An analysis of the mineral waters of Saratoga and Ballston : containing some general remarks on their use in various diseases. Together with observations on the geology and mineralogy of the surrounding country, &c.; &c.;

& leg.

6 Shirts
5 Neck cloths
2 Waistcoats
3 pr Pantaloons
4 pr Stockings
1 night cap
1 Pocket Hf

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4 pr stockings

21 p.

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Containing some general remarks on their use in various diseases.

TOGETHER WITH SOME OBSERVATIONS

ON THE

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Of the surrounding country, &c. &c.

BY DOCTOR JOHN H. STEEL.

Member of the Medical

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DESCRIPTION

OF THE SURROUNDING COUNTRY.

THE surrender of General BURGOYNE, and the medicinal springs within its precincts, have given a celebrity to the town of Saratoga, which few other places in the state of New-York possess. A description of the town and surrounding country, will, on that account, be deemed interesting, particularly as it will enable invalids, as well as men of pleasure, to make such arrangements, before visiting the Spring, as may be conducive to their comforts and pleasures while there.

The town is fourteen miles in length, from east to west, and from five to six in width, from north to south, having, for its boundaries, the Hudson river on the east, the towns of Northumberland and Greenfield on the north, Milton on the west, and Malta and Stillwater on the south.

The north part of the Saratoga lake, which is about nine miles in its whole extent from south to north, and between three and four in breadth, is situated near the centre of the town, from east to west, and is supplied with water, chiefly, by the Kayadarossares creek, which has its source in the mountains of the same name, about fifteen miles distant, in a northwest direction, and after taking a circuit of about thirty miles, empties its waters into the lake, near its northwest corner, which, thus supplied, retains its clearness and depth, without much variation, through the year.

The Kayadarossares creek, which forms part of the southern boundary of the town, and divides it from Malta, is peculiarly well adapted for mill seats; passing through a very fertile country, which was formerly covered with great quantities of white-pine timber. The number of mills which have been erected

on it is truly astonishing; many of them, however, have disappeared with the forests that caused their erection; but they have established a reputation not to be forgotten, that whenever our country shall be in a situation to support manufactories, this creek will possess strong inducements (as long as *water-power* shall be preferred to that of *steam*) for the enterprising manufacturer to establish himself on its borders.

The Saratoga lake discharges itself by the *Fish creek*, which passes from the north end of the lake, through the town of Saratoga, in an easterly direction to the Hudson, and disgorges its waters into that river near the village of Schuylerville, formerly famous for its herring fishery. Previous to its union with the Hudson, it forms several fine falls, on which the proprietors have erected mills of various kinds.

On the flat land adjoining the river, to the north of the Fish creek, are still to be seen the remains of the fortified camp, erected by General Burgoyne, on his retreat after the disastrous battle at Bemus' Heights in Stillwater. At this place he capitulated to the American forces under General Gates.

The town of Saratoga contains a variety of soils. On the borders of the Hudson river and along the Kayadarossares and Fish creeks, there are extensive flats of alluvion land, extremely productive in grass. The lands, to the south of the Fish creek, and east of Saratoga lake, are high and uneven, composed principally of gravelly loam, combined with argillaceous earth, and are very fertile; while the north and western parts of the town are mostly yellow-pine plains, forming a link of that extensive chain of plain lands which stretch along the Hudson river, in a southerly direc-

tion, as far as the highlands. The plains, in the vicinity of the Springs, are considered, by the farmers, of a much better quality than they usually are in other parts of the country; this preference arises from their having a level surface, and from the soil not being composed of sand only, but possessing a large admixture of loam. The application of gypsum has rendered these plains very productive, not only in grains, but likewise in clover and timothy grasses. Such has been the magic effects of that excitement to vegetation, that these lands, which a few years past, were considered of little value, are now as much esteemed, and sell for as high a price as any other in the county; Saratoga may, therefore, be considered as highly valuable for agriculture, as it produces the various grains and grasses in great abundance.

The mineral waters, which are becoming so celebrated in the history of

our country, are situated at what may be considered the termination of the plain lands and the commencement of the mountainous, and seem to form the centre of a long range, in the form of crescent, commencing at Ballston lake, about eleven miles to the southwest, and terminating at the Quaker-springs, in Stillwater, about ten miles to the southeast.

At Ballston they discover themselves very faintly in a spring on the west side of the Long lake, and in some wells near the academy, at the *Spa* they are very strong. They appear again, in the course of the same circle, at Ellis' mills, and at Saratoga they are more numerous and diversified in their sensible qualities, than at any other place. The whole marsh extending from the Washington spring, on the west, to Taylor's springs, on the east, the distance of more than a mile, appears to be almost entirely occupied by them. At the Quaker springs, on the east side

of Saratoga lake, they again appear less strongly characterized; beyond which they have not as yet been traced.

All the fountains in this crescent, as far as they have been examined, appear, with few exceptions, to possess the same *qualities*, differing only in the *quantity* of the substances common to all. We are, therefore, led to believe that they receive their essential and characteristic properties in one extensive labaratory, and being sent out from thence through different conduits, acquire from them, in their passage to the surface, the various abstractions which constitute their real differences.

The mineralogical structure of the surrounding country, so far as it has been explored, does not appear to throw much evidence on the subject of the formation of these waters, and the geology of their immediate vicinity adds still less to the satisfaction of the enquiring philosopher.

The highlands, which commence at the Springs, gradually swell into mountains to the north, and form a continued chain that extends to the confines of Canada. This chain is broken, about seven miles from its commencement, by the passage of the Hudson, which has rent the mountain nearly to its base, and discovers a bed of very pure limestone, which is continued, beneath the mountain, to the bank of the valley in which the Springs are situated; where, taking a dip beneath the surface, is lost in the plains to the east, and is not discovered again in that direction until we approach the mountains on the east side of the Hudson, the distance of fifteen or twenty miles, where the similarity in its appearance and structure, evince the continuation of the same ledge. This ledge likewise discovers itself, in a southwest direction, along the confines of the more distant mountains of Kayadarossares, in the Schenectady patent, and at the Hellebergh.

The surface of the Palmertown mountains, (which are the nearest to the Springs) is composed principally of large irregular masses of rock of a granite structure, intermixed with a variety of different species.

In the valleys, and along the borders of streams, extensive ledges of iron *Pyrites*, or sulphuret of iron, discover themselves, resembling, in all respects, those in Vermont, which have been manufactured into *sulphate of iron.* These are combined, in some places, with an iron ore, which, containing a much less quantity of sulphur, appears more suitable for the furnace.

Small specimens of the fluate of lime, and considerable masses of plumbago, of a pretty fine quality, have likewise been picked up about the beds of torrents, and in the valleys.

Those who have formed the idea that the Highlands in the vicinity of West-Point, at some distant period, presented an impassable barrier to the waters of the Hudson, will find much to corroborate and strengthen the opinion, by an examination of the course, form, and structure of the extensive range of mountains on the east and west side of the Hudson, and from a particular reference to the *peculiarities* in the formation of the extensive and fertile region placed between them; but as this would be embracing a subject that is not immediately connected with the present performance, it is deemed unnecessary to discuss it here.

