole hillside is "a deposit from the springs, having assumed, in the course of ages, just the rounded or cascade-like form we might expect from their action. (See remarks.)

Hot Springs Creek rises in the valley of Horse-Shoe Mountain, about a mile and three quarters from the Hot

*This orthography is likely to become obsolete, as Washita is rising into favor. - Ed.

Springs. Its source consists of springs, and it is in fine weather a rivulet over which you can step with ease. Passing through a deep gorge or valley not much more than one hundred yards in width, it here leaves the base of the Hot Springs Mountain on the east and the "Cold Mountain" on the west, each near five hundred feet above its level; and into its waters, by cascades and jets d'eau, fall the healing ones of the Hot Springs.

It is worthy of notice that on the opposite side of the same mountain, and not three-fourths of a mile from it, there is a plentiful chalybeate spring, gushing from an immense quartz rock, of which the waters are so cold as to be drunk with difficulty.

The considerations which go to prove that these waters derive their heat from a great depth, are too obvious to require mention; nor is there any thing improbable, to my mind, in the supposition that it is derived from the central heat of the earth.

Of the Hot Springs, there are some fifty-four distinctly recognizable, besides a considerable number in the bed of the creek. With one exception, their temperature ranges from 120° to 148° of F., and their composition is nearly the same. The exception is a warm spring (temperature 100°); discovered a year ago on the bank of the creek beneath the others. It has a strong odor and taste of sulphur, and is believed to have considerable virtues. (See remarks.)

The quantity of water discharged by the various hot springs is estimated at 350 gallons per minute (one spring affording 60 gallons), or, say about 500,000 gallons per diem.

The analysis of the water is as follows (by Prof. Owen, State Geologist, Arkansas):

1½(one and a half) gallons of water contain -

Of Silica, with Sulphate of Lime--	1.04	grains
Carb. of Lime, 1.63, and		
with Bi-Carb. of Lime -----	2.04	"
Carbonate of Magnesia -----	0.326	"
Bi-Carb, of Magnesia -----	0.05	"
Sulphate of Lime, dissolved		
in water -----	0.35	"
Chloride of Potash -----	0.05	"
Chloride of Sodium -----	2.13	"
Oxide of Iron, with a little		
Alumina -----	0.133	"
Dry Powder (insol.) -----	1.16	"

The average attendance of visitors this spring and summer had been about four hundred, chiefly persons afflicted with rheumatism, neuralgia, paralysis, dyspepsia, mercurial affections, and syphilis. Rheumatism is the most frequent of these.

The baths are taken according to the custom of the place, without immediate medical supervision. Small wooden bath-houses are fitted over the creek, and close to the precipitous edge of the hill. Wooden reservoirs retain the water which they receive through wooden troughs, until it is sufficiently cooled to be borne; it is then dropped in a stream of about an inch in diameter, from a height of nine or ten feet, upon the affected part, or the body generally (the time, according to the patient's power of endurance), and is received into a large wooden tub used for the plunges bath. A small chamber adjoining receives the steam from the constant flow of the water, through wooden strips on which he stands, and drinking copious draughts of "hot and hot" in the meanwhile, the patient endures the vapor for five or ten minutes without any apparatus for breathing of fresh air, an occasional protrusion of the nose at the door being necessary. After which, more drinking of "hot and hot", and to bed to sweat profusely under blankets from half an hour to two. This, once or twice a day, and the frequent drinking of fresh hot during the day, other medicines being laid aside. This is what custom prescribes.

As a first effect of this treatment, rheumatics generally experience a return of pain to all parts previously attacked, and frequently in parts not previously affected, and throughout the body, the pains being frequent and often severe. I myself had been for some weeks free from pain, except in one ankle; but, after a single bath, began to have the aches and pains peculiar to rheumatism in nearly all the joints and muscles. They continued with me for about two weeks (from one to three weeks is their common duration), a relief from them being experienced for an hour or two after the bath. Their gradual disappearance is regarded indicating a cure. There are, however, well authenticated cases where they have continued during a stay of two months or more, and soon after leaving the springs the patient has found them to disappear and a permanent cure to have been established. (See remarks.)

