An essay on two mineral springs, recently discovered at Harrogate; and on the springs of Thorp-Arch and Ilkley : including the history, chemical analysis, and medicinal properties of these waters, with some observations on their use / by Adam Hunter ... physician to the House of Recovery at Leeds.

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ESSAY

ON

TWO MINERAL SPRINGS,

RECENTLY DISCOVERED

At Harrogate,

WITH

REMARKS ON THE SPRINGS

OF

Thorp-Arch and Ilkley.

PRICE FIVE SHILLINGS AND SIXPENCE.

Headley and Mudie, Printers, Leeds.

AN

ESSAY

ON

TWO MINERAL SPRINGS,

RECENTLY DISCOVERED

AT HARROGATE;

AND ON THE

SPRINGS

OF

THORP-ARCH AND ILKLEY;

INCLUDING THE HISTORY, CHEMICAL ANALYSIS, AND MEDICINAL PROPERTIES OF THESE WATERS, WITH SOME OBSERVATIONS ON THEIR USE.

BY ADAM HUNTER, M.D. F.R.M.S.E.

Physician to the House of Recovery at Leeds.

Sacros ausus recludere fontes.

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AND SOLD BY ALL BOOKSELLERS.

1819.

TO

THE MEMBERS

OF THE

Leeds Philosophical and Literary Society,

WHOSE PRESENT EXERTIONS IN THE CAUSE OF SCIENCE

SO JUSTLY ENTITLE THEM TO THE GRATITUDE

AND APPLAUSE OF THEIR TOWNSMEN,

THIS EXPERIMENTAL ESSAY

IS RESPECTFULLY INSCRIBED,

AS A MARK OF HIS HIGH RESPECT FOR THEIR PUBLIC SPIRIT;

BY THE AUTHOR.

PREFACE.

THE Analysis of the Harrogate Springs was undertaken and completed in May, and sent for insertion in the Edinburgh Medical and Surgical Journal. But being received too late for the July publication, the increasing number of persons using these waters, and their anxiety to know the contents, induced me to give the results in their present form.

The experiments, though perhaps deficient in elegance, will not, I trust, be found inaccurate.—The observations lay claim to more indulgence. They were drawn up on the spur of the moment, more with a view to satisfy the general inquirer, than with the hope of affording much additional information to the medical reader, on a subject in itself sufficiently uniform, and which has employed the pens of more than a thousand writers.

Resorting to watering places has become a distinct trait in the national character. While this continues, it is the duty of the medical adviser to be well acquainted with the precise qualities of the different springs, on which he may be consulted. Frequently interrogated respecting those of Thorp-Arch and Ilkley,—finding, at the same time, little to satisfy myself,—I applied for information at the fountain head. Though desirous of acquiring knowledge, which, at a subsequent period, might be advantageously laid before

the public, I had no intention of immediate publication. A variety of circumstances concurred to alter my views;—the *bis dat qui cito dat* must therefore extenuate the want of a performance more elaborate and mature.

The analytical department was conducted with every possible attention to contingent circumstances. Without having a single preconceived opinion to support, or fallacy to rectify, I have stated the results simply as they occurred. The medicinal properties and effects of the springs are given with a mind equally free from bias, and, I hope, not dead to observation. Led away by my own feelings, I may perhaps weary some with the History of Ilkley:—such must not blame me, since I censure not the man whose eye is undelighted with the scenery of nature, or whose ear is unattuned to the harmony of sound.

To say more would be superfluous,—less might have been deemed improper. Should the reader, therefore, receive as much instruction from this Essay, or benefit from the Springs, as I have experienced amusement in the details, and pleasure in my visits to their source, neither he nor myself will have reason to complain.

Park-Row, Leeds,
Aug. 27, 1819.

TABLE OF CONTENTS.

ERRATA.

Page 3, line 14, for no, read few.

—— 47, —— 7, for frequent, read frequently.

—— 49, note, for 4to. read 4.

—— 71, line 17, for erected, read placed

—— 79, —— 10, for right, read left.

TABLE I.—Salino-Sulphuretted Spring—the nature of the ingredients, and the gaseous contents were acertained upon the spot; and the results stated in the table, were obtained by careful evaporation of the water sent me by the proprietor. Several circumstances have since concurred to induce me to suppose that there must have been some mistake in the water sent, for which I presume not to account. The contents in a Wine Gallon of this water, *drawn by myself* are—

	Grains.
Muriate of Soda.....	151
——— of Lime.....	5
——— of Magnesia.	23
Sulphate of Lime.....	3
Loss.....	1
Total	183

PRELIMINARY REMARKS.

THE nature and variety of the Harrogate Mineral Waters, hitherto discovered, have been long known to the Profession, and their beneficial effects extensively experienced, and deservedly appreciated by the public. Nor have they attained their present celebrity by any of those adventitious and frequently ambiguous circumstances, which at one time render similar springs generally resorted to, and in a few years leave them entirely deserted. For, with the exception of Bath, which has been celebrated as a watering place from the most remote period of our authentic history, and carries its origin far into the obscure regions of fable, no other mineral springs in England have obtained a longer, more extensive, and equally increasing reputation.

The treatises which have been written expressly on the Harrogate waters, since the discovery of the first spring, (Tewhit spaw,) in

the year 1571, by an ancestor of the present Sir Thomas Slingsby, Bart. constitute no inconsiderable number; and when taken in conjunction with what has been said by those who have written more generally on this department of medical science, are amply sufficient to shew their importance.

Without entering into the particular history of, or instituting any minute comparisons between, these treatises and their respective authors, which would be irrelevant in an essay of this nature, I proceed to observe, that Dr. Dean appears to have been the first who published an account of the Tewhit well, in 1626*. It had previously, however, found two staunch advocates in a Dr. Timothy Bright, and Dr. Anthony Hunter, Physician at Newark-upon-Trent, the latter of whom, says Dr. Dean, "often chided us Physicians at York, for not writing upon it, and deservedly setting it upon the wings of fame."

Dr. Stanhope, in 1632, wrote a fanciful, but not incorrect, statement of the springs known

* Vide Spandarine Anglica, or the English *Spaw-fountain*, in the Forest of Knaresburg; as also a relation of other medicinal waters in the said Forest—4to. London, 1626.

in his time*; and details a number of wonderful cures, in the quaint, but rounded and verbose, language of that stately age.

Dr. John French, in 1651, "being commanded by his occasions down to the spaw in Yorkshire, and being prevented from his intended, and speedier return by the then Northern distractions; to improve his time; as also for a more full satisfaction of his own profession, especially some worthy Doctours in the South, presents them with a treatise on these waters;"† in which he involves himself at the outset concerning the "*original of springs*" between the opinion of Aristotle, that "springs are generated of the aire shut up in the earth, and by the coldness thereof condensed into water;" and the objection to this, by Van Helmont, who

* Entitled, Cures without Care; or, a Summons to all such as find little or no help by the use of Physick, to repair to the Northern Spaw, &c. by DR. MICHAEL STANHOPE.—4to. London, 1632.

† The Yorkshire Spaw, or a Treatise of four famous Medicinal Wells, viz.—the Spaw, or Vitrioline Well; the Stinking, or Sulphur Well; the Dropping, or Petrifying Well; and St. Mungo's Well, near Knaresborow.—12mo. London, 1652.——This curious and rare work was obligingly sent me, by my friend Mr. Richardson, Surgeon at Harrogate, to whom I am indebted for some useful remarks on this subject.

proves by experiment, that "aire shut up in an iron pipe, an ell long, and compressed, again extends itself, when it should have been converted into water bythe coldness of the Iron," had Aristotle's doctrine been correct.

In 1656, Dr. George Neal, of Leeds, who, together with his son, attended occasionally at Harrogate during the summer season, for the long period of sixty-seven years, wrote his 'Spadacrene Eboracensis,' which was never separately published*,—but incorporated in the works of Dr. Short, of Sheffield, printed in 1734. It is a tribute due to the memory of this last mentioned learned and indefatigable physician, to observe, that his "Natural, Experimental, and Medicinal History of the Mineral Waters of Derbyshire, Lincolnshire, and Yorkshire," including not fewer than 131 different springs, may still be perused with advantage, though alloyed with all the chemical absurdities of the period in which he lived.

Drs. Simpson and Alexander also wrote on these springs; the former antecedent, the latter subsequent to the publication of Dr. Short.

* Short on Mineral Waters, Vol. 1st. p. 186. 4to

The late Dr. Walker, of this place, in 1784 published an Essay on the Waters of Harrogate and Thorp-arch; more valuable for its medical directions and elegance of composition, than its chemical accuracy or experimental research. Indeed the medical directions and topographical observations are the only useful parts of nearly all the works I have perused upon Mineral Waters published prior to this period. And though the Doctor was a pupil, and appears to have been no inattentive one, of the celebrated Dr. Black, still this difficult branch of chemistry was but then emerging from obscurity. The incomparable Essays of the illustrious Bergman, the true parent of this species of analysis, were translated into English the same year: and from this work, as from a pure fountain, have the streams of real inductive philosophy irrigated and fertilized this field of inquiry.

I do not find that the late well known Dr. Alexander Hunter of York, published upon these waters; but he was long their steady supporter, both by precept and example, having found them useful in recruiting those powers of the Stomach which a too solicitous attention

to its calls*, as well in the Doctor as his patients, sometimes rendered highly expedient.

But the last, and by far the most valuable, treatise upon these springs, which has yet been given to the public, is the work of Dr. Thomas Garnett, who resided for some time upon the spot. This gentleman, unfortunately for science, was cut off in the early part of his career.—Possessed of considerable ingenuity and talent, he appears to have inherited one of those enthusiastic, anxious, and inquiring minds, which baffle all obstacles, surmount all difficulties, and allow no subject which presents itself to pass without observation and consequent elucidation. His treatise was published in 1793, and though not free from errors in the chemical department†, has passed through several editions. The numerous changes which have since that time occurred at Harrogate, and the still greater certainty in the analysis of Mineral Waters which has been afforded us by the

* Vide Culina Famulatrix Medicinæ, 2nd. Edit. York 1806. By A. Hunter, M.D. F.R.S.L.&E.

† Vide Exper. xiii. p. 51. Edit. 6. 1816. Exper. 59. p. 60. Ibidem.

labours of Kirwan, Murray, Henry, Thomson, Jameson, Saunders, Brande, and other chemical writers, might perhaps render a new analysis of all these springs worthy of public attention: and it is not improbable, when a little longer personal observationof their effects, shall enable me to speak with more decision on their virtues, that I shall again revert to this subject.

The two springs, the analysis of which is now presented to the public, were discovered about seven months ago by boring in search of sulphur water to supply the increasing demand for the Baths. They are situated at the distance of about 200 yards from the promenade-room; in a field adjoining the Leeds and Ripon road, the property of Mr. Oddy, of the Lodge, at Low Harrogate. They have a north-east aspect, and command a pleasant view of the Lodge and neighbouring valley, which is tastefully laid out, and ornamented with clumps of trees.

The alluvial earth having been removed, a stratum of clay presented itself; beneath which lay a bed of sand, and this was found to cover a dark bluish aluminous earth, from under which the water issued. Three borings were made,

each to the depth of eight yards; the first and third, in the lowest part of the valley, and a few yards distant from the fence adjoining the road. In the first, the water was found impregnated with salt*. This was subsequently abandoned upon the discovery of the third, or *Saline Chalybeate Spring*, which supplies the well now in use. The second boring, on the rising ground, in a line at right angles with the first and third, and at the distance of 16 yards from the latter, is the *Chalybeate Spring;* the water of which is conveyed in proper pipes down the declivity, and issues through a parapet-wall into a basin placed for its reception. The wells are sunk deep enough to allow of cisterns; these Mr. Oddy has covered with strong flags accurately cemented, layers of baked clay and earth, being added to exclude the air and extraneous water. The whole is finished in the most approved manner.

* It was closed up before I had an opportunity of examining the Water.

NEW SALINE CHALYBEATE SPRING.

NATURAL PROPERTIES.

The water newly taken from the spring is transparent, and has rather a sparkling appearance, when poured from one glass into another: the taste is distinctly saline, but not unpleasantly so compared with the sulphur water. The temperature of the well was 47° Fahrenheit, the thermometer in the shade standing at 62°; and being immersed in a pool of water in the immediate neighbourhood, it stood at 58°. Its specific gravity is 1.0075.

CHEMICAL ANALYSIS.*

I endeavoured in the first place to ascertain by the use of re-agents, with as much precision as possible, the different principles contained in the water.

* I have pleasure in stating the obligations I am under, in the prosecution of this analysis, to my friend Mr. Joseph Atkinson, manufacturing chemist at Halton in this neighbourhood, who was with me during all the experiments; and whose practical knowledge of chemistry, rendered him not only a pleasant companion, but an active and useful coadjutor. To his brother Mr. John Atkinson surgeon-dentist, in Leeds, who, actuated by a similar attachment to such pursuits, occasionally favoured us with his company, I feel also greatly indebted.

EXPER. *a.*—Acetate of Lead produced a copious white precipitate, without the least tinge of blackness, to indicate the presence of Sulphuretted Hydrogen: nor could this Gas be distinguished by the smell or taste, or the use of any other re-agent.

EXPER. *b.*—Paper stained blue by the Infusion of Litmus, was in a slight, but perceptible degree, reddened by water recently drawn from the well: but after the water had been boiled, it produced no change on the Litmus Paper.—Hence, since the absence of Sulphuretted Hydrogen Gas had been previously ascertained, this effect must have been produced by *uncombined Carbonic Acid.*

EXPER. *c.*—A few drops of Muriate of Barytes, added to a wine glass of the water, after standing half an hour, exhibited a very slight cloud:—from which I infer the presence of *Sulphuric Acid,* in combination with some of the earths or metals, though in a very minute quantity.

EXPER. *d.*—On adding three drops of the solution of Nitrate of Silver to the same quantity of water, a very copious white flocculent

precipitate ensued; which proves that the *Muriates* greatly predominate.

Exper. *e.*—A quantity of the water being evaporated to dryness, and the strong Sulphuric Acid poured on the dry saline mass thus obtained, copious white fumes were emitted, without any mixture of red fumes. Hence it is nearly certain, that the water contains *no Nitrates.*

Exper. *f.*—To ascertain if the Boracic Acid was contained in the water, which sometimes, though rarely, occurs in mineral springs*, a portion of the water was boiled, and then deprived of the whole of its Muriatic and Sulphuric Acids, by Nitrate of Silver, and Nitrate of Barytes; a few drops of the Acetate of Lead were then added: but, after standing forty minutes, no precipitate was observable.

Exper. *g.*—To a glass of the water prepared, as in the last experiment, a few drops of the Nitrateof Mercury (made without heat) were added, in order to detect the Phosphoric Acid, if present: but no indication of the presence of that Acid could be found.

* Kirwan, p. 14. 207.

Thus having ascertained that the water contained *Carbonic, Sulphuric, and Muriatic Acids;* I next proceeded to investigate the nature of the different salifiable bases with which they are combined: since it is evident from the foregoing experiments, that, with the exception of the Carbonic Acid, they are all neutralized by the earths, alkalies, or metals.

Exper. *h.*—Beginning with the more general indicators: to a wine glass of the mineral water, half a glass of lime water was added; a brownish white precipitate immediately ensued. This would partly arise from the Carbonic Acid; but from the colour, as well as the copiousness of the precipitate, it was also evidently further produced by the precipitation of *Oxide of Iron, and of some of the earths.*

Exper. *i.*—A solution of soap in Alcohol, was *instantly curdled,* on being dropped into the water; though not in a very high degree.

Exper. *j.*—Turmeric Paper was not at all affected by it: nor was the Muriate of Lime precipitated. Hence it does not contain the alkalies in excess.

EXPER. *k.*—A portion of the water being evaporated to dryness, and pure Potash added: no trace of Ammoniacal Gas was exhibited.

EXPER. *l.*—A few drops of the Tincture of Galls being added to a glass of the water, it immediately assumed a purple colour; and, on standing ten minutes it gradually deepened in appearance: on repeating the experiment, and dropping a little of the Subcarbonate of Soda into the water, previous to the Tincture of Galls, this effect was still more apparent.

EXPER. *m.*—The triple Prussiate of Potash produced no sensible change; but a few drops of Muriatic Acid, being first dropt into another glass of the water, the triple Prussiate was added as before, when a *beautiful light green colour* was produced, which increased in intensity by remaining exposed to the air.

