The use and abuse of the Harrogate mineral waters / by Arthur Roberts.

The New Analyses.

The Use and Abuse of the Harrogate . . Mineral . . . Waters. . . .

By

Arthur Roberts, M.D.,

M.R.C.S., Eng.

Third Edition, Revised and Re-written.

PRICE SIXPENCE.

PRICE SIXPENCE.

BY THE SAME AUTHOR.

THE HARROGATE MINERAL WATERS.

NEW ANALYSES.

WITH OBSERVATIONS.

The Lancet, June 24th, 1894:

"The drinking waters of Harrogate.—Dr. Arthur Roberts has recently undertaken a new analysis of the chief drinking waters of Harrogate. In his investigations he has had the assistance of Mr. Fairley, the city analyst for Leeds, and Mr. Singer, of Calverley. Although regular periodical examinations are made of the bathing waters of Harrogate, it would seem that some time has elapsed since the drinking waters were subjected to chemical analysis. Thus, the Tewit Well—the first to be discovered at Harrogate—has not been analysed since Professor Hoffman analysed it in 1854, and some of the others had not been analysed for twenty years until the present time. The first point that was elicited in the course of Dr. Roberts' investigations was that while the saline ingredients varied considerably from time to time according to season and temperature of the air, the amount of sulphur in the Harrogate waters remained practically unchanged The amount was 0·6596 grains per gallon in April and 0·5101 grains in June, in which latter month the amount of sulphur attained its minimum. In the Old Sulphur Water of the Royal Pump Room it was found that since the analysis of Professor Thorpe in 1875, there was apparently some decrease in the amount of sulphuretted hydrogen, sodium, and chlorine present, and an increase of the amount of silica, calcium, and potassium. In the Strong Sulphur Water of the Montpellier Gardens a diminution of the saline constituents from 1,003 grains per gallon to 724 grains was noted since the analysis by Professor Attfield. The amount of sulphur was found to have remained the same. The quantity of barium salts had increased considerably. In the Mild Sulphur Water of the Montpellier Gardens there had been some increase of chloride of sodium. In the Magnesia Waters some decrease in sodium, potassium, and calcium was observed. The Chalybeate Waters were found to have rather less iron than at

the time of the last analysis by Professor Attfield in 1879; considerable less chloride of sodium, which is an advantage, and a marked increase of barium and bromide was found in these waters. In the Tewit Well already mentioned, the investigations of Mr. Fairley showed an increase in the amount of iron, calcium, and sodium, with a decided decrease in the amount of potassium Dr. Roberts, in his pamphlet, from which we have taken the above facts, discusses the therapeutics of the Harrogate Waters, which he recommends in skin diseases, affections of the stomach, liver, and kidneys, gall-stones, gout, rheumatism, lumbago, sciatica, nervous exhaustion, &c.

British Medical Journal, Oct. 6th, 1894. Page 761 :—
The Harrogate Mineral Water; New Analyses, with Observations. By Arthur Roberts, M.D.
(Harrogate, R. Ackrill, 1894. Cr. 8vo., pp. 48. 6d.)

"The New Analyses, to which this pamphlet refers, have been made by Mr. Fairley, F.R.S.E., of Leeds, and Mr. Singer, F.C.S., of Calverley, and they are especially interesting, as showing to what a degree the quantitative composition of Mineral Springs may vary from time to time. Even in the same year the quantity of solid ingredients in the same spring was found to vary to the extent of 35 grains per gallon. In the 'Strong Sulphur' spring, since Professor Attfield's analysis in 1879, the saline constituents have decreased from 1003·000 to 724·794. In the same spring the quantity of barium has increased from 0·240 to 3·173 grains. Moreover, Mr. Fairley found an appreciable quantity of bromide present, and Professor Attfield found none. In another spring, 'Mild Sulphur,' the magnesia had increased from 1 grain (Professor W. A. Miller, 1869) to 9·4 grains. In another, there is an increase of 61 grains of chloride of sodium per gallon. In another, 'Starbeck,' the potassium has increased from 0·368 grains to 11·157 grains, and the lime has decreased by one half. The 'Kissengen' water has lost 219·706 grains of saline constituents. In 'Muspratt's Well,' the so-called Chloride of Iron water, the quantity of iron, according to this recent analysis, is 3·603 grains of carbonate of iron and 3·941 of chloride of iron, against 11·622 grains of carbonate of iron and 13·898 of chloride of iron in the analysis of 1881. These extracts from this useful pamphlet show how very important it is that Mineral Springs should be frequently analysed, and how delusive often the published analyses may be when they have remained uncorrected for a long series of years."

SALINE RESIDUES

OF THE

HARROGATE WATERS.

Chloride of Iron,
Royal Baths.

Alexandra Chalybeate,
Royal Pump Room.

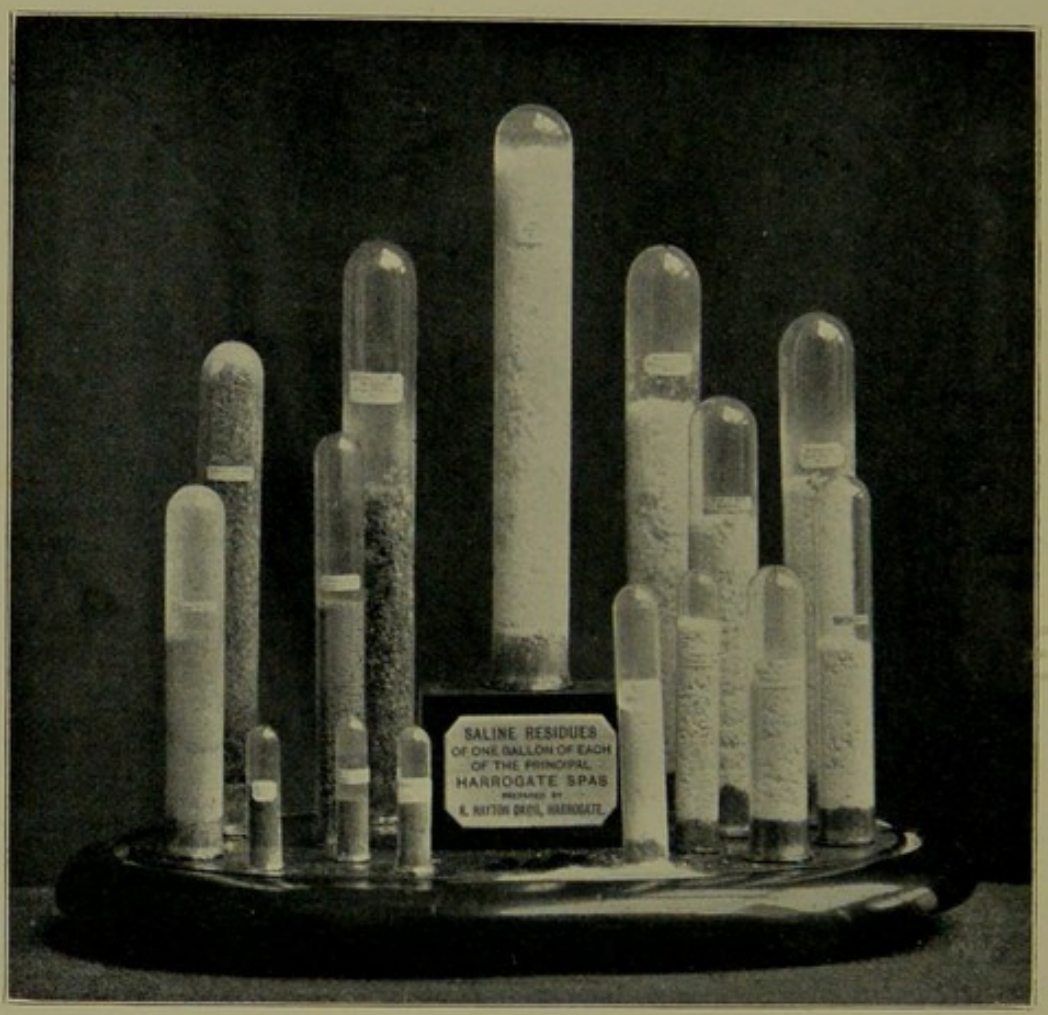
Kissingen Water,
Royal Baths.

Old Sulphur,
Royal Pump Room.

Strong Sulphur,
Royal Baths.

Mild Sulphur,
Royal Pump Room.

Mild Sulphur,
Royal Baths.



GREAVES

HARROGATE

Alum Water,
Bogs Field.

Tewit Well, Stray,
near Prince of Wales.

Pure Chalybeate
Royal Pump Room.

St. John's Well, or Old
Spa, Wetherby Road.

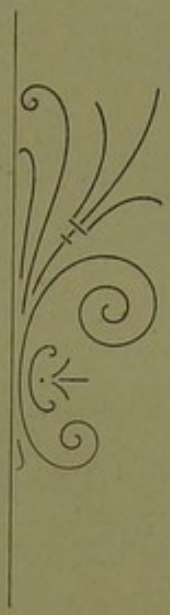
Starbeck Sulphur Water

Harlow Car Sulphur.

Magnesia at Bog Field,
Valley Gardens, and
Royal Pump Room.

No. 36 Well, Valley
Gardens.

THE USE AND ABUSE OF THE HARROGATE MINERAL WATERS



BY

ARTHUR ROBERTS, M.D.

THIRD EDITION, REVISED & RE-WRITTEN.

PRICE SIXPENCE.

HARROGATE:
PRINTED AND PUBLISHED BY R. ACKRILL, "HERALD" OFFICE.
1901.
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PREFACE.

