EXPERIMENTS AND OBSERVATIONS ON THE MINERAL WATERS OF PHILADELPHIA, ABINGTON, AND BRISTOL,

In the PROVINCE of PENNSYLVANIA.

Read June 18, 1773, before the AMERICAN PHILOSOPHICAL SOCIETY, held at PHILADELPHIA.

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Quæ presenti opusculo desunt, suppleat ætas. Fructum Studiorum viridem, & adhuc dulcem promi decet; dum et venia et spes est, & paratus favor, & audere non dedecet.
QUINTILIAN.

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TO THE HONOURABLE

RICHARD PENN, ESQUIRE,

LIEUTENANT GOVERNOR

AND

COMMANDER IN CHIEF,

OF THE PROVINCE OF PENNSYLVANIA,

AND OF THE COUNTIES OF

NEW-CASTLE, KENT AND SUSSEX, ON DELAWARE,

AND PATRON OF THE

AMERICAN PHILOSOPHICAL SOCIETY,

THE FOLLOWING

EXPERIMENTS AND OBSERVATIONS,

AS A SMALL TRIBUTE TO HIS

PUBLIC AND PRIVATE VIRTUES,

ARE INSCRIBED

BY HIS MOST OBEDIENT

AND HUMBLE SERVANT,

B. RUSH

EXPERIMENTS AND OBSERVATIONS ON THE MINERAL WATERS, &c.

THE different ſtages of ſociety, like the different ages of the human body, have their peculiar diſeaſes. In the infancy of all ſocieties, diſeaſes are ſimple and few in number, but in proportion as they advance in arts and opulence, which always bring along with them the refinements of luxury, diſeaſes multiply, and are complicated in ſuch a manner, as to require more powerful aids than the ſimple preparations of plants and metals. Theſe aids have been ſought for from a variety of ſources, but from none oftener than mineral waters. Theſe waters, which have flowed for many years unnoticed by our anceſtors, have, of late, attracted the attention of the public, and have now become a very important part of the materia medica.

I SHALL confine the following experiments and obſervations entirely to the mineral waters of Philadelphia, Abington

Abington and Briſtol. Theſe, from their quality, are equal, and from their ſituation, juſtly to be preferred to the many mineral waters, of a like nature, which have been diſcovered in every part of this province.

I SHALL *firſt* give the chemical hiſtory of theſe waters, as diſcovered by the effects of heat and mixture.

Secondly, I ſhall mention, in as conciſe a manner as poſſible, a few of thoſe diſeaſes in which they are uſeful: And—

Thirdly, Subjoin directions how to uſe them.

CHAP. I.

OF THE PHILADELPHIA MINERAL WATER.

THIS water is found in a well, twenty-ſix feet deep, in Sixth-ſtreet, near the corner of Cheſnut-ſtreet, on a lot of ground belonging to JOHN LAWRENCE, Eſq; The water, when it firſt comes from the pump, has a ſlight fætid ſmell, is ſomewhat turbid, and after ſtanding a few hours expoſed to the air, depoſits a yellow ſediment. The ſmell of the water is encreaſed by reſt.

IT has a ſtrong ferruginous taſte. Its ſpecific gravity compared with rain water is, as 1000,45 to 1000.

OF THE ABINGTON WATER.

THIS water is found about twelve miles to the north of Philadelphia, on a plantation belonging to Mr. WILLIAM FRENCH. The ſpring flows near the bottom of a hill that deſcends with a gentle declivity. The ſoil around the ſpring is a yellow rediſh clay, with a ſmall mixture of ſand. It has a ferruginous taſte, and

by

by expoſure to the air becomes turbid, and depoſits a yellow ſediment. Its ſpecific gravity is to rain water, as 1000,90 to 1000.

Of the Briſtol WATER.

This water is found near the ſurface of the ground, in the neighbourhood of a ſoil abounding with black ſand. It is tranſparent, but depoſits a yellow ſediment after ſtanding a few hours in the open air. When it is put up in bottles, and well corked, it will retain its mineral virtues for many months. It has a ferruginous taſte, which is not diſagreeable. Its ſpecific gravity is exactly the ſame as that of rain water.

These waters are emetic, purgative, and diuretic, according to the conſtitution of the patient, or the quantity taken into the ſtomach. They likewiſe quicken the pulſe, and promote perſpiration.

The following table will ſhow the effects of mixing a variety of ſubſtances with theſe waters. The firſt column contains an account of the ſubſtances which were added; the ſecond, third, and fourth, contain an account of their effects upon the waters.—It will be unneceſſary to mention the proportions of each, as the event of the experiments was nearly the ſame, with very different proportions.

