

Francis (J. W.)

AVON
MINERAL WATERS.

BY
JOHN W. FRANCIS, M. D.



OBSERVATIONS
ON
THE MINERAL WATERS
OF
AVON,
LIVINGSTON COUNTY, NEW-YORK.

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AVON MINERAL WATERS.*

THE experiments and observations which have been made at different periods by various writers on the mineral waters of the United States, if properly grouped together, would constitute a work of great practical utility. This service has indeed been performed, to a considerable extent, by Dr. Bell, of Philadelphia, and a large amount of information on this interesting subject, which was scattered through numerous volumes, may be found in his work on Baths and Mineral Waters.

Among the earliest papers which have appeared, of this nature, may be mentioned an Analysis of the chalybeate waters of Bristol, Pennsylvania, by the late Dr. John De Normandie, of that place, and printed in the first volume of the Transactions of the American Philosophical Society. The investigations of this learned physician, though wanting in the philosophy of modern chemistry, were such as to awaken much public attention to the Bristol waters ; and some sixty years ago they were deemed to possess properties analogous to those of Bath and Spa : they were at that time largely employed for their curative powers, but have latterly fallen into disuse. So early as about 1789, Dr. Mitchill instituted his first series of experiments on the waters of Saratoga Springs, and subsequently added many pertinent observations on their medicinal qualities. These waters, with those adjacent, at Ballston, are now so univer-

* From the United States Medical and Surgical Journal.

sally known to both hemispheres,* and so extensively had recourse to, that little more need be said in this place than to recommend the reader, for the fullest details of chemical analysis and of a practical nature, to the recent work of Dr. Steele. So ample has been the experience of different medical observers concerning the active properties of these waters in various disorders, that the principles for their exhibition formerly urged with such earnestness, seem at the present day the less requisite. Yet caution against the popular error of indulging in their use to excess, must still be enforced, as the soundest principles of art are often set at nought by the preposterous indulgence, which some allow themselves, when they resort to the springs. These waters are designated *acidulous saline chalybeates*.

The Schugl's Hills, or *Schooley's Mountain* water, deserves also to be here noticed. The water of this mineral spring is said to have been known to the aborigines, and to have been employed by them as a remarkable remedy, which they concealed from the whites. Be this as it may : the Schooley's Mountain water is situated in Washington township, nineteen miles north-west of Morristown, and fifty miles from the city of New-York. The chemical analysis of it made by Professor Macneven, my late colleague in Rutgers Medical College, furnishes an admirable specimen of this species of philosophical investigation ; and were the products of other salubrious medicinal springs, within the United States, examined with a like minuteness and accuracy, we should have little cause to lament our present imperfect knowledge of this class of products with which our country is so largely enriched. I may be pardoned for dwelling a moment longer on this water. Schooley's

* See Hosack's Essays ;—Dyckman, Edinburgh Dispensatory.

Mountain, by geometrical measurement, has been ascertained to be more than fifty-four hundred feet in height, above its immediate base. Dr. Mitchill calculates, by approximation on the falls of water at different mill-dams along the hurrying channel of the Musconetchunk to its junction with the Delaware, and on the descent thence to Trenton, that the base itself is five hundred feet more above tide water.*

This mineral spring issues from the perpendicular side of a steep rock, about forty or fifty feet above the level of a brook that gurgles over a rocky bottom, within a few paces of it. The spring discharges a gallon in about two minutes and a half, and the quantity is not observed to vary under any change of season or weather. Its temperature, at its issue from the rock, was found to be fifty-two degrees of Fahrenheit. The bare taste and appearance show that it is a chalybeate; and it is strongly characterized by the peculiar astringency and savour of ferruginous impregnations. The iron is easily separated from the mineral water: its carbonic acid is altogether in a state of combination, and hence it never occasions flatulence, while it proves a corroborant to feeble digestive powers. Hence it is recommended in many chronic diseases and general debility, and especially in calculus and affections of the kidney and bladder. In an instructive case which Dr. Macneven has recorded, the patient took from fifteen to twenty half-pint tumblers a day, with most decided benefit; and he informs me, that other examples of its salutary action in other disorders have come within his knowledge and observation.

The following are the results of Dr. Macneven's analysis:

* Bruce's Mineralogical Journal.