It is not necessary to write a long preface. In this Edition are incorporated my pamphlets:—"The Harrogate Mineral Waters; New Analysis with observations," (published seven years ago), and the one on "The Use and Abuse of the Harrogate Mineral Waters" (published five years ago). The treatment at Harrogate now, not only includes the Sulphur and Chalybeate Waters and Sulphur Baths, but also the most recent improvements in the therapeutic use of Air, Water, Heat, Light, Electricity, Exercise, Movement and Diet. The ever present thought in the mind of the Physician is to find out the easiest, simplest, and readiest way to restore the patient to health, and this by as little inconvenience to the patient as possible.

KINGSWOOD HOUSE,
2, PRINCES SQUARE,
HARROGATE.
14th March, 1901.

INDEX.

THE USE AND ABUSE OF THE HARROGATE MINERAL WATERS.

So much has been written in praise of the Harrogate Mineral Waters, that it seems advisable to issue a word of warning against their abuse. Their therapeutic value stands so high in England, that it would be a great misfortune to invalids if the abuse of them were to bring discredit on them. When rightly administered, they cannot be too highly praised, but the popular idea seems to be that they cure every disease, and can be taken with advantage in any manner, and at any time. This, of course, is not the case, any more than it is with any other medicine.

Early writers on the Harrogate mineral waters have recorded many cases of patients being made ill, who certainly ought never to have taken the sulphur waters at all. Patients have come under notice, who, for the first few days have drunk the waters with benefit, but at the end of a week or so, have experienced a general feeling of *malaise*, accompanied with more or less headache and flying pains in the joints and muscles. Symptoms sometimes manifest themselves during the drinking of the waters, which, if carefully watched by the physician, are often beneficial, and result in the disease being cured. It will be easily understood that when the gouty poison is hidden in the system, and the sulphur water brings it to the surface, or to one of the joints, by careful management this may lead to a cure. Most writers have warned people of these dangers.

The waters are very powerful medicinal agents, which must not be taken without the advice of experience. London physicians have frequently pointed out to the author the bad effects that they have seen produced by the Harrogate mineral waters, and the occasional serious results to patients who have gone to consult them after their visits to Harrogate. One physician writes in the following strain:—

> "It is a great pity that people will insist on drinking such large quantities of the Sulphur Water, thus doing themselves harm. Harrogate is such a healthy place, the air well supplied with ozone, and such splendid medicinal uses in the chalybeate waters."

These results are often brought about by doctors at a distance prescribing the waters for their patients. The patients come to Harrogate and follow their doctor's prescription of the waters or baths, or both, until they are quite ill, and then either consult a Harrogate physician or go home in disgust, blaming the waters, the baths, the place, but never thinking that it is impossible for a doctor at a distance to understand the proper uses of the water. The Harrogate physicians may be called specialists as far as regards the waters and baths, and when a patient comes to Harrogate for treatment the physicians expect that the doctor at home has used the best medical treatment, and that the patient is sent to Harrogate for the waters and baths.

Sometimes the doctor at home will send a patient with special directions not on any account to have a bath, or not to take this water or the other. If medical men, when sending a patient to Harrogate, would kindly write to the doctor explaining the nature of the disease, and the peculiarities of the patient, and leave the treatment as to baths or waters with the Harrogate doctor, it would be more beneficial for the patient as well as the doctor.

As has been pointed out, these waters are powerful medicinal agents, and, like any other medicine, their action

on the body must be watched and controlled when necessary. The treatment may have to be completely revised and altered within a week.

It will be necessary to point out why the waters cannot always be beneficial, and may sometimes be disastrous to the patient. To understand this, we must investigate some of the conditions of health and disease, as well as the constituents of the waters.

CONDITIONS OF HEALTH AND DISEASE.

Health is the result of the uniform action of all the organs of the body working in perfect harmony and accord. As soon as this equilibrium is disturbed there is an alteration of the action of one or more organs. This disturbance, if not soon remedied, may be the first step to disease. When then does this departure begin? We know that the blood is supplied with nourishment by the digestion of food in the stomach and bowels, and the amount of oxygen in the blood is affected by the quality of the air breathed, whilst the circulation is influenced by the amount of exercise taken, and the effect of heat and cold, whether dry, moist, or wet, on the skin.

Excluding acute and infectious diseases, we can trace all diseases to one or other of the following causes:—

1. The result of digestion, whether it is good, bad, or indifferent, on the blood. This includes the formation in the bowels of ptomaines, leucocytes, and toxins, which, when absorbed into the blood, act as a direct poison, expending their force chiefly on the nervous system.

2. The effect of the circulation of the blood on digestion.

3. The effect of respiration on the blood. This may be altered by the purity or impurity of the air inspired, the altitude at which the air is inspired, the dryness or moisture of the air, and the variation of the circulation, as affected by the condition of the heart and bloodvessels.

4. The amount of exercise taken and the character of exercise.

5. Whether sufficient rest is obtained, and also whether it is taken at the proper time and under suitable conditions.

6. The effects of light on the system.

7. The effects of heat and cold on the body, whether in the form of air, vapour, or water.

Lastly, the state of the nervous system.

The unhealthy products of digestion, acetic acid, butyric acid, carbonic acid, lactic acid, sulphuretted hydrogen, &c., are formed and absorbed into the blood, and poison the tissues. Some of these are oxidised in the tissues, and their injurious effect prevented; but many, after having pervaded the blood and tissues, are carried to the kidneys, where they are excreted and pass out of the system.

Under the name of ethereal sulphates, these products of putrefaction are found in the urine. The most important of these substances are the ethereal potassium sulphates of phenol, cresol, catechol or pyrocatechin, indol, and skatol. They are formed in the bowels as a result of putrefaction of the food, pass into the blood stream, and are eliminated by the kidneys. Hence the importance of very careful examinations of the urine, repeated from time to time. Besides the ethereal sulphate in the urine, there are other sulphates which are always present. In healthy people these latter are the only sulphates found in the urine, and unless putrefaction is going on in the bowels, or there is a tendency to the

formation of abscesses in the body, the ethereal sulphates are not found. Simple constipation does not cause them to appear in the urine; hence, as Dr. Halliburton says, "The best criterion of the occurrence and amount of putrefaction in the body is the relation of the ethereal sulphates in the urine to the total sulphates."

When putrefaction has begun in the bowels, alteration in diet alone will not stop it. The evil may go on for a long time, and the patient not know it, for his appetite often remains good, and thus the stomach is overloaded, and in some cases dilation of the stomach will come on, leading (as pointed out by Dr. Bouchard, of Paris, in his valuable work on "Auto-intoxication") to headache, a feeling of great depression, an uneasy disposition, sensibility to cold, insomnia, vertigo, obscuration of sight, double vision, partial and fleeting dropsies of one or more limbs, contraction of the extremities, &c. Palpitation, even sudden syncope, may be caused by the result of this putrefaction in the stomach and bowels. Constipation often accompanies this condition, leading to a still greater absorption of poisonous products, or diarrhœa may come to the rescue, but it often fails to bring away the putrefactive mass. Give this patient a few days of the strong sulphur water and you wash out all this putrefactive mass, and the headache is gone, the malaise has passed off, and the patient feels a general well-being, and is fit for anything. But when the bowels have been well cleansed of these fermentative products, great care must be exercised as to the continuing of the strong sulphur water. Many can continue to take it for a fortnight, or three weeks, and the author has known patients who have taken it for six weeks without any apparent injury. Still, it is wiser to discontinue the strong water and take either a mild sulphur water or a chalybeate water.

The rule laid down by the late Dr. Short was very good: "If after you have taken the strong sulphur water for a few

days, or a week, you feel nausea after taking it, it is time to stop it." This nausea must not be confounded with the nausea often experienced the first morning or two of drinking the sulphur water. Sulphuretted hydrogen in moderate doses has a very beneficial action on the system, and stimulates the formation of healthy blood; but if taken in too large quantities, or for too long a time, it produces toxic effects.

Senator records the following striking case: One of his friends was suffering from indigestion, in which sulphuretted hydrogen was produced in the bowels of the patient. There was vomiting; and eructations were given off both by the mouth and rectum. The symptoms consisted of fainting, anxiety, and clouding of the intellect. These symptoms shew themselves in many who have taken the strong sulphur water for a week or ten days, and, who, during the first few days, said they never felt better in their lives. But the effects of this water are not only caused by the sulphuretted hydrogen, but by the large amount of salts, chloride of soda, potash, lime, &c., thus absorbed into the blood. Its specific gravity is raised too high, and the tissues are over-supplied with saline constituents.

The following sometimes occurs: A patient comes to consult a medical man, and is advised to take the sulphur water for three days or so, and then to return. He finds, however, that he is so much better, that he continues the sulphur waters for a week or ten days, when he suddenly finds himself feeling poorly, and worse than he was when he began to take them. Then he thinks he had better go and see the doctor. He tells his consultant that the waters do not suit him, and that they have made him worse than he was before. On being asked why he did not return when requested, he says, "Oh! I felt so well, and thought the waters were doing me so much good, that I did not think it necessary to trouble you." Examination of the blood under the

microscope shows that some of the red corpuscles are beginning to disintegrate and shrivel up. Had he returned, and had the waters changed to one of mild sulphur, or one of the chalybeate waters, he would have been saved all his suffering and ill-health, and gone home to tell his friends how much good the Harrogate waters had done him.

Further attention must be drawn to the fact recorded by Roth, of Wielbach, that "Sulphuretted hydrogen entering the portal vein by diffusion attacks the iron of decaying blood corpuscles, and thus aids their destruction." And Dr. Oliver adds: "The strong affinity for iron which the sulphur present in sulphides is well known to possess, as well as the clinical value of sulphur waters in congestive states of the liver and portal vein, favour this theory." He also quotes Professor Gubler, who says: "Once having reached the blood, sulphur acts as a diffusible stimulant; it accelerates the circulation, raises the temperature, inflames the viscera, almost determines hemorrhages, causes headache, sometimes giddiness, increases cutaneous transpiration, and produces—when the dose is large and long continued—an appreciable febrile movement."