Experiment I.	Philadelphia Water.	Abington Water.	Briſtol Water.
Tincture of galls.	A deep purple color.	A dark brown color.	A deep purple.
II. Syrup of violets.	A green color.	Ditto.	Ditto.

Experiment

Experiment III.	Philadelphia Water.	Abington Water.	Briſtol Water.
Soap and water.	No coagulum but a lather.	Ditto.	Ditto.
IV. Skimmed and boiled milk.	No coagulum.	Ditto.	Ditto.
V. Tincture of rhubarb.	Yellow, inclining to an olive color.	Ditto.	
VI. Vitriolic acid.	No change at firſt, afterwards tranſparent.	Ditto.	No change.
VII. Nitrous acid.	The ſame as the vitriolic acid.	Ditto.	No change.
VIII. Marine acid.		More tranſparent.	No change.
IX. Spirit of wine.	No change.	Ditto.	Ditto.
X. Spirit of hartſhorn.	No effervescence, or turbidneſs, but a light green color.	Ditto.	Ditto.
XI. Spirit of ſal ammoniac.		No change.	Ditto.

Experiment

Experiment	Philadelphia Water.	Abington Water.	Briſtol Water.
XII. Solution of vegetable alkali.	Green color and ſmall turbidneſs,	Ditto, without a turbidneſs.	Ditto.
XIII. Cauſtic alkali.	No change.	Ditto.	Ditto.
XIV. Lime water.	A turbid, dark green color.	Ditto, with a precipitation.	A light green color.
XV. Solution of ſugar of lead.	* Great turbidneſs, became milky, and after ſtanding ſometime depoſited a white precipitate.	Ditto.	Ditto, tho' in a leſs degree.
XVI. Solution of lead in the nitrous acid	Turbid and white.		
XVII. Solution of ſilver in nitrous acid.	Cloudy, afterwards purple with a precipitate.	Ditto.	Ditto.
XVIII. Solution of blue vitriol.		No change.	Ditto.

Experiment	Philadelphia Water.	Abington Water.	Briſtol Water.
XIX. Solution of corroſive ſublimate.		No change.	Ditto.
XX. Solution of allum.	More tranſparent. After ſtanding for ſome time a blue cloud floated on the ſurf ace.	Ditto.	No change.
XXI. Fixed air from chalk, by vitrolic acid.	Rendered it (after it had ſtood for ſome time and become turbid) clear and tranſparent.		

All theſe mineral waters depoſit a ſediment when they are boiled.

Let us next enquire into the nature of the ſubſtances contained in each of them.

One quart of the Philadelphia water yielded, by evaporation, four grains of ſolid matter, three of which appeared to be an iron ochre, and one an earthy ſalt, which dilaqueſced upon being expoſed to the air; upon adding to this ſalt a pure vegetable alkali, a white powder was precipitated, which had all the properties of magneſia alba; the ſalt which remained ſhowed all the uſual marks of digeſtive ſalt. The ſaline matter found in this water, appears

appears then to be a ſpecies of ſal ammoniacum fixum, with this difference from the ordinary ſalt of that name, that the earth which is united with the marine acid, is a magneſia, and not quick-lime.*

ONE quart of the Abington Water yielded two grains of iron ochre, without any ſenſible mixture of earthy or ſaline matter; upon evaporating three quarts of this water, half a grain of ſalt was diſcovered, mixed with ſix grains of the iron; this ſalt, upon examination, appeared to be common ſalt.

ONE quart of the Briſtol Water yielded, by evaporation, two grains of ſolid matter, one of which was iron, the other had all the properties of common ſalt.

OBSERVATIONS.

FOR a long time iron was thought to be ſoluble in water, only by the intervention of an acid. Dr. STAHL taught us, ſome years ago, that it was ſoluble by means of an alkali; and Mr. LANE has proved by a number of experiments, publiſhed in one of the late volumes of the philoſophical tranſactions, that iron is ſoluble in water, by the intervention of fixed air; † but that

* *See an account of this earthy ſalt in* Dr. LEWIS's *Philoſophical Commerce of Arts.* Page 640.