Vegetable extract, 92; muriate of soda, 43; muriate of lime, 2.40; muriate of magnesia, 50; carbonate of lime, 7.99; sulphate of lime, 65; carbonate of magnesia, 40; silix, 80; carbonated oxyde of iron, 2; loss, 41=16.50.*

The *White Sulphur* springs of Virginia have long enjoyed a distinguished reputation, and are resorted to at the present day, as formerly, by numerous invalids, suffering from disorders of the digestive organs, chronic affections of the liver, the sequelæ of protracted intermittent and remittent fevers, the derangements induced by the preposterous use of mercurials, cutaneous diseases, certain female complaints, &c. &c. Where these various disorders are unconnected with inflammatory symptoms, they are pronounced to be of the greatest efficacy. So far as my acquaintance with these waters extends, it coincides with that of the most favourable opinion given in their behalf. Their action on the skin is of singular efficacy and importance. They are somewhat more exciting than ordinary saline sulphureous water. The reproach, long ago made, still holds just, that they have not received the attention they merit, as objects of rigid chemical investigation. Dr. Bell's work, already referred to, contains the best exposition I have seen of their composition and remedial qualities. A Virginian is to be excused in lauding, in no common accents, the white sulphur springs: the facts in the case warrant it; and moreover, in so doing, he only follows his political apostle, Mr. Jefferson.†

Kentucky boasts of numerous mineral springs of a sulphureous class. Dr. Drake, of Cincinnati, considers those of the Big Bone Spring, or *Salines*, and the Olympian Springs, as the most noted. The water of the Big

* Transactions of Literary and Philosophical Society of New-York, vol. i.

† See Notes on Virginia.

Bone Spring, he affirms, contains sulphuretted hydrogen in large quantities; and holds in solution the muriates of soda and lime, and the sulphates of soda or of magnesia. The disorders to which Dr. Drake thinks it more peculiarly adapted, are the torpor, obstruction, or chronic inflammation produced by acute diseases of the lungs, liver, spleen, kidneys, in short, any of the viscera, and which have continued so long that the constitution is exhausted. In these cases, experience has shown them to possess all the efficacy that could be expected in any mineral waters. From a pint to a gallon may be taken, according to the strength of the patient, and its sensible effects on the system. The quantity drank at first should be small, especially by those of reduced habits. These waters do not increase the pulse, but their sensible effects on the alimentary system, kidneys, and skin, are great. The action of the former is very much increased, and the latter is frequently affected in a few days with a violent itching, and an eruption of pimples or pustules, which are now and then connected with large biles.

With these cursory remarks on some of the mineral waters of the United States, we may be the better enabled to estimate the composition and peculiar properties of the *Sulphur Springs of Avon*. Had the work of Dr. Bell included any account of these waters, I would have forborne to offer the present imperfect observations on the subject; the more so, as I am still engaged in a series of chemical inquiries, to determine their respective ingredients, assisted by my friend, Dr. Ellet, the late professor of chemistry in Columbia College.

The Avon springs are situated in Livingston county, state of New-York, within a mile of the village of Avon.

* See Bell on Baths and Mineral Waters, p. 436-7.

The village is on the bank of the Genesee river, and is passed through by the great western road from Albany to Buffalo. The soil in its vicinity is of the richest and most productive quality, yielding the cultivator a full reward for his labour: that of the flats, as they are popularly called, consists entirely of alluvial deposit, while the table land presents all the varieties of calcareous and argillaceous mould. The sensibilities of the valetudinarian may here cherish to satiety the beauties of Avon scenery, and the botanist find the richest materials for enlarging his herbarium.

