

A treatise on Cheltenham waters, and bilious diseases ... To which are prefixed observations on fluidity, mineral waters, and watering places / By Thomas Jameson.

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Jameson, Thomas.

Publication/Creation

Cheltenham, Eng. : Printed by H. Ruff : Sold by Robinsons [and] Murray, London; Hough, Gloucester; and at the Libraries, Cheltenham, 1803.

Persistent URL

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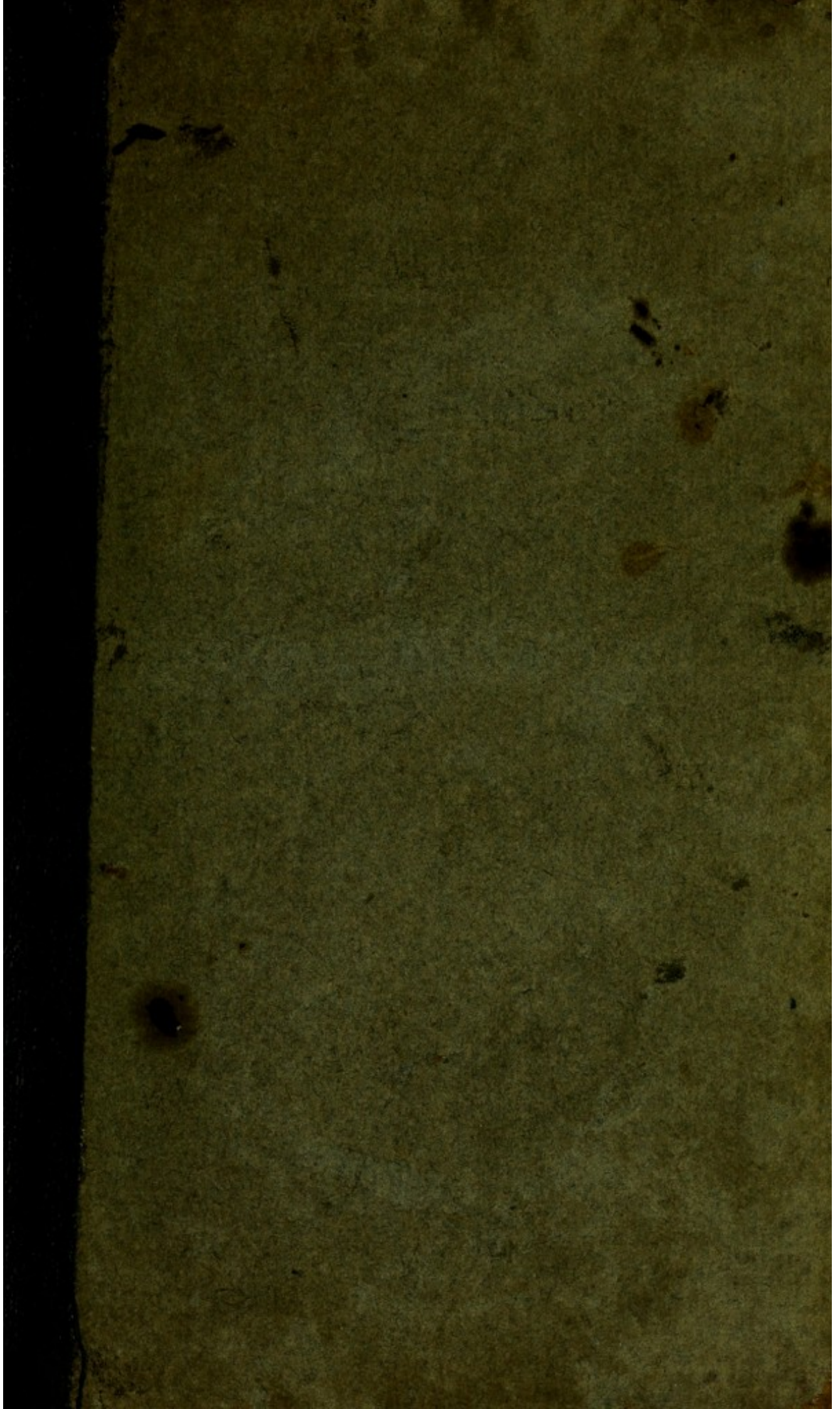
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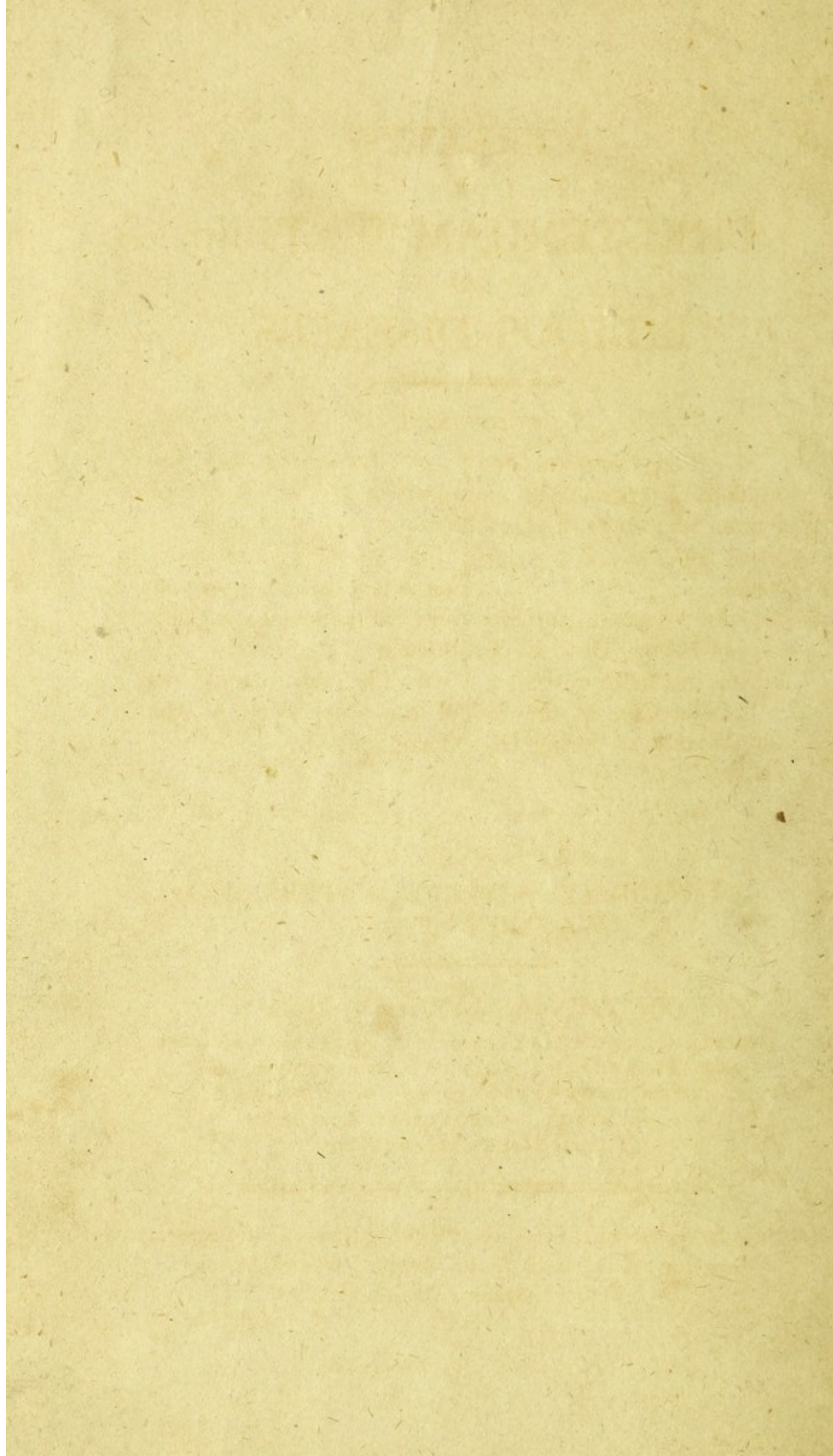
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A TREATISE
ON
CHELTENHAM WATERS,
AND
BILIOUS DISEASES.

CONTAINING

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|--|--|
| 1. The Chemical and Medical Properties of the Saline Springs of Cheltenham, and its Neighbourhood. | 4. Directions for the most appropriate mode of drinking the Waters. |
| 2. Arrangement, and History of Bilious Diseases occurring in this Country | 5. Geological Experiments for the Discovery of new Saline Springs at Cheltenham. |
| 3. The Uses of the Saline Waters in curing Diseases. | 6. The Nature, and Uses of the Steel Well in Mr. Barret's Field. |

TO WHICH ARE PREFIXED,

OBSERVATIONS
ON FLUIDITY, MINERAL WATERS, AND
WATERING PLACES.

By THOMAS JAMESON, M. D.

MEMBER OF THE COLLEGES OF PHYSICIANS OF LONDON
AND EDINBURGH; LATELY LECTURER ON THE
PRACTICE OF PHYSIC AT THE OLD FINSBURY
DISPENSARY, LONDON; NOW RESIDENT
PHYSICIAN AT CHELTENHAM.

Sold by Robinsons, Paternoster Row; Murray, Fleet Street,
London: Cruttwell, Bath; Hough, Gloucester; and
at the Libraries, Cheltenham.

1803.

Printed by H. Ruff, Cheltenham.



A TREATISE
ON
CHILTEHAM WATERS
AND
BILIOUS DISEASES.

CONTAINING

1. The Chemical and Medical Properties of the most appropriate mode of drinking the Waters.
2. A description of the new system of drinking the Waters.
3. The Nature and Properties of the Waters.
4. The Test of the Waters.
5. The Test of the Waters.

ON THE
NATURE, MINERAL WATERS, AND
WATERING PLACE.

By THOMAS LAMBERT, M.D.

Member of the College of Physicians, and of the Royal Society.
Fellow of the Royal Society, and of the Royal Academy of Sciences.
Fellow of the Royal Society, and of the Royal Academy of Sciences.
Fellow of the Royal Society, and of the Royal Academy of Sciences.

Sold by R. B. Shaw, Stationer, Row, Murray, and Son,
London; and by R. B. Shaw, Stationer, Row, Murray, and Son,
at the Stationer, Row, Murray, and Son,
London.

TO
THE RIGHT HONOURABLE
JAMES LORD SHERBORNE,
BARON SHERBORNE OF SHERBORNE,
IN THE
COUNTY OF GLOCESTER.

MY LORD,

THE HANDSOME MANNER IN WHICH YOUR
LORDSHIP PERMITTED ME TO INSCRIBE
THE FOLLOWING SHEETS TO YOUR LORD-
SHIP, HAS IMPRESSED A LIVELY SENSE OF
THE OBLIGATION CONFERED UPON

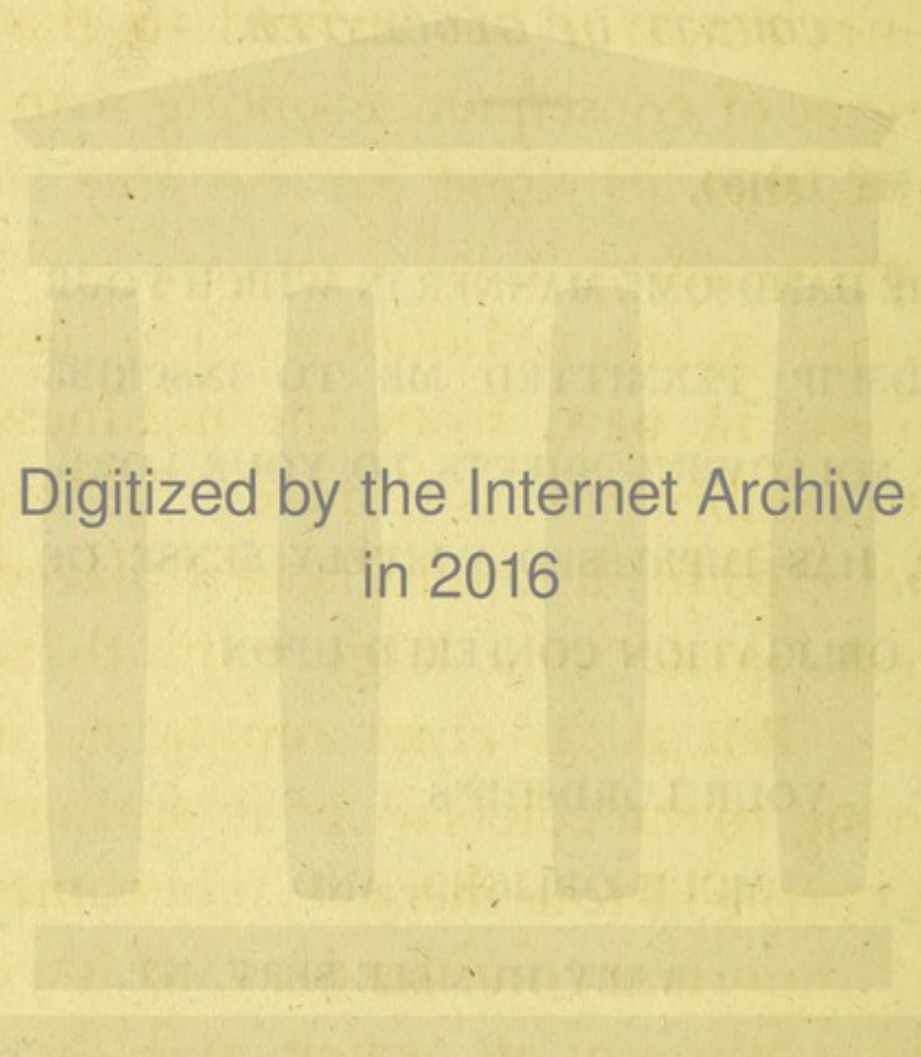
YOUR LORDSHIP'S

MUCH OBLIGED, AND

VERY HUMBLE SERVANT,

T. JAMESON.

CHELTENHAM,
November, 1803.



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PREFACE.

CHELTHENHAM has arrived to that degree of consequence among mankind, that its name has become as familiar all over the East and West Indies, as it is in London. This has arisen, in part, from the mildness and salubrity of its climate ; for it is sheltered by distant hills, as if placed in the center of a large amphitheatre. But as its chief reputation is owing to the celebrity of its springs, in curing bilious diseases, it becomes an important consideration, to have the nature of its water, and their modes of operation, in these intricate disorders, explained ; which my experience in tropical climates has enabled me to undertake.

As my object was to render this treatise worthy the attention of medical men, and at the same time, as intelligible as possible to invalids, I have endeavoured to give a plain narrative of the properties of all the mineral waters in Cheltenham, and its neighbourhood ; and have prefixed a few introductory observations, explaining the new chemical names, and the acknowledged medical virtues, of substances usually found in mineral waters ; on purpose to avoid the frequent interpretation of terms, which would have occurred in the course of the work.

The suspicions which prevailed among the visitors at Cheltenham, during the two last summers, that the chemical properties of the saline waters were changed, and the

apprehension that the fountains of health from whence they flowed, would soon fail to yield a sufficient supply of water, for the ordinary consumption of their votaries, determined me to investigate the subject; the result of which I now present to the public.

The Lower or Old Well, of greatest renown, has yielded, during the two last summers, nearly the same quantity of water as formerly; but, in consequence of the increase of drinkers, it has generally been drank dry in the space of an hour and a half. The only difference of properties between the present and past state of the water consists, in a less frequent discovery of the sulphureous smell, than it originally possessed; but its dose, and its vir-

tues, are nearly the same as they ever were.

The Upper or King's Well has been gradually declining for some years past, particularly in the quantity of water it supplies. Few salts were made from it last winter, and its water was so scanty this summer, that it was frequently consumed in less than half an hour. It seldom was perfectly clear, from the difficulty of raising so small a quantity of water from a great depth. It has not the hepatic smell it originally possessed, but its cathartic properties continue undiminished.

The failure of this well, no doubt, increased the demand upon the other spa, but not to so great a degree as might be expected, because

few persons were in the habits of drinking the water of the Upper Well, except servants, who seldom visit Cheltenham on account of their health.

To remove all apprehensions of future scarcities of water, by any extraordinary influx of company to Cheltenham, the author has diligently employed himself the whole past summer in superintending the boring of the ground, in different places in the vicinity of the town, for the purpose of discovering new springs. It appears from his researches, that a sufficiency of water to supply any demands that can possibly be made upon the place, will soon be obtained.

Two additional springs have already been discovered, which contain saline water, not inferior to that of the established spas, in chemical

or medical virtues. One of which supplies such abundance of water that it is intended to convert it to a well.

As this Treatise is chiefly intended for practical uses, the history of Bilious Diseases has occupied the largest part of it; and for the accurate discrimination of those cases which require a purging plan, from those that do not, the whole of bilious complaints usually occurring in this country have been separately considered; and for the sake of perspicuity are arranged into a concise system.

As brevity has likewise been a principal consideration with the author, every subject foreign to the professed objects of the Treatise has been avoided. No more chemical discussion has been introduced, than

was absolutely necessary to support the opinions advanced. Some observations were necessary to be made on baths, and those auxiliary remedies, which render the waters more efficacious in curing diseases; and upon the nature of the soil of Cheltenham, a subject unexplored, but may lead to a knowledge of the origin of purging chalybeate waters. These subjects, however, are confined to a very few pages of the work.

As there never was any publication on the properties of the Royal Spa, I have briefly stated the analysis I made.

The more valuable any remedy proves, the more liable it is to be abused. This is most obvious with respect to sea-bathing, calomel, and Cheltenham waters, neither of which

can be used imprudently without serious consequences. This treatise is intended to remove prevailing errors with regard to Cheltenham water, and calomel. The imprudent use of the former occasioned Dr. Saunders to calculate, that a third of the whole number of the drinkers of Cheltenham water was hurt by persevering in the purging plan*.

No doubt, great mischief has arisen from writers recommending the purging springs of Cheltenham in nervous diseases, and in cases where the vital powers are greatly diminished. It is not surprising that patients should deceive themselves, when the faculty propagate errors, and praise mineral waters indiscriminately. In a late treatise on Cheltenham water it is observed, that it is proper for consumptions,

* Preface to Dr. Saunders on the Liver, 3d edition,

dropsy, and nervous debility ; for it braces the nerves, and endues them with new vigour*. And the same dangerous doctrines have been since promulgated in the Cheltenham guides.† In a medical publication on Cheltenham waters, the latest and most popular, they are recommended, especially in nervous diseases, which the author exemplifies by a case of palsy of the side, being cured by them, as related to him by the patient himself ; and adds, that several other cases came within his own experience‡. Whereas, the only notice taken of bilious diseases in that treatise, is in the following words, “ complaints within the abdomen from foulness of the alimentary canal, obstructions, or redundancy of the bilious

* Barker on Cheltenham Water, p. 28, 29, 33. 1786.

† Tour to Cheltenham by Moreau, p. 55, 60. 1797.

‡ Dr. Smith on Cheltenham Water, p. 57, 62. 1787.

secretion, enlarged spleen, &c." are benefited by the waters.

But another more frequent cause of mischief arises from patients using the water indiscriminately, without medical advice. It is not uncommon for persons to commence a course of purging, from a supposition that they are bilious; and for those who are really bilious, to prosecute a purging plan, without knowing to what extent purging water can be taken with safety. Prudence requires that invalids should always be directed, before they drink the waters, whether they are to pursue a laxative, or a purging plan; and after they have continued their use a certain time, to know whether changes have taken place in their constitution, or their disease, to interdict their further use.

I have subjoined an account of the newly established chalybeate well at the upper end of Cheltenham, the nature of which the public were unacquainted with, although many persons drank the water. I have perhaps entered more fully into the consideration of its medical virtues, than a secondary object of this treatise requires, or experience has authorised; but from its being a simple carbonated chalybeate, similar to that of Tunbridge Wells, and numerous others in these kingdoms, which differ little from each other in their medical application, the same observations will serve for the administration of any other simple chalybeate, that have been given for this water.

I have called it Steel Well to distinguish it from the saline spas, with

which it has been frequently confounded, although they differ so essentially in their nature, that the saline and steel waters are used in different kinds of diseases, and most frequently in those of an opposite nature.

From my own observations, as well as those of others, made upon this water last year, it was then stronger than it proved this summer; perhaps the long continued hot and dry weather, from the superficial situation of the well, decomposed its water; and there is reason to believe, when some projected improvements of the proprietor have taken place, that it will become a powerful tonic, and prove a valuable acquisition to the town of Cheltenham, and its visitors.

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INTRODUCTORY OBSERVATIONS

ON

FLUIDITY, MINERAL WATERS, AND
WATERING PLACES.

THE afflux of water to any particular spot, depends chiefly upon the exposure and situation of the place with respect to the winds and seas, the degree of elevation of the land, and the nature of the soil and subsoil which compose the surface.

Philosophers have generally considered the ocean to be the source of all waters on the surface of the globe; and that fresh water is derived from it, not by filtration through the pores of the earth, but by evaporation from the sea, in consequence of the action of the sun and air upon it.

These watery vapours ascending, principally from the ocean, and also in a small degree from the land, form clouds in the atmosphere, which are transported by the winds to the sides of mountains, where they are robbed of their fire, and precipitated in large drops to the surface of the earth; hence it is, that winds which blow from the sea over mountains generally render the adjacent lands watery, and that the southwest winds, which bring moisture from the Atlantic Ocean, produce the greatest quantity of rain, and the most frequent storms of the island of Great Britain.

