A full and distinct account of the mineral waters of Pyrmont, and Spa ... / Collected from the best authors, and improved by Dr. Turner.

A FULL and DISTINCT

ACCOUNT

OF THE

Mineral Waters

OF

PYRMONT, and SPA.

CONTAINING,

I. The natural Hiſtory of the adjacent Countries, and of the ſeveral medicinal Springs therein.
II. A New Chymical Examination of the Waters, whereby their real Contents and Ingredients are clearly diſcovered.
III. Of their various Virtues and Effects upon Human Bodies, and the Diſeaſes that have hitherto been cured thereby.
IV. The moſt approved Method of uſing them; as to the Seaſon, and the Quantity, according to the Difference of Age, Sex and Conſtitution.
V. Of Bathing with them.
VI. Of the Abuſes and Miſtakes in uſing the Waters, whereby they may prove dangerous and hurtful.

Collected from the beſt AUTHORS,
And improved
By Dr. *TURNER.*

THE SECOND EDITION.

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TO THE

READER.

THE *mineral waters of* Pyrmont *and* Spa *having for many years been greatly esteemed in most countries of* Europe *for their wonderful and surprising efficacy in perfectly curing various diseases incident to mankind, when all other remedies have prov'd ineffectual, and alleviating others, which are in their nature iucurable; and being at present in great use and reputation in this* kingdom, *I am persuaded that a more full and distinct account of their particular Qualities, and of the right method of using them, than has hitherto appeared in* English, *will be very acceptable to the publick; this I was the more inclinable to undertake, having experienced the singular efficacy and vertue of the* Chalibeat *waters in a case of my own, from which, by their means, I was happily recover'd; I therefore think myself particularly obliged to promote, to the utmost of my power, the knowledge of them, and likewise the method which able physicians have by long experience and observation found to be most safe, proper and necessary in using them; and tho' it is not to be supposed that any unreasonable Man will have so little regard to his health, as rashly to enter upon a*

courſe of Chalibeat *waters without the advice and direction of a skilful phyſician, yet as moſt patients are liable to forget the rules and directions that are given them by word of mouth, and as they have not always a phyſician by them, it ſeems very neceſſary to put into their hands ſuch an approved method as is to be ſtrictly obſerved, that they may know how to govern themſelves from the beginning to the end of the courſe; provided nothing extraordinary or unuſual happens during the ſame; and I believe every one will think this the more expedient, that ſeriouſly conſiders that an irregular method of uſing the waters will not only fruſtrate all the hopes and expectations of the patient, and render his trouble and expence ineffectual, but what is worſe, may heighten the diſtemper he already labours under, or bring on others equally or more inſupportable, and as I had ocular demonſtration, upon the ſpot, of the wonderful effects of thoſe waters, I thought it neceſſary to ſpend ſome time both at* Pyrmont *and* Spa, *that by a careful examination of the ingredients of the waters, and of the grounds and foundation upon which the phyſicians of thoſe places build their practice, I might acquire a tolerable knowledge of what I intended to recommend to the world. But on the other hand it muſt be own'd, that in treating of a ſubject of this nature with any perſpicuity, it is not enough for a perſon to have ſufficient abilities to make a philoſophical enquiry into the ſeveral ingredients of the waters, but he muſt likewiſe have had opportunities by long experience and ſucceſsful practice to obſerve and thoroughly underſtand their particular virtues, effects, and manner of operating; but as this is not the work of a few days, and a ſhort ſtay at thoſe places, but of long obſervation and repeated trials; I therefore thought it would be moſt acceptable to all perſons of reaſon and judgment, if I made choice of ſome of the moſt celebrated and approved authors, who by their capacities*

and

and experience bid faireſt to underſtand this ſubject, and to extract from their writings what would be moſt uſeful to the Engliſh *reader, either unacquainted with their language, or not having opportunities to peruſe them; and tho' the waters of* Pyrmont *are eſteemed among the beſt, if not the richeſt of any cold* Chalibeat *waters in* Europe, *and the cures performed by them are as great and remarkable as of any waters whatſoever, yet they are not ſo generally known amongſt us as is to be wiſh'd, there being no perfect account of them publiſhed in our Language; wherefore I had them chiefly in my view, and have made choice of that full and learned deſcription of them given by the ingenious Dr.* SEIPPIUS, *firſt phyſician and counſellor to the prince of* Waldeck, *a gentleman of* great learning, long experience, *and* fine taſte, *who has conſtantly reſided and practiſed at theſe wells above twenty years, and with great induſtry and pains has acquired ſo thorough a knowledge of this ſubject, that he ſeems to have left little to the further enquiry of others, and is ſo courteous and obliging to ſtrangers, that he readily communicates his knowledge to ſuch as are capable of profiting thereby. As the learned author differs in many circumſtances from others who have wrote on the ſame ſubject, I believe the curious will not think their labour loſt in obſerving what he has ſaid. I have extracted from his Book what I thought neceſſary both with reſpect to the natural hiſtory of the valley of* Pyrmont, *where the wells are, and alſo the chymical analyſis of the waters themſelves, in which he is very curious and full, and his method and rules to be obſerved both in drinking and bathing are ſo very reaſonable, that I have omitted nothing material that may be uſeful to the patient. In his book, which is writ in the* German language, *things are handled at a great length, and there are ſeveral learned and curious digreſſions, which I have omitted,*

propoſing

propoſing to myſelf to repreſent to the reader, as briefly as I could, only ſuch things as ſeemed moſt for his purpoſe, and I hope I have done the learned author *juſtice in repreſenting his thoughts aright, without intermixing thoſe of any other author; ſo that* he alone *is to be underſtood to be the perſon that ſpeaks from the beginning to the end on this ſubject.*

In the account of the waters of Spa *I have made uſe of* Neſſel, Stephius, Chrouet, Coquelet, Breſmal, d'Heers, Gerinx, *&c. and as their Rules and directions in uſing theſe waters are much the ſame as thoſe of Dr.* Seippius, *I thought it needleſs to mention them, but refer the reader to the method to be obſerved in the uſe of thoſe of* Pyrmont, *and ſo avoid a great many unneceſſary repetitions, which would ſwell this treatiſe to an unreaſonable bulk.*

The good effect of the waters depending not only upon their being genuine, but in good condition, ſuch as are adulterated and ill-managed being very pernicious to the patient, I took a particular care laſt ſummer when I was at Pyrmont *and* Spa *to ſettle a correſpondence with proper agents, whoſe fidelity I can ſafely rely on, that a ſufficient quantity of the waters of both places be from time to time and at proper ſeaſons bottled, ſealed, pack'd up, and ſent over, in ſuch a manner, as they may loſe as little of their virtue by the carriage as poſſible; I can therefore aſſure all perſons that ſhall have occaſion, that they may be furniſhed therewith to their intire ſatisfaction, at the* Mineral Water Warehouſe *in* St. Albans Street, *near* Pall-Mall; *where is likewiſe to be had the choiceſt of all other mineral waters now in uſe.*

THE

THE CONTENTS.

The Contents of the Treatiſe on the Mineral Waters of PYRMONT.

CHAP. I.

CHAP. II.

CHAP. III.

CHAP. IV.

The Contents of the Treatiſe on the Mineral Waters of SPA.

CHAP. I.

A Physical Description of the Valley of Pyrmont, *of the* Chalibeat, *and other Springs, that are to be seen therein.*

THE county of *Pyrmont*, belonging to the illustrious *Prince* of *Waldeck*, famous for its medicinal waters, which have been well known in most Parts of *Europe* above 200 years, lies, in the opinion of the best geographers, in the 52d degree of latitude, and 29th of longitude; tho' in most new maps it is placed in the 53d degree of latitude, and 30th of longitude; towards the north and east it borders upon the elector of *Hanover*'s dominions; towards the south and west, partly on the elector of *Hanover* and duke of *Wolffenbuttle*'s territories, and partly on the county of *Lippe* and bishoprick of *Paderborn*.

The lower part of the county, particularly the valley where the castle of *Pyrmont* stands, and the *Chalibeat* waters are, is a most agreeable country, yields a very fine prospect, and is much admired by all strangers; and whereas most mineral waters come from under high hills, deriving their medicinal qualities from the minerals contained

in their bowels, the wells, generally ſpeaking, are ſo ſhut up by the mountains, that there is either no proſpect at all, or it is very inconſiderable; on the contrary, in this valley of *Pyrmont* there is a plain of three *Engliſh* miles both in length and breadth, thro' which runs the river *Emmer*, upon whoſe banks are the moſt beautiful meadows and paſtures that can be ſeen any where, and from thence to the Mountains are excellent corn-fields, and this beautiful and fruitful valley is ſurrounded with a circle of high green hills.

The wells lie between the caſtle of *Pyrmont* and the town of *Oeſtorff*, and have for many ages been very much admir'd for their particular taſte and wonderful properties, as might be eaſy to ſhew from many authentick hiſtories; they were anciently called the *Holy Wells*, (*Heiligen Brunnen*) and the ground where they ſpring up was called the *Holy Meadows*, and at preſent they are frequently ſo called by the inhabitants, probably, becauſe they were look'd upon as a ſacred wonder of nature upon the account of the unuſual manner of their riſing and bubbling out of the ground, and of their particular taſte and healing qualities, which many ancient authors have taken particular notice of.

The better to underſtand the nature of theſe mineral waters, it is neceſſary to inquire a little into the nature and qualities of the country and ground from whence they ſpring, and as we have already told you that the valley of *Pyrmont* is ſurrounded with hills, we ſhall firſt conſider thoſe towards the north, for, from under theſe the waters come, and without doubt bring along with them ſome parts of the mineral contents.

The uppermoſt part of theſe hills is a very good fruitful ſoil, very proper for all kind of corn and garden herbs. The next *ſtratum* is yellow or whitiſh *clay*, *marle*, *ſand*, *&c.* ſometimes one, ſometimes th'other, and under theſe is found, in divers places in great abundance, a *brown reddiſh ſtone*, ſometimes in great lumps, and ſometimes in ſmall pieces; and about 800 paces from the wells towards the eaſt is a *ſtone quarry*, out of which they dig yearly a great quantity of ſtones for building: Theſe ſtones are eaſily ſplinted as they lie horizontally, and in many of the ſplinters are to be ſeen many ſmall particles like filings of ſilver, and in the ſmall vacuities between the ſplinters is found a *glutinous reddiſh earth*, very like the *Terra Lemnia.*

The quarry men dig always into the mountain horizontally, for if they ſhould dig downward they would ſoon meet with a *ſulphureous ſuffocating exhalation*, as they did a few years ago, when at my deſire they went deeper, and altho' the Hole was very ſmall, and not very deep, yet they felt it for ſeveral days after, by which we ſee that without any great trouble, there might be a *Grotto del Cane* made, like to that between *Naples* and *Puzzolo*; for not many years ago, during the greateſt heat of the ſummer, eſpecially in the month of *Auguſt*, the exhalation was ſo very ſtrong, that when the ſun ſhone directly into the foreſaid hole, the motion and riſing of the vapour was very viſible, and every day were found near to it dead fowls of different ſorts, which having come to feed upon the inſects that were killed by the exhalation, were themſelves catch'd in the ſame manner.

At the ſame time the experiment was made with a dog, which being tied with a rope, and

thrown upon the hole, he preſently began to breathe very hard, to leap, open his mouth and pant after freſh air, he would have inſtantly fallen down dead, if he had not by leaping gone out of the horizontal line, where the vapour was more rarify'd, and ſo catch'd ſome freſh air. This vapour, juſt like that of the *Grotto del Cane* near *Puzzolo*, ſeldom riſes higher than one foot and a half, or two foot above the ground, ſo that one may ſafely enough ſtand in it, providing he don't ſtoop too low.

Towards the north, about 500 Paces from the wells, lies a great, high and long hill called *Bomberg*, in whoſe bowels, or perhaps in the bowels of the contiguous hills, ſo far as we can conjecture, is gather'd together the water that ſupplies our wells, which afterwards ſinks and penetrates thro' the hills till ſuch time as it can find a convenient out-gate; but what kind of minerals are contained in theſe hills has not hitherto been fully inquired into; but not far from the ſteel well (commonly called *Stahl Brunnen*) on the ſame ſide is a riſing gound full of very porous ſtones like to the *Tophus*, which being broken, appear like iron ruſt or droſs, ſome red, and ſome brown, and black, which being thrown into a furnace, and afterwards ſeparating the lighter particles or droſs from the more weighty, we found by a loadſtone, that a great many particles of iron were contained in the ſame; ſo that we may conclude, that if the uppermoſt ſtones give ſuch indications of iron, if we ſhould dig deeper, we might find great plenty both of *irony* and *ſulphureous ſtones*.

Not far from this ſtony riſing ground, and about a muſket ſhot from the *Stahl Brunnen* (ſteel wells) are the *Stein Quellen* (ſtony ſprings) whoſe waters,

waters, ſpreading themſelves over the contiguous ground, wherever they come, they cover every thing with a *ſtony cruſt*, which is not eaſily ſeparated from any thing it cleaves to. If you take a handful of the black mud from the bottom of theſe Springs, it ſmells like the *hepar ſulphuris*, or like a gun newly diſcharged; and the ſtones, after they are burnt and thrown into water, ſmell after the ſame manner. From hence we may conclude, that very probably the water derives from the ſubterraneous ſulphur, a property and virtue to diſſolve and incorporate into it ſelf the ſtony ſubſtance, which, when it comes into the open air, it throws off and lets fall again.

As to the wells and water which are found round the *Steel Wells*, and which deſcend from ſome hills and riſing grounds which lie north and eaſt, it is to be obſerved, that all of them have ſomething of the acid, mineral, ſulphureous ſpirit, which is not common to water that comes from other places, and which is very diſcernable to the taſte of thoſe that are not uſed to ſuch waters.

About two hundred paces from the *Stone Quarry*, there is a very ſtrong ſpring of acid water, very pleaſant to the taſte, which has indeed a great deal of the *acid mineral ſpirit*, but brings along with itſelf nothing of *iron*, or any other *mineral ſubſtance*, except a little *bitteriſh ſalt*, and a little *ſubtilized earth*; we call it by the name of *Berg Sauerling*, becauſe it ſprings up on a hill, where the ground is very ſtony, and it's ſource is much higher than that of any other of our acid ſprings. It mixes exceeding well with wine, pearles prettily, and has a moſt agreeable taſte, and would be very proper for them that like to drink water

with their wine at meals, but find the *Stahl Brunnen* water too ſtrong for them.

The waters that are to the north weſt are commonly heavier and more acid than thoſe towards the eaſt, perhaps becauſe they run deeper under ground, and ſo have paſſed through more of the mineral. There are many other ſmall ſprings here and there, which have an *acid taſte*, contain a *yellowiſh irony earth*, and have ſomething of the contents of the *Steel Waters*, but in much ſmaller quantity.

The waters that come from the north weſt are heavier and more acid than thoſe from the eaſt: And on the other ſide in the meadows, there are a great many ſmall ſprings of the ſame quality, but are not ſo ſtrong of the mineral, neither do they throw up ſo much water.

All theſe different ſprings are ſo many indications and proofs, that all round under ground, is full of irony and ſulphureous ſtones.

There is one thing to be obſerved with reſpect to the waters that riſe near the head-wells; a few paces behind the well-houſe, ſeveral ſmall ſprings run together into a canal, by which they are carried into the common bathing-place. In the year 1716, I found in this ditch, all at once, here and there, three pound weight of the cleaneſt and moſt beautiful *lapis ſelenites* that ever was ſeen, ſome pieces of it weighing twelve ounces, which had been formed in this water. Theſe ſprings are not very *acid*, neither do they give any yellowiſh tincture to the ground; and when it is evaporated, there remains behind a very *ſmall ſaline earthy ſediment*. This natural generation of the *lapis ſelenites* ſhews us, that there is a *chriſtalline matter or ſubſtance*, which by art may be ſeparated from our waters.

We

We come now to the *ſteel wells* (*Stahl Brunnen*) themſelves, which in compariſon of the high grounds which lie to the north, may be ſaid to ſpring out of a low ground, but with reſpect to the plains that lie towards the ſouth, and upon the river *Emmer*, they may be ſaid to lie high enough, for from the wells to the lower end of the avenue, it is above five hundred paces, and all along a very conſiderable deſcent, for which reaſon, waters of a different nature cannot ſink towards theſe wells.

The head well, which formerly was called the *Holy Well*, is incloſed and covered with a large eighth cornered houſe, by which it is preſerved from all dirt, and from the mixture of rain or other water.

The place where the ſpring riſes is about four foot and a half diameter, and the water ſtands about three foot and a half above the ſpring (or is three foot and a half deep), becauſe the conduit or canal that carries it away cannot be made lower; and the weight of the great quantity of water that ſtands upon the ſpring, is the reaſon why this well does not ſpring or ſpout up with ſo great force, nor ſo high as the *Brodel Burn*, only the ſprings throw up ſmall bubbles like water that begins to boil; but the ſpring is very ſtrong, and pours forth a great quantity of water, ſo that there is never any want, how much ſoever you pleaſe to carry away, and I have in one minute taken up from the ſtream that runs from the well, four large buckets full, containing thirty pound weight of water each, which amounts to a vaſt quantity in twenty-four hours.