The Avon springs seem to have been partially known to the Seneca tribe of Indians, who, until within a few years, inhabited a village on the opposite bank of the river, which they called Canawagus. The far-famed chief, *Red Jacket*, enumerated them among his remedial measures for the cure of disorders of the skin; and *wasting disorders*, as they were termed, were supposed capable of being removed by their use, even applied externally.* They may now justly

* Doubtless this term, *wasting disorders*, included many physical infirmities, whose pathognomonic features greatly differed, and many other different sorts of pulmonary disorganization. Dr. Rush declares that pulmonary consumption is wholly unknown to the North American Indians. It is generally admitted, that in countries where fever and agues prevail, consumption is of rare occurrence. The Rev. Dr. Dwight also makes this observation in particular reference to the great western country; and it is sufficiently proved that intermittent fever constitutes a great outlet to the lives of our aborigines. But the declaration of Dr. Rush is not tenable. Hunter, who may be deemed good authority on the subject, remarks, that pulmonary consumption among the North American Indians is established by too many familiar facts. The celebrated chief, Red Jacket, in an interview I had with him at his Reservation, near Buffalo, in September, 1823, gave me the particulars of the cases of no less than seventeen of his relatives, (including, I think, ten or eleven of his own children,) who had died of pulmonary consumption. He was quite descriptive in his statement, and seemed sufficiently qualified to make a number of very fair distinctions in relation to the matter. This digression from our more immediate subject will probably be excused, on account of the curious character of the facts which it records.

be deemed conspicuous among the mineral waters of the state of New-York. They at present comprise two springs, within about forty-two rods of each other, and are somewhat less than one-third of a mile from the Genesee river: they issue from the foot or base of the highlands that border its low grounds. They are denominated the lower and upper springs; while the former has been for several years known, the latter is but recently, and is preferred by some. I first became personally acquainted with them in the summer of 1827, when they were frequented by a number of infirm visitors. Professor Hadley has lately published an analysis of the upper spring, which seems to have been made with a good deal of accuracy. According to his analysis, one gallon of the water contains, carbonic acid, 5.6 cubic inches; sulphuretted hydrogen gas, 12 cubic inches; carbonate of lime, 8 grains; sulphate of lime, 84 grains; sulphate of magnesia, 10 grains; muriate of soda, 18.4 grains; sulphate of soda, 16 grains; and a small quantity of other matter. According to Dr. Salisbury, a resident at Avon, the weight of the constituents of the water of the *lower* spring are as follows: arranged so as to form compounds existing in the water, and calculated for 10,000 parts by weight, are

Carbonate of lime.....	5.02
United to carbonic acid.....	1.70
	—6.72
Chloride of calcium.....	1.44
Sulphate of lime.....	9.83
Sulphate of magnesia.....	8.49
Sulphate of soda.....	2.35
	<u>28.83</u>
By volume of 10,000 are	
Hydro-sulphuric acid.....	4.34
Nitrogen.....	2.35
Oxygen.....	25
	<u>6.94</u>

Dr. Salisbury adds, the chlorine assigned to calcium, as the chloride of calcium, is often found in those waters which contain but little saline matter. There remains 00.6 of sulphuric acid, apparently in excess, which is accounted for by the difficulty of separating, accurately, magnesia from the other salts. The quantity of carbonate of lime exceeds the equivalent quantity of carbonic acid necessary to render it soluble in pure water; and this fact affords a probable explanation of the character this water exhibits when tested by coloured paper.

The volume of water discharged from this spring, Dr. Salisbury further remarks, is the same at all seasons of the year, and does not appear to depend in the least upon atmospheric influence; as nearly as can be ascertained, under existing circumstances, it is fifty-four gallons in a minute. The temperature of the water is invariably forty-five degrees Fahrenheit. The specific gravity, 10.018. As it issues from the spring it is very limpid and somewhat sparkling.

The analysis of these waters, which I caused to be made about two years ago, did not afford satisfactory evidence of either containing iodine. Nevertheless, a strong probability is, that both iodine and bromine enter into their constitution. Dr. Usher, of New-York, and Dr. Steele, of Saratoga, have lately found iodine in the congress water at Saratoga; Dr. Steele has discovered a trace of bromine, the hydro-bromite of potash, in the water of Hamilton spring. It is well known that iodine exists but in the smallest quantity in the waters in which it has, as yet, been discovered; and that in waters which have been repeatedly and carefully analyzed, it has escaped detection. This occurrence took place with the saline springs of Sales, in Piedmont, from which, so recently as in 1820, M. Angelina

procured iodine. There are good reasons to suppose that waters so amply impregnated with sulphureous matter as those of Avon springs, may contain both iodine and bromine.*