EXPER. *n.*—The same (Ex. *m.*) being repeated on water that had been boiled and filtered; neither the purple nor blue tinge was produced by the Gallic or Prussic tests.—From the first of those experiments, it appears that a small quantity of *Iron* is present, in a low state of

oxidation; and as no traces of it were found after boiling, it necessarily follows that its solvent must be the *Carbonic Acid.*

Exper. *o.*—The Oxalate of Ammonia occasioned a copious white precipitate, both before and after boiling: indicating that *Lime* is present in the water, in combination with *a fixed Acid.*

Exper. *p.*—In order to learn whether Magnesia was also present, having previously concentrated the water considerably by boiling, all the other earths and alkalies were thrown down by Carbonate of Ammonia, added so as to be a little in excess. Phosphate of Soda was then added, which caused an immediate precipitation; the Phosphoric Acid thus forming a triple insoluble compound with the Magnesia and Ammonia*.

Exper. *q.*—The Succinate of Ammonia produced no effect on a portion of the water, which had been concentrated by boiling. Hence I infer that Alumina does not exist in the water, or only in the most minute quantity†.

* Dr. Wollaston.

† Dr. Marcet's analysis of the Brighton Chalybeate Water.

Exper. *r*.—Pure Ammonia being poured into the concentrated water, no blueness was observable; and as the presence of a Sulphate had been detected in the early part of our investigation; it became unnecessary to attempt the discovery of Strontia or Barytes, which are well known to be incompatible with that class of Salts.

By these experiments we find the water contains Iron dissolved in Carbonic Acid. Magnesia and Lime have also been detected; and from the abundance of combined Muriatic Acid, the presence of one or both of the fixed Alkalies may justly be inferred.

Before proceeding to investigate the proportions and state of combination of these principles, I took the opportunity, while on the spot, to ascertain the Gaseous contents of the spring. The following experiments were instituted for this purpose.

Exper. *s*.—Two quarts of water, immediately from the spring, were boiled very slowly for half an hour, and the Gas carefully collected in the usual manner measured 5.58 cubic inches; temperature 55°, the Mercury in the Baro-

meter standing 30 inches. This Gas did not blacken Acetate of Lead; but, being agitated with a mixture of lime and water, 3.16 cubic inches were instantly absorbed. The remainder, consisting of 2.42 inches, not absorbable by lime water, was examined in Dr. Hope's Eudiometer, by agitating it with Hydrosulphuret of Lime, and was thus found to consist of 82 parts *Azotic Gas*, and 18 *Oxygen*; which gives .435 Oxygen, and 1.985 Azotic Gas, in the half gallon.

The Wine Gallon therefore contains,

Carbonic Acid Gas, -	6.320
Azotic Gas, - - -	3.970
Oxygen Gas, - - -	0.870
Total,	11.160 cubic inches.

The existence of Oxygen Gas, in Mineral Water which contains Carbonate of Iron, even in this small quantity, seemed to me rather problematical*; at least, after standing a few days, it appears to be entirely absorbed by the iron: for if a bottle be completely filled with the water

* Murray's Materia Medica, Third Edition, Vol. ii. p. 455.—Vide etiam Kirwan, p. 8.—London, 1799.

and immediately sealed, in a day or two a brown precipitate, consisting of a portion of the Carbonate of Iron, highly oxydized, is observed to fall to the bottom of the bottle.

Having ascertained the nature and quantity of the Gaseous contents, we next proceeded to examine the different saline bodies, by evaporation and solution.

Exper. *t*.—1st. A quantity of the water was very slowly evaporated to dryness, and a mass of Deliquescent Salts was obtained.

2nd.—On a part of this mass, one ounce of Alcohol was poured, and frequently stirred, in order to separate all the saline matter soluble in Alcohol. The insoluble Salts were repeatedly washed on a filter with Alcohol; and the alcoholic solution evaporated to dryness. The Salts thus obtained were extremely deliquescent.

Exper. *u*.—A portion of Salts, procured as above, was dissolved in distilled water; Oxalic Acid gave with the solution a copious precipitate. Neither the Muriate of Barytes, nor the triple Prussiate, produced any change

upon it; nor did the Carbonate of Lime cause the slightest alteration, to indicate the presence of Alumina; but the Nitrate of Silver gave a very abundant precipitate. From these facts I inferred, that it contained only the *two Muriates of Lime and Magnesia.*

Exper. *v.*—The Salts which were left undissolved by the Alcohol, (in Exper. *t.* 2.) were next subjected to the tests. Part of the mass being dissolved in distilled water, the solution agitated and filtered, a brown precipitate remained on the filter; and the liquor afforded a white precipitate, on the addition of Oxalate of Ammonia. After being precipitated with the Oxalate, and filtered, the solution was concentrated by boiling, and Carbonate of Ammonia and afterwards Phosphate of Soda added; but no precipitation ensued. From which it appears, that no Magnesian Salt was present.

Exper. *w.*—In order to learn if Alumina was contained in the solution *v*, a portion of it was precipitated by Carbonate of Ammonia; the precipitate collected and digested in a solution of pure Potass, then washed and dried, but it was

not sensibly diminished in weight. The Muriate of Platina being dropped into the solution *v*, no change was produced: from all which it appears, that neither Alumina nor Potass, were present in the solution.

Exper. *x*.—Muriate of Barytes being dropped into the solution *v*, a precipitate was immediately formed: and a very copious one took place on the addition of Nitrate of Silver.

Thus the absence of the Nitrates, and of Ammonia, having been ascertained by the experiments *e*, and *k*; the earthy Muriates having been removed by Alcohol; and Potass and Alumina proved (by exper. *w*,) not to be present;—it necessarily follows that the solution *v* contains only *Muriate of Soda*, and *Sulphate of Lime:* for though the absence of Sulphate of Soda has not been proved by direct experiment, it may be inferred from the presence of Muriate of Lime and Magnesia; since we know these salts cannot exist together in the same water, without mutual decomposition*.

* Henry's Chemistry, p. 467. Edit. 5to.

It now only remained to ascertain the relative proportion and weight of the Salts, contained in a given quantity of the water. To accomplish which, the following means were adopted:—

Exper. *y*.—Two wine quarts of the water were evaporated, (as in exper. *t*. 1.) the dry mass re-dissolved in distilled water, and filtered. There remained on the filter a brown powder, which being washed and dried, weighed 5.25 grains. The saline solution was again evaporated to dryness; and the dry mass weighed 243 grains.

Exper. *z*.—The saline mass *y*, was treated with Alcohol as (in Exper. *t*. 2.), and the ***Muriates of Lime and Magnesia*** thus obtained, weighed 21.5 grains: hence half a grain had been lost in the process.

Exper. *a.a*.—The two Muriates *z*, were decomposed by adding Sulphuric Acid in excess, and evaporating them to dryness; then raising the heat to expel the excess of Acid, two drachms of distilled water were poured on the dry mass; the solution being filtered, evaporated, and allowed to stand in a cool place,—distinct chrys-

tals of *Sulphate of Magnesia* were obtained. These chrystals, having been decomposed by Carbonate of Potass, and the Carbonate of Magnesia saturated with Muriatic Acid, yielded 6.5 grains of *Muriate of Magnesia*, which deducted from the original 21.5 grains, leaves 15 for the weight of the *Muriate of Lime*.

Exper. *b. b.*—The saline mass (in Exper. *y.*) being dissolved in distilled water; the Sulphate of Lime was decomposed by Oxalic Acid, and the Oxalate collected on a filter: the Sulphuric Acid was thrown down by a solution of pure Barytes, care being taken not to add more than was necessary for the purpose.

Exper. *c. c.*—The solution of Muriate of Soda was then evaporated to dryness; and was found to weigh 217 grains. Thus the Salts left undissolved by the Alcohol in Exper. *y*, consisted of—

Muriate of Soda, . . . 217

Sulphate of Lime, and Loss, 4.221 grains.

Exper. *d.d.*—The brown precipitate, obtained in Exper. *y*, after being moistened with distilled water, and exposed for ten days to the

action of the air, in order to oxidize the Iron, so as to render it insoluble in the Acids, was then boiled in distilled water. It lost 1.25 grain. And the water being evaporated to dryness, yielded 1.25 grain of *Sulphate of Lime.* The Oxalate of Lime produced (in Exper. *b. b,*) being decomposed by heat, and saturated with Sulphuric Acid, 3.25 grains of Sulphate of Lime were obtained. Thus we have 4.5 grains of *Sulphate of Lime.*

Exper. *e. e.*—The remaining 4 grains of brown precipitate were digested in distilled vinegar; this solution being filtered and evaporated, the Acetate produced was not deliquescent, which evinces the absence of Magnesia. On the exposure of the Acetate in a Platina vessel to a strong heat, the white Earth obtained was totally soluble in distilled water; and being precipitated by Carbonic Acid and evaporated, 1.5 grain *Carbonate of Lime* was produced.

Exper. *f. f.*—The highly oxidized Iron was mixed with wax and heated to redness; then digested in Muriatic Acid, which entirely dissolved it. This solution was completely decom-

posed by the triple Prussiate of Potass. The remaining 2.5 grains consisted therefore of *Carbonate of Iron.*

Upon summing up the various products in the foregoing analysis, the *Wine Gallon* will be found to contain:—

	Grains.
Muriate of Soda, . . .	434.00
——— Lime, . . .	30.00
——— Magnesia,. . .	13.00
Sulphate of Lime, ...	9.00
Carbonate of Iron, . . .	5.00
——— Lime, . . .	3.00
Loss, ...	2.50
Total.	496.50

Gaseous Contents.

	Cubic Inches.
Carbonic Acid Gas, . . .	6.320
Azotic Gas, ...	3.970
Oxigen Gas, ...	0.870
	11.160

I defer offering any remarks upon the contents obtained, or the medicinal qualities of this water, until the results of the following Analysis have also been exhibited; when I shall advance a few observations upon the nature and properties of both springs, in the treatment and cure of those diseases in which they have already proved serviceable, or may hereafter be found beneficial.

NEW CHALYBEATE SPRING.

SENSIBLE PROPERTIES.

The appearance of the water when first taken from the well, is remarkably clear and bright; no perceptible smell can be detected; it sparkles gently when poured from one glass into another; when at rest, air bubbles slowly separate, and adhere to the sides of the glass; the taste is distinctly and strongly chalybeate. The temperature was 48° Fahrenheit, the surrounding atmosphere varying from 58° to 64°. Specific Gravity 1.0012.

CHEMICAL ANALYSIS.

EXPER. A.—Lime water produced a copious brownish precipitate.

EXPER. B.—Litmus paper was instantly reddened by it, but after a few hours exposure to the air, and likewise after being boiled, the water ceased to produce this effect.

EXPER. C.—The Acetate of Lead produced a white precipitate; and polished silver was not tarnished, after being kept many hours in the water. From which it appears, that it contains *disengaged Carbonic Acid;* but affords no traces of Sulphuretted Hydrogen. To ascertain this still further, several of the experiments mentioned in the former Analysis were employed, and the results found to be the same.

EXPER. D.—The Barytic test gave no indication of the minutest portion of the sulphates.

EXPER. E.—Nitrate of silver occasioned a slight precipitate of a white colour. Further experiments, which it is unnecessary to particularize, not having enabled me to discover any other Acid, than the *Carbonic and Muriatic* and the latter in very small quantity, and in a combined state, as is shown by Experiments B. and C.; I proceeded to the detection of the Earths and metallic Oxides.

EXPER. F.—Solution of Soap was instantly, though not strongly curdled, on being added to the water.

EXPER. G.—Muriate of Lime was not precipitated: from which may be inferred the absence of the Carbonated Alkalies.

EXPER. H.—Neither Oxalate of Ammonia, nor Fluate of Ammonia, established any traces of that very common principle in Mineral Waters, Lime.

EXPER. I.—A small quantity of the water being evaporated, and solution of Potass poured on the dry matter obtained, no cloud was formed round a stopper held over it, moistened with Muriatic Acid; from which the presence of Ammonia could be inferred.

EXPER. K.—Carbonate of Ammonia, in small quantity, was added to a portion of the water, which had been very much reduced by boiling; a few drops of Solution of Phosphate of Soda, then produced a very slight precipitate: which proves the existence of *Muriate of Magnesia*, though in the most minute proportion.

EXPER. L.—Tincture of Galls produced a copious inky precipitate before, but no effect after boiling, thus evincing that the *Iron* is in large quantity, and dissolved by Carbonic Acid.

EXPER. M.—Two wine quarts yielded by slow ebullition, for half an hour, 8.15 cubic

inches of *Carbonic Acid,* and 2.10 Azotic Gas.

Exper. N.—Two wine quarts being evaporated to dryness, the dry mass digested in distilled water, and the solution filtered: the brown powder remaining on the filter, weighed 5.25 grains, which upon careful examination afforded no traces of the earths; and was pure *Carbonate of Iron.* The solution was concentrated by boiling, pure Ammonia added, then filtered, and the clear solution evaporated in the usual manner; the dry mass obtained being next exposed to a moderate heat, to expel the Ammonia, was found to consist of *Muriate of Soda,* which weighed 1.25 grain.

From these experiments it is evident, that Iron is the predominant ingredient in this water. The proportions in a *Wine Gallon* being, of—

	Grains.
Carbonate of Iron, . . .	10.50
Muriate of Soda, . . .	2.50
——— of Magnesia, a very minute quantity.	
	Cubic Inches.
Carbonic Acid Gas, . . .	16.500
Azotic Gas, ...	4.200
Total.	20.700

The analysis of these two springs was conducted with as much care as possible. The experiments which could be finished in a few hours were undertaken upon the spot; but evaporation, and other tedious processes, were performed at Leeds, on the water carefully bottled, sealed, and brought over for the purpose.

From the ingredients in the *Saline Chalybeate Well*, it appears to hold a middle rank between the waters of Lemington Priors* and the Saline Chalybeate Wells, at Cheltenham †, and differs principally from the latter, in containing a larger proportion of the Muriates, and less of the Sulphates. Though the properties of these Salts are considerably different in their undissolved state, or even when dissolved separately in pure water; yet, when held naturally in solution, together with the other ingredients of Mineral Waters, their action appears to be nearly similar. Dr. Saunders observes, "that "under the head of *Neutral Purging Salts*, "are included the Sulphates of Soda and

* Dr. Lambe's Analysis.

† Dr. Jameson's Treatise on Cheltenham Waters.

"Magnesia, and the Muriates of Lime, Soda, "and Magnesia. The power," he continues, "which the earthy Muriates may possess, of "acting on the Intestinal Canal, is not quite "ascertained, but from their great solubility, "and from analogy with Salts, with similar "component parts, we may, I think, conclude "that this forms a principal part of their oper-"ation*." From these considerations, as well as the acknowledged utility of the contents, we may anticipate that this spring will be a valuable addition to the Harrogate Waters. And as many people, after having drunk the Sulphur Water, at Harrogate, for a few weeks, are recommended to proceed to Cheltenham, it might be desirable before they undertake this journey, to many so unpleasant and inconvenient, as well as expensive, that they should give this water a fair trial†.

* Saunders on Mineral Waters, p. 362-3.—1800.

† Let me not be understood as wishing to exalt Harrogate to the detriment of Cheltenham, or any other place; for although it is both proper and natural to wish well to the town and neighbourhood in which we live, yet I have no object in view, but the elucidation of truth, and a desire that this water should be tried. Like every thing else, it will then find its level; if really useful, the public reap the advantage; if otherwise, no attempt on my part shall ever be made, to rescue it from merited oblivion.

Like most waters of a similar nature, it is gently aperient; and to produce this effect the same quantity seems also necessary. The following paragraph is taken from a letter of the proprietors sent me a few days ago. "Some "of the company are taking the water, and "many of our neighbours have taken it for "some time past; it is found to be by all ape- "rient. How far it may be beneficial in other "respects, you are best able to judge.

"One Gentleman now taking it has fre- "quented Cheltenham many years; he is deci- "dedly convinced of the similarity of this water "*in its taste*, to that of Cheltenham, and in its "*effects upon himself*."

Reasoning *a priori*, we might suppose that it would be more especially useful in cases of Biliary Derangement, and Atony of the Stomach; but as such reasoning is frequently futile and inconclusive, I shall here only subjoin, from Dr. Jameson's valuable work on the Cheltenham Waters, a tabular view of the principal diseases which require a course of purging waters: in most of which, I am inclined to believe, the

spring under consideration may be tried with safety, and I trust with advantage.

"Inflamed and scirrhous liver, or spleen.

"Torpid action of the liver.

"Bilious state of the stomach.

"Habitual costiveness.

"Hypochondriacal complaints.

"Sick head-ache with bilious vomitings.

"Some kinds of bilious purgings.

"Jaundice, and biliary concretions.

"Depraved appetite and indigestion.

"Pimply eruptions, called scurvies.

"Scaly and scurfy states of the skin.