† Dr. STAHL's *method of diſſolving iron in an alkali is, by adding a ſolution of a vegetable alkali, to a ſolution of iron in the nitrous acid. May not the fixed air contained in the alkali, and which is diſcharged from it by its uniting with the nitrous acid, be the medium of the iron's ſolution rather than the alkali?*

iron is ſoluble in ſimple water, without the aid of any of theſe matters, is a modern diſcovery in chemiſtry. When we examine our experiments properly, we ſhall find that the iron is diſſolved chiefly in this manner, in the waters of Philadelphia, Abington and Briſtol.

THE green color produced by the ſyrup of violets, in Experiments II, is no proof of the preſence of an alkali in theſe waters; for we find the ſame color from adding it to a ſolution of Epſom ſalt, or to a ſmall quantity of the Æthiops martialis of Lemery; we find it produced, likewiſe, from a cold infuſion of iron filings in water—This infuſion ſtrikes a purple brown color, with an infuſion of galls.

THE lather, in Experiments III, from mixing theſe waters with a ſolution of ſoap, is a proof of their freedom from a large quantity of ſaline and calcarious matters. It is the preſence of theſe ſubſtances, in all waters, which renders them hard; another proof of the ſoftneſs of theſe waters is, their boiling peas.

THE waters becoming tranſparent, upon the addition of the vitriolic acid, as in Experiments VI, is owing to the vitriolic acid's attracting and diſſolving the iron contained in the waters; no change was produced in the appearance of the Briſtol Water, upon the account of its natural tranſparency.

THERE being no effervescence from mixing theſe waters with the volatile or fixed alkalies, as in Experiments XI, XII, and XIII, is a proof of their containing no acid.

THE

THE turbidneſs, &c. from the addition of lime-water, in Experiment XIV, was probably owing to the lime's attracting ſome fixed air from the mineral waters, which we ſhall ſee hereafter exiſts, in a ſmall quantity, in theſe waters, particularly in that of Philadelphia.

THE milky appearance and turbidneſs, in Experiments XV, were owing to a decompoſition. The vegetable acid of the ſugar of lead attracted the iron, and depoſited the lead with which it was before combined.

THE turbidneſs, in Experiment XVI, was owing to the nitrous acid attracting the iron and letting go the lead, which was before diſſolved in it.

THE cloud and precipitation, in Experiments XVII, was likewiſe owing to the nitrous acids attracting the iron, with a force greater than it did the ſilver, with which it was formerly united.

THE effect of the ſolution of allum, in Experiments XX, was owing to the vitriolic acid of the allum (not being fully ſaturated with clay) attracting and diſſolving the iron contained in the waters.

THE proportion of iron found in a given quantity of theſe, and all chalybeate waters differs: *Firſt*, According to the ſeaſon of the year; being greateſt in cold and dry weather.

Secondly, According to the time in which they are drawn from the ſpring: And—

Thirdly, According to the degree of calcination the iron has undergone: The more compleatly its principle of inflammability is ſeparated, the more freely it diſſolves in water.

THE

THE Philadelphia water, probably, owes its greater proportion of iron, to the preſence of a ſmall quantity of fixed air; that this is the caſe we learn from Experiment XXI. Upon weighing half a pint of the water, likewiſe, twelve hours after it was drawn from the well, it was found to have loſt four grains of its weight. Mr. JAMES HUTCHINSON, Apothecary to the Pennſylvania Hoſpital, and Student of Medicine in the College of Philadelphia, found the proportion of fixed air to be much greater than this, upon expoſing the water to the heat of boiling water. The proportion in this and in the other waters is, however, too ſmall, compared with thoſe chalybeate waters, where the iron is diſſolved by fixed air, to ſuppoſe that it is the medium of the iron's ſolution in them.

TO what is the peculiar odor of the Philadelphia water owing? It has been aſcribed to ſulphur; but there are few direct proofs of ſulphur being diſſolved in a ſimple ſtate in water. *

I HAVE

* *To know whether ſulphur was ſoluble in water by means of fixed air, or the principle of inflammability, I tried the following experiments. I added eight ounces of water to half an ounce of ſulphur, and blowed into it for ſome time. I likewiſe conveyed, into the ſame quantity of ſulphur and water, ſome fixed air from an effervеſcing mixture of chalk and the vitriolic acid, by means of the bended tube, deſcribed by* Dr. MACBRIDE. *After this, I conveyed in the ſame manner, into the ſame quantity of ſulphur and water, a quantity of the principle of inflammability, from a mixture of iron filings and nitrous acid. Upon examining the water chemically, after each of theſe experiments, it did not afford a ſingle mark of ſulphur.*

I HAVE examined ſome water brought from Caldas da Rainha, in Portugal, which ſmelt ſtrongly of ſulphur, without being able to detect the leaſt particle of ſulphur in it. It is no uncommon thing in chemiſtry, to find an exact reſemblance in the odors of bodies, which differ widely from each other in their nature and properties. The ſulphureous ſmell, in moſt of mineral waters, is probably owing to the eſcape of the principle of inflammability, or in other words, of that volatile principle, called, by ſome modern writers, inflammable air.