About forty-two foot from this well ſprings up the great *Brodel Brunn*, which has hitherto been made uſe of only for bathing, it being neither ſo

ſpirituous, *fine*, nor *clear* as the well uſed for drinking. This is found by experience not to be ſo good for drinking as the other, and does not paſs ſo eaſily.

This great bathing-well is fourteen foot in circumference, the water ſtands two foot above the ſpring, (or is two foot deep;) and in this place there are between thirty and forty great or ſmall boiling ſprings, that riſe out of the ground with great force, and make a greater noiſe than a brewer's copper when boiling, ſo that in calm weather it is eaſily heard at the diſtance of fifty paces. About a hundred and twelve foot weſt of the well uſed for drinking, there is another well ſurrounded with oaken pales, about twenty two Foot in length, and ſixteen broad, the water is about four foot deep, there are ſeveral ſprings both great and ſmall in it. This well is weaker than any of the other, and has very little of the acid mineral ſpirit in it, and is commonly uſed by poor people for a cold bath.

Theſe waters bring along with them in great quantity a reddiſh yellow earth, which may be gathered in great abundance, both in the wells, and in all the conduits and ditches through which they run, for ſix hundred paces from the ſprings, and the avenue and all the ground on both ſides is full of it, which in ſome places lies two foot deep, clean and without any mixture: *This yellowiſh earth*, being either taken from the ſprings or the water conduits, or the ground about the avenue, when ſmelted, will anſwer the loadſtone, and when it is ſeparated from the *alcaline earth*, and *chriſtalline cremor* (as we ſhall afterwards ſhow,) has all the properties that perfect iron or ſteel has. Although this ferruginous earth, as we may call it, is found in great plenty wherever the water

runs,

runs, yet there is not to be found the leaſt piece of *tophus-ſtone*; and this is ſo much the more remarkable, becauſe the ſtony ſprings (*Stein Quellen*) are ſo near; ſo that it is evident they have no communication under ground with the ſteel wells.

This ferruginous earth is not only found in great plenty about the wells, but alſo ſticks to all veſſels wherein the water is kept either hot or cold, and dyes them yellow: notwithſtanding of this, the *iron* conſtitutes the ſmalleſt part of the *ſolid ſubſtance*, or *hard matter*, which is incorporated with the water.

So far as I have been able hitherto to find out by repeated experiments, a pound of water contains only two grains, or two grains and a half of iron, after it has been cleanſed from the *chriſtalline* and *alcaline cremor*, and ſmelted into a pure and clean ſteel; but the whole *ſediment*, or all that hard and dry matter which remains, after evaporating the freſh water, weighs twenty two grains, ſo that the *ſteel* makes at moſt but one eleventh part of the ingredients. As we are now ſpeaking of the *materia* which the mineral waters bring along with them, it muſt be remembred, that our waters never ſuffer any alteration either from dry or wet weather; and whereas it is a common complaint, that in many mineral ſprings, in rainy weather, they become much weaker, and when they are evaporated don't leave behind half the matter as in dry weather; on the contrary, our waters in all ſeaſons of the year, and in all kind of weather, wet or dry, yield always the ſame quantity of matter or ſediment.

We may make this further obſervation upon what preſents it ſelf to our outward ſenſes when we drink the waters at the wells, *viz.* as ſoon as you take up a glaſs full of it, you perceive an

infinite

infinite number of ſmall pearles or bubbles riſing in the glaſs, and which are in greater number when the glaſs is thruſt with violence into the well, and the air is thereby forced into the glaſs under the water, for then they riſe with a noiſe, and like a vapour above the edge of the glaſs, ſo that if you hold the glaſs over againſt you, your face will be ſprinkled with the particles of the water.

It is commonly believed by water-drinkers, that theſe riſing pearles and bubbles are the *ſpirituous* or *ſubtileſt* parts of the water, and contain all the *Virtue* of it, ſo that they ſwallow it down with great haſte, that they may not loſe the virtue of it; but if you take up the water out of the well ſoftly, and not thruſt the glaſs into it with violence, then there is little motion to be ſeen in the water, and yet there is the ſame quantity of Spirits in it; ſo that it is the *air* that occaſions this commotion in the water, and all theſe pearles and bubbles are ſo many particles of air, which being ſhut up in the glaſs extricate themſelves out of the water, and ſo occaſion that commotion, but the *ſpirituouſneſs* of this water is the reaſon why the air mixes more eaſily and plentifully with it than with other water.

The water is clear as chryſtal, only you may obſerve ſome ſmall appearance of a milk colour in it, which diſtinguiſhes it from common water; when the water is firſt taken up, this appears but very little, but ſhows it ſelf more and more every hour, when it is put into an open glaſs and expoſed to the open air, and ſo much the faſter the warmer the place is. This *milk colour* afterwards changes into *reddiſh*, *troubled*, or *muddy clouds*, wherewith the *ſteel* ſeparates it ſelf, and ſhows it ſelf above like a *ſhining glittering ſkin*.

The

The taſte of the freſh water is *acid* like wine, pungent, ſharp, refreſhing and pleaſant, but at laſt taſtes ſomewhat of vitriol, ſo that many wiſh they could exchange the laſt taſte with the firſt; nevertheleſs moſt drinkers of theſe waters drink them with very good liking, and frequently drink more of them than they are ordered, or is neceſſary for their cure.

By the ſmell one may diſcover in our wells a *ſubtile ſulphureous* vapour, which ſometimes makes the water-ſervers giddy and light-headed, and this is moſt obſervable when the greateſt quantity of water is drawn off. This *ſulphureous* vapour is the cauſe why fiſh and frogs, ducks and goſlings, when thrown into theſe wells, grow giddy and loſe their ſtrength, and at laſt fall down and ſink, though this does not preſently happen, but ducks, for example, ſwim ſometimes an hour before they are any way affected; and if theſe animals, as ſoon as they begin to ſink, are taken out, they neither ſuffer in their health nor life, and ſoon appear as brisk as ever.

This *ſulphureous* vapour is not always alike ſtrong, but is ſtrongeſt in the hotteſt ſeaſon, ſo that when the heat is exceeding great, young ducks will fall down dead in a moment, though old ones will hold it out longer. But this vapour has not the property of *a poiſon*, which when it gets into the body abides therein, and corrodes the ſame, but it has only a particular *elaſtick, dilating power or quality*, by which often in a moment, as ſoon as a ſufficient quantity of it falls into the lungs, it drives and keeps out of them all air whatſoever, and ſo puts to a ſtand all the organs of reſpiration, and at once makes all motion in the breaſt to ceaſe; but as ſoon as the vapour ſhut up in the breaſt finds a free egreſs, and the freſh

air

air enters, the animal comes to it ſelf again, and ſuffers no hurt; ſo that creatures die for want of freſh air, not through the influence of any *arſenical matter* conveyed into the body by the vapour: and as I told you before, this vapour does not riſe much higher than a foot above ground, ſo that old geeſe can by reaſon of the length of their necks, continue much longer in the water.

This acid *ſulphureous ſpirit* is the reaſon why the waters never freeze, no not in the coldeſt winters, as in the years 1709 and 1716.

To conclude this phyſical deſcription of theſe mineral wells, I ſhall ſay one word relating to the daily uſe of them.

Many inhabitants of the county of *Pyrmont*, and of other places that lie next to it, particularly the inhabitants of *Oeſtorff* make uſe of this water the whole year, ſummer and winter, whenever they are thirſty and at their meals, as their ordinary drink, and at dinner-time they come with their flaggons and bottles as if it were an alehouſe: every body makes uſe of this water, young and old, and many ſick and confined to their beds, women in child-bed, and ſucking children, they are not afraid of its pungency or ſharpneſs, or that it ſhould affect their lungs, or do them any hurt; but from long experience they know, that commonly it is good for every body, keeps the ſtomach in good order, and ſharpens the appetite: and in this county the people are ſtrong and healthy, and arrive at a great age; for in the lower part of the county, during the laſt thirty years, it is computed, that about 1500 men have died, among whom were 128 that were ſixty years old; 109 ſeventy years; 57 eighty; 37 ninety; and 6 one hundred years old and above; which altogether amount to 339 old people, which is almoſt

a fourth

a fourth part of the whole number, and in ſome places the old men bear a greater proportion.

CHAP. II.

A chymical examination and inquiry into the nature of the Pyrmont *waters, whereby their real contents and ingredients are clearly diſcovered.*

FROM what has been ſaid in the preceding chapter, all circumſtances duly conſidered, it will be eaſy to find how far one may venture in paſſing a judgment, with reſpect to the contents of theſe waters, and without ſtopping to examine and confute what ſeveral learned phyſicians have advanced, I ſhall proceed to ſhow what I have found out by frequent examination and daily experience; and ſo far as I can demonſtrate my *theſis*, it will at the ſame time appear how far ſome have been miſtaken, and how many things others have with the greateſt aſſurance aſſerted, without having made the leaſt examination and inquiry into the nature of the water. We ſhall therefore firſt ſhow, that the *ſpirit* which preſerves the whole mixture, and all the chief properties of the water, is a *ſubtile, acid, ſulphureous ſpirit.*

2*dly*, That this ſpirit is herein intirely different from the common ſpirit of ſulphur; that it brings along with itſelf a ſubtilized mineral-fat (*Pinguedo*) wherewith it was mixed under ground.

3*dly*, That this *ſpirit*, contrary to the opinion of all authors, does not *diſſipate* and is not *volatile*, but on the contrary, the longer it is in the water, the more *fixed* it is. Particularly, 4*thly*, This ſpirit does by little and little unite itſelf with the

alcaline

alcaline ſalt, or with the ſubtile ſweet *alcaline earth*, which is found in all mineral waters, and ſo makes of it a *ſal enixum* or *neutrum*, like a *tartarus vitriolatus*, *ſal polychreſtum*, or very like *ſal mirabile glauberi*.

5thly, That through this uniting of the *acid ſpirit* with the alcali, it muſt let fall all the *diſſolved Iron* that it had aſſumed, and ſo the water muſt loſe all *vitriol qualities*.

6thly, That the ſubtile ſweet *alcaline earth* in the water does far exceed the *acid ſpirit* in quantity, ſo that conſequently this *ſteel water* muſt operate more as an *alcali* than an *acid*.

7thly, That over and above all theſe foremen-tioned *ingredients*, there is in the water a *clean*, *tranſparent*, *chryſtalline*, *taſteleſs ſubſtance*, like the *lapis ſelenites*, or mountain chryſtal diſſolved.

In order to demonſtrate theſe propoſitions clearly, we will firſt briefly enumerate the changes and ſeparations which theſe ingredients in the water undergo in open *air* and in *diſtillation*, without any mixture of any other thing. And laſtly, give an account of what remains, after the water is intirely evaporated.

The firſt change we obſerve in the water when expoſed to the open air, and ſtanding in a ditch or marſh, is the *party-colour'd ſhining ſkin*, with bright rainbow colours, which ſwims and covers the ſurface.

This *ſkin* of *divers colours* ſhows itſelf after the water has ſtood ſome hours in the ſun, or has been warmed over a fire, and the more gently it is warmed, the more do theſe colours ſhow themſelves.

The next *ingredient* which ſeparates from the water, is the *yellow ferruginous earth*, which ſhows itſelf very remarkably, not only in the open and

warm

warm air, but in all glaſſes, earthen, and other veſſels whatſoever, into which the water is put, though ever ſo well corked and ſtopt.

The more the water is warmed, either by the ſun beams, or over a fire, or when a bottle full of it is put into a veſſel full of hot boiling water, the greater motion appears in it, ſo that innumerable air-bubbles riſe with great noiſe in the bottle, and break through the ſuperficies of the water, and every little globule of air ſeems to carry along with it a ſmall particle to add to the blewiſh ſkin, which by little and little increaſes and grows thicker; and this motion laſts a conſiderable while, about two hours in a moderate heat, ſo that it is ſcalding hot before its firſt *mixture* is thoroughly broken, and for a good while the water taſtes ſtrong of iron.

Laſtly, When all the motion of the air-bubbles is over, the whole water appears yellowiſh and troubled, and the ſkin thick upon it, it becomes inſipid and taſteleſs, ſo that one cannot find any more in it, the leaſt appearance of its former properties. If you let the ferruginous earth ſettle well for ſome days, and then ſtrain the water through paper, it will then be clear as cryſtal, and in a cloſe glaſs will continue clear.

Let our water be poured into a glaſs receiver, or *ſtill*, put a helm upon it, and begin to diſtil it into a cloſe glaſs bottle, the ſame alterations appear in the receiver as in the open air and heat: but the beautiful Colours, which ſome pretend to have diſcovered in the helm during the diſtillation, are nothing more than what is uſual in diſtilling common water, when through the refraction of the light, different colours, like the rain-bow, are formed in the receiver, and in the drops which fall from the helm.

The

The diſtilled water, neither the firſt nor the laſt, has no acid or ſulphureous taſte or ſmell, nor has it ever any ſmell, if it be kept clean from dirt; but it taſtes a little, as if ſomething had been burnt in the receiver, if it be diſtilled with the gentleſt heat, and *ex balneo mariæ*: but this burnt taſte is ſoon gone, if the glaſs bottle wherein the water was preſerved is not ſhut very cloſe: If you decant it twice, there remains a very ſmall portion of *white earth*, which mixed with acid things cauſes no efferveſcence. If you take a great quantity of freſh water, and put it into a receiver with a ſmall hole above, and heat it as faſt as poſſible, and then hold your noſe over it, it has no other ſmell than the ſteam of common hot water. If with a gentle heat you evaporate one half of the water, and then ſet it in a cool place for twenty four hours, you will obſerve a great many ſmall and ſomewhat long tranſparent cryſtals formed in it, which have no taſte, and will not cauſe any efferveſcence, when mixed with acid things.

If you entirely evaporate the water, till it is quite dried up, there will remain *a brown, yellowiſh, red matter*, intermixed with ſome white; from a pound of water out of the *Trinck Brunn*, you have twenty two grain weight; from the greateſt *Brodel Brunn*, twenty four grain; from the lower bathing-well, fifteen grain; and from the *Berg Sauerling*, five or ſix grain. If upon this *ſediment*, or remaining *dry matter*, you pour a little diſtilled clean water, warm it a little, and then ſtrain it through a paper, afterwards let it evaporate, till quite dried up, you will find a ſmall white bitter *ſalt*; from the *Trinck Brunn*, ſeven grain out of a pound of water; from the *Brodel Brunn*, ſeven or eight grain; from the lower bathing-

bathing-well, five or ſix grains; from the well call'd *Berg Sauerling*, two grains. The remainder of the ſediment which could not be diſſolved in the water, is the *alcaline ſweet earth*, the reddiſh *ferruginous earth*, and the *chriſtalline ſubſtance*.

When the well known *Hydrometrum Kircheri*, or *Glaſs-water-Ballance*, is put into the freſh water, it ſinks to the lowermoſt degree, but as ſoon as the water begins to be troubled, and to loſe its acid taſte, the *ſtaticum vitreum* ſinks to the ſecond degree, and in the common ſweet water of the country, it goes down to the third degree.

As it is well known that other *ſubtile ſpirituous ſteel waters*, when weighed preſently at the ſpring, are, notwithſtanding their mineral contents, lighter than common water, even than rain, or diſtill'd water; wherefore I took a glaſs-vial with a long narrow neck, and put five pound of our common ſweet water into it, and marked with a diamond how high the water reached in the neck of the vial, and after pouring it out, I weighed five pound out of our mineral *Trinck Brunn*, and pouring it into the vial, it came ſo near to that of the common water, that it wanted only two thirds of a dram to make it come up to it: but afterwards having ſometimes repeated this experiment, I found it did not always hold, and that according as the air is lighter or heavier, the water aſſumes more or leſs of it; but I deſign to examine this matter more narrowly at another opportunity.

Theſe are the chief circumſtances and alterations of the water, alſo the ſeparations of its ingredients, which are brought about partly by itſelf, and partly by evaporating it by the heat of the ſun, or by diſtillation; we ſhall enquire into the true cauſes of theſe ſeveral phænomena, and further explain them by ſeveral natural experi-

ments, and ſo apply them where it is proper to our poſitions.

The firſt thing we have undertaken to prove is, that the ſpirit in the mineral water, which preſerves and contains all its chief properties, is a *ſubtile, acid, ſulphureous ſpirit.*

This poſition will meet with leaſt oppoſition, ſeeing moſt phyſicians are of opinion, that the *ſpirituouſneſs* in all mineral waters, particularly in thoſe that are acid, proceeds from the ſulphur of irony ſtones.