"Inflammations of the skin of the face.

"Exudations and watery humours of the skin.

"Some kinds of scrofulous tumours.

"Inflammations of the eyes, and eyelids.

"Inflamed ulcers, and discharges of the legs.

"Some stages of rheumatism and gout.

"Inflammatory asthma.

"Female diseases.

"Piles, and Fistula.

"Diseases of the kidneys, gravel, and stone.

"Intestinal Worms.

Where a stronger Chalybeate is judged necessary, two parts of this water might be mixed with one of the Chalybeate Water, which is only a few yards distant. In the few cases in which the Saline Chalybeate has hitherto been tried, under medical superintendance, its effects have been decidedly beneficial. In one case of obstinate Amenorrhoea, attended with symptoms of Hysteria, in which various other remedies had been used without effect, it has accomplished a complete cure. A gentleman who has long been affected with severe and complicated Dyspepsia has also taken it to the extent of a pint each morning for the last three weeks, and now feels himself much relieved. These I have seen. Several other cases equally conclusive, have been mentioned to me, which from not being properly authenticated, I deem improper for insertion.

The Chalybeate Spring, from the Analysis, appears to contain a larger proportion of the Carbonate of Iron, than almost any water of the same class hitherto discovered*. But the nature and properties of Chalybeate Waters are in

* Vide Table ii.

general so well understood, as to render a more minute illustration less necessary.

Since the foregoing part of this Essay was written, in the month of May, the number of persons who have taken the *Saline Chalybeate Water*, to the period at which I now write, (July 25,) has increased beyond my most sanguine expectations. Upwards of seventy are now using it daily with the most beneficial results. And from diligent inquiry, as well as attentively watching the effects produced in a considerable number of cases, I am now enabled to lay down some additional directions for its use. No general directions, however, can suit the varieties of constitution, temperament and disease, which might otherwise, by judicious management, reap benefit from this and similar remedies. And it is a long and well established, though melancholy truth, that much discrepancy of opinion respecting the effects of the most powerful and salutary remedies, as well as much irreparable mischief to the patient, has

arisen from their unregulated use in those cases where they are really indicated, or their indiscriminate exhibition in other cases where they are manifestly injurious.

Directions for taking the Saline Chalybeate Water.

As this water may be taken with two different intentions, namely, as an ***Evacuant***, and as a gentle ***Alterative***, the quantity must be regulated according to the effect desired. To answer the first intention, it must be drunk in larger quantities and repeated at shorter intervals. A glass, containing half a pint, should be taken, and repeated once or twice at the interval of ten or fifteen minutes. In a great majority of cases this will be found sufficient. But where the bowels are more than usually constipated from previous disease, or any other cause, a larger quantity is required; and may be taken to the extent of two or three pints, as I have repeatedly witnessed, not only with safety but advantage. The Iron it contains, though in many cases a most valuable addition to the water, renders it, to a certain extent, less active

as a purgative. This, however, is easily obviated, either by the addition of a little Sulphate of Magnesia, or by gently concentrating a portion of the water. By the latter process the Carbonic Acid, which holds the Iron in solution, will of course be expelled, the Iron precipitated, and the water become purely Saline. But as the invigorating qualities of the Iron and Carbonic Acid are thus lost, the former method is to be preferred. I have also frequently recommended some of the water to be highly concentrated, and a portion of it, thus prepared, to be added warm to each glass of the water before it is drunk; nor has this way of using it hitherto failed in any case with which I am acquainted. From what has been stated, the manner of obtaining its *Alterative* effects must be sufficiently obvious.

It is taken with most advantage at the pump before breakfast, gentle exercise being used between the intervals of drinking. General consent has established that the summer season is best adapted for a course of Mineral Waters.

It has been frequently remarked, that some individuals, on commencing a course of Mineral Waters, are affected with drowsiness, vertigo,

obtuse pain in the head, nausea, flatulence, oppression of the stomach, prickling heat, and various other uneasy sensations, as if arising from universal fulness of the whole system*. Persons recently arrived from a long journey, or using food different from that to which they have been accustomed, or who indulge too much in the use of stimulating liquors, are most liable to these attacks. So irregular is the first action of almost all Mineral Waters, that it is not uncommon for effects to be produced directly opposite to their known qualities. These or similar anomalous symptoms I have also observed, in a few instances to have been occasioned by the water under consideration. Such affections are now, with every appearance of reason, referred to the greater than ordinary quantity of water taken into the stomach; and not to any peculiarity in the mineral ingredients. This is rendered still more probable by the same effects arising from an excessive use of the purest

* Fothergill on Cheltenham Waters.
Jameson on Cheltenham Waters, p. 144.
Walker on Harrogate Waters, p. 105.
Saunders on Mineral Waters, p. 451, 2.
Pearson on Buxton Waters, v. 2. p. 210.

spring water*; and further confirmed by the disappearance of these complaints, as soon as the system becomes habituated to the liquid, or when some sensible effects are produced upon the bowels, skin, or kidneys. Should these symptoms be unusually severe or protracted, the use of any aperient medicine, will accelerate the action of the water;—should flatulence, or similar disagreeable feelings, supervene, they may frequently be removed by a few drops of ether, sal-volatile, or other antispasmodic.

From three to five weeks, has been commonly stated as a sufficient length of time for a course of similar waters. Such statements however are

* Dr. Wall, who published an account of the Malvern Water, (one of the purest springs in England,) which seems to owe its celebrity to the circumstance of its purity; in explaining its operation, observes, "I cannot close this treatise without mentioning one effect "of this water, that at first it frequently makes persons drowsy, and "sometimes gives them a dull pain in the head. Symptoms like "these are common upon the use of chalybeate waters, but there is "no metalic principle in this spring. I think these effects must be "owing to the ready and easy admission of the water in the blood, "whereby a plethora is brought on *pro tempore*."

The same effects have been observed from the Bristol waters, also remarkable for their purity.

The reader will likewise find some sensible remarks upon this subject, in a judicious and well written treatise upon the Mineral Water, of Askern, near Doncaster. By T. Le Gay Brewerton, p. 76. et secuta.

merely arbitrary, as this must depend entirely upon the nature and progress of the disease;—a trivial and evanescent alleviation, instead of a complete and permanent cure, being too frequently the consequence of an early discontinuance of their use. For be it remembered, that almost all diseases in which mineral waters prove beneficial are of a chronic form, have been gradually stealing upon their unwary victims, and that the constitution is often undermined ere we are sensible of its having sustained any injury. Is it therefore to be supposed, that drinking any quantity of the most powerful mineral water for a few weeks, or even months, shall be able to penetrate, resolve, and remove those obstructions in the different organs, which have been accumulating for years, or ingrafted in the system from our earliest infancy?

This water is known to be beneficial, and ought to be persevered in, if after using it for a short time the appetite begins to be increased, food to be relished, and digestion performed with greater ease than formerly.—And no doubt can exist of its salutary tendency, when the

complaint for which it was prescribed, gradually gives way to returning health.

It operates in a mild but effectual manner without occasioning gripes, or inducing the langour which sometimes follows the action of more acrid cathartics. It may be taken by the most delicate individuals for a considerable length of time, without the least inconvenience; and from the invigorating qualities of the Iron, additional strength is commonly acquired during the continuance of its use. In small or alterative doses it promotes the secretion of urine, and may frequently be beneficially applied for this purpose.

As I shall have occasion, when treating of the Ilkley water, to offer a few observations on Bathing, it is here only necessary to remark, that the salutary influence of either hot or cold bathing, according to the views of the prescriber, goes hand in hand with the effects of the water, in no inconsiderable number of the complaints in which it has already proved beneficial, or from apparent analogy may hereafter be found of advantage.

EXERCISE.—From the earliest records of physic to the present day, exercise has always been considered one of the principal means, suggested by the Author of our being, for the preservation of health and alleviation of disease. In the early stages of society, where loco-motion is absolutely required for procuring daily subsistence, we find few or none of those diseases recorded, which a more complex and artificial order of things has engendered among mankind, and entailed upon their posterity. But as almost every good in this life has its attendant evil, our object is by no means to deprecate those improvements which the ingenuity and labour of man have been able to accomplish, but to caution against their abuse, and to point out how they may be employed in prolonging life, and adding to health, comfort, and happiness. So essential is exercise to the enjoyment of health, and health to the enjoyment of every other blessing, that the man is inexcusable who neglects the former, and yet expects to retain the latter.

The rules laid down by one of the earliest writers on this subject, have scarcely hitherto

been surpassed:—"Sanus homo, qui et bene "valet et suae spontis est, nullis obligare se "legibus debet: ac neque medico neque iatra- "lipta egere. Hunc oportet varium habere "vitae genus: modo ruri esse, modo in urbe, "saepiusque in agro; navigare, venari, quiescere "interdum, sed frequentius se exercere: siqui- "dem ignavia corpus hebetat, labor firmat; illa "maturam senectutem, hic longam adolescen- "tiam reddit. Prodest etiam interdum balneo, "interdum aquis frigidis uti."*

To the pure air, agreeable company, amusements and relaxation from business, no small share of the benefits derived from Watering Places has universally been attributed. Early hours are always conducive to health and longevity. It has been observed that men of every temperament and manner of living, have had their lives protracted beyond the period usually allotted to mankind; but it has also been remarked, that they were, uniformly, early risers. The morning and forenoon are certainly the most proper times for the invalid to take exercise, yet too great stress has been laid upon this

* Celsus, l. i. p. 14.

circumstance; for though no one ought to take violent exercise immediately after meals, the injury said to be produced depends more upon the stomach being loaded with *too much* food, than upon any bad consequences which can arise from the exertion; indeed it is no more likely to prove hurtful after a moderate dinner, than after breakfast. The advantages to be derived from walking, riding on horseback, or in a carriage, as the patient's health, strength, inclination, or circumstances, will permit, are too well known to require any exhortations for a steady perseverance in their use. If the patient be a sufficient length of time in the open air, or otherwise actively employed, I am less solicitous as to the manner in which it may be accomplished, though riding on horseback, has, ceteris paribus, been preferred.*

To those to whom the sensual gratification of 'drinking deep, or the tooth-picking lounge

* Dr. Fothergill in his excellent 'rules for the preservation of Health,' observes—

"Of all exercises walking is the best, as it is the most natural for "men in health.

"All sorts of exercise are wholesom and best before meals, especi- "ally riding.

"Riding on horseback, is the best exercise to recover lost health, "and walking the best to preserve good health." p. 36. Ed: 6.

upon the Sofa, afford little pleasure, the Ball-Room, is both a pleasant and healthy mode of spending the evening. Than dancing, there is no species of exercise which can be taken within doors, morecheering to the mind and renovating to the body. Though usually stiled a laborious recreation I seldom, if ever, remember to have seen it produce any bad consequnces, while I have repeatedly witnessed its good effects. The music alone has a remarkable power over many individuals in soothing the mind and equalizing the passions; and a placid state of mind becomes, in its turn, a powerful auxilliary in the treatment, and cure of no small number of the most inveterate diseases. Almost every muscle in the body participates in this exercise. It is especially useful in exciting the action of the abdominal viscera, and in promoting a due secretion from the biliary system. An excitement is also produced in the capillary vessels, the action of the cutaneous glands is encreased, and perspiration elicited with less fatigue than in almost any other exercise;—the chest expands, the lungs play with freedom, the blood circulates with vigour, and a glowing

animation pervades the whole system. Hence its use in Chlorosis, Amenorrhoea, and Hypochondriasis, with other diseases of a similar nature. That dancing, like many other recreations, is liable to abuse, I am ready to admit; custom or fashion has absurdly enough made it too frequent encroach upon the hours which ought, naturally to be devoted to sleep; this should on all occasions be avoided. The weak and delicate cannot, or at least ought not to exert themselves like the strong and vigorous: and in no instance should the body when overheated be suddenly exposed to the cold air. The warm bath is a real luxury after this exercise, and will frequently induce sound and tranquil sleep.*

* I remember the cases of a lady and gentleman, in which the cold bath rather abruptly applied, seemed of service, after dancing. The lady had for some time laboured under the anomalous symptoms of chlorosis; the gentleman was a martyr to severe rheumatism—a ball was announced in their neighbourhood, which they both proposed to attend merely as spectators—the animating sound of two violins, and the still more penetrating thrill of the Highland Bagpipe, made their former *wise* resolutions quickly vanish.—They joined in the dance, and continued the amusement with alacrity during the evening. Having to pass a considerable rivulet in their way home, which only offered the precarious accommodation of stepping-stones, the night too being frosty, the lady's foot slipt, and as the gentleman was gallantly assisting her over, and had hold of her hand at the time—they tumbled headlong into the chilly element beneath.—

DIET.—" From the days of Pythagoras down " to the present, to deter mankind from intem- " perance, says ' Dr. Alexander', has employed " the tongue of the declaimer, the pen of the " satirist, the reasoning of the philosopher, and " the religion of the divine; and all with less " success than could have been wished or ex- " pected." Moderation in eating is at all times highly commendable, but more essentially necessary during a course of Mineral Waters. For, the largest proportion of cases which require their use, has been either originally excited, or subsequently maintained, by a too free participation in the luxuries of the table. As there is no class of diseases, in which a proper regimen is found to be of greater importance, so, there are none in which medicine, is unfortunately less efficient. Aware of this, it is imperative upon all who either value the health they enjoy, or seek to regain that which is lost, to

No time was lost in getting home—and the catastrophe was highly dreaded by the parents of both, as well as by the parties themselves. The lady kept her bed all next day, but from that period began to recover: and the gentleman equally fortunate, soon afterwards made her an offer of his hand on more secure ground than the *slippery* stepping-stones of * * * Water.

abstain from those things which their own experience, or that of others, has ascertained to be injurious; and to have recourse to such plain food as will nourish the body, without oppressing the organs of digestion. The number of distinctions, and the variety of detail which this important subject involves, preclude the possibility, in the limits prescribed to this Essay, of laying down rules suited to every case, or entering minutely into a consideration of the different kinds of Aliment*. Nor is it the mere *quality* of food which is generally of most importance. The *quantity* and *variety*, the *time* it is taken and the *manner of preparing* it, are the objects most worthy of regard.

Nothing is more common than to hear persons complain, that they have no appetite for breakfast. After making the usual condolence upon the weak state of their stomach, it will generally be found, on further inquiry, that they have eaten a *little* (here synonimous

* The reader is referred for further directions, to—
Fothergill'sRules for the preservation of health.
Cheyne on the Natural method of curing diseases of the Body and Mind, Ed. 4to.
Willich's Lectures on Diet and Regimen.
Arbuthnot on Aliments, Ed. 4to. &c.

with *hearty*) supper, drunk a *small* glass or two of wine or spirits after it, gone to bed and slept, or tried to sleep, till the family bell rings them down to breakfast. This requires no comment. To those who rise early, and who eat little or no supper, the breakfast is generally a pleasant, and ought to be a hearty meal. We are thus enabled to undergo the fatigues of the day, and prevented from having recourse to that mongrel and ambiguous repast, the *lunch;* against which even bon-vivants are wont to exclaim. Tea and Coffee are now in such general requisition for breakfast, and our systems are become so habituated to their use, that it would be difficult, to find a substitute more agreeable, or upon the whole less hurtful. Milk, where it can be taken, is certainly more nourishing and wholesome; and ought always to be preferred by those drinking *Chalybeate Waters:** not only in regard to its chemical properties,

* Garnett on Harrogate Waters, p. 208.9. 1816.

If the use of tea be so objectionable when drinking Chalybeate Water; Dr. Short, is equally severe against the use of Ale with the Sulphur Water. "This water mixed with Ale, certainly makes the "most intolerably nauseous Draught in Nature. A stranger to the "trick would certainly call for an Attorney to make his will," if not done before." p. 290.

but as it coincides most powerfully with the curative intention of the water. Plain dry toast, to which a little cold butter is added, is easier of digestion than either roll or muffin. To a person in health this is of little consequence, but where the stomach is relaxed, or nicely balanced, the difference is very perceptible.

To enumerate the various dishes commonly presented for *Dinner*, at those places where people resort for the avowed purpose of recruiting their health, would, to me, be a task neither easy nor agreeable. Much must be left to the judgment, and something to the habits of the patient. He will best consult his own health, however, and the intended effects of the waters, who, partaking of one or two plain dressed dishes, allows the others to disappear as they entered. Most boiled vegetables may be eaten with safety:—Salads and every species of raw vegetables, are often prejudicial, at best but equivocal, totally uncalled for, and not to be recommended. The rod, which occasioned so much distress to honest governor Sancho, ought, with inexorable sweep, to be extended over every species of baked meat, pastry, and the

whole train of confectionary agréments. The indiscriminate use of these deleterious substances, and their frequent exhibition to children, is indeed matter of serious regret, and cannot be too severely deprecated; for they tend, in no small degree, to produce and prolong those scrofulous and cutaneous affections, which render the period of childhood a perpetual scene of trouble, and too frequently of premature dissolution.—And haply, should some few thus indulged survive to adolescence, the malady which before had a disposition to the cuticular and mesenteric glands, now fixes on the more vital pulmonary organs, and lays the foundation of those complaints, which annually destroy, in the most interesting period of their lives, the "sweetest and fairest" of the British Isles.