Another common effect is an active salivation in such as have used mercury - the soreness and spitting often continuing two to four weeks; and on recovery from this, some disease dependent on it, supposed perhaps to be neuralgia, rheumatism or ophthalmia, disappeared. This I have seen repeatedly.

A number resort here for the cure of gout, not generally with success.

The curative effects are not generally perceptible to the patient, many complaining of being worse, or no better, who ultimately go away cured.

Drinking the fresh hot water seems to have a very soothing effect on irritable conditions of the stomach - acts, I guess, on the mucous membrane. No nausea attends its first or its frequent use, and it is drunk in large quantities with relish and relief before and soon after meals.

Its first effect on the bowels vary much, and frequently cause a temporary derangement, constipation, or the reverse, which disappears during the first fortnight.

Paralytic cases, stiffness in the joints, contractions of the muscles, swellings on the bones, are relieved slowly in general, sometimes quickly, sometimes not at all, though the cases are few in which some relief is not experienced. They are treated with overdoses of douche. Some three or four, I saw come, unable to walk, or moving slowly with assistance of others, and crutches. They seemed to improve in general health, and to gain a little freedom of motion daily, without seeming aware of the improvement themselves. Hands that were knotted up gradually relaxed, and rheumatic swellings disappeared without other previous indications of a cure than improved appetite and regular perspiration. The swelling you may recollect on my left hand, disappeared in about a month. I saw one young lady arrive, walking with great difficulty on crutches. She had had fever, and as a result of it, an affection apparently paralytic in her ankles. In about a fortnight she was conspicuous in the ball room for her graceful dancing. There seemed to be no doubt about the cure, but some opined that Cupid had lent her his wings, which accounted for the lightness of her carriage. My vis-a-vis at the table, was a young lady who had one knee and one hip useless from an old rheumatism, and who could not get to her meals except with the assistance of her husband and a crutch. Although very delicate, she took the douche for a half hour or so twice a day. Her health improved daily, and at the end of two months she walked slowly by herself. My own impression was very strong that a continuance of the treatment would have cured her.

The improvement of the appetite, after the first week, was almost universal. Coarse food becomes palatable.

Palpitation of the heart was a symptom frequently caused by immoderate or ill-times use of the bath, as were

also headache and nervousness, and, occasionally, the victim of chill and fever to such as had had it (other baths of similar temperature, are said on high authority, to have the latter effect uniformly); but in this region, the chill and fever yields promptly to proper treatment, at least it did in my case, and in every one which I saw.

The presence of a good physician to superintend the bathing and record its effects, would be a great thing for the patients and for the science of medicine. The only physician practising there, Dr. Hammond, died shortly after our arrival. For want of advice, or for excess of it from every body, the injudicious use of the baths has doubtless proved fatal in a number of cases to persons who came here extremely ill.

There is one disease, in the cure of which these waters have no rival: I mean syphilis in its advanced stages, and especially where it has been unsuccessfully treated with mercurials. From what I have seen, I believe they have no rival in the cure of this affection.

When spacious hotels, built of stone, which is so plentiful here, and abounding in numerous comfortable bath-rooms, shall fill this valley, so admirably adapted to their construction - and when a railroad now building shall bring passengers from nearly all of the great travel lines of the Union converging at Memphis - from what island in the Pacific or Indian Ocean will not the afflicted seek these healing fountains, and what number of thousands shall be the limit of the concourse! For I do not hesitate to say that buildings could be so constructed as to accommodate with the waters from 8,000 to 10,000 visitors.

There are numerous other springs in the neighborhood, as sulphur, chalybeate, etc.; but one eight miles distant and called the Sulphur Spring, seems worthy of notice, as it is said to contain an excess of nitrate of potash, some bicarbonate of soda, sulphur, chloride of sodium, iron, magnesia, alumina, and iodine (?). I have seen its use produce the happiest effects in rheumatic cases.