The reader will note that Professor Gubler says when large and long-continued doses of sulphur are taken evil results may follow, and it is this point the author would particularly emphasize. The sulphur waters are excellent medicines *if taken in suitable doses, and not continued too long.* The experience of physicians for centuries has proved their value.

THE DISEASES FOR WHICH THE HARROGATE TREATMENT IS SUITABLE.

And in saying Harrogate treatment it does not mean that each patient must of necessity drink the waters. As has already been pointed out, there is at Harrogate such a large variety of treatments in the way of electricity, light, super heated baths, ordinary sulphur baths, massage, &c., that any

chronic disease that is curable may be cured or alleviated at Harrogate. The various conditions of the climate will be pointed out in another place.

GALL STONES, DISEASES OF THE LIVER, AND JAUNDICE.

These diseases are almost typical cases for the beneficial action of the sulphur waters. They cause the transudation of fluids from the blood to the bowels, and thus relieve portal congestion. They also have a solvent action on the mucus, both in the bowel and gall duct, and by cleansing the latter from its mucus, enable the gall stones to come away and set free the pent-up bile.

INDIGESTION.

Indigestion, either in the stomach or bowels, is greatly relieved by the mild sulphur waters, and, along with a a special diet, is, in some cases, cured.

NERVOUS CONDITIONS, BRAIN FAG, &c.

These conditions benefit very much by the use of the chalybeate waters and suitable baths and massage, with or without electricity. But patients suffering from these troubles must give plenty of time to the cure, which is shortened in duration by the bracing climate and the inducements to take suitable exercise on the Stray. The sulphur waters have an injurious effect on the neurotic temperament.

HEART DISEASE.

In recent years it has been found that many forms of Heart Disease are very much benefitted by baths. At Nauheim, in Germany, the waters have a special beneficial action in these diseases. By the addition of certain salts to the Harrogate waters we can have a bath exactly like the ones at Nauheim. For years the Harrogate doctors have used these

baths, and also the exercises. Exercises, especially those done quietly and carefully, have been proved to be exceedingly useful to patients suffering from heart diseases.

ALBUMINURIA.

This has often been cured whilst taking the waters and baths. At first, years ago, the author would not allow patients suffering from albuminuria to drink the waters, but now he has many times seen the albumen entirely disappear whilst drinking the waters. By albuminuria, the author does not mean Bright's Disease, though the latter is very much relieved by a judicious course of treatment at Harrogate.

ANAEMIA.

This is common in all diseases, and in their treatment we have first to consider whether anæmia is present or not, and to what extent it is present. We will first, however, speak of anæmia, as it is generally understood, as a disease by itself. Anæmia may be described as of three kinds: 1st, where there is a diminution of the red corpuscles, the white remaining the same; 2nd, where there is a diminution of both the red and the white corpuscles; and 3rd, where the red are in their natural number, but there is a distinct increase of white corpuscles.

In the first two divisions, the sulphur waters would act as a direct poison, and might produce a most serious condition, but in the third, a short preliminary course of mild sulphur water would be beneficial. In all cases of anæmia the iron or chalybeate are very good, and will cure the patient both of the anæmia and often of the accompanying constipation. Yet people suffering from anæmia will persist in drinking the sulphur waters. Fortunately, nature comes to the rescue and rejects the sulphur waters; thus saving the patient. Harrogate supplies a rich diversity of chalybeate waters, which, taken in conjunction with the baths, are of the greatest service.

GOUT.

In this disease we have an excess of the white corpuscles, with, in some cases a diminution of the red, and in others, the red are found in normal quantities. If the strong sulphur waters are given to a person suffering from gout, in whom there is a diminution of the red corpuscles, *he will soon find himself getting worse every day*. Where there is a normal number of red corpuscles, a few days, or even longer, of the sulphur waters may do good, but their action on the blood must be carefully watched. In gout the baths are especially useful, and, combined with the chalybeate waters, frequently cure the patient.

RHEUMATISM.

In this disease there is generally distinct anæmia, hence the sulphur waters must be taken with great caution. On the other hand a course of the chalybeate waters, with suitable baths, cannot be otherwise than of service.

RHEUMATOID ARTHRITIS.

In this disease the sulphur waters must never be drunk. Rheumatoid Arthritis may be greatly benefitted by taking the chalybeate waters and having a course of Dowsing's Radiant Heat and Light Baths.

SKIN DISEASES.

Here again the question of how much anæmia is present must determine which of the waters will be most suitable. No rule can be laid down further than the one that if there is a diminution of red corpuscles the sulphur waters must not be given for long, if at all. The action of sulphur baths on the skin is so well known that they are only mentioned to be recommended. The skin and horny growths, as the hair, nails, &c., contain a sulphur compound, termed "Keratin." Prof. Gamgee* says: "The sulphur in keratin is very loosely com-

*"Physiological Chemistry," by Prof. Gamgee (page 298).

bined, and when heated with barium hydrate and water in sealed glass tubes, nearly the whole of the sulphur is obtained in the form of sulphuretted barium, Ba. (S.H.) 2. (Hoppe-Leyler)." In diseases of the skin the epidermis often appears to have lost its power to grow. This may be due to a want of the sulphur element, or of an occasional stimulant such as a Russian or a Vapour Bath. In order to increase the action of the sulphur water on the skin, arrangements have been made, for the last two years, for a current of Electricity to be passed through the sulphur water during the bath. It was demonstrated that by using a continuous current of not more than 20 milli-amperes, with the positive pole applied to the body, there was a deposit of sulphur on the skin, and hence a rapid cure of the skin disease. In order to demonstrate this more perfectly, Dr. Smith asked Professor Smithels, of the Yorkshire College, and his assistant, Dr. Dawson, to make some experiments, which* fully proved the truth of what has been acted upon for years, that the sulphur is deposited upon the skin. By this means, not only is the skin disease cured, but a strong, healthy, firm skin is formed.

DISEASES OF WOMEN.

These diseases are always a special study to medical men. The Harrogate waters are found very useful in conjunction with the various baths. In prescribing the sulphur waters great care has to be exercised, especially in connection with the question of anæmia. A lady comes to Harrogate and takes the sulphur waters with marked benefit, and returns home wonderfully improved. She returns next year to take them again, and, as her previous prescription of the sulphur waters answered so well, she does not consult her doctor. Alas! she

*Vide "British Medical Journal," 16th February, 1901, page 393.

finds on this visit that the waters are doing harm, and determines never to come again. If she had only consulted her physician again he would have found that she was suffering, in addition to the old symptoms, from anæmia, and that she must not drink the sulphur waters at all, but take a course of sulphur baths, and drink one of the chalybeate waters. Had she done this, all would have been well, and she would have returned home praising the wonderful effect of the Harrogate mineral waters.

CORPULENCE.

Many suggestions have been made for the cure and relief of obesity. As people grow old, they frequently become too fat, and invariably the heart and lungs are impeded in their work, and though perhaps they may go on for years in an *apparent* good state of health, they have lost their stamina, and have no resource within themselves to cope with any acute disease or strain that may come upon them. Many very stout people thus go on for years, but the first attack of inflammation of the lungs or other acute disease exhausts them and they cannot fight against the disease.

It is not altogether a question of how much you eat, but also of how often. Three things are wanted. (1.) A suitable diet. (2.) Such waters and baths as will best promote the healthy action of the stomach and liver, and improve the circulation and respiration, and enable the skin to throw off the waste products. (3.) Such exercises—and when necessary, massage—as will increase the vitality and growth of the muscle.

For the sake of those who are interested in obesity and also in people who are too thin, I have had printed a table setting forth the weight from any given height from 5ft. to 6ft. 3in.

TABLE OF NORMAL WEIGHTS.

These are taken from a record averages compiled by insurance companies, taken from observation of over three thousand persons. They include weight of ordinary clothing:

Height. ft.	in.	Min. Weight. st.	lbs.	Max. Weight. st.	lbs.	Average. st.	lbs.
5	0	7	0	9	6	8	3
5	1	7	4	9	12	8	8
5	2	7	8	10	4	8	13
5	3	7	13	10	10	9	4
5	4	8	3	11	1	9	9
5	5	8	7	11	7	10	0
5	6	8	9	11	11	10	3
5	7	8	11	11	13	10	5
5	8	9	0	12	2	10	8
5	9	9	5	12	11	11	1
5	10	9	10	13	2	11	6
5	11	9	12	13	8	11	11
6	0	10	1	14	0	12	2
6	1	10	4	14	6	12	7
6	2	10	11	14	11	12	12
6	3	11	3	15	3	13	3

EXCESSIVE LEANNESS.

A great many people are too thin, and it is far more difficult to get a person to put on flesh, than to reduce it. Still, there is a great danger with people who are too thin, and a well devised plan ought to be thought out by their physician to obviate this leanness.

This condition is only alluded to as one that may be very much benefitted by a true course of treatment.

TAKING THE TREATMENT.

HINTS BY THE WAY.

Instances where people have made themselves ill by indiscriminately drinking the waters often come under the author's notice. These are frequently people who have come to Harrogate for a few day's change of air and rest, and who think because they are in Harrogate they must do as other people, and drink the waters, with the result

that often they make themselves ill. In another place it has been pointed out how necessary it is for a patient under treatment to have the advice of a special physician. There is an old proverb, "What is worth doing, is worth doing well," and if a patient is poorly enough to come to Harrogate for treatment, it is indispensable for his health and even more economical to consult a physician and get cured as quickly as possible.