The quantity of butter consumed, and of most other sauces of which it forms the basis, is also highly objectionable. Animal food is itself sufficiently nutritious; and where butter is taken with fish, or vegetables, it ought to be plain and in small quantity. Indeed where the taste is acquired (for it must now be an acquired one) of eating vegetables without butter, they

will be found in many instances more pleasant, and in every instance more wholesome. Though butter in its natural state is highly nutritious, and with many, easy of digestion, yet the changes it undergoes when subjected to heat in the different culinary processes, render it not less noxious than rancid oil, and when united with flour, isinglass, and similar substances, it becomes still more indigestible.

Jellies, plain pudding of rice, or flour and milk, baked fruits, with the omission of the pastry, are light and easy of digestion, and often constitute an important part of the invalid's dinner: but before using too great variety of these and similar articles, after a meal of more solid food, it may be well to remember the words of the Poet:—

> ———The stomach, crammed with every dish,
> A tomb of roast and boiled, and flesh and fish,
> Where bile and wind, and phlegm, and acid jar,
> And all the man is one intestine war!*

Water is the element, wisely afforded us by nature, for allaying thirst and diluting our solid food: and I greatly question, if the art of

* Pope's Imitat. Hor. B. ii.

man has hitherto been able to produce any substitute better adapted for the purpose. The only reasonable objection to its use, is its occasional hardness and impurity ; these, though said to exist much oftener than is really the case, may be remedied by previous boiling or distillation; while the chance of obtaining good beer is much more precarious*. But, where small beer has been the common beverage, the mere drinking of Harrogate Waters, except some other cause intervene, does not preclude its ordinary use.

* Hoffman has thus recorded his sentiments respecting water. "Pure water from a clear stream, drank in such a quantity as is sufficient to quench the thirst, is the best drink for persons of all ages and temperaments. By its fluidity and mildness, it promotes a free and equal circulation of the blood and humours through all the vessels of the body, upon which the due performance of every animal function depends; and hence water drinkers are not only the most active and nimble, but also the most cheerful and sprightly of all people. In sanguine complexions, water, by diluting the blood, renders the circulation easy and uniform. In the choleric, the coolness of the water restrains the quick motion and intense heat of the humours. It attenuates the glutinous viscidity of the juices in the phlegmatic, and the gross earthiness which prevails in melancholic temperaments: and as to different ages, water is good for children to make their tenacious milky diet thin and easy to digest; for youth and middle aged people, to sweeten and dissolve any scorbutic acrimony or sharpness that may be in the humours, by which means pains and obstructions are prevented ; and for old people, to moisten and mollify their rigid fibres, and to promote a less difficult circulation through their hard and shrivelled pipes."

Wine is the bane of youth, the comfort of middle life, and the milk of old age. Taken to the extent of two or three glasses, it promotes digestion, and increases perspiration. But the valetudinarian ought to be particularly on his guard not to exceed this quantity; the temptation of agreeable company, having nothing else to do, and the habits he has formerly indulged, render this caution doubly necessary: and though occasional excess in drinking, is, with justice, admitted to be less injurious than in eating, yet the destructive influence which the liberal and daily use of vinous liquors produces on the vigour and stamina of the constitution, is too universally known and feelingly experienced, to require any additional reprobation*.

* Oh! seldom may the fatal hours return
Of drinking deep! I would not daily taste,
Except when life declines, even sober cups.
————————For Youth has better joys:
And is it wise when youth with pleasure flows,
To squander the reliefs of age and pain?
Armstrong B. ii. p. 39.

This admirable Poem contains so many excellent reflections upon our present subject, and in a form so polished and pleasing, that the person who has not read it has still a few hours of pleasure to come. He who has once read it, need not be reminded to peruse it a second time.

All must be aware that the use of spirits is liable to more serious objections; as their immediate and powerful action upon the coats of the stomach, the gastric juice and biliary system is still more active and pernicious. When the stomach feels heavy or distended after dinner, a cup of good coffee is better calculated to remove these feelings and promote digestion than any quantity of wine; and as I have witnessed, and sometimes experienced, a tumbler or two of pure spring water is yet more effectual.

Fruit in this country seldom forms a regular meal. Taken either before or after dinner, in moderate quantity, it rarely proves troublesome, and is generally wholesome. When used in large quantities, together with wine, immediately after dinner, it is apt to produce acidity, and occasion spasms in the stomach and bowels. Where this occurs it should of course be discontinued.

From no meal does the constitution suffer such general injury as from heavy *Suppers*.— When dinner is taken at four or five o'clock, and a proportionate quantity of wine, fruit, and cakes consumed afterwards, it becomes impossi-

ble for the stomach, worn out with previous fatigue, or rendered torpid from the burden of unassimilated aliment, to digest an additional quantity of solid food; even though the *false appetite*, excited by the afternoon's wine, should seem to demand it. Besides, the stomach thus distended presses in the recumbent posture, upon the diaphragm, impedes the action of the lungs, and gives rise to difficult respiration, troublesome dreams,* and other unpleasant sensations. Nor can the food pass readily from the stomach, in the horizontal posture. Remaining, therefore, in the first passages of the alimentary canal, the absorbents are stimulated to undue action, the grosser particles of the chyle, which exercise would otherwise expel, are carried into the general circulation, and the blood becomes thickened and impure. A vitiated mass of fluids is thus accumulated in the system, which, being unable to pass by the excretory vessels, gives rise to apoplexy, gout, obesity, scrofula, stone, dropsy, consumption, and similar complaints. Nor are

* "If ever I ate a good supper at night,
I dreamed of the devil, and waked in a fright."
NEW BATH GUIDE.

the feelings of the supper-eater to be envied in the morning. Obtuse compressed pulsating pain in the head, hot dry tongue, tainted breath, teeth loaded with sordes, general lassitude, and giddiness amounting sometimes to syncope, are, in a greater or less degree, his first sensations: while the person who wisely retires to bed without supper, or is at least contented with a little bread and milk, a few plain vegetables, or a glass of water, soon sinks into a calm and undisturbed sleep, awakes next morning refreshed and vigorous, his spirits animated, his head clear, with a mind and body prompt and active to execute the evening's resolutions and undertake the labours of the day. Where an early dinner has been made, I would recommend eating more bread than is usually done at tea, and omitting supper altogether; or when much exercise has been taken in the afternoon, a little light food may be necessary, and should be taken an hour or two before retiring to rest. But enough has been said to point out the danger to those, who wish to enjoy good health, or to reap the full benefit of the Mineral Waters.

After all that has been written on this subject, or which, I conceive, can hereafter be advanced, it is undeniable that there are pleasures attending good generous living, which few are found to despise, and a still smaller number able to resist. When a rich and luxurious diet is counterbalanced by much active exertion, the consequences are neither so immediate in their approach, nor destructive in their effects. Unfortunately, however, the majority of those who give way to such enjoyments, gradually become anxious for repose. The exercise is postponed, while the former propensities continue undiminished, or increase as the body grows unable to resist them. Thus the escape of to-day only encourages the hazard of to-morrow. But though the powers of the stomach are confessedly great, and are long able, in an astonishing manner, to overcome those excesses in which the folly and depraved appetites of men have been accustomed to indulge;—yet a broken constitution, a premature old age, and all the harrassing feelings of a weakened and diseased mind, will sooner or later show that the

laws of sobriety are not to be invaded with impunity: and that temperance is the rock on which we must establish the basis of robust and energetic youth, build the solid fabric of manhood, and support the tottering structure of declining years.

OBSERVATIONS

ON THE

MINERAL SPRING,

AT

THORP-ARCH.

——————the glooms disclose,
I see the fountains in their infant beds;
I see the rocky siphons stretch'd immense,
The mighty reservoirs of harden'd chalk—
O'erflowing thence, the congregated stores,
The chrystal treasures of the liquid world,
* * * * * * *
But who their virtues can declare? who pierce,
With vision pure, into these secret stores
Of health, and life, and joy?

THOMSON.

THORP-ARCH is beautifully situated upon the banks of the River Wharfe; between Tadcaster and Wetherby, and at nearly an equal distance of 12-13 miles from Leeds, Harrogate, and York. The Mineral Spring, which has given celebrity to this village, was discovered on the 4th of June, 1744, by John Shires an inhabitant of the place. He died at the advanced

age of eighty; thus affording, in his own person, no bad specimen of the salubrity of the climate, and the virtues of the Spring, which he was accustomed freely to drink, and strongly to recommend.

Dr. Short, in a work published subsequently to that already mentioned, appears to have been the first writer who noticed this Spring*; and he bestows some well merited encomiums upon the beauty and healthiness of the situation. Dr. Donald Monro classes it among those Waters which have a 'strong Sulphurous Smell,' from which circumstance, as will afterwards appear, I am inclined to believe he had never seen it. His account is as follows†; "this water is a pure "brisk Salt Chalybeate, which proves purga- "tive. An ale gallon yielded one ounce six "drachms of sediment, twenty-five grains of "which were a white alkaline earth, the rest sea "salt."

Dr. Walker along with his Essay on the Harrogate Waters, gives a regular analysis of this Spring; with some pertinent remarks on its

* Short on Mineral Waters, 8vo. p. 56.

† Treatise on Mineral Waters, v. i. p. 454. London 1770.

situation, and the diseases in which it has been found beneficial. But his experiments are not altogether conclusive, as he has fallen into several errors both in the nature and quantity of the ingredients*.

The spring is on the south, or Boston side of the Wharfe, upon the estate of Oliver Gascoigne, Esq. the Lord of the Manor. The water issues from the bottom of a lofty limestone rock, which in some measure overhangs the river; and is conveyed by means of a pump into a room built for the purpose. So nearly is the Spring on a level with the stream, that after heavy falls of rain, it is not unfrequently overflowed; this, however, is not found to injure, but rather improve the water, as its action is always considered most powerful during wet weather, or after a flood †. The soil, which is light and dry, consists of Sand, Clay, and Magnesian Limestone; the rocks are chiefly calcareous, and though supposed to be impregnated

* Experiments 3.10.

† Does this proceed from the river water floating upon that of the Spring, and by its pressure forcing the Spring Water to regurgitate, and thus dissolve a larger proportion of the Mineral substances?

with different Minerals, no mines are found in the neighbourhood.

CHEMICAL ANALYSIS.

When recently drawn from the pump, the water has a clear sparkling appearance; but on standing a short time becomes slightly turbid. It has a distinct saline taste, not unsimilar to the Saline Chalybeate Spring, at Harrogate, which it also resembles in its other sensible properties. Temperature 49°. the surrounding medium being 57°. Specific gravity, at 55°, 1.0095.

Exper. I.—On adding a little Acetate of Lead, a very copious *white precipitate* instantly took place, which remained unaltered for some hours: this precipitate would have become *brown* had the water contained Sulphuretted Hydrogen*, nor could this Gas be distinguished by the smell, or the additional application of the most delicate tests.

Exper. II.—Nitrate of Lead having an excess of Acid, gave an abundant precipitate,

* Dr. Monro, in 1770 says, it smells strongly of Sulphur, Dr. Walker in 1784, observes, it has a slight Sulphurous smell; and I now find it in 1819, entirely free from this principle. It is probable, therefore, the water has undergone some change.

which on standing for two hours, was nearly all re-dissolved. When the Acid was still less saturated with the lead, it produced *a white precipitate* which on agitation was wholly taken up*. Saturated Nitrate of Lead instantly threw down a very copious *white* sediment which remained unchanged.

EXPER. III.—Litmus Paper was instantly *reddened* by the water fresh from the spring: but not after boiling.

EXPER. IV.—Muriate of Barytes, produced no change.

EXPER. V.—Tincture of Galls gave a *purple precipitate.*

EXPER. VI.—Lime Water produced a copious *white deposit.*

EXPER. VII.—The Water after being boiled and filtered, exhibited no traces of *Iron* by the Gallic or Prussic Tests.

* This differs materially from the results of Dr. Walker's third and tenth experiments;—the third is as follows—'A few drops of the Solution of Lead in the Nitrous Acid not fully saturated, were mixed with a glass of the water; no immediate change succeeded, and only a very small portion of a greyish sediment, was deposited after the mixture had stood 24 hours'.

Walker's Essay, p. 184.

EXPER. VIII.—Oxalate of Ammonia threw down a copious precipitate.

EXPER. IX.—Nitrate of Silver produced an abundant white precipitate.

EXPER. X.—Solution of Soap, in Alkohol, was *instantly curdled.*

EXPER. XI.—Muriate of Lime exhibited no change.

EXPER. XII.—To obtain the Gaseous contents, the same measures were adopted as already detailed, (vid Exper. *s.*) the quantity procured from two quarts of the water, at the usual temperature and pressure, was 8.28 cubic inches, of which 5.28 being absorbed by lime water, was, therefore, *Carbonic Acid:* the remaining three inches was found to possess the qualities of *Atmospheric Air,* though the Azotic Gas appeared to predominate.

The foregoing Experiments were performed upon the spot—the following upon the Water carefully conveyed to Leeds :

EXPER XIII.—The water, after being boiled and filtered, afforded a copious *white precipitate,* with Lime Water; which, being collected on a filter, and afterwards agitated in water,

impregnated with Carbonic Acid, was immediately re-dissolved.

EXPER. XIV.—To another portion of this precipitate a few drops of Sulphuric Acid were added, care being taken not to add more Acid than was sufficient to saturate the precipitate; it was instantly dissolved, and Succinate of Ammonia being dropt into the solution, produced no change. Hence the absence of Alumina:—the precipitate was consequently the *Magnesian Earth.*

EXPER. XV.—A wine gallon being evaporated to dryness in the usual manner, produced 584 grains of Saline matter.

EXPER. XVI.—Sulphuric Acid, poured on a portion of this Salt, did not disengage any red fumes.

These experiments show that this water contains neither Sulphates, nor Nitrates: but prove the presence of the *Carbonate of Iron, and the Muriates of Lime, Soda, and Magnesia.*

The 584 grains of Saline matter obtained as above, were digested in distilled water, and the solution filtered: a brown residuum (x.) remained on the filter, which weighed 2.4 grains; this being treated with distilled vinegar afforded

no indication of the soluble earths. The remaining brown powder was then digested in Muriatic Acid, and 0.75 grain remained undissolved, which had all the characters of *Silica*.—The brown residuum (x.) contained therefore—

	Grains.
Carbonate of Iron, . . .	1.75
Silica, ...	0.75

The remaining 581.5 being treated with Alcohol, as in the former analysis, yielded 7.25 grains *Muriate of Magnesia*, and 12.25 *Muriate of Lime*: the remaining 562 grains *were pure Muriate of Soda*.

Thus, the *Wine Gallon*, contains—

	Grains.
Muriate of Soda, . .	562.00
——— of Lime, . . .	12.25
——— of Magnesia, . .	7.25
Carbonate of Iron, . . .	1.75
Silica, ...	0.75
	584.00

Gaseous Contents.

	Cubic Inches.
Carbonic Acid, ...	10.56
Azotic Gas, ...	6.00
	16.56

The following is the result of Dr. Walker's Analysis from the same quantity of water.

"1. Inflammable air (Hydrogen Gas);
2. Fixed air;
3. Muriatic Salt in the proportion of an ounce, (480 grains) to a gallon;
4. Calcareous earth, and } together gr. xvi.
5. Selenitical earth, } in a gallon;
6. A small portion of iron, suspended by fixed air."

General Remarks on the Thorp-Arch Waters.

The component parts of this Spring do not differ materially from those of the Sulphur and Saline Chalybeate Waters at Harrogate. It contains a smaller proportion of Saline matter than the former, and less Iron than the latter, while, at the same time, it partly combines the properties of both. Though the Sulphuretted Hydrogen Gas, with which it was formerly said to be impregnated, has now disappeared, it not only retains the same quantity, but, by the present analysis, seems to have acquired an additional proportion of saline ingredients.

This water is aperient and diuretic, operates mildly, and with considerable certainty; while the large proportion of its gaseous contents prevents the stomach suffering from its liberal use. If regularly persevered in under proper directions, and a due regard to those auxiliary means, without which all remedies of this nature can be but partially operative, the invalid who resorts to Thorp-Arch will seldom have occasion to complain.