At Ballston, the mineral waters discover themselves in a clayey soil, over extensive strata of slate. At the Spa, the slate is less apparent, the strata, in some places, consisting of clay and coarse gravel, in others of sand and clay. At Ellis' the soil is a coarse gravel, clay and slate;

but at neither of these places are there any appearances of limestone. At Saratoga there is no appearance of slate ; the upper stratum is principally a sandy loam ; the second, clay with a coarse gravel, and limestone in great abundance. At the Quaker springs, the appearance is still different. A rich loam forms the surface of the earth, and the stones and rocks in the vicinity are of a granite structure, and extremely hard.

The spontaneous decomposition of the extensive ledges of *Pyrites*, (which appear to take so considerable a share in the structure of the mountains to the west and north,) and consequent formation of the *sulphate* of *iron*, might be supposed to have the effect of evolving the carbonic gas, that is so plentifully diffused in the waters, from the lime rock with which the solution of the sulphate of iron might be supposed to come in contact ; but the total absence of a sulphate

of any kind in the waters, does away the probability of this theory; and the diversity of the soil, in the vicinity of the different clusters of fountains, may be considered as a conclusive evidence that the waters are not indebted to that source for any of their sensible qualities. We are, therefore, at present, destitute of any known causes by which we can explain the various combinations that terminate in the production of these waters.

Dr. Seaman has conjectured that the gas is driven from its union with lime, by the effects of subterranean heat; in which case the fountains may be considered as those of pure carbonic acid gas, in which the water and the several articles held in solution by it, are altogether accidental ingredients. The conjecture is certainly a plausible one, and there may be fountains of this gas in the vicinity, without the intervention of water;

which, issuing solitary from their caverns, mingle with the atmosphere unnoticed. This is no more than what actually takes place at the celebrated Grotto del Cani, near Naples; and had we a Vesuvius in the neighbourhood, we should find no difficulty in accounting for its appearance here. But as this idea is altogether speculative, it is deemed unnecessary to detain the attention of the reader from what may probably excite more interest.

A short History of the Springs.

The spring first discovered, was the *High Rock ;* and the tradition of the Indians assures us that they were well acquainted with its medicinal qualities long before the country was explored by the Europeans. Their attention was first attracted to the spot by the great quantity of game that frequented the place as a salt-lick, and they became more attached to it from a discovery of the efficacy of the water in the removal of rheumatism, and some other complaints, to which they were subject.

The first communication, by the Indians, was made to Sir William Johnson, who was occasionally afflicted with the gout. They advised him to the use of the water of this fountain, and in the year 1767, he was persuaded by them to undertake the journey from his farm

near Johnstown, about thirty miles distant, and was conveyed by them to the spring. Passing, in his route, by Ballston lake, he spent the night at a new settlement just then formed, by Michael M'Donald, whom Sir William engaged to accompany him. They proceeded by a road, through the wilderness, which the Indians cut for them, remained at the spring for some time, returned improved in health, and afterwards published to others the valuable qualities of the water.

Sometime after Sir William's return, a man, by the name of Norton, influenced by the growing celebrity of the spring, obtained a permission from the owners of the soil, to erect buildings, and clear the land in its vicinity; under this permission, a small hut was built and a clearing made; but the fear which the hostile Indians inspired, during the revo-

lutionary war, which commenced about this time, induced Norton to abandon his improvements.

At the termination of the war, Norton resumed his occupancy; and about the years 1784 and '85, other improvements were made, by the arrival of new settlers, which afforded accommodations to a few invalids. About this time, the Flat Rock, the President, and the Red Spring, were discovered; but although the company resorting to them increased annually, the accommodations remained nearly stationary for many years.

The settlement at Saratoga received a check from the discovery of the springs at Ballston, about the year 1787. Situated in the midst of a flourishing country, those springs had advantages, which were not, at that time, possessed by Saratoga. These advantages were eagerly embraced by the proprietors of the

lands on which the springs were situated; and good houses of accommodation were erected, and other improvements made, with great rapidity.

The Saratoga springs continued to languish under the neglect of the owners, until 1803, when the valuable qualities of the Congress Spring, induced Mr. Putnam, (to whose enterprise the public are greatly indebted) to erect a large house of entertainment near it; since which time, the waters of Saratoga have gradually gained a celebrity that appears as firmly, as it is justly, established.

The concourse of visitants, who frequent the *numerous* houses of entertainment, that have been lately erected in the village, affords a well grounded expectation that it will ever continue the resort, not only of invalids, but of the gay and fashionable.

Situated in an elevated country, the atmosphere is extremely clear and cool, forming a pleasing contrast to the oppressive heats of the south: a great number of visitors will, therefore, be attracted to this spot during the hot months of the year, not only by the salubrious waters of the different springs, but by the very healthy and pleasant situation of the place.

Perhaps few situations in our country afford, to the visitant, more numerous sources of amusement than these springs. The Saratoga lake, at the distance of four miles, invites the sportsman to fish on its extensive and limpid waters, or to shoot on the low grounds, forming a part of its margin, which abound with wood-cock. The lovers of trout have the means of gratifying their palates, by eating the most delicate and well flavoured, at Barhite's, about two miles distant. Lake George, the spot, of all others, com-

bining, most agreeably, the *sublime* and the *pretty*, is but twenty-eight miles on the north. At that place, the artist may select innumerable points of view to occupy his pencil. The angler will find a recompense for his toils; and the observant tourist may amuse his friends by giving them true descriptions of what must please.

On the Hudson there are three falls or cataracts, which merit notice. The first, or highest up the river, is at Hadley-landing, fourteen miles distant; the second, is Glen's falls, on the road to Lake George; and the third, at Sandy hill. The two last are about eighteen miles distant from the Springs. The height of these falls is estimated at forty feet.

The roads, leading to all these places, are good, particularly when they pass over the plain country; as they are there not only level and dry, but frequently hard and smooth, in consequence of the

admixture of loam with sand. The invalid can, therefore, select such route from the springs, as may best suit the state of his health. If feeble, or afflicted with painful disease, he may ride on the plains without fatigue ; or, if more vigorous, and courting exercise, he may mount the hills in Greenfield, on the north, where, in a tour of eight or ten miles, he may enjoy a mountain scenery.

The establishment of a line of steam boats, from New-York to Montreal, by the way of Lake George and Lake Champlain, places this village in the great road between those cities. Its importance, therefore, as a resting place, will be much enhanced, as the travellers between those great marts, (from both which it is nearly equidistant) may gratify their curiosity without deviating from their route, and enjoy, while there, a constant and convenient intercourse with either place.

Analysis of the Waters.

A description of the various processes, by which the results here stated, were obtained, will be interesting and satisfactory to those who are acquainted with the science of chemistry; and to such, the following brief sketch, will be sufficiently explicit.

The processes consisted of such as were performed with a view to ascertain the *number* and *qualities* of the different substances contained in the several waters under consideration; and of such as were instituted with a view to ascertain the *quantities* of the various substances.