WE ſee then, from the foregoing experiments, that theſe three mineral waters contain iron, diſſolved in them, without the intervention of an acid, an alkali, or of fixed air.

THEY, no doubt, contain a greater quantity of elaſtic air than common water. To this we may aſcribe their briſkneſs and exhilirating effects on the ſpirits.

IT is the gradual ſeparation of this air, which cauſes the ſpontaneous turbidneſs and precipitation in theſe waters, after they have ſtood uncovered for ſome time. We obſerve the ſame phœnomena in all impure waters, after they have been expoſed to the air, eſpecially in a warm place. I would not be underſtood to mean, from what has been ſaid here, that iron is not, ſometimes, found diſſolved in water, by means of the vitriolic acid. The waters of Shadwell and Weſtwood, in England, and of Hartfell, in Scotland, are of a vitriolic nature, and yield a true ſal martis, upon evaporation. But waters of this kind, are by no means ſo common as ſome have

have ſuppoſed. They are known by changing a piece of blue paper to a red color; and by depoſiting a blue ſediment, by adding to them a ſmall quantity of a fixed alkali, prepared with ox's blood, in the manner directed for the manufactory of Pruſſian blue.

From theſe Experiments we may explain the cauſe of the ruſting of iron when expoſed to the air. It is owing to the water (and not to a vegetable acid) which always floats in the air, acting as a menſtruum upon iron.

CHAP. II.

Of the Diseases *in which theſe mineral waters are proper.*

It is common, among ſome people, to recommend theſe waters indiſcriminately, in all nervous diſeaſes. It has been the fate of theſe diſeaſes, to be known in the different ages of phyſic, by the different names of ſpleen, vapours, hip and the like. At preſent they are collected under the general name of diſeaſes of the nerves. When we conſider how much theſe diſeaſes are connected with thoſe which belong to the other parts of the human body: When we conſider too, how much they are diverſified by their cauſes; by the age, and the ſex of the patient; and chiefly by the two oppoſite ſtates, of relaxation and tenſion of the nervous ſyſtem, perhaps it will appear, that ignorance never found a more ample ſanctuary for itſelf, than when it marked down all thoſe diſeaſes which are various in their ſymptoms, and difficult of inveſtigation, under the name of nervous. It would require a volume to diſtinguiſh and arrange theſe diſeaſes properly.

properly. I ſhall only mention the names and characteriſtic marks of a few of them.

THESE waters are proper in the hyſteria. This diſorder ſhows itſelf in a thouſand ſhapes. It is known by attacking the female more than the male ſex; eſpecially ſuch as are of a delicate and weak habit; by being accompanied with flatulences, contractions of the muſcles of the belly, and a ſenſe of ſomething reſembling a ball riſing in the throat. It prevails moſt in warm climates and ſeaſons; and, laſtly, it is always ſubject to exacerbations from any cauſe that ſuddenly affects or diſturbs the mind.

THEY are proper in the palſy, whether of part or of the whole body, where the pulſe is not full, and where the ſymptoms of a plethora are wanting. It is always a ſtrong preſumption of the propriety of uſing theſe waters, where the diſeaſe has continued a long time, without any remarkable change in the ſymptoms.

IN the epilepſy, when it ariſes from an affection of the ſtomach, or the womb, or from a general weak habit of body, theſe waters are proper.

THEY may be drank with advantage in a certain ſtage of the gout, particularly when it comes on in the decline of life. The conſtitution then exhibits various marks of great debility. The gouty affection in conſequence of this, inſtead of appearing in the feet, ſhows itſelf in a weakneſs, nauſea, and acidity of the ſtomach.

ſtomach. Theſe ſymptoms are generally accompanied with coſtiveneſs and flatulency of the bowels.

They are uſeful in an old obſtinate diarrhœa, or habitual purgings, when not accompanied with a griping, or a diſcharge of blood mixed with the ſtools. Sailors returning from long voyages, or from warm climates, are moſt ſubject to this diſorder.