The directions laid down in the preceding part of this Essay, will, in almost every instance, be found applicable to the water under consideration. As a purgative, it should be taken in the morning, in pretty large quantities; as an alterative or diuretic, a glass may be used, at any time, when the stomach is empty.

The diseases, successfully treated by this water, coincide so nearly with those formerly stated, as to render repetition unnecessary. There are, however, some complaints in which it has acquired particular celebrity.—"The principles" says Dr. Walker "which compose Thorp-Arch water give it a superiority over Harrogate (Sulphur) water, in general relaxation, bilious

disorders, glandular obstructions, and schirrhosities, stomach complaints, and spontaneous vomitings. Harrogate water is to be preferred in cutaneous diseases, the piles, rheumatism, worms, ulcers, and probably in the stone and gravel." The truth of these remarks, so far as I have witnessed, or learned from others, appears unquestionable. In colic, cutaneous eruptions, female complaints, head-ach, and jaundice, it has also acquired considerable reputation. Indeed there are few other chronic complaints in which its use, under proper modifications, could not with propriety be recommended.

The want of Baths which was long, so justly, regretted by those resorting to this place, is now obviated: both a hot and cold bath having been erected immediately adjoining to the pump room, and thus a plentiful supply of fresh water can always be conveniently obtained. The inns, and several other houses, have also accommodations, upon a smaller scale, for the same purpose. From these and many other improvements, an annual increase of visitors has recently occurred. Indeed the growing prosperity of the place may be well exemplified from the following circum-

stance—the village of Boston, where the Spring is situated, was begun in an open field in the year 1753, and now contains more than six hundred inhabitants; while upwards of fifty houses, many of them extremely elegant, have been built within the last twenty years*. Neither is this perhaps to be wondered at, for though unsupported by trade or manufactures, and independent of its Mineral Spring, the situation of this charming village must always command the admiration of the traveller, and the attention of the invalid; nature having, with unsparing bounty endowed the neighbourhood with all the beauties of which a rich luxuriant English valley is susceptible; and rendered it one of the finest and most healthy spots in Yorkshire.

The cool shadowy walks along the banks of the river, the excellent condition of the roads, some fine smooth and elevated downs in the vicinity, with the delightful prospects continually arresting the eye and progress of the beholder, render Thorp-Arch extremely well calculated for every species of exercise. The

* For some of these particulars, I am indebted to my friend Mr. Bainbridge, Surgeon, in that neighbourhood.

places generally visited for pleasure and amusement are Bramham-Park, Harewood-House, Plumpton-Rocks, and Gawthorp-Oak, with several others, no less worthy the attention of the admirer of rural scenery. The ancient towns of Wetherby and Tadcaster, are only a few miles distant; to either of which places the drive is very pleasant. Near the latter, lies the ever memorable heath of Towton. Here forty thousand Englishmen, with savage fury, during the contest between the white and red rose, embrewed their hands in each others blood. The reflections which croud upon the mind, on visiting such a spot, are almost indescribable, and are strongly and happily contrasted with the now peaceful appearance, and smiling cheerfulness of the country around.

The air, wafted for many miles over a dry, well cultivated, upland country, is here, in a summer's evening, inexpressibly mild and salubrious. The spirits, harrassed and depressed with various cares, become gently invigorated, then gradually soften and assimilate to the soothing sweetness of the surrounding scene.

Thorp-Arch seems eminently suited for those who wish, for a time, to unbend the brow of anxious thought, or to recruit the body worn with toil; or, finally, to those, who, retiring from the bustle of life, wish to spend the evening of their days in the calm unruffled enjoyment of health of body, and peace of mind;—the greatest blessings which mortals can possess, or a bountiful Providence here bestow.

OBSERVATIONS

ON THE

ILKLEY FOUNTAIN.

Ye who amid this feverish world would wear
A body free of pain, of cares a mind;
Fly the rank city, shun its turbid air;
Breathe not the chaos of eternal smoke—
Exhal'd, to sully heaven's transparent dome,
With dim mortality.
* * * * * * * * *
While yet you breathe, away; the rural wilds
Invite; the mountains call you, and the vales;
The woods, the streams, and each ambrosial breeze,
That fans the ever undulating sky.--

ARMSTRONG.

THE resources which nature so uniformly displays in every part of the creation, ought at all times to make us consider her most minute operations with attention. In no instance, perhaps, is this more evident, than in the science of medicine, there being few diseases incident to man for the removal of which a natural remedy, has not also been provided. Mineral Waters strongly corroborate the truth of

this remark, their utility having been long experienced in a class of complaints, no less numerous than important. But in those Springs commonly termed Mineral, there is found a certain portion of foreign contents, to which part of their action, on the system, must be attributed; where we find, however, as in the present instance, the most powerful actions induced, and the most obstinate complaints removed, by water distinguished only by its purity, we are led to admire that wonder—working power, which, has thus abundantly strewed the seeds of health, over the vale of disease.

The Village of Ilkley lies on the south side of the Wharfe, upon the road between York and Lancaster, about 16 miles West from Thorp-Arch; 6 miles from Otley; and 16 from Leeds; while at a considerable distance to the north-west lies the ancient town of Skipton. Though this village appears to have undergone no alteration for many centuries, and the cottages, with primitive simplicity, still retain their roof of straw; yet it was formerly a place of great notoriety; being well known to antiqua-

rians, as the important Roman station of Olicana. The great Roman road, or Watling-street, which begun at Richborough, in the county of Kent, and was continued to St. Abbs Head, passed by Ilkley, and is still visible from its *green sward*, on the neighbouring mountains. Richard* informs us that it was one of the principal towns of the Brigantes, and succeeding antiquaries, in their notice of this spot, have paid a due tribute to departed greatness †. The population may now amount to between 300 and 400. Dr. Whitaker informs us, that the baptisms in 1600 were 21, in 1700, 21, in 1800, 14. The manor of Ilkley, has continued in the Baronial family of Midleton, of Midleton, for many centuries, and the present Lord is William Midleton, Esq. of that ilk. The variety of mineral and vegetable productions, the number of Roman remains, three large and well marked encampments of that warlike people, the scites of different sanguinary conflicts between the ancient Britons and daring Caledonii, with the now ruined

* Richard of Cirencester, p. 38, Iter. vii. p. 54.

† History of Manchester, by the Rev. Mr. Whitaker, Ed. 2. B. I. p. 200.—1783.

History of Craven, by T. D. Whitaker, L.L.D. F.A.S. p. 202-6.—1805

and peaceful piles of cloistered abbeys, and fallen towers—render this enchanting neighbourhood, important to the naturalist, valuable to the artist, and dear to the antiquarian. But the remembrance of our subject forbids us to linger on ground, which, though highly interesting, is foreign to our present inquiry.

The Spring *is situate* nearly three quarters of a mile from the village, upon the side of Rumblesmoor; the path leading to it rising by a very steep ascent. When on the spot, a semi-amphitheatre of shelving rocks, forms a bold and projecting back-ground; the water, no doubt, percolating to a common centre in this bosom. A mount, now planted with trees, which indicates the scite of a small encampment, or some other work, rises immediately behind, and the trench seems to have inclosed the spot from whence the Water issues. The prospect from this eminence is truly delightful, and has always excited the admiration of the visitor. Whatever of natural scenery can be heightened by a variegated and highly picturesque assemblage of streams, woods, rocks, villas, fruitful plains and verdant hills, terminating in a wide

expanse of bleak and barren mountains, is here displayed to the greatest perfection, and at one glance presented to the view. Below lies Ilkley, venerable from its very simplicity; directly opposite is Midleton-Lodge; a little to the right, the elegant modern mansion of Denton-Park, the seat of Sir Henry Carr Ibbetson, Bart., rendered memorable as the birth-place and occasional residence of the notorious Sir Thomas Fairfax; to the right, the village of Addingham, is finely situated at the bottom of a semicircular range of gently swelling hills, which though they impede the prospect in this direction, amply compensate by their own natural beauty and local interest. The river Wharfe, from its source above Oughtershaw, to its termination in the Ouse, winds along one of the most delightful rural vallies that can well be imagined, nor is it any where more peculiarly interesting than in this neighbourhood; full in view of the Ilkley Spring for several miles, proceeding upwards, it sweeps gently to the right, and rolls rapid and solitary, as if lamenting their present fate, amid the rough and gloomy forests of Bolton Abbey, and Barden Tower. While the

adjacent hills though they do not, with primitive asperity, rear their rugged and hoary heads to the clouds, are, notwithstanding, in many parts, sufficiently bold to give the finest and most picturesque effect to the charming landscape extended beneath.

The period at which Ilkley Fountain was *first discovered*, or used medicinally, seems involved in impenetrable obscurity. I consider it very probable, however, that it was one of the many springs, in England, first brought into notice by the Romans, who were no strangers to the luxury of either the hot or cold bath. The hot springs of Bath and the tepid waters of Buxton were both used, and perhaps first discovered, by this people. "The Romans," says Mr. Whitaker*, on their settlement in Britain, immediately marked and collected the Mineral Springs of the island, which had rilled on for ages, either utterly unnoticed by the natives, or wasting their waters on the solitary wilds of the country." Camden's account of Ilkley, which has been followed by most succeeding antiquarians, will

* History of Manchester, p. 200. Tacitus Agric. Vit. c. xxi. Balnea.

enable the reader to draw his own conclusions on this subject*.

The quotations from Gildas, and Seneca, Camden's own account, together with the well known fact, that *Medicinal Springs* were more especially deified by the Romans and Druids,

* "That it was an ancient town, appears from the pillars of Roman work, in the Church-yard and elsewhere, and that it was rebuilt by Virius Lupus, lieutenant and proprætor in Britain, from this inscription, lately dug up in the Church:

IM: SEVERVS
AVG. ET AVTONINVS
CAES. DESTINATVS
RESTITVERVNT. CVRAN-
TE VIRIO LVPO *LEG. E-
ORVM *PR. PR.

The following altar, which I saw there under the steps of an house, shews that the 2d cohort of the Lingones was stationed here by the inscription made by their prefect, in honor of Verbeia, probably the nymph or Goddess of the river Wherf, which runs by, and which I suspect from the close resemblance of names they called Verbeia.

VERBEIÆ
SACRVM
CLODIVS
FRONTO
PROEF. COH.
II. LINGON.

For Gildas writes that "in that age rivers were loaded with divine honours by the blind people of Britain." "Seneca also informs us that altars were erected to them." "We worship" says he "*the heads of great rivers*, and altars are erected at the *first emersion of a considerable stream out of the recesses of the earth.*"—Britannia by Gough, Vol. iii. Fol. p. 7. 1789.

while in later ages, under a different religion, but with the same views, their sanative properties were attributed to the patronage of some particular saint, seem strongly to favour the idea that the altar* was dedicated to the fountain at Ilkley, and not to the river Wharfe. The circumstance of such a large quantity (100 gallons per minute) of the finest water bursting from the front of a rugged and rocky mountain, without any lake or morass in its neighbourhood, must, in that superstitious age, have attracted considerable notice and veneration, while its use would soon teach them that such veneration was well bestowed. Its immediate vicinity to the encampment already mentioned, the stream also forming one of the brooks which glides along the side of the ancient fort at the village, and its purity, of which no people were better judges, must inevitably have conspired to

* This stone, which has engrossed the attention of antiquarians, to the exclusion of the Spring, which is of so much greater importance, is now placed in the corner of the garden, at Middleton-Lodge. I examined it lately, but the inscription from exposure to the elements, is, unfortunately become totally illegible. It is of a quadrangular figure, about four feet high, with a patera or cup on the top, and appears to be the common hard sandstone of the neighbourhood.

make this water both known to, and used by the Romans. The observation of Seneca alone, would go far to render this idea conclusive, "altars are erected at the first emersion of a considerable stream out of the recesses of the earth," such was literally the case with Ilkley Well, while the source of the Wharfe, was 35 miles distant, and the stream itself, in the neighbourhood of the village, unattended with any particular pool or gullet to influence the imagination or excite the veneration of the pagan beholder. Dr. Whitaker p. 206. observes, "How "long this well has been frequented, I know "not. It was certainly neglected by the Roman "soldiers, whose limbs, crippled by service in "a much colder climate than their own, required "to be relaxed, rather than braced, and had "therefore, *warm* baths generally provided "for them in the British stations". With all posible deference to the opinion of this eminent antiquary, to whom the West-Riding is so greatly indebted, he appears, in this instance, to refine too much, as no people then in existence were more in the habit of using the *Cold* as

well as the warm bath*; water too must have been required even for a warm bath, and this was perhaps the most convenient upon the spot. Besides it is paying his own countrymen a poor compliment, to make them be held for nearly four hundred years in subjection by people whose limbs were not able to endure the salutary action of cold water; and lastly, the Doctor is well aware, that the majority of the

* From the time the conquerours of Greece and Asia introduced the frequent use of Baths at Rome, the Romans began to consider them as essential to health as nourishment itself. In the time of the Emperors there were eight hundred public Baths in Rome, Agrippa alone, built one hundred; and it is mentioned that in almost every Village there were two or three. In each were hot, warm, and *cold* baths, so that every one might choose. As a hint to Bath constructors, and keepers—their cheapness tended very much to encrease their use.

Dum tu quadranti lavatur,
Rex ibis.—
'Whilst for *a farthing* bathed you strut a king'!—
Hor. L 1. Sat iii.

It is also well known that the Roman youth after the most severe exercise in the *Campus Martius*, while covered with dust and perspiration, were accustomed to plunge into the Tiber, and this practice was, at least, continued during the reign of Augustus. For Horace, L. 1. Od. 8, after asking Lydia why her lover neglects his usual exercises, among other inquiries, puts the question.

Cur timet flavum Tiberim tangere?
Manners and Customs of the Romans, p. 61.
Celsus, L. 1. et passim.—

soldiers in the Roman armies stationed in Britain, were from countries equally cold, if not sometimes more so than the climate of Great Britain. Noticing the different encampments. Dr. Whitaker remarks. " Within the camp on Addingham moor are a tumulus and a perennial spring; but, by a position very unusual in such encampments, it is commanded on the West by higher ground, rising immediately from the foss. That inconvenience, however, is remedied by an expedient, altogether new, so far as I have observed, in Roman castramentation, that is a line of circumvallation, enclosing both the camps, and surrounding the whole hill; an area, probably of 200 acres." The necessity of having this *perennial spring* within the camp, in case of an attack, may, I humbly conceive, solve this singularity in the line of circumvallation, and will show, at the same time, that the Romans were not accustomed to neglect a constant supply of the best water that could be procured.

Camden chiefly attributes this Altar to the river from the 'close resemblance of names', but so far as I have been able to discover, we do not find the word Verbeia used by any writer

prior to himself, and he merely gives it as a probable conjecture; which without further consideration has been taken up, re-echoed, and confirmed by every succeeding antiquary. That the Gu in the original word Guerf, would have been changed by the Romans into V, and the f of the same word into b, had they made any alteration, is, from the analogy of the languages, sufficiently probable, and does credit to Camdens conjecture as an etymologist. But the terms Guerf, Nidd, &c. are evidently of Celtic or British origin*, and we are well aware that out of the numerous rivers and other local objects to which appellations were given by the Romans in Britain, very few are found engrafted upon the original name; indeed, it is not probable, that this haughty and victorious people would be very anxious to strain their own copious and sonorous language, to the abrupt and guttural roots of the aborigines.

* The Nidd in Yorkshire, and the Nith in Dumfries-shire, are both from the same Celtic root, and signify 'whirling stream', many other words similar in sound and meaning, will occur to those versant in the subject. Chambers Caledonia, Vol. 1. p. 74, 4to. The curious reader will find an immense mass of interesting matter in this work, which betrays the most astonishing power of research.

Allowing however that the Romans had called this River Verbeia, it is not unlikely that the original inscription upon the altar might be mutilated, or rendered nearly illegible when copied by Camden, as upwards of thirteen hundred years from its erection, must have elapsed before he saw it †; the situation where it was found, and the nature of the stone gives still greater weight to this opinion; indeed it is reduced almost to certainty, when we recollect that no antiquarian who examined it, even a few years afterwards, was able to decypher the inscription correctly. Might not Camden then partly deceived by the original word Guerf, together with the apparently greater importance of the River (mineral springs being in no request, and very little resorted to at the period in which he wrote) have mistaken the word Verbeia for Hygeia? If so, Hygeia, or the Goddess of health, must have precided over Ilkly well, and to her this altar must have been dedicated.