The first intention was principally answered by the application of various chemical re-agents to the waters of the several springs, the number and effects of

which, will be noticed in the description of the fountains, to which they were applied; from the perusal of which, it will be observed, that the conclusions here drawn, correspond, in all essential particulars, with those already published by Dr. Seaman, in his "Dissertation on the Mineral Waters of Saratoga and Ballston," and corroborated by the later observations of Dr. Vandervoort, and Mr. Griscom, an eminent chemist, of New-York. It is, therefore, presumed that, from the weight of such authority, the most scrupulous will be satisfied that the medical properties of these waters are entirely owing to their containing the following substances, viz.

Carbonic acid Gas,
Muriate of Soda,
Carbonate of Soda,
Carbonate of Lime,
Carbonate of Iron, and
Carbonate of Magnesia.

Two springs in the vicinity, not heretofore examined, contain, in addition to the above articles, (excepting carbonate of magnesia) *sulphurated hydrogen gas.*

This fact being fully established, it is hardly necessary to observe, that the several medicinal springs, at Saratoga and Ballston, do not derive their different effects upon the system from any difference in the *qualities* of the articles they contain, but simply from a difference in the *quantities* of the substances common to all.

It remains to show the processes by which the substances were separated, and their quantities ascertained.

A quantity of the water, from each spring, to be examined, was carefully measured and placed in separate glass vessels, in a sand-bath, the temperature of which was raised to from 150 to 170

degrees, the vessels being covered with three or four folds of fine crape, to prevent the access of dust or sand. In this situation the water was suffered to evaporate completely, when the vessels were removed, the residuum, being carefully collected and weighed, was thrown into about ten times its weight of cold, recently distilled, water, in which it was suffered to remain several hours, being frequently agitated. It was then filtered, and the insoluble part, having been well washed, was again dried and weighed, its loss giving the quantity held in solution by the water.

To this solution was added an infusion of purple-cabbage, which immediately gave the whole a beautiful green colour, evincing the presence of an alkali. Muriatic acid, diluted, by the addition of ten times its bulk of water, was then combined, drop by drop, with the solution, until the purple colour of the

cabbage was restored; the number of drops required to produce this effect being noticed. The solution was then placed in a sand-bath, and the water again suffered to evaporate in a temperature of ninety degrees. The process terminated in the formation of entire cubic crystals, which, from further examination, proved to be pure muriate of soda.

The *quantity* of the carbonate of soda, contained in the solution, was inferred from having previously ascertained the number of grains required to neutralize a given number of drops of the dilute muriatic acid.

The insoluble residue was then submitted to the operation of very dilute sulphuric acid, added in small quantities at a time, until it was brought to the exact point of saturation. It was then suffered to stand several days, and occasion-

ally, a drop of the dilute sulphuric acid added, to complete the solution of the iron; after which it was filtered and the iron precipitated from the solution in the form of prutian blue, by the addition of prutiate of lime.

The solution, being separated from the precipitated prutiate of iron, was placed in a sand-bath, and the sulphate of magnesia separated from that of the lime, by evaporation, and subsequent solution, upon the principle laid down by Henry.

The gas was procured by means of a large bladder, connected, by its neck, to one extremity of a stop-cock, the other being fitted to the orifice of a tin cone, the capacity of which was accurately ascertained in cubic inches. The water, to be examined, was placed in this vessel at the fountain, and the stop-cock, connected with the bladder, immediately applied, its valve being opened. In this

situation, it was placed in a water-bath, raised to the boiling point, and there retained, until the gas ceased to come over. The contents of the bladder were then received over water in a glass jar, gaged to half inches.

The temperature of the room in which the experiments were made, and that of the water over which the gas was received, was kept at seventy degrees.

The idea, suggested by Dr. Seaman, that the gas of these fountains is combined with azote and oxygen, does not appear to be well founded. The weak affinity subsisting between water and *nitrogen*, induces the latter to escape immediately on the first application of heat. Experiments made on the gas thus obtained, does not warrant the belief that a single particle of it is azotic; at any rate, if there is any, it is in so small a quantity as not to be indicated by any means used for that purpose.

The experiment, mentioned by the Doctor, to prove that the water contains oxygen, is entirely misconstrued. "That the water" (says the Doctor,) "contains this last" (oxygen) "is proved by its precipitating an *ochery substance*, after having had some sulphate of iron dissolved in it in a well corked vial." This fact is to be explained without *presuming* the presence of oxygen.

Sulphate of iron is decomposed on being mixed with the water from any of the fountains, the sulphuric acid having a stronger affinity for soda, magnesia, &c. than it has for its iron; unites itself with these, while the carbonic acid, connecting itself with the divorced iron, forms the *ochery substance* or red carbonate of iron.

From every consideration, there can be no doubt, that the great quantity of ærial fluid obtained from these waters, is

the pure carbonic acid gas, uncombined with any other gasceous substance whatever.

It is necessary to notice one other experiment of Dr. Seaman's, from which he erroneously infers "a slight impregnation of sulphur." A solution of nitrate of silver being combined with the water occasions a white precipitate, which, on suffering to stand, becomes of a dark muddy appearance: the dark colour, however, does not take place if the mixture be excluded from the light, and any water impregnated with the saline properties of those under consideration, will tarnish precipitated silver without the presence of sulphur, if it be exposed for any time to the rays of light.

Sulphur is a substance that is not known to combine with water, except through the intervention of *hydrogen*, forming *sulphurated hydrogen* gas; as it

is not pretended that this gas exists in the water, we necessarily conclude that the water does *not* contain a "sulphurous impregnation."

I exempt from this remark the two fountains which obviously manifest to our senses the presence of the gas above mentioned, and shall notice them hereafter under their respective heads.

The analysis will be further illustrated in the course of the following description of the several Springs.

Congress Spring.

This truly celebrated fountain is situated on the westerly border of a low swampy, and, at present, uncultivated piece of ground, at the foot of a beautiful little cascade, formed by a small stream that rises about fifty rods to the west of the place.

The Spring was first discovered about twenty-five years since, issuing from a small aperture in one of the rocks situated near the base of the water-fall: the rock, however, by some accident was moved from its place, and the water ceased to flow from its side. Not long after a gentleman by the name of Putnam, one of the most enterprising among the first settlers of the place, discovered bubbles of air breaking through the water in the middle of the brook. Govern-

ed by the hopes of recovering the original fountain, he turned the stream from its course, and having removed the earth to the depth of about eight feet, discovered a strong mineral water rising from among the stones and gravel of the bottom in numerous places. He then prepared a conical box, and having placed the widést end of it so as to include the greatest number of these little fountains, replaced the earth around it, and thus secured to posterity the possession of a mineral water, which, for its peculiar medicinal properties, stands unrivalled in the annals of the world.

The water rises in the curb to a little above the surface of the brook (which still passes around it) but seems unwilling to mount much higher; it escapes through a hole in the side at a rate considerably less than a gallon a minute, but when the pressure has been removed by lessening the *column* of water in the curb,

as when it has been rapidly diped out, it rushes in with greater violence and it becomes difficult, if not impossible, to remove the whole contents of the well.

The gas escapes through the water in fine bubbles, giving to the surface the appearance of simmering, not unlike that which water exhibits just before the process of violent ebullition takes place.