The water thus collected, is returned to the great abyss from whence it came, by means of rivers, flowing from the higher to the lower grounds; which in turn give birth to springs and wells upon the plains. The benevolent Creator of the Universe hath therefore supplied every country, of any great extent, with chains of mountains;

which are situated for the most part near the sea, upon the western boundaries of continents *; and rise steeper on one side than on the other, more effectually to distribute their waters, and to extend their benign influence over the face of the earth. The higher the mountains rear their lofty heads, the more rain they condense; hence there falls near 50 inches of annual rain at Kendal and Glasgow, on the western coast, and not half that quantity at London or at Edinburgh, upon the eastern coast of this island.

The state of the earth's surface has also great effect in augmenting the proportion of its water. Trees bring rain; and clearing a country from its wood, lessens the quantity of its vapour, and permits the solar beams to exert their influence on the land:

* This proposition is fully established by Mr. Arrowsmith's new charts of the four quarters of the globe; which exhibit the great ranges of mountains situated upon the western continents, near the sea.

hence cultivation has always been considered as the best means to render a country dry, as well as warm.

The different dispositions of the soils themselves, to retain or part with their humidity, is so universally understood, as hardly to deserve attention in this place.

Sand having less attraction for water than any other earth, permits the water to penetrate between its particles, so as to leave the surface of the land dry; and a chalky soil greedily absorbing water, from its saline nature, is apt to be carried into the earth and appear in the subsoil: whereas, clay forming a chemical union with water, is rendered extremely adhesive and retentive of moisture.* Soils in general retain a full third of the water which falls on their surface, and permit two thirds to pass under ground; but when a tenacious clay forms the subsoil,

* Bergman says clay absorbs ten times more water than sand.

the vegetable mould is apt to be supersaturated with water, which cannot penetrate through it.

While the rain from the atmosphere flows in the upper strata of the earth, it is fit for the nourishment of animals and vegetables, and becomes accumulated in cavities or wells, which collect water immediately from the strata around them, and therefore are liable to become dry in the summer season; but when rain descends by dykes and vertical fissures to great depth in the earth, it is collected in reservoirs, and returns again to the light of day in a gradual manner, at all seasons of the year. Waters thus coming from considerable profundity, are apt to be mineralized, and thereby less suited for the nutriment of organized beings; but are intended by the Author of Nature for the important purpose of recovering the health of the human species.

Streams of water, passing with great force

in the interior of the earth, and sometimes making irruptions upon miners, depend upon the great law of hydraulicks, which raises fluids to the level from whence they came; for the pressure of the atmosphere cannot be excluded from the interior of the earth; being a porous body, which has the looseness of its texture increased by the numerous vermin inhabiting it, by various gases escaping from it, and by water dissolving its substance, as well as by the many fissures which naturally exist in its most insoluble and indurated materials.*

SOFT WATER, the immediate product of evaporation, falls in the form of rain, hail, or snow, through the atmosphere to the earth in a pure state, unless it should

* The elasticity of the earth, derived chiefly from its humidity, is observable in the rattling of our windows when a carriage passes at considerable distance in the street.

have imbibed some particles of extraneous matter by falling through a vitiated air; but from its affinity to most substances in the earth, it comes from thence always more or less changed.

It dissolves the adventitious bodies it every where meets with in the storehouse of nature, in a way peculiar to itself. Its elements are not separated, but it unites with them in its entire state; for which reason it is commonly said to dissolve them. Sometimes it combines with substances of the animal and vegetable kingdoms, which are apt to render it putrid; at other times it unites with salts and metals which mineralize it, and render it hard. It frequently becomes again soft on exposure to the atmosphere, by immediately depositing these extraneous bodies which it held in solution; hence the water of rivers, lakes, and ponds, is for the most part soft. At other times it conveys the mineral salts to a considerable

distance, and meeting with matter of new attractions, deposits them in a crystalized state in the strata of earth, and in the crevices of rocks; from whence they are taken up by passing rills of water, as shall afterwards be noticed with regard to Cheltenham waters.

All other species of natural waters are mineralized; but they are not numerous, for we can reduce them to the following kinds.

SEA WATER, the most plentiful fluid in nature, is also the most useful one. As those minerals which are of greatest utility to the inhabitants of the earth, exist most abundantly near its surface, so sea salt and iron, the elementary principles of most medicinal waters, are the most common of all mineral substances on the surface of the globe; and the human race is instinctively directed, by the palate, to the use of that which constitutes the thirtieth part of the boundless ocean; on account of its being

necessary for the digestion of the food, and as a stimulus to the excretory organs of the human body *. Sea water, besides supplying most of our annual rain, gives birth to salt springs and lakes, and to most of the impregnations of mineral wells †.

It receives transparency from the great quantity of earthy salts contained in it. The rays of light pass deeper into it than they do into distilled water, from the density of its particles being increased by the salt. Divers can see at a great depth in the ocean : and sailors often receive warning of the bottom of the sea, when they cannot obtain soundings with a deep sea line of an hundred fathoms. It was formerly supposed that water took bodies into its pores without in-

* Marine salt is the most universal article of commerce in the world.

† Mr. Scheele obtained glauber salt, at a low temperature, from a mixture of sea and Epsom salts, contained so abundantly in the water of the ocean.

creasing its bulk, because it can be saturated with a great number of substances, one after another, without apparent increase of volume; but the Bishop of Landaff, in his valuable essays on chemistry, has plainly proved the contrary. It is a chemical union, which augments both the bulk and weight of the water, in proportion to the degree of its impregnation: hence the gravity of mineral waters has always been taken as a criterion of the quantity of foreign matters they contain; making a small allowance for the airs, which are sometimes in such proportion as to diminish their weight. It is this increase of density, from the union of salts, that raises the boiling point of water according as the solution approaches to full saturation; and renders the mineralized waters more lucid and transparent than others.

Sea water taken internally proves purgative; but is not in great esteem for that

purpose, on account of the heat and thirst it occasions. It is therefore never prescribed in inflammatory diseases, but only in those cases of scrofula and debility, which require the combination of its irritative and cathartic powers ; hence, also, it has often more effectually removed the tape worm from the human body than any other remedy.

PUMP WATERS, collected chiefly from the upper strata of the globe, are rendered hard by the earthy salts they contain ; this arises from an insipid selenite (called *gypsum* by the ancients), composed of sulphuric acid and lime, which proves the most universal of all the causes of their hardness ; but it may easily be separated from them by boiling, as we perceive, by the incrustations which spontaneously take place on the inside of our tea-kettles. On account of soft waters abounding more than others with

animal and vegetable substances, those which are hard have less tendency to putrefaction, and are in general clearer than the soft ones.

Notwithstanding water drinkers prefer hard waters to those which are soft, on account of their transparency and coolness, yet they have their disadvantages; for they often taste flat, and sometimes produce uneasiness at the stomach: but there is no reason to accuse them of producing chronic diseases, as Dr. Percival and others have done; since selenite is so insoluble in its nature, as in all probability to pass by the bowels, without mixing with the human fluids*.

PETRIFYING SPRINGS derive their properties from an acid or alkali dissolving calcareous or silicious earth in water. These waters suffering decomposition, permit the earthy matter sometimes to be deposited

* Selenite requires 500 times its weight of water to dissolve it.

upon the surface of solid bodies, in such a manner as to leave their internal organization intire; at other times, after carrying off part of their fibres, fill their pores so completely with earths, as to obliterate their structure, and leave only a stone, with the figure of an organic body. Most of our warm waters, as Matlock and Buxton, are of this kind.

Petrifying waters have been supposed by many, to be unsafe beverage; the fear of their producing petrifications in the body, or of sticking in the kidneys, and producing stone or gravel, are equally unfounded; since the living machine has the power of counteracting every chemical and mechanical property of matter; so that these waters may be drank with as much safety as any others. Upon the same principle, we cannot employ them with a view to thicken the blood, or to stop hæmorrhages, as formerly practised.

THERMAL WATERS are not numerous in this country, and seldom contain much impregnation; but they are truly valuable on account of their temperature.

Cold springs, which derive temperature from the atmosphere, vary little in the same latitude in different times of the year, provided they be situated deep in perpetual shade, and remain undisturbed by combustion. As their temperature is of a mean between summer heat and winter cold, every degree of latitude produces a degree of difference in the temperature of springs; hence the amount of annual heat of climate has been more frequently estimated by the springs of a country, than by any other means.

But the temperature of many springs exceeds the medium heat of both the atmosphere and the land. The waters of Bath possess from 107 to 116 degrees of heat; those of Bristol, 84; of Buxton, 82; and

of Matlock, 69 ; they must, therefore, derive their heat from combustible bodies in the bowels of the earth.

Thermal waters appear to come from subterraneous fires, at great depth in the earth, which convert the portions of water next them into steam. This vapour penetrating the incumbent strata, is condensed to the state of boiling water, and accumulated in reservoirs, from which it makes its way gradually to the light of day ; and proves of different temperatures according to the distance it has penetrated.

The waters of Bath have flowed for ages, with undiminished heat, which nothing but subterraneous fires, that burn for centuries, can account for ; and at Iceland the water is ejected boiling hot, in irregular columns, and with convulsive motions, only to be ascribed to the irresistible powers of steam.

The next species of natural waters being the more immediate object of this Treatise,

shall have a more particular consideration than those already enumerated.

MINERAL WATERS partake of impregnations, in addition to those usually contained in pump water, which have given great variety of character to the different wells of these dominions.

They have been usually divided by their chemical properties into saline, chalybeate, and sulphureous waters ; but hardly any of them possess a simple character, for they approach each other in a gradual manner, both in the quantity and quality of the ingredients they contain. It might, perhaps, be better to distinguish them by their medical properties ; such as, diluent, cathartic, tonic, diaphoretic, and astringent, * which

* The operation of mineral waters may be explained as follows: *Thermal*, as Bath, Bristol, Buxton, and Matlock, are *diluent* and *diaphoretic* ; the sea, Epsom, Nevil-holt, St. Chad's, and Bagnigge, are *cathartic* and

would express their principal effects on the body ; a more essential object of consideration, than any scrupulous inquiry into the causes of these effects : because chemical knowledge, for the purposes of the human body, must ever be subservient to medical.

Out of one hundred and thirty mineral wells in Great Britain, and thirty in Ireland, not more than twenty are much resorted to, or held in great estimation for the cure of diseases ; although the greatest number of them might have acquired equal reputation, had they been brought into use : so much depends upon situation, and the caprice of fashion, to establish the fame of watering places.

The IMPREGNATIONS of mineral wells are not very numerous, and half of the ingre-

diuretic ; Tunbridge is *tonic* ; Cheltenham and Scarborough are *cathartic* and *tonic* ; Harrowgate, Moffat, and St. Barnard's, are *alterative* and *detergent* ; and Hartfel is *astringent* and *detergent*.

dients have no salutary action on the human body, with which we are acquainted; but taken in the aggregate they are of great importance in the cure of diseases. The following are of most consequence as articles of the materia medica.

I. GASES, of various kinds, are contained in natural waters, either in a combined or loose state. Their affinity for water is so little, that with difficulty they can be retained in it. They fly off by mere exposure of the water to the atmosphere, or by the smallest increase of its temperature.

Atmospheric Air exists more or less in every species of water, except that which is newly obtained from the still; animals could not otherwise live and breathe in the sea and rivers, nor would they die immediately by immersion in distilled water.

Carbonic Acid Gas (Fix'd Air), so abundantly produced from lime-stone, every where in the earth, exists, in some propor-

tion, in almost all waters. It unites with the earths and metals as a weak acid; and when superabundant, gives the water a sparkling appearance during its escape. It is the only gas whose medical properties in water have been duly ascertained. It acts as a saline substance in promoting the secretions; but is apt to produce giddiness and headach when the water contains it in excess: which effect is so great at times, as to prevent the patient from taking a full dose of the water. As a grateful acid, it has long been employed, in a separate state, to check vomiting, and to obviate putrescency of the system.

Sulphurated Hydrogen Gas (Hepatic Air), formed by the decomposition of pyrites and water, abounds in particular springs; especially those of the thermal kind. It possesses many of the chemical properties of acids, but its medical operation on the body is not well ascertained. It has been employed

with greatest advantage in the cure of cachexies. It also kills worms; and, externally applied, cures cutaneous diseases.

Nitrogen Gas (Mephitic Air), produced from the decomposition of animal substances, exists in some springs; but it has such feeble adhesion to water, that it cannot be retained in it; hence, in passing off, it increases the sparkling appearance of the water: but there is little reason to regret this futility, since it exerts no salutary properties upon the human stomach.

II. SALTS exist in all mineral waters. Indurated bodies, which, in their simple state, are of an insoluble nature, unite with water, by means of oxygen or carbonic acid. Every substance must be converted into the nature of a salt before it becomes soluble in water. Thus magnesia, in its pure state, is insoluble; but when united to carbonic acid, it readily combines with water. Another

law of chemistry is, that bodies only unite chemically with one another in determined proportions: thus iron is rendered soluble, by acquiring a portion of oxygen; but it becomes again insoluble by an excess of the same principle: which explains a great many of the phenomena of mineral wells.

The Sulphuric Acid, formed from sulphur; and *the Muriatic Acid*, from sea salt; have both great avidity for water; but are never found in it alone; because they always meet with alkalies or earths, to which they unite themselves, and form neutral salts.

Carbonate of Soda (Fossile Alkali), the offspring of sea salt, is a common ingredient of waters; but it is generally united to a mineral acid in them.

Sulphate of Magnesia (Epsom Salt), obtained for commerce from the bittern of sea water, is the most common of all the perfect salts in springs, except sea salt. It acts on the human body as a brisk and easy cathartic,

and also operates by perspiration or urine, according as the skin is kept warm or cool ; but it gives the water a bitter and nauseous taste.

Sulphate of Soda (Glauber's Salt), the combination of sulphuric acid with soda, is the most valuable ingredient of saline springs ; but it predominates only in a few. It is a brisk and easy cathartic, which proves more grateful to the palate than sulphate of magnesia.

Muriate of Soda (Sea Salt), is generally associated, in small quantity, with the two former salts, in springs ; and thereby, in some degree, meliorates their taste, and increases their purgative powers.

Three saline earths are found in mineral waters, viz.

Calcareous Earth (Lime), the most important of all the earths to organic nature, is the most common one, and therefore exists generally in waters ; but it has a greater

tendency to load the stomach, than to prove a remedy for the cure of diseases.

Magnesian Earth (Common Magnesia), exists in the greatest number of springs, and is a useful purgative.

Aluminous Earth (Pure Clay), is found in a few springs, in the state of alum, by combining with an excess of sulphuric acid. There is but one well in reputation in Britain, which is that at Moffat, in Scotland. Many others might be found, if the water could be used internally in diseases. Four years ago, I examined one at Wardrew, near Gilzland, in Cumberland, of an austere taste, and strong astringent nature. The country people were in the habits of resorting to it for the cure of ulcers, by external application.

III. METALS are seldom found in mineral waters, except iron. Copper only exists in water near copper mines.

Chalybeates, the most common of all kinds of mineral waters, are easily discovered by their inky taste, and ochrey channels, and by exhibiting a shining pellicle on their surface. Iron is generally suspended in the water by carbonic acid; although in a few instances it is held in solution by sulphuric acid; as in alum waters.

The attenuation of iron is not less remarkable in water, than the extraordinary effects of such a minute portion of matter upon the human body. A pint of Tunbridge water does not contain above a fourth of a grain of steel, and yet every portion of the water can be changed to a dark colour by a drop or two of tincture of galls. In like manner, the same small portion of iron, taken internally in a pint of water, for a few weeks, constringes and hardens the fibres of the human body. It is therefore employed in weak, lax, pale habits, and in chlorotic and cachectic diseases.

There are some other mineral bodies found occasionally in springs, besides those enumerated, as well as some small portions of animal and vegetable matters in a few waters, but they do not give them a medical character,

The DILUTING PRINCIPLE of waters, which is the only one in common among them, is perhaps the most important of all their properties, as well in a medical as in a physical point of view. Numbers of facts might be adduced in proof of this. The Matlock water, issuing from the rocks of Derbyshire, is distinguished for being the clearest water in England, with little impregnation. Bath waters are said to brace the stomach, although they are hot, and contain so little iron, that it cannot be weighed by the accuracy of chemical experiment. We observe daily in medical practice, that the oxyd of iron, administered in

doses from two to ten grains, has less effect in curing diseases, than the eighth part of a grain, taken in the minute state of division in which it exists in mineral waters. The strongest saline springs contain little above a dram of purging salts in a large dose of water, and yet this produces greater effect upon the body than three times the quantity of the same salt dissolved in a small portion of common water.

In a treatise I published fifteen years ago upon diluents, I pointed out the salutary effects of simple waters, and explained the operation of the fluid principle upon the human body. It was then observed, that in the healthy state, liquids were necessary for the digestion of the aliment, and well calculated to lessen the effects of acrimonious matters in the stomach; to fit the chyle to pass the lacteal vessels; to give fluidity and mildness to the blood; and to carry off its saline particles, by the different outlets of

the body. In a diseased state, they rendered the small vessels permeable, promoted the secretions, and carried off every putrid and acrimonious principle, generated in the body by diseased action of the vessels. It is by dilution chiefly that we can explain the reputation of many waters and decoctions, which contain the medicating properties in so small a quantity, that their bulk must be of more importance than any specific principle they contain ; since the same good effects cannot be obtained by a much larger dose of the same medicine, united with a smaller portion of water.

I heard Dr. Cullen, 33 years ago, express himself, in his lectures upon the subject of diluents, in nearly the same words which he published in the latter part of his life*.

“ Almost all kinds of mineral waters,
“ whether chalybeate, sulphureous, or sa-

* Cullen's first lines of the Practice of Physic, Vol iv. page 376.

“ line, have been employed for the cure of
 “ scrofula, and seemingly with equal success
 “ and reputation; a circumstance which
 “ leads me to think that it is the elementary
 “ water that is the chief part of the remedy.”

I have seen some of the late Mr. Hunter's patients labouring under schirrus and several chronic diseases, to whom he prescribed nothing but a large tumbler of cold pump water, to be drank before breakfast every morning: one lady told me she had received a great deal of benefit from the practice in the cure of a cancer.

Besides these effects of the aqueous principle upon the body, the minute state of division, with which chemical bodies are united to water, renders them more diffusible over the human system, and more active upon the stomach, than grosser substances. The effect of the increase of the surface of bodies by minute division is remarkable in quicksilver, which may be swallowed, in its

entire state, to the quantity of several ounces at a time, without producing so great an effect upon the body, as two or three grains would do when it is minutely triturated with the most innocent substances.

The TEMPERATURE of springs occasions a great difference in their character, and is therefore of importance in the cure of diseases. This is a strong argument in favour of mineral waters being drank on the spot, independant of all other circumstances: and it is matter of experience, that the purest water drank at home, even at any degree of temperature, will never have the same good effect in removing diseases, as if it was drank at a celebrated watering place, although a contrary doctrine has been frequently advanced by some late writers. It is a property of all mineral springs, sheltered from the sun, to be uniform and steady in their temperature. They

are colder in summer, and warmer in winter, than all other waters, except the sea: which explains the appearance of smoke frequently seen hovering over springs in the winter season, in consequence of their warm vapours being condensed by the colder state of the atmosphere.

As cold liquids brace the stomach, and warm ones tend to relax it, the colder that mineral waters, in the generality of diseases, are drank, in the summer season, the better. But, in many cases, where people have not been in the habits of taking large draughts of cold fluids, they should not at first drink them in their coldest state, without caution: on the contrary, in those cases, where relaxation of the body is wanted, it is necessary to drink them hot. Hence arises the great utility of Bath waters in gout, rheumatism, and biliary calculi.

WATERING PLACES hold forth many

advantages to invalids, besides the impregnations, and other properties of their wells. I have, therefore, long considered the subject of mineral waters as unfairly represented to the public. Treatises have been written upon the chemical properties of particular wells, which could have no other effect, than to display the knowledge of their authors; others have been written upon particular springs, to prove that they cure all diseases by the supernatural powers of their ingredients: whereas, the truth is, the good effects arising from a resort to watering places, depend neither upon the chemical nor medical properties of the springs alone; for a variety of other circumstances operate in conjunction with the waters in the cure of diseases. All kinds of mineral waters, drank upon the spot, prove efficacious in curing diseases, although it is well known that some of them have no more impregnation than common pump water. The

great number of cures performed by the *Malvern, Buxton, and Bristol waters*, which contain very little foreign matters, clearly demonstrate, that their salutary effects depend on several circumstances, acting in conjunction with the impregnations of the waters; which I shall now endeavour to enumerate separately.

Change of air is the cause of many cures performed at watering places. Merely removing persons with chronic, or obstinate diseases, from one place to another, although the air to which they are shifted may not be so pure as that which they breathed before, has always been considered by the faculty of the utmost importance in the cure of diseases: and we have daily proofs of cures obtained in this way, after all other remedies have failed. But when the change is made from a less pure to a more pure air,

the chances of recovery must be greatly increased.