But ſeeing ſeveral of the moderns upon obſerving, that the *alcali* predominates in mineral waters, and not being able to find whence the *acid* ſhould proceed, ſeeing no *vitriol* can be prepared out of ſuch waters, do think that there is no acid in them, but that the *ſpirit* is rather of an *alcaline nature*, a *gas ſulphureum ex marte*, without acid, like the vapour which riſes when one pours *ſpiritum ſulphuris per campanam*, or *oil of vitriol*, upon filings of iron. We will therefore mention ſome experiments, which will at leaſt ſhew, that in our ſteel waters, there is an acid of ſulphur, though the *alcaline matter* has the advantage, as in other wells: and firſt, it is allowed by both learned and unlearned, that the taſte of the ſteel water is *acid*, and every body that knows what *acid* is, will reckon it among *acid* things: but it is not a corroſive, but a fixed acid, which leaves upon the tongue a pleaſant, rough, ſharp taſte, like that of wine, beer, or other liquors, which have been rightly and duly fermented; and it is from this that ſuch waters are called *acidulæ*, though ſome have pretended to have found a ſharp *alcaline* taſte in the waters; but it is very evident, thoſe gentlemen have conformed their ſenſes to their pre-conceived opinion.

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Moreover, 2*dly*, The taſte and the gentle metallick ſmell of the waters is ſo manifeſtly like that of *vitriol*, that even children themſelves compare it to that of ink: now ſeeing there is no *vitriol*, nor taſte of *vitriol* without *acid*, 'tis manifeſt that the mineral ſpirit of the waters is of an *acid* nature. Let us diſſolve a little *vitriol* of iron in a good quantity of common water, and add to it ſome drops of the *volatile ſpirit of ſulphur* or *vitriol*, it will ſmell and taſte ſo exactly like the water of our wells, that one muſt do the greateſt violence to his ſenſes, to deny that they are like the one to the other; or if into a good quantity of common water, you drop *ſolutionem ferri per ſpiritum ſulphuris vel vitrioli*, adding a little of the ſaid ſpirits and of glauber ſalt, this mixture will taſte more like the mineral waters.

3*dly*, We have already ſhewn, that in a ſtone quarry near the wells, and in the mineral wells themſelves, there is a *ſulphureous acid vapour*, which is frequently ſo ſtrong, that all kind of beaſts are killed thereby; when we examine the vapour in the hole of the quarry by the ſmell, we find that there is nothing it is more like to than to the *volatile*, *penetrating*, *acid ſmell* of great *black ants*, from whence they diſtil *ſpiritum formicarum acido volatilem.*

And ſeeing this vapour, as we have already ſhewn, vents itſelf through the mineral wells, conſequently the waters cannot but be *acid*, for we know by many chymical experiments, how eaſily a mineral *acid ſpirit*, reſolved into ſmoak, will fix itſelf in water placed near to it, and continue united with it.

4*thly*, It is only the *acid ſpirit* that can diſſolve the ingredients contained in the water, and keep them in the form of a clear liquor; we have al-

ready ſhewn how eaſily the mixture of the mineral water is undone, and the ſeveral ingredients in it are ſeparated; but if you mix a few drops of the *acid* of ſalt-peter or ſalt with it, but particularly the *ſpirit of ſulphur* or *vitriol*, ſo that the *acid* begins to predominate a little, all the ingredients will remain diſſolved, and the water continue clear as chryſtal, whether hot or cold, ſo that they cannot be ſeparated till all the water be evaporated.

If you take ſome very troubled mineral water, and drop a little ſpirit of *vitriol* into it, in a moment all the *ferruginous* earth, and whatever elſe is contained in the water, will diſſolve, and it will become perfectly clear again; from hence we may clearly enough conclude, that the *menſtruum*, or whatever it is, that ſharpens the water, and communicates to it the diſſolving quality, muſt be the *acid of irony and other mineral* ſtones.

5thly, Nobody has hitherto been able to prove, that any other beſide an *acid ſpirit* ariſes, or can be prepared from minerals, and brought in *liquorem*, and ſeeing that ſubtile, rough, ſharp, *ſomewhat* in the water, muſt be a *ſpirit*, *& quidem ex mineralibus*, neceſſarily it muſt be *ſomewhat acid*; and every where in all minerals and metals, the *acid* is to be found in and with the *ſulphur*, and in many places great mountains, and large tracts of ground are full of them; and in great earthquakes and mines in ſeveral places of *Europe*, iron and ſulphur are found together in ſtones or flints of different ſorts.

And it has been demonſtrated by the beſt writers on mineral waters, *E. G. Dr. Liſter de fontibus medicatis Angliæ*, and Dr. *Bergern* in his diſſertation *de Thermis Carolinis*, that the true original of all the ingredients and materials of *mineral acid*

waters,

waters, and of hot baths, is to be found in pyrites ſtones, moiſtened and mollified by water; and this truth is agreed to by the moſt learned philoſophers in that way, and it alſo confirms this, that the ſpirit of the mineral water proceeds from the *acid*, ſeeing the irony ſtones and pyrites have no other thing elſe that is *ſpirituous* in them, and they conſiſt of *ſulphur*, *iron*, and a ſtony matter.

The *acid* of this ſulphur is the only *menſtruum* or inſtrument of diſſolution, whereby all the *ingredients* of the irony-ſtones are made ſoluble, and united with the water. The *acid* alone without any *alcali*, together with the iron, gives the *vitriol* taſte and *purple blue tincture* to the waters.

The *acid* alſo preſerves in all *mineral*, eſpecially *ſteel waters*, their excellent qualities and virtues, and to this they owe their good effects.

If once this acid be loſt, or abſorbed by the *alcaline terreſtrial particles* of the irony ſtones or pyrites, the excellent mineral ſpirit, the *vitriol taſte*, the *tincture*, as alſo the beſt qualities and virtues of the waters are loſt at the ſame time. Wherefore the *acid* of the irony ſtones and pyritæ is the firſt and chief thing that ought to be conſidered in the original and mixture of the mineral waters, and if this be forgot, and only regard had to the *alcali* and the *ſalia enixa*, the key will be intirely loſt; whereby the *generation*, and all the *phænomena* of *mineral waters*, may be clearly explained.

6thly, We have a very good proof a *poſteriori* in our mineral waters, that there is not only an *acid* among its ingredients, but that it muſt be in ſpecie, the *acid* of ſulphur; for it is ſhewn under the fourth head or poſition, that the ſalt of the water conſiſts of an *alcali*, and the *acid* of ſulphur;

phur; and that by adding *aliquod pingue*, it may be made *ſulphur*, and out of the *ſulphur* may be made *ſpiritus acidus*, or by adding of iron, *vitriol* may be made of it, alſo of the bare *ſalt* of the water a quantity of *pure ſulphur* may be made; and whoſoever will rightly conſider the original of this ſalt, as it ſhall be afterwards explained, as alſo the *generation* of the *ſulphur*, and the experiments relating thereto, will, as it is hoped, have no further doubt that the *volatile ſpirit* of the water muſt proceed from the *acid of ſulphur* in the irony ſtones and pyritæ.

Dr. *Hare* has indeed on the contrary aſſerted, 1*ſt*, That *ſulphur* is an *alcali*. 2*dly*, That the *acid ſpirit* that is diſtilled from the ſalt of the *Pyrmont* waters, is only *a creature or productum* of the fire; but ſeeing the author does not confute the experiments, whereby out of this *acid creature* of the fire, ſulphur may be again made in different ways, and ſo become what it was, before ever it was brought to the fire, all his objections fall to the ground.

2*dly*, We ſee moreover, that this ſpirit is eſpecially herein diſtinguiſhed from the *common ſpirit* of ſulphur, in that it brings along with itſelf a *ſubtilized mineral pinguedo*, a fat wherewith it was mixed under ground.

It is allowed, that there are few mineral waters to be found wherein one can meet with a right, pure, formal *ſulphur*, except in thoſe that are cold; and various authors aſſert many things upon this head without any good foundation.

The principles of common ſulphur are, an *acid*, a *ſmall quantity of fat*, and *of earth*, and it is evidently, a *compoſitum*, which cannot be diſſolved intirely in water without the addition of a *ſharp alcaline ſalt*. When this is done either by art, or nature

in

in baths and wells, the waters have a ſtrong rotten taſte, and in many hot baths, may be compared to that of rotten Eggs, and ſuch waters make ſilver firſt yellowiſh, and at laſt black, as *ſolutio ſulphuris per alcali* uſes to do; but it is not ſo with our waters, wherefore we do not aſſert, that there is a *formal ſulphur* in them, but it may well be put together or reduced from the *contenta* of the water, as we ſhall afterwards ſhew; but that there is contained in it a *fat* and a *combuſtible ſubſtance* is manifeſt, for if you throw the *dryed reddiſh ſediment* of the water upon melted *ſalt-peter*, you will plainly ſee, that a great many particles of it do kindle and burn with the ſalt-peter, and this is more manifeſt if you gather a good quantity of the *ſkin of divers colours*, that is formed upon the waters, and after drying it throw it upon the ſmelted ſalt-peter, you will obſerve a great many clear ſparks burning out of it, which you cannot obſerve, if you throw any matter upon it that has nothing combuſtible in it.

If you ſmelt a quantity of the yellow *ferruginous earth* which the waters leave upon the ground, in a cloſe crucible, without mixing any thing with it, after it is bruiſed, it will follow the magnet, which throughly burnt iron crocus, in which there is nothing combuſtible left, will not do; and before the magnet can move it, you muſt put ſome fat or combuſtible thing to it, and ſmelt it with it. And as the diſtilled water has ſomething of a burnt taſte, we may from that conjecture, that ſome combuſtible thing muſt be there, for ſuch a taſte proceeds only from fat and combuſtible things. Moreover, as fat things are light and ſwim upon the water, and appear in different colours, ſo alſo the ſkin of *divers colours*, which we have already deſcribed, is a manifeſt proof, that

the waters contain a *fat*; the *ſulphur* alſo which by diſtillation is found in the ſalt of the mineral waters, is a proof of a *fat* in the waters, ſeeing there is no ſulphur without it.

It is this *fat* which, together with the particles of iron, forms the ſkin of divers colours, and the ſaid iron particles are kept ſwimming by it, for they being heavier than any of the other ingredients in the water, would neceſſarily fall to the bottom, if they were not ſupported by ſomething that is light. It is this *ſubtilized fat*, bound up with the *acid ſpirit*, which gives the waters their *agreeable* and *ſpirituous taſte*, and is the cauſe why they don't taſte like common water, made ſharp with the ſpirit of *ſulphur* and *vitriol*, nor ſo flat and ſweet as diluted *ſolutio vitrioli martis*, but rather *penetrating* and *piquant* like *wine*.

And the mineral waters may in ſeveral things be compared to *fermented liquors*, for as from a thick, ſweet, and clammy *muſtum*, by the internal motion and ſubtilization of the fat, and of the ſaline *acid* particles, a *ſpirituous*, *ſtrong*, *clear* and *agreeable liquor* is prepared: in like manner from the coarſe dead ſtones, by the conſtant moiſtening of the water, and motion of their particles, the excellent mineral *ſpirit* of the *medicinal waters* is formed in the bowels of the earth of *fat and acid ingredients*.

And as fermented liquors emit a ſulphureous penetrating vapour, ſo that in great cellars, candles are frequently put out, and people made giddy thereby, ſo there ariſes a *vapour* from the mineral reſolution of the ſtones, which at wells, and other holes and openings of the earth, getting vent, does affect both men and beaſts.

We come now to the third poſition, *viz.* that the *ſaid ſpirit*, contrary to the opinion of all authors,

thors, does not diſſipate and fly away, but on the contrary, is always more and more fixed; and this is clear from the ſmell of the waters, when newly taken out of the well; for it is not penetrating, ſulphureous and ſuffocating, as all *volatile ſpirits* uſe to be, but it is a vitriol ſmell, though ſometimes it has ſomething of a gentle *ſulphur*, as when you diſſolve vitriol of iron in water, and ſmell to it; in a word, it is a *gentle metallick*, and ſomewhat of a *ſulphur ſmell*, as one may ſay of a piece of tin, copper, iron, ſilver, yea gold itſelf, that it has ſomething of a ſmell, the effluvia being exceeding ſmall.

If you ſet a great quantity of it upon the fire, which preſently makes all *ſpirituous* things, which are any way *looſe* and *volatile*, preſently to ſmell ſtrong, you may hold your head over it a great while, ſuppoſing a large copper full of it, and the fire be ever ſo ſtrong, yet neither the organs of ſmelling nor of reſpiration ſhall be affected thereby; or if you have any objection to this, then hold your head over the ſmall opening of a great glaſs receiver full of the water, and heated as quickly as poſſible, yet you will perceive nothing different from the ſteam of common water. Is this ſpirit then ſo ſubtile, that it cannot affect the organs of ſmelling and reſpiration? All the ſpirits we know, in the whole *materia medica* and *chymica*, the more ſubtile and volatile they are, the more powerfully do they affect the olefactory nerves; or how can we taſte this ſpirit, but not ſmell it?

It is objected, that there ariſes a *ſulphureous* vapour out of the wells, which manifeſtly ſhews how the ſpirits evaporate; but this objection rather confirms than deſtroys our *poſition*; for ſuppoſe that the ſpirit in the water, either were, or

were like to any thing that ariſes like a ſulphureous vapour out of the wells, certainly it muſt have the ſame effect during the time it is evaporating, and the water, when warmed, would emit a *ſuffocating, ſtupifying ſteam*, which is by no means the caſe with our waters, as we have already ſhewn.

This ſulphureous vapour is not to be looked upon as an *eſſential part* of the mineral waters, but as meerly accidental; for the queſtion is not, whether a *ſulphureous ſpirit*, which the waters cannot fix in themſelves, does not now and then riſe up and ſpread itſelf through the openings of the wells; but the queſtion is about the ſpirits which properly belong to the mixture of the waters, and are incorporated with it, and alſo unite the other ingredients with it. That this ſpirit does evaporate, it no ways appears, nor can any man prove it.

And though what is diſtilled from the freſh waters has ſomething of a burnt taſte, yet no body can look upon this as a ſpirit, for there is no difference in the taſte between the firſt drops and the laſt, nor have they any effect in *ſolutionibus* or *precipitationibus*.

If it be aſked, what becomes of the ſpirit, and where does it remain, ſeeing it does not evaporate, and yet is ſo ſoon loſt? this difficulty will be very eaſily ſolved by ſhewing, 4*thly*, that this ſpirit unites itſelf by degrees with the *alcaline* ſalt, or with the ſubtile *ſweet alcaline earth*, of which in all mineral waters there is always ſome quantity found, and makes of it a *ſal enixum*, or *neutrum*, like a *tartarus vitriolatus*, *ſal polychreſtum*, or rather like a *ſal mirabile glauberi*.

There is no rule in chymiſtry more common, true, or leſs denied, than that *acid* things and

lixivious

lixivious ſalts, or *alcalia*, when put together, do unite the one with the other; at firſt they ſtruggle and bite one another with great violence (to ſpeak as the chymiſts do,) which occaſions a great noiſe, a great deal of froth, and frequently heat; preſently upon this, they are cloſely bound together, and of them two is formed a third *ſalt*, which is neither *acid* nor *lixivious*, nor *taſteleſs* like a *terra alcalina*, but altogether *ſaline*.

The ſalts that ariſe from this union are called *ſalia neutra*, or *enixa*, as common ſalt, *ſalt-peter*, *allum*, *ſal polychreſtum*, *ſal mirabile glauberi*, &c. ſome of which are formed by nature, others prepared by art; and the acid which before was ſo volatile and ſpirituous, does afterwards cleave ſo faſt to the *alcali*, that frequently it cannot be ſeparated from it by the ſtrongeſt fire.

Now ſeeing the *mineral ſpirit* of *ſteel waters*, according to the opinion of moſt, both ancient and modern phyſicians, does chiefly conſiſt of an *acid*, according to our firſt poſition, and that modern authors agree, that in all hot and cold mineral waters, there is not only a *lixivious ſalt*, or an *alcaline earth*, but that the *alcali* predominates in them, ſo that the *acid ſpirit* cannot evaporate, but muſt, according to the already mentioned well known rule, combine or unite with the *alcali*, when it meets with it in any liquor, and thereby form a *ſal enixum*, or *neutrum*; and we have already mentioned what quantity of the ſaid ſalt is contained in a pound of our waters; we have already diſtinguiſhed between a volatile and a fixed *ſpirit of ſulphur* in the waters. The volatile, ſulphureous, and *fat acidum*, cleaves to the particles of iron, and by its peculiar property, which all *artificially prepared acids* have not, defends itſelf againſt the *alcali* in the water, till it be overpowered

powered by the air and the heat; but the *fixed acid* is already united with the *alcali*, while under ground, and with it conſtitutes, as we have already ſaid, the greateſt part of the bitter *mineral water ſalt*.

When the chryſtals of this ſalt are expoſed to the eye, they are very like the chryſtals of ſalt-peter; but when examined with a magnifying glaſs, they don't appear to have ſo many angles and other figures intermixed as ſalt-peter, and they are all ſmall oblong *parallelograms*, with four ſides, and the uppermoſt and undermoſt ſides are broader than the two remaining horizontal plains are; when this *ſalt* is freed from the *volatile ſpirit of ſulphur*, either *per retortam*, or by *calcination* in a ſmelting crucible, and chriſtalized anew, all the before-mentioned figures appear great, beautiful and tranſparent, and ſome of them are half an inch long, and in breadth about $\frac{1}{4}$ or $\frac{1}{5}$ of their length, others of them appear ſhort and thick, but all quadrangular.