You ask me for some observations on the *modus operandi* of the waters. I can give you none. Their mode of action seems to be of the kind called insensible. My own opinion is that their chief virtue lies in the following things: Pure, dry mountain air (the valley is fifteen hundred feet above the level of the sea), and an abundant supply of pure hot water, free from every taint of cooking utensil or hurtful metallic substance. These conditions any where fulfilled would have the same result. I believe, too, the water drunk acts by soothing irritation of the stomach, improving the digestion, and that the baths act as powerful

stimulants, and at the same time, in conjunction with the drinking, cause constant uniform perspiration. And it is my opinion that good digestion and healthful perspiration, with exercise and pure dry air, will leave only one cure out of a thousand for the doctor to perform.

The chief disadvantage of a residence here results from the insufficiency of the accommodations. The parties to the protracted litigation for the ownership of the springs are unwilling to expend money for their improvement until the suits are decided. The houses are old and rickety, and but one room in many cases is allotted to four persons, in some to five. The discomfort and danger to health from these causes are better imagined than described.

Yours very respectfully,

A. J. Wright.

August 25, 1859.

REMARKS BY DR. CARTWRIGHT.

In 1804 and 1805, Wm. Dunbar, Esq., of Natchez, and Dr. Hunter, at the instance of President Jefferson, explored the Washita as far as the Hot Springs. In his report to the President of the United States (see Medical Repository, vol. 9, p. 305, etc.), Mr. Dunbar, speaking of the Hot Springs, says: "The water is palatable, and very good to drink, having but little foreign impregnation. The body of the mountain from which it issues, is silicious, partly flint and partly freestone; but the superficial parts which have been overflowed by the effusions from the Springs, are incrustated with a stratum of calcareous matter, that, in the course of time has been deposited from this water. A trifling portion of iron is contained in it, too, and precipitated with the lime. In the hot water of these springs a green plant is vegetated, which seems to be a species of the conferva, probably the fontinalis. But what is more remarkable, a bivalve testaceous animal adhered to the plant and lived in such a high temperature too."

"This country," continues Mr. Dunbar, "was colonized early by the French. They projected and began extensive settlements on the Washita; but the general massacre planned, and executed in part, by the Indians against the French, put an end to their undertakings, and they were never resumed under the French government." He mentions a silicious composition resembling oil-stone or Turkey-stone, also mineralized wood and carbonated wood found in the vicinity of the springs, but found no lava, pumice, or other volcanic matter.

A very interesting account of the Hot Springs of Arkansas is contained in a letter from Dr. Joseph Macrery, of Natchez, published in the Medical Repository, vol. 9, p. 47-50. New York : 1806. We learn from this letter, that several persons of Natchez, and the Mississippi territory, visited the Hot Springs in 1804, a little prior to the exploration of W. Dunbar, Esq. This letter states that the springs mountain, or hills, consists mostly of silex in its various combinations, and schistus or slate. The exploring party discovered antimony, mineralized by sulphur, of a bluish grey metallic appearance with radiated crystallization, composed of slender hexahedral prisms; zinc, mineralized by sulphur, forming the ore called blende; feldspar of a white, inclining to a red color, granulated texture, the surface covered with crystal, of a rectangular form, and very brilliant; black schorl, with pieces of quartz intermixed." They analyzed the mineral substances met with in search of gold and silver, but found none. They analyzed the water and found it to contain less mineral impregnation than common spring water usually does. A little carbonic acid was detected in it, a slight trace of iron, a small quantity of calcareous matter, and a little muriate of soda. They tried it by the various reagents commonly used to detect minerals, viz: Muriate of barytes, spirits of ammoniac, caustic potash, acetate of lead, nitrate of mercury, the sulphuric and muriatic acids; but these reagents produced no effect upon the water. The party learned that the Hot Springs mountain had, from time immemorial, been called by the Indians the "Land of Peace," and that hostile tribes, while there, remained in harmony with one another. They learned that the aborigines resorted to these Springs on account of their medicinal virtues, and that the white people in the nearest settlements "testified to their efficacy in curing or relieving chronic pains, paralytic affections, and inability to motion generally.

"Many of the white hunters, who are very liable to disease from exposure to the vicissitudes of climate and season, have been restored by the use of these Springs from a state of entire inability of motion to complete health and activity.