It should be pointed out that it is not always necessary to drink the waters, and many diseases can be cured without doing so. We are now able at the Public Baths to administer every kind of Hydropathic, Chromopathic, Radiant Heat, Electro-thermic, and other treatment, and in the larger number of patients it is not necessary to drink the *unpleasant* sulphur water. The sulphur and chalybeate waters are used both internally and externally. A word or two on both aspects will be useful, and first as to the internal use of the waters.

DRINKING THE WATER.

Special glasses are sold at nearly all the chemists with marks for measuring the ounces. All the hot sulphur waters ought to be drunk quickly, or else the sulphuretted hydrogen, which is one of the most important constituents of the waters, escapes. It should not, however, be gulped down as if there were a train to catch. It is better to drink all the iron or chalybeate waters through a glass tube, which is sold by the chemist for the purpose. The chalybeate waters are used only for drinking. The usual hour to drink the waters is from 7 a.m. to 8.30 a.m. The drinker gets up about 6-30 to 7-0 a.m., dresses quietly and walks down to the waters, or if too weakly for this, rises about 7-15 a.m. and dresses in time to go down from the

hotel in the bus at 8 a.m. Breakfast being at nine, this is rather late to begin drinking the waters, but after all it is a matter of convenience to the visitor, provided breakfast is not taken for an hour after the last glass is drunk. Generally, a visitor drinks one or two glasses in the early morning between 7-0 and 8-30 a.m., and then again in the forenoon between 11 and 12-30, and when necessary, in the afternoon between 4 and 6-30. When patients enjoy an afternoon cup of tea, this may be taken about 4-30 p.m., but without anything to eat, and the evening water at 6-0 p.m. when they dine at 7-0 p.m. It is not necessary in all cases to take the water three times a day, and sometimes it is better for the patient to omit the morning water altogether or else to take it in bed. Another point in connection with drinking the waters: there is an old idea, that people should not drink both a sulphur water and an iron or chalybeate water on the same day. This is quite true, if you drink them near together, but if you have a meal between, it is not only safe, but in many cases beneficial.

A band plays three times a day during the season: in the morning from 7.30 to 9 at the Crescent Gardens, and from 3.0 to 4.30 p.m. in the Valley Gardens. If wet at either of the above times, the band plays in the Winter Garden, which is comfortably warm in cold weather. In the evening, from 7.30 to 9, the band plays in the Spa Concert Rooms.

THE BATHS.

It might be useful to point out some of the chief reasons why people complain that the baths do not agree with them. It is important to understand that the therapeutical effects of the baths depend upon *(a)* the preparation of the patient for the bath, *(b)*, the nature and application of the bath itself, and *(c)* the treatment after the bath. *(a)* The preparation for the bath. The patient must be warm and comfortable, not

fatigued. The patient should always get to the Baths a little before the time in order to rest in a warm place, or to walk slowly about until the bath is quite ready. *(b)* The bath. If the patient is to have a sulphur slipper bath he should lie quietly in the water the prescribed time, rubbing his arms, legs, and body occasionally, to help the circulation of the blood through the skin. A little rubbing of the body helps the action of the water very much. If a joint is swollen this may be carefully rubbed, but if the patient is weakly he must be careful not to tire or exhaust himself by rubbing. *(c)* The treatment after the bath. This is very important. The patient must carefully wipe himself dry, or if unable to do this he must have assistance. He should then lie down for ten minutes, and dress slowly. He should then quietly return to his lodgings or hotel, and lie down until the next meal.

When returning from the bath it is imperative that the patient should not look in shop windows, nor call in shops to make purchases, nor stop to talk on the way home to his friends. Neither ought ladies to walk and sit in the hotel gardens during the evening after dinner, without warm wraps over their shoulders and round their necks, and warm shoes on the feet. All these may appear simple, but oftentimes it means the difference between catching a cold, and suffering in consequence from rheumatic or neuralgic pains here and there; and the treatment going on without these drawbacks until health is re-established. If we get an extra cold day, it would be much better for the patient to wait a day or two before taking the bath. Nothing is lost by being careful, nor gained by being in a hurry.

PROPER TIME FOR TAKING THE BATH.

Unless otherwise ordered, the best time to take a bath is two hours after a meal. The Author has seen much mischief done by taking an Aix Douche or Vichy Douche on an empty stomach before breakfast. People do this in order to have a day free to go to some place of interest; but they forget that they come to Harrogate to be cured of a disease, and that the proper treatment of this must be considered before pleasure. To come to Harrogate for a week or a fortnight to drink the waters and have the baths, and expect to have an excursion every day, or every other day, and yet get benefit from the waters, is simply absurd. **If people want pleasure, let them have pleasure; but if they want to be cured of their disease, let them devote themselves to curative measures.**

SPA DIET.

Little need be said about diet, for the best is an ordinary diet. Do not eat between meals, but at each meal eat sufficient. On the other hand do not overload the stomach. Three meals are quite sufficient and no one ought to have more, except in very special cases when ordered by the physician. Afternoon tea may be taken with great advantage to the patient, *provided always* that nothing, not even a biscuit, is eaten with it. Physicians have tried to hit upon a typical diet for patients taking the waters, but experience has taught that the ordinary mixed diet is the best. **After the course of waters is completed the patient should take a more particular diet according to his disease,** but whilst taking the waters and especially the sulphur waters, do not alter your diet on any account. Dr. Andrew S. Myrtle, who has been in practice in Harrogate for 43 years, is of the same opinion.

Generally speaking, the best diet is one composed of meat—beef or mutton, white fish, eggs, toast, butter, vegetables, watercress, nettles, salads, plenty of ripe fruit of any kind in season, except rhubarb. Tomatoes may be eaten occasionally. Strawberries should never be eaten by anyone suffering from skin disease. Nuts if ground in a nut mill and well chewed may be eaten. Almonds and raisins even without the port, form an excellent addition to the fare. Nuts contain plenty of oil which keeps the body warm and improves the condition of the skin Young ladies suffering from anæmia or chlorosis, should not take carbo-hydrates or starchy food. The best diet for anæmia, even when taking the chalybeate waters and baths, is red meat, beef or mutton, fruit, and nuts. Anæmic people and those suffering from neurotic diseases, should not eat rhubarb or tomatoes. Butter may be eaten freely, and sugar.

MASSAGE, EXERCISE, AND MEDICAL GYMNASTICS.

These are so well known that it is not necessary to say much about them. Like all health resorts, we have some very good and well trained Masseurs and Masseuses, and we have many that do not understand their work at all. The spinal exercises in heart disease have done so much good that every medical man and every nurse ought to be thoroughly versed in them, and able to apply them at the houses of the patients. These exercises, with or without the Nauheim baths, have been a great help to patients suffering from heart disease who have come to Harrogate, and the facilities for long *level* walks have no doubt helped the treatment. It is not necessary to describe the uses of massage and exercises for rheumatic and gouty joints. That massage and exercise are now overdone, there is abundant evidence, but it only points more than

ever to the desirability of all exercises and massage being carried on not only by trained masseurs, but also under the eye of the physician. It is to be feared that if more control is not used about this question of exercise, really useful means of treatment and cure will fall into disuse. In nervous diseases, paralysis agitans, locomotor ataxy, &c., exercises properly regulated are very useful. These are all so fully described in works written for this purpose, that it is not necessary to do so here.

THE BATHS.

Since the publication, in 1894, of the Author's pamphlet on the Harrogate Mineral Waters with new analyses, the Royal Baths have been completed, and the Corporation have purchased several new sulphur springs, including the Starbeck Sulphur Baths and Water.

The Sulphur Waters and Baths may be obtained at the following places :—

The Royal Baths.—Every class of bath may be obtained here, except the Thermal Sulphur, and in addition to the sulphur water there is a special sulphur water called the Beckwith Water. From Easter to the end of October, sixpence a bath extra is charged at these baths.

Victoria Baths.—The baths obtained here are the Thermal, the Strong, and the Mild Sulphur, the Combined Needle Bath, the Nauheim Baths, the Harrogate Massage Douche, the Liver Pack, and the Vapour Bath. Here both first and second-class Strong and Mild Sulphur Baths may be obtained, and there is a reduction of 6d. a bath before 9 a.m. and after 5 p.m.

Starbeck Baths are two miles out of Harrogate, and can be visited by walking, by bus, or by rail. The fare by bus or rail is twopence each journey. The bus starts from the top of Albert Street near Station Bridge. Here there is a swimming bath, and also sulphur slipper baths. The swimming bath is filled with an alkaline sulphur water (vide new analyses) which is very pleasant and soothing to the skin. No one suffering from skin disease is allowed to enter it. All the above belong to the Corporation.

Harlow Car Sulphur Baths. — These baths are very useful in certain forms of skin diseases, in rheumatism, and gout. They are a very mild alkaline sulphur water (vide table of new analyses). They are given in the form of slipper baths and needle baths. The last few years the bathing accommodation has been much improved, as well as the attendance on the bathers. On cold days there is always a fire lighted in the bathroom. An open wagonette (closed in wet weather) runs at regular intervals from the "Herald" Office, Low Harrogate, to Harlow Car, the charge for the return journey is 1s. This is a beautiful drive on a fine day, even when not requiring a bath. Afternoon tea can be obtained at the hotel.

A short description of the various baths will be found useful:—

1.—**Slipper Bath** is constructed so that the patient can lie down and be covered with water up to the neck. In these baths plain water may be used, or sulphur water. Of the latter three kinds are presented, the Thermal Sulphur Bath, the Strong, or the Mild Sulphur Bath. They may be given either hot or cold.

2.—**Sitz Baths** are provided, and can be used with either sulphur or plain water, and either still or running water.