When first diped, the water is remarkably limpid, and were it not for the constant escape of free carbonic gas in numerous fine specks, it would be perfectly transparent. It, however, becomes turbid after standing a few hours exposed to the air, and deposits a sediment.

Its effect upon the taste is a predominant sense of salt and carbonic gas, not unpleasant to those who are in the daily use of it. When swallowed, its effects depend in a great measure upon the state

of the stomach at the time of receiving it, and upon the quantity drank; when taken however, in a moderate draught, by a person in tolerable health, the sensation is seldom if ever unpleasant, and to most people, who are in the habitual use of it, particularly in the hot season, the beverage is delightful.

Its most obvious effect, when taken as a medicine, is that of a cathartic and diuretick. In most habits this effect is produced by drinking five or six half-pints in the morning before eating; soon after taking it the person feels a sense of fullness about the stomach and bowels, attended with eructations of fixed air; a slight giddiness of the head and a sensation bordering on a disposition to sleep. These feelings, however, are soon removed by the copious discharges that almost immediately follow, leaving the stomach with an increased appetite for food, and the desire for exercise unshackled with languor.

The temperature, by *Fahrenheit's Thermometer*, at the bottom of the spring, is fifty degrees, and it does not suffer any sensible change during the winter or summer; neither does the season appear to have any effect in diminishing or increasing the quantity of water.

The application of the following reagents illustrate its composition.

Infusion of purple-cabbage, gives first a blue colour, which soon becomes a beautiful green.

Tincture of litmus, becomes red.

Tincture of galls, tea, &c. gives a purple colour, as do all the vegetable astringents. This experiment does not succeed after the water has been boiled, or has stood for a long time exposed to the air.

Nitrate of mercury, produces an immediate milky appearance, which terminates in a white precipitate.

Nitrate of silver, produces a copious white precipitate, which on being suffered to stand, becomes of a dark, muddy appearance; the dark colour, however, does not take place, if the mixture be excluded from the rays of light.

Muriate of barytes, produced no sensible effect.

Acetate of lead, produces a cloudiness, terminating in a dense sediment.

Caustic ammonia, a white precipitate.

Caustic alkali, a more dense precipitate.

Prutiate of lime, produced no effect, but on the addition of a small quantity

of sulphuric or nitric acid, the prutiate of iron was immediately formed and precipitated.

Sulphuric acid, produced a copious disengagement of fixed air.

Nitric and muriatic acids, a less copious disengagement of gas.

Citric acid, a turbidness.

Oxalic acid, an immediate precipitate.

Lime-water, a turbidness.

These experiments indicate the presence of carbonic acid, a carbonated alkali, carbonated earths, and a carbonated iron, together with a muriatic salt.

Further experiments, conducted in the manner heretofore stated, gave the following actual contents of one gallon, or 231 cubic inches of the water.

Muriate of Soda,	471.5
Carbonate of Lime,	178.476
Carbonate of Soda,	16.5
Carbonate of Magnesia,	3.356
Carbonate of Iron,	6.168
Total,	676 grains.

Carbonic acid gas, 343 cubic inches.

It will be perceived, from the above statement, that the quantity of fixed air vastly exceeds any thing yet discovered, and that this, combined with the marine salt, and various carbonates, give to the waters of this fountain, in their cathartic properties, a decided preference over every thing of the kind hitherto known.

It is recommended and used with propriety, in all those chronic cases where cathartics and gentle aperients are indicated, and one of the most valuable properties, which it possesses, is, that when properly taken, it may be persevered in

for almost any length of time, and a daily increased evacuation from the bowels produced, without debilitating the alimentary canal, or in any way impairing the digestive powers of the stomach, but on the contrary, the spirits, appetite, and general health will be improved.

The good effects of this water is likewise particularly noticed in obstructions of the liver and other organs connected with the functions of the stomach and intestines; and in most of those complaints resulting from a residence in a hot climate, or the habitual use of ardent spirits.

Columbian Spring.

This fountain discovers itself at the foot of a steep bank, consisting principally of sand and yellow loam, about fifteen rods westerly from the Congress, and a short distance from the south side of the brook.

The water being confined by a curb, rises a few inches above the surface of the surrounding earth, and escapes through a small hole made for the purpose.

The well is sunk about six feet, and the water comes in so fast as to render it difficult to empty it by diping, even with a bucket.

The surface of the water, when viewed in the fountain, does not present the sim-

mering appearance so conspicuous in the Congress, but the gas breaks up through it in large bubbles at irregular intervals, giving to the water the resemblance of a more violent ebullition. The surface of the earth, over which the water escapes, is covered with the carbonate of iron and lime.

The water is quite limpid, and, when drank, betrays its chalybeate properties to the taste, together with the sense of carbonic gas. Its temperature is the same as the Congress, and the application of tests evince the presence of the same qualities, differing only as to quantity.

One gallon or 231 cubic inches of the water, from a careful analysis, yielded the following result.

Muriate of Soda,	-	201.5
Carbonate of Soda,	-	22.5
Carbonate of Lime,	-	121.
Carbonate of Magnesia,		1.5
Carbonate of Iron,	-	7.5
	Total,	354 grains.

Carbonic acid gas, 236 cubic inches.

This water seldom operates as a cathartic, unless taken in large quantities, or when used by persons whose stomachs are extremely irritable. Its most obvious effects when taken in proper doses are diuretic, at the same time operating on the secretions and excretions generally: it likewise exhibits the powers of a mild and pleasant stimulant, and as a tonic, if we are to judge from the quantity of iron which it contains, is not *excelled* by any natural water yet discovered.

Washington Spring.

This fountain is situated by the side of a rill of remarkably pure water, at present in the bushes, about fifty rods to the southwest from the last described spring, and is elevated about twenty feet above the surface of the Congress.

The ground around it is incrustated with calcareous and ferruginous substances. The water is limpid, sparkling, and acidulous. Its temperature is 48 degrees: and one gallon affords the following contents.

Muriate of Soda,	-	231.5
Carbonate of Soda,	-	16.5
Carbonate of Lime,	-	127.5
Carbonate of Magnesia,		2.5
Carbonate of Iron,	-	6.
		Total, 384 grains.

Carbonic acid gas, 247 cubic inches.

The water of this fountain is seldom drank, but on account of its remote situation, is resorted to by the indigent, for the purpose of external application, and is found to be of eminent service when applied to old, ill-conditioned ulcers, and obstinate eruptions of the skin.

Hamilton Spring.

This is situated in the marsh, which forms the border of the brook, about fifty rods in a northeast direction from the Congress.

The well is sunk about eight feet through a loose black earth, a wooden curb prevents the egress of the water, which rises from the bottom, and likewise secures it from the intrusion of foreign substanccs. The external appearance around the spring is similar to those already spoken of, and the presence of gas is evinced by the almost constant and violent commotion produced by its escape. Its temperature is 48 degrees; and one gallon is found to hold the following articles in solution.

Muriate of Soda,	-	269.5
Carbonate of Soda,	-	24.5
Carbonate of Lime,	-	147.5
Carbonate of Magnesia,		7.5
Carbonate of Iron,	-	3.0
	Total,	452 grains.