The value of these waters has, within the last three or four years, been justly and highly appreciated, and induced numerous valetudinarians to partake of them. They may be ranked among the most powerful and remedial waters yet made known; but, like other active medicinal agents of a similar character, they are liable to great abuse, and in certain states of the system may prove seriously detrimental. Possessing active emetic and cathartic properties, particularly the waters of the spring last discovered, it is requisite that caution be exercised not to indulge in them too freely at first; and as they are more or less exciting, they also demand that previous to commencing their use, the system should, in many cases at least, be first relieved by the employment of some efficient cathartic. This precaution is of saving importance, and I have known a disregard to it to lead to almost entire disappointment in anticipated benefit for many weeks; while, on the contrary, the general powers of the system being relieved by antiphlogistic and aperient means, the waters have often accomplished all that could be desired, in a comparatively short period. As in the administration of all sulphureous waters, so also those of Avon should be closely watched, and their use for a while suspended, when febrile irritation, or undue local determinations occur. This is most apt to take place in habits preternaturally full, or when local inflammation exists:

* See Gairdner on Mineral and Thermal Springs. Very generally associated with iodine, says Dr. Gairdner, is the congenerate substance, bromine. Ballard first discovered it in sea water, and subsequently it has been detected in several saline springs; it exists almost always as a hydro-bromate of magnesia.

where a congested condition of the viscera happens, their best adjuvants are mild mercurials, or saline cathartics.

In disorders of the digestive organs, arising from torpor of the primæ viæ, hepatic obstructions, and affections of the glandular system; in rheumatism and gout, and in many of the most formidable of cutaneous affections, these waters have secured the confidence of those who had previously suffered to the severest degree from these maladies. In many forms of ill-conditioned ulcers, their utility as a wash is abundantly manifest: while the invalid uses them internally, he may at the same time have recourse to them for some twenty or thirty minutes, on alternate days, in the form of a warm bath, the temperature of which may vary from 96 to 98° Fahrenheit.

By many who have profited largely from the use of Avon waters, in chronic affections, their employment, by means of bathing, has been urged emphatically, as superior to any other method of using them. If it be thought that like some sulphureous waters, they, by their long-continued action, greatly diminish strength, this objection loses its validity when we limit their use to the form of bathing. But so far as concerns the Avon waters, I have never been apprised of an example, that could be fairly cited, of their debilitating influence. On the contrary, under circumstances the most discouraging, they have demonstrated their renovating capacity. In venous plethora, and in chronic congestion, when the constitutional powers are much impaired, to the relief obtained by mild aperients, the warm sulphur bath cannot but prove an admirable auxiliary. Few chronic diseases are combated, even by the most dexterous, with the prospect of an immediate healthful change; yet these waters claim properties which inspire us with the hope that some of the severest and most obstinate forms of disordered

action may be steadily and gradually subdued by their salutary operation.

In pulmonary disorders their beneficial agency is not yet confirmed, and further experience must determine their merits: if employed, their use is to be regulated by the nicest precepts of the healing art, inasmuch as these waters are eminently calculated to produce powerful changes on the system by their active operation. In the incipient and active stage of pulmonary irritation, it becomes our duty to precede their employment by venesection, and the other customary means of depletion, analogous to the practice we have recourse to with the Ballston or Congress waters. The same observation applies to hemoptysis, to acute disorders of the digestive organs, liver, and other viscera. The direful consequents which inevitably occur in such cases, from the Saratoga waters, when these cautions are not heeded, are too painfully known to be dwelt upon in this place.

In several forms of female disease, the Avon waters can be safely and efficaciously recommended. In many cases of difficult and painful menstruation, in chlorosis, and in certain complaints mainly depending on weakness, after a judicious course of preparatives, such as a careful clinical observer would enforce, these waters present themselves vested with sanative powers. Aware of the Protean character of constitutional disease depending upon uterine irritation, and chronic affections of that organ, I have no doubt that future investigation will demonstrate that the Avon waters possess many advantages over chalybeates in cases of this nature. I would extend the same remark to the complex affections connected with ovarian disease.