If you dry this ſalt gently, you may make of it a powder white as ſnow; it has the gentleſt taſte of any ſalt whatſoever, it is cooling and perfectly bitter, but it has not the leaſt taſte of *alum*, as ſome authors have falſely pretended. The chryſtals are ſo ſolubile, that if you put half an ounce of water, and as much of the *ſalt* in a glaſs, the ſalt by the gentle heat of the hand, and by turning it over and over, will change into ſmall grains, which cannot be done with any *ſal neutrum*, except *tartar. ſolub.* and *terra foliata tartari*, and even theſe not ſo well. If you let the *diſſolved ſalt* ſtand in a glaſs in the open air for ſome days, it riſes above the water, and forms all kind of figures, as ſalt-peter and ſome other ſalts do.

If to the ſolution of the freſh ſalt you put a ſmall quantity of a ſharp diſſolved lixivious ſalt, either that of *pot-aſhes*, or *ſalt of tartar*, it will precipitate a ſmall matter white as ſnow, which will by degrees fix upon the bottom like ſmall bits of cotton; and if you ſeparate it from the water edulcorate, and dry it, you will find it to be a fine *alcaline earth*, which will fret with *acid things*. But you cannot obſerve any efferveſcence in this ſalt itſelf, when mixed with all kinds of *acid* or *alcaline* things; yet it is remarkable, that though the oil, or the heavy *acid of vitriol* will not ferment with the *ſalt*, yet if you pour it upon the freſh ſalt, when it is neither diſtilled nor calcined, and mix them together, there will preſently ariſe a *volatile-penetrating-acid-ſulphureous ſpirit*, and will continue very ſenſibly for ſome time.

From what has been ſaid, it is evident, that a part of the *natural acid* in our waters is much more delicate, ſubtile and volatile than the common prepared *acid of vitriol*, which in this experiment drives away the *natural volatile acid* from its *alcali*, and fixes itſelf in its place. If you pour the oil of vitriol upon *tartar. vitriolat. glauber ſalt*, or *Epſom ſalt*, you will obſerve no penetrating ſpirit riſing up, becauſe in theſe *ſalibus neutris* the *acid* is as ſtrong, coarſe and heavy, as the *oil of vitriol* itſelf.

If you make the freſh ſalt of our waters paſs through a glaſs ritorte, the *volatile* and *moſt ſubtile part* will be ſeparated from the *acid ſpirit*, and will, like the moſt *volatile ſpirit* of *vitriol*, penetrate with a ſtrong ſulphureous ſmell, through the joinings and clay of the ſtill. This is the true *ſpirit* of the *mineral water*, which ſo many perſons have hitherto hunted after to no purpoſe; from three quarters of a pound of our *ſalt*, after having dried

dried it perfectly well, I had above three ounces of the acid volatile ſpirit, to which one muſt ſmell very gently, if he would not be half run through.

Whatever may be ſaid of the beſt *ſpirit of vitriol*, may be ſaid alſo of this *liquor*, it had a ſtrong taſte like the not *rectified ſpirit of tartar*, its *colour* was a *reddiſh yellow*, and when put upon ſilver, it made black ſpots in it. There was ſomething of a black ſoot in the neck of the ritorte, and which is very remarkable, above a grain of perfect ſulphur. In a ſmelting fire, our ſalt melts with an ordinary heat, more eaſily than *tartarus vitriolatus*, and becomes as fine and thin as water: if you throw a little *pulvorized ſmall-coal* upon it, or any other *fat oily thing*, and cover the crucible well, letting it ſtand for ſome time upon the fire, you ſhall have out of it a *hepar ſulphuris*, and you may obſerve a blue flame, and the uſual ſulphureous ſmell riſing from it.

This *hepar ſulphuris* has all the properties and effects of common ſulphur, when it is mixed and ſmelted with a *lixivious ſalt*; if you diſſolve it in water, and pour diſtilled vinegar upon it, you will have *lac ſulphuris præcipitatum*, which being dried and put into a glaſs or earthen veſſel, by ſetting it upon hot ſand, may be reduced to a formal yellow ſulphur, and out of this may be prepared an acid *ſpiritus ſulphuris per campanam*, with iron, *vitriol*, and with all kind of oils, *balſama ſulphuris*; ſo that all the uſual compoſitions and tranſpoſitions of ſulphur may be prepared out of it, as of common ſulphur.

In the foreſaid experiment the *acid* of our *ſalt* unites itſelf with the fat of the coal and other combuſtible things; and thus of the *fat* and this

acid

acid is formed a *real ſulphur*, but the *alcali* in the ſalt forms the *hepar ſulphuris*.

A real true ſulphur in no manner of way can be prepared with the acid ſpirit of common ſalt and ſalt-peter, and other acid ſpirits; from whence we may ſafely conclude, that the *acid ſpirit* of our *water and ſalt*, is the acid of ſulphur or vitriol; ſeeing this acid alone is only fit, together with a fat, to be formed again into a ſulphur, ſuch as it was before in the ſtones.

If our *ſalt* after it is freed from the *volatile ſpirit* by *diſtillation* or *calcination*, be compared with any of the known *ſalts*, which are prepared of the *acid* of *ſulphur* or *vitriol*, and a fixed *alcali*, it will be found to reſemble the *glauber ſalt* as much as any other whatſoever; neither is it unlike the *Engliſh Epſom* ſalt, but the quality by which it is diſtinguiſhed from both is, that a part of the acid of this ſalt is more delicate, ſubtile and volatile, and alſo contains in itſelf ſome *ſubtilized* particles of a *combuſtible ſubſtance* out of the ſtones, ſo that by the common acid of vitriol, and alſo by diſtillation it can be forced from its alcali, which is not the caſe with the glauber and *Epſom* ſalts.

If this ſimple truth, which has been explained under the fourth poſition, be duly conſidered, *viz.* that the *ſharp and acid ſpirit of the mineral waters* does not evaporate, but that uniting itſelf with the *alcali*, it forms *ſalia enixa* or *neutra*, and if the ſeveral alterations of the waters be rightly obſerved, our fifth poſition will be thereby greatly confirmed, which is, that the *acid ſpirit* of the waters, by uniting itſelf with the *alcali*, muſt let fall all the diſſolved particles of *iron* which it had aſſumed, and ſo the waters muſt loſe all their *vitriolick qualities*.

It has been already ſhewn that the waters contain a perfect *ſteel*, both from the reddiſh yellow earth which lies about the wells, and which, when ſmelted, is attracted by the loadſtone, and alſo from the yellow matter or ſubſtance, which being ſeparated both from the water and the other contents, and then ſmelted, is alſo attracted by the loadſtone; and it is certain, that the *Pyrmont* waters are ſo rich in ſteel, that no waters I know, can be compared to them in this point, and this will be manifeſt to any body that will be at the pains to compare the ſediment of a like quantity of any other chalibeat water with ours, and it will appear that there is not only leſs of the reddiſh yellow matter in it, but alſo that the colour of the other ſediments is much paler than that of ours; and any perſon of experience in examining mineral waters, may eaſily ſatisfy himſelf about it.

That the *ſteel* is united with the *acid ſpirit* of *ſulphur*, and thereby forms a delicate *vitriolum martis nativum*, is evident both from the taſte and ſmell, and from the known proof with gall, which in our waters makes a ſaturated purple-blue and reddiſh colour, is ſo manifeſt, that all authors with one voice acknowledge, that there is vitriol in all mineral chalibeat waters; but as all ſuch waters intirely loſe all vitriol qualities when put upon the fire, or when only expoſed to the open air, ſo that there does not remain the leaſt appearance of a real *vitriol:* this has confounded all authors, ſo that ſome have ſaid one thing, ſome another, but none of them has either found out, or explained intelligibly the true cauſes of the wonderful *loſs of the vitriol.*

It is well known that metals of all kinds when diſſolved by acid ſpirits, and brought into a tranſparent liquor, will, by mixing a ſubtile *alcaline earth*, or lixivious ſalt with them, be ſnatched from them and fall to the bottom, the *acid* joining itſelf more eaſily with the *alcali* than with the metal, ſo that this needs no further explication; and when we have ſhewn that there are ſuch like *combinations* and *precipitations* in mineral waters, then all the great difficulties which learned men form to themſelves, will fall to the ground; *viz.* how to explain why the vitriol is ſo eaſily loſt, either in the open air or by a gentle heat? and why it is impoſſible by art, to draw any vitriol from ſuch kind of waters?

Vitriol is not of ſuch a nature as to be deſtroyed by a gentle fire, as long as it has enough of water or moiſture by it, and yet it cannot be had out of waters, in which, when they are freſh, it is obſerved to be, by divers properties peculiar to it.

It is with the *vitriol* in mineral waters, as with a *ſolution of common vitriol*, when an *alcaline lixivium* is poured upon it; the acidum lets go the metal, and unites itſelf with the *alcali*, and with it makes a *tartarum vitriolatum*. The ſalt is formed after the ſame manner, and is of the ſame kind, and does not differ from it in any eſſential point; and when it is thus formed, the metal, ſteal or iron, which was diſſolved by the acid, falls to the ground like a yellow powder.

All the phænomena which one obſerves by inquiring into the mineral waters, do agree with this poſition, and may be clearly explained by the ſame. *E. G.* why ſo many globules of air ariſe out of the mineral water when it is warmed? whenever new combinations of different ingredients in the waters happen; whenever an acid

particle unites itſelf with an alcaline, the air is forced out of the interſtices and pores of the bodies, and extending itſelf into ſmall bubbles, and being lighter than the water, it is preſſed up to the ſurface. How many thouſand globules of air will ariſe from a ſmall piece of metal, when it is diſſolved by an acid ſpirit, and incorporated into it? On the contrary, when ſpirits fly out of any liquid, they go incognito without any tumult, ſuch as *volatile*, *burning*, *or ſmoaking ſpirits*; there is no noiſe, no air-bubbles.

Whence is it that the waters after ſome time cannot receive any tincture from gall? This is no more to be wondered at, than that ink loſes its blackneſs and becomes brown, when any alcaline lixivium is mixed with it. In neither of theſe liquors does the iron or the acid of vitriol vaniſh, but their particles are placed and combined after a different manner.

Whence is it that ſo ſpirituous a liquor does ſo eaſily turn to a flat inſipid water, and yet according to our hypotheſis, the ſpirits are not evaporated? This happens juſt after the very ſame manner, that the moſt corroſive *aqua fortis* may preſently by a little *alcaline ſalt* be made ſo blunt and mild, that one may afterwards eat it without receiving any injury, the ſpirit does not evaporate, but all that, which before made the *aqua fortis* ſo ſharp and ſpirituous, is yet in the liquor, and is to be found in the newly formed *ſale medio*, and may be brought out of it again, juſt as, we have already obſerved, may be done with our mineral water ſalt. From hence it is alſo eaſy to explain why hot mineral waters are not by much ſo ſharp, nor have ſo much of the wine taſte as the cold waters and precipitate the iron ſooner; for the great heat which follows upon ſuch like precipitations

and

and combinations, *&c.* as are occaſioned by the acid ſpirit that is in mineral ſtones, is in a great meaſure already over, while theſe waters were under ground, which alterations the cold waters do not undergo till they are above ground. And here it may be proper to conſider, the principal and moſt ſpecious objection which can be made to our hypotheſis, *viz.* why is it ſo long before the *acid* and *alcali* unite the one with the other in our mineral waters? why muſt the waters be warmed ſo long before this combination enſues; whereas on the contrary, chymical *acids* and *alcalis* do unite with great force, even in a moment?

The cauſes of this difference are as follows:

Firſt, As we have already ſhewn, that though the ſpirit of our mineral waters be the *acid of ſulphur* or *vitriol*, yet being a *natural ſpirit*, it differs from the common *ſpirit* prepared by art, and is mixed with a certain *ſubtilized fat*, whereby it is made more *gentle*, *delicate* and *volatile* than the common ſpirit of ſulphur or vitriol; and it is from this mixture of *ſubtile fat*, that the *ſpirit* ſeems to have its property of cleaving ſo cloſe to iron, as a metal which has in itſelf a great deal of *combuſtible ſubſtance*; when this *ſubtile fat ſubſtance* is, by means of the *air* and the *heat* which put all its parts into a new motion, ſeparated from the ſpirit, then alſo its particular *nexus* with iron ceaſes, and the acid ſpirit paſſes intirely over to the ſubtile alcaline earth; ſo that it is this fat and the iron, which keeps the acid a long time from mixing intirely with the *alcali*.

Secondly, The natural mineral *alcali* is not ſo *ſharp* nor *inſinuating* as the *artificial* is, as may eaſily be ſeen, if the *mineral ſalt* be diſſolved in water, and if diſſolved ſalt of *tartar*, or a *clean lixivium* of *pot-aſhes* be poured upon it, it will precipitate

a *ſubtile alcaline earth* from the ſalt, and join it ſelf with the acid in its room, and the *alcali* will remain ſtill in the water, without having any effect upon the acid, till ſuch time as the air and heat cauſe a new motion in all its parts.

The *natural acid ſpirit* as well as the *natural alcali*, in chalibeat waters has its peculiar character and property, by which they are both remarkably diſtinguiſhed from ſuch as are *artificial*; the *natural acid ſpirit*, as long as the water is not moved by the air, and the heat, continues to cleave faſt to the particles of iron, and does not preſently mix with the *alcali*; but it is not ſo with the *artificial acid*, for as ſoon as an *alcali* approaches it in any liquor, it preſently joins itſelf to it, and leaves the diſſolved metal, whatever it may be; yet this is not an eſſential difference, it is only in degree and time, and what the *artificial* effectuates in a moment, the *natural* performs but very ſlowly. And this is the true way to explain the ſeveral phænomena obſervable in the mineral waters; for other opinions are partly too ſubtile and incomprehenſible, and partly contrary to experience and the teſtimony of our ſenſes.

We come now to explain our ſixth propoſition, *viz.* That the *ſubtile ſweet alcaline earth in the mineral waters does far exceed the acid ſpirit in quantity, ſo that they muſt operate rather as an alcali than an acid.* And here we muſt ſhew what proofs we find of an alcali in our chalibeat waters, and that the acid ſpirit is far from being ſufficient to ſaturate all the alcali in them, but that in proportion there is ſtill a great quantity of *ſubtile alcaline earth* remaining over and above.

And, firſt, the freſh water ferments ſtrongly with all kind of *acid things*, E. G. wine, vinegar, ſpirit of nitre, *ſalt and vitriol.*

Secondly,

Secondly, It is not turned by the ſyrop of violets, and the juice of red cabbage, into a graſs-green colour, but becomes ſomewhat greeniſh; and when ſuch like juices, by being mixed with *acid things*, become of a high red colour, it reſtores them again to their blewiſh colour.

Thirly, A ſolution of *common vitriol* does firſt trouble the waters, and then by degrees intirely precipitates without any noiſe or efferveſcence, but the ſolution of ſublimate does not trouble the water at all, much leſs does it precipitate a reddiſh-yellow, orange-colour'd powder, as other ſharp *alcaline waters* uſe to do, for it requires a *ſharp ſaline alcali*, to bring this colour out of the ſublimate, bare *alcaline earth* will not do it, E. G. crabs eyes, prepared muſcles, and the like. It is manifeſt that, that part of the *alcali* of the waters, which is the moſt ſubtile, and fitteſt for mixing with the ſalt, is bound up by the acid particles, and that the remaining part of it is not *ſubtile, ſaline, and ſharp enough* to inſinuate itſelf into the compoſition of the ſublimate, and to precipitate the mercury, and give it a reddiſh-yellow colour.

Fourthly, When the *Pyrmont* water is mixed with ſweet milk, and boiled with it, it rather hinders it to coagulate, than any manner of way diſpoſes it for it, which would not happen, if the *acid* had the advantage or predominated in the water. Theſe experiments clearly and fully ſhew the *alcaline nature* of the waters; we ſhall now ſhew, that after the waters are all evaporated, there remains an *alcali* behind.

We have already ſhewn that the moſt ſubtile *ſaline, alcaline* part is bound up with the acid in the bitter ſalt, and that after evaporating the waters, there remains an *earthy alcali*, which has nothing of *ſalt* in it, will now appear. When

the *ſal amarum neutrum* is ſeparated from the ſediment of the water, there remains behind about two thirds of a taſteleſs reddiſh yellow earth, of which there is about 14 or 15 grains in one pound of water; of this there may be two grains reckon'd for iron, and about one third of it is a *materia ſelenitica*; ſo that there remains about eight grains of *cremor and ſubtile alcaline earth*, which will cauſe an efferveſcence and froth when mixed with *acid things*, and almoſt wholly diſſolve, and this *alcaline earth* is white as ſnow, and as fine and delicate as prepared mother of pearl, and it is inferiour to no *alcaline earth* in ſubtilneſs and virtue, which may be eaſily conceiv'd, ſeeing it cannot be diſcovered in ſo tranſparent and clear chryſtal water.