Carbonic acid gas, 284 cubic inches.

This water ranks among the first as a diuretic and antacid, and from its saline properties is frequently used as a substitute for the Congress, in those cases where the irritable state of the stomach renders the more drastic effects of that water inadmissible.

This fountain likewise furnishes a supply of water for the bath-house, which is situated near it on the opposite side of the brook, and is the most convenient and secure of any the place at present affords.

Flat Rock Spring.

Following the course of the brook about one hundred rods from the Hamilton, we come to this fountain. It discovers itself on the verge of a marsh, at the foot of a steep bank, which terminates the west side of the valley through which the brook passes; this bank is composed of argillaceous earth and sand, and is elevated about forty feet above the brook.

The earth around the spring is incrustated by a friable rocky substance, which extends to the distance of several feet, and forms a dry and commodious platform for those who visit it; this rock is simply the usual deposit from the water, combined with sand, leaves, sticks, &c. for which it is indebted to the wind and rain, and is no more than what happens

about any of these fountains, where the water is suffered to stagnate in their immediate vicinity.

Near the centre of this platform, the water rises to the surface and issues in a small stream. The well is eight or nine feet deep, and is curbed to prevent the intrusion of foreign substances.

Its external appearance and taste resembles the Columbian, and the analyses confirms the similarity.

Its temperature is 48 degrees, and one gallon affords the following articles :

Muriate of Soda,	-	194.8
Carbonate of Soda,	-	11.2
Carbonate of Lime,	-	107.
Carbonate of Magnesia,		1.5
Carbonate of Iron,	-	7.5
	Total,	322 grains.

Carbonic acid gas, 252.5 cubic inches.

This water is used in all cases for which the Columbian is recommended, and has hitherto been considered as the best chalybeate spring, the place afforded, and on that account, has been the most frequented. It is by no means improbable that there are cases in which this water will answer a better purpose as a tonic, than the Columbian, from its containing a greater quantity of fixed air, a less quantity of the saline principle, and at the same time, an equal quantity of iron.

High Rock Spring.

Pursuing the course of the valley about one hundred rods further, in a northerly direction, we come to the High Rock. It is situated near the bottom of a ledge of rocks, which at this place marks the westerly side of the valley, and is composed principally of calcarious earth, in which are imbeded large masses of flint stone and quartz.

The water of this fountain is surrounded by a conical rock, which is, very justly, considered the greatest natural curiosity which the country affords; its diameter, at the base, is between eight and nine feet, and its height between five and six; at its top is a circular opening, nearly twelve inches in diameter, which gradually widens as the rock enlarges, leaving its walls of nearly an equal thickness

throughout. In this cavity the water rises to within two feet of the top, and is there seen constantly agitated by the incessant escape of carbonic gas, for which the vacancy above the water, forms a capacious and secure *reservoir*, where the curious are frequently entertained by its deleterious effects on animal life.

This rock, like those we have before described, is composed of ferruginous particles, and calcarious earth, combined with sand and such other articles as accident threw in the way. It is however, more compact in its structure, and particularly about its top, less friable.

That this curious production owes its origin to the water, will not admit of a doubt, and that the fountain once issued from the cavity and descended upon its sides, is equally certain; but the precise manner in which the rock was formed, or the time when the water ceased to

flow upon its surface, is not so obvious.—I am disposed to believe with Dr. Seaman, that the basis of this mass was commenced beneath the surface of the earth, that the water, thus cooped up within the limits of its own sediment, continued to rise, and escaping over the sides of its prison, constantly added to the dimensions of its walls. In this manner it would continue to rise until the column of water in the curb, balanced the power that compelled it up, in which case it would become stationary; and it is but fair to conclude, that in process of time, the power, so propelling the water, might be diminished, when the water in the rock would sink in exact proportion to the loss of that power.

The idea propagated by the inhabitants, that the water owes its escape to a fissure, occasioned by the fall of a tree, appears to be entirely fabulous, as the fountain was visited as early as the year

1767, and no appearance to induce such a belief presented itself at that time, and yet the water did not reach the top of the rock by several inches.

The appearance or taste of the water does not materially differ from those already described. Its temperature is 48 degrees, and a gallon affords the following contents.

Muriate of Soda,	-	210.
Carbonate of Soda,	-	18.
Carbonate of Lime,	-	115.
Carbonate of Magnesia,		.5
Carbonate of Iron,	-	4.5
Total,		348 grains.

Carbonic acid gas, 243 cubic inches.

The singularity of this fountain first introduced it to notice, and for a long time it remained the only one in use, when much was said by the credulous of its

astonishing effects in the cure of almost all diseases. From the above analysis however, it does not, at present, appear to possess properties to distinguish it from most of the others in its neighbourhood.

It is a mild cathartic, but is principally used as a restorative; and is found to be an efficacious diuretic.

President Spring.

About thirty rods from the High Rock, in the same valley, is the President spring. It is about four feet deep; the water breaks up through the fissures of a ledge of pure lime rock, that forms its bottom, and furnishes an ample supply in the wooden curb that protects it. It is remarkably sparkling. Its temperature is 51 degrees, and a gallon affords the following ingredients.

Muriate of Soda, - -	135.
Carbonate of Soda, - -	19.
Carbonate of Lime, -	107.5
Carbonate of Magnesia, -	2.5
Carbonate of Iron, - -	6.
Total,	270. gr.

Carbonic acid gas, 314 cubic inches.

The water of this fountain is much drank, and from the great quantity of fixed air which it contains, is a refreshing and pleasant beverage. It is highly serviceable in urinary affections, and is much used as a discutient in diseases of the skin.

Red Spring.

THIS is situated near the road in the border of the marsh, in a northeast direction from the President. It receives its name from the carbonated iron that is observed about it, and the water when agitated, has numerous particles of fine sand, stained with this substance floating in it, which gives it a red appearance. The temperature is 48 degrees, and the analysis of a gallon gives the following proportions.

Muriate of Soda, - -	117.52
Carbonate of Soda, -	24.48
Carbonate of Lime, - -	97.
Carbonate of Magnesia,	3.
Carbonate of Iron, -	6.
Total,	248. gr.

Carbonic acid gas, 150.5 cubic inches.

Popular opinion has sanctioned the use of this water as an application to ill-conditioned ulcers and diseases of the skin, and it is much more used for this purpose than for any other.

Taylor's Springs.

Within a few years, a number of springs have been discovered, in the course of the same valley, on land belonging to John and Ziba Taylor. They are situated about one mile in an easterly direction, from the High Rock. The soil through which they discover themselves, is composed of argillaceous earth and sand, combined with the usual deposits, iron and lime.

From among several that have been opened and curbed, three have been selected as possessing strong medicinal qualities. These have received from their proprietors the distinguished names of Washington, Jackson, and Alexander. Of these, the Washington of course, ranks pre-eminent, and, in its saline properties, is only inferior to the Congress.—The

water is clear and sparkling. Its temperature is 48 degrees, and a gallon yields

Muriate of Soda,	-	313.54
Carbonate of Soda,	-	26.46
Carbonate of Lime,	-	140.
Carbonate of Magnesia,		5.5
Carbonate of Iron,	-	4.1
	Total,	489 $\frac{6}{10}$ gr.