3.—**The Turkish Bath.**—This is so well known that it is unnecessary to describe it. One very important word of warning is, do not remain in the hot room too long. Dr. Fleming's experiments. which appeared in the "Journal of Anatomy and Physiology," vols. xiii, show that after 50 minutes in the hot room there is a distinct fall of blood pressure and general debility. The author's experience points to 30 minutes as the longest time to remain in the hot room, and the patient should remain in the cooling room 20 minutes to half-an-hour, and not exert himself for two or three hours after the bath.

4.—**Hot Air Body Bath** is so constructed that you expose the body to hot air whilst the head is outside. This is done by making a box with an opening for the head, the patient being seated and **the feet in hot water.** With some patients it is better to put cold wet cloths on the head.

5.—**Russian Bath** is similar to the Turkish Bath, hot steam being used instead of hot air.

6.—**Vapour Body Bath** is similar to Hot Air Body Bath, except that hot steam is used instead of hot air.

7.—**Bertilot's Baths.**—These are in the form of hollow boxes made so that a hand, arm, leg or thigh can be placed in them and hot water applied. They are very useful for diseases of the joints, and are not so expensive an application as the electric heated apparatus.

8.—**Berthe Vapour Bath.**—This is similar to a Vapour Bath, but the vapour is broken up in very small particles by being pressed through certain pipes. The vapour also passes through a small box into which

can be placed medicinal herbs, such as rosemary, turpentine, eucalyptus, &c. The Berthe Bath is often used as a preliminary to the Vichy Douche.

9.—**Needle Bath** and **Combined Needle Bath.**—This is one of the most important baths we have. By it we can apply a douche of hot water—the temperature regulated by the thermometer—to any part of the body. We have in the combination an ordinary Needle Bath, a Wave Douche, a Shower Bath, a Spinal Douche, Descending Douche, and Ascending Douche. There is also a hydraulic lift to raise or lower the floor according to the height of the patient. This bath can be used with sulphur or plain water. As a rule, it is used with plain water.

10.—**Nauheim Baths.**—For years these baths have been given at the Royal and Victoria Baths, either with plain or sulphur water, and in some cases by the addition of certain salts to the water. The carbonic acid is generated artificially. Experience has shown that these baths are useful in heart disease, especially in the form in which there is dilatation of the muscle. These baths are also useful for patients suffering from nervous exhaustion and irritation. There is a form of nervous irritability which has nothing to do with hysteria, and which often comes on from prolonged worry and work, which is greatly relieved, and often cured, by a course of these and other baths. The Carbonic Acid has a sedative effect on the nerve endings, and may act in a similar, but milder, way to the vibratory motions used at medical gymnasiums.

11.—**Harrogate Massage Douche.**—This is the Harrogate adaptation of what is known as the Aix-les-

Bains Douche. We have specially trained masseurs and masseuses for this bath, which consists of douches of water—at a regulated temperature fixed by the physician—back and front, whilst one attendant massages the back and the other the front of the body, the patient being seated all the time. This is followed by a Needle Bath, and, when ordered by the physician, by any special douche. The process occupies about twenty minutes.

12.—**Vichy Douche.**—This is similar to the Massage Douche, except that the patient is lying down. Frequently before the Vichy Douche the patient has a short Berthe Vapour Bath. During the bath, atomised water from a horizontal bar and rose spray is showered on the patients to keep them warm.

13.—**Liver Pack with Needle Bath.**—These packs are for patients suffering from jaundice, disease of the liver, or indigestion. It is applied as follows:—The patient is taken into a warm room, and after undressing is covered with warm blankets. The attendant has ready a large poultice, made with mustard bran, which is wrapped from the spinal column round the liver, and well in front of stomach. The patient lies still for fifteen or twenty minutes, according to its action on him. It is then taken off, and a Needle Bath administered, after which he should lie wrapped in warm blankets for a short time, then dress and go to his hotel or lodgings, and lie down for an hour.

14.—**Peat or Mud Bath.**—This is an ordinary Slipper Bath, filled with peat, and sulphur or plain water added as directed by the physician, who also regulates the temperature and duration of the bath, which is generally fifteen to twenty minutes. These baths are useful in nervous exhaustion, diseases of women, rheumatism, and diseases of the skin.

15.—**Pine Baths.**—These are made by the addition of pine extract to the Sulphur Bath, and are beneficial and particularly soothing and grateful to the skin.

16.—**Sprays for the Throat, the Nose, and the Ears.** — Special sprays have been invented for these regions or parts of the body. The Sulphur or Chalybeate waters are used, whichever the physician decides is most suitable for the patient.

SPECIAL BATHS.

During late years, super-heated dry air, either by non-luminous heat, or luminous and radiant heat, has been used in the treatment of diseases, and in conjunction with the latter may be mentioned treatment by light, either white or coloured. Electricity has also been more used in treatment than formerly. It is therefore, necessary to give a special account of the various appliances which have been employed.

CAUTION.

In taking the super-heated baths great care is required to insure that no part of the body of the patient comes in contact with the heated metal. This need never happen if the patient will only carry out the instructions of the nurse.

THE TALLERMAN BATH.

Mr. Tallerman, after much thought and consideration, introduced an apparatus for applying great heat by hot air, to the arms and legs. The limb was put into a specially made cylinder, and the heat generated by gas burners below. It was eminently successful in the treatment of stiff-joints and other diseases. The drawback was that the external heat and fumes from the gas were oppressive to the patient. The writer has been told that Mr. Tallerman now uses electricity to produce the required heat.

THE GREVILLE BATH.

Mr. Greville thought that the same heat could be obtained by electricity, and he made a similar apparatus, heated by hot wires—the heat being created by electricity. At the Royal Baths, Harrogate, we have his various apparatus for applying high temperature to the whole body, or any portion of the body, as an arm, leg, &c. This heat is colourless, or dark, and is conveyed to the patient by means of hot dry air.

LUMINOUS HEAT TREATMENT.

It has been proved, beyond controversy, that the above baths have done a very great amount of good and saved untold suffering. But can we do better? Let us look at the object we have in applying heat. Food is burned in the body and converted into heat, much in the same way as coal burns in the grate and gives out heat. This is by a process of oxidation, and the normal result is that the food is burned to an ash. If from any cause this process is interfered with, the food, instead of being burnt to ash, remains (to use our illustration of coal in the grate) a "cinder." This has been fully explained by a leading physician in the "Traveller." The object of all baths is to burn this "cinder" to an ash and thus enable the system to get rid of the waste products. In Tallerman and Greville baths the heat is dark heat, and it will be useful to show that dark heat does not penetrate the tissues, whilst light does. Dr. R. T. Bowles, the eminent authority on sun-burn on the Alps and other subjects connected with heat and light, says*:—"Heat, as heat, does not burn in the ordinary way. You feel it as warmth, but it does not sting and burn. These physiological changes are due to the light rays chiefly, which are converted into heat; the light rays are degraded as they pass through the tissues." He adds: "I saw Tyndall perform the following experiment:—He passed a beam of electric light through water to absorb the heat rays, and then, by passing the resultant rays through a lens of ice, he set fire to some black paper on the other side and ignited gun-cotton. Therefore, it was not the heat rays which brought that about, but the light rays."

* The Journal of Balneology and Climatology, Vol. III., Part 2.

Mr. Urquhart, in his book on the Turkish Bath, shows that *rays of* heat have a curative action on the body, and that they had properties distinct from transmitted heat. Dr. Hedley, who has studied this question as much, if not more than any other physician, says; * "But I consider that the ideal source of heat for such a purpose is a *luminous* one, and with this to start with, it is evident that by suitable diffusing arrangements, or by screening with metal or coloured media, every form of heat can be obtained—direct radiation from a luminous source, or radiation from any special part of the spectrum (e.g. red), or obscure radiation, or heated air." After referring to Tyndall's well-known experiments, Dr. Hedley adds, "The inference from these facts seems obvious, viz: use luminous heat if it is desired to *penetrate the tissues of the body*."

It is only by penetrating the tissues that we can complete the combustion of the "cinder," and this is effected by the following treatment.

THE DOWSING BATH.

THE RADIANT HEAT AND LIGHT TREATMENT.

Mr. H. J. Dowsing designed an apparatus for treating diseases on altogether novel lines. He discarded the old idea of heating air and applying it to the body, and produced powerful electric heat lamps which threw or projected both light and heat rays direct upon the body. The air even is not necessary as a medium, for like the sun's rays, which pass many thousands of miles through space, the electric heat rays will pass even through a vacuum. In this system luminous rays are employed, so that the Dowsing method of treatment is entirely different to others. Coloured glass may be interposed between the luminous rays and any part of the body. The Author has used red light with this system in cases of stiff and swollen knees, to the great advantage of the patient.

*The Journal of Balneology and Climatology, Vol. III., Part 2.

HARROGATE SPA.

A note is added here to show that the treatment of diseases by super-heated apparatus, can be better carried out at a health resort where mineral waters are obtainable. It is well-known that different salts in the same solution cause electric currents, they may be slight, but they are real, and are capable of generating healthful actions in the various organs of the body. Heat and light promote electrical re-action, and hence the Dowsing radiant heat and light bath may prove in practice more beneficial when there is an excess of salts in the blood, and therefore, better results may be expected by a combination of a course of the waters and super-heated baths at Harrogate than elsewhere.

LIGHT BATHS.

So much has been done on the Continent and in America in the treatment of disease by light either white or coloured, that the Corporation, taking time by the forelock, have purchased a light bath. This is used either with sunlight, or with the electric arc lamp, which gives a similar light and produces the same spectrum as sunlight. The effect of both lights is the same on the patient. The full bath is given as follows :—The patient sits in a chair, with the head out, as in a vapour bath. The front of the bath is closed with glasses of various colours—blue for the heart and chest, violet for the stomach, golden yellow for the bowels, and red for the legs and feet. The various colours can be applied locally or separately.