‡ Virius Lupus signed a treaty of peace with the Caledonii A. D. 200. Severus arrived in Britain A. D. 208, the altar must have been built about this time. Camden visited Yorkshire in 1582, published his Britannia 4 years afterwards.

Would my limits permit, many other arguments might be adduced in support of this opinion. Mr. Whitaker in his History, p. 196—mentions his having discovered "on the northern side of the belfrey (in Ilkley Church) a couple of stones, overlooked by Camden, one of which was plainly a Roman altar, a patera appearing embossed on the edge of it; and the other exhibits a woman grasping a snake in either hand, which raise their heads considerable over her shoulders". Every one knows that Hygeia is usually represented after this manner. He further informs us, p. 197, that in the year 1767, he saw a stone exhibiting a somewhat similar figure, which had been discovered in a field a little distant from the Grit-stone water in the neighbourhood of Buxton. That the Romans had an enampment at Buxton, and that the waters were the principle inducement for their establishing a station in that wild desert spot, is definitely settled from the same authority. Again—The Rev. Dr. Whitaker History of Craven, p. 205—observes; "the sculpture discovered by Mr. Whitaker in the steeple is still entire; I suspect the steeple itself to have been

erected with stones dug out of the fortress." That the steeple was erected from ruins I think very probable, but from what particular ruins I am unable to decide. Now compare these accounts with Camden's having "seen the altar under the steps of an house," and it will almost appear certain, that these three stones had originally been erected on the same spot, had been barbarously demolished by the hands of ignorance, and that the same caprice, which we often find operative in matters of greater moment, had made one stone *the step of a door*, and fixed the other two in the belfrey of the Church steeple*.

On the *modern history* of this spring I shall not detain the reader. It has been resorted to, at least, for the last two centuries. John Ramsden, aged 92, the oldest inhabitant in the

* Since the above was written, I find, in Gough's additions, that a Mr. Fairfax had transcribed it some years previous to Camden's arrival at Ilkley, and used the word *Capito* for the *Fronto* of Camden, neither of these words are at all applicable as the sirname of Clandius, while the former is still more absurd in any other sense. I prefer therefore, the reading of Camden, though no reliance can be placed upon it. The original word, I am strongly of opinion was *Fonti*, which would establsh the point in question. Stukeley supposed the figure in the steeple, a Hercules strangling the serpents; to which it does not bear the most distant resemblance, while it shews at the same time,that there is no particular reason for attributing the altar to Verbeia.

village, who has always lived upon the spot, and still retains his faculties in a surprising manner, informed me that people from London and other distant places were accustomed to visit Ilkly in his father's time, whom he mentions as an old man. This account was confirmed by a lady in the village, whose father, grandfather, and great-grandfather remembered the springs being frequented by invalids.

No medical writer, ancient or modern, with whom I am acquainted, has given any account of this water, with the exception of my friend Dr. Mossman, who has favoured the public with a brief, but animated description of Ilkley spaw in his excellent Essay on Scrofula, and Glandular Consumption. Had the Doctor detailed his experiments, which, however, do not seem to have fallen within the range of his plan, and informed us what were the real nature and proportion of its contents, this account had perhaps never been published. Indeed my desire to ascertain these, was strongly excited from the following passage in his Essay.—"It has been very generally visited, and very often analysed by medical men and others; but being previously assured of

its great efficacy, and having begun their experiments under the impression that this efficacy sprung from the circumstance of the water being strongly impregnated with some vegetable or minerable substance;—and not being able to detect any such impregnation, they have uniformly been discouraged, and have abandoned the pursuit."—The late Mr. Moorhouse, Surgeon, at Skipton, made I believe, some experiments upon this water, which were never published; I have also been informed, that Dr. Murray, of Edinburgh, examined it some years ago, but the results have not been given to the public by that eminent chemist.

Though I have to lament the deficiency of written evidence respecting the nature and sanative properties of this spring;—I gratefully record the information received through my intelligent friend Mr. Spence, Surgeon at Otley, who, from being very frequently at Ilkley, has had ample opportunities of observing the action of the water, which he has done with particular attention; and the effects, hereafter to be detailed, are as much the results of his experience as of my own.

ILKLEY FOUNTAIN.

SENSIBLE PROPERTIES.

The water as it issues from the spring, surpasses in clearness almost any which I remember to have seen; it sparkles a little when poured from one glass into another; is devoid of taste or smell; when in the bath it appears remarkably pellucid, and seems to convey an idea of chilly transparency, similar to river water viewed under clear ice. In the mouth, it produces no particular coldness, but rather the sensation of softness, lightness, and purity; and it feels peculiarly grateful to the stomach. Temperature 48°, the thermometer in the shade standing 64°; the bulb being plunged into a pool of water in the neighbourhood, the mercury stood at 58½°; and the thermometer being again immersed in the stream running from the fountain, at the distance of half a mile from its source, stood at 57°; having, at this short distance, nearly acquired the temperature of the neighbouring water. Specific Gravity at 55°, 1.00015.

CHEMICAL ANALYSIS.

EXPER. 1.—This water gave no indications of Iron to the Gallic and Prussic Tests, even when the agency of the former was assisted by a few drops of the Solution of Carbonate of Soda; and the latter by a few drops of Muriatic Acid, previously added to a glass of the water.

EXPER. 2.—Muriate of Barytes occasioned no precipitate, after standing half an hour.

EXPER. 3.—Solution of Soap in Alcohol, produced no perceptible change.

EXPER. 4.—On the addition of Lime Water, a slight cloud was formed at the end of ten minutes; which dissolved with effervescence, in distilled vinegar; this shows that ***Carbonic Acid Gas is present.***

EXPER. 5.—Half a grain of Nitrate of Silver, in powder, being thrown into a glass of the water, a distinct bluish cloud appeared around it, after standing a few minutes.

EXPER. 6.—The colour of Litmus paper was not perceptibly changed by immersion in the water;—from which it appears there is no fixed Acid present, and that the Carbonic Acid is in

too small quantity to affect the vegetable colours.

EXPER. 7.—I next proceeded to collect the gaseous products in the usual manner *, by boiling two quarts of the water, fresh from the Spring, and receiving the gases in a glass jar; 9 cubic inches of the permanently elastic fluids was

* It may be proper to mention that the Gases, in this and the preceding experiments, were collected in a tin vessel, made for the purpose, according to the description given, p. 89, by Dr. Garnett, in his Analysis of the Harrogate Waters. I found it to answer pretty well, and the ease with which it can be conveyed, and applied in any situation, where fire can be procured, is no small recommendation for its use. The remainder of my apparatus, in itself sufficiently simple, was obligingly supplied by my friend Mr. Atkinson, and by Mr. West, and Messrs. Walker and Bedford, Chemists and Druggists.

Though much has been, and may still be accomplished in Chemical pursuits, by means apparently very inadequate to the effects produced; yet the ease with which operations are conducted, and the confidence inspired from the results, render a complete apparatus, a most desirable object to the experimentalist.—It is with infinite satisfaction, that I view this bar in the path of science, about to be removed in Leeds;—a number of public-spirited, and respectable individuals having formed themselves into a Society, and subscribed most liberally for erecting a Hall, and procuring a good philosophical Apparatus. Without anticipating more brilliant results, such an institution must diffuse information on all hands, and inspire the rising generation with the desire of cultivating that species of knowledge most likely to improve their different vocations: while it must at the same time, powerfully tend to the investigation and illustration of many highly important parts of Natural History, hitherto unascertained in this interesting district.

thus obtained; of which 6.3 cubic inches were rapidly condensed by agitation with Lime Water, producing Carbonate of Lime; consequently it was Carbonic Acid Gass: the remaining 2.7 cubic inches, were Common Air.

From these experiments it appears, that the only principles contained in the water were *Carbonic Acid Gas, Common Air, Muriate of Lime* in very small quantity, and perhaps a minute portion of Muriate of Magnesia.

Exper. 8.—Two quarts of the water being evaporated to dryness, afforded 4.75 grains of a greyish deliquescent powder.

Exper. 9.—I re-dissolved this in a small quantity of distilled water; then precipitated all the Lime, by adding the Oxalate of Ammonia; and in order to ascertain if the Magnesian Earth were present, I added well-saturated Carbonate of Ammonia in excess, and afterwards Phosphate of Soda, according to the method first proposed by Dr. Wollaston; a precipitate, consisting of the triple Phosphate of Ammonia and Magnesia, was immediately formed; which being collected and dried, weighed 2.5 grains: and as 64 grains of Muriate of Magnesia thus

treated, yield 100 grains of triple Salt, 2.5 grains of the latter Salt indicate the presence of nearly 1.5 grain of the Muriate of Magnesia; and this, deducted from the original 4.75, gives 3.25 grains *Muriate of Lime.*

Thus the *Wine Gallon* was found to contain—

	Grains.
Muriate of Lime	6.50
——— of Magnesia . . .	3.00
Total	9.50

Gaseous Contents.

	Cubic Inches.
Carbonic Acid Gas . . .	12.60
Atmospheric Air	5.40
	18.00

General Remarks on the Ilkley Water.

By this analysis it appears, that the Ilkley Spring is a very pure soft water; and that like those of Malvern, Holywell, and Tunbridge, with the thermal Springs of Bristol, Matlock, and Buxton,* it differs in nothing from ordinary

* Table ii

water, but in being more free from saline matter†; and in being several degrees colder than the generality of springs. This unusual coldness, however, is not to be attributed to any frigorific process of nature, going on in the caverns of the Mountain in which the water takes its rise; but evidently proceeds from the great depth of the spring, nearly the whole course of which is many fathoms below the surface of the earth. Hence its temperature is found to be 48° of Fahrenheit, which is the uniform temperature of the Earth a few feet below the superficies, as well as of all common water at a considerable depth from its surface. To prove this, I immersed a Thermometer in a draw-well, thirteen yards deep, the mercury on being drawn up, stood at 48½°, the temperature at the time being 76°, in the shade: the

† Though springs of this class are universally compared with common water, I scarcely remember to have seen the contents of any water in general use, particularly mentioned. From a wine gallon of the pump water I daily use, which is reckoned as pure as the generality of the water found in Leeds, I obtained 36 grains of solid residuum, which consisted chiefly of Muriate of Lime, a very small portion of Carbonate of Lime, and a trace of Oxide of Iron. Another Well, in common use, afforded 104 grains of residuum. These satisfactorily show the extreme purity of the Ilkley Water.

mercury had probably risen the half degree during its ascension.

It has already been stated, that the water issuing from the spring amounts to 100 gallons per minute; this, when required, is conveyed into two Baths, each holding 1100 gallons. The spring was inclosed by the late Marmaduke Midleton, Esq. and a neat cottage, containing the baths, dressing-rooms, and other conveniences, has since been erected, by the present lord of the manor. It is still, however, susceptible of several improvements, as from no person's living upon the spot, it has been suffered to go considerably out of repair. Though the procuring of fuel would be attended with difficulty, it is also worthy of consideration, whether a warm bath, of this water, might not in some cases be of advantage?

This spring being principally resorted to for bathing, too little attention has been paid to its *internal use*, which ought not however to be neglected; as drinking liberally of the water, will in almost every instance powerfully co-operate with its external application. The late Mr. Moorhouse, than whom, perhaps, none have

had a longer and more general experience of its effects, was accustomed to remark, that the poor generally reaped more benefit from it, and got sooner relieved of their complaints, than the rich; which he justly, in my opinion, attributed to their drinking more regularly and freely of the water, and using more exercise afterwards. The water may be taken in large quantities without deranging the organs of digestion, and as no small share of the good effects obtained from all mineral waters seems to depend on the primary element*, its lightness and extreme purity are additional recommendations for its use. The most sensible effect produced, when taken internally, is a powerful, and sometimes immediate, determination to the kidnies, and its diuretic properties generally continue during the course. Where the functions of the stomach are excessively debilitated, it will sometimes occasion slight and transient

* It is not at present my intention to enter minutely into the rationale of pure water used medicinally; some valuable observations on this subject will be found in the fifth chapter of Dr. Saunders' Treatise on Mineral Waters: and in the account given of the Malvern and Holywell Springs, both of which, in their natural properties, contents, and effects, are nearly similar to the Spring under consideration.

distention, and must therefore be taken in moderation; but as a celebrated professor has observed, when treating of the Bark, by a steady perseverance in its use it will generally make way for itself. The system may conveniently be habituated to the use of this water by taking it at meals, and it should be drunk at all times when any diluent is required.

General Remarks on Bathing.

The action of water when applied to the surface of the body, has occasioned much difference of opinion among writers on the subject. This appears to have arisen more from a partial and limited view of the effects produced by the fluid under different temperatures, and the length of time it is continued, with the variety of constitution and disease to which it has been applied, than from any real misconception of its general effects, which in most instances are sufficiently apparent. The stimulating and debilitating powers of water are only relative terms, since both can be procured from it by continuing for a shorter or longer period under its direct in-

fluence. This is more especially the nature of the cold bath, though water at any degree of heat, in which it can be applied to the body, will produce the same effect; as the undue action of the most powerful stimuli will ultimately tend to exhaust the frame and destroy the powers of life. By the term stimulant I here understand an increased action in the arterial system, the heat being for the moment diminished; this acceleration of the circulation becomes necessary to supply the heat so rapidly abstracted by the sudden immersion in cold water. When the temperature of the bath exceeds that of the body, the stimulant effect arises from a cause directly opposite, the circulation being excited to expel the increased heat, by the cooling process of perspiration; and thus the body is so constituted, as to provide against the undue extremes of either heat or cold.

As the action of water differs so materially under different degrees of heat, the principal object to be studied in its application, is the changes produced upon the system by these varieties of temperature. For this purpose

water, from the highest to the lowest degree of heat in which it can be safely applied externally, may be divided into hot, warm, tepid, and cold baths; to which may be added vapour and shower baths; with the more partial application of the water, under any of the above degrees of temperature, to some particular part of the body, as sponging, semicupium, or pediluvium.

A bath is termed *hot* when the temperature of the water is permanently higher than that of the body in a state of health. It commences therefore at 97o, and is seldom carried above 109°. On entering the hot bath a strong and permanent sensation of heat is experienced, the surface of the body becomes reddened, the face flushed, the pulse excited in force and frequency, the respiration grows hurried and occasionally laborious; these feelings continue increasing till profuse perspiration breaks forth, which lowers the violence of the action produced. Where no increased cuticular discharge is induced, the excitement commonly gives rise to such anxiety and general feeling of suffocation, as to threaten apoplexy, or other alarming symp-

toms, and oblige the patient to leave the bath. —This bath is seldom had recourse to by people in health, or in them only with the view of exciting perspiration; the person using it, therefore, generally retires to bed immediately after, by which any danger arising from sudden exposure to the air is prevented. Even in a state of disease this remedy is rarely applied. It is chiefly required in paralytic affections, and similar obstinate chronic complaints, or in habits rendered unusually torpid by a long residence in hot climates, or where perspiration has failed to be excited by other means.

The *vapour bath* is rapidly superseding the former; whether it is equally safe and powerful when applied generally to the system, my own experience does not allow me to decide, and I shall not detain the reader with the remarks of others*; but I have repeatedly witnessed the application of steam to particular parts of the

* An improvement in the mode of administering the vapour bath by the Honourable Basil Cochrane, 1809.

Transactions of the society for the encouragement of Arts p. 181. v. 30.

Essay on Bathing by Sir A. Clarke, M. D. Ed 4. 1819. where it is highly spoken of, and the account given accompanied with a plate.

body attended with much advantage. The vapour bath seems a necessary appendage to all general bathing establishments.

Descending in the range of temperature, the *warm bath* next demands our attention, which is perhaps more frequently used than any other, when the body is labouring under disease. It varies from 85° to 97° of heat, according to the feelings of the patient, water appearing warm to some, when it is comparatively cool to others, or even to the same individual under different circumstances. This is the state in which water is commonly most agreeable to the feelings, the body being only transferred into a denser medium of the same temperature with itself. No immediate sensible action is therefore produced by the warm bath, as is found to be occasioned by sudden immersion in very hot or cold water. But the heat of the bath being usually greater than the surrounding atmosphere, the action of the extreme vessels is increased and the skin at the same time softened and relaxed, while the blood is gently propelled towards the surface: thus the general circulation

becomes fuller and slower, and respiration is carried on with greater freedom; while a gentle perspiration is induced which may be kept up or restrained at pleasure.