They afford the moſt certain relief in all caſes of a want of appetite, when it originates from a defect in the ſtomach. The appetite may be deſtroyed, by cauſes which operate, directly or indirectly, upon the ſtomach. Thoſe which operate directly, are tea, ſpirituous liquors, and bitters, taken in an immoderate quantity, or at improper times; too full meals; ſtrong vomits; and warm drinks of all kinds: The cauſes which operate indirectly on the ſtomach, are, all ſedative paſſions of the mind; ſuch as, grief, fear, love, &c. together, with whatever weakens or diſorders the other parts of the ſyſtem.

We ſhall, hereafter, point out what kind of diet ſhould be joined with the mineral waters in this diſorder.

They are proper in all thoſe colics which ariſe from mere weakneſs of the bowels; and particularly in that ſpecies which is accompanied with an overflowing of the bile; a diſeaſe this, to which the inhabitants of warm climates are moſt ſubject.

BESIDES theſe diſeaſes, in which the nervous ſyſtem is chiefly affected, theſe mineral waters are uſeful in all obſtructions of the liver and ſpleen; whether they are brought on by indolence, intemperance, or intermitting fevers, and whether they ſhow themſelves in a mere ſwelling, and hardneſs, or a jaundice, a cough, or a dropſy. In the dropſy they ſhould be given, only while they continue to operate by urine or ſtool; for this purpoſe they ſhould be drank (not in the uſual manner) but in large quantities.

THEY are proper in all caſes of the chronic rheumatiſm. They will be the more efficacious in this diſorder, if the fleſh-bruſh be uſed at the ſame time.

THEY are very uſeful in the piles, eſpecially when they occur in that ſtage of life, in which the arterial plethora yields to the venous. This ſeldom happens till the thirty-fifth or thirty-ſixth year of life.

IN all female obſtructions, and weakneſſes, which are accompanied with a general languor and debility of the whole ſyſtem, theſe waters afford conſiderable relief.

I HAVE heard of one or two caſes, in which they have relieved children afflicted with worms. Here they act like bark, rhubarb, aloes, and bitters of all kinds, *indirectly* upon the worms, by giving a proper tone to the bowels. Among the many ſubſtances which deſtroy them *directly*, there are few more powerful than ſugar, honey, ſalt, and ripe ſummer fruits. All children ſhow a fondneſs for theſe things. The appetites in this early period of life, are not corrupted by habit or vitiated by

diſeaſe; and may therefore be liſtened to, as the voice of nature. Theſe ſubſtances ſhould be given upon an empty ſtomach, and the patient ſhould not eat any thing for an hour afterwards.

THEY are proper in all cutaneous diſeaſes and foul ulcers of long ſtanding, whether they be of a ſcorbutic or ſcrophulous nature. The parts affected ſhould be waſhed with the mineral water twice a day.

THEY are uſeful in diſeaſes of the kidneys and bladder, when a difficulty or obſtruction, in making water, ariſes from relaxation, or ſmall calculi in theſe organs. They are juſtly to be preferred to common ſpring or pump water, which is ſeldom ſo pure, as not to contain ſome calcarious matters, which are ſaid to increaſe theſe complaints. *

THEY have been uſed, with ſucceſs, in obſtinate gleets, after the moſt powerful aſtringent medicines have been uſed to no purpoſe.

LET us next enquire, in what diſeaſes theſe waters are hurtful.

IN the hypochondriac diſorder the chalybeate waters are a doubtful remedy. Although this diſorder is ſometimes joined with the hyſteria, yet it is diſtinct from it in its nature, and requires a very different treatment.

* PERCIVAL'S *Experiments and Obſervations on Water.* Page 14.

ment. It is known by its attacking the male more than the female ſex; by its prevailing moſt in cold ſeaſons and climates; and by its being accompanied with acidity, flatulency, coſtiveneſs, or a diarrhœa; an intire want of, or an inordinate appetite; pain in the ſtomach and breaſt, after eating; a vomiting; an unuſual diſcharge of ſpittle from the mouth; colic, &c. In this diſorder, all preparations of iron have been found hurtful; and although the quantity diſcovered in theſe waters be very ſmall, yet I have heard ſeveral patients, who laboured under the above ſymptoms, complain of being worſe after drinking them. It is a little extraordinary, that a draught of warm water, will ſometimes, create an appetite in this diſorder, after bitter and aromatic medicines have been adminiſtred to no purpoſe.