In my opinion, it is not difficult to diſcover the original of this *alcaline earth*; the *Pyritæ* have not only *ſulphur* and *iron* in them, but as they have the name, ſo they are really ſtones, and have a great deal of a ſtony hard ſubſtance, ſome more, ſome leſs; in ſome it is coarſe, in others ſubtile, fine and ſoft. When the *acid ſulphureous ſpirit* and the iron, which is in theſe ſtones begin through the moiſtening of the water, to operate the one upon the other, the ſtony ſubſtance is affected at the ſame time, and is penetrated, ſubtilized and diſſolved by the *mineral ſpirit*; the ſubtileſt part of the ſame mixing with the ſalt, joins itſelf to the heavieſt part of the acid, and ſo conſtitutes our *bitter mineral water* ſalt: when above ground the iron is ſeparated from the acid ſpirit, a part of the *alcali* is ſaturated by this *acid*, another part is the above mentioned *alcaline earth* or *alcali terreum*, and another part of this ſtony ſubſtance, is intimately mixed with ſomething of *an acid ſulphur*,

and

nd conſtitutes that matter which we made mention of in our ſeventh poſition, *viz.*

That there is in the *waters* a *clean, tranſparent, cryſtalline taſteleſs ſubſtance, like a lapis ſelenites, or like ſmall mountain cryſtals.*

When the water is diſtill'd very gently and ſlowly, and after it is almoſt wholly evaporated, this cryſtalline ſubſtance places itſelf all over the *alcaline cremor*, and the ſlower the waters are evaporated, the greater the cryſtals are, which ſometimes cannot be well diſtinguiſhed by the naked eye, but in a magnifying glaſs they appear in ſmall white ſhining particles, all made up of clear tranſparent prickles, preſently they become larger, and appear ty'd like ſmall brooms, there being a great many of them cloſely compacted and tied together at one end, and at the other end divided into a great many points; ſometimes they appear like ſo many ſmall, thin, tranſparent *lamellas*, and *quadrangular*, *oblong*, *flat ſmall figures*, which manifeſtly repreſent the *lapis ſelenites* to the naked eye. This matter is perfectly taſteleſs, does not grit under one's teeth like ſand, but is ſoft like the *ſelenites ſtone.*

Theſe cryſtals when either put near a gentle fire, or calcined upon a good fire, loſe all their ſhining and tranſparency, and turn to a powder whiter than ſnow, but it is not at all like lime; for it has no heat if you pour water upon it, nor is there any efferveſcence when it is mixed with acid things, ſo that it has all the chief qualities of the *ſelenites ſtone.*

The reaſon why I compar'd it to the mountain *cryſtal* is, becauſe this matter, according as the evaporation proceeds, quick or ſlow, turns into cryſtals that reſemble long ſpits and needles, whereas the *ſelenites ſtone* does commonly form it

ſelf into thin ſmall leaves one upon another, and ſometimes into clear broad Plates. And this may ſuffice concerning the volatile and fixed ingredients and contents of *Pyrmont* waters.

CHAP. III.

Of the chief virtues and effects of the Pyrmont *waters upon humane bodies; and of the diſeaſes which have been cured thereby.*

AFTER having fully examined and conſider'd the mineral contents of the *Pyrmont* waters, and what diſtinguiſhes them from common water, with the ſeveral remarkable circumſtances relating to them, we muſt now conſider their virtues, effects, and manner of working.

The mineral waters work according to all their incorporated ingredients together, and the ſafeſt and ſureſt way to learn the virtues and advantages of any water, is, by repeated experience and manifold examples; and we are not to reject all conſiderations *a priori*, providing we do not take for our foundation a chaos of chymerical ingredients, but the true anatomy of the ſeveral different parts of the contents of the water, for hereby we attain to a reaſonable practice, and hereby is experience confirmed, and render'd unchangeable; for otherwiſe it often happens, that phyſicians in their water deſcriptions contradict themſelves, and ſay ſo many abſurd things of the virtues of their water, that what one eſtabliſhes to day is confuted by another to morrow.

Before we take into conſideration the common effects of the water, we will firſt conſider and ſet before you theſe poſitions, we have already demonſtrated.

Firſt, The *acid ſpirit of ſulphur.*
2*dly*, The *vitriolum martis nativum.*
3*dly*, The *ſalt.*
4*thly*, The *ſteel* or *iron.*
5*thly*, The *alcaline earth.* And,
6*thly*, The *cryſtalline ſubſtance.*

Each in particular according to its peculiar known properties and effects.

The firſt is the *ſpirit of ſulphur.* That acid of *ſulphur* and *vitriol* is of the ſame ſpecies, is a thing agreed upon by the moſt learned chymiſts, and they can, as often as they pleaſe, without any difficulty, make vitriol out of ſulphur, and with the acid of vitriol make ſulphur, one out of the other.

That the ſpirit of *ſulphur* and *vitriol* is a medicament, which without any mixture of any other thing, may be taken without any danger or hurt, to 10, 15 drops, and ſometimes a ſcruple and more, is agreed upon by the learnedeſt and moſt experienced practitioners.

And this acid is ſo far from doing any hurt, that when it is taken with due regard to the conſtitution, and in due time and order, it ſtrengthens the ſtomach, reſtores loſt appetite, deſtroys the ſuperabundant bitteriſh ſharpneſs, both in the ſtomach and bowels, and alſo in the blood, and carries all ſuch matter entirely off by urine. This *acidum* has been found of great uſe in hot fevers, eſpecially in thoſe that are infectious, and it is uſual to mix in drink 12, 15 or 20 drops, whereby the very much thinned blood is a little thickned, and a putrid reſolution of it prevented, *&c.*

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As to what relates to the acid ſpirit of ſulphur or vitriol, which appears in our ſteel waters, we have ſhewn in the preceding chapter, that it is very like the *volatile ſpirit of vitriol*; ſuch a ſpirit has indeed a very ſtrong penetrating ſmell, but neither the *taſte* of it, nor the *corroding effect*, is by any means ſo ſtrong as a common *acid* of *vitriol*, or any other *acid chymical ſpirit*, yea it is gentler by much than *vinegar*, which we daily make uſe of.

The cauſe of the gentleneſs of this volatile ſpirit, tho' it is itſelf an acid of the ſame ſpecies as the common acid of vitriol (for the common ſpirit may be eaſily changed into a volatile, *& è contra*) we have already given, *viz.* that *the ſubtilized fat* that is mixed with it does indeed make the *acid ſalt particles* more *volatile*; but according to the manner of all oily and fat things, does blunt and remove their ſharpneſs and pointedneſs, and not only this, but the ſpirits of this water are freed from all gnawing and corroſive ſharpneſs, both by the diſſolved iron with which they are combin'd, and by the *alcali*, as in Poſition 6, 7. ſo that it is impoſſible that the acid ſhould any manner of way corrode the moſt ſoluble thing whatſoever.

On the contrary, the efficacy and virtue of ſuch a *volatile ſpirit* has been ſo much celebrated by many chymiſts and practitioners, againſt *epilepſies*, *palpitation* of the heart, *&c.* and for the ſpeedy *reſolution* of all ſorts of *obſtructions*, that if the half of it were true, it ought to be look'd upon as an excellent remedy; but the *natural* ſpirit muſt be more excellent, than that prepared by art. This *volatile acid* according to our fifth poſition, is united with the iron, and with it conſtitutes a hard *vitriolum martis nativum*, which is the

ſecond

ſecond ingredient we muſt here conſider according to its medicinal properties and virtues.

A *clean vitriol* of *iron* is not only daily made uſe of, by the beſt practitioners, as a ſafe and good remedy, but they give a doſe of it ſo far as 10, 12, 15 grains, and continue it daily one week after another. It opens obſtructions in the bowels of the lower belly, ſtrengthens the ſame, and by the gentle contracting virtue of the iron helps their too great relaxation, diſſolves ſlime, kills worms, *&c.* The much uſed and excellent *tinctura martis Ludovici Tartariſata* is made out of it, and the moſt cautious phyſicians make no ſcruple to give the vitriol of iron to children of a week old, in *pulvere abſorbente Wedelii.*

If notwithſtanding all this, any perſon ſhould be ſuſpicious of the *common vitriol* of *iron*, and ſhould look upon it as a *ſecret corroding acid*, yet let him not think the ſame of the *vitriolum martis* in our water, for according to the ſixth poſition, the *alcali* predominates in the water, ſo that the *acid* can never have any corroding effect, for as ſoon as an *acid particle* is looſened from the *iron*, it is preſently catch'd by the *alcali*, and ſo cloſely united with it, that it is with difficulty diſunited again by the power of the fire.

From this uniting of the *acid* with the *alcali*, does our *mineral water ſalt* proceed, as we proved under the fourth poſition, and have compared it *cum tartaro vitriolato*, and particularly *cum ſale mirabili glauberi*, and the *Engliſh purging ſalt.*

What excellent virtues, ſure and gentle effects, ſuch *ſalia media* have, which are formed of an acid vitriol, and an alcali, we are inform'd of by daily experience, we may alſo learn from the lofty titles given them, when they are

called

called, *ſalia polychreſta arcanum duplicatum* &c. Theſe *ſalts* thin and diſſolve all *ſlime*, hardneſs and *obſtructions* in the *ſtomach*, bowels, ſpleen, liver and other glandulous parts; they are reckoned the beſt *medicines* in fevers, cure all ſorts of agues, and are very ſuccesfully joined *cum bezoardicis fixis* in hot fevers; are very effectual in *ſwellings*, *dropſies*, &c. are *ſtrong diureticks*, and cleanſe the kidnies and bladder from gravel, ſand, *&c.* all which properties are well known; and theſe artificial ſalts are ſo gentle, that not only may one with ſafety take large doſes of them, but may continue to take them for many days ſucceſſively, without occaſioning any gripings or uneaſineſs; of this nature is the ſalt of our water, as we have proved under the 4th head, ſo that there is no reaſon to fear any corroſion, for as much as in one pound of water, there is not above ſeven or eight grains, and even that mixed and ſurrounded with a *predominating alcaline earth.*

We come now to conſider the *ſteel or iron*, which we find in our medicinal waters, and as *iron* in common life is the moſt uſeful of all metals, ſo it has had hitherto the pre-eminence, over all other metals in phyſick, and of it are prepared the ſafeſt, ſureſt, and moſt uſual medicines, yea the filings of *red Iron* are often preſcribed and taken to very good purpoſe.

The principal medicinal effect of *iron* in human bodies, is that it ſtrengthens and gently contracts all the bowels, in long illneſſes the fibres of all the inward parts are much weakned and relaxed, and by virtue of the *ſulphureous*, *dryed ferruginous earth*, they recover their natural ſtrength and firmneſs, and by the motion of it's parts all ſlimy tartarous obſtructions, if not too much hardned, are preſſed out of the ſeveral canals

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of the body; for which reaſons, the *ſteel* or *iron* water produces ſo excellent effects in *malo hypochondriaco*, *morbis matricis*, defects of digeſtion and all obſtructions whatſoever. The leſs iron there is in any mineral water, the ſooner may the bowels ſuffer injury by the uſe of the ſame, by opening and relaxing them too much, and the fibres of the nerves are thereby greatly weakned, but nothing like this can happen in the uſe of the *Pyrmont* waters, which abound ſo much in iron, in which thing no waters can come up to them, ſo that their virtues muſt be greater, and their uſe more ſafe.

The difference that there is between a rich *ſteel water*, and a *water* that has *little* or no *iron* in it, is very remarkable in the *Pyrmont* waters, for the longer you let them ſtand, till the iron ſeparates itſelf from them, the more do they purge, which every body experiences, that drinks them at home and at a great diſtance from the wells, (for ſometimes by warm weather, the water is very much altered in it's mixture, and the greateſt part of the iron fixes itſelf on the glaſs or earthen veſſels) and we hear them often ſay that the waters have more effect upon them at home than at the wells, and this effect they reckon by the frequent purging. But what advantage is there, tho' the body be never ſo well cleanſed by the ſalts and the water, if at the ſame time the bowels do not recover their due ſtrength, firmneſs and contracting motion? for when this is not the caſe, the hurtful humours do often gather again in the weak and ſlippery bowels as ſoon as they are expelled, ſo that the benefit ſuch patients reap by the water is very ſmall. There is one queſtion relating to the *iron* or *ſteel* yet remaining, viz. *whether the ſteel in the water performs it's effect as a vitriol, or as a cro-*

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cus martis. It has been demonſtrated in the preceding chapter, that the water when expoſed to the open air, and particularly by heat, as in the ſtomach and bowels, by degrees loſes, and lets fall all its vitriol qualities, and therein mixes itſelf with all kind of *acid bitter and groſs earthy matter*, and eſpecially the fat earthy particles cleave to the vitriol of iron, overcomes the ſame, and thereby forms a black ink colour, which we ſee by the excrements of ſuch as uſe the ſteel waters. The water leaves or throws off all its *vitriolick qualities* in *primis viis*, and ſuppoſe ſome *ſteel* ſhould be carry'd into the blood with the other contents of the water, yet it operates rather as a ſubtile crocus of iron, by ſtrengthning the relaxed ſolid parts, than by any prevailing vitriolick qualities proves hurtful to the nerves, as ſome authors imagine; but particularly the predominating ſubtile *alcaline earth*, (which is the fifth ingredient we are to conſider the effects of) does hinder both the acid and the virtiol of the waters to have any bad effect, as has been already proved; every nurſe knows what effect ſubtile alcaline earth produces in our bodies, and there are very few recipes for powder wherein we do not ſee crabs eyes, oyſter ſhells, mother of pearl, *&c.*

And that the *alcali* in our *ſteel water* is ſuch a *ſubtile earth*, and of the delicate fineſt ſort, which is diſolved in cryſtal clear water, we have already proved in the preceding chap. and it muſt have this ſame effect, and even greater, *viz.* to *correct* and *attract* to itſelf the *ſuperfluous acid-bitter* and *ſaline ſharpneſs* in the ſtomach and bowels, which afterwards, is convey'd out of the body by the cleanſing virtue of the water.

Finally, there remains the *taſteleſs cryſtal ſubſtance* of the water, and we muſt conſider if this has any medicinal

medicinal virtues. We have already obſerved, that this tranſparent cryſtal is nothing, but a pure *ſelenites ſtone.* This ſtone is a ſoft tender earth, which does not grit between the teeth, and it may eaſily be rubbed into a ſmall imperceptible powder.

If neither the powder of *crude* nor *calcined ſelenites* will make any efferveſcence with acid things, it is alſo well known to be the caſe, both of prepared mountain cryſtal, and of many precious and other ſtones, (*lapidibus pretioſis & minus pretioſis,*) which nevertheleſs are in great reputation with the beſt practitioners, for their medicinal virtues, eſpecially the prepared mountain cryſtal, which is found exceeding beneficial to both old and young, againſt ſuper abounding, ſharp *corroſive gall*, in *looſneſſes*, *fluxes*, *ſtone* in the *kidneys*, *palſies*, *fluore albo*, &c. and is often given to nurſes to increaſe their milk.

Tho' the *materia ſelenitica* is not ſo hard and firm, yet in other things it may well be compared with the *ſubſtance* of the *mountain cryſtal*, and upon the account of its tenderneſs and ſoftneſs appears to have more free entry into, and greater effects upon the humours of the body, and accordingly in my practice I have often made uſe of, not only the cryſtaline matter, but alſo of a pure *ſelenites ſtone*; in ſuch caſes in which the mountain cryſtal is recommended, and that both by themſelves and mixed with other things, and always they have *effectum precipitantem.*

Moreover the *lapis ſelenites* is not only made uſe of, for mechanical and external things, as paint for ladies, *&c.* but ſome very experienced phyſicians have made uſe of it as an excellent *antiſpaſmodicum* againſt the *Epilepſie*, *paroxyſms of the ague and the like.*

Theſe

Theſe are the properties, virtues and effects of all the *ingredients* which *conſtitute the mineral contents* of our water, and where the hurtful corroſive qualities lye, or what ingredient does corrode, is impoſſible to be diſcovered; on the contrary every one acquainted with the *materia medica* will confeſs,

Firſt, That the *Pyrmont* waters, according to the proven virtues of the ſeveral parts of their mineral contents, deſerve rather to be called ſweet than acid.

2*dly*. That every Day ſalts and other things are preſcribed to the weakeſt ſick people, and ſuch as are affected with inward diſtempers, which are ſharper and more griping than the contents of our waters, and conſequently all frivolous pretences about the ſharpneſs and great ſtrength of the water, *&c.* proceeding partly from envy, and partly from ignorance, do now fall to the ground. We muſt now conſider further how the freſh *Pyrmont* waters, with their united mineral contents, do operate in our body, and what are the effects that men commonly experience by them. The moſt obvious and beſt known operation of the waters, when drank in due meaſure is, that they greatly increaſe all the natural *evacuations* and *ejections* performed by the ſeveral organs of ſecretion and cleanſing of the whole body.