Carbonic acid gas, 251 cubic inches.

This water may be used, with propriety, in most cases for which the Congress is recommended; the quantity, however, requires to be somewhat increased in order to have the same effect upon the bowels. In calculous and nephritic complaints, it might be supposed to have a preference on account of its alkaline property.

The *Jackson* is a few yards from the Washington, in a northwesterly direction.

The fountain was completely covered by a thick incrustation of the usual appearance and consistence.—The temperature is 50 degrees, and a gallon affords

Muriate of Soda, - -	240.
Carbonate of Soda, - -	18.
Carbonate of Lime, - -	103.8
Carbonate of Magnesia, -	3.
Carbonate of Iron, - -	5.2
Total,	370 gr.

Carbonic acid gas, $256\frac{5}{10}$ cubic inches.

The *Alexander* is on the verge of the brook, twenty or thirty rods from the Jackson, in an easterly direction; its appearance and taste is similar to the others. The temperature is 48 degrees, and a gallon affords

Muriate of Soda, - -	238.4
Carbonate of Soda, - -	19.6
Carbonate of Lime, - -	119.5
Carbonate of Magnesia, -	7.
Carbonate of Iron, - -	5.5
Total,	390 gr.

Carbonic acid gas, 253 cubic inches.

The properties of these fountains entitle them to no small share of respect, and it is by no means improbable, that when proper accommodations are prepared, they will receive the attention of the diseased, particularly of those who may wish to be retired from the noise and turmoil of the fashionable circles that throng the Congress.

Ellis' Spring.

About two miles from the Congress, in a southerly direction, on land belonging to a Mr. Ellis, is another mineral fountain distinguished by the name of Ellis' Spring. It is situated in a deep valley on the side of the principal northern branch of the Kayadarossaras creek, the banks of which, at this place, rise nearly fifty feet above its bed, and are frequently indented by deep valleys that open into the creek, the side of one of these having been lately denuded, for the purpose of erecting mills, furnishes a favourable opportunity for inspecting its structure; the appearance of which is as follows, First,

A mixture of clay and gravel,	2 feet.
Coarse gravel and sand with a great variety of small stones, generally smooth,	4

At the bottom of this stratum issues a spring of very pure water which is never dry, and retains a temperature of 50 degrees.	
Coarse gravel, sand, and clay, with paving stones, -	20 feet.
Red oxide of iron, combined with sand and clay, -	2
Clay and coarse gravel,	4
Lamellated slate, suitable for domestic uses, although it has not as yet been worked for that purpose, -	3
Coarse gravel and clay,	4
Another stratum of lamellated slate, which extends beneath the creek, to an unknown depth, - -	10
Making in the whole,	49 feet.

These strata are all placed in a horizontal position, and are well defined.

The valley in which the mineral fountain discovers itself is of a semi-circular form, including the area of an acre.

Differing from all the others of the kind, this water issues from the bank in a *horizontal* direction; it betrays its character the moment it approaches the light, by its sparkling appearance, and the deposit of its iron, which stains the walls of the little rill, as it trickles down the declivity to the marsh, a few feet below, where it has formed a compact rocky substance, resembling in all respects, those heretofore described.

The water is remarkably clear, its taste is acidulous and chalybeate, and its temperature is 47 degrees. One gallon yields the following ingredients.

Muriate of Soda,	-	188.
Carbonate of Soda,	-	10.
Carbonate of Lime,	-	110.5
Carbonate of Iron,	-	7.5
Total,		316 grains.

Carbonic acid gas, 224.5 cubic inches.

From the above analysis, it will be perceived, that as a chalybeate, this fountain is inferior to none; and from its retired and pleasant situation will, no doubt, become a place of considerable resort.

Sulphur Spring.

Between two and three miles from Ellis' Spring, directly up the creek, and near its side, is a strong scented sulphur spring. It rises perpendicularly from the earth, in a stream sufficient to turn a mill, at the foot of a steep bank, composed of sand and clay, intermixed with a great variety of small stones.

The approach to this fountain is discovered at the distance of some yards, by the sulphurous odour with which it impregnates the atmosphere. The water is clear, and but triflingly agitated by the escape of gas. Its taste is unpleasant, slightly resembling bilge-water. It deposits a brown sediment, which marks its passage to the creek the distance of one hundred yards. Its temperature is 50 degrees, while that of a fountain of pure

water, which arises from the same bank, in a horizontal direction and within ten feet of it, is at 46 degrees.

Its properties are indicated from the application of the following tests.

It becomes purple from the addition of a solution of nutgalls; but not after boiling.

It becomes green from the addition of purple-cabbage, and red from the addition of litmus.

Nitrate of silver produces a cloudiness which becomes black in the dark, if the experiment be made with the water fresh from the spring; but otherwise, it does not become dark unless the mixture be left exposed to the rays of light.

Sulphuric acid produces an escape of gas.

Muriate of barytes, no effect.
Oxilic acid, a turbidness.
Lime water, a turbidness.

The following articles were separated from a gallon of the water.

Muriate of Soda,	-	23.6
Carbonate of Soda,	-	1.4
Carbonate of Lime,	-	33.1
Carbonate of Iron,	-	1.9
Total,		60 grains.

Carbonic acid gas 43.5 cubic inches.

Sulphurated hydrogen 11 cubic inches.

The proportions, of these two gases, were obtained by adopting the method proposed by Kirwan. A graduated glass jar was filled with the gas over water, and carefully removed into a vessel containing nitrous acid, the immediate condensing of the sulphurated hydrogen gave the proportions of each.

The sediment about the spring, is composed of iron and lime, combined with a small quantity of white sand, which the water is constantly bringing up; but no experiments, which I made, will warrant the belief, that it contains the smallest quantity of sulphur.

This water has been used, both externally and internally, in various cutaneous diseases, but from the above analysis, it is probable that the sulphurous impregnation adds but little if any to its virtues in these diseases, and excepting as a source of cleanliness, (which may be found in any other water) it possesses no very important properties as a discutant.

Ballston Springs.

The Village of *Ballston Spa*, is situated about seven miles in a southwest direction from the springs at Saratoga.—The great resort to this village, on account of its mineral waters, has made it, like Saratoga, a place of extensive notoriety.

The fountains discover themselves in a marsh at the bottom of a deep valley, through which one of the principal southern branches of the Kayadarossares creek passes. The wells have been sunk from six to eight feet, and the water rises from the bottom through a coarse gravel. The principal fountain is situated near the centre of the village, and the liberality of the inhabitants has ornamented and secured it with a handsome iron paleing, and marble platform. The water rises

to within four feet of the top of the curb, and is there seen constantly agitated by the escape of gas. It is remarkably clear and sparkling, and when drank betrays its chalybeate, as well as its gaseous properties to the taste.

From the repeated application of the several re-agents to the waters of this fountain, they appear to contain no properties to distinguish them from the waters of Saratoga. Its temperature is 50°, and one gallon, or 232 cubic inches, from a careful analysis, yielded the following result.