The chalybeate waters have been ſometimes recommended in the phthiſis pulmonalis, or conſumption of the lungs. It is difficult, perhaps impoſſible, to tell, in all caſes, when a conſumption ariſes from a primary affection of the lungs. A diſcharge of pus, is not always a ſign of an ulcer in theſe organs. There may be a cough, which is ſymptomatic, and brought on by a primary diſorder of the liver. There may be a diſcharge of pus from the lungs, owing to their being ſo relaxed, as to pour forth thoſe parts of the blood, from which, pus, under certain circumſtances, is formed. In theſe caſes, the chalybeate waters may perform a cure; but I doubt much, whether they ever cured or relieved a true conſumption; whether brought on by an abceſs, tubercles, or ulcers. In every ſtate of the human body, when the inflammatory diatheſis prevails, theſe waters

are

are improper. That it prevails in the conſumption, we infer from the hard pulſe, and ſizy appearance of the blood.

These waters, we ſaid, are improper in all diſeaſes where an inflammatory diatheſis prevails.

They are hurtful therefore in moſt caſes of hemorrhages, or preternatural diſcharges of blood from the body. Hemorrhages are either active or paſſive: The former happen before, the latter after, the thirty-fifth or thirty-ſixth year of life. It is in the former, in which the inflammatory diatheſis chiefly prevails. They are known by an increaſe of the tone and action of the arterial ſyſtem, and by all the common ſymptoms of a plethora.

These waters are likewiſe hurtful, for the ſame reaſon, in the acute rheumatiſm, and gout. This latter diſeaſe reſembles the former a good deal, in its ſeat, ſymptoms, and method of cure, when it attacks in the early part of life. It appears at the uſual ſeaſons of inflammatory diſorders, and is accompanied with a conſiderable degree of the inflammatory diatheſis. It is now called the *tonic* gout, to diſtinguiſh it from that, which comes on in the decline of life, and which, from the irregularity in its ſeat, times of acceſſion, and ſymptoms, is called the *anomalous*, or *atonic* gout. Theſe names are ſufficient to ſhew, that we do not look for the immediate cauſe of the gout in a tartar, chalk, gluten, or in acrid matters of any kind; but, that we preſume it to be ſeated primarily, in the moving ſolids. It would be

be eaſy to multiply proofs of this, drawn, both from the hiſtory of the gout,* and the eſtabliſhed laws of the nervous ſyſtem. The methods of treating the tonic and atonic gout, ſhould be very different, and it is through a want of attention to theſe, that ſo many ſeeming contradictions are to be found in all the writers upon this ſubject. In the former, a low diet, conſiſting, chiefly, of milk and vegetables; an entire abſtinence from ſpirituous

* *There is nothing which has ſtrengthened the belief of the gout's being occaſioned by matter, more than the opinion of its being hereditary. It ſeldom appears in thoſe who are deſcended from gouty parents, till the twentieth or twenty-fifth year of life: Where could a matter of any kind be lodged, during this time, without ſhowing itſelf? Why do not the changes which the conſtitution undergoes in this time, evolve it? Where do we find the leaſt reſemblance of this, in theſe diſeaſes, which we are ſure depend upon morbid matter? The gout appears to be upon a footing with the conſumption and madneſs, which ſeldom appear in perſons deſcended from conſumptive or maniacal parents, till the body arrives at its maturity. Theſe, no one will pretend to ſay, are occaſioned by morbific matter. A ſlight catarh, whether from cold or contagion, will bring on a conſumption; a trifling agitation of the mind,—madneſs; and ſmall deviations from temperance will bring on the gout in theſe people,* only *becauſe the body is prediſpoſed to them. This prediſpoſition is derived from the original ſtamina, and depends upon a peculiar form and organization of the ſolids. It is obvious to the ſenſes in perſons deſcended from conſumptive parents.*

ous liquors, with moderate exercise, insure a certain cure. This assertion I know will be controverted by many, who believe from tradition, that the gout is always incurable. The only circumstances which can afford us proofs, are a good deal unfavourable to it; for where shall we find an instance, of a young man, with an affluent fortune, in the career of pleasure, who will give up, what he calls, "his friend and his bottle," merely, to avoid one or two fits of the gout in a year, much less, to lay up a stock of health and spirits for old age. But, let us pursue nature in her private walks. Have we not seen people, who were afflicted with the gout in the early part of life, reduced in their circumstances, and by involuntary temperance and labour, afterwards, perfectly cured of it? Instances of this kind, which are to be found in all countries, prove, that the gout is as truly a curable disease, as the rheumatism or the intermitting fever. In the atonic gout, which comes on in the decline of life, and which shews itself in the kidnies, bowels, stomach, lungs, &c. the springs of life are too much worn, to be repaired by a low diet or exercise. The patient here must take wine and solid food in a moderate quantity, in order to keep the disorder in the extremities. It is no more a reproach to our art, to say, that we cannot cure this stage of the gout, than that, we cannot render man immortal. It would be less absurd, to believe all the delusions of Alchemy, than, to expect a medicine to cure the gout in either of its stages, from the animal, vegetable, or mineral kingdoms.