FINSEN'S APPARATUS.

This apparatus for the treatment of lupus has been added to the Light Bath department. It is exactly like the one presented by Her Majesty Queen Alexandra to the London Hospital. The apparatus is so arranged

that by a system of lens and water medium the light may be applied to the part desired. By colouring the water the various rays of light can be directed on the diseased part. The diseased part is covered with a special glass, and there is an arrangement for a current of cold water to continually run round this glass to keep it cool and agreeable to the patient.

Only one patient can be treated at a time, and this generally takes one hour. It is chiefly used for the treatment of lupus, but it has a larger field of curative power, and will, as its action is more understood, be useful in many diseases.

RONTGEN RAYS.

In connection with Finsen's apparatus may be mentioned the **X Rays,** which are now used in the treatment of many diseases, and are also useful in their diagnosis, especially those of the joints. The Author is having the X Ray Apparatus fitted up, so that it will be helpful both in the diagnosis and treatment of disease.

ELECTRICITY.

This can be applied, not only locally to the affected parts, but also in the baths. Plain or sulphur water is used according to the physician's direction, and arrangements have been made to pass a current of electricity through the Peat or Mud Bath if it is deemed advisable.

We have in use three currents, the Faradic, the Galvanic, and the Sinusoidal currents.

As to the uses of electricity much need not be said. Every physician has had an opportunity of using it, and the last few years it has come more to the

front, owing, as the author believes, to the fact that the application of electricity has become more available for medical men. Now that we have at Harrogate many forms of electricity, and the treatment carried out under the auspices of the physicians, very good results are attained. The importance of electricity on nutrition is very well explained by Dr. Hedley. *(*a*) The faradic current (general faradisation) leads to an increase in the respiratory exchanges by excitations of the muscular system, and also of the sensory nervous system, in other words the nutritive exchanges are increased either with or without muscular contractions. (*b*) The continuous current (galvanic) which has always been considered as *par excellence* the current of nutrition, produces no appreciable influence on the respiratory combustions. To explain its trophic effects, therefore, it has been surmised that these may be the result of an influence on cellular secretion or other process. (*c*) Sinusoidal currents afford the most striking results. Without any excitation of the neuro-muscular apparatus, and with complete absence of pain, there was a notable difference in the intake of oxygen and the output of carbon dioxide by the lungs. In point of fact the respiratory exchanges were increased by 25 per cent.

After referring to many experiments that have been made on the various currents and modes of applying electricity and their beneficial effects on the patients, Dr. Hedley adds: "The above experimental data form the starting point of that field of modern practice which aims at the treatment of diathesis, and of general conditions of the system, and this by the generalised, rather than the localised, action of electric currents." The Water Bath is the most

* Hydro-Electric Methods in Medicine, by W. S. Hedley, M.D.

helpful for this form of using electricity, and the sulphur water enables a patient not only to have electricity but also the beneficial effects of the sulphur. This combination of sulphur water and electricity is very useful in skin diseases.

THE CLIMATE OF HARROGATE.

The season begins at Easter, and from then until the end of October we have a constant stream of visitors. During July, August, and September, the resources of the hotels, hydros, and lodging houses for visitors, are taxed to the utmost, and new hotels, hydros, boarding houses, and lodging houses, have recently been erected. Many who have come on a visit for their health have afterwards taken up their residence here, thus showing how the climate of Harrogate is appreciated. Of late years Harrogate has become more of a winter resort, and patients who have remained for treatment during the winter, do not complain of the weather being colder than in similar places. There is a dry, bright atmosphere, and the walks about are so many and varied, that visitors have not any lack of choice. Any one fond of walking should purchase "Walks about Harrogate," by the late Mr. Grainge, price 3d. This little work is also incorporated in "Thorpe's Illustrated Guide to Harrogate," published by R. Ackrill. The mean altitude of Harrogate, being 460 feet above the sea level, gives it a mountainous atmosphere, well charged with oxygen and ozone. The Meteorological Society's transactions distinctly show that Harrogate feels the effect of the sea breezes, as it is situated on the highest table-land between the east and west coasts, and at almost an equal distance between the two seas. Mr. Farrah, who formerly recorded all the information at Harrogate for the Meteorological Society,* informed the writer that sea salts have

been found deposited on the windows in West Park and York Place, thus giving practical evidence of the presence of the sea breeze. When Mr. Farrah discontinued taking the meteorological returns, Mr. G. Paul was requested to do so, and on his kindly consenting, the Corporation appointed him Borough Meteorologist for Harrogate. He has very kindly at great sacrifice of time and patience, supplied some very valuable information as to the climatology of Harrogate. He has prepared all the tables given in this pamphlet.

It should be mentioned that previous to 1891, Mr. J. H. Wilson, F.R.M.S., West Park, took these records.

SUNSHINE.

It has been often shown that more sunshine is frequently registered at Harrogate than at other stations, especially in the winter months. The following table from matter published in the "Yorkshire Post," gives the hours of sunshine during December, 1899:—

	H.	M.
Philosophical Hall, Leeds	8	30
Cliff Road, Leeds	16	20
Adel, Leeds	12	50
Bowness-on-Windermere	32	40
Grange-over-Sands	35	36
Falmouth (observatory)	43	12
Southport (observatory)	17	24
Bradford (The Exchange)	9	15
Harrogate	47	16

This shows that Harrogate had in that month more sunshine than Falmouth in South Cornwall. Though there are more mist and fog in Harrogate than formerly, the records of sunshine prove that Harrogate has far more days with bright sunshine than other places, and has a higher record for sunshine during 1900 than any of the following places:—*

	Hrs.	Mins.
Adel, Leeds	1,502	15
Bowness-on-Windermere	1,406	50
Grange-over-Sands	1,618	32
Falmouth	1,932	54
Southport	1,660	17
Bradford	947	50
Worthing	1,885	36
HARROGATE	1,955	28

One more proof will be sufficient. The following table gives the sunshine for July, 1900, which can be compared with the table on page 37, for December, 1899. It is for sunshine up to 6 p.m. omitting Saturdays.

	Hours.	Minutes.
London	218	42
Hastings	266	0
Eastbourne	263	18
Brighton	253	12
Worthing	267	24
Llandudno	175	30
Rhyl	172	36
Southport	184	36
HARROGATE	**263**	**18**

So much has been written, both on the Continent and in America, on sunshine and its curative effects on the body, that the above tables will be well worth a careful study, and are a convincing proof that Harrogate is eminently suited for the curative and beneficial effects of this mode of treatment.

The figures given in the table at the foot of page 37 are taken from the monthly tables published in the "Yorkshire Post," except Worthing, which is taken from the London "Daily Telegraph."

TEMPERATURE.

To gauge one place with another by the respective "mean temperature" is fallacious; as one of the places, having the same "mean" may have a much higher or lower mean maximum or mean minimum. What is desirable for a good climate is a high mean minimum and a relatively low maximum. The average mean minimum of Harrogate ranges, in very cold weather, almost invariably higher than London, Paris, or Berlin. We thus get in Harrogate a more even temperature, winter and summer, than in most other places. The table on page 47 gives the mean shade temperature, and also the mean range of temperature, that is, the difference between the temperature at the warmest part of the day and at the coldest.

This is very important, because the extremes of temperature are what help to make up the difference between one climate and another, and the smaller this range is, the healthier the place.

RELATIVE HUMIDITY.

The statistics given under this head are those of 9 a.m. It is to be observed, however, that the relative humidity in Harrogate, in the middle and latter part of the day, is very much lower than that of 9 a.m.—often 40 to 50 per cent. less. The relative humidity is the expression of the amount of invisible moisture present in the atmosphere of a place. An average annual humidity of 60, taking 100 as the saturation point, would be so dry that ordinary vegetation would not grow; and an average of 75 is a remarkably dry place.

RAINFALL AND RAINY DAYS.

Harrogate has long been known as a dry place, and this fact is borne out by the rainfall. The following table gives the rainfall and rainy days at twenty-one inland and seaside watering places. In looking over the number of so-called rainy days, the reader must understand that a slight hoar frost, which, when dissolved, measures 1-100ths of an inch of rain, is given as a rainy day; and a dry, bright atmosphere like Harrogate has, during the winter, many such days of slight frost, or passing showers of rain or snow, which, though they impose no inconvenience on anyone yet add considerably to the number of our so-called "rainy" days. These days may vary from 20 to 40 in a year. This makes comparisons as to the number of rainy days between various places very difficult, but it

does not affect the total rainfall. It will be noticed that such places as Southport, Blackpool, Grange, Ilkley, Matlock Bath, Buxton, Ilfracombe, Torquay, Bath, &c., have a higher rainfall than Harrogate. This feature is also further shown in the succeeding table, which gives the average of Harrogate and several others of the chief health resorts for **twelve** years.

COMPARATIVE RAINFALL AND RAINY DAYS IN 1899.

From Symon's "British Rainfall."

	Ins.	No. "rainy" days.		Ins.	No. "rainy" days.
Bath	29·82	146	Ilfracombe ...	38·37	160
Blackpool ...	32·82	182	Ilkley ...	37·52	—
Bournemouth ...	27·18	161	Leamington ...	22·40	145
Brighton	26·83	125	Llandudno ...	32·42	174
Buxton	43·38	179	Matlock Bath ...	32·64	177
Cheltenham	28·68	171	Penzance	36·00	180
Clifton	35·49	141	Southport	29·99	183
Eastbourne	28·43	—	Torquay	34·96	160
Grange	45·98	199	Tunbridge Wells ...	28·00	157
Great Malvern ...	27·06	163	Whitby	26·93	189
Hastings	27·86	138	**HARROGATE** ...	**29·77**	**173**

NOTE.—1899 is the latest year published of the "British Rainfall."