When we consider that London, in winter, is encompassed with a cloud of carbonic vapour, from the chimnies ; and with fogs from the drains, and the river Thames ; that its atmosphere, in summer, is filled with the dust of stones, straw, and horse-dung, and rendered oppressive by reflected heat from buildings and stony pavements ; we cannot be surprised that its inhabitants endeavour to prolong the span of their existence, by laying in a stock of purer air in the summer, in country situations.

Impure air seldom arises from the soil itself, unless where there are stagnant marshes. On the contrary, new ploughed ground has been long recommended for the cure of diseases, because it has the property of absorbing all kinds of putrid effluvia from the atmosphere, for the purpose of nourishing vegetable bodies : hence it is, that putrid

substances prove the best manure. It is large assemblies of breathing animals—combustion of fires and candles—and masses of putrid substances, where there is no soil to absorb their effluvia—which contaminate the air of cities, and render it necessary for the valetudinarian, and for people with tender lungs, to take refuge in the country.

The effects of odours on the nerves and brain, occasioned Dr. Cullen to observe, in his *Treatise on the Materia Medica*, that those vegetable perfumes, which emitted the strongest effluvia, were the most powerful antispasmodics. He therefore gave the preference to assafoetida and musk in curing diseases; and I have little doubt but that perfumes, of the agreeable kind, are extremely friendly to the human frame, and that the odour of a flower garden, or bean field in blossom, may produce tranquilizing effects on the nervous system.

As sudden vicissitudes of temperature are neither safe to the health of the human body, nor congenial to the feelings of the skin, rendered irritable by heat, or by long residence in warm climates, the benevolent hand of nature has placed the seasons of the year in gradual succession, and removed the hot and cold countries so distant from each other, as to render transitions from one to the other, safe to the human frame; yet new comers, from the tropical countries, find it necessary to season themselves to the cold of Britain in a gradual way, by taking shelter in the warm atmosphere of Bath in winter, and in the mild air of Cheltenham during the summer season.

Exercise in the pure air is another advantage which watering places afford. Very few watering places are in esteem which are unprovided with either variegated walks, or pleasant rides; and when exercise is mo-

derate, regular, and general, it increases the vigour and health of the human system. It produces an equal generation of animal heat, and stimulates the living powers to perform their functions, and to remove the causes of diseases. But the exercise should be of the most agreeable kind, and that which employs the greatest number of muscles; therefore riding on horseback is to be preferred in most cases; especially in company with agreeable companions. It agitates the trunk of the body, which is of the greatest importance to the health of the machine; and it draws out the mind of the patient from the consideration of his disease, by an attention to the numerous objects around him; both of which circumstances are necessary for its most salutary effects.

Occasional relaxation of mind is as necessary for the health of the body, as it is for the happiness of the human species.

Continued anxiety has great effect in exhausting the powers of life. In many cases, it brings on diseases; and in others, it destroys the chance of recovery, which particular situations or remedies would otherwise accomplish. It has been found by experience, that transition from home to scenes of a new and pleasing nature, generally has the effect of emancipating the mind from the cares of life, as well as of removing the body from the fatigues of business. Watering places generally furnish various kinds of amusements, which the inhabitants are solicitous to multiply in every way they can. The libraries supply entertainment in the sultry part of the day, when exercise cannot be taken with pleasure or advantage.

Regular habits of life have great effect in preserving and restoring health. Many gentlemen, who are in convivial habits at home, find it necessary to shake them off

by an excursion to the country, for the benefit of their health. Ladies, who commonly go to bed at eleven or twelve o'clock at night at watering places, and rise at seven or eight o'clock in the morning to walk to a mineral well, must find it much more conducive to their health, than their habits of late hours in the crowded assemblies of the metropolis, or the neglect of the pure stream of vital air, which exhales so copiously from the vegetable kingdom in the morning.

Confidence in a remedy is a principal step towards the cure of a disease. There is a tendency in the human mind to attribute virtues to natural remedies, which it supposes cannot be supplied by art; and to none more than to springs, which have been held in veneration from the earliest times. The expectation that waters will do good after other remedies fail, is attended with

the best possible effects to the patients. Hope must be kept alive in the human breast; and the sensible qualities, of saltness, temperature, transparency, and sparkling, of mineral waters; together with the observation of the crowds of people who derive benefit from them, contribute greatly towards the salutary effects they produce. If they had no bad taste nor smell, the patients would have no confidence in their virtues; and without faith they could not be made whole: because they would not continue long enough in the use of the waters, to give them the fair chance of performing a cure.

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TREATISE

ON

CHELTENHAM WATERS,

&c.

CHAP. I.

AN HISTORICAL ACCOUNT OF CHELTENHAM,
AND THE SPRINGS IN ITS
NEIGHBOURHOOD.

AFTER premising a few observations on the nature of the place which gives origin to mineral springs, the subject spontaneously dividesit self into the consideration of their natural history, chemical impregnations, and medical properties.

The *Situation* of the town of Cheltenham—which consists of one principal street—is upon the border of a fertile sandy valley, called the Vale of Evesham, in Gloucestershire; and is nearly surrounded by a chain of calcareous hills, of moderate height, and not many miles distant from the town.

It lies $94\frac{1}{2}$ miles, by the Uxbridge road, W.N.W. from London, in the centre of many important towns, which increase its prosperity, and afford the invalids, who visit it, an opportunity of performing pleasant excursions for the benefit of their health, during the intervals of drinking the waters*.

The *Population* of the town, consisting of 2,639 inhabitants, is increased in the summer season by an almost equal number of transient visitors†: and the reputation of

* Taking Cheltenham as the centre, the bearings and distances of the chief towns by the turnpike roads, taken from Cary's County Map and Itinerary, 2d. edit. 1802, are as follows :

Bristol	$44\frac{1}{4}$	miles	S. W.
Bath	$44\frac{1}{2}$	—	S. S. W.
Monmouth	35	—	W. S. W.
Worcester	25	—	N. N. W.
Malvern	22	—	N. W.
Tewkesbury	9	—	N. W.
Oxford	40	—	E. S. E.
Cirencester	16	—	S. S. E.
Evesham	16	—	N. N. E.
Gloicester	$9\frac{1}{2}$	—	E. N. E.
Winchcomb	7	—	N. E.

† The population, from the late survey by order of Parliament.

the place is now so great, that the augmentation of its population, both in respect to residents and casual visitors, is astonishingly rapid. During the summer of the year 1780, the company amounted to three hundred and seventy-four only; of 1790, to eleven hundred; and of 1802, to near two thousand. Hence the two principal occupations of the people of the town consist in, building houses, and letting lodgings.

The *Climate* has great diversity of character, in situations little distant from each other, owing to the division of the county by nature, into the Coteswold, or hilly country, the Vale, and the Forest.

The Coteswold country, about 500 yards above the bed of the Severn, is separated from the parish of Cheltenham by a semi-circular range of mountains, and diversified with many farms, and numerous sheep pastures. Hence the climate is cold and windy for eight months of the year; but in the hot weather, these elevations afford cool and refreshing rides, and supply enchanting prospects of the valley below.

The Valley of Gloucester, called also the Vale of Evesham, not excelled in beauty by any spot whatever, receives vivacity from the course of the majestic Severn, and embellishment from numerous rural villages and plentiful orchards. It has a pure air, and mild climate, which contribute largely to the benefits that invalids from tropical countries derive by their visit to Cheltenham. It is screened by the hills from the destructive influence of the cold easterly winds, which prevail in Britain in the beginning of summer, and during the equinoctial seasons, particularly upon the eastern coast of this island; and it is not subject to the great inundations of rain, which take place on the western coast, particularly in mountainous situations. The sandy soil, and chalky hills, absorb the humidity of the atmosphere so quickly, that the roads and streets of the town become dry immediately after a shower of rain; although in the winter season, continued rain renders them pulpy and impassable, until the frost sets in to harden them.

The Forest of Dean, separated from the vale by the Severn, being covered with

woods, and enriched with mines, has a climate less pure and salubrious: but upon the whole, no county has produced a greater number of instances of longevity than Gloucestershire.

The *Soil* of the parish of Cheltenham is, in many places, altogether sandy, and in others consists of a brown clay. But a circumstance almost peculiar to the Vale of Gloucester is, that the soil in many places abounds with strata of stiff blue clay, which extend, sometimes, to great depth under the surface, and become hard, and lamulated, like soft slate. These are frequently found replete with fossil shells*, and in particular places with crystals of purging salts.

The **SPRINGS** of Cheltenham and its neighbourhood, which have risen the town

* As marine shells are not unfrequent in this county, in the centre of stones, appearing blended with them into one petrified mass, some violent convulsion of nature must have taken place to entomb them in the hearts of mountains, and in beds of clay, where they are often found retaining their entire structure.

to its present celebrity, make considerable figure in the natural history of the place.

An erroneous opinion has long gone forth through the county, and has been adopted by Mr. Barker, in his Treatise on Cheltenham Spa's, that the saline waters come from the neighbouring mountains in a prepared state. This idea has given rise to unfounded fears, that digging the earth in the vicinity of the old wells would endanger their duration. But experiments lately made, and afterwards to be noticed, sufficiently prove, that the salts, with which they are impregnated exist, in the strata of the earth immediately surrounding the wells. And it is matter of general experience, that the waters which supply our common pumps, seldom come from any great distance through the earth.

Another report, connected with the foregoing opinion, is, that the saline springs in the neighbourhood of Cheltenham extend in one direction through the vale: to refute this error, it will be sufficient to refer to the following brief account of them, which will

shew that they are met with in many different situations in the county.

Nature has been particularly bountiful, in bestowing neutral salts upon the valley of Gloucestershire, as appears from the number of impregnated springs, which have come within the sphere of my observation, in a short space of time ; but, as they are mostly in a neglected state, and as it would occupy too much space in this Treatise to notice them at large, I shall only point out the most general circumstances respecting them.

The *Hyde* spring, in the parish of Prestbury, two miles and a half from Cheltenham, and one from the village of Cleeve, consists of a purging water, which was strongly recommended by Dr. Linden, in the year 1750, as equal in efficacy to that of the Cheltenham Spa. I visited the place last year, as already described, and found a common pump well, in a farm yard, about fifteen feet deep. It usually contained about sixty gallons of water, and frequently in winter near 100, with less strength than that in the hot weather of summer, when it often became nearly dry. It is a saline water, re-

sembling that of Cheltenham, as strong in taste, and exhibiting the same kind of appearances by chemical tests. It never was brought into general use for drinking, but great quantities of salts were made from it, during a series of years, by the late Mr. Ironmonger surgeon. It is now used only to cleanse the milk pails, and other utensils of the farm.

In *Cleeve* field, near Gotherton, about four miles from Cheltenham, and three to the northward of the Hyde spring, there is a well, about four feet deep, full of high coloured water, and exposed to the atmosphere. It is a weak brine spring, containing a large proportion of common salt.

At *Arle*, a mile from Cheltenham, on the south side of a public road, there is a spring of purging water, which rises in a ditch. Dr. Short described it, in the year 1740, to be a bitter, purging water, as strong as that of the Hyde, but not so clear. I observed that the ground, for twenty yards immediately round the well consisted, of a blue clay, different from the general soil, which was yellow. This water greatly resembles that

of Cheltenham, but not so strong, and is altogether neglected.

At the village of *Walton*, about seven miles from Cheltenham, and one from Tewkesbury, there is a well, which contains a purging water, rising out of a stratum of blue clay, at the depth of 20 feet. The late Dr. Johnstone, of Worcester, described it, in the year 1787, as possessing a sulphureous smell, and containing some iron. He observed, that it sometimes occasioned giddiness of the head, and usually acted like Cheltenham water upon the bowels.

At the seat of Robert Morris, Esq. near the village of *Barnwood*, eight miles from Cheltenham, and one and a half from Gloucester, is a well, which was discovered last year. On digging close to the house for fresh water through a blue clay, so hard, as to require blowing up with gunpowder, there issued, at twenty feet deep, a saline water in great abundance. A pump was placed in it, and the poor people, who have drank of it, say a pint or two proves cathartic. It contains a greater proportion of common salt, to that of the Epsom or

Glauber, than is found in the other wells of the vale.

At *Nanton Farm*, nine miles from Cheltenham, and half a mile from Todington, on the Tewkesbury road, there is a draw well, which contains a great quantity of saline water. It has been noticed above thirty years : and salts were attempted to be made from it, but they proved too black for use.

On examining this well, in June 1803, I found the water tasteless at the top ; but on sinking a bottle thirty feet deep, it brought up water, which emitted a strong smell of sulphur, and tasted brackish. Some people in the neighbourhood who have drank of it, say that a quart proves purgative. It turns black by boiling in metal vessels ; and is never used at the farm in the hot season, when the water is low, on account of its great degree of saltness.

At *Walsworth Hall*, the seat of Mrs. Hayward, three miles north of the city of Gloucester, there is a spring, which, forty years ago, was resorted to on account of its saline impregnations. When I visited the spot, in June 1803, I was shewn to a deep

hole, in a field near the house, that was in use as a watering place for cattle, which contained water of very little taste, but exhibited, in lesser degree, precipitations with chemical reagents, similar to those of the waters before enumerated.

All these different saline springs in the vale, when examined by chemical tests, afforded the same kind of precipitations, differing from one another in proportion of ingredients only.

With tincture of galls, they changed in less than twenty-four hours to a greenish coloured fluid, with a shining variegated pellicle on the surface, and a dark brown sediment at the bottom*. With acetite of baryte, more or less of a white precipitate was produced; with oxalic acid, a white powder; with pure ammonia, a white pre-

* This decomposition arose from the gallic acid, and not from the alcohol of the test, because powder of galls produced the same effect. As both the common pumps and the mineral wells, uniformly exhibited this appearance, there could be no suspicion of the presence of iron; it must therefore be a greenish precipitation of selenite.

precipitate and film adhering to the glass; with nitrate of silver, a blue sediment; with nitrate of mercury, a white sediment, changing to yellow: with equal quantity of alcohol (of the specific gravity of 0,830) they dropped a white powder; and when added in double proportion to the water they deposited slender crystals. Which experiments I considered demonstrative of the presence of sulphuric and muriatic acids — of lime and magnesia—in short, that the compounds of selenite, sea, glauber, and Epsom salts prevailed in these waters.

As the two old saline spa's have advanced the reputation of Cheltenham Waters, above all others of the same kind in these kingdoms, they require a separate, and particular consideration.

CHAP. II.

OF THE LOWER AND UPPER SALINE SPA'S,
AT CHELTENHAM.

THESE are situated a few hundred yards distant from each other, upon a rising ground on the south side of Cheltenham, and not above a third of a mile from the centre of the town.

THE LOWER OR OLD WELL.

Its importance was discovered by Mr. Mason, the proprietor of the field, observing that it remained fluid in frosty weather when other springs were frozen, and that pigeons flocked to the spot for its salt. In the year 1718 he railed it in; and his successor, Capt. Skillicorne, in the year 1738, built a dome over it, and erected a pump room adjoining. Soon afterwards a gravel walk was made to it, and two rows of elm trees planted, which now form a towering shade against the rays of the scorching sun, and one of the most beautiful walks in Britain.

This well very early attracted the attention of medical men, who contributed greatly by their writings to bring the water into reputation; although they differed considerably in their accounts of its impregnations. The indefatigable Dr. Short, when examining the mineral wells all over Britain, earnestly recommended it, in the year 1740, as an excellent purging chalybeate, and as challenging the preference of all the purging waters of England*. He observed, that it had been examined by Dr. Baird, of Worcester, and Dr. Greville, of Gloucester, soon after its establishment; and that in the quantity of from one to three pints, it proved a powerful purgative.

C. H. Senkenberg, from experiments made upon it in London, in the year 1741, denied that it had any chalybeate properties†.

Dr. Lucas said it contained iron, which invigorated the habit of body, at the same time it proved purgative; and that old men drank it by the quart.

* History of the Principles of Mineral Waters. 4to. Vol. 2. 1740.

† Philosophical Transactions, No. 461. A. 1741.

Dr. Rutty obtained 528 grains of solid matter from a gallon of water. He said it contained a little iron and sulphur, together with salts; and that the dose was from one to three or four pints*. It would appear from the observations of Drs. Short, Lucas, and Rutty, that the water has not lost any of its purgative properties, since no greater quantity is required at this time, than the dose they describe.

Mr. Barker published a pamphlet, recommending its use in a prevailing pestilential constitution of the atmosphere†.

Dr. Fothergill, of Bath, analyzed it, and called it a purging chalybeate, which emitted a slightly fœtid smell of sulphur, especially after rain‡.

Dr. Smith, of Oxford, repeated the observation of Dr. Short and Dr. Fothergill, that the well yielded thirty-five pints of water in an hour, which was not sufficient for 300 drinkers; and therefore he thought

* Synopsis of Mineral Waters. 4to. 1757.

† A Treatise on Cheltenham Water, 1786.

‡ An Experimental Inquiry on Cheltenham Waters. 2d Edition, 1788.

it incumbent upon him to point out three great causes of the scarcity, which might be obviated *, viz. The patients drinking it repeatedly, from a mistaken idea of its proving alterative: sending for quart bottles full to their homes, when a pint was only necessary: and taking too large doses of the water, from an impatience under their disorders.

I shall next state the observations I have lately made upon this well.

The Lower Spa is situated upon a rising ground, and in a sandy soil, but the water issues from a bed of blue clay or marl, under the sandy surface.

The construction of the well, according to my observations, in August 1802, when it was cleaning out, consists of a common leaden pump, from which a conduit pipe descends to the bottom of the well. The depth is nine feet, and the diameter two feet square. One half of the well is lined with lead, and the other with hewn stone;

* Observations on the Uses and Abuses of Cheltenham Waters. 1786 and 1801.

and it is covered closely over with a trap door, to retain the airs, and exclude extraneous matters.

The water rose in the well, in two days, to the height of two feet nine inches, at the time there had been more than a week's previous dry weather ; so that the whole quantity accumulated in two days was 82 gallons : and there is no doubt but that it collects much faster when it is constantly pumped off. This quantity corresponds with an observation I made in a fine morning, in the height of the season, that 330 persons drank the well dry, between the hours of seven and twenty-five minutes after eight ; and the same thing occurred every morning for weeks together. I reckoned 490 pints of water to have been drank, besides eight or ten gallons left in the cistern, and twelve quart bottles filled* ; which, altogether, made fifty-eight gallons of water supplied by the pump that morning. The quantity of water which this well yields is not much less than it ever has been, but yet is inadequate

* A well pint is twelve ounces.

to the consumption in summer, from increased resort of company to the place. In winter it is sent off in bottles to different parts of the kingdom.

The water from the pump is tolerably clear, and nearly free from smell. It possesses a greater briskness than common water, and separates air bubbles on standing. It tastes bitter, and brackish, but not disagreeably so; and these vary, in a small degree, together with the strength of the water, at different times and seasons.

The temperature is tolerably uniform, notwithstanding the well is so near the surface. I found it at 53° of Farenheit, at eight o'clock in the morning, and about six degrees higher at noon, in the beginning of the months of May and August, when the medium heat of the atmosphere was fifteen degrees higher.

I intended to have made a particular analysis of this spring, but was refused by the renter of the spa a single gallon of water for that purpose. From the experiments I have been able to make, with a wine bottle

full at a time, I find the quantities resulting from Dr. Fothergill's experiments, made in the year 1788, with respect to the salts, differ very little from those of the present state of the water ; I shall therefore repeat them: A gallon of water contains 480 grains of glauber and Epsom salts—5 grains of marine salt—25 grains of magnesia—and 40 grains of selinite: these together make 550 grains of solid contents.

But his analysis is incomplete with respect to the quantity of airs and of iron, which the water now contains. He has stated 24 ounce measures of fixed air, and eight ounces of hepatic and nitrous gases, together with five grains of iron, in the gallon of water.

I have never been able to discover hepatic gas in any waters at Cheltenham, or its neighbourhood, except in the well at Todington; however, there can be no doubt, from the testimony of Dr. Fothergill and others, but that it formerly contained sulphur,—and I am of opinion that it may still occasionally emit some hepatic effluvia; for sulphur, as well as iron, is abundant in many parts of the soil at Cheltenham, and easily

discovered in water by its smell and effects on metallic preparations. It cannot however be considered at present, as a character of this water: and it is much better for the drinkers that it is devoid of this nauseous substance, which could never exist in sufficient quantity in the water to do good to the health.

To ascertain whether it contained a chalybeate principle, I had the water pumped on powdered gall nut, and, after standing a few hours, it changed to a dirty brown colour. It likewise turned purple with a few drops of tincture of galls; but suffered no change from prussiate of potash*. These appearances took place with the water fresh from the pump, but not after it had been exposed a short time to the atmosphere, or had lost its cold temperature by removing in bottles. From which circumstances it is evident, that the water is not altogether free from iron, and that it is suspended in it by carbonic acid; but at the same time, the ferruginous principle is extremely small in

* The water did not exhibit the same appearances with the tests when it was low, as it did on first pumping in the morning.

the present state of the well. It has neither a chalybeate taste nor smell; and cannot contain a fourth part of the five grains of iron to a gallon, which is stated in the analysis. Indeed, the strongest chalybeate in Europe, the Pyrmont water, contains only five grains of iron to a gallon, which is held in solution by 90 per cent. of carbonic acid gas, according to Bergman's analysis; whereas this water contains very little of that gas in a loose state;—and Tunbridge water, the strongest carbonated chalybeate in Britain, contains no more than two grains of iron in a gallon of water, according to Dr. Babington's analysis.