To enumerate the diseases in which the warm bath, has been either generally or locally applied, would be to exhibit a catalogue of almost the whole nosology; there being very few complaints where its judicious administration has not been attended with considerable advantage. But while the warm bath is so universally useful as a remedy, I differ from those who consider it equally advantageous in the healthy subject. For notwithstanding it has been stated that the "*warm bath is in reality a Tonic, and fortifies the system against cold,*"* I am fully of opinion that its long continued use, where no disease is to be combated, tends to relax and enervate the system, and that catarrhs and other complaints arising from checked perspiration, more frequently supervene from its indiscriminate employment than from any other manner of bathing. When there is a want of vigour to

* Clarke's Essay p. 1st.

support the re-action of cold bathing, the warm or tepid bath is preferable, this very weakness being an almost certain indication of diseased action. It is undoubtedly serviceable, also, when the body, otherwise in health, is exhausted by fatigue; but the beneficial effects in such circumstances, arise from its equalizing the circulation, relaxing the density of the fibres, and inducing a state of repose. The body when allowed to rest thus resumes its wonted energy, and so far the warm bath, by removing irritation, may be said to possess secondary tonic powers: but in our variable climate, if the usual occupations of the day are resorted to immediately on leaving the bath, the consequences will not unfrequently be injurious. It is consistent with reason and experience, that when the pores of the skin are relaxed and perspiration induced, the system is more susceptible of cold than at any other period; if the warm bath, therefore, as it certainly does, occasion the former, it must inevitably lead to the latter. In the same popular treatise it is remarked, "that the body debilitated by fatigue is parting with its heat rapidly, by increased perspiration: in the other

(the warm bath) being surrounded with a medium of nearly its own temperature, the heat of the system is prevented from escaping and has rather a tendency to accumulate. By this means the body is better able to resist the action of cold, immediately after coming out of a warm bath, than perhaps in any other given situation." The former part of this observation is sufficiently evident, and forms no bad comment on the latter, the effects in both cases being not dissimilar. That no danger can accrue from cold as long as the body remains in the warm bath, is unquestionable, and that the animal heat is prevented from diminishing below the temperature of the water, is equally certain; but I am not aware how many degrees of heat the system can accumulate from water of the same temperature with itself. Heat has a tendency to diffuse itself through all bodies, and were it to accumulate in the present instance, perspiration would reduce it to the natural standard. Granting, however, that on leaving the bath, some of this conveniently accumulated heat did remain, it must very soon be given off to the surrounding atmosphere, and the languor and relaxed

state induced will then enable the cold air to act much more decisively. This is proved every day by those who confine themselves in heated apartments being more susceptible of cold than others constantly exposed to its action. In countries where the warm bath is in general use, the climate is either much hotter than ours, or they guard against the consequences by using the tepid or cold bath immediately afterwards, by which a real tonic effect is produced*. The numerous instances of catarrhs and similar affections, which supervene on the first use even of the natural tepid bath, as is daily witnessed at Buxton, go further to establish what has now been advanced, than a hundred volumes written in its support.

The warm bath, therefore, I consider principally useful in a debilitated or diseased state of the system: it may, however, be used by any one, proper precautions being adopted. Under these views, no particular time can be specified for its application. If perspiration be excited,

* An interesting account of the Russian manner of bathing, is given in the Journal de Physique, Tom. 25. an abstract of which will be found in Saunders on Mineral Waters, p. 439. and in most other essays on this subject.

and its continuance be wished for, the patient, of course, goes to bed; where sleep is the object required, the evening naturally suggests itself. The frequency of its use must depend upon the effects produced, and the intention for which it is applied. Those unaccustomed to the warm bath ought not to remain in it above five or ten minutes at first, and gradually increase the time as the constitution can bear it: from twenty minutes to half an hour will in general be found sufficient.

The *tepid bath* includes a much wider scale of temperature, than those already mentioned; as it may vary from 60° to 90°, and according as it approaches one or other of these extremes, the nearer its effects resemble the cold or warm bath. The body, when submitted to the action of the tepid bath, in most cases suffers no perceptible change, the pulse, heat, and respiration remaining unaffected. Its properties are therefore more strictly negative than any of the others, and benefit is received, more from the impurities of the surface being removed by the detergent qualities of the water, and flexibility restored to the general system, than from any

specific effects of temperature. From this its use must be obvious. It becomes valuable when the body is in such a weak, languid, or irritable state, as neither to bear the re-action of cold water, nor the excitement of the warm bath.

Thus, in phthisis the tepid bath is generally to be preferred; and in most cutaneous affections, where a higher degree of temperature is seldom necessary. As immersion may be continued for a great length of time, without occasioning much subsequent lassitude, it seems particularly indicated after attacks of rheumatism and gout, with similar complaints, in which some febrile irritation and sporadic pains continue to exist, after the violence of the disease is subdued. It is no less advantageous in the febrile affections of children, where it almost invariably affords relief; and in relaxing the growing rigidity of old age.

In early infancy, the daily use of the tepid bath is to be preferred, but after a few months have elapsed, washing a child in cold water, is much more efficacious in invigorating the system and laying a foundation for future health.

Though it has become customary of late to decry this practice, and to raise imaginary terrors in the minds of mothers respecting the danger of cruelly submitting the *delicate feeble frames* of children, to the action of cold water;—an incontrovertible mass of experience, both ancient and modern, proclaims it not only safe, but highly salutary. However much the inhabitants of civilized countries may excel in mental acquirements and other artificial accomplishments, they commonly yield, cæteris paribus, to their less informed neighbours in health and physical power. This arises principally from the different manner of rearing their children. In those nations which have been particularly distinguished for muscular force and agility, this practice has been universally employed. In the medical annals of almost all nations, it will be found that as luxury and effeminacy encreased, the temperature of their baths arose by the same scale*.

* The Roman History exhibits a beautiful illustration of this; the baths became hottest during the reign of Nero, they were checked by the wisdom of Adrian, and regulated by the conqueror Severus. Heir: Mercur: L. 1. Cap. 10. Gibbon's Decline and Fall of the Roman Empire, Vol. 5, p. 280.

It has been argued, that from the disproportion of some of the organs in childhood, congestion and inflammation are apt to take place. In answer to this it may be observed, that the washing or plunging a child in cold water, is so momentary as to allow of no congestion taking place, and again, that the system of children is too flexible to permit such congestion to continue; while from being early accustomed to it, there are always sufficient powers of re-action. This, as far as my own experience goes, I have uniformly found to be the case; nor in a district where this is happily daily practised, was I ever able to trace disease to, or discover any bad effect from, washing or immersing a healthy child in cold water, but on the contrary a hardy race is produced, which bid defiance to future hardship and exertion. When disease did occur, the tepid bath became much more serviceable. After the child is washed, he ought immediately to be well dried and dressed, or put to bed as the time requires. I would therefore entreat mothers to continue this practice as the best means of rearing a strong, healthy, and vigorous offspring.

The advantages of the more partial application of warm or tepid water, may be gathered from what has been already remarked. Bathing the feet in warm water is frequently of great service in allaying general irritation or slight febrile action. From the powerful, but inexplicable sympathy which exists between the feet and abdominal viscera, warm water applied to the former, often relieves the most distressing symptoms of the latter. In nausea, spasms of the stomach, diarrhaea, or cholera morbus this remedy, so simple and easily procured, ought not to be neglected; as it will sometimes afford ease where more complex measures have failed.

To enter into a disquisition concerning the real or alleged properties of baths impregnated with mineral or vegetable substances, would of itself require a separate treatise; the accounts respecting them being much at variance. I dismiss them, therefore, for the present, with observing that those who frequent watering places ought certainly to use them in preference.

For the same reason I shall not enter upon the subject of *sea-bathing,* excepting as it coin-

cides with the few observations to be offered on the cold bath. Popular opinion, which though not always to be believed, ought not to be entirely neglected, has, by an increasing use of sea-bathing, triumphantly exposed many fallacies from time to time promulgated respecting its danger. Persons resorting to sea-bathing, for the removal of any disease, soon experience whether it is likely to prove beneficial, and pursue it accordingly. While those who, with no particular complaint, retire for a few weeks in summer, to the sea-side, for the purpose of shaking off the dregs of a city life, seldom return disappointed; as they generally, if I may so express myself, lay in a stock of health, which enables them to withstand the excesses of the ensuing winter. Where an irritable state of the pulmonary organs exists, sea-bathing ought to be avoided. In plethoric and corpulent habits, or in any case where a preternatural determination to the head has been felt or may be dreaded, it should either be altogether refrained from, or used with the utmost circumspection.

The shower bath, and affusion of water at any temperature, are attended with powerful

and immediate effects upon the system. They are seldom employed, however, except under medical superintendance; and the original work of Dr. Currie*, which has proved such a productive mine to all succeeding writers on the subject, gives the most explicit directions for their use.

——————— You, the fair
Hygeia calls———
To slake the veins, till soon a purer tide
Flows down those loaded channels, washeth off
The dregs of luxury, the lurking seeds
Of crude disease, and through the abodes of life
Sends vigour, sends repose.——

In the subsequent remarks, I shall have a strict reference to Ilkley Spring, though any water of equal purity and temperature would of course be attended with nearly similar effects.

Cold Bathing is one of the most salutary agents we possess either in health or disease. Notwithstanding, however, it is so extensively useful, it is too powerful in its action to be unattended with danger, and ought therefore to be employed with caution.

* Medical Reports on the effects of water, by James Currie, M. D. F. R. S. Liverpool.

The shock, on plunging into Ilkley Bath, is excessive, and an irresistible impulse to escape from its influence is the first sensation produced. When this is accomplished, and the bather begins to dress, re-action almost immediately takes place, which is soon followed by a pleasant glow and lightness throughout the whole system. The body feels as relieved from a previous load, and unwonted energy and activity are communicated to the muscles of voluntary motion, while the mental sensations equally participate in the general animation. These feelings continue to a greater or less extent during the day, and are terminated by a night of calm and refreshing sleep. If, however, the body be kept still and quiet, some time after leaving the bath, a tendency to drowsiness is perceptible; this seems to arise as well from the previous excitement, as the ease and freedom from irritation which is almost universally experienced. I prefer assigning it to these causes, rather than to any undue determination of blood to the head or thorax, from observing that headach or similar complaints, are rarely experienced by those bathing in this water.

Though one of the coldest natural baths to be met with, it is used by the most delicate and infirm individuals, a proper degree of re-action seldom failing to occur. This may justly be attributed to the body being so immediately withdrawn from its action, and to the heat being evolved in the same ratio with the previous cold*. Indeed as the benefit derived from

* To ascertain the effects of Ilkley water by experiment, two friends and myself agreed to plunge into the bath, aud remain different periods, noticing the results accruing from each. Mr. S. was to be simply immersed; Mr. A. to remain in the bath one minute; and myself two minutes. Temperature of the bath 48°. Atmosphere 60°.

Mr. S.	Pulse, immediately before going in, ...	80
	Heat in the mouth, ...	97°
	——— axilla, ...	94°
	Pulse immediately after immersion, ...	122
	Heat in the mouth, ...	84°
	——— axilla	74°
	Five minutes after, pulse	88
	Heat in the mouth, ...	94°
	——— axilla, ...	90

Mr. A.	Pulse, immediately before going in, ...	87
	Heat in the mouth, ...	96°
	——— axilla, ...	93°
	At the expiration of one minute, pulse	96
	Heat in the mouth, ...	90°
	——— axilla, ...	80°

Fifteen minutes afterwards, heat and pulse natural.

every species of cold bathing arises chiefly from the shock sustained, and the subsequent re-

My pulse, immediately before going in, ... 72
Heat in the mouth. ..... 96°
———— axilla, ... 93°
Pulse at the expiration of two minutes, weak and tremulous, could not be distinctly counted
Heat in the mouth, ... 90°
———— axilla, ... 78°
Five minutes afterwards, pulse 84
Heat in the mouth, ... 93°
———— axilla, ... 87°
Twenty minutes afterwards, heat and pulse natural.

After the first shock, the water, for a very short space, felt somewhat more pleasant. By the time, however, the first minute was expired, constriction at the heart and diaphragm became so great, that I was obliged to raise the upper part of the chest out of the water. At this period I felt a strong inclination to leave the bath, but my two friends, who had not yet experienced its effects, with true philosophic ardour, planted themselves upon the steps and rendered egress impossible. I remained, therefore, the other minute, the water still feeling very cold, while a prickling sensation was extended over the surface. The time having elapsed, apparently the two longest minutes I ever spent, some degree of tremor and shivering was produced; this very soon subsided, and I was amply compensated by the delightful feeling I subsequently experienced. In the winter season, I have been repeatedly in water at 32° which did not appear so cold. This no doubt depended upon the difference of the atmosphere, and the capability of resisting cold being greater in winter. Mr. A. on his first plunge exclaimed, he was burnt, and was out in a moment, but was instantly compelled to resume his situation and finish the experiment. Persons, however, using this bath daily, soon become reconciled to it.

I am aware that experiments of this kind must be frequently repeated before any decisive conclusions can be drawn. These will show, however, that the pulse is quickened at the moment of immersion and abates as the temperature increases. They also show that

action; by leaving the bath as soon as possible, the necessary excitement must always be more speedily and certainly established. Consequently, where the water is very cold, there is no temptation for remaining in the bath; persons with great apparent debility are thus enabled to use it with safety; while, if the temperature of the water were several degrees higher, it might induce them to continue in the bath till the powers of excitement were exhausted.

In its general effects, this water, used as a bath, is highly invigorating, promotes the different secretions and excretions, and gives a keen edge to the appetite. In this respect, it excels any water with which I am acquainted. But a share of this quickening power must, in justice, be attributed to the bracing qualities of the mountain breeze, which sweeps along the strath in such ethereal purity.

re-action commences almost immediately, is soon finished, and proceeds more rapidly in proportion to the shortness of time the body is immersed. Re-action was not increased by any subsequent excitement;—there was a thunder shower at the time; the bath was exposed to the atmosphere, and no exercise was taken till the experiments were concluded.

Few directions are necessary for the use of this bath. It ought not to be used above once in the twenty-four hours, and for very infirm persons once in two days, will be sufficient. As a topical application twice or thrice daily will answer every good purpose. For those in good health, or who are tolerably strong, the morning, before breakfast, is the most suitable period for immersion. Weak and debilitated habits generally feel languid till they receive breakfast; for such the forenoon is most proper; the natural heat of the day tending to produce re-action, besides rendering their feelings more comfortable on leaving the bath.—Nothing requires to be stated respecting the period of continuance in the water, as no one, whose external feeling is not completely torpid, will remain in it a moment longer than till he can get out. It should, in all cases, be particularly inculcated upon those using the cold bath, not to desist till, by dry-rubbing, exercise or the use of warm liquids, they have produced a sensation of heat upon the surface; which will seldom or never fail to be induced by a steady perseverance in these measures.

Diseases in which the Ilkley Spring has proved useful,

Must undoubtedly include most of those which receive benefit from general cold bathing, but I shall here advert only to those where its efficacy has been long incontrovertibly established. Of these the first which merits attention is scrofula, in the various stages of which it has been attended with the most astonishing success. Its benign influence in this intractible complaint did not escape the attention of Dr. Mossman, who observes, "without the sanction of any medical writer*, it has uniformly forced

* I am here happy to correct a mistake into which both my learned friend and myself have fallen. From a communication, most obligingly sent me by Mr. John Eagle, resident near Ilkley, received while this sheet was in the press; I find that Dr. Short gives a brief account of this spring. While from a passage in the same author's preface, p. xvii. I am inclined to believe, that it was also noticed by Dr. Martin Lister, in his Discourse on the Mineral Waters of England, published in 1682, to the work of the latter I have no access, but as Dr. Short only mentions him to detect his errors, it is perhaps of less consequence.

Dr. Short, after describing the natural properties of the water, in words almost similar to those already used, observes, "five pints of this liquor exhaled, left seven grains of sediment:—Therefore, though this water is of the greatest esteem and repute of any in the North of England, in the King's Evil and other old Ulcers; yet it derives these effects neither from its fixed nor volatile parts; but

itself upon the notice of all descriptions of people in its vicinity, who labour under the influence of *Scrophula*.—They resort to it with the fullest conviction of its curative powers, and they are seldom disappointed of its beneficial effects,—A respectable clergyman, long a resident at Ilkley, informed me, that he never knew a scrophulous patient give the waters of that place a fair trial, without either experiencing benefit approximating to a cure, or being materially relieved."—This account has been amply confirmed by succeeding experience, and is completely accordant with what I have witnessed. In more than one case where the Sulphur Water at Harrogate, accompanied with warm bathing, has failed, I have known the

wholly from the coldness and purity of the element." In his mineralogical details, the Doctor is very incorrect. Natural History of Mineral Waters, 4to. p. 307, 1734.