CHAP.

CHAP. III.

Of the manner of USING *theſe mineral waters.*

THE quantity to be drank daily, of theſe waters, muſt be determined by the conſtitution and diſeaſe of the patient. Too large a draught at firſt, has ſometimes produced very diſagreeable effects, which have diſcouraged patients from giving them a fair trial. They ſhould be guarded againſt this, and in ſome caſes, where the uſe of them is clearly indicated, they ſhould be encouraged to look upon their harſh operation at firſt, as a preſage of their doing much good. The beſt method for people of delicate habits, is to begin with a gill or half a pint, and encreaſe it gradually to five or ſix half-pints in a day. Formerly, the chalybeate waters were drank in a much larger quantity; but experience has taught us, that three pints, or two quarts at moſt, in a day, are ſufficient to produce all the ſalutary effects, we have reaſon to expect from them. The patient has always drank too much, if he becomes very feveriſh, and perceives an uneaſy ſenſe of heat in his breaſt, immediately after taking the water. He ſhould drink them, if poſſible, at the fountain head; as their virtue is much impared, by being deprived of their air. The beſt time for drinking them, is early in the morning, at noon, and in the evening, upon an empty ſtomach. The patient ſhould always walk or ride, or uſe ſome other gentle exerciſe, immediately after drinking them. When we want to promote perſpiration, they ſhould be drank juſt before the patient goes to bed.

In ſome diſeaſes which require theſe waters, the ſtomach is oftentimes ſo weak, as to reject them, even in the ſmalleſt quantity. When this is the caſe, the waters ſhould be mixed with a little cinnamon or mint water, or the ſtomach ſhould be prepared for them, by ſome grateful aromatic tincture. I have heard of a lady, who could retain the waters upon her ſtomach only when ſhe drank them in bed, and remained there an hour or two afterwards. They relieved her of the complaint for which ſhe drank them.

If the waters ſhould not keep the bowels gently open, the patient ſhould make uſe of ſuch laxative medicines as will beſt ſuit his diſorder.

They may be drank for ſeveral months, in any ſeaſon of the year, eſpecially in the ſpring, ſummer, and autumn. It is a good practice to intermit them now and then, for a few days, leaſt they ſhould loſe their efficacy, by habit.

It would encroach too much upon our plan, to mention the particular diet which the ſeveral diſeaſes, we have mentioned, require. The patient ſhould obſerve the moſt ſtrict regard to the quantity of his food. This caution is the more neceſſary, as the waters, ſometimes, excite an artificial appetite, which it is by no means ſafe fully to gratify. Four or five ſmall meals, are better than one or two in a day, for valetudinarians, upon the account of their being leſs ſtimulating. In all caſes of indigeſtion, acidity, flatulency, &c. in the ſtomach, patients ſhould abſtain from vegetables, and live, as much

as

as poſſible, upon an animal diet. Beef and mutton will be found much eaſier of digeſtion, in theſe caſes, than what are commonly called the white meats.*

THIS diet ſhould not be continued too long. In proportion as the ſtomach recovers its tone, the patient ſhould gradually return to the uſe of vegetables, or to mixed aliment. What Dr. CADOGAN ſays of milk, we may ſay of vegetables that it is, generally, a ſign the ſtomach requires them, when it cannot bear them.

IN all cutaneous and ſcorbutic diſeaſes, foul ulcers, &c. the patient ſhould live entirely upon vegetables, provided he is not very old, or of a very weak habit.

THERE can be no other objection, to patients drinking theſe chalybeate waters with all their meals, than the danger of their loſing their efficacy, by too conſtant uſe. The ingenious female author of "l'Hiſtoire, de la Putréfaction," has proved, by experiment, that they haſten the diſſolution and putrefaction of aliment.