The medical character, which this water has so justly obtained, is due chiefly to its neutral salts. It contains a greater proportion of glauber salt than other mineral wells in Britain; which operate upon the intestinal canal in an expeditious manner, without exciting nausea or gripes; and the iron, although small in quantity, assists the water to excite an appetite, and promote the digestion of the food.

THE UPPER, OR KING'S WELL.

Its discovery is due to our beloved Sove-

reign, from whom it derived this name. During the royal visit, in 1788, His Majesty drank the water of the Lower Spa, from the 12th of July until the 16th of August, and on his departure was pleased to order a well to be sunk, for the domestic purposes of the late Lord Fauconberg's house, in which he had resided during his stay in Cheltenham.

On digging the ground to the depth of fifty-two feet, instead of fresh water a saline one issued from a soil of blue clay, that resembled the water of the Lower Spa. A well was presently constructed, and a pump room erected over it. It is situated about 500 yards from the Lower Well, and 100 yards from the house of the late Lord Fauconberg, upon the summit of a rising ground, called Bays Hill.

By observations I made this summer, when the pump was shifting, the well is constructed of a cylindrical pit, of three feet diameter, and fifty-four feet deep. The sides and bottom are lined with hewn stone, through the joints of which the water penetrates. Three years ago an iron barrel was fixed in it, which was three inches in diameter, and thirty feet long, with a double

valve for greater security ; from which an iron conduit pipe of twenty-four feet was continued to the bottom of the well. But this iron work became so much corroded with the salts, that the water proved extremely turbid, particularly on first pumping; which rendered it necessary to be removed. Accordingly, the old leaden barrel, of four inches diameter, less liable to corrosion, was reinstated in the well this summer; since which, the water has proved much clearer, and nearly as transparent as that of the other well.

The quantity of water produced by this well was formerly so abundant, for a series of years, that horses were permitted to drink it, but within these last three years it has failed very considerably. It now supplies less than the Lower Spa. It sometimes is drank out in half an hour, and seldom holds out the whole morning; for the quantity, as well the quality, of this water is not always alike.

When the plumbers were at work in May last, I had the well sounded. On Monday morning it contained nine inches of water,

on the Thursday following fifteen inches (none having been removed): so that it had risen only six inches in three days. It therefore appears, by the quantity accumulated, compared with the diameter of the well, that it had collected sixty-six gallons of water in five days, immediately succeeding a week's rainy weather.

This well being situated upon hilly ground, at a great distance from the promenade, together with a prevailing prejudice in favour of the water of the other spa, have occasioned it to be resorted to, only by the inhabitants of the town and visitors' servants, except when the Lower Well is exhausted; and it is not unusual for both of them to be drank dry before nine o'clock.

Formerly a number of bottles were fetched every morning for those persons who were unable to attend at the well, or were sold to the inhabitants of the town at four pence per quart bottle: but the number of these dispensations have been greatly limited this summer. In winter, salts are prepared from it, and sold at the rate of sixteen shillings per pound, or used occasionally to increase the strength of the water at the Lower Spa.

As there has been no publication upon the chemical properties of this water, I shall briefly state the result of my experiments, without filling many pages with detailed chemical investigation, which is of less consequence to the public than practical information.

The water is obtained at first, with laborious pumping, a little turbid, but soon becomes clear, though not perfectly transparent—it has a brackish taste, and gives the tumblers a greasy appearance; in consequence of its coldness condensing the atmospheric vapour.

At eight o'clock in the morning, beginning of August,
Its temperature was 54.

Its specific gravity at that temp. 1,0059.

It raised the boiling point to 214:5 degrees.

When the mercury in the barometer stood at 29:60.

Lime water produced immediate turbidness and sediment in it. The colour of tincture of litmus was a little redened: but syrup of violets and turmeric paper were

not at all changed. Neither did sulphuric acid produce many air bubbles in it, on standing. From which appearances I inferred, the presence of very little carbonic acid gas in a loose state. But I afterwards expelled through quicksilver from a pint of the water, three cubic inches and a half of gas, which had been in a more fixed state; 2:1 inches of this was absorbed by lime water, and therefore consisted of carbonic acid gas; the remainder was chiefly atmospheric air, which hardly supported flame*.

The pure solution of sulphate of iron immediately changed the water to a brown fluid, with a copious dark coloured sediment, denoting the presence of oxygenous gas.

It had no smell of sulphur. The solution of acetite of lead produced a white, and

* In a few cases, this gaseous fluid, when the water is drank in large quantity, effects the head; many persons, therefore, improperly speak of the water containing a spirit.

not a dark precipitate ; and the solution of white arsenic did not turn it turbid or yellow ; which would have happened, if there had been hepatic gas in it. But I have been informed, that the water of this well has at times been found with the smell of sulphur.

This water, pumped on the powder of gall nuts—on the tincture of galls—and on prussiate of potash, suffered no kind of change. Neither have I perceived the water of this well, at any time this season, to possess the chalybeate smell or taste, nor to turn a cold infusion of tea to a dark colour, so as to give suspicion that it contained iron.

On evaporating a gallon of the water, after ten days dry weather, I obtained 446 grains of solid residuum ; which is nearly equal in saline properties to two ounces of salts in crystals. Whereas Dr. Fothergill states the gallon of water, from the lower well, to contain not quite an ounce and a quarter of crystalized salts.

When treated separately, the following

proportions of the salts were obtained from a wine gallon of water.

	Grains.		Grains.
Sulphate of soda	196	desiccated. =	490 crystalized.
Sulphate of magn.	159	_____ =	310 _____
Muriate of soda	33	_____ =	40 _____
Sulphate of lime	32	_____ =	38 _____
Carbonate of lime			
and magnesia	26	_____ =	34 _____
	446	desiccated	912 crystalized.

The differences, therefore, between the water of the two wells, consists in the upper containing a larger portion of neutral salts than the lower well; for a pint of water holds in solution more than a dram and a half of perfect salts (when crystalized), besides earthy ones; by which means it proves somewhat more nauseous to the taste, and more laxative to the bowels, than the water of the lower well: and it does not appear to contain any of the chalybeate principle.

CHAP. III.

AN ARRANGEMENT OF BILIOUS DISEASES,
REQUIRING THE USE OF THE
SALINE WATERS.

THIS is a subject which comprehends an infinite variety of diseases of the chronic kind, and those which require an evacuating plan of treatment, which is the most important part of the practice of physic.

The following classes of diseases immediately present themselves to our view, as likely to receive benefit from a course of Cheltenham waters, properly conducted: a huge tribe of bilious, hypochondriacal, and stomach complaints, connected with the state of the hepatic system; besides chronic inflammations—diseases of the urinary passages—worms—and eruptions, invading other parts of the body. But as half the invalids who visit Cheltenham are afflicted with bilious disorders, contracted either by residence in warm climates, or by injury

done the digestive organs, they demand our first and most particular consideration.

Diseases of the biliary organs are not well understood in this country*, and I should wish to contribute my mite in advancing the knowledge; but this treatise will only admit of taking such a cursory view of their history, as may be necessary for the purpose of pointing out those, which most require the use of purging waters.

INFLAMMATIONS OF THE LIVER.

These are mostly the offspring of colonial heat. When generated in cold climates, they arise, either from intemperance in eating and drinking, or from a peculiar temperament of the body. But nineteen times out of twenty they derive origin from the burning heat of climate, or from the liquid fire of the still†. This appears to be the

* The Economy of the Liver and its Diseases, has undergone considerable discussion in a valuable work lately published by Dr. Saunders; 3d edition.

† Spirituous liquors often injure the liver more than they do the stomach. The ancients used to enlarge the

reason that men, are found more frequently affected with liver complaints, than women*.

The *Liver* being an organ of immense size in proportion to the bulk of the body, sufficiently manifests its great importance in the animal economy; and *the peculiarity of its structure* explains the character of its diseases.

The softness of its texture, and the degree of its vascularity, render it extremely subject to states of congestion, and to different chronic inflammations†. Its insensibility occasions its diseases to be of a more latent and insidious nature, than any which invade the human frame. From contiguity of situation, and its adhesion to the diaphragm, it is often difficult to distinguish between the diseases of the abdominal and

livers of geese, by mixing spirits with their food; and it is said that hogs acquire swelled livers when fed on brewers' grains.

* The only exceptions I know to this proposition are, jaundice and gall stones, to which women are most liable in this country, from their sedentary habits.

† It possesses two sets of blood vessels, one for its nutrition, and the other to secrete bile.

thoracic cavities. And from its connexion with the functions of the stomach and alimentary canal, the hepatic and alimentary organs reciprocally partake of each others diseases.

In short, the influence of the liver is so great, that there is not any part of the human system which does not at times sympathize with its affections. Many complaints referred to other organs have their origin in this gland. Gout, apoplexy, hypochondria, and piles, are frequently associated with diseased liver; and many constitutional disorders are spontaneously relieved, or terminated by bilious diarrhea*.

The liver is liable to both acute and chronic inflammation, called in this country *Hepatitis*, and in the East Indies, where it is endemial, *the Liver Complaint*. This disease is not unknown in the West Indies; although it does not prevail there so generally as in the East, on account of the sea and land breezes, which cool the atmosphere

* In the first volume of Darwin's *Zoonomia*, it is observed, that hepatitis, from inebriation, produces gout in the feet.

of islands. And in all probability, hepatitis would invade Guinea, which is hotter, in most places, than the East Indies; if it was inhabited by Europeans.

During eight years residence in tropical countries, I had occasion to observe three different species of what is termed liver complaint, and have seen the disease, since then, assume the same forms in these islands, viz.

I. PHLEGMONOUS INFLAMMATION of the membranes of the liver; which resembles pleurisy in the intensity of fever and pain of the side. The pain most commonly extends from the region of the liver, on the right side, to the shoulder of the same side, accompanied with quick pulse, heat, thirst, and difficulty of breathing: the right hypochondrium is sometimes swelled, but jaundice seldom accompanies the acute disease*.

* European diseases in warm climates are few, and uniform. In the East Indies, the hepatitis and cholera morbus prevail in the dry season; and the remittent fever and flux, in the rainy season. The two former are most common among those who undergo great fatigue, but the latter are the most fatal. It is the remains of these diseases that fill Cheltenham with bilious patients.

II. CHRONIC INFLAMMATION, or a schirrous state of the substance of the liver, without fever. It is attended with fulness and obtuse pain of the right side, which patients often express as a sensation of uneasy weight of the part.

In the progress of the disease, the liver may be felt hard and ponderous, on pressing the fingers under the false ribs*. It is mentioned in a treatise by Dr. Grainger, of Jamaica, republished by Dr. Wright, of Edinburgh, in the year 1802, that negroes were in the practice of removing adhesions between the liver and surrounding parts, by placing the patient across a sugar hogshead, and employing friction with their fingers beneath the small ribs. This practice deserves the attention of medical men; and if it should be attempted in this country, care must be taken not to break the substance of the liver, which is naturally of a soft and brittle texture, and liable to be dented by

* At first, the enlarged liver is situated high in the chest; but in the advanced stages, it contracts by absorption, and descends so low, that the great margin may often be felt by the fingers, in a callous state.

moderate pressure, or fractured by more violent means.

An indurated state of the liver is, perhaps, one of the most common diseases of the East Indies; and often of such an indolent nature, that persons are afflicted with it for many years together, without knowing what ails them. They complain of loss of appetite, nausea, bitter taste of the mouth, low spirits, accompanied with foul tongue and sallow complexion, and sometimes with uneasiness of the right side, which at first they are apt to ascribe to a bilious constitution, but which increases; and, by continuance in warm climates, terminates fatally. Whereas in Europe, by careful living, and the occasional use of evacuating remedies, these patients often live as long as if they had no such disease.

But frequently the disease assumes a more unfavourable aspect, the enlarged liver presses on the bile ducts, and brings on jaundice. In some cases, its pressure upon the thoracic viscera injures the vital functions: in others, the thoracic duct and blood vessels are compressed, so as to occa-

sion swelling of the lower limbs, and a train of dangerous hydropic symptoms.

III. A SUPPURATIVE STATE of the liver is a frequent consequence of the former diseases; but it is also common for abscesses to be found in the interior substance of the liver after death, where patients never complained of pain of the part in their life-time, nor were suspected to have inflamed livers*.

The mildest state of the disease (called *vomicæ*), where small portions of matter form cysts round themselves, by pressure, may continue for many years without molesting the general system: but when abscesses become large, they rarely terminate favourably, by an external opening in the skin; they more commonly discharge themselves internally, into the nearest cavity; or

* Two cases, which I communicated to the London Medical Society, were published in the third volume of their Memoirs. In Jamaica, a patient died of consumption of the lungs, where the liver was found completely suppurated: and a woman died suddenly in labour, from the bursting of an abscess in the liver; neither of which diseases were known to have existed before death in that organ.

bring on hectic fever and jaundice, which rapidly destroy the patient.

Although the chronic inflammations of the liver do not immediately prove fatal, yet they, for the most part, injure the health; and oblige invalids to have recourse to frequent means of depletion. The constitutions of such persons not being able to bear the lancet, nor violent evacuations, and the sensation of fulness in the hepatic system suggesting the necessity of a purging plan, they generally find their way to Cheltenham, for the benefit of the purging waters and climate.

The saline water, drank two or three times every week as an evacuant, will prove of the utmost service in removing the congestion and fulness from the region of the liver and gall ducts, attendant upon the different kinds of hepatitis; but will be more useful in the two former, than in the latter species. It may also be taken, with advantage, to remove the plenitude and distention of the stomach and intestines, from food or flatulence, which will press the liver upwards,

and interrupt the vital functions of the thorax.

As a diluent, it will facilitate the passage of the bile from the ducts, and lessen the febrile action of the system, generally. The waters of Bath, which are also diluters of bile, cannot be used with the same freedom, in cases of great irritation or hectic fever, as the neutral salts dissolved in a large portion of cold water.

The saline water may also be made to co-operate with a course of mercury, in chronic inflammations of the liver; or substituted in the place of calomel, where patients cannot persevere, with safety to their constitutions, in the use of so powerful a remedy.

In chronic inflammations of the liver, it is necessary to join gentle exercise in the open air, to the use of the waters; to invigorate the habit, and promote the absorption of the fluid matter, or indurated substance of the liver.

Besides those diseases arising from a change of structure in the liver, there are

others which depend upon the derangement of its secretions.

Bile is a fluid so readily soluble in water, and so easily coagulated by acids, or alcohol, that chemists have been able to ascertain its nature, by accurate chemical analysis. This viscid, green fluid, consists of water, soda, albuminous, and resinous matters. The alkali is useful to saturate the acid of the stomach, formed in digestion; the albumen, received from the gall bladder, to give it consistence; and the resinous principle, to impart a bitter, antiseptic, and soapy, property to the alimentary mass*. But the most important use of the bile is, to stimulate the bowels to perform their peristaltic motion, absolutely necessary for digestion, and for carrying the food through the body.

It is not, however, a strong stimulant to the alimentary organs, in their sound state. I administered, in several cases, from 25 to 30 grains of bile (from the human body and from oxen), made into pills: this seldom

* It is the colouring matter of the resin, that imparts the dark colour to the contents of the alimentary canal.

produced more than one laxative evacuation, except in one patient, who, during the hot weather, being in a feverish habit of body, was considerably purged by a dose of that strength. Neither does bile stimulate the vital organs, or other parts of the animal body, than the alimentary canal. On the contrary, when the blood is saturated with bile, as in cases of jaundice, the pulse becomes slow, and the moving powers torpid. In like manner, when a patient lives long enough to be completely jaundiced, he generally recovers from the yellow fever in the West Indies.

The bile is not liable to become putrid, as formerly supposed, unless in high temperatures (as above a hundred): on the contrary, it is itself an antiseptic, which obviates the tendency of the aliment to run into the putrefactive fermentation. Hence it is, that blood saturated with bile for years together, does not turn putrid in cases of jaundice.

The black colour, which it sometimes acquires in diseases, most commonly arises from a mixture of red globules of blood,

escaping from debilitated vessels. And the bile, naturally of a dark green colour, like the red particles of blood, gives a deep tinge to a great quantity of other matter.

Symptoms indicating derangement of the biliary fluid, attend almost all diseases of the alimentary organs, and are therefore very various; but the most remarkable differences observable in the state of this secretion, depend either upon its superabundance, deficiency, or obstruction.

I. INCREASED SECRETION OF BILE.

This is the consequence of continued atmospheric heat, or of vascular irritation in the liver. Bile is naturally secreted in greater abundance than any other fluid of the human body, except the urine and perspiration. But in cases, where the circulation of the blood is hurried, especially through the liver, the bile will, at times, pass from the ducts in a full stream, and in a thin crude state. I have seen above a quarter of a pint of bile vomited every half hour, for days

together, in a fever, at the time the patient took very little drink.

It is evident that increased secretion of bile, like other evacuations long continued, will weaken the vessels of the liver, by repeated action, as well as by the profusion of discharge: and, in the course of a few years, will produce a permanent predisposition in that organ to derangement of functions. Hence, it is not uncommon for invalids, after they arrive in cold climates, to retain their constitutional tendency to bilious symptoms, when they are neither afflicted with any organic disease, nor exposed to uncommon circumstances of weather.

To render myself more intelligible, I shall state my ideas on the operation of warm climates, in producing specific diseases in the human system.

A gradual and constant application of heat to the human body, imperceptibly changes the state of its stamina, by inducing relaxation and debility*. Thus, we observe,

* The sudden application of heat has a more dangerous effect. The constitution not having time to ac-

that greater external circulation of blood, and increased discharge from the cuticular surface, which take place in warm climates, exhaust and weaken the interior vessels of the body, from which the strength and vital energy are chiefly derived*. While, at the same time, heat increasing the circulation of blood in the liver, augments the secretion of bile, and thereby occasions its transmission to the intestines, in a more copious thin state, than in cold climates; which secretion becomes a new source of irritation to the alimentary organs, especially in their inflamed state.

This diminished tone in the circulating powers, and increased discharge from the liver, enable the human constitution to adapt itself to sultry climates, and establish the

commodate itself to climate, the quick transition from Europe to the West Indies induces the yellow fever, so fatal to Europeans newly arrived. Whereas, those who perform a voyage of five or six months to the East Indies are not liable to it.

* The greater external circulation is observable, by copious perspiration, and by the increased sensibility of the skin to cold air.

predisposition to particular classes of diseases, which prevail in bilious habits. But tropical diseases do not occur, until a morbid irritability, or erisipelatous inflammation, have taken place in the membranes of the chylopoetic viscera, which render them liable to receive stimulus from their own natural fluid, in a similar manner to what happens with the mucous membrane of the throat, when inflamed by catarrh. It is irritated by its own secretion, and the disease aggravated thereby, without that fluid differing from its natural state, in any other way, than in increased tenuity and quantity.

A BILIOUS STOMACH, is a common occurrence in cases of excessive secretion of bile. On bile passing freely into the duodenum, some of it must be regurgitated into the stomach, as the opening of the common duct is within two inches of the lower orifice of that organ; and by its presence there, in unusual quantity, will induce the following dyspeptic symptoms: loss of appetite—nausea—foul tongue—bitter taste in the mouth—thirst—inclination to vomit—

fulness in the region of the stomach—low spirits—now and then a bilious turgescence of the vessels of the eye—and scanty, high coloured urine.

The Cheltenham waters are more serviceable in these cases than in most others, to carry off the bile; but they ought to be drank in small doses, that the stomach loaded with bile may be able to retain them. There will often be occasion to use the water warm, in this state of the stomach. But not to encourage much vomiting; as, in all cases of redundant bile, the proper exit is downwards.

SICK HEADACH, is a disease often met with in practice, but never noticed as idiopathic, until the time of Dr. Fothergill*.

I lately had two patients labouring under it, ladies of bilious habits, who had resided long in the West Indies.—It attacks with violent headach, which affects the eyes, almost to blindness, accom-

* Fothergill's Works, published by Dr. Lettsom in 1783, Vol. iii. p. 219.

panied with a great degree of sickness of the stomach, and most commonly with bilious vomiting. It returns every three weeks, and generally continues one day, but never more than two or three at a time. It is aggravated, or brought on, by costiveness, fatigue, or irregular diet.

This habitual disease is very difficult to cure; but may be mitigated, by taking a gentle emetic, and laxative medicine, in the beginning of the attack, or immediately before it. One of these patients, by my desire, tried a course of the Cheltenham waters, last summer, and received considerable benefit from it, having had no returns during the time she was at Cheltenham, and but very slight ones for several months afterwards.

BILIOUS DIARRHEA, looseness, occurs frequently where there is excess of bile in the constitution. It is often attended with nausea, foul tongue, and bitter taste in the mouth, but seldom with gripes or fever. On the contrary, it is, for the most part, a salutary effort of nature, to carry off the superabundant bile by the bowels.

Bile meeting with an acid in the stomach, forms a neutral salt, which occasions green evacuations*. And its resinous part, not entering the circulation, it colours the contents of the alimentary canal, in proportion to the quantity present in it. We have therefore the means of ascertaining, both the state of the stomach, and of the biliary secretion, by attending to the appearances of the alvine discharge.