With ſome perſons the water occaſions a ſtrong ſalivation, which continues for ſome days, and carries off a great deal of phlegm or ſlime, through the glands of the mouth, throat and wind pipe; it affects the ſtomach alſo, and cauſes vomiting, and thereby a great deal of filth is thrown out. It alſo carries off by ſtool the groſs humours lodged in the bowels, this frequently laſts for ſome days and occaſions a very

ſenſible heat in the body. But for the moſt part it paſſes through the kidneys and bladder, and many perſons do daily make more water, or at leaſt as much as they drink. It occaſions a ſweat over the whole body, and even to ſuch as ſweat with great difficulty, or complain that for ſome years, they have never been able to ſweat regularly; and when the humours are very ſalt and full of gall, it occaſions an out-breaking over the whole ſkin, which ordinarily is ſoon gone, or is removed by bathing at the end of the cure. The ordinary bloody fluxes both in men and women, which are attended with ſuch bad conſequences, are cured by the waters in a more ſafe and ſure manner, than by any other known method whatſoever.

Theſe ſeveral cleanſings of the body are carried on in ſo gentle a manner, if men proceed regularly, that no medicine is to be compared to it, and altho' ſome have repreſented it as too ſtrong, yet all that have drank it regularly, know the contrary by experience.

And not only does it viſibly produce the foreſaid effects, but according to the parts of its mineral contents, it muſt alſo produce theſe following effects requiſite for reſtoring of health, *viz.* it corrects the ſaline bitter and ſharp humours of the ſtomach and bowels, alſo changes and ſweetens the whole maſs of humours, and it diſſolves, attenuates and ſeparates, all obſtructions of the lungs, kidneys and ſmall veſſels of the body, and carries off all kind of impurities through the ſeveral excretories.

And as it is very common in broken conſtitutions and weak bodies, tho' ever ſo well cleared of all hurtful humours and obſtructions, yet they eaſily breed and grow again. But by the uſe of

the waters the tone and elaſticity of the ſolid parts and fibres is, by means of the *ſulphureous balſamick ferruginous earth* contained in them, reſtored and ſtrengthned, and thereby all new gathering of hurtful matter and juices in any parts of the body prevented and hindered; ſo that all theſe things conſidered, it is evident, that when among all the means of recovering health, any one ſhall be found deſerving the name of a *panacæa*, it muſt certainly be the mineral waters, and according to the forementioned circumſtances, the *Pyrmont* water muſt be one of the beſt. And particularly, God has provided the mineral water as a ſingular remedy againſt all chronical diſtempers (except a very few) provided they be not too much rooted and inveterate; and in the opinion of the learneded and moſt expert practitioners they are the laſt *aſylum*, after men have gone over all the *predicamenta remediorum* to no purpoſe.

So that it is abundantly evident by innumerable inſtances, that it has a wonderful effect in manifold diſtempers, to which human nature is liable, as thoſe of the *head*, *apoplexies*, *delirium*, *loſs* of ſleep, and all defects of the outward ſenſes, all diſeaſes of the breaſt, and ailings of the lungs, by ſweetning the ſharp ſaline humours, tepmeating the boiling heat of the blood, and ſtrengthning the parts by its contracting, healing and balſamick virtue; and here it is to be obſerved, that in diſeaſes of the breaſt, it muſt not be drank cold but lukewarm, otherwiſe by its coldneſs it may prove hurtful. It is alſo good againſt all diſorders of the ſtomach, loſs of appetite, defects in the digeſtion, palpitations of the heart, *&c.*

And in the bowels, againſt all pituitous, flatulent and bilious cholicks, deſtroys and carries off all worms, when all other means fail, and alſo

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in paralytick diſorders, convulſions and cramps, ſcorbutick eruptions and ſpots, ſwellings and gouts, *&c.*

It attenuates, ſeparates and ſweetens the thick viſcous ſharp and bitter blood, cures both the beginning and remains of the *lues venerea*, *ſcurvy*, *cachaxies*, &c.

And in women it cures all obſtructions of the *menſes*, *green-ſickneſs* and *decolorationes menſium*, *relaxations* of the *matrix*, and parts belonging to it, *barrenneſs*, &c. I could confirm all this by manifold examples, and thereby compoſe a compleat courſe of medicinal hiſtory and cures performed by the *Pyrmont* waters, which would give great light to practice, with reſpect to mineral waters, but muſt delay it till another opportunity.

CHAP. IV.

Of the way and manner of drinking the Pyrmont *waters, ſo as to profit thereby, both with reſpect to the ſeaſon, preparation, quantity, order, cold, or heat, continuation, diet, medicines, according to the difference of age, ſex and conſtitution, and how to obviate and prevent accidents and obſtacles during the cure; and laſtly, concerning the effects of the water after the patient has left off drinking.*

HItherto we have given an account of the virtues and effects of the waters for recovering the health, and now we ſhall lay down certain rules which are to be obſerved in the uſe of them, in order to attain ſo excellent an end; and ſo much the more neceſſary it is to do this, becauſe experience teaches us, that not only the mean

for recovering of health, but even our natural nouriſhment, if not made uſe of in due meaſure and order, does more hurt than good, and inſtead of helping, does really deſtroy the body.

The firſt thing to be conſider'd is the *ſeaſon*; we have already obſerv'd that our waters have a like virtue in all times and changes of the weather, ſo that at all times of the year, when it is judged fit by a skilful phyſician for the patient, wearied with other medicines, the waters may very ſafely be uſed; for there is no month in the year wherein we cannot ſhow, that the waters have had the deſired effect; but ſeeing the waters are moſtly drank cold, and the cure is in itſelf rather temperate and cold, than hot, ſo it may eaſily be obſerved that the months of *May*, *June*, *July* and *Auguſt*, are the moſt convenient; for in this ſeaſon there is better opportunity for motion and exerciſe of the body in the open air, and taking ſuch diverſions as are very neceſſary during the cure.

As for ſuch as cannot drink the waters at the wells, it is to be obſerved, that it is beſt for them to drink them in the months of *March*, *April* and *May*, before the heats come on; for the waters being then carried to very diſtant places, are heated upon the road in the day time, and cooled again in the night, whereby their ſpirituouſneſs is very much abated, and the ſteel particles thrown upon the ſides of the veſſels wherein the water is contained, which does not happen when the water is drawn and carried away in cool weather, and afterwards put into cool cellars till it be uſed.

Some phyſicians are for beginning to drink the waters a week, or three or four days before the full moon, that ſo they may have done by the end of the moon, when the humours of the body

dy are more eaſily purged away; but as no body can know before-hand how long they muſt continue the cure, which depends upon the effect the waters have, therefore this method ſeems to have very little in it.

The moſt proper time of the day is the *morning*, *faſting*, after the body has been ſtrengthened and refreſhed by reſt; for then the ſeveral excretions occaſioned by the waters are beſt performed; and it is beſt to wait till the ſun has diſpelled the moiſture of the night, and warm'd the air a little, before you begin; and it ſeems beſt to get up about five a clock, and before ſix, or there-about, the moiſture upon the body occaſioned by the bed will be moſtly over, and then from ſix to eight is the moſt convenient time, even for ſuch as take the largeſt doſe; and in four hours, *viz.* from eight to twelve, which is the uſual hour for dinner at the wells, the waters have their greateſt effect, provided they paſs tolerably well. When you begin too early, you are in danger of ſuffering by the cold, and by waiting too long for dinner after you have done drinking, the appetite becomes too ſtrong.

It has been an old cuſtom about four of the clock in the afternoon, after the digeſtion is finiſhed, and the ſtomach diſburdened, to drink ſome glaſſes of the waters; but this is no neceſſary part of the cure, though it may be done if one be thirſty, and has a deſire to it; but to drink as much in the afternoon as in the morning, as ſome have done, is certainly very hurtful; for it is contrary to all reaſon, when nature is employed to prepare and diſtribute the nouriſhment for the preſerving and ſtrengthening of the body, then to divert it from its work, and put it upon excretions and evacuations.

2*dly*, We muſt conſider the *preparations* for the cure. They that are uſed to let blood about the time of the Equinox, ought not to omit it, if they deſign ſoon after to make uſe of the waters, and it is very proper for ſuch as have much blood and very hot; and experience teaches us, that it is beſt for moſt patients to do it ſome time before they begin, conſidering that the ſtomach and other internal parts, after letting of blood, are with many for ſome time more tender and weak, and ſo more eaſily hurt by the coldneſs of the waters; and conſidering that ſome are more liable to evacuations, by which nature is ſoon exhauſted, it is beſt not to fatigue one's ſelf too much, and ſuch as come long journies to drink the waters, ought to reſt themſelves a day or two before they begin.

Purging before you begin to drink the waters, which was looked upon as ſo neceſſary by all the ancient phyſicians, is now rejected by ſome of the modern, as hurtful or uſeleſs. It is very ſtrange that both parties make uſe of ſuch general terms without any difference, ſeeing the conſtitution and ſtate of the body, as alſo diſeaſes, with their ſeveral circumſtances and accidents, are ſo different, that no rule here can be ſo general as not to have its exceptions. Sometimes the ſtomach, the bowels, *&c.* are ſo filled up and ſtopt with glutinous ſlime, which the water, being a gentle cleanſer, cannot ſo ſoon remove out of the way; ſo that it is much hindered thereby in its free operation; and ſometimes patients a little before have been purged and vomited, and there is no ſuſpicion of any filth in the *primæ viæ*; ſo that they have no occaſion to be purged again; theſe others may be prepared for drinking thewaters by ſimple digeſtives, or opening ſalts; but where ſtronger

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purgantia are neceſſary in *forma pilular' pulv' infus' potionis, elixiris, &c.* without which the waters will not paſs freely. It is the phyſicians buſineſs to judge what is fit to be done, and to determine according to circumſtances, and not *tanquam extripode* to treat every body alike.

3*dly*, As to the *meaſure* it cannot be intirely determin'd, how much every body ought to drink, but according to every body's conſtitution, diſtemper and the working of the waters, the doſe is to be meaſured, for with ſome, they operate but ſlowly, with others preſently; 3, 4, 5, 6, pound has been found ſufficient, and to operate both by ſtool and urine, and I never allow the ſtrongeſt to drink above 8 pound. The firſt receive into their body about one fourth of an ounce of the mineral, and the others in proportion, which is enough for a doſe, and this far exceeds what Dr. *Slare* allows in his treatiſe, ch. 6. § 13. And in *England* uſually, they don't drink above 3 pound, which is about a flaſk; we are not againſt ſmall doſes here, nor do we approve of it when weakly perſons drink too much; but daily experience ſhows here at the wells, that moſt of the water drinkers, drink with good appetite between 5 and 6 pound, and find no inconveniency by it, but very good effects, when they do it with caution, and obſerve our rules. On the contrary, the water gives greater uneaſineſs when drank in ſmall quantity, and it is with it as with other evacuating medicines when not taken in ſufficient quantity, which move, but do not carry off, conſequently nature is not lightened, but more burdened thereby; this is the cauſe why we keep to a middle portion in the annexed meaſure and doſe.

In what order any one of theſe meaſures and quantities are to be drank, may be known by the following rules.

1*ſt*, The glaſſes ought not to be bigger, than to hold one fourth of a pound.

2*dly*, Such as are of middle age, and have ſtrong bowels, may drink every quarter of an hour 3 or 4 ſuch glaſſes one after another.

3*dly*, Such as have not ſufficient internal heat, and find a ſenſible uneaſineſs from the coldneſs of the water, may drink two ſuch glaſſes every half quarter of an hour, or only one half pound at a time, that ſo the bowels may be able to warm the cold water.

4*thly*, Tho' the ſaid glaſs meaſure be but ſmall, yet it ought not to be drank at one breath or draught, but by degrees, for thereby the water looſes ſomewhat of its coldneſs in the mouth, and ſuch as fear that it looſes its ſpirit, when they drink it ſlowly, know not what the mineral ſpirit is.

5*thly*, In this manner one may drink the firſt morning between 2 or 3 pound, the 2*d* between 4 and 5, and the 3*d* morning 6 pound, and ſo continue as many days one after another, as the circumſtances and conſequent effects ſhew that it is proper.

6*thly*, One is not tyed down ſo intirely to this method and order, as not to dare in one morning, to drink two glaſſes more, and in another two glaſſes leſs; but every body is herein to regulate himſelf, according to his appetite, and according as it works.

7*thly*, Caution in leaving off by degrees, is not ſo neceſſary as when you begin, for the bowels cannot then ſuffer ſo great an alteration by leaving off water, as they did when the faſting ſtomach was unaccuſtomed to the cold *regimen*.

8*thly*,

8*thly*, Such as drink it warm, may without danger drink larger glaſſes and faſter, yet muſt not exceed meaſure and number; and the way to warm it, is to put the water freſh out of the well into a glaſs bottle or earthen veſſel, and after ſtoping it well with a cork, to put it into a kettle full of warm water, till ſuch time as it loſe its great coldneſs, and according to the conſtitution and diſtemper, even till it be milk warm. When the waters are drank warm at the wells, they don't loſe ſo much of their ſpirit, as when they are carried far from the wells, as experience ſhews.

For *firſt*, the red ſteel earth does not fix itſelf upon the ſides of the veſſel wherein it is warmed, as it does upon thoſe wherein it is carried to a great diſtance.

And *ſecondly*, the waters by gall thrown into them, become as black when they are warm, as when they are cold, which does not happen when the waters have intirely loſt their ſpirits; and indeed the waters are ſo full of ſpirits, that a ſmall loſs of them is not diſcernable, ſo that after being warm'd, they have all the ſame effects as when cold; moreover we know by experience, that ſuch perſons as have not been able to drink them cold, have by warming them had all the ſucceſs they could deſire.

The next thing to be conſidered is, how long the waters are to be drank; we cannot fix upon any certain number of days, but every one muſt govern himſelf according to the nature of his diſtemper, and the effect of the waters; ſome finiſh the cure in 10, 12, 14, days, others cannot leave them off without damage, till they have drank them 3 or 4 Weeks; and we have an inſtance of drinking them every day for 3 months, and alſo of repeating the cure twice in the year at leaſt, with great

great advantage to health: nevertheleſs the following rules with reſpect to the continuation and length of the cure are to be obſerved.

1*ſt*, The beſt and ſafeſt way is, not to drink too much at a time, leſt thereby you do violence to nature; but rather to continue the cure 3 or 4 Weeks longer.

2*dly*, You may begin to drink the waters for a little while in the month of *May*, and afterwards proceed in the month of *July* and *Auguſt*.

3*dly*, When the waters agree perfectly well with you at firſt, and ſo continue, if the diſtemper is not inveterate and deeply rooted, the cure may be finiſhed in 14 or 16 days.

4*thly*, If the Waters begin only to paſs very well, after you have uſed them 8 or 14 days, as it happens with many people, it is eaſy to obſerve, that it is neceſſary to continue to drink them longer, till the obſtructions be ſufficiently removed, and the body thoroughly cleanſed.

5*thly*, How many years, one after another, it is neceſſary to repeat the cure, every one will be able to judge for himſelf, by conſidering the ſtate of his own health in the after part of the year; but we have many examples that the 1*ſt* and 2*d* year the waters made no alteration in the diſtemper, nevertheleſs the third or fourth the patients were perfectly cured.

6*thly*, Such as have been accuſtomed to drink the waters ſeveral years, cannot without injury to their health leave them off, for at the return of the ſeaſon of the year they feel their old diſtempers again, which never leave them till they return to their uſual cure. But it is not neceſſary to confine one's ſelf to drink the waters every year, but they may forbear till ſuch time as they feel ſome ſymptoms of their diſtempers, neither have they, that

drink

drink them yearly, any reaſon to fear that at length nature will thereby be weakned and conſumed before its time; ſeeing a great many perſons, and ſome yet living, have drank them 30 or 40 years ſucceſſively, and ſometimes twice a year, even after they were ſeventy years old, and ſtill with good ſucceſs.

7thly, It is without any foundation what ſome pretend, *viz.* that the clearneſs of the urine, and the excrements not being any more of a black colour, is a ſign that the patient ought to leave off drinking the waters; but they ought to continue, till ſuch time as they find their bodies ſenſibly eaſed, and remarkably altered and cleanſed; when they begin to grow weary, and to nauſeate them, then they ought to leave off. And if any perſon is not ſatisfied with this advice, let him conſult a phyſician what is fit to be done, all circumſtances conſidered, that ſo he may neither have too much nor too little of a good thing.

The next thing to be conſidered is the *dyet*, which by the antients was called the *life* and *ſoul* of all cures, and without it our waters ſignify but very little. Dyet conſiſts, not only in eating and drinking in a regular way ſuch things as are wholſome, but it comprehends alſo the ſtate and condition of the *air*, *motion* and *reſt*, cleanſing of the body, ſleeping and waking, and alſo the exerciſe of the mind.

As to eating there is no reaſon to confine one's ſelf ſo much as ſome phyſicians pretend, who will not allow their patients, while drinking the waters, to eat any garden herbs, and other harmleſs things; but what is chiefly to be avoided is hard, heavy, ſharp, acid, ſalt, high-ſeaſoned victuals, all too new ill baken bread, greaſy cakes and baked meat, peaſe and beans, bacon and pork,

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old and tough meat of whatever ſort, either freſh, pickled, or dried in the ſmoak, all glutinous and ſlimy parts of animals, as calves heads and feet, brains, liver, ſalt and dried fiſh, all ſlimy and viſcous fiſhes, ſuch as, old pikes, tench, eels, *&c.* all raw fruit, melons, cucumbers, muſhrooms and ſalads, whereby the bowels are filled with ſlime, relaxed and cooled, which occaſion hurtful looſneſſes, cholicks, *&c.* But there are a great many things in kitchen gardens, which may not only be eaten with ſafety, when young, tender and well done, but are very proper and fit nouriſhment for ſuch as drink the waters, for they gently open the body, and ſo promote that which the waters, generally ſpeaking, do occaſion to moſt patients; but we except ſuch perſons as either have an averſion to garden ſtuff, or feel any uneaſineſs after eating it.