IT is a common queſtion, for patients to aſk their phyſicians, which of the three mineral waters we have de-

 ſcribed,

* *En effet, plus un animal eſt jeune, plus il tient du végétal, & moins il tend par conſequent à la corruption. A meſure qu'il vieillit, il perd de cette qualité, parce que tout tend dans la nature à l'alkaleſcence. Il devient donc plus ſuſceptible de putréfaction.*
Eſſai pour ſervir a l'hiſtoire de la putréfaction. Page 25.

ſcribed, is the beſt. The ſubſtances, contained in each of them, being nearly the ſame, in proportion and quality, the difference in their ſtrength may be rendered equal, by the quantity drank, or by mixing them with common water. That water will do moſt ſervice, where the patient can enjoy the benefit of exerciſe, proper diet, a pure air, agreeable company, and an entire relaxation from buſineſs, to the greateſt advantage. Abington and Briſtol, therefore, will always have the preference for the chief of theſe articles, to Philadelphia. Briſtol, for theſe ſeveral years paſt, has been in great repute. I am furniſhed with a number of well authenticated caſes, drawn up by Dr. DENORMANDIE, an able phyſician at Briſtol, in which the water of this place, joined with a proper regimen, in diet and exerciſe, has performed ſome very remarkable cures. The following juſt account of the village, bath, &c. of Briſtol, was written by the above gentleman.

" The public being thus informed of the real qualities and contents of theſe waters, founded on experiments; it may not be amiſs, to add a deſcription of the ſprings, and the conveniences with which the ſick may be furniſhed, during their reſort to the Bath. The waters are diſtant half a mile from the borough of Briſtol, which lies on the ſhore of the river Delaware, oppoſite to Burlington, and about twenty miles from Philadelphia; the houſes, about fifty in number, are ſituated on a high, and dry ſandy bank of the ſame river, whoſe ſhore is bold and gravelly, which renders the borough remarkably healthy, notwithſtanding the contrary has been reported, and thence become almoſt a popu-

lar

lar error; good lodgings, and other accommodations, may be had at a reaſonable rate; the poſt thrice in every week, and a ſtage-waggon every day, Sundays excepted, during the ſummer ſeaſon, paſs through the village, which daily preſent, to the ſick, an opportunity of correſponding with their friends throughout the continent. The roads for ten miles diſtance, leading either to Philadelphia, or New-York, are the beſt in the province, which, with a road, leading along the banks of Niſhaminy, afford moſt agreeable opportunities of riding, either in carriages or on horſeback, to ſuch of the ſick as may be directed to uſe thoſe kinds of exerciſe. The inhabitants of the borough are conſtantly ſupplied, with all kinds of butchers meat, poultry, and vegetables.

"THE Baths, for the time, are ſo improved, as to render them convenient and uſeful. A room forty-four feet long, is compleatly finiſhed, between the pump room and the room for bathing; here, whilſt the baths are preparing, and during the time of drinking the waters, every morning, which generally takes up half or three quarters of an hour, the company amuſe themſelves, in a manner the moſt agreeable, and have an opportunity of walking (an exerciſe, during that time, eſſentially neceſſary) free from every inconvenience, ariſing from an expoſure to the open air.

"TO the northward, and adjoining this long room, is the pump, incloſed in lattice work, and ſo ſituated, that the drinkers are immediately ſupplied with the water through a ſmall door made in the partition, between the long

long room and the pump, by a perſon attending for that purpoſe.

"The Baths are in ſeparate rooms, at the ſouth end of the long room, one for ladies and another for gentlemen, with dreſſing apartments to each of them. They contain four hundred and ſixty gallons each, and are filled in five minutes, by pumps immediately over the principal ſpring, which, by the moſt exact obſervation, are found to yield one hogſhead of water in five minutes. After bathing, the water is let off, and conveyed away by pipes under ground, ſo that every bather may be ſupplied with freſh water, without being delayed but a few minutes."

After all that has been ſaid upon this ſubject, we muſt acknowledge that mineral waters, like moſt of our medicines, are only ſubſtitutes for temperance and exerciſe in chronic diſeaſes. An angel muſt deſcend from heaven, and trouble theſe chalybeate pools, before we can expect any extraordinary effects from their uſe alone. There is a great reſemblance between the fate of medicine and religion. In every age and country, an article of faith, or a mode of worſhip, have uſurped the place of the precepts of morality. Thus, in medicine, we find a variety of remedies, ſuch as mercury, bark, ſteel, woodlice, tar, lime, and, mineral waters of all kinds, pine buds, ginſeng, &c. have been put in the place of temperance and exerciſe. The faſhion of the former paſſes away, but the effects of the latter, like the obligations of morality, endure for ever.

FINIS.