YEARLY AVERAGE RAINFALL OF TWELVE YEARS, 1888 to 1899 Inclusive.

From Symon's "British Rainfall."

	Inches.		Inches.
Leamington	21·76	Matlock Bath	29·92
Cheltenham	25·59	Bath	30·97
Great Malvern	26·00	Clifton	32·75
Tunbridge Wells ...	27·74	Ilkley	34·87
HARROGATE ...	28·96	Buxton	47·98

WINTER RESIDENCE.

The late Dr. Britton wrote a very able paper to show how suitable Harrogate is as a winter residence, and the author can fully bear out what he said. The mean variation of temperature is remarkably small, especially in November, December, January, and February, really the winter months. Mr. Paul has frequently observed during the winter season that the

temperature of the sun's rays in Harrogate has been as much as 10 and even 15 degrees higher than in London. The table before referred to on page 37 shows, as previously remarked, that Harrogate receives during the winter month of December more sunshine than Falmouth in the south-west. It is true that in April there are east winds, but they are not so severe as in many other parts of Yorkshire. The winds which are most prevalent in Harrogate are the westerly winds, and the west part of Harrogate which comprises Low Harrogate is the most shielded part of the town. The westerly winds must pass over on their way to Harrogate the several ramparts of the Pennine Range which form the river valleys of the Calder, the Aire, the Wharfe, and the Washburn rivers. By these hills the winds are deflected up into the higher atmosphere again and again, and are thus dried and warmed. Mr. Paul further remarks that "It is a singular fact that the greater part of the phenomenal gales which affect this country on a large scale do not affect Harrogate, or only to a minor extent."

DISEASES.

The climate is especially suitable for the treatment of bronchitis, sore throats, and for certain stages of consumption, but as has been pointed out by other writers, it is very detrimental to the febrile stages of consumption. It does well for kidney diseases, gout, rheumatism, and all affections connected with the liver. The beautiful and even walks on the Stray are well adapted to people suffering from heart disease, and those who have difficulty in walking up hills. Dr. Andrew S. Myrtle says that "the air of Harrogate also acts as a tonic to the relaxed and congested mucous membrane, thereby lessening the secretion from its surface, *much in the same* way as the air of Cannes does. Many of my patients have drawn my attention to the similarity of the two places, as regards climatic conditions and corresponding results."

THE MINERAL WATERS.

THE NEW ANALYSES—CLASSIFICATION.

All previous writers on the Harrogate Mineral Waters have classified them into Sulphur and Iron or Chalybeate Waters, and then again, according to their saline constituents. Opposite the title page will be found a photograph of a collection of the amount of salt in each gallon of the water drawn from the various wells. There are fifteen waters shown, and it is easy to see at a glance the different amount of salts in each. They are obtained by evaporating the water, and the salts placed in the glass tubes. Dr. Hoffman divided them into four classes:

1.—THE STRONG SULPHUR.

2.—THE MILD SULPHUR.

3.—THE SALINE CHALYBEATE.

4.—THE PURE CHALYBEATE.

Finding that the waters had not been analysed for a long time, the Author had eleven waters analysed, six by Mr. Fairley, F.R.S.E., F.I.C., the city analyst for Leeds; and five by Mr. Singer, F.C.S., then of Keighley. The results of these analyses will be given on page 49, compared with former analyses, and the date of such analyses. It will be noticed that this is the only analysis which has ever been made of No. 36 Well.

As the result of analyses, a further classification of the waters may be made, as follows:—

1.—**The Strong Sulphur:**

(*a*) The Strong Sulphur, Royal Pump Room.

(*b*) The Strong Sulphur, Royal Baths.

2.—**The Mild Sulphur:**

(*a*) The Mild Sulphur, Royal Pump Room.

(*b*) The Magnesia, which may be obtained cold in the Bog Fields, and in the Pump Room, Valley Gardens; and hot, in the Royal Pump Room.

(*c*) The Crescent Water, Royal Pump Room.

(*d*) The Mild Sulphur, Royal Baths.

(*e*) The Beckwith Water, Royal Baths.

(*f*) The No. 36 Well, Pavilion, Valley Gardens.

(*g*) The Starbeck Water.

(*h*) The Harlow Car Sulphur Water.

3.—**The Saline Chalybeate:**

(*a*) The Kissengen Water, Royal Baths.

(*b*) The Alexandra Water, Royal Pump Room.

(*c*) The Chloride of Iron Water, Royal Baths.

4.—**The Pure Chalybeate:**

(*a*) The Pure Chalybeate, Royal Pump Room.

(*b*) The Tewit Well, on Stray, near Prince of Wales Hotel.

(*c*) St. John's Well, on the Wetherby Road.

THE STRONG SULPHUR WATERS.

The action of these waters are upon the stomach, liver, and bowels, and by thus cleansing out the gateways to the blood, the injurious products of fermentation are washed out and prevented from being absorbed. Evidence is continually coming before one that the sulphur waters, by cleansing the bowels, prevent auto-poisoning in a way that ordinary purgatives do not. Probably this is because sulphur is very inimical to bacteria, which abound in the fermenting products of digestion. When the liver is

primarily at fault, the Strong Sulphur at the Royal Pump Room is the best; but when the liver acts well, then we can give the one at the Royal Baths. Care, however, is required in giving these waters where there is high arterial pressure, or disease of the arteries, since rupture of a blood vessel in the brain has been known to take place through drinking these waters.

After a few days, or more, according to the condition of the patient, the purgative action can be continued with the Kissengen. In that case the iron forms insoluble compounds with the product of digestion, and they are carried away by the bowels. During the time of taking the Strong Sulphur in a morning, the effervescing Kissengen may be taken during the day. In that case it acts as an agreeable tonic.

THE MILD SULPHUR WATERS.

There are eight mild sulphur waters in constant use, either for drinking or bathing. The new analyses will show the difference in their composition. The waters act in a similar way to the strong sulphur, but in a milder form, and hence can be taken when the strong doses would be injurious to a patient. They are useful in rheumatism, gout, bronchitis, coughs, sore throat, and diseases of women.

It is an important point in connection with drinking the waters and taking the baths, that the patient should be in a suitable condition for the treatment. This is especially so in cases of disease of the skin. If the liver is sluggish or if the bowels are not acting, the system becomes clogged and the patient instead of getting better, gets worse. There is a difficulty as to choosing the right time for giving a bath in the case of skin diseases, and patients often delay

their recovery because they will take the baths too often, or for too long a time. It is important that patients should not hurry over the treatment in cases of long-standing. Patients sometimes think they ought to be cured in as many days as they have been years ill. As other writers have frequently pointed out, the good effects of these waters is frequently not seen or felt during their administration. A doctor who took the waters and baths last year wrote after some weeks at home :—

> "After my return home, for a week or ten days, I felt worse, but then I began to recover, and have gone on well ever since, until now all the pain is gone, and I feel quite well. I feel certain the waters and baths laid the foundation of my recovery."

Even when a patient can find time to take a full course of the waters and baths, they improve the system so much that often, returning home, their own doctor finds that medicines and remedies he had used fruitlessly before now have a curative effect, to the comfort both of the patient and doctor.

THE CHALYBEATE WATERS.

These include both the saline chalybeate and pure chalybeate. These are especially useful in the early stages of rheumatoid arthritis. These are also very useful in all cases where you have anæmia, whether it is caused by gout, rheumatism, or any wasting disease. In pure anæmia the iron is also useful, for two reasons : (1) it precipitates by-products of digestion, and hence prevents their absorption into the blood ; and (2) the iron, combined with the various salts, as shown by the new analyses given on page 50, is absorbed into the blood. These remarks apply equally to the chloride of iron and Alexandra water, as well as the Kissengen water, though the latter acts better on the liver than either of the others.

The **Tewitt Water** is unique. It contains some of all the salts in the other water except sulphuretted hydrogen, which is replaced by iron. It acts as a tonic and alterative, and is very useful in certain forms of skin disease. It is the most suitable iron water for children and has always had a reputation as an external application in painful conditions of the eye, **where there is no ulceration**; but it ought not to be used until the eyes have been examined by an eye specialist.

ARE THE CONSTITUENTS IN THE WATERS FAIRLY CONSTANT?

Mr. Davis, F.C.S., the borough analyst, kindly collected a specimen of the magnesia water on the first day of every month for a year. The object of this was to ascertain whether the sulphur and the salts in the water were constant in their amount. The sulphur varied only from 0·6596 grains in April to 0·5101 grains in June, a difference of only 0·1495 in the gallon, that is, the sulphur practically remained the same all the year round. These facts are of great value, when we learn from the analyses of Mr. Bothamley, of the Yorkshire College, that the sulphur, in the form of sulphuretted hydrogen, varies at Askern from 55·0 c c. to 22·5 c.c. The solid constituents varied only 35 grains from the highest to the lowest. The full table will be found on page 49. Hence we are able to prescribe the Harrogate Mineral Waters at all times of the year, and know that their composition does not vary.

THE KURSAAL.

The Corporation have in hand a scheme for the erection of a large Kursaal to hold upwards of 2,000 persons, and of a new Pump Room, with an extensive covered promenade for the water-drinkers. Those schemes are now only waiting the sanction of the Local Government Board and completion of the details, prior to erection.

HARROGATE.

METEOROLOGICAL ELEMENTS OF CLIMATOLOGY FOR THE LAST SIX YEARS,

At 9 a.m., 1895 to 1900 inclusive.