As to *milk dyet*, we will by no means adviſe it, ſeeing there are many who do not agree with it, even when they are not drinking the waters, and it might, in the mean time, diſpoſe them to looſneſſes, but that it is ſo dangerous and hurtful as ſome phyſicians would make it, as if the acidity of the water did curdle the milk, is both falſe, and without any foundation, for we have proved that the waters by their predominant alcaline earth rather hinder than occaſion the curdling of the milk; and as it is uſual to prepare the body for a milk dyet by alcalis, ſo I have found by experience both from myſelf and others, that a milk dyet agrees better with one rather after the cure than before it, and even during the cure, by many inſtances I have found it to be harmleſs and innocent, and very lately a hypocondriacal perſon of a very weak conſtitution, who lodged in my houſe, did for 4 weeks every evening ſup upon

ſweet

ſweet milk and bread, and next morning drank 4 pound of *Pyrmont* water, which had ſo good effect, that he was happily cured of his diſtemper.

It is not fit to dine till 4 hours after having done drinking, ſo that they who drink from 6 to 8, ought to dine at 12, and they that drink from 7 to 9, at 1 o'clock, and tho' the waters ſhould paſs in 2 or 3 hours or ſooner, yet it is beſt to let it be full 4 hours before eating, and to eat nothing at all before dinner, that ſo the waters may work without any diſturbance.

The patient may eat heartily at dinner, providing he don't eat too faſt, and chew it well, for commonly the waters ſharpen the appetite, ſo that many eat too faſt, and their victuals not being ſufficiently maſticated, do often occaſion indigeſtions, and ſeveral other inconveniences, and as variety of diſhes tempt to eat too much, and ſo over load the ſtomach, it is better to chooſe one good diſh, that ſo too much eating may not delay or hinder the cure.

Supper muſt not be too late, not after ſeven o'clock, a ſmall ſoope and a little boiled meat, which is better than roaſted, it muſt be ſomething that is eaſily digeſted.

People of diſtinction are frequently too negligent with reſpect to this article; for as they uſually frequent balls and other diverſions, they cannot leave them off while they drink the waters; they ſup at 9, 10, or 11 a clock, when by protracting the time of ſupper, and motion of the body, their appetite is ſharpened, and they eat more at ſupper than dinner, and preſently after go to bed; ſo that they have a reſtleſs night, and in the morning, which is the fitteſt time for the waters, their body is quite tired, and their ſtomach full of crudities.

As to *drink*, it is beſt for every body to make uſe of that they are moſt accuſtom'd to, and which agrees beſt with them; and if they make uſe of beer, it ought to be good and freſh, neither too new, nor too old, but well boiled, clear and brisk.

It is a groſs miſtake to think that the waters weaken the ſtomach, therefore it is neceſſary to ſtrengthen it with wine, for on the contrary the *Pyrmont* water fortifies the ſtomach, as experience ſhews, for many, who having entirely loſt their ſtomach, through long looſneſſes, *lienteries*, *&c.* have perfectly recovered it by the uſe of the waters, and ſuch as with any reaſon complain of weakneſs of ſtomach after the cure, owe it wholly to themſelves, having either by a diſorderly diet, drinking the water cold, or too much at a time, brought it upon themſelves. However, a glaſs of good wine at meal-time taken moderately is of great ſervice during the cure, for thereby the ſtomach is warmed and fortify'd, the digeſtion forwarded, and by its diuretick virtue the remainder of the water carried off, good *rheniſh* wine, neither too acid, nor too ſtrong, is beſt, for old ſtrong *rheniſh* wine ought rather to be taken as a medicine in ſmall quantity than otherwiſe; good *French* wine is alſo of great ſervice, and indeed the choice of the wine ought to be left to every body's liking, only wines that are ſtrong and apt to heat the body, are to be made uſe of as cordials, and ſmall wines are moſt proper to quench the thirſt.

If one be thirſty about an hour or more after eating, a diſh of tea or coffee can do no hurt, providing one don't drink too much of it, and thereby relax the bowels too much; and I don't think it adviſable to drink *Pyrmont* water at meals,

or to mix it with wine, tho' the inhabitants thereabout are accuſtomed to drink it without any inconveniency, but to ſuch as are not uſed to it, it muſt prove hurtful, for it carries the victuals too ſoon out of the ſtomach, which is very prejudicial.

The next thing to be conſider'd, is the *air and the weather*, and tho' theſe are not in mens power, as eating and drinking, yet they ought to conſider how their bodies are affected thereby, and as the air conſtantly ſurrounds, and preſſes upon our bodies, the pores, and alſo the motion of the liquids in the external parts of the body, are much alter'd, changed, and inſenſible perſpiration ſometimes increaſed,at other times much leſſen'd, or intirely taken away thereby; and the ſeveral changes of the weather occaſion various changes in the body; ſo that the effects of the waters upon the ſame perſon and diſeaſe, are not always alike, but exceeding different and various. Tho' a *temperate, warm air* is beſt for drinking the waters, yet this not depending upon our choice, it frequently happens, that we have a hurtful, cold and moiſt air, as well in the *Dog-days*, as in the month of *March*, and if at ſuch a time one is either drinking the waters, or come to the wells for that purpoſe, he muſt not wait for good weather, but muſt go on, and guard againſt the bad effects both of wind and weather, the beſt he can; and the beſt and ſafeſt way is, to warm the waters a little, as if it were in winter, and to keep by a good fire, and in a large room, where there is conveniency for walking. And as there are ſome perſons very phlegmatick and weakly, who cannot endure the cold, it may be proper for them to drink it in bed, and a very little warmed, providing they don't make a cuſtom of it, but

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after they get up, to uſe ſo much the more motion ; but ſuch as are robuſt and of a hotter conſtitution, and will notwithſtanding the cold, drink the waters at the wells, and ſo enjoy a freer air, they ought to cloath themſeves well, drink but ſmall glaſſes at a time, and thereby prevent all hurtful colds.

Very warm air, hot and ſultry weather is very inconvenient while one is drinking the waters, for too much ſweating delays and hinders their good effects ; in ſuch a ſeaſon, it is beſt not to neglect the cool of the morning, and to frequent cool and ſhady places.

We come now to the *motion* and *exerciſe* of the body, which ought to be conſidered as a neceſſary part of the diet ; and here, care muſt be taken that the motion be not violent, and thereby the blood be over-heated, and ſo occaſion immoderate ſweating ; but the motion muſt be agreeable to the weather, according as it is hot or cold.

As to cleanſing the body, great care muſt be taken, that it be kept open, and that the urine come away plentifully. There are many celebrated mineral waters that operate ſtrongly by urine, but open the body very little: on the contrary, *Pyrmont* waters promote excretion both ways in ſuch a manner, that there are very few in proportion, who have any reaſon to complain, and experience teaches how much it lightens the body, and of how great advantage it is, after the waters work plentifully by urine, if they occaſion ſome ſtools alſo; and the beſt Phyſicians adviſe, that when the waters themſelves have not this effect, it ought to be procured by ſome relaxing medicines, and, indeed, when this is neglected, the conſequences are very bad.

In thoſe diſeaſes which have their ſeat in the ſtomach, bowels and other contiguous viſcera, the working of the waters by ſtool contributes much to the cure; but when the whole *maſſa humorum* wants to be altered, thinned and ſweetned, and the kidnies and bladder cleared of ſand and ſlime, or the lungs and other viſcera freed from obſtructions and ſuperfluous ſharp humours, the nerves ſtrengthned and opened, and alſo the diſeaſes of the external and ſolid parts removed, in ſuch caſes the working by urine is preferable, for whatever paſſes by urine, muſt by the circulation of the blood, be carried through all the parts of the body, ſeeing we know no other way it can come at the kidnies and bladder, ſo that the mineral waters muſt carry their medicinal properties through the body, and by mixing with the ſeveral humours and touching every part produce their effect.

As to *ſweating* it is a very common and beneficial excretion during the water-cure, for thereby a great deal of what is hurtful to the body is carried off. But ſweating in the morning while you drink the waters, if they have not begun to paſs either by urine or ſtool, muſt by all means be moderated or intirely prevented, for thereby the waters are by the blood carried too much towards the external parts of the body, which hinders them to be carried off either by ſtool or urine, which muſt neceſſarily give great uneaſineſs to the body, and this is the reaſon why ſuch as perſpire ſtrongly, and are liable to much ſweating, always find that the waters work beſt with them, as they call it, when the weather is pretty cool; for then their pores are more ſhut, and the moiſture or humours of the body are more preſs'd towards the inward parts.

Sweating after the waters are gone off by urine and ſtool, and upon moderate motion, is very wholeſome and beneficial; but when one begins the cure, it ought to be prevented as much as can be in the night-time, and ſuch as are ſubject to it, ought to put on warm cloaths as ſoon as they can in the Morning, and not expoſe themſelves too ſoon to the cold morning air, but walk for ſome time in their chambers, till it be entirely over.

The beſt time to ſleep during the cure is from nine or ten at night, to 4 or 5 a clock in the morning, and they take beſt care of their health, who after ſupping at 7 a clock, do walk a little, and then go to bed by times, without any regard to company or diverſion; for hereby they will procure quiet ſleep, and greatly forward their cure.

Sleeping in the middle of the day, about which ſo much has been ſaid *pro* and *con*', may be eaſily prevented, by eating moderately, and not over-burdening the ſtomach, drinking but little wine, keeping in company, and not ſitting ſtill, *&c.*

The exerciſe of the *mind* ought alſo to be conſider'd; for upon the temper of the mind the cure very much depends; wherefore it is neceſſary to guard againſt all *envy*, *jealouſy*, *anger*, and other hurtful paſſions, and to uſe all endeavours to be of a *contented*, *chearful ſpirit*.

As to phyſick during the cure, it muſt conſiſt of few choice things, for the *Pyrmont* waters contain in themſelves ſeveral rich medicinal ingredients, and ſo need leſs aſſiſtance from other medicines. The ancient *well-phyſicians* have made long regiſters of remedies, that the water-drinkers ought to make uſe of according to them; and indeed a patient that muſt go through the ſeveral claſſes of the *materia medica* may well be terrify'd;

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ſome of the *moderns* reject all phyſick during the cure, and commonly human underſtanding falls from one extream to another. It would be too tedious and by no means neceſſary to preſcribe here for the ſeveral diſeaſes we have mentioned, only we propoſe it to the conſideration of practitioners, and refer it to the experience of every one, viz. *That* in *the cure* of *many diſtempers* the *waters give effectual help* and *aſſiſtance to other remedies.*

As to the common and ordinary medicines which patients make uſe of when they drink the waters; we have ſaid ſomething already relating to the preparation of the body; during the cure, relaxing medicines, and ſuch as ſtrengthen the ſtomach are moſt uſed, and amongſt thoſe that are relaxing, the opening and mollifying *ſalts* have the preference in the preſent practice, ſuch as *tartarus vitriolatus*, *ſal polychreſtum*, *cremor tartari*, *ſal anglicanum catharticum*, *ſal mirable glauberi*, &c. and ſeeing ſuch like ſalts agree with the natural ſalts of the water, it is reaſonable, when the waters do not operate either by urine or ſtool, to forward them by ſuch ſalts, and we know by experience, when they are well prepared, they neither heat nor gripe, but paſs with the water, either by urine or ſtool, and when it is neceſſary, they may be frequently repeated.

It would be beſt indeed to make uſe of the *Pyrmont water*'s own *ſalt*, but there being only 7 grains in a pound of water, and the charge and trouble of preparing it being great, the ſalt that comes neareſt to it in it's properties will anſwer the end; one kind of ſalt agrees with one, and another with another, and indeed few patients have any occaſion for them, the water's own ſalt and virtues being ſufficient. Other purgatives

are not to be rejected, and whereas both the waters and ſalts work ſometimes only as digeſtives and mollify the peccant humours in *primis viis*, &c. and make them moveable, ſo that in a long cure, a ſtrong purging medicine may be very beneficial and carry off intirely all filth, and not a few patients are thereby much eaſed, and their cure goes on more ſucceſsfully, and for theſe reaſons it is ſafeſt, and at the end of a cure, to take a purging medicine, not too gentle, that thereby all hurtful, ſlimy, obſtructing matter, ſoftned and made moveable by the waters, may be carried off; and ſuch a medicine may be given in any form, as agrees beſt with the patient, but what they call *night pills* are beſt and moſt ſerviceable, if they be made of good *reſolvent gums*, *extractis amaris* and ſuch like, and they may be ſo prepared, as after 6 or 7 hours ſleep, to work gently in the morning, and if they be taken in the beginning or middle of the cure, one may drink ſome water upon them in the morning without any prejudice, but towards the end of the cure it is beſt to drink after the pills, ſome tea or thin ſoope in the morning.

As to *ſtomachicks*, which during the cure are uſually made uſe of before eating, it is not to procure a good appetite, which without them is generally ſtrong enough, but the chief reaſon is, that when the digeſting juices of the ſtomach are too much carried off and leſſened by the great quantity of water, or when the ſtomach and the contiguous viſcera have ſuffered by the coldneſs of the water, and thereby indigeſtion is occaſioned, the gentle warming aromatick eſſences contribute to reſtore the ſaid juices to the ſtomach, and the neceſſary heat to the bowels; but theſe medicines muſt be adminiſtred according to the conſtitution of patients.

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As to the difference of age; we have already ſhewn that the *Pyrmont* waters are not to be rank'd among the ſtrong and rough medicines, but rather among the ſure and gentle ones, ſo that neither aged perſons nor children are to be excluded from them, with this proviſo, that children be not ſo tender and young, as not to be capable of direction, and being kept in order; and aged perſons not intirely ſpent and decay'd. When children are above ſeven years old, and old perſons have ſome ſtrength, other circumſtances duly conſider'd, we have many inſtances, that the water is neither too ſtrong nor too ſharp for them, but may be of very great benefit to them; but they muſt be very careful to obſerve the preſcribed rules, particularly, to drink little, ſlowly, and a little warm.

Some are of opinion that cold mineral waters agree beſt with men, and warm, beſt with the female ſex, and this is neither without ground nor experience, for ſeeing the female ſex is more phlegmatick, and leſs accuſtomed to cold drink than men, they generally ſpeaking agree better with warm, and ſuffer by cold drink. From this we may conclude, that if the mineral water be a little warmed, it will agree as well with the female ſex, as what is naturally warm, and they ought to take care to forbear drinking the waters 3 or 4 days during their *menſes*; and ſuch as are with child would do better to have a little patience, or if they cannot bear their indiſpoſitions ſo long as nine months, they ought to ſeek relief by other means, which will not occaſion ſo great and frequent evacuations; yet I have known ſome Ladies of a delicate conſtitution, that have drank the *Pyrmont* waters for ſome weeks after they were with child, and received no hurt, but brought forth ſtrong and healthful children, nor have I

known any inſtance of miſcarriage occaſioned thereby; yet I have obſerved that moſt of them are troubled with nauſeating and vomiting, and with ſome few, the waters have operated but ſlowly and with much trouble, as if nature did powerfully keep back and oppoſe ſuch evacuations, wherefore in ſuch circumſtances, there is very little to be done with drinking the waters.

Women that give ſuck have frequently got great benefit by the waters, and ſucking children have thereby been greatly relieved and happily cured; in the morning they ought to let the children ſuck them dry before they begin to drink the waters; and about ten when the waters have done working, they may let the children ſuck a little, or wait till noon. They muſt take care that every morning their bodies be kept open, and when the waters don't paſs freely, they muſt take ſome gentle things to make them paſs; for if this be not done, it brings a great purging upon the children, occaſioned by the waters they ſuck along with the milk; and the milk is rather increaſed than diminiſhed by them.

As to different conſtitutions, the waters agree beſt with *ſanguine* and *cholerick perſons*, for they can bear drinking cold things, and the waters drank in ſmall quantity work well and quickly with them, which is not ſo with phlegmatick and melancholy perſons, for they muſt drink a greater quantity or forward the working by ſalts, and it is beſt for them to drink them lukewarm.

When people drink the waters in a regular manner, it ſeldom happens that any hurtful accident prevents their going on with the cure, but ſometimes ſuch circumſtances happen which require particular conſideration, viz. *Intire retention* of the waters, *vomiting*, *coſtiveneſs*, *want of appetite*,

tite, *retention* of *urine*, *looſeneſs*, *cholicks*, *ſoreneſs* and *heat* in the *inteſtinum rectum*, *itching* and *out-breakings* over the whole Skin, *unuſual drowſi-neſs*, *reſtleſs nights*, *giddineſs* and *head achs*, *cramps* in the calf of the leg and other members, *ſmart-ing pains and return of old ailings*.