I have for several years past recommended the Avon waters; to those of the lower spring I give the preference:

they have proved available in the severest cases of rheumatism and gout, and in some affections of the urinary organs. Clinical observation has enabled us to affirm, that few disorders of a constitutional origin are more perplexing in their diagnostic character than the maladies arising from long persistence in errors of diet: from this, among other sources, the digestive functions become enfeebled or broken up, and the irritations of impaired digestion, associated with the undue secretion of uric acid in various forms, lead to the production of gout, gravel, and other formidable and agonizing derangements of the kidney and urinary functions.

In cases of this sort, Dr. McLean and others of enlarged experience have testified to the eminent usefulness of the Saratoga waters; and I believe it will be found that those of Avon possess merits of a similar quality, if not of a higher degree. It behooves us, however, previously to relieve the system, by unlocking the several emunctories, to abate inordinate action, and regulate the habits of the sufferer: for even of waters so comparatively feeble as the Bath waters, England, it is said by Dr. Parry, that they are in no form whatever beneficial, during the paroxysm of gout, or in any inflammatory disposition which may exist in the interval.

After the preliminary management of the case by depletory means, and appropriate alvine aperients, the use of the water of Avon for a few days, or perhaps weeks, has wrought an alteration the most gratifying, evinced by improved appetite, increase of flesh, and invigorated health; and while the body receives the impress and partakes of all the advantages of increased physical energy, a corresponding improvement marks the capacity of the intellectual powers. When taken internally, the Avon waters prove cathartic, diuretic, diaphoretic, and tonic. They thus constitute an

effective alterative; and inasmuch as their tonic properties are the results of their general influence on all the emunctories of the body, particularly those of the cutaneous and urinary functions, they claim to themselves qualities which are denied to the entire class of tonics and stimulants strictly so called, and the mischief invariably induced by these last named articles, wherever local congestion exists, are entirely guarded against by the waters of Avon.

Their manifestations on the surface are conspicuous. I am not able to say from experience that in this respect they surpass, or even equal, the white sulphur waters of Virginia; but am scarcely ready to believe that these last fairly boast of a superiority in their action on the skin. Their extraordinary alterative effects must unquestionably be greatly owing to the action they induce by the cutaneous secretions.

As a striking example of their alterative influence on the cutaneous surface, I may mention the case of an individual, now in the twenty-second year of his age, incommoded by congenital ichthyosis, and whom I recommended to repair to these springs last season. The free use of these waters, internally and by bathing, for some ten weeks, so effectually removed this morbid alteration of the skin, as in divers parts to leave no trace of the previous existence of disfiguration.

In speaking of the constitutional influence of the Avon water, Dr. Salisbury, who has had much experience with them during a residence at the springs for four summers, has the following remarks: "The operation of Avon water upon the human constitution is modified by the quantity drank in a given time, and by the constitution, habit and disease of the individual. Generally speaking, four or six half pint tumblers of the water, drank during the day, produce a mild cathartic effect, and under its long continued exhibition to this extent, no debility ensues, but, on the con-

trary, the appetite and strength are very much increased. In very large doses, as from ten to fifteen tumblers a day, it operates powerfully upon the bowels, kidneys, and skin. A moderate use of this water, persevered in for a considerable length of time, will insure to it a powerfully alterative effect in cases where there is no acute inflammation."

A judicious mode of commencing the use of the Avon water, is to take six or seven half-pint tumblers during the twenty-four hours: a couple of tumblers may be advantageously drunk before breakfast, and some two or three hours after that meal the same quantity may again be taken, and an additional tumbler-full or two in the afternoon. To the sense of smell they present the usual properties of sulphuretted hydrogen gas, but in a very small degree; they are nowise oppressive to the digestive organs. Some, however, take them in larger quantity, and oftener repeat the draught. Others, again, never use them until after the first meal. Like the Ballston and Saratoga waters, they are sometimes drunk to a most pernicious extent. It is expedient, therefore, in all cases, to regulate their administration by their immediate effects; and every regard must be paid to age, sex, disease, constitution, and individual peculiarity. To guard against undue local determination, either cerebral, thoracic, or visceral, will always become a matter of professional duty.

All observations of a dietetical character are here designedly forborne: and I need scarcely add, that, with these precautions, the Avon waters may, in numerous cases, command the praises both of the patient and prescriber. Moreover, as these waters are armed with such potent qualities, their influence on the system must be either prejudicial or beneficial; and they demand, in all cases, the advice of the physician.

New-York, June, 1834.