"The water is soft and limpid, without smell. The taste is agreeable. It is used in preference to the cold springs in the vicinity. In July, 1804, it was very dry; the degree of heat was so great that persons could not expose themselves to the vapor, which is the usual mode adopted by those who visit them on account of their health. Meat was boiled in the water in a shorter time that could be accomplished by a culinary fire; it was made use of to prepare both tea and coffee. The temperature of the water is (not) influenced by the season."

REMARKS BY SAMUEL A. CARTWRIGHT, M.D.

(Explanatory Note by the Managing Editor. - The delay in publishing Mr. Wright's paper, which in itself is acceptable, was caused by the inability of the editor (under which he still labors) to reconcile the analysis, which Mr. Wright quotes from Prof. Owen, with the remarks which Dr. Cartwright attached to the original paper. This explanation is necessary, in order that the reader may understand the purpose of this second series of remarks by Dr. Cartwright. It will be seen, according to Prof. Owen, State Geologist, that twelve pints of the waters of the Hot Springs contain but 7.219 grains of foreign ingredients, divided among very numerous substances, so that there is, of this compound, but little over half a grain in one pint. How such a water, which by various accounts contains enormous quantities of mineral matter, and which turns to stone, can be almost wholly pure, is the question which the learned writer has undertaken to solve. Audi alteram partem.)

I visited the Hot Springs of Arkansas two years ago, and remained there several weeks. I am sure the water is charged with something which has not been mentioned in these analyses. I think it is electrified oxygen or ozone. I noticed the green plant mentioned by Mr. Dunbar, as a species of conferva, and by Prof. Bell and others regarded as a deposit from the water. I could arrive at nothing satisfactory in regard to it. It is not a deposit from the water, as is generally supposed; nor do I think it is a conferva. If it were a deposit it would occupy some fixed place in the stream of hot water, at the bottom, top or sides; but it is found in all of these places. I put some of it in my ears, and in a few days had great difficulty in getting it out. It had turned to a gritty substance, like stone. It was soft and unctious, yet it soon hardened into a calcareous looking substance like that which covers the hill side from whence the hot springs issue. I take it to be, not a vegetable, but a mineral animal, or stony polyp, a jelly-like animal - the coral rag. Information is needed in regard to it. I am sure it will prove to be a species of coral, bearing the same relation to hot mineral water that the coral bears to sea water. It is so abundant in the hot water as to lead me to the conclusion that the upper crust of the Hot Springs Mountain, or calcareous matter, mentioned by Dunbar and other explorers, is entirely formed from it, and not from any deposit in the water itself. The water itself is proved, by direct and repeated experiments, to deposit nothing whatever.

"Consider how many and how different distempers are cured by the use of the hot baths and medicated waters." "There is observed in all these medicated waters, a certain spirituous principle, very volatile, which renders them easily movable through all the vessels of the body, and makes them that they can be drunk in much greater quantity than even the purest common water. In some medicated waters, the volatile principle is so very subtle, that they ought to be drunk at the fountain head. But as soon as they are deprived of their volatile principle, they taste perfectly vapid. Some of these waters contain nothing else besides that volatile principle and pure water, at least nothing can be obtained from them by any chemical experiments." (See vol. 10, page 244, Van Swieten's Commentaries on Boerhaave.)

There is a spirituous principle in the water of the Hot Springs of Arkansas. It may be electrified oxygen or ozone. There is another principle in them, which causes a little salt and pepper to convert them into a very palatable soup, or at least, a liquid tasting like soup. It is, perhaps, the basis of gelatin. But will the fact be believed that a little salt and pepper thrown into water, almost chemically pure, will convert it into a palatable soup, or a liquid tasting like soup made from the flesh of animals? Shall the fact be suppressed on that account, is the question? It may be asked, if there be a gluten in the water why does it not show itself by gelatinizing when the water cools? Researches in animal chemistry have proved, that long boiling destroys the property of gluten to gelatinize, and hence the substance, which forms at least a third of the tissues of man, and is the basis of his bony structure, eludes all the senses, when boiled in water, except the sense of taste. The sense of taste detects it in the Hot Springs of Arkansas, when a little salt and pepper are added to the water containing it. Leucine and glycine can be produced from gluten by boiling with caustic potash. Leucine may also be obtained the same way from the protein compounds. Shall the fact be ignored or suppressed, that a large proportion of the human body is composed gelatinous substances, because no chemist has ever been able to detect gelatin in the blood, or in any healthy fluid of the body? There is surely glue in the bones and all those tissues, whose functions are mechanical, although the chemist cannot detect it in the blood or other healthy fluids of the body. How did it get into the tissues, and why is the glue from the skin and bones of an old animal more tenacious and cohesive than from younger animals, are questions more difficult to explain, than the question why salt and pepper will convert the almost chemically pure water of the Arkansas Hot Springs into a beverage like soup? If all facts which cannot be satisfactorily explained were suppressed, the sciences would be half demolished. But when