A single dose of Cheltenham water, taken now and then, will be useful in cases of bilious diarrhea, to clear the bowels from bile; but more especially before entering on the common remedies, opium and astringents. As bilious constitutions seldom can bear violent purging, the tendency prevailing in this disease to it, renders caution, and moderation in the dose, necessary. I have often known great languor succeed a single copious evacuation of bile, particularly in the advanced periods of life.

* This is remarkable in the copious green evacuations of children, from the acid of the stomach, during the lactescent period.

CHOLERA MORBUS, the autumnal endemic of Europe, is another instance of redundant bile. It attacks the constitution, excited by summer heat, with sudden depression of strength, fever, and bilious vomiting. The peristaltic motion of the bowels, which commences from the stomach, is often inverted through the whole canal, so that its contents are returned upwards: but at other times cholera is attended with purging.

Although it is commonly a mild disease in this country, yet in some cases it is the most violent spasmodic one we know, attended with spasms of the calves of the legs, and a feeble, contracted pulse; which state of the disease kills in a day or two, and sometimes terminates in dysentery or jaundice. In like manner, the yellow fever of the West Indies attacks newly arrived Europeans, especially in the autumn of the year, with violent cholera, which destroys in three or four days, or terminates in complete jaundice.

Cheltenham water is not used in this acute

bilious disease. Indeed, in all cases of inverted peristaltic motion, where every thing swallowed is immediately rejected by the mouth, bulky, nauseating remedies, which would increase the exertions of the stomach, had better be avoided.

DYSENTERY, or flux, is so much connected with the flow of bile, that it appears only in countries which produce violent bilious diseases. It rarely occurs in Europe, except in camps and fleets in the autumn of the year. But the chronic state is often brought from abroad. The acute symptoms of fever, gripes, straining, and sanguineous evacuations, having subsided, there remains irritability, or ulceration of the large intestines, which produce frequent mucous dejections; and continue for a number of months, and even years, until patients look like walking skeletons.

In the acute dysentery, as the intestines are not able to clear themselves, laxatives are necessary, almost daily, particularly neutral salts, to evacuate the upper part of the

intestinal tube, and to increase the secretion from the glands, without gripes. Cheltenham water will answer this indication fully. But the chronic disease, from the morbid irritability of the intestines would most probably, be rendered worse, by the use of the saline water. However, the water of the steel well of Cheltenham, might be drank with considerable advantage, in habitual fluxes.

BILIOUS FEVER, is attended with excess of bile, and with repeated vomitings. Like other hepatic diseases, it occurs most frequently after sultry weather, and in the autumn of the year. But it does not appear to arise from an acrid state of the bile, so much as from a morbid irritability of the alimentary canal, which had taken place in the organs previous to the vomiting. The appearances in these diseases, generally ascribed to acrid, or putrid bile, ought rather to be imputed, to the diseased state of the alimentary tube, and to the febrile state of the body. Any fluid detained in an inflamed part, soon turns putrid by increased heat.

The bile must therefore be considered as a symptom, and not as a cause of the disease.

Although this, like most other acute diseases, cannot be considered as a proper object for the use of Cheltenham water, yet it is necessary that it should be mentioned, and that a general survey should be taken of all bilious diseases ; on purpose to discriminate those that require the use of the saline water, and those which forbid it.

The practice of medicine in tropical countries, where diseases are attended with excess of bile, consists in the use of laxatives, with plentiful dilution ; to remove the bile, and allay irritation of the system.

I had seventy patients daily under my care in Antigua hospital, in the West Indies, who were either ill of yellow fever, or of dysentery. As their stomachs could not bear any thing solid for a minute, I followed the practice of that hospital, which was, to give them as much cold water, wherein a log of quassia wood had been steeped, as they could use. The effects

arising from that part of this bitter laxative fluid which remained upon their stomachs, were, to wash away the bile, and to invigorate the habit, sinking under the fatigue of perpetual vomitings. In like manner, the practice in Europe among the ancients was, to give large draughts of cold water to check the vomiting of intermittent fevers. And I have, in my own practice, always found cold water, corrected by a small bit of toasted bread, to be one of the best drinks in those fevers which are accompanied with vomitings.

These facts strongly indicate the use of Cheltenham water in the milder diseases of this climate, attended with excess of bile. It ought to be taken in divided portions, no more at once, than will sit easy upon the stomach, and produce gentle evacuations; keeping in mind, that a smaller portion of purgative will operate upon bowels, which are irritable, and where bile is redundant, than in other cases.

II. DIMINISHED SECRETION OF BILE.

This is as much the consequence of coldness of climate, as the excess of bile is of

its heat ; and is as frequent an attendant of diseases.

The secretion may be lessened by debility of the hepatic vessels, induced by long residence in warm climates. By any disease occupying the place of the secreting vessels in the liver, such as schirrus or abcess. And by general torpor, or languid circulation of the blood through the liver, as happens in the melancholic, and chlorotic temperaments, in this country. The effects of these will be, to deprive the alimentary organs of their natural stimulus, and to dispose them to assume diseased action.

DYSPEPSIA, or Depraved Digestion, is associated, at different times, with both a redundant and a deficient state of the bile. But it is much oftener ascribed to excess of bile, than it deserves ; since costiveness is the most common symptom attending dyspepsia ; and arises, for the most part, from a diminished peristaltic motion of the intestinal canal, by want of the natural stimulus of the bile. The former kind of dyspepsia has already been noticed, under the head of bilious

stomach, and the other state, attended with deficient bile, remains now to be considered.

As dyspepsia is the most universal of all diseases, and hardly any exist without stomach complaints, we must enter more fully into its history than has been done with other hepatic disorders.*

Stomach complaints are generally the creatures of our own formation, and seldom exist in the early periods of life. The burning heat of climates—the use of tobacco—tea drinking—over distension of the stomach—and, above all, the abuse of fermented liquors, are the bane of the human species. They destroy the general system, by weakening the tone of the stomach, and creating an imperfect state of the digestive fluids.

The digestive organs do not permit any kind of alimentary matters to pass into the blood unchanged, except common salt; but this transmutation is very different in the healthy, and diseased states of the body.

* As this disease is generally symptomatic of so many other diseases, Nosologists have hesitated to admit it as a distinct genus.

In the healthy state, three progressive operations are necessary, to convert dead organic bodies into living matter. First of all, the gastric juice coagulates the liquid ingesta, so as to allow time for the stomach, and the fluids secreted from its coats, to convert the aliment into a sweet, pulpy mass. And all classes of substances are digested into the same kind of bland fluid; which can be separated into three parts like the milk and blood of animals. It is the same in the Bramin of India, who lives on vegetables—the African, who feeds on fish—and the Laplander, who eats nothing but reindeer. This process cannot therefore be altogether a chemical one, but must also depend upon the living power of the coats of the organ itself. In the next place, the bile and pancreatic fluid, are mixed with the liquid mass, to convert it into chyme, and to transmit it through the alimentary canal. Finally, it is united to lymph, and brought into contact with the atmosphere, in the lungs, to complete the process of animalization.

But, in the diseased states of the digestive organs, these operations are considerably varied. The stomach being a muscular bag, which suffers different degrees of plenitude, according to the quantity of its contents, (not by collapse of its sides, but by general contraction), renders it extremely obnoxious to injury: for the living power may be diminished, by the stimulus of over distension, as much as by the deficiency of excitement, from continued contraction. Hence it is, that the quantity of food taken becomes of as much consequence as its quality, for the health of the human body *. The stomach weakened, either by inanition, repletion, or by other means, has its actions illperformed.† Nausea, sickness, increased flux of saliva, and vomiting, according to the degree of prevailing debility, take place, more especially in the morning, when the stomach is deprived of sufficient stimulus, by being in an empty state.

* Dr. Fordyce observes, “that no food is in itself wholesome or unwholesome, but as it is compared with the state of the stomach.”—*Treat. on Digestion*.

† Mr. Hunter observed, that, on dissection, he found the stomach uncommonly flabby in many subjects.

At the same time, the gastric fluid becoming deficient, the alimentary substances assume their natural tendency to fermentation. Vegetable bodies change to acetous acid, which brings on heartburn—vomiting of corrosive fluid—hiccup—pain in the stomach—now and then voracious appetite—and sometimes a short tickling cough. In like manner, animal substances run into the putrid fermentation, attended with offensive breath—eructation of a greazy fluid, which inflames in the fire—and with putrefaction in the bowels.

Whenever the alimentary fluids are not in sufficient quantity to correct the rapidity of these fermentative processes, numerous other phenomena take place. The air is disengaged from the food, and eructed, at times, in such astonishing torrents, even in the empty state of the stomach, as to have made the late Mr. John Hunter suppose it was occasioned by secretion, like that in the air bags of fishes.

Distension of the abdomen—disturbed sleep—sense of suffocation in the throat—difficult respiration—and giddiness of the

head, are the common effects of the chemical overcoming the animal powers.

But, dyspepsia is not confined to the alimentary canal, the liver and its secretions are brought into consent. The bile does not flow regularly—the body is sometimes purged, but for the most part costive : a feeble action communicated from the stomach to the intestinal tube, together with the want of bile, bring on this species of torpor on the bowels. When the digestion is weak, and the food does not pass through the body, in the natural period of twenty four hours, its thinner parts are absorbed, in an acrid state, and an accumulation of the indurated parts, render the body uneasy, and feverish. The countenance becomes palid, the tongue furred, and the urine high colourd, and scanty.

When an appropriate quantity of nutritious chyle is not prepared, as mostly happens in dyspepsia, the body is badly nourished—the flesh wastes—the strength and spirits are depressed—and a general irritability of body and mind succeed.

Notwithstanding bilious patients receive relief from high seasoned foods, generous

wine, and ardent spirits, they prove but temporary delusions. The latter, in particular, inflames the internal membrane of the stomach—thickens the coats of the gall ducts—lays the foundations of schirrous liver—and terminates in jaundice—palsy—or dropsy—without the patient be saved, by an early and gradual transition to temperate habits.

Cheltenham waters are of as much use in stomach complaints, as in any disorders whatever ; provided the doses be moderate. They lessen the effects of acrimonious matters in the stomach, and gently remove the oppressive load of undigested food from the debilitated organs, without exhausting the system, like more drastic remedies. If dyspepsia arises from full feeding, they will lessen plethora ; and if it is attended with feverish habit, they will remove the irritation of bilious and fæculent matters from the intestines, and bring the body to a regular solutive state. Besides—their cold temperature—diluting principle—and irony impregnation, will assist considerably in restoring the digestive powers. Experience

furnishes the best possible proof of this, for the first, and most common effect of a course of Cheltenham water, is to improve the appetite.

In short, the cases which most require the use of Cheltenham water, are those connected with congestion in the liver, and attended with costiveness from deficient bile: but at the same time other remedies should be conjoined to the use of the water. Motion on horse-back is well calculated to remove these states of congestion. Pump water is the best drink to be used with the food, either in the dyspeptic, or bilious state of the stomach, provided its tendency to induce costiveness be obviated, by occasional laxatives. Bitters of the laxative kind and soda, are the fittest medicines to substitute instead of bile, in the acid, and debilitated state of the stomach. A mild emetic might be given occasionally to excite the flow of bile—but the repetition should be carefully avoided; for vomiting is a morbid action of the stomach, attended with sudden debility, from a close connexion between it and the brain. Sea sickness is a much safer remedy, and ge-

nerally attended with the happiest effects, in cases of deficient bile, from dyspepsia, or congestion in the liver.

HYPPOCHONDRIASIS, the Hypochondriac Disease, is another state of dyspepsia, accompanied with dejection of mind, and diminished secretion of bile.

Stomach complaints hardly ever arise to great height, without affecting the mind. Therefore, in this disease, flatulency—distension—acidity—erratic pains about the ribs—and costiveness, are accompanied with languor and a melancholic state of mind, turned in upon the bodily affections. On the contrary, the close connexion subsisting between the body and mind, is observable in the rapid effects of the depressing passions upon the stomach and liver. Bad news produces a pain of the stomach, and immediately destroys the keenest appetite. And grief diminishes the flow of bile, as suddenly as a fit of passion encreases it.

As Hypochondriasis is commonly attended with fulness of habit, and deficiency of

bile, gentle evacuating remedies, become as necessary for the cure, as tonic ones. Hence great numbers of persons come to Cheltenham with this disease, for the benefit of the waters, which operate as already noticed under dyspepsia.

CHLOROSIS, is a morbid irritability of the female constitution, between the ages of 17 and 25, which disturbs the healthy actions of the animal economy. As this disease has been mistaken for a jaundiced state of the body, my principle view in noticing it, is to point out its connexion with the biliary system, and prevent mischief ensuing from the free use of Cheltenham water under false impressions. There are no appearances of absorbed bile, either in the eyes, or urine. On the contrary, there is a deficiency of bile, by reason of the languid circulation of blood in the liver.* The discoloration, or rather

* Dr. Saunders, at page 161 in his Treatise on the Liver, observes, that those persons who secrete least bile, have a sanguineous complexion—soft hair—and lax fibre; in whom the sanguific powers are weak, as in chlorotic females; and the persons most subject to redundancy of

the paleness of the skin, arises from a scarcity of red globules in the blood: the presence of which are always necessary to constitute the healthy complexion.

The general weakness, and inactivity, together with the dyspeptic, and œdematous symptoms, which attend chlorosis, plainly indicate an invigorating plan of cure. Exercise on horseback, dancing, sea bathing, and tonic remedies, will prove more useful than a course of purging waters. Although there are not wanting instances of the disease having received benefit, in its early stages, from these waters.

OBSTRUCTIONS OF THE BILE.

Interruptions to the course of the bile in its passage from the liver to the intestines, are more frequent causes of diseases in this country than between the tropics, most probably from greater viscosity of Bile. Besides, the train of dyspeptic complaints, arising from deficient bile in its obstructed state,

bile, are those with black hair—ruddy complexion—and strong fibre.

another set of symptoms arises from its absorption into the blood.*

We judge of the presence of bile in the circulation of the blood by the yellow colour of the skin ; but it is not at all times, and in every part of the body alike. In jaundice, it is mostly in the eyes and face—in febrile diseases, it is chiefly in the skin of the body—and in some diseases it appears in irregular tints interspersed through different parts of the system. The absorption of bile is best ascertained, and soonest discovered in the eyes, where the white coat renders it extremely conspicuous---and in the urine, where it is readily seen passing from the circulation in greatest abundance.

The following diseases are prominent instances of obstructed bile, but they are difficult to be distinguished from each other, on account of the same cause producing different sets of symptoms, at different times.

* There are numerous very large Lymphatics on the external coats of the gall bladder and ducts, which absorb the bile ; and Dr. Saunders is of opinion that absorption is also performed by the hepatic veins of the liver.

THE JAUNDICE is not a disease of the bile itself, and seldom of the liver; but, five times out of six, it arises from concretions impacted in the gall ducts, which obstruct the flow of bile into the duodenum, and occasion it to be taken into the circulation of blood. It is therefore seldom fatal, unless, at the same time, the viscera be in a schirrous state. It also occurs now and then, from spasmodic contractions of the common duct, since it has been known to arise from hysteria, and violent fits of passion—from inflammation thickening the coats of the ducts, as happens in cases of dram drinking—from viscid fluids obstructing the ducts, as in the infantile period—from pressure on the ducts, as in pregnancy—and from redundancy of bile, as in the yellow fever.

So many causes give a variety of character to the disease, but the most common symptoms in the alimentary organs, are—deep seated pain in the epigastric region, which patients sometimes discribe as a sinking, and faintishness in their stomach,*—indigestion,

* As neither the liver, gall-bladder, or ducts, are irritable organs, the pain has been attributed to the cal-

and other dyspeptic symptoms, from want of bile in the alimentary canal—and when the obstruction in the common duct is complete, an obstinate costiveness, attended with whitish, and clay-coloured evacuations, prove constant concomitant symptoms.

The presence of bile in the blood, occasions depression of strength—low spirits—torpor—slow pulse—yellowness of the skin and eyes—cuticular eruptions—and an appearance of bile, in all the secreted fluids, but the milk.

Next to emetics, the best remedies in jaundice, are purgatives, to supply the want of stimulus to the intestines; therefore Cheltenham water drank largely will completely answer the indication; at the same time, by being drank warm it will assist in relaxing the ducts, and by its attenuating principle dissolve the obstructing cause.

culus distending the common duct, at its oblique entrance between the coats of the duodenum. But it is a curious fact, that notwithstanding the opening of this duct, upon the right side of the epigastric region, the pain is generally felt in jaundice at the pit of the stomach.

BILIARY CONCRETIONS, passing the ducts, occasion symptoms of a more violent nature, than those of the jaundice ; and are attended with a feverish habit of body, but with no great yellowness of the skin. It has lately been discovered, by dissections, to be a disease as frequent in this climate as urinary calculi.*

I have seen its chronic state remain quiescent for many years, attended with dyspep-

* The nature of biliary calculi has not been long discovered. Dr. Coe was the first who wrote professedly on the subject, and his book is still a valuable work. The disease was mistaken by the ancients for cholic—spasms—rheumatism—and dyspepsia ; but Haller observed gall-stones to be a more frequent occurrence in Europe than urinary calculi. Many gall bladders have lately been found completely filled with these concretions, which were not known to have existed till after death. Probably a viscid state of the bile in cold countries, favors the disease ; for however much biliary calculi differ in hardness, shape, colour and size, it is generally allowed they arise from decomposed bile ; not by inspissation, but by the formation of regular chrystalline layers. They are so abundant in the gall bladders of horned cattle, that butchers find them in great quantities, between the months of November and March, when the season is cold, and the cattle confined in the stall.

tic symptoms—fulness at the region of the stomach—uneasiness when it is empty—irregular bowels—dark sediment in the urine—and a sallow complexion—which were ascribed, by the patient, to a bilious constitution, but terminated suddenly by passing gall stones.

In the acute disease, when concretions are passing into the intestinal tube, there occurs in most cases—a violent, deep seated pain, darting from the pit of the stomach to the back bone; sometimes extending to the right shoulder and arm. The intensity of the pain brings the whole system into sympathy, which by repeated paroxysms, like those of parturition, endeavours to expel the mechanical irritant. Vomiting—hiccup—chilly fits—contracted pulse—and sometimes convulsions succeed.

In a few days, when these symptoms disappear suddenly, a small concretion, perhaps no bigger than a pea, and most commonly of a white soft nature, may be found by washing the alvine evacuations; but when there are more than one calculus in the gall bladder, the disease is apt to return again after a time.

Cheltenham water can be of little service in the painful period of passing gall-stones; relaxants of the most powerful nature are generally resorted to. But in chronic cases it may be drank warm with as much success as any remedy whatever, with a view to dissolve the biliary concretions, and carry them out of the system.

CHAP. IV.

MULTIFARIOUS DISEASES REQUIRING THE
THE USE OF PURGING WATERS.

THE subject of the purging plan, naturally embraces a vast number of miscellaneous diseases ; but next to those of the bilious, and dyspeptic kinds, the saline waters of Cheltenham have been found of greatest service in a variety of cuticular affections, of an anomalous nature.

ERUPTIONS.

By this term is meant all cutaneous disorders, which in popular language have been called *Scurvies*, without including exanthematous diseases, which are altogether of a different nature*. Exanthemata arise from specific fevers, and destroy the tendency of

* The term *Impetigines*, used by the ancients for crusty eruptions, has been adopted by Sauvage and Cullen, as the general nosological term for cutaneous diseases.

the skin to repetition ; whereas, cutaneous diseases, of a more local nature, render the skin susceptible of frequent relapses, after having been once injured by them.

Most cutaneous diseases are connected with the state of the constitution, and some are hereditary ; they will therefore receive benefit from purging waters, and other internal remedies. But a great number are merely diseases of the scarf skin, existing beyond the extremities of the capillary vessels, and thereby little under the power of internal remedies.*

Their connexion with the stomach and lungs, is not well understood, but eruptions seldom appear, or disappear, in any great numbers, without producing symptoms of dyspepsia. If they be repelled by cold, and afterwards brought out by heat, or cordials, their second appearance is attended, like the first, with the following

* The cuticle, which covers the true skin, being external to the circulation, and consisting of squamous bodies, nearly inorganic, renders cutaneous diseases sometimes immoveable for a number of years, and occasions freckles and stains to continue through life.

symptoms: Loss of appetite—sickness and vomiting—pain of the stomach—low spirits—oppression at the præcordia—and difficult respiration: the skin becomes next affected, which proves that the eruptions were the cause of the stomach complaints, and that the constitution exerted its powers to expell them.

The law of the animal economy, which determines the secretion of the skin to alternate with the exhalations of the lungs, (observable in cattarrhs arising from suppressed perspiration) is the cause of repelled eruptions, being apt to bring on asthma, and dropsies, particularly in the feeble periods of infancy and old age; and renders caution at all times necessary, to avoid repelling eruptive diseases to the internal surfaces of the body, by external means.

Many of them are so rooted in the habit, that they cannot be cured either by external or internal remedies, but spontaneously disappear, and re-appear, after a number of years, particularly in the spring and autumn, when the constitution exerts its

greatest force, to discharge its ailments upon the skin.