Muriate of Soda,	-	159.
Carbonate of Soda,	-	9.
Carbonate of Lime,	-	75.5
Carbonate of Magnesia,		2.5
Carbonate of Iron,	-	7.
Total,		252 grains.

Carbonic acid gas, 210 cubic inches.

It is highly important to observe, that although the water, from which the above analysis was made, had been carefully bottled and corked at the spring, and had stood but forty-eight hours previous to the process being commenced, nevertheless it is but reasonable to conclude that a minute quantity of the iron had been precipitated before the process was commenced, from the loss of carbonic gas, which the water is known to sustain from being bottled. We may therefore safely conclude that the water of this fountain, contains the same quantity of iron as the Flat Rock, the Columbian, or Ellis' Spring; that is, $7\frac{1}{2}$ gr. to a gallon, and probably a trifle more than its bulk of fixed air.

This water, if drank in large quantities or when taken by persons whose stomachs are extremely irritable, operates as a cathartic; it is likewise, in most instances, a powerful diuretic; and like

the other strong chalybeates in the vicinity, "is of eminent service to an impaired or capricious appetite, and weakness of the assimilating organs, in irregular digestion, flatulent distention of the abdomen, anxiety about the *præcordia*, difficult respiration from sympathy with the stomach, occasional vomiting of viscid mucus," &c.

Low's Spring.

About one hundred rods further down the creek, and near its side, is the bathing or Low's spring. The waters of which resemble in appearance the one already described, and the application of tests indicate the same properties. Its temperature is 52°, and one gallon is found to hold in solution the following articles.

Muriate of Soda, - -	142.
Carbonate of Soda, - -	10.
Carbonate of Lime, - -	64.5
Carbonate of Magnesia, -	1.5
Carbonate of Iron, - -	6.
Total,	224 gr.

Carbonic acid gas, 220 cubic inches.

Sulphur Spring.

Within twenty feet of the last described fountain, is a sulphurous water which betrays its character to the smell and taste. Its temperature is 52°, and the following substances were separated from one gallon.

Muriate of Soda, - -	64.
Carbonate of Soda, - -	6.
Carbonate of Lime, - -	30.
Carbonate of Iron, - -	4.
Total,	104 gr.

Carbonic acid gas, 144 cubic inches.
Sulphurated Hydrogen, 7 cubic inches.

The Waters of these two fountains are mostly used for bathing, but they are sometimes drank, and the latter is supposed to be highly efficacious in cutaneous diseases.

GENERAL OBSERVATIONS

On the Use of the Waters in diseases.

I SHALL conclude my observations on the waters of these fountains, by a few general remarks on their application in the various diseases for which they have become so deservedly celebrated.

The waters are so universally used, and their effects so seldom injurious, particularly to persons in health, that almost every one who has drank of them assumes the right to direct their use to others, and even empiricks, without any knowledge of their composition, and little or none of their effects, contrive to dispose of their *directions* to valetudinarians to no other purpose than to injure the reputation of the waters, and destroy the prospects of the diseased.

Nothing can be more absurd than the idea that governs many who visit the

Springs for the restoration of their health, that they are to recover in proportion to the *quantity* they drink; for although persons in health may, and frequently do, swallow down enormous quantities of the water with impunity, it by no means follows, that those whose stomachs are enfeebled by disease can take the same quantity with the same effect. Stomachs of this description, most frequently, reject the too copious draught and save the system from the evil consequences that would otherwise inevitably follow, but when it happens to be retained, the result is indeed distressing; the pulse becomes quick and feeble, the extremities cold, the bowels swollen and painful, and the whole train of nervous affections alarmingly increased, and should the unfortunate sufferer survive the effects of his imprudence, it is only to a renewal of his worst apprehensions from a loss of confidence in what he most probably considered a last resort.

Among the great variety of invalids who resort to the Springs, none, perhaps, receive more essential and effectual benefit from their use, than

The Bilious and Dyspeptic.

In the first, if the attack be recent and unattended with any serious organic affection, it is most usually removed in the course of a few days, by a free use of the Congress water; but in those cases where the functions of the stomach and bowels have become impaired, from the long continuance of the disease, attended with anasarcas swellings of the extremities, &c. Although the waters of this fountain may be resorted to with nearly the same assurance of obtaining relief, nevertheless, more caution is indispensably necessary in its administration, for, should a great quantity of the water be drank, without having the proper effect by the bowels and kidneys, it is never bene-

ficial; but on the contrary, frequently increases the most alarming symptoms of the disease. In this case I have been in the habit of recommending the conjunction of some mild cathartic medicine; and for this purpose, two or three grains of *calomel* have been given over night, followed in the morning with three or four tumblers of the water, with the happiest effect; a few doses of this description, usually places the bowels in a situation to be more easily wrought upon by the water alone, and the patient becomes convinced of its efficacy in his disease, from a few days proper application.

In Dyspepsia, it is usual to begin a course of the waters with the Congress. This should be taken in the morning before breakfast, four or five tumblers full are commonly sufficient to produce a pretty copious discharge from the bowels, and in weak irritable habits, half the quantity, or a single tumbler full, in some

cases, is amply sufficient to answer the purpose, but in those cases where the bowels are attended with an habitual constipation, the quantity of water required to move them is apt to prove too cold to the stomach, and by producing cold chills and nausea, frequently defeats the general intention of its application; this may be prevented by taking some suitable laxative over night, and a much less quantity of water in the morning will answer the wishes of the patient without subjecting him to any inconvenience. But the water of the Congress is not, alone, to be depended on for the removal of this disease; when the stomach and bowels have been sufficiently cleansed by the pleasant and innocent purgative properties of this water, recourse must be had to the operation of the more powerful *chalybeates;* these are to be found in the waters of the *Flat Rock*, the *Columbian*, in *Ellis' Spring*, and at the *Spa*.

The quantity of waters, from either of these fountains, to be used daily, depends in a great measure on the state of the disease and the disposition of the stomach; it is therefore necessary to commence their use in small quantities at a time, in distant and regular intervals, gradually increasing the quantity and frequency of the draught as may be most agreeable to the stomach, and least injurious to the feelings. In this way, the quantity may be increased to from one to two quarts a day, and it is questionable whether a much larger quantity may be drank with any additional advantage.

Conjoined with the internal use of the water, bathing should not be forgotten; its exhilarating effect upon the surface, contributes much to the restoration of the vigour and health of the stomach. The cold shower bath should always be preferred where the energy of the system is sufficient to overcome the effects

of the cold, and produce the sensation of warmth over the surface of the body immediately after its application. Where this sensation is not produced, the cold bath should be dispensed with, and the tepid or warm bath substituted in its stead, together with general friction, with a flesh brush or coarse flannel, over the whole surface.

The stimulating effects of these waters, arising from their saline and gaseous properties, give them a decided preference over any other, as a bath; and those who are labouring under a deficient or irregular action of the cutaneous vessels, arising either from a sympathetic affection with a diseased stomach, or from an original affection of the vessels themselves, will find it to their advantage to persevere in its use under this form.

The idea of bathing before sunrise or early in the morning, is entirely errone-

ous. Before bathing, the system should always receive the invigorating effect of moderate exercise and a nutricious repast. The hour of ten or eleven in the forenoon is, therefore, the most suitable time for its application.