On renewed research, I likewise find that Dr. Rutty gives the following hyperbolical passage as quoted from another Treatise of Dr. Short's on the virtues of cold water,—"Ichley and Willoughbridge, quatenus pure waters have cured more ulcerated patients, than the whole art of physic and surgery." Methodical Synopsis of Mineral Waters, 4to. p. 23, 1758.

Mr. Eagle's letter, which I regret not having received sooner, has furnished me with several other interesting local particulars, which in no respect differ from those already advanced, while they tend strongly to confirm the antiquity, celebrity, and utility of this spring.

water of Ilkley effect a cure. Where tumors occur in the maxillary glands, with a tendency to suppuration, it seldom fails to discuss them, which prevents those unpleasant cicatrices arising from their ulceration.—Connected with this disease, its efficacy has been remarkable in chronic inflammation of the eye, which is often so harrassing and tedious of cure in persons of a scrofulous diathesis. In the weak irritable state of the eyes, proceeding from various causes, attended with a painful and acrid discharge of watery humor, or a dry burning heat, bathing them in this spring has also proved highly serviceable.

In atrophy, and the mesenteric diseases of children, this water has been found no less beneficial. The weakest and most emaciated children have not only been able to endure its action, without any bad consequences, but have gained strength daily under its use. In such cases, however, it is prudent to wash the body with the water for the first few days, and then use it as a bath. A suitable quantity should also be taken internally: this may conveniently

be mixed with a little milk, which is found of an excellent quality in the neighbourhood.

At a more advanced period, when youth is fast ripening into manhood, there frequently occurs in persons of both sexes, a manifest deficiency in the vital functions, with a tendency to more serious complaints. Weak, sallow, and emaciated, they seem scarcely to exist, or by such existence merely to point out their approaching dissolution. In several instances of this nature, where the balance of life and death seemed equally poised, the waters of Ilkley have turned the scale in favour of the former*.

By persevering in the same means, the various cutaneous eruptions of children, commonly, though inaccurately enough, classed under the term scorbutic, including itch, tetters, scald-head, ringworm, herpes, &c. receive the most complete and permanent relief.

In all stiff joints and muscular contractions, arising from sprains, dislocations, rheumatic, or paralytic affections, this water has also been

* Pulsa fugit macies: abeunt pallorque situsque;
Adjectoque cavæ supplentur sanguine venæ;
Membraque luxuriant.

OVID. METAMOR.

very successful. In these, and chronic swellings of various descriptions, it is frequently applied under the form of dry-pumping. The patient descends into the empty bath, and placing the part affected under the pipe which supplies the water, the plug is withdrawn, and the stream received with any degree of impetus. In this manner, with the alternate use of blisters and leeches, white swellings attended with hectic fever, and in other respects apparently hopeless, have been relieved or entirely removed.

Chronic weakness of the general system, or of the thoracic, or abdominal viscera, unattended with severe or complicated derangement of structure, have likewise been frequently much relieved by the use of this water. Among these may be reckoned lientery, gleet, painful and gravelly affections of the bladder and kidnies, attended with morbid discharge of urine*.

Nor has this spring passed uncelebrated in female complaints. Where the catamenia are irregular or profuse, where much local irritation exists, while the system is not suffering under such general debility as to render re-action

* How far might this water be expected to prove useful in Diabetes?

difficult, it has often been found of advantage. Considerable discernment is requisite in the treatment of these affections, and as the most particular directions might be misunderstood, I decline enlarging further than recommending the tepid bath, for some time previous to the use of the other, as a prudent preparative in most affections of this nature.

The powers of the stomach, and consequently the whole system, are often diminished or rendered irritable by close confinement, literary pursuits, and similar causes, without the existence of any organic disease; slight febricula occurs, and considerable anxiety supervenes: country air and bathing become extremely useful, and a residence of a few weeks at Ilkley, or any similar situation, seldom fails to dispel these symptoms, and renew the vigour of the system.

The accommodations at Ilkley are such as a small sequestered village may be supposed to afford; persons frequenting it having been almost universally allured by the sterling utility of the water. Those who do resort here for pleasure, or who are otherwise able to enjoy themselves,

comprise their chief amusement in surveying the beauties of the surrounding country, fishing, or by permission, in shooting, coursing, and other rural sports. It is much to be regretted, however, that the conveniences are not greater; as I dare to observe, on the fullest conviction of the truth, that no spring of a *similar nature* in England, will do more for the invalid. One or two additional Lodging Houses, on a more extensive scale, would be a material improvement. But according to the useful maxim of making the best of every thing, (one great secret for the attainment of happiness,) the want of the splendid hall and other enjoyments, frequently disposes the visitor to spend more time in inhaling the healthy gale of the neighbouring mountains.

TABLE I.

Showing the contents, in a wine-gallon, of each of the Harrogate Waters. To this Table copied from DR. GARNETT'S Analysis, I have added the contents of the two Springs now analysed;—those of Thorp-Arch, and Ilkley;—together with the springs mentioned in the appendix.

NAMES *of the* WATERS.	Specific gravity.	Cubic Inches.			Grains.								
		Carbonic acid gas.	Azotic gas.	Hepatic or sulphurated hydrogen gas.	Muriate of soda.	Muriate of lime.	Muriate of magnesia.	Carbonate of lime.	Carbonate of magnesia.	Carbonate of iron.	Sulphate of magnesia.	Sulphate of soda.	Sulphate of lime.
Sulphur Water.	1,0064	8	7	19	615,5	13	91	18,5	5,5		10,5		
Crescent Water.	1,002	20,8		13,6	137		45	3,1		2	8		
Tewit Well.	1,00017	16	5							2,5			4
Old Spaw.	1,00014	15,75	4,25							2		3	1,5
Saint George's Spaw.	1,00012	13,5	3,5							2			4,5
New Saline Chalybeate, or Caledonian Spring.	1,0075	6,32	3,97 Oxigen Gas. 0,87		434	30	13	3		5			9
New Chalybeate or Hibernian Spring.	1,0012	16,5	4,2		2,5					10,5			
Thorp-Arch Spring.	1,0095	10,56	6		5,62	12,25	7,25			1,75			Silica .75
Ilkley Fountain.	1,00015	12,6	Air 5,4			6,5	3						
Saline Sulphuretted Spring.	1,0055	8,6	Air 3,6	6	424	15	65						10
Sulphuretted Spring.			5	9	15		8						

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TABLE II.

Taken from the Work of Dr. Saunders, exhibits the Composition of some of the most celebrated Mineral Waters in Europe.

CLASS.	NAME.	Highest temperature. — Farenheit.	Contained in an English wine pint of 28.875 cubic inches.						
			Azotic Gas. cubic inches.	Carbonic acid gas. cubic inches.	Sulphurated hydrogen. cubic inches.	Carbonated soda. grains.	Neutral purging salts. grains.	Selenite & earthy carbonats. grains.	Oxyd of Iron. grains.
Simpler cold	*Malvern*			*uncertain*	*none.*	*none*	*uncertain*	*uncertain*	*none*
	Holywell				*none*	*none*	*uncertain*	*uncertain*	*none*
Simpler thermal	*Bristol*	74°	*uncertain*	3.75	*none*	*none*	2.81	3.16	*none*
	Matlock	66°		*uncertain*	*none*	*none*	*uncertain*	*uncertain*	*none*
	Buxton	82°	0.474	*uncertain*	*none*	*none*	0.25	1.625	*none*
Simple saline	*Sedlitz*			1.	*none*	*none*	1.856	8.68	*none*
	Epsom				*none*	*none*	40. ?	8 ?	*none*
	Sea				*none*	*none*	237.5	6.	*none*
Highly carbonated akaline	*Seltzer*			17.	*none*	4.	17.5	8.	*none*
Simple carbonated chalybeate	*Tunbridge*		0.675	1.325	*none*	*none*	0.344	0.156	0.125
Hot, carbonated chalybeate	*Bath*	116°	1.?	1.?	*none*	*none*	10?	10?	*uncertain*
Highly carbonated chalybeate	*Spa*			12.79	*none*	1.47	4.632	1.47	0.56
	Pyrmont			26.	*none*	*none*	7.13	23.075	0.56
Saline, carbonated chalybeate	*Cheltenham*		*uncertain*	5.687	*uncertain*	*none*	62.125	6.85	0.625
	Scarborough			*uncertain*	*none*	*none*	20.	10.	*uncertain.*
Hot, saline, highly carbonated chalybeate	*Vichy*	120° ?		*uncertain*	*none*	*uncertain*		*uncertain*	*uncertain*
	Carlsbad	165°		*uncertain*	*none*	11.76	47.04	4.15	*uncertain*
Vitriolated chalybeate	*Hartfell*				*none*	*none*	*none*	*none*	4.815*
Cold sulphureous	*Harrogate*		0.875	1.	2.375	*none*	91.25	3.	*none*
	Moffatt		0.5	0.625	1.25	*none*	4.5	*none*	*none*
Hot, alkaline sulphureous	*Aix*	143°		*uncertain*	*uncertain*	12.	5.	4.75	*none*
	Borset	132°		*uncertain*	*uncertain*	*uncertain*	*uncertain*		*none*
	Barge	120°			*uncertain*	2.5	0.5	*uncertain*	*none*

* *That is, 2.94 contained in the sulphat of iron, (this salt when crystallized containing 28 per cent. of oxyd of iron, according to Kirwan) and 1.875 additional of oxyd of iron.*

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APPENDIX.

THERE seems at present a laudable desire among the inhabitants of Harrogate to increase the number of mineral springs. From all the water in the neighbourhood being more or less impregnated with mineral substances, considerable certainty is afforded for research. I have here briefly to notice the contents of *two other springs*, in the garden immediately behind the promenade-room, where the Crescent Well is situated. While this work was in progress, the proprietor, Mr. Linforth, requested me to examine them. Not to increase the bulk of this Essay, already extended beyond my intended limits, I have stated the results in Table I.—

The first, or Salino-Sulphuretted, is of the same class as the old Sulphur Well, but compared with Dr. Garnett's analysis, considerably weaker. As bath water, however, it is sufficiently strong, or perhaps superior to most at present used for that purpose. In delicate constitutions, where the other water is sometimes too powerful, this spring will be found no improper substitute.

The second presents an anomaly in the Waters of Harrogate. It is a pure spring water, impregnated with Sulphuretted Hydrogen Gas; and, as will be seen by a reference to the Table, almost entirely free from saline contents. It is thus similar to the Dinsdale, and Croft Springs, which have come into great reputation from this im-

pregnation alone. The reader who wishes to see what authors have advanced respecting the virtues of these springs, and the diseases in which they are more especially applicable, is referred to Willan's Observations on the Croft Sulphur Water 1782, and to Mr. Peacock's Analysis of the Dinsdale Spring.

Not treating generally of the Harrogate Waters, I have purposely avoided all local details. Commanding so many advantages in the variety of its springs, the purity of the air, and the excellency of its accommodations, Harrogate must ever attract numbers who either seek health from its waters, or pleasure from an intercourse with its varied society. To the fashionable and wealthy, it has long been a favourite resort;—nor has it been less the desire of the lower classes, whom misfortune, poverty, and sickness have combined to depress. Such have often sighed for the renovating aid which its waters afford, and too often sighed in vain. The circumstances of the poor allow not the expence which a residence at Harrogate incurs, while the charitable contributions, hitherto made on their behalf, are a mere apology, as if to reconcile the conscience to the neglect of measures much more efficient.

I have been led to these and the following remarks, from the truly philanthropic spirit breathed in a late address to the public by "A visitor at Harrogate, on the Subject of Providing *Baths*, and a Charitable Fund for Enabling the Poor to Partake of their Benefit." The praiseworthy object the writer has in view, demands the grateful thanks, hearty concurrence, and active co-operation of every friend to humanity.

I have no pleasure in condemning the conduct or motives of any; but, as a public body, in a public measure, the inhabitants of

Harrogate, unmindful that the prayer of the needy availeth much, have not been the first to forward this truly desirable and benevolent undertaking. To their more wealthy neighbours and visitors, they must, to a certain extent, have recourse for the means; but which of them has come openly, perseveringly forward, in its support? Much may be accomplished by individual perseverance,—infinitely more by united exertion; and this is an object worthy of both.

Having said thus much, it behoves me to show, that the present very inadequate charity was instituted between twenty and thirty years ago, by Dr. Cooper, of Kirby-Overblow; and from all I can learn, has continued ever since without material alteration. Limited in its resources, the advantages derived have been sufficient, though little more than sufficient, to indicate its immense importance on a more extended and improved plan.

The Address before me states that forty-one patients have been this season admitted on the charity. Of these, only three are returned as *no better*. We may reasonably suppose that not a few of these cases had baffled the faculty, in their respective neighbourhoods; yet, let the annals of any hospital show a more favourable return. By the Report added to the Address, it appears that £143 19*s*. 6*d*. was collected for this charity, in the year ending October 1818. By the same Report, it appears "that three thousand two hundred and fifty Ladies and Gentlemen visited Harrogate at the different boarding houses prior to the sixth of October, *besides those who were in lodgings*." It may justly be asked, What is this sum among so many? Not one shilling each, and, including those in lodgings, it would fall much short even of that pittance. Is then that godlike characteristic of the British nation—charity—blunted by the atmosphere of Harrogate? By no means. The ill success of this fund has arisen from the spirit in which the regulations have been unfortunately con-

ceived, and, I say it with submission, carried into execution. The second regulation runs thus—" That ONE SHILLING ONLY be requested, but any further sum received the subscriber chooses to give." In the first place, I believe this *one shilling only* is seldom applied for—and secondly, let any one suppose, that, on the arrival of a Nobleman, or wealthy Commoner, he is applied to for *one shilling only*, to bathe the Poor;—it must be obvious, that he can hardly fail to imagine, that its proposed application is a matter of little or no consequence whatever. Let the solicitation be for a sum worthy the liberality of the individual, he will pause—inquire—and, finding the object deserving of his utmost beneficence—present a donation commensurate with the importance of the benefits to be conferred.

Harrogate, then, ranking as one of the first watering places in the kingdom, has for two hundred years had no accommodation for the poor; and for the last twenty-five years, nothing more than the miserably insufficient fund to which I have alluded. The object of 'A VISITOR'S ADDRESS,' with the evident concurrence of the Committee, p. 9. is by the erection of baths and other conveniences, to remove this reproach. I presume not to say how this may best be effected, but it ought to be done on a scale of magnitude suitable to its importance. Wards might be established, similar to those of other hospitals—subscriptions solicited from the wealthy and humane—from the townships in the different manufacturing districts—and from the governors of other charities throughout the kingdom: the subscription of a certain sum entitling the donor to have a patient on the books.

The extent of such an establishment must depend upon the means, and these ought to be directed by the object to be attained. To this end, we must now turn, while I hesitate in entering upon the slightest possible sketch of its importance.—For it promises not only the

cure and alleviation of thousands of needy sufferers, but such an institution, placed under active and intelligent superintendance, would form a centre, whence the rays of knowledge might emanate, and even enlighten the whole science of medicine, on the subject of Mineral Waters.—From all parts of the empire, the most inveterate cutaneous affections might be here congregated; their classes, genera, and species, accurately marked; and the powers of baths, natural, mineral, and artificial, distinctly and unequivocally ascertained. Particular accounts of each case might be kept. These, laid before the public, would richly repay the contributor, by the extended and improved knowledge acquired for the treatment of his own complaints. Many are the diseases in which the powers of Mineral Waters are almost unknown;—in all the diseases to which they have been applied, much uncertainty exists, and must inevitably continue, till a mass of evidence, only to be acquired in a situation where the practitioner can command adherence to his orders, shall finally set them at rest.

The valuable knowledge obtained from Hospitals devoted to particular diseases, is universally understood;—and I doubt not, should baths be established at Harrogate, they will tend not less to the advance of medical science, and the benefit of the community, than to the relief of the individual sufferer. From the conviction of this truth, which must find a responsive feeling in every breast, I cherish the hope, that similar establishments will sooner or later be found at every principal watering place in the kingdom.

Let Harrogate, then, not be the last to adopt this benevolent measure—let the Committee call upon all to whom these waters have afforded relief—let the feeling heart remember how much is due to the bountiful Author of every good, in the person of His meanest creature—that the benefits should be confined to no rank in life, to no indi-

vidual condition, but diffused alike among the sons of affluence and the children of sorrow.—Let them so exert themselves that the plans recently suggested by a liberal minded "VISITOR," be forthwith carried into execution.—And, let them earnestly entreat the pecuniary assistance of all who, thankfully enjoying the blessings of Providence, are not indifferent to the wants of others,—who, gratefully, with one hand take the cup of health, and with the other humanely extend it to their equally afflicted and less fortunate fellow mortals.

THE END.

Headley and Mudie, Printers, Leeds.