The spring is the season of peculiar activity in animal bodies, and disposes the human skin to alter its state, similar to the tendency observable in the skin of animals, to throw off its coverings before summer. A similar predisposition, less strong, prevails in the autumn of the year, the period of general decay.

These tendencies have laid the foundation of the popular opinion, that cutaneous diseases arise from foulness of blood, and that there is a necessity for bleeding, and taking physic, every spring and autumn, for the maintenance of health. The same idea of tainted blood has occasioned the affections of the skin to be called scurvies, or scorbutic blotches, &c. But the term is improper, since scurvy is a disease of the whole habit, arising at sea from indolence—putrid food—bad air—and nastiness, which would be greatly aggravated by a purging plan. Whereas the cutaneous diseases, thus denominated scorbutic, are usually local ones, arising from causes of an

opposite nature, such as full living, violent action of the cutaneous vessels &c. which receive benefit from a plan of purging waters. The disease called scorbutic, or scurvy, likewise occurs on land, though rarely, and discovers itself by blotted countenance—spongy gums—debility—low spirits—hæmmorrhagies—and at times, pimples—blotches—and ulcers of the skin. But sea and land scurvy is a disease different from a mere cutaneous one, and will be sooner removed by general remedies, such as bland nutritious diet, cleanliness, air, and exercise, than by Cheltenham water, or any kind of medicines, except bark.

Skin diseases may be distinguished by their external appearances,* and for the purpose of this treatise, I shall divide them into—pimples, scales, inflammations, exudations, and some scrofulous affections.

* As we can form a better judgment of the nature of eruptions by the eye sight, than by elaborate description, Dr. Willan is publishing a work on eruptive diseases, with numerous engravings executed by able artists, which will form a valuable addition to the stock of medical science.

PIMPLES, are the most common diseases of the skin. Many of them arise from cold suddenly applied, either externally or internally, to the body ; others from great external heat, or from violent exercise, exciting little phlegmons, or rashes upon the skin. They also occur in the face, from hard drinking, and become habitual. And a very violent species called herpes or tetters, is attended with a sharp humour and itching. It attacks in clusters, and seldom can be subdued unless by strong escharotics externally applied.

Decoctions of the woods, called diet drink, have been commonly used against such kinds of eruptions, but they only operate by their quantity as diluents, and Cheltenham water, which unites the purgative with the diluting principle, will prove of greater efficacy in all kinds of papulary diseases, to divert the fluids from the skin, and to relieve the constitution by purging ; more especially in those cases brought on by gross and full living.

SCALY ERUPTIONS, and desquamations,

are common diseases in cold climates, arising from a dry state of the perspirable surface. The leprous kind, with a rough, chopped skin, is preceded commonly by oppression at the stomach and vomiting, which are followed by crusts in successive crops, with exudations of moisture issuing from beneath them.

The cure of these is extremely difficult, but so far as internal remedies have power over the dry scurfy states of the skin, Cheltenham water is equal in efficacy to any other, particularly to carry off the humors by the bowels. The great dependence, however, ought to be placed upon external remedies, such as warm and tepid bathing. These will soften the skin, and wash the humor from it, while at the same time cooling laxatives may be taken internally. Hence it is, that so many cures are performed on leprous patients at the Bath Hospital, and that the valuable addition of the fumes of sulphur to the cleansing property of hot water, have rendered the baths at Harrogate so celebrated in scurfy diseases.

INFLAMMATIONS of the Skin, of the erithematous kind, occur frequently upon the nose and face, from a peculiar irritability of the capillary vessels of these parts. An obstinate species called *Gutta Rosacea*, and sometimes a surfeit, occurs in the faces of delicate females, from sudden exposure to cold air, or drinking cold liquids when the body is heated.

In superficial inflammations, Cheltenham water will prove as useful, to divert the flux of blood from the skin, as tonic remedies do in removing the debility of its vessels.

EXUDATIONS, or watery humours, occur in various parts of the body; but they are most frequent about the ears. Children are extremely subject to them, during the three first years of their life, and they also occur now and then in adults. I have seen ladies attacked with severe painful inflammations of the ears, accompanied with an acrid serous discharge from behind them, which had a strong tendency to spread over the neck.

All serous humors are dangerous to be

repelled. Local remedies are, therefore, never safe, without at the same time internal means be used to draw off the fluids from the constitution. A serous discharge suddenly checked will be apt to induce partial plethora — convulsions — and dropsy. Blisters, therefore, will prove the safest local remedies, and solutions of neutral salts the best general ones. They, besides, have an advantage over most others, by not confining the patient within doors in fine weather.

SCROFULOUS AFFECTIONS of the skin. Glandular obstructions are commonly accompanied with general debility, and dyspeptic symptoms, and therefore do not require a purging plan; but as some strumous tumors, and ulcers, are attended with chronic inflammation, cases will sometimes occur to require the use of these purging waters.

When old ulcers of the legs are inflamed and painful, or when ulcers discharge much serous humor, Cheltenham waters will prove a beneficial remedy internally.

I do not agree with some writers on Chel-

tenham water, that it is a fit remedy for tubercles, or indeed for consumption of the lungs in any of its stages. It would be spending time unprofitably that would be better employed in a sea voyage, or in removal to a warm climate.

In OPTHALMIES, and strumous affections of the eye lids, the water may be more usefully employed than in any other diseases of the lymphatic system, by washing the eyes with it, two or three times a day, and taking a dose internally two or three times a week. It will also have good effect in many obstinate chronic inflammations of the eyes, which are not at all scrofulous; but when they are discovered to depend on scrofula, the patient should go to the sea-side. Bathing, fresh air, and occasional use of sea-water internally, are of more importance than all other remedies in every species of scrofula.

CHRONIC INFLAMMATIONS.

Besides chronic inflammations of the liver already considered, a few others, which derive benefit from Cheltenham water, require to be noticed.

RHEUMATISM and GOUT may receive benefit from the water in some of their stages. In the beginning of the diseases they will constitute a material part of the antiphlogistic regimen, and improve the state of the stomach at the same time. Three or four doses taken before the time the fits commence, will often carry the fire out of the body, and prevent the explosion taking place; especially when used before repeated attacks of the disease have weakened the constitution, and established a habit of recurrence. Likewise afterwards, when inflammation and pain have subsided, and rigidity and swelling of the joints remain, before the disease has arrived at its complete attonic state, a dose of the water, now and then, will carry off the inflammatory remains of the disease.

In ASTHMA, of an inflammatory nature, Cheltenham water is a safer evacuant to remove obstructions of the lungs than bleeding. In cases of peripneumonia notha, which invade old people in winter, it will be of much greater service than in the spasmodic disease with regular paroxysms.

FEMALE DISEASES, which mostly consist of chronic inflammations, receive great benefit from a course of Cheltenham waters. Numerous gentlemen attend at the wells to wash away the effects of the luxuries of the table, but ladies, less liable to stomach complaints, are equally numerous in their attendance, on account of the benefit they experience from the waters. They are of great service in many cases of amenorrhœa, and always in leucorrhœa.

Cheltenham waters are generally useful in diseases arising from sedentary life, or a partial plethoric state of the female constitution.

HEMORRHOIDS, or PILES, either external or internal, arising from a sedentary life, or plethoric habit, will derive benefit from the water, unless in cases where the discharge of blood is extremely profuse. Costiveness, a principal source of irritation, must always be obviated, in cases of piles or fistulous ulcers, but acrid or purging medicines, will aggravate these diseases; therefore cooling laxatives are only admissible.

The suppression of piles, after they have become connected with the constitution by repetition, is often productive of a dangerous translation of the congestion of blood from the hemorrhoidal vessels to the stomach, liver, or head, especially in gouty and bilious habits; in such cases the water taken every other day, for a considerable time, will be of great service.

NEPHRITIC DISEASES, such as gravel and inflammations of the kidneys, are considerably benefited by Cheltenham waters taken in repeated small doses, to act as an alterative more than as a purgative. No other means have been yet discovered of preventing the generation of urinary calculi, or of dissolving them in the bladder, than diluting fluids; hence the Malvern waters have acquired celebrity as solvents of these stones: and Dr. Percival recommended a course of distilled water for the same purpose.

Cheltenham waters will diminish inflammation in the organs, and increase the flow of urine, as is observable in stranguries. In

cases of gravel they will wash away sandy concretions from the kidneys and bladder, and even alter the state of the secreted fluid, so as to render it less liable to form depositions in these organs.

INTESTINAL WORMS.

The human body, like that of other animals, is infested with parasites. Different species of worms inhabit its various parts, but those of greatest magnitude occupy the alimentary canal*; and by means of their living principle, resist the powerful solvents of that cavity.

The controversy of worms occasioning diseases in a healthy body, or receiving only a nidus from its debilitated state, does not require discussion here†; I shall only observe,

* Children are troubled with pediculi; and there is hardly a cavity or viscus of adult bodies, wherein worms have not been found, and of different species according to the nature of the organ.

† The bowels of children in Europe, on account of their humid relaxed state, favor the growth of worms; but they occur more frequently in adults in the West Indies, from a similar relaxation of habit; neither whites nor

that I consider a certain proportion of those animals, consistent with a healthy condition of the body, for straggling ones, now and then, make their appearance, where they were not suspected to have existed. But when they are very abundant, symptoms take place in the habit, which represent different diseases; among which a few peculiar ones characterise the disorder in question.

We judge of the presence of worms by itching of the nose—pale or sallow countenance—voracious appetite—fetid breath—starting and grinding the teeth in sleep—uneasiness, and sometimes tumefaction of the abdomen—feverishness, and emaciation of the body—irregular state of the bowels and sometimes skins or living worms voided.

As Cheltenham water is not equally useful in all worm cases, we must discriminate the principal species of these animals.

blacks are exempt from them. I have seen large round worms crawl from the mouths of men attacked with bilious fever, probably from finding their situation disagreeable at that time, but these animals were not of the nature of earth worms, for they did not live long out of the body.

TERES, or round worms, are generally about ten inches long, and of the size of a goose quill, resembling common earth worms. They live in the stomach, and upper part of the intestinal canal, and very often kill the patient, by perforating the digestive organs. The symptoms are those before enumerated; and when the disease increases—severe pain of the head and belly—fainting—intermittent pulse—convulsions—and sometimes epilepsy, succeed.

ASCARIDES, or maw worms, are of a white colour, and about three quarters of an inch, long. They inhabit the lower part of the intestinal tube. By their diminutive size, and distance from the digestive organs, they produce so little mischief, that some people are subject to them their whole lives, without inconvenience. At other times they produce irritation—heat and tenesmus in the rectum with mucous dejections.

TRICHURIS, the long thread worm, has a body about two inches and a half in length, with a tail like a hair, three times longer

than the body. This species occupies the cæcum or blind gut.

TENIA, the tape worm, is jointed like the links of a chain, from one to ten yards long. Each joint having a mouth and bowels, they constitute so many distinct animals, with one head and tail in common. It occupies the upper part of the intestinal tube, and drinks up the chyle so rapidly, as to destroy nutrition. Hence the symptoms of pale countenance—sickness—voracious appetite—costiveness—fetid breath—pain and distension of the belly—feverish habit and emaciation, take place.

The most dangerous species of worm is the tenia, and it is the most difficult to remove, for every joint becomes a new animal. Besides, these worms bury themselves in mucous, and become so firmly attached to the intestine, that nothing but a continued course of purging remedies, which will remove both the animal and the mucous, can perform a cure.

Ilately observed at St. Chad's Wells at Battle

Bridge, near London, many bottles arranged over the pump containing tape worms, which had been destroyed by the water, which is much weaker in its effects on the body than that of Cheltenham, and contains no sulphur or iron, which help to destroy these animals, but resembles it in the saline impregnations.

Cheltenham water has always been famous for discharging different species of worms from the intestines, particularly the tenia and ascarides.

The late Dr. Heberden, recommended a course of purging waters, that could be repeated without injury to the constitution, as the best remedy for worms.

CHAP. V.

SUMMARY OF DISEASES WHEREIN CHEL-
TENHAM WATERS ARE INDICATED,
AND CONTRA-INDICATED.

LEST the foregoing history of diseases should prove too minute or too medical, for the perusal of invalids, I have subjoined a recapitulation of the principal disorders, for which the waters have been recommended.

It is impossible to particularize every disease, without writing a system of medicine, or to print any kind of directions or cautions, that can sufficiently guide the patient in the proper use of the water, at all times; for the human body, both in its natural and diseased states, undergoes such constant changes, as to render a remedy that proves beneficial at one time, prejudicial at another. Besides, some diseases, that receive benefit from the waters, are often complicated with others, which do not require them; and those that require them most, take place in

debilitated constitutions, which forbid the use of purging waters. It is therefore necessary for invalids, who value their health and lives, to consult a physician in all doubtful and difficult cases. Dr. Saunders says, from observations he made last summer at Cheltenham, "that a third of the whole of those persons who drank the saline waters, was benefited; one third derived no advantage; and another third was evidently hurt, by persevering in the purging plan."* This kind of calculation evidently points out an extensive abuse of a very valuable remedy, which, like other powerful ones, requires careful administration.

They are INDICATED in two thirds of all bilious complaints found in this country; and especially in the chronic cases of obstructed liver, and deficient bile, which require a perseverance in the use of the water.

Cheltenham water is the only species of purgative that can be taken for a great

* Preface to the 3d edition of Dr. Saunders's Treatise on the Liver.

length of time, with safety to the constitution, in consequence of the proportion of nutriment being increased, and the system supported under the evacuation, by the water improving the appetite. I have known a dose of the water, taken every morning for eight weeks together, where the purging did not exceed two or three times a day at most, attended with great advantage to the health. But I am however of opinion, in the generality of cases which require a course of saline water, that a dose should be taken only every other morning, and that few cases require purging every day.

The following are the principal diseases which require a course of purging waters.

Inflamed and schirrous liver or spleen.

Bilious state of the stomach.

Indigestion, and costiveness.

Hypochondriacal complaints.

Sick headach.

Some kinds of bilious purgings.

Jaundice, and biliary concretions.

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.

They are CONTRA-INDICATED in cases of debility from old age ; infirm old men of cold constitutions require something more nutritious. Likewise, in diseases where the nervous system is weakened, or the vital power exhausted.

In both these cases, they can only be used to remove occasional costiveness, for if the ingesta and secretions be drawn off from the alimentary canal more rapidly than the constitution can repair the waste, nutrition must be diminished, and symptoms of debility, low spirits, emaciation, and perhaps dropsy or palsy, succeed.

There are few chronic diseases in which the body can bear to be deprived of its due proportion of nutriment; and there are none, wherein the bowels ought to be robbed of their natural mucus (except worm cases), which drastic purges, or even mild ones constantly applied, will be apt to do. I consider four or five motions a day, produced by any kind of purging remedy for eight days together, to lessen the lymphatic part of the blood as much as the loss of half a pint of blood from the arm, would do in the same space of time. The impropriety, therefore, of using purging saline waters in the following diseases, must be perfectly obvious :

Nervous diseases.

Palsies.

Consumptions.

Hæmorrhagies.

Dropsies.*

Fevers and very acute diseases.

* Purges, which are often employed in dropsies are of the drastic kind, to stimulate the absorbents of the general habit, and not of that kind which operates only by drawing off the fluids from the intestinal canal.

Their utility is *AMBIGUOUS* in affections of the head. To ascertain the effects of Cheltenham water upon an organ so necessary for existence, involves a question of great importance; more especially as prejudices have prevailed against its use, in cases where the habit is predisposed to diseases of the head.

Most mineral waters have a tendency, soon after drinking, to encrease the animal spirits, and produce temporary plethora of the head. Giddiness, headach, and drowsiness, are very common symptoms on the first use of mineral waters, and generally come on immediately after drinking them; but these effects are transient. They for the most part go off again in a few minutes, and gradually diminish in force by an habitual use of the water.

Whether these symptoms arise from absorption of the water into the circulation, or from its effects upon the stomach, is not a decided point. They however appear to me to depend upon several causes acting primarily upon the stomach.

The simple fluid principle, water, pro-

duces a degree of plenitude and tension in the circulating system.* It will also, at times, raise the pulse and produce copious flow of perspiration, especially in warm weather, from the stimulus of its bulk and temperature being communicated by sympathy from the stomach to the general system; but partial plethora of the head cannot be ascribed to this cause.

An over dose of any kind of water not working off freely, may affect the head by distending the stomach. The organ in this state will press upon the large blood vessels, and lessen the cavity of the thorax, so as to interrupt the free transmission of blood from the head to the general system, and thus prove dangerous in cases where there is a tendency to sanguineous appoplexy, or mania. Sudden deaths from appoplexy frequently happen immediately after a full meal, long before the aliment had time to enter the circulation; and heavy indigestible suppers produce night mare. There is therefore reason to believe, that when the

* Vide Treatise on Diluents by the author, published 1788.

stomach continues over distended with water for a length of time, it may prove prejudicial to the head.

But the most common cause of cephalic symptoms arises from the quantity of loose airs contained in mineral waters. The intoxicating effects of carbonic acid gas both in beer and water, rendered volatile by the heat of the stomach, are familiar to every person's observation. Malvern and Bristol waters, which contain more gaseous than solid matters, produce vertigo, and slight headach; and chalybeates, which contain the greatest proportion of carbonic acid gas, can only be taken in comparatively small doses, on account of their liability, on first drinking, to produce giddiness, headach, and sense of fulness in the head.*

But Cheltenham water, which contains a

* Dr. Rutty observes, that the celebrated Pouhon and Geronsterre waters in Germany, which have given origin to the name of spa to many other chalybeates, contain iron, with such abundance of carbonic acid and sulphureous vapours, that they do more harm than good in disorders of the head.

Rutty's Synopsis, 2to. page 331.

smaller portion of elastic fluids than most other kinds of mineral waters, produces now and then vertigo and slight headach, especially when a large quantity of the water is taken, and does not work off; or when its neutral salts excite nausea. Giddiness is generally a precursor of vomiting, whether it arises from food, medicine, or any other cause disturbing the stomach. But an operation of this nature upon the head, by nauseating the stomach, can never be injurious to the brain or its diseases. On the contrary, Cheltenham water, when it purges, has a tendency to cool the brain, and to lessen plethora in the head. The effects of the small portion of iron it contains are completely superseded by its cathartic virtues. It does not accelerate the pulse; and whenever apoplexy or mania have succeeded its use, they must have arisen from the congestion of the liver, which, directed to the use of the water, or from too free a use of it, debilitating the constitution.

CHAP. VI.

THE MODES OF ADMINISTERING
THE PURGING WATERS.

THIS remedy is so little variable in its nature, and the modes of using it are so well ascertained by long established practice, that few observations will suffice on the best methods of applying it to diseases.

The following directions are most deserving notice, and will apply equally to both the upper and lower purging wells of Cheltenham.

The best SEASON OF THE YEAR for a course of these waters, is the summer, on account of the advantages derived from the co-operation of air and exercise with the water, as explained in the introduction to this treatise. It is also the season which renders the removal of bile, and undigested food from the bowels, most necessary for health.

The waters are likewise strongest, and their refreshing effects most felt, in summer, for most superficial mineral springs are weaker in cloudy and rainy seasons, than in clear dry weather. But it may also be drank in the middle of winter with considerable advantage, by taking off the chill, or drinking it at the fire-side.

The spring and autumn are likewise proper seasons for its use, on account of the tendency of the constitution to inflammatory and eruptive diseases at these periods. Hence the usual time of the resort of company to Cheltenham begins in April. The season is at its height from the beginning of July until the end of September, and finishes in October, except with those persons who intend to remain all winter; of which there have been considerable numbers during the two last years.

Travelling in hot weather ought to be gentle and easy, for vascular commotion once excited, may terminate in a feverish habit of body, that will defeat the intended purposes of the water. And for the same reason, it may sometimes be necessary on

the first arrival at Cheltenham to rest a day or two, before commencing the purging plan.

PREPARATION of the body has been usually recommended, previous to drinking mineral waters, but with Cheltenham water this is unnecessary, because it is, for the most part, sufficiently active of itself, and in the way commonly expected from preparation.

Patients in the habit of using calomel, may begin with taking two or three grains of it, in the form of a pill, at bed time; and working it off next morning with a dose of water at the well.

But the practice which I have observed at Cheltenham, of invalids using physicians' prescriptions which contain calomel, without advice, is often followed by the most fatal consequences. Calomel, without doubt, is one of the best articles of the materia medica in numerous diseases, and the prejudices of bilious patients in its favor rest upon the most solid foundations, but mankind are not sufficiently aware, that its valuable pro-

perties depend upon its activity, and that it cannot be taken in repeated doses, by persons exposed to the weather of this climate, without a considerable degree of danger.

The continued use of mercury brings on an inflammatory state of the body, and by stimulating the secretory vessels in every part of the system, renders patients extremely liable to get cold, from the common variations of our atmosphere. In tropical climates where the weather is uniformly warm, it can be taken every day for weeks together, but in this country, the same kind of practice would ruin the best possible constitution.* Three doses of calomel, with an interval of two or three days between each, to act as purgatives, and afterwards remitted for several weeks, will, with the use of Cheltenham water, be as much as can be taken in any bilious case, without incurring the risk of the effects of its absorption,

* I have known gentlemen in the East Indies take calomel night and morning, to the amount of a hundred grains, advantageously, who could not bear fifteen grains in this climate without affecting the mouth, which is a symptom that generally renders confinement to the house necessary, to avoid the risk of colds.

which ought never to be done without the advice of a medical practitioner residing on the spot.