facts apparently conflict with one another, does the cause of truth and science require that one or the other be suppressed? Surely not if they are ascertained to be facts cognizable to one or more of the senses. They may be antagonistic facts only in appearance, artificially and not naturally antagonistic, made so by antagonistic explanations of them. Thus, Wm. Dunbar, of Natchez, long known to the scientific world, attributes the calcareous upper stratum of the Hot Springs Mountain as deposited by the water of the Hot Springs itself. The conflicting fact is the almost chemical purity of the water. How can it be pure, and contain so much calcareous matter to encrust a mountain? How can it be pure, and filled with a green gelatinous substance, which he calls conferva? How can it be pure, if a stick or twig left in it a short time becomes encrusted with a calcareous substance like the upper stratum of the mountain? Are we to deny the existence of these facts, or deny the purity of the water? The antagonism is in the theory of explanation - not in the facts themselves. The calcareous matter is there on the mountain in and around the springs. A similar calcareous matter, in the shape of shoals and islands, is found in the ocean. It is admitted that these shoals and islands are not formed by vegetable growth, by sea-drift, or by depositions from sea water, as their first discoverers may have supposed, but are built up by the exuviae of little animals, called polypiers, inhabiting the water where the shoals and islands are found. These animals are found to consist of a gelatinous substance and the salts of lime. The latter, being a stony substance is indestructible, and accumulates with every generation of these animals. Suppose, before science could satisfactorily account for their formation, the makers of the charts for mariners had said to the discoverers, we will not put down your shoals and islands on our charts, because you contradict yourselves: "you say that the sea water, where these shoals and islands exist, does not differ perceptibly from the common water of the ocean; we cannot swallow the contradiction that there is no extra sediment in the water beyond other sea water, and yet believe that the shoals and islands you pretend to have discovered have any existence, and we will not insert them on the charts; we could not do so without involving you in contradictions; we have more respect for you and ourselves than to make liars out of you." Nature is true to herself: she does not lie. Those who faithfully report the phenomena of Nature, as witnessed by their senses, may not be able to explain them, but their statement of the facts cognizable to their senses, may involve apparent contradictions; but the lie or contradiction is imaginary, not real: it is in the brain of the theorizer, whose theories weave it into a contradiction, and not in Nature or the observer of Nature. The brain of the individual who has got the theory in his head that the upper crust of the Hot Springs Mountain is

deposited by the water, and that the green gelatinous substance in it is also deposited by the same fluid, will not permit him to believe in the fact that the water is purer than common spring water usually is. But his belief does not add a particle of impurity to the water, or take away a particle of the calcareous matter forming the upper crust of the side of the mountain from which the Hot Springs issue. His belief in regard to the green slime found in the water, does not alter its character; it turns to stone when dried, whether he believes it or not. All polypiers, when dead, leave behind them an indestructible substance resembling stone. The green substance in the Hot Springs water of Arkansas cannot be any thing else than polypiers. The upper crust of the mountain consists of their dead bodies. While living, they attract lime from water. "Enfin, on croit que les polypiers absorbent la part calcaire de Peau, et qu'ils la purifient." (Dic. du Science Med., vol. 44, p. 262.) "La forme exterieure des polypiers, qui est souvent celle de certaine plantes, les a longtemps fait regarder comme des veritables vegetaux. Les naturalistes ayant reconnu des animaux dans plusieurs d'entre eaux." (Page 161, vol. 44.) * * * * Mr. Dunbar discovered animals of a bivalvular form in the green substance in the Hot Springs water. He took that green substance to be a conferva, but Dunbar's theory does not alter the facts,