	Mean shade temperature degs.	Mean range degs.	Mean rel. humidity per cent.	Mean of monthly rainfall inches.	Mean of monthly "rainy" days No.	Barometer corrected to sea-level and 32 degs. Far. Mean of monthly bar. inches.
January ..	36·5	8·0	87·5	3·03	20·5	29·951
February ..	36·3	9·8	87·2	2·63	14·3	29·923
March	39·8	10·6	83·0	2·10	17·8	29·853
April	42·6	14·0	77·3	2·14	15·1	29·951
May	48·9	16·4	71·3	1·69	12·1	30·080
June	56·6	16·8	72·5	3·29	14·2	30·048
July	59·5	16·2	72·5	2·60	12·0	29·977
August .. .	59·0	14·1	75·8	3·27	16·0	29·988
September ..	54·9	14·3	79·8	2·31	13·7	29·997
October	49·4	10·9	88·1	3·63	16·1	29·945
November ..	43·9	8·7	88·2	2·85	18·8	29·997
December ..	38·7	8·4	* 86·1	3·57	18·8	29·796
Six years' monthly means.	47·2	12·3	80·8	2·75	15·8	29·956
Yearly means.				32·80	*189·4	

* Of these. ten per cent are "rainy" days, on which less than ·02 inches have fallen during the 24 hours.

January 23rd, 1901.

G. PAUL, Borough Meteorologist,
Harrogate.

ANALYTICAL EXAMINATION OF THE WATER OF THE MAGNESIA WELL, BOGS FIELD, HARROGATE.

The Samples were taken in the Pump Room.

The Quantities are in Grains per Gallon.

	Temperature.					Solids.
1893.	Air.	Water	Specific Gravity.	Chlorine	Sulphur.	Dried at 280°–300° F.
May 1			1002·26	114·379	0·5277	215·25
June 2	60°	54°	1002·47	111·199	0·5101	208·95
July 1	65°	56°	1002·28	108·784	0·5628	197·75
August 2 ...	65°	60°	1002·38	107·943	0·5453	196·70
September 4	63°	58°	1002·23	99·826	0·5277	184·80
October 13 ...	54°	51°	1002·21	99·412	0·5277	180·25
November 2	48°	46°	1002·10	101·373	0·5980	188·65
December 2			1002·30	98·968	0·5628	185·15
1894.						
January 1 ...	40°	40°	1002·20	99·848	0·5628	185·50
February 2	52°	39°	1002·21	102·337	0·5980	191·10
March 2 ...	45°	42°	1002·24	105·685	0·6068	194·25
April	59°	46°	1002·34	108·206	0·6596	201·60
Average ...			1002·27	104·746	0·5657	194·16

The Sulphur is given in an uncombined condition, it probably exists in combination with Hydrogen as a gas, and also combined with an alkali.

The total saline constituents, from the temperature they were dried at, are in an anhydrous condition.

R. HAYTON DAVIS, F.C.S.

4th April, 1894.

THE HARROGATE SULPHUR MINERAL WATERS, WITH OLD AND RECENT ANALYSES IN PARALLEL COLUMNS.

	Old Sulphur. Royal Pump Room.		Strong Sulphur Montpellier Gardens.		Mild Sulphur. Royal Pump Room.		Mild Sulphur. Montpellier Gardens.		Magnesia. Bogs Fields & R. P. Room.		Starbeck Spa.		Harlow Carr.		No. 36 Well. Bogs Field.
	Thorpe, 1875.	Singer, 1893.	Attfield, 1879.	Fairley, 1893.	Miller, 1869.	Fairley, 1893.	Attfield, 1879.	Fairley, 1893.	Muspratt, 1867.	Singer, 1893.	Fairley, 1871.	Singer, 1893.	Muspratt, 1867.	Singer, 1893.	Singer, 1893. First Analysis ever made.
Specific Gravity at about 60 deg. Fah.	1·01103	1·0103		1·00704		1.00453		1·00581		1·0026		1·0032		1·0019	1·0039
Grains per Gallon.															
Sodium	354·189	332·333	334·726	241·810	232·474	137·197	158·439	177·778	85·466	65·875	52·958	53·792	10·156	6·259	90·235
Potassium	5·031	12·829	2·523	1·991	5·947	1·353	2·985	2·036	14·641	4·990	0·368	11·157	0·656	1·226	14·529
Lithium	0·125	0·170	trace	0·189		0·342	trace	0·109							
Ammonium	0·348	trace	0·337	0·159		0·092	0·221	0·164					trace		
Barium	4·327	2·432	0·240	3·175		0·102	trace	0·395	0·805	0·711					0·915
Strontium	trace	trace	1·808	1·419		0·642	0·778	0·793							
Calcium	27·681	32·990	32·373	23·462	6·081	14·786	17·995	19·588	7·400	3·072	4·563	2·355	4·821	4·991	5·380
Magnesium	14·225	23·709	14·671	9·708	0·605	5·670	6·979	6·364	4·112	3·882	1·903	0·911	2·463	1·117	3·412
Aluminium	trace	0·097		trace										0·129	
Iron		0·172	0·200	0·063		0·078	trace	0·055		0·115				0·287	0·345
Manganese															
Fluorine	trace		trace				trace			trace					
Chlorine	613·077	602·889	600·033	409·706	371·155	226·931	279·660	297·426	145·875	103·237	70·570	81·018	7·385	3·975	156·634
Bromine	1·985	1·407		1·534		0·968	trace	0·713		trace	0·558	trace			
Iodine	0·103						trace			trace		trace			
Sulphur (in Sulphides) ..	2·939		5·948	0·011	3·882	0·232	3·600	0·431	0·290	0·761			1·453		
Sulphur Trioxide (Sulphuric Acid)		0·507	0·374	1·854		0·835	0·398	1·570		0·192	1·100		2·548	1·635	
Carbon Dioxide (Carbonic Acid)	16·305	14·014	4·004	21·187		13·474	7·346	18·274	14·826	14·472	12·447	11·622	11·893	11·479	9·844
Oxygen of Bases of Sulphates and Carbonates	5·882	4·702	1·621	7·699		6.778	2·786	8·293	5·390	4·185	4·753	3·225	4·843	4·500	3·578
Phosphoric Acid	trace			trace		0.002		trace		trace					
Silicic Acid	0·701	3·101	3·570	0·647	2·402	0·602	3·838	0·092	1·608	1·855	3·270	0·665	1·313	0·539	0·280
Nitric Acid			0·572				0·235								
Organic Matter	trace														
Totals ..	1047·518	1031·361	1003·009	724·794	622·496	419·084	485·258	533·951	280·413	203·347	151·590	164·752	47531	36·197	485·152
Gases in Solution in Cubic Inches per Gallon.															
Hydrogen Sulphide ..	10·16	14·22		15·24	4·18	5·37		9·41			*	1·04		0·92	8·31
Carbon Dioxide	40·10	37·32	60·00	12·17	13·22	3·07	54·00	9·15	11·50	65·28	*	28·99	6·0	34·54	19·33
Nitrogen			3·70	12·59	2·01	15·06	3·20	6·03			*		8·0		
Oxygen ..															
Marsh Gas			2·30				0·80								
Totals	50·26	51·54	66·00	40·00	19·41	24·40	58·00	24·58	11·50	65·28	* Not estimated	30·03	14·0	35·46	27·64

THE HARROGATE CHALYBEATE WATERS WITH OLD & NEW ANALYSES IN PARALLEL COLUMNS.

	Kissingen Water. Montpellier Gardens.		Chloride of Iron Water. Spa Concert Room.		Tewit Well. On the Stray.	
	Attfield, 1879.	Fairley, 1893.	Botham-ley, 1880.	Fairley, 1893.	Hoffman. 1854.	Fairley, 1893
Specific Gravity at 60 deg. Fah.		1·00678	1·00545	1·00515	1·00011	1·000315
Elementary Constituents in Grains to the Gallon.						
Sodium	265·747	195.208	109·341	151·423	0·110	1·416
Potassium	11·238	2·122	1·681	1·114	1·292	0·083
Lithium	trace	0·346	trace	0·035		0·009
Ammonium	0·148	0·490	0·137	0·005	trace	0·012
Barium	1·785	3·070	1·905	2·031		0·043
Strontium	0.490	0·392	0·345	0·283		0·085
Calcium	35·089	33·138	33·952	16·890	0·781	1·541
Magnesium	16·544	13·258	14·546	7·603	0·780	0·762
Iron	4·631	1·540	11·170	3·481	0·656	1·136
Manganese			0·420	0·141	trace	0·054
Fluorine						
Chlorine	524·369	386.484	284·530	285·955	0·798	1·348
Bromine	trace	0·890	0.299	0·567	trace	trace
Iodine			trace		trace	
Sulphur Trioxide (Sulphuric Acid)	0·175	0·435	0·076	0·378	0·412	1·333
Carbon Dioxide (Carbonic Acid)	8·007	12·043	4·190	3·289	2·877	3·947
Oxygen in bases of Sulphates & Carbonates, &c.	2·947	4·439	1·538	1·281	1·111	1·703
Phosphoric Acid		0·003				
Silicic Acid	3·570	1·176	1·414	0·592	1·041	1·708
Organic Matter					0·663	
Total Solids	874·740	655·034	465·544	475·068	10·521	15·180
Gases in Solution as supplied in Cubic Inches to the Gallon.						
Carbon Dioxide	21·30	4·41	53·554	11·04	11·85	1·66
Oxygen	5·20	2·37		0·17	0·40	0·53
Nitrogen	1·50	13·63		9·74	5·53	6·12
Marsh Gas				trace		
Total Gases.	28·00	20·41	53·554	20·95	17·78	8·31