The worſt accident of all is the intire retention of the waters; It is not hurtful for the firſt and ſecond day, providing they don't drink too much, neither is it a ſign that the waters will be of no ſervice to them. It is uſual in this caſe to take a good purge to carry off the waters, and the fol-lowing days to take a little of the water's own ſalt in the firſt glaſs in the morning, or ſome other opening and diuretick ſalt, and then uſually every thing goes on well; But when the waters never paſs without daily repeating theſe things, it is better to leave them off and ſeek relief by other medicines.

Vomiting frequently is of great ſervice, for there-by the ſtomach is cleanſed from all kind of filth, and commonly it continues but for 1, 2 or 3 days, if it continue longer and ſo hinder the waters from working otherways, it is beſt to ſtop it as much as poſſible, the patient muſt drink but ſlow-ly and little; the vomiting leaves off with ſome, as ſoon as they begin to drink the waters a little warm, and others ſooner vomit with the warm than the cold water; when the vomiting proceeds from a cold and weak ſtomach they ought to make uſe of good *aromatick* and *bitter eſſences*, and they have beſt effect if taken at night before they go to ſleep. *Coſtiveneſs* is frequently the greateſt cauſe of nauſeating and vomiting and of ſeveral other ac-cidents during the cure, wherefore it is beſt to guard againſt it at firſt, which is beſt done by eating a good deal of ſoops, wholeſome garden

ſtuff, ſome fruits, prunes, currants and ſuch like, and when the waters are warmed, 12 glaſſes frequently purge more than 24 cold, alſo purging medicines prudently taken are very helpful, and ſalts have frequently very good effects this way, and indeed are the beſt both for gentleneſs and ſafety; *clyſters* made of the mineral waters warmed, with other things belonging to them, are of great ſervice, if the patient be uſed to them, and other circumſtances allow of it.

Want of appetite ſeldom happens, ſeeing the waters frequently give a good ſtomach to ſuch as have loſt it; but when it happens, it uſually proceeds from the body's not being open enough, and as ſoon as that is removed, the appetite returns; there are other cauſes of loſs of appetite, which a good phyſician will eaſily judge of, and relieve by good ſtomachicks.

As to an intire *retention* of *urine*, hitherto I have ſeen no inſtance of it, altho' I have had ſeveral patients, both men and women under my care, who conſidering all circumſtances had reaſon to believe, that they had great ſtones in their bladders. When it happens to any perſon, either from this or other cauſes, if other helps fail, they muſt make uſe of a catheter, or when the *ureters* are ſtopped, they muſt uſe gentle *diureticks*, *antiſpasmodica*, &c. *emollient clyſters*. If there be any ſharpneſs or burning in the urine, it generally proceeds from ſand brought by it from the kidnies, or half cured gonorrheas, or when ſaline, bitter and ſharp humours are carried off thereby, if this ailing ſhould either be too violent, or continue too long, tho' it generally goes off in few days, it will be proper to take a good doſe *ex pulvere temperante* or *freſh ſweet oyl* when you go to bed, *or in gonorrheas*, to take the *ſpecifica antivenerea*.

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When little of the water paſſes by urine but moſt of it by ſtool, and thereby a great looſeneſs is like to enſue (tho' the *Pyrmont* waters by their rich ingredients uſe rather to ſtop than to relax too much) in that caſe it is beſt to drink very ſlowly, that the waters may have time to ſink through the meſenterium, and commonly in this caſe ſtrong *diuretick tinctures* and bitter *aromatick eſſences* are made uſe of, alſo when it is neceſſary, gently *retentive*, *quieting* and *balſamick pills* or *electuaries*, upon which the waters will operate as they ought; I have many examples of both men and women, who after too great intimacies with one another, have had great looſeneſſes, belly aches, and cholicks, and here *abſtinence* is the beſt receipt.

Cholicks during the time of drinking the waters proceed, commonly from cooling the ſtomach and the bowels too much, wherefore they that are ſubject to them, ought to warm the water and drink it ſlowly and in ſmall glaſſes. But when Cholicks ariſe from ſtopping of the body, then it is neceſſary to open it by relaxing medicines. And belly aches proceeding from flatus's muſt be removed by *carminative eſſences* and keeping the body open.

Soreneſs and *heat* of the *inteſtinum rectum* is aſcribed by many to the ſharpneſs of the waters, but if this were the cauſe, it would grow worſe every day, whereas the waters themſelves cure it in 3 or 4 days, but it is the ſharp gall, which ſticks here and there upon the guts, and which is mollified and carried off by the waters, which occaſions this ſoreneſs and heat, if this continue too long and make the patient very uneaſy the ſureſt way is to waſh himſelf with the mineral waters or to uſe the bath twice, and commonly after this it is gone in a few days, and in ſuch a

caſe

caſe anointing cum *unguento populeonis de linaria*, or with *oleo verbaſci*, *hyperic* and the like, has good effect.

Itching and *Out-breakings* upon the ſkin, happen to them that have ſharp and ſcorbutick blood, and is an excellent effect of the water, and never hurts any body but preſently goes away, when the ſuperfluous ſharp humours are corrected and carried off, the uſe of the bath towards the end of the cure, clears the ſkin of all naſtineſs of this kind.

As to *Drowſineſs*, it is very common to moſt patients, from ſeveral cauſes, viz. The ſulphureous ſpirituouſneſs of the waters, the early motion and exerciſe of the body in the morning, eating heartily at dinner, and ſometimes drinking too much, and when the drowſineſs is more than ordinary and altogether inſupportable, it proceeds from thick ſlimy blood, unfit for motion, whereby the head and veſſels of the brain are over-charged, and phlegmatick conſtitutions are moſt liable to this indiſpoſition, but it goes off when the waters begin to work thoroughly, the body alſo may be freed of the load of ſuch ſuperfluous humours by the uſe of proper pills.

Waking and *reſtleſs nights* during the cure, do ſoon over fatigue the patient; ſanguine, cholerick and melancholy perſons are moſt ſubject to theſe, but it may be prevented by opening a vein and letting a ſufficient quantity of blood; and at night before you go to bed, ſome good cooling, quieting ſoft medicines may be proper, but no opiates are to be taken, for they will hinder the waters from working.

Hot and dry conſtitutions are moſt ſubject to *giddineſs* and *head aches* during the water cure, but they are commonly tolerable, or go off in a few days, and they may be removed the ſame way as reſtleſſneſs;

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ſufficient opening of the body, bathing the feet, and the like, are very ſerviceable in this caſe.

Cramps in the calf of the leg and other parts of the body is not an uncommon effect of the waters, for it paſſes through all the parts of the body; but theſe are ſeldom ſo ſtrong but they may be born, and they may be eaſed or removed by rubbing the parts affected with *Anhalt water*, *ſpirit of wine and camphire*, *ſpiritu formicarum* and ſuch like.

The returning of *old pains* in the ſolid parts, and breaking out of *old ſores* are particularly to be remarked, and frequently happen during the cure, and tho' at firſt they portend a great deal of hurt and danger, yet daily experience teaches us that they not only are very ſupportable, but that a perfect and laſting cure does uſually follow upon the ſame, and that uſually the more uneaſy the affected parts are, the more reaſon there is to expect ſure help from the waters.

The remarkable *after-effects* of the mineral waters, of which ſo much has been ſaid, both by ancient and modern phyſicians, are alſo confirmed to us by experience, viz. That patients, ſome weeks and months after they have done drinking the waters, reap the greateſt benefit and help thereby; and are cured of *apoplexies*, *lameneſs*, *dimneſs* of ſight, *deafneſs* and other diſtempers, ſometimes by degrees, and ſometimes all at once, contrary to all men's expectation. Much has been ſaid concerning the cauſes of ſuch *after-effects*; I account for them after the following manner. It is confeſſed that from the very beginning of our formation, (*ab ipſo ovulo*) the *ſolid parts* were formed and put together out of the *fluids*, that afterwards, the ſolid parts are always affected by the fluids, and when theſe are any manner of way infected or ſpoiled, thoſe by degrees ſuffer dammage alſo; if the fluids are reſtored

to

to a good ſtate, the ſolid parts, if their intire texture is not deſtroyed, or if not ſtuffed with matter that cannot be diſſolved, are alſo brought into a better ſtate, and as they are not liable to ſo ſudden alterations as the fluids are, ſo they are laſt in receiving any help; they are not ſo ſoon hurt by inward cauſes as the fluids are, but when they are once weakned or hurt, it is longer before they are perfectly reſtored to their former function; when the mineral waters work, they penetrate through all the parts, preſs upon the weak and obſtructed parts, and thereby cauſe an extenſion, and a very ſenſible pain and feeling of former ailings, and during the cure there is no appearance of help, yea rather matters grow worſe; but when the mineral waters have fully and duly paſs'd through all the *excretoria*, all the juices are by their excellent, cleanſing and ſweetening virtue brought into a good ſtate; when nature has once received this aſſiſtance, and is delivered from the inſupportable load of ſuperfluous and hurtful humours, ſhe becomes afterwards her own beſt phyſician, and by means of the good wholeſome nutritive juices, ſhe has recovered, repairs by degrees, as far as poſſible, what ſtill was defective in the ſolid parts, when drinking the water was over.

And now I ſhall only recommend to ſuch as love their health, that the ſureſt way to partake of the great benefit and good effects that frequently follow after the courſe of drinking the waters is quite over, is, to abſtain from all tedious courſes of phyſick, and ſtrictly to obſerve a regular dyet in all points, and the longer they do it ſo much the better, and in this way by God's bleſſing, to expect the after-effects of the waters.

CHAP.

CHAP. V.

Concerning Bathing with the Pyrmont *waters.*

SOME people foolifhly imagine that cold *ſteel-waters* ought not to be warmed and made uſe of for bathings, ſeeing there are ſo many natural hot baths, which ſeem deſign'd by providence for that purpoſe, and are more proper and efficacious for removing diſtempers than cold waters warmed, but there is no more reaſon to think that we ſhould make uſe of the means, which God has given us for the recovery of health, juſt in the manner as they come out of the Earth, without any preparation, than that we are to eat all our food raw and undreſſed; on the contrary, the right uſe of many of the beſt things we enjoy, ſeems to have been hid from man, till ſuch time as he ſhould by the right improvement of his underſtanding, and by careful obſervation and experience, find out in what way and manner ſuch and ſuch things might be made uſeful and beneficial to mankind.

With reſpect to *Bathing*, as there are many mineral waters, ſo hot that they cannot be uſed till they ſtand ſeveral hours to cool, and as reaſon teaches men not to uſe them as they come out of the ſpring, ſo it is with reſpect to cold waters, and as they generally agree both in their *original*, *ingredients*, *operation* and *effects*, it is reaſonable to expect, that cold mineral waters, when warmed, ſhould be as effectual for removing the indiſpoſitions of the human body, as naturally hot waters, and as the cold waters are commonly more

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ſpirituous, and their ingredients more ſubtile, it is not without reaſon, that it is aſſerted, that when ſuch freſh water is rightly prepared for bathing, it has better effect than a naturally warm bath, and particularly the *Pyrmont* waters, which may be warmed to a great degree for two hours, before the internal fermentation and motion of the ſubtile parts ceaſe, and their ſpirits be intirely gone, for when this internal motion of the mineral ſpirit is in its greateſt ſtrength, it muſt neceſſarily affect and penetrate the ſolid parts of the body more ſtrongly than a bare *ſaline water*, whoſe ſpirit and ſubtile parts have been already concenter'd, changed and intirely loſt in the *alcaline earth*, which gives us reaſon to think, that ſteel water baths are to be uſed more cautiouſly, and with greater circumſpection than natural hot baths, becauſe the firſt operate more ſtrongly and are more penetrating than the laſt.

As to bathing with *Pyrmont* waters, we have ſo many inſtances of the wonderful effects of them in that way for almoſt theſe 200 years, that no other mineral water, hot or cold, can boaſt of the like, and it were eaſy to enumerate many of the various cures upon perſons of all ranks, atteſted by phyſicians of the beſt characters, who were eye witneſſes of the ſame, but ſeeing this would be too tedious, we chooſe rather to proceed to give an account of the beſt way and manner of preparing the bath, ſo as it may duly anſwer the end, alſo to mark out the ſeveral groſs miſtakes and abuſes, that people fall into in this point.

The way and manner that the waters operate externally may be conſidered under two circumſtances, *viz.*

1*ſt*, As long as the internal motion of the ſubtile parts of the waters continues and all their

their *ſpirituouſneſs is not exhaled* and concenter'd into the *alcaline earth*, it ſtrongly ſtimulates the extremities of the nerves, inſinuates it ſelf into the nervous and membranous parts, and contracts the external ſolid parts, ſtrengthens and opens the nerves and reſtores to the relaxed fibres their natural tone, and all the *peccant matter*, which ſticks in the external parts and their ſeveral canals is attenuated and partly carried off by ſweating, partly carried back into the common maſs of the humours, and afterwards caſt out of the body by its ſeveral excretory ducts.

And when the membranous and muſcular parts are too much moiſtned, mollified or extended, or filled with thick and viſcous, or ſwelled with cold hydropical humours, they recover their ſtrength and elaſticity, and the ſwellings are intirely diſpelled.

2*dly*, When the internal fermentation of the water is over, the ſpirituouſneſs is gone, and the irony earth precipitated, then they operate much more gently, and come nearer to the nature of hot baths, they mollify more than they did before, and by the *balſamick*, *ſulphureous ferruginous earth*, they ſtrengthen the ſolid parts and cleanſe the ſaline particles, inſinuate themſelves into them, but all this goes on more gently and ſlowly than before. The firſt way of operating is beſt for ſtrong conſtitutions, and when one is ſure that the body is freed by the internal uſe of the waters, from all ſuperfluous and filthy humours, and that the *viſcera* are ſound and in good condition. To ſuch, bathing affords frequently a very ſpeedy relief againſt external accidents and defects, and does more in 5 or 6 times than other Baths in 20.

As for ſuch as are of a tender and weak conſtitution, and who have reaſon to ſuſpect that the

the *maſſa humorum* is any manner of way corrupted, or who have any ſwellings, the ſecond *mixture and ſtate of the water* is ſafeſt and beſt, at leaſt it is fit to begin with it, and afterwards come to the other when matters are changed for the better, leſt the ſuperfluous and hurtful humours thrown back into the *viſcera* and other parts, occaſion *inflammations* and other diſorders.

How this two fold ſtate of the bath is regularly to be obſerved for the advantage of the patient, a ſkilful phyſician will be beſt able to judge and determine, according to the difference of conſtitutions and nature of diſtempers; and if the neceſſary rules be well obſerved, every body will find by experience, and by manifold inſtances of cures that happen every year, that the *Pyrmont* water when warmed is effectual in all diſeaſes wherein hot mineral baths have been found to give relief.

We ſhall now conſider, *1ſt*, The neceſſary preparation for bathing.

2dly, The time, when.

3dly, How long it is fit to continue it.

4thly, The way of preparing the waters.

5thly, How long it is fit to ſtay in the bath, with the other rules neceſſary to be obſerved, in and after the bath.

1ſt, The beſt preparation for bathing is, uſing the waters internally, for thereby the body will be ſo well cleanſed, that there will be no reaſon to fear that the ſuperfluous humours will be heated by bathing and brought to ferment, or any hurtful thing driven from the outward parts into the *viſcera*, as has been already ſaid.

But if for any particular reaſons, bathing without previouſly drinking, the water, is found to be moſt proper, then the body muſt be firſt cleanſed by proper medicines, and during the

courſe

courſe of bathing, dayly kept open; and ſuch as abound in blood may open a vein ſome days before they begin.

2*dly*, As to the time the following rules muſt be obſerved.

1*ſt*, The beſt time of the year is the hot ſeaſon, when the weather is good, and there is the leaſt reaſon to be afraid of catching cold, and thereby ſhutting the pores of the body.

2*dly*, After the Patient has drank the waters 8, 10, 12 or 14 days, and finds his body eaſed and cleanſed thereby, then it is proper to begin bathing, and it is not neceſſary to fix particularly upon a determined time for continuing the bath, as ſome imagine, for many drink the waters warmed in the morning, and afterwards bath in them, and go on for 2, 3, 4, weeks, and ſometimes twice a day, without any inconveniency, and the experience of many years ſhews us, that the internal and external uſe of the waters at the ſame time are very conſiſtent, when due care is taken, to uſe them in a regular moderate manner, and indeed drinking the water moderately, during the courſe of bathing, is among other things of great uſe to prevent *coſtiveneſs*, which ſuch as uſe the bath are very liable to, and thereby ſeveral indiſpoſitions are occaſioned, which may indeed be helped by relaxing medicines, but by none better than by the water it ſelf.

3*dly*, It is neceſſary that they who uſe the waters both internally and externally at the ſame time, ſhould ſet apart more time for that purpoſe than two or three weeks, that ſo the cure may not be over haſten'd, but proceed gently with all due precaution; neither is it improper to prolong the bathing eight days after having done drinking,

and ſometimes it may be proper not to begin bathing till drinking the waters is intirely over, but all this muſt be ſuited to the circumſtances of the patient.

4*thly*, The time of the day moſt proper for bathing is nine a clock in the morning, and five in the afternoon, when digeſtion is over.

5*thly*, Such as are fat