The best TIME OF THE DAY for drinking the water is found by experience to be early in the morning, and it is seldom used at any other time, at Cheltenham. Medicines intended to operate in the circulation of the blood, ought to be taken with a full meal, but water, which acts on the alimentary organs only, should be drank on an empty stomach ; and the use of it at this time is attended with a further advantage, of the operation being finished before dinner.

I have known some invalids drink the water at bed-time, for the purpose of remaining all night in the bowels, to work itself off early next morning, by the assistance of exercise. But the principal benefit is derived from drinking it at the pump early in the morning, when the temperature and volatile principles enhance the value of the remedy ; and the early walk in the pure cool air, enables those who pursue the salutary practice, to eat a hearty breakfast.

The DOSE of the water ought always to be moderate on first using, and the quantity increased according to the effects produced on the body. The dose will, therefore, very much depend upon the age, sex, constitution, and disease of the patient ; and, at the commencement of the course, it will require the opinion of the faculty to determine, whether the water should be drank in such quantities as will gently increase the natural evacuations of the body, or act as a brisk cathartic ; as well as to regulate the quantity necessary to be continued after changes have taken place in the habit.

In the writings of the ancients, and even in modern times, upon the continent of Europe, five or six quarts of mineral waters are considered as a moderate dose.* But in the improved state of medical science in this

* Dr. Rutty, who wrote largely on mineral waters, in 1757, says, in the chapter on the waters of Spa, " Those who drink little are not benefited ; the greater the quantity any one drinks the better, if the waters pass off well : so that some have drank twenty-one pints in a day." *Synopsis*, p. 333.

country, physicians are adverse to such large quantities. An over or under dose are equally improper; the one injures the stomach by distention, and the other is attended with loss of time, perhaps during an increasing disease.

These waters are generally intended to produce more or less purging; and it very seldom happens that benefit is obtained from them, by those patients who apply at Cheltenham, without they be taken in sufficient quantity to operate upon the bowels; * the dose must, therefore, be regulated by the number of evacuations.

A small half-pint tumbler, containing about six ounces of water, drank quickly, before the volatile particles escape from it, and a like quantity repeated, after walking half an hour or twenty minutes, will, in general, be sufficient to begin with. In two or three days the quantity may be increased to two glasses, containing twelve ounces each,

* They also prove diuretic; but it is only a property in common with all neutral salts largely diluted, and not to be considered as a particular indication for these waters.

called well-pints. Some cases may require three of these largest tumblers, to be drank with the use of exercise between each. It is necessary the water should be taken in these divided portions, to prevent nausea or distention of the stomach, and accompanied with exercise, to quicken the operation of the water. It is better to drink a quart of fluid, of any kind, at three times, than at twice, particularly of Cheltenham water, which is liable to be rejected from the stomach. Three or four tumblers full, drank with a quarter of an hour or ten minutes between each, will be sufficient in any case whatever; although I have seen people imprudently take larger quantities.

Now and then casual symptoms occur, on first drinking the water. If it disturbs the stomach, instead of passing off freely, Cheltenham salts must be added to one of the glasses; which are always kept in solution by the pumper, for the purpose of strengthening the dose.

The symptoms of flatulence, nausea, and vomiting will often receive some degree of

mitigation from pepper-mint drops, Ether, or a tea spoonful of simple tincture of cardamoms, taken with the water, or after it. When it continues to disturb the head with giddiness or pain, the water should be warmed, or exposed to the atmosphere a few minutes before it is drank, to dissipate the aërial principles; and after drinking it, the patient should walk about in the open air. When it produces gripes, or habitual purging, vegetable food, malt liquors, and acid fruits should be avoided. These, indeed, should always be used sparingly, at the time Cheltenham water is operating upon the bowels.

The waters often lose their effects by repetition, and require the assistance of purgative medicines, or a temporary intermission of their use. Bitter laxative pills will prove an excellent auxiliary to quicken their operation, and a short excursion to the country, or drinking the water of the Steel Well a few days, will prevent the bowels forming a habit of resisting the action of saline waters.

The TEMPERATURE of the water is of more importance than generally imagined. In its cold state, it braces the stomach, and refrigerates the body. In its warm state, it relaxes the stomach; and, by the loss of its volatile principles, proves less flatulent. Invalids should, therefore, endeavour to bring themselves gradually to the use of it in the coldest state, unless in cases of gout, rheumatism, spasms, gall-stones, or indurated viscera; and then some of the water heated should be added to each dose.

The DURATION of the course should be regulated by the nature of the disease, and effects of the waters on the constitution. Those who visit Cheltenham for amusement, are satisfied with drinking as much as relaxes the bowels, for a week or two; but invalids, in general, continue at Cheltenham from two to four weeks, except in obstinate chronic cases, which require complete alteration of the habit; they are obliged then to persevere in a moderate use of the water for months, and sometimes for years, to get their health re-established.

When the saline waters, by improving digestion, increase the size of the body, their continuance is safe, for any length of time; but when they produce much emaciation, they should be left off for a time.

The water should always be left off in a gradual manner, to avoid the mischief that might arise from full diet suddenly succeeding a course of depletion.

WARM BATHING is an excellent auxiliary remedy, for many chronic diseases that require purging waters; and for this purpose convenient baths are provided at Cheltenham.*

All degrees of heat between 95 and 120 are employed for hot baths; but the most common one is about 97° or 98°; and water of these temperatures, exceeding the natural standard of animal heat, applied to the extended surface of the human body, is decidedly a powerful stimulant to the heart

* Hot and cold baths have been established at the upper end of Cheltenham since the year 1787, by Mr. Freeman, from King's Street, St. James's Square, London; who has also provided both a male and female cupper.

and arteries, but more especially to the vessels of the skin.

The hot bath, in these ways, excites perspiration, and removes spasmodic diseases, rheumatisms, cholics, uterine obstructions, hypochondriacal complaints, and paralytic affections. By promoting the flow of Bile, it proves serviceable in bilious diseases, and relaxes the gall ducts in cases of jaundice, and biliary concretions. Likewise, by exciting an external circulation, it relieves the internal parts of the body from obstructions, and allays both vascular and nervous irritation, so as to induce sleep, and to relieve from the fatigues of a journey in a rapid manner; and by softening, and cleansing the skin, it proves of great service, externally, in most cutaneous diseases.

The hot bath may be used during the days of drinking the water; and it seldom proves a dangerous remedy, provided the alimentary canal and blood vessels are previously emptied, by a few doses of Cheltenham water, and the patient be well protected from the cold, after coming out of the bath.

The *Vapour Bath* has nearly the same ef-

fects as hot water; acting as a stimulant, and relaxant of the skin and general system.

The practice at Bath, called *dry pumping*, of permitting water of a high temperature, to fall with great force on particular parts of the body (which proves a powerful stimulus in joint cases, and other local diseases,) can also be performed very efficaciously at the baths of Cheltenham.

Tepid bathing has of late years become more fashionable than any other species of artificial bathing. It strengthens the body, and may be used in many cases with the saline waters advantageously; but it ought to approach the warm bath in temperature, such as from 90 to 96 degrees of heat.

CHAP. VII.

GEOLOGICAL EXPERIMENTS TO DISCOVER
NEW SALINE SPRINGS AT CHELTENHAM.

THE Town of Cheltenham is situated upon a level spot of sandy soil, and therefore plentifully supplied with water. A small river runs, at a little distance, on each side of the town,* and springs of hard water are every where found, at the depth of from ten to eighteen feet, without containing impregnations of perfect salts or iron, and fit for domestic purposes.

On each side of the town, north and south, there are rising grounds at the distance of a quarter of a mile; but not exceeding a hundred feet at the greatest elevation. The soil of these eminences, which

* The river Chelt, arising above Charlton Kings, passes on the south side, and Wyman's Brook, arising out of Prestbury Hill, near Hewletts, passes on the north side of the town, in their course to the Severn.

consists of a blue clay or marl, extends from within a foot or two of the surface of the land, in one continued stratum, to unknown depth.

The differences most observable are, its growing dryer and harder the deeper it penetrates, so as to appear in some places indurated and laminated like soft slate. In most situations it contains fossil shells, and detached pieces of pyrites; and in several places on the south side of the town, native crystals of salts. But the subject will be better understood by relating some experiments lately made in boring the ground in different situations, in the vicinity of Cheltenham.

To procure saline water on the south side of the town, in July 1802, a pit was dug through a tenacious blue clay, eight feet wide and fifteen deep, in a field adjoining the lower spa.* Many marine shells were found at the depth of eight or nine feet, and detached pieces of pyrites, amounting

* This pit was dug by Mr. Harward, of Cheltenham, in his field next the lane.

to several pounds were taken out a little deeper. But instead of a salt spring, as was expected, land springs poured in so fast, as to prevent further digging, which rendered the plan abortive.

On the north side of the town, in a field adjoining the lands called marsh, the ground was bored near the river, in June last, to the depth of 38 feet, and shells, together with pyrites, were discovered, in the same kind of blue clay, without any spring of water whatever.* The next trial was at the summit of the hill, in the same field, with a view to discover a fresh water spring. And at the depth of 25 feet, a weak chalybeate water issued forth, but no other spring could be found; after boring to the depth of one hundred and five feet, through one continued stratum of blue marl, in many places so hard, as to require the chisel borer to penetrate it.

When the grounds belonging to the Rev.

* The property of Francis Welles, Esq. of Cheltenham, well known for his liberality, and public spirit.

Mr. De la Bere of Cheltenham were bored in October last, on the south side, at the summit of Bays Hill, I observed the soil between 5 and 10 feet deep, contained crystals of salts; at 60 feet, many shells were ground to pieces by the borer; and at 70 feet, a scanty spring of saline water was found, which resembled that of the Royal Spa, and not above 200 yards distant from it.

I had the ground bored, during the last summer, in above forty different places, on the south side of the town; and discovered crystals of selenite in many situations, and springs of saline water in two places*.

In the lane adjoining the Lower Spa, a well was dug, five feet wide and eighteen deep, which supplied water of a saline, sulphureous, and chalybeate nature.† It was

* I was honoured with Lord Sherborne's permission to search for water in the waste lands.

† The sulphur in the waters about Cheltenham is so transient, that, on the discovery of this spring, the water was strongly impregnated with hepatic gas, after being shut up ten days; which now hardly can be discovered in it. The same of the Lower Spa, which seldom discovers sulphur, except in the spring of the year.

seen to flow from the upper part of the lane, through three or four openings in the clay at the sides of the pit, 12 feet beneath the surface; which appeared to have been formed by the removal of shells and pyrites. But this well not yielding more than 10 gallons of water in 24 hours, I proceeded to bore higher in the lane; and, in October last, discovered another spring of saline water, at 40 feet deep, which supplies a gallon of water in four minutes, from a hole $2\frac{1}{2}$ inches diameter. It is, therefore, intended immediately to dig a well in this situation.

I next subjected the various matters of the soil and the water to chemical experiment.

The CLAY was nearly of the same kind in every situation; when moist, it exhibited a blue colour, and smooth tenacious texture. It adhered to the tongue, and tasted insipid. It was so indurated as to appear glossy, like polished marble, when cut with a knife. When dry, the colour became a little brown, and the texture brittle. It was studded with glittering crystals of salts, distinctly seen

with the naked eye, about the size of peas ; and with the microscope, in the sun, the salts were discovered to be blended, with brown oxyd of iron and blue clay, into one common mass.

This clayey mass effervesced strongly with vinegar, indicating the presence of earthy carbonates ; and in many situations abounded with powdery particles of lime. For these reasons, the inhabitants use it as a manure for the land, and reckon it unfit to make bricks. Where ever the crystals of salts were very abundant the surface of the land was naked, and the soil unsuitable to agricultural purposes.

To ascertain the proportion of saline matter that the clay in the lane contained, a solution was made of a hundred grains of dried clay in an ounce and quarter of dilute muriatic acid, and the liquor filtered from it. The dried residuum was boiled ten minutes in six ounces of distilled water, and filtered again ; the remaining insoluble portion, after drying, weighed only 53 grains ; which shewed that the clay had lost near half its weight. How immense then must the

quantity of saline matter be in many acres of such soil in the parish of Cheltenham ! The remaining argillaceous earth had lost none of its blue colour. It was unflammable, contracted in the fire, with a crackling explosion, and consisted of alumine, some magnesia, and a little silex.

The SHELLS were similar to the remains of marine animals of different species, buried at all depths in the soil—some entire, others in fragments ; and when dissolved, had left the impression of their form upon the clay. Some possessed all the original characters of shells, with lineaments expressed in the most perfect manner. Others consisted chiefly of indurated clay, and a crystalized matter, the colour of horn, in the form of shells. Many of them were marcasites, exhibiting a beautiful argentine and brassy lustre externally *. And a few were composed in-

* The alchymists considered marcasites as stony matters, receiving colour from different metals ; and they distinguished them into gold and silver species. The term is used at present nearly in the same sense as mundic, for the first rudiments of a metal ; that is, a mineral

ternally of brown pyrites. These extraneous matters, in their fluid state had filled the cavities of the shells, and afterwards became indurated, while the calcareous matter gradually changed to another form.

The species of shells, dug from the blue clay on both sides of the town, consisted of a few common bivalves ; such as shells of snails, oysters, cockles, and muscles.* But

containing fewer metallic particles than constitute an ore. The term is often applied to shining fossils, whether they contain metal or not.

* Besides these common bivalves, there are numerous fossil shells of the nautilus kind, buried in the clay of this island, which are never found in our seas. The *cornua ammonis* is one of the most frequent in every country, although so seldom discovered in the living state, that most conchologists have supposed the species extinct. Linneus, however, says they still exist in the deep seas. We know little of the inhabitants of the watery element. The shells, driven on shores by agitation of the shallow waters, are few, in comparison of the numerous races of testaceous fish, which are dissolved by the water, or destroyed by other species in the great abyss. The family of ammonites must have been one of the most numerous among testaceous animals, in the ancient world ; and nothing but a general deluge could have blended the shells of land, river, and sea animals

the most numerous were sea-worms, of the class of univalves.

The *dentalia*, or tusk-like shells, consisting of a conical tube four or five inches long, were very numerous, and always compacted with hard clay. But the *cornua ammonis*, called serpent or snake stones, were the most abundant of the whole. They consisted of four spiral and tapering convolutions, rolled in a circle, like a coil of rope. They exhibited striæ on the back, with regular ridges between, and internal chambers, which were petrified with blue clay or pyrites. This species afforded a beautiful variety; for they were of all sizes, from a silver penny to a crown piece, and often possessed different degrees of metallic splendour. Their chemical composition consisted of lime, carbonic acid, and the extraneous matters enumerated.

The PYRITES (Sulphuret of Iron) were mostly in oval masses, frequently as large promiscuously together, upon the most elevated situations, and at the greatest distances from their primeval abodes.

as walnuts ; at other times, in flat patches, with a smooth shining surface, and brassy appearance ; and generally of a pale yellow colour, denoting the species to be a sulphuret of iron, formerly called martial pyrites. They were so hard as to scratch glass like a diamond, and to strike fire with steel. They were brittle, and the fracture discovered metallic fibres converging to the centre. The specific gravity was 3. 5. at a temperature of 60° ; and when the sulphur was dissipated by roasting, they lost nearly half their weight. The remaining pyrites, dissolved in dilute sulphuric acid, deposited a fourth part of their weight, by adding prussiate of potash.

The SALTS, only found near the surface, proved to be crystalized selenite, which wasted by exposure of the clay to the weather. They had a transparent sparkling appearance in every inch of clay, and a texture softer than alabaster. They were mostly of a flat or cubical shape, but sometimes in tuberculated masses, larger than peas, as if the confinement of the soil had obstructed their crystallization. Their taste was insipid, or ra-

ther slightly astringent, and their solubility in fluids extremely difficult; but when reduced to powder, and exposed to a strong heat to expel the acid, they became a white, friable powder, soluble in water. This solubility, together with the undisturbed transparency of the solution by adding pure ammonia, shewed the base was not magnesia; and the white precipitate produced by adding oxalate of ammonia, were sufficient evidences of its being lime. The acid was discovered to be sulphuric, by acetite of baryte producing a deposit of sulphate of baryte, in the solution of the watery crystal in a large portion of water.

Besides these salts, I thought I observed in some situations, small particles of perfect salts in the dry clay, which tasted more pungent and soluble than the former, and effloresced by exposure to the air; but I have not yet fully ascertained their nature.

The ARTIFICIAL WATER obtained by boiling the clay, and that collected naturally in the openings of the ground, were compared in the following manner.

A pound of clay, taken from the borings

in the lane, was boiled in a gallon of water for half an hour, to dissolve the salts; and the liquor filtered.

The clay liquor had a salt taste. The boiling had separated the gases and iron, but decompositions were produced by the different tests, which shewed the presence of lime, sulphuric acid, muriatic acid, magnesia, and soda.

The NATURAL WATER tasted salt, and with the tests exhibited the same appearances as the clay liquor; likewise, by being in possession of its air and iron, it turned milky with lime water, and red with vegetable juices; and changed to dark green, or purple, with the powder and tincture of galls.

Half a gallon of the water, evaporated to dryness, afforded 300 grains of residuum, which is more than was obtained from the water of the Royal Spa: and by evaporating 12 gallons to a pint and a half, and cooling it in a shallow vessel, twelve ounces of beautiful large crystals an inch long, of the

shape of six-sided prisms, with dehdral summits, were obtained; which salts were soluble in three parts of water at 60 degrees of heat. These indicated the greater abundance of sulphate of soda, than of sulphate of magnesia or muriate of soda; which latter would have disposed the chrystals to assume more of the quadrangular and cubical shapes, and to require more water for solution.

From the whole of these experiments, I made the following general deductions.

1. That the elevated lands, on both sides of Cheltenham, consist of immense beds of blue clay; their bases forming an intermediate valley, upon which the sandy soil of the town rests. This clay does not in general contain chrystals of salts; but they have never been found, except in dark blue clay; and that only upon the south side of the town, and near the surface of the soil.

2. That the clay is of so tenacious and indurated a nature, that no water can penetrate it, without some change of stratum, or accidental aperture, permit it to pass: hence

it is, that springs of water are so difficult to be met with on boring. And as none of the wells, old or new, have been dug beyond the blue clay, the supply of water cannot be so rapid as with other springs, which percolate looser materials, or rise upwards with great force.

3. That the native salts or their principles exist in the soil immediately surrounding the wells, and the water which dissolves them comes from the surface; these wells cannot, therefore, interfere with each other at any great distance; and their water must be stronger at one time than another, according to the state of humidity in the earth.

4. That the decomposition of clay, martial pyrites, and shells, appear to give origin to many of the impregnations of these waters. The action of air and water changing yellow pyrites to a saline nature, give birth to sulphuric acid, hepatic gas, and chalybeate principle; the clay supplies magnesia, and the shells calcareous earth and carbonic acid*.

* I have lately found, on digging the blue clay, many Belemnites, a species of straight conical shell, three or

5. That both the clay liquor and natural water of these experiments, discovered the same kind of impregnations as the old spa's did in their original state ; and that the proportion of salts was equally abundant, because a single pint of water from the lane operated upon the bowels of several persons who drank it.

Lastly. That a sufficient supply of saline water may be had at Cheltenham, for any possible consumption ; and little remains, except to select the best water, in the fittest situation, to establish a new well.

four inches long ; and am informed, they are extremely numerous in the soil of many parts of the Vale of Gloucester.—How marine shells and the principles of sea salt exist in such situations is a subject involved in obscurity ; but it is well understood, that pyrites, which abound in hilly countries, and in all kinds of clay, can supply these impregnations mentioned. Oxygen uniting to sulphur forms an acid, which reacts upon the iron, and the water is decomposed, so that hydrogen gas is let loose. Hence Lemary supposed it the cause of volcanos and subterraneous fires, which he illustrated by burying iron filings and sulphur, moistened with water, in the earth. And it appears to me, that the shells are changed, first to a radiated horny appearance, and afterwards to the chrystals of selenite described.

CHAP. VIII.

THE NATURE AND USES OF THE STEEL
WELL IN MR. BARRETT'S FIELD.

ALTHOUGH this well was only established last autumn, it has so considerably attracted public attention, that the number of subscribers this season have exceeded 150. It is therefore necessary that its nature and uses should be properly understood.

I have undertaken to give a brief explanation of these, under the order of the physical, chemical, and medical properties of the water; together with its doses, and application to particular diseases.

I have given it the name of Steel Well, from its similarity of principles to steel, which is also a carburet of iron, and to distinguish it from the other spa, which is likewise called a chalybeate by many, on account of its containing an irony impregna-

nation, with its more powerful saline one*.

There is a singular analogy between the springs of Cheltenham and Scarborough in Yorkshire; each town being supplied with different spas, upon the same spot of ground—one a valuable purging water, containing iron, and the other a simple chalybeate spring. The well I am about to describe is of this latter kind; and it is a favorable circumstance for Cheltenham and its visitors, that nature has bestowed upon it different springs, which can fulfil the two grand indications of cure in diseases—of evacuating or strengthening the human body, as occasion may require. It is not an unimportant consideration for invalids resorting to Cheltenham with their families, that the individuals who do not require an evacuating remedy, can be supplied with a bracing one, immediately from the hands of nature.