In calculous and nephritic complaints the waters have long been celebrated for their efficacy; and numerous well attested instances of their good effects can be produced, where the disease was not only mitigated, but effectually cured. In these cases the subjects of them voided large quantities of sand and small gravel; and for some years past have felt no symptoms of the return of the complaint.

The fountain that would seem to promise most in these diseases, are the Hamilton, and Taylor's Washington, as they contain the greatest quantity of the *ærated alkali.* But the waters have been

usually drank indiscriminately for this purpose, without reference to any particular fountain; it is, therefore, probable that the fixed air and lime add to the *lithontriptic* properties of these waters.

They should be drank in such quantities as to keep the bowels loose, and repeated sufficiently often to keep up an increased secretion by the kidneys.

In chronic rheumatism, the virtues of the waters were celebrated by the aborigines, and later observations confirm the justice of their faith. The Congress water has the most celebrity in this disease. It should be drank in the morning, in sufficient quantities to move the bowels two or three times, followed, through the day, by moderate draughts of some of the other fountains; and, in most instances, the *shower bath* will add much to the efficacy of the water. Fol-

lowing this course, for a length of time, gradually relaxes the rigidity of the muscles, adds strength, and facility of motion, to the diseased joints, and restores ease and vigour to the whole system.

Scrofula, is another disease for which those who are afflicted with it, frequently become applicants to the waters, and experience has sanctioned the belief of their utility in this afflictive complaint. The chalybeate waters are those from which we are to look for the greatest benefit; they must be commenced in small doses, and the quantity gradually increased as the stomach will bear them, and their use continued at least through the summer months. There are but few of this description that have not received advantage; and numerous instances might be adduced, where the less seriously affected have perfectly recovered in consequence of a proper course of bathing and drinking.

In dropsy, arising from viceral obstructions of long continuance, the waters are manifestly injurious, as they invariably increase the swelling and add to the sufferings of the patient; but in recent cases where the affection arises simply from a deficient action in the absorbent vessels, the water has a singular effect in removing it; it should be drank in the morning freely, so as to produce a copious discharge from the bowels, and through the day taken in such quantities as to keep up a pretty constant discharge of urine. The bloating is relieved immediately, and a subsequent course of chalybeates, will finally establish the permanency of the cure.

In *Paralysis* the waters have usually been singularly serviceable; the purgative properties of the Congress render it most applicable to this disease, and its good effects are much increased by the use of the bath.

In chlorosis, and a variety of other complaints peculiar to the female sex, the waters maintain a *high* and *deserved* reputation. In these cases the bowels should be kept loose by the use of the more purgative waters, and the stronger chalybeates should be persevered in for a length of time; their good effects will be accelerated by frequent bathing and moderate exercise.

"The general operation of chalybeates," (says Dr. Saunders in his Treatise upon the Mineral Waters of Europe) "is to increase the power of the secretory system, in a gradual, uniform manner, and at the same time, by the permanency of their stimulus, or some other cause with which we are not well acquainted, to impart a gentle and salutary increase to the body, of strength, tone, nervous energy and general vigour of all the functions. It is, therefore, chiefly in chronic disorders, in those that arise from slow begin-

nings, and are attended with great laxity and debility of the solids, but without much organic disease, that these waters are found to be particularly useful."

Four Pints, or, 115.5 *Cubic Inches of Water from the following Springs, contain the annexed ingredients.*

NAMES OF THE SPRINGS.	Temperature.	Inches of Carbonic Acid Gas.	Inches of Sulphurated Hydrogen Gas.	Muriate of Soda.	Carbonate of Soda.	Carbonate of Lime.	Carbonate of Magnesia.	Carbonate of Iron.	Total amount.
Congress.	50.	171 089	none	235.75	8.25	89.238	1.678	3.084	338
Flat Rock.	48.	126.25		97.4	5.6	53.5	0.75	3.75	161
High Rock.	48.	121.36		105.	9.	57.5	0.25	2.25	174
President.	51.	157.132		67.5	9.5	53.75	1.25	3.	135
Red Spring.	48.	75.25		58.76	12.24	48.5	1.5	3.	124
Washington.	48.	123.5		115.75	8.25	63.75	1.25	3.	192
Columbian.	50.	118.		100.75	11.25	60.5	0.75	3.75	177
Hamilton.	48.	142.		134.75	12.25	73.75	3.75	1.5	226
Ellis' Spring.	47.	112.25		94.	5.	55.25	none	3.75	158
Taylor's Washington.	48.	125.456		156.77	13.23	70.	2.75	2.05	245
Jackson.	50.	128.25		120.	9.	51.9	1.5	2.6	185
Alexander.	48.	126.5		119.2	9.8	59.75	3.5	2.75	195
Ballston Spa.	50.	105.		79.5	4.5	37.25	1.25	3.5	126
Low's.	52.	110.		71.	5.	32.25	0.75	3.	112
Sulphur.	52.	72.	3.5	32.	3.	15.	none	2.	52
Saratoga Sulphur.	50.	21.75	5.5	11.8	0.7	16.55	none	0.95	30

Since the foregoing observations were in type, a new analysis, of the "Mineral Waters of Ballston and Saratoga," has appeared with directions for their use, &c. &c. by *William Meade*, M. D.—The essential difference, in the two results, merit a more attentive examination than the present situation of this work will admit of.

It is somewhat singular that the Doctor should be able to detect muriate of lime and muriate of magnesia, without observing the appearance of the carbonate of soda, which, from my experiments, and all those that have preceded them (many of which have been performed by the most eminent chemists in the *United States*) is made too obvious to escape the most superficial observer. On this subject, I have only to observe, that alcohol purified by dry muriate of lime, as

directed by Accum, Experiment CXII, Art. XXXI. could not, by me, be made to take up the smallest quantity of the saline property from the residuum of any of the waters. That the muriate of magnesia might remain, in a very *dilute* state, with the solution of the carbonate of soda, is possible; that it does in a concentrated state, is *inconsistent* with the present knowledge of chemical facts.

I am happy to observe that the result of my experiments, on this subject, are corroborated by those of Doctor Dana, of Boston, on the Congress water, and published in the New-England Journal, No. I. Vol. VI. page 22.

With regard to the difference in the quantity of iron held in solution by the waters, with the utmost deference to the opinion of a "*member of the royal physical society of Edinburgh*," I will venture to affirm, that any member of an American *Fe-*

male Herbal Society from the simple application of an affusion of her tea leaves, would be able to draw a more accurate comparison of the relative chalybeate properties of these fountains.

The method which I adopted to aid my inquiries on this subject, was often repeated on different quantities of the waters, and always with the same result. I shall, therefore, rely on the *liberality* and *wisdom* of my own countrymen to correct the errors or confirm the facts.

With regard to the Doctor's lengthy observations on the medicinal qualities of the waters, it is believed, that had he omitted this part of his book until he had acquired a more *experimental* knowledge of their use in diseases, he would have done more credit to himself, and certainly have been more useful to the public.

5 Shirts
6 Cravats 1 Spread Hf
4 pr Stockings 2 pr slippers
1 pr Pantalo
2 Hfs