* I have frequently in this Treatise, for distinction sake, used the word saline to the purging spas only, although, strictly speaking, all chalybeates are saline, as iron is insoluble until it is converted into a salt.

Iron is so universal a metal, that it exists generally in the animal and vegetable kingdoms, and in most coloured earths, stones, and sands. It is frequently found in large quantities, uniformly diffused through clay and boggy grounds, as well as in the strata and veins of rocks, and craggy mountains. At other times, it exists in clay lands, in detached fragments of pyrites ; which we have shewn to be the case with the soil of Cheltenham. Chalybeates are, therefore, found in all situations ; and carbonic acid being also present every where, simple carbonated chalybeates are the most common of all kinds of mineral springs.

Mineral waters contain carbonic acid, the solvent of iron, in all proportions, from a tenth part to an equal bulk of the water. Those, in different situations, are thereby enabled to hold in solution, from half a grain to five grains of iron, in a gallon of fluid. Simple chalybeate springs differ only from one another in the proportion of these two ingredients ; for the other matters they contain are in an inconsiderable proportion, and have no medical virtues.

As the volatile acid escapes from them they lose their irony impregnation, and therefore chalybeate springs are often used for domestic purposes. All the house-pumps at Tunbridge Wells contain iron; and the one at the Well Cottage, adjoining the walk to the lower spa of Cheltenham, is a strong carbonated chalybeate. These are reduced by boiling to a state of simple water; and therefore such kind of chalybeates, pumped cold upon green tea, are changed to a dark or purple colour; but, poured upon it boiling hot, do not exhibit the same appearances. For the same reason also, chalybeates lose their properties by transportation, and by exposure to the atmosphere in a state of rest; but these effects might be avoided, by adding five drops of muriatic acid to each quart bottle of water, which would greatly improve the tonic virtues, at the same time that it retained the iron of the water.

In a level meadow belonging to Mr. Barrett of Cheltenham, about 500 yards from the mill, and nearly the same distance from the upper end of the town, there formerly

was a hole, at the side of a stream running through a thicket of brush wood, which contained an iron water. It had long been used by the country people for disorders of the eyes; but not otherwise noticed, (except by Dr. Fothergill, who mentioned it slightly sixteen years ago*,) until last summer, that the stream was traced by its ochry channels a hundred yards nearer its source.

A new *well* was constructed, and a pump-room, within thirty yards of it, erected; to which a foot-path on the bank of a small river, and a coach-road a little distant, serve for an easy access.

The well being but four feet deep, and the pipe conducting the water buried only a foot and a half in the soil, the water was considerably affected by the summer heat increasing its temperature, and separating its iron. At my request, however, the proprietor covered them over with earth, in the autumn, by which means the water became stronger and colder; and he has formed a plan, to be executed this winter, of a brick-

* Dr. Fothergill's Treatise on Cheltenham Water, p. 49. 1788.

building and plantation of trees, to exclude them more effectually from the influence of the weather; which probably will render the spring of greater importance.

When the well was completely emptied, the water was discovered to issue from different places of its bottom out of a black gravel underneath a yellow clay, and the well filled to the waste pipe in an hour and a half; which is equal to the supply of a hundred gallons of water in an hour; a much larger quantity than can ever be consumed by drinking.

This *water* resembles that of Tunbridge Wells, in Kent, in most of its properties*.

On first pumping in the morning, ferruginous films are found floating in the water, drawn from the surface of the well, but after

* They are similar in chemical composition, and medical effects; but the Tunbridge water appeared to me last May to be a little stronger of iron, and more transparent than the Cheltenham. The Tunbridge water changed the prussiate of potash to a blue color, and green tea to a purple, but this water produced little effect with prussiate of potash, and turned tea only to a brown colour. The former is also equally cold in winter and summer; and arises from great depth into the stone bason, and with such force, that it is supposed to take origin in one of the high hills adjoining.

a few of the first gallons have been thrown away, it becomes clear, and almost perfectly transparent. Like other chalybeates, it produces a brown stain and greasy appearance on the glasses, which render frequent washing of them necessary, to exhibit the water in greatest perfection.

The temperature of the water varied from 47° in November, to 60 degrees in August.

The specific gravity, at the former temperature, was 1,0002.

The CHEMICAL CONTENTS of the water were ascertained, in August 1803, by Reagents, Evaporation, and Distillation. I shall briefly state the mode in which the experiments were prosecuted.

1. By exposing the water 12 hours to the atmosphere, in an uncorked bottle, it changed nearly to the state of common pump-water*.

2. When placed over the fire, it emitted air bubbles; and, after boiling 12 minutes,

* This water does not retain its properties even in corked bottles for any great length of time.

deposited a brown powder ; which appearances plainly indicated the escape of carbonic acid gas, and the precipitation of iron.

3. Lime water rendered it milky ; and sulphuric acid produced air bubbles, with an increase of transparency ; denoting the *carbonic acid gas* to be in considerable proportion.

4. Tincture of galls turned it purple ; green tea and brandy turned it to a dark colour *. But these appearances did not take place after the water was boiled, in consequence of the loss of *iron*.

5. The solution of nitrate of silver produced a small degree of white flaky precipitate, which became bluish by exposure to the light ; and the acetite of lead produced a copious white precipitate, soluble in acetic acid. These indicated the presence of *muriatic acid*.

* Mr. Weighton, at the Angel Inn, Tunbridge, related to me an anecdote of a servant sent by his master for a pint of brandy. He drank part of it, and filled it up at the house pump. His master was greatly displeased to have what he called black poison sent him, until the landlord explained the circumstance of all the pumps of the town containing iron.

6. The acetite of baryte produced slight turbidness; denoting some *suphuric acid*.

7. Oxalate of ammonia produced copious white precipitate, indicating the presence of *lime*.

8. Pure potash, and pure ammonia, both produced a white precipitate of *magnesia*.

The *proportion* of fixed principles was next determined.

9. By evaporating, near the boiling point, eleven gallons of water to dryness, I obtained 220 grains of solid contents.

10. This powder, digested with 2 ounces of alcohol, was filtered, and dried at 212 degrees*. The alcohol having taken up muriate of lime, the dried mass weighed only 192 grains.

11. The residue being digested 24 hours with six ounces of cold distilled water, was filtered and dried. The water having taken up the muriate of soda, the dried residue weighed 166 grains.

12 After boiling the residuum a quarter

* All the filters were dried over the uniform heat of boiling water.

of an hour in eleven pints of distilled water, it was filtered and dried. Having lost its selenite, it weighed 158 grains.

13. The undissolved residue was oxydated by exposure for three weeks to the rays of the sun, in a moist state. It did not cease to effervesce until it was saturated with 12 ounces of distilled vinegar, which took up all the magnesia and lime. When filtered and dried, there remained 20 grains of oxyd of iron. This oxyd, dissolved in muriatic acid, and precipitated by prussiate of potash, yielded only 15 grains.

14. The spiritous solution which had passed the filter was evaporated to dryness, and moistened with 12 drops of sulphuric acid. This paste exposed to moderate heat, emitted white fumes of muriatic acid; and urged with strong heat, yielded a little lime.

15. The watery solution which had passed the filter, evaporated in 85 degrees of heat, exhibited slender crystals on the surface of the hot fluid, adhering to the sides of the bason, which on being dried on bibulous paper, proved to be common salt.

16. The boiled solution evaporated to

dryness, yielded 8 grains of earthy salts ; which proved, by the tests of baryte, pure potash, and pure ammonia, to be sulphate of lime.

The *aërial principles* collected over mercury, from a pint of water taken immediately from the spring, were three cubic inches of air, absorbed by lime water. Two and a half suffered diminution by nitrous air. One suffered no alteration from nitrous gas, and extinguished a lighted taper.

I shall, therefore, state the wine-gallon of water to contain—

	Grains.
Oxyd of iron - - - - -	1.36
Muriate of lime - - - - -	2.55
Muriate of soda - - - - -	2.02
Sulphate of lime - - - - -	.73
Carbonate of magnesia and lime	12.55
Solid contents	19.21

	Cubic Inches.
Carbonic acid gas - - - - -	24.
Atmospheric air - - - - -	20.
Nitrogen gas - - - - -	8.
Gaseous fluids	52.

The MEDICAL PROPERTIES of this water arise in some measure from the quantity of cold fluid, and carbonic acid gas, but the most important and distinguishing impregnation is the iron; the other contents of the water have no medical use.

The effects of iron on the human body are numerous, and truly valuable. It being the safest and most friendly of all the metals as a remedy.

All preparations of iron corrugate the living fibre, as we readily perceive by their stypticity in the mouth. In consequence of which they generally render the body costive, and are employed to restrain preternatural evacuations, by constringing the extreme vessels of the system.

Iron braces the stomach, and improves digestion, so as to increase the elasticity of the muscular fibre, and excite the nervous energy, by augmenting nutrition.

By entering the circulation, it increases the red color of the blood; so that it may be said to generate blood in a double capacity.

It is evidently a stimulant to the heart and arteries, for both the strength and frequency of the pulse are increased by its use. It is therefore more useful in cases of languid circulation, and cold constitutions, than in febrile states of the body, or plethoric habits.

But Cheltenham waters diffuse the stimulus of iron more generally over the system than the metal taken in substance; and both the carbonic acid and the cold water contribute to brace the stomach, and stimulate the various emunctories of the body. Hence it is, that a general glow of heat, and increase of urine, and sometimes of perspiration, succeed a dose of chalybeate waters.

The waters are more invigorating in proportion to the iron they contain, than is observable from any artificial preparation of the metal. An eighth part of a grain of iron contained in a dose of steel water, having more salutary effects on the constitution, than two or three grains of the oxyd of iron taken in powder: the reason most probably is, the acid of the stomach dissolves but

a small part of ferruginous powder, and the remaining portion passes downwards, without entering the circulation; and thereby turns the alvine evacuations to a dark colour. Whereas, repeated doses of chalybeate waters do not depend upon the fluids of the stomach for solution, and seldom produce the same effects on the contents of the alimentary canal. Hence the oxyd of iron, during its solution in the stomach, is often accompanied with eructations of foetid vapour, and by remaining in an undissolved state is apt to produce nausea, sickness, load and pain at the stomach, and sometimes purgings; which seldom arise from a moderate use of the springs*.

From these general effects of chalybeate waters it is evident, that they will prove most useful in chronic diseases (those of long standing, without immediate danger), and will require cautious application in acute and inflammatory ones; it therefore becomes necessary to discriminate a few of the leading

* Neither Tunbridge nor Cheltenham chalybeate waters discolour the intestinal evacuations, according to observations and inquiries I made last May respecting both these waters.

classes of diseases, in which they may be used.

Steel waters are INDICATED in chronic diseases, accompanied with debility, and unattended with feverish symptoms. Two species, which are at first partial ones, require them more than all others.

IN DEBILITY OF THE DIGESTIVE ORGANS, attended with the usual symptoms of loss of appetite, flatulencies, distension of the bowels, acidity, and vomiting; or in dyspeptic symptoms, accompanied with diseased mind, called hypochondriasis; or in a debilitated state of the stomach and alimentary canal, from hard study, or debauch, the steel waters will prove decidedly useful; especially, if an aperient medicine, such as the waters of the saline well, or an aloetic pill, be interposed once or twice a week, to keep the body solutive during the time of drinking the chalybeate.

IN DEBILITY OF THE UTERINE VESSELS, producing obstructions, weaknesses, or sterility in females, the steel water proves ex-

tremely beneficial. It is sometimes employed in preternatural evacuations of the uterus, to give strength to the extremities of the debilitated vessels. Steel waters are useful in cases of chlorosis, especially if they be accompanied with stimulating remedies, and horse exercise.

Cases of general debility are very numerous, but they require discrimination; for almost every disease either originates from, or is attended with, debility of the body.

In CONVALESCENT STATES of the body, where patients are recovering from fevers, bilious attacks, or other diseases, where no visceral obstructions remain, steel waters will restore the tone of the system, and prevent relapses. They are therefore used in cases of decayed constitution, from warm climate or free living. In habitual fluxes, brought from the Tropics, they will strengthen the intestinal fibres, and prove gently restraining*.

* Dr. Cheston, of Gloucester, related to me a case of habitual constipation, cured by the strengthening effects of the steel water of Cheltenham on the bowels.

IN NERVOUS DISEASES, from relaxation or delicacy of habit, such as hysterical disorders, palpitations, terrors, imaginary sensations, irregularity and depression of spirits; or those of the paralytic kind, connected with the state of the brain, such as tremors and palsied limbs, steel water will prove efficacious.

IN SPASMODIC DISEASES, from preternatural irritability of the nervous system, such as convulsions, St. Vitus's dance, and epilepsy, a course of chalybeate water will often prove beneficial.

IN CHRONIC INFLAMMATIONS of the EYES and EYELIDS, either scrophulous or otherwise, steel water will be useful, both as an internal tonic, and as a cooling restraining wash, externally applied.

This water may be drank, in most cases, on the intermediate days, or even on the same day that the saline waters of the other wells are used, provided the disease requires a bracing remedy.

Steel water is CONTRA-INDICATED in a great number of diseases, particularly in some of those which receive most benefit from the purging waters of the other wells.

IN INFLAMMATORY DISEASES, where the action of the sanguiferous system is increased, as in fevers, hectic states of the body, paroxysms of acute rheumatism, and gout, this water is not a safe remedy.

IN VISCERAL OBSTRUCTIONS, especially of the liver and spleen, it is a hazardous remedy. It might restore the tone of the stomach, but it would increase the organic obstruction, by its stimulus and astringency.

IN DETERMINATIONS OF BLOOD to the head or lungs, it should be prohibited; therefore, in vertigo, constitutional headaches, and tendency to apoplexy; or in inflammatory asthmæ, coughs, and consumption, it would be dangerous to increase the circulation, or to generate blood by steel water.

IN DROPSIES, it might act as a tonic, and

give vigour to the absorbents, but in many cases the quantity of astringent fluid would promote accumulation of water in the cavities.

In CALCULOUS DISEASES, such as gall stones, gravel, and stone in the bladder, the water of this well does not contain a sufficient quantity of carbonic acid, to render it so beneficial as waters which contain more saline matter.

The MODES of ADMINISTERING the steel water require little illustration, being nearly the same as with all other simple chalybeates, which are so generally understood.

The course ought to commence with an aloetic purge, or other aperient medicine, such as a dose of the saline spa, to empty the bowels.

Steel waters are apt of themselves on first using to produce purging, especially when the bowels are loaded with bile; but this effect ceases in a few days. These kind of waters are never intended to evacuate; their most usual and salutary operation upon the secretory system is, to promote the flow of

urine, and, when accompanied with exercise in hot weather, to excite perspiration: which effects arise more from the bulk of fluid and coldness, than from the stimulus of their impregnations upon the habit.

The DOSE of the water of this well has such variable effects on different constitutions, as to require time and experience to determine its proportion.

As it is not a strong chalybeate, its dose of water is well adjusted to the powers of the constitution, and its use safer in doubtful cases than a stronger water, but requires a course of longer duration. Invalids generally drink as copiously as their stomachs and heads will permit without disturbance. But as a very small quantity will frequently produce giddiness, flushing of the face, and headach—or bring on nausea and distension of the stomach, in some patients—it is proper to begin with one of the smallest glasses, containing about a quarter or a third of a pint. This may be taken about eight or nine o'clock in the morning, accompanied with half an hour's gentle exercise in the air, and repeated again about the middle of the day.

In a few days, if the water has agreed with the patient, three of the same glasses may be taken at equal intervals; for it is better to repeat the number of doses, than to increase the quantity at a time.

It is apt to lose its effect by habit; and therefore in a week or two it may be increased to half a pint at a time. I have more than once seen a full wine pint taken at a time without any other effect than eructation of wind; and have myself drank three quarters of a pint of the water three times a day, by way of experiment, without any inconvenience. But I consider two wine pints of it drank at three times, to be sufficient for most constitutions, and for every salutary purpose in any disease.—When it is drank at a distance from the well, the bottle must be well stopped, and the cork made to touch the water by screwing it in. The bottle ought not to be heated by the hand, or put into a warm place.

It has been a practice to dilute those chalybeate waters which affect the head by their loose airs, with common pump water; and to warm those, of such a cold temperature as to disagree with weak sto-

machs, by placing a corked bottle, containing the chalybeate, in a vessel of warm water*. But the water of this well will not require dilution, nor increase of temperature at any season, otherwise than by warming the glasses at the fire before the water is pumped into them; and will also be attended with no risk of bursting bottles.

The duration of the course for drinking steel water generally extends from twenty to sixty days, and longer when the disease proves obstinate.

COLD BATHING may be used with great advantage in many diseases which require steel waters; that is, in most cases of chronic debility, where no fever or visceral obstruction attends them.

In this country, every degree of heat between 32° and 82° of Farrenheits is called cold; between 82° and 95° tepid; and all above

* Dr. Rutty says, page 317, on Pyrmont waters, that putting a bottle of water fresh from the well and close corked, into hot water, until it becomes milk warm, will not deprive it of its iron, and will fit it for stomachs which cannot bear the water cold.

these, hot baths. But as these numbers relate entirely to the sensations, and different states of the human body, it is always safer to begin with the tepid, and proceed gradually to the cold, bath ; especially when patients are drinking chalybeate waters.

The effects of cold applied to the extended surface of the human body, either in the aërial or fluid form, depend very much upon the prior state of the skin. Heat at 90° produces the sensations of cold, as well as at 60° , according to the temperature that the patient's skin had been accustomed to.

The entire surface of the body, or any part of it, is liable to have its irritability increased by heat of climate or clothing.

The instances of warm climates producing *general* irritability are remarkable in the inhabitants of tropical climates being little able to bear even the cold of our summers ; and in warm chambers inducing tenderness, and susceptibility of the constitution to colds. Mankind are always healthiest when the weather permits them to take exercise in

the fresh air, and subject to the greatest number of diseases when the seasons confine them to the house.

A remarkable instance of *partial* irritability from clothing, is observable in the greater tenderness of the feet than of the hands and face ; which latter are more vascular and nervous than the former. The lower classes of people in the Highlands of Scotland, and north of Ireland, can endure the continued application of rain, frost, or snow to their naked feet, without injury, while their southern neighbours are liable to catarrhs, and bowel complaints, from the slightest cold, or humidity communicated to their feet, through a thin pair of shoes,

To destroy the irritability of the skin, living in a free circulation of cold air is of the utmost importance, especially in the early part of life ; but the attempt to harden the constitution late in life by the stimulus of the atmosphere, when its powers are little adequate either to resist or remove diseases, is always a dangerous practice,

The cold bath is also of great consequence to lessen the irritability of the skin, as well as to contribute, with chalybeates and other remedies, to cure diseases.

The general operation of cold upon an animal body is, to constrict the vessels of the surface—to excite the action of the heart and arteries—and to promote an appetite*.

When applied in the manner of a cold bath, the quick transition of temperature, gives such a stimulus to the heart and arteries, that their reaction removes the constriction of the skin occasioned by the cold, and produces a glow of heat and gentle perspiration over the surface of the body. These are considered to be the criterions of the salutary operation of the cold bath; and when it is accompanied with these effects, it proves useful to rouse the general system to vigorous action, in cases of languid circulation or nervous diseases; and to

* The consideration of the animal body, as an original source of heat, and the effects of its rapid or slow transmission to an external medium upon the vital organs and sensations, are not required for the practical purposes of this treatise.

increase the tone of the capillary vessels of the skin.

But when the constriction of the skin from cold continues permanent, by want of vigorous action of the blood vessels, the bath produces the same effects as fatigue, want of food, or exhausting evacuations would do, in weakening the body and subjecting it to various diseases. Therefore, when the symptoms of coldness, shivering, headach, languor, want of appetite, and low spirits, continue to succeed the use of the cold bath, it ought not to be persevered in.

The **SHOWER BATH** of cold water, is less alarming to nervous patients, and less liable to produce cramps, than cold immersion; and it will be attended with nearly the same effects in bracing the body.

When we consider that the human machine commences nearly in a fluid state, and grows gradually more and more indurated by the actions of life, until the organs are no longer able to perform their functions

from rigidity, we are able to account for the use of the different baths, and for the nature of the diseases which occur in the succeeding periods of life.

During the first twenty years of human existence, the soft stamina, in a state of preparation, are subject to diseases of debility, and receive greatest benefit from tonic remedies, and the hardening powers of cold water.—In the next twenty years, the solids of the machine, in their most perfect and vigorous state, render the body liable to fevers and inflammatory diseases, which receive greatest benefit from the mild effects of the tepid bath.—In the last twenty years of human duration, the rigid materials in a state of decay, subject the body to diseases of debility and ill-performed actions, and therefore receive the greatest advantage from the heating and relaxing properties of the hot bath.

THE END.

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During the first twenty years of human existence, the soft stroma, in a state of preparation, is subject to diseases of debility, and receive greatest benefit from tonic remedies, and the hardening powers of cold water.—In the next twenty years,

ERRATA.

Page 24, line 13, for the *fourth* of a grain read an *eighth*.

Page 61, line 13, for *two* grains read *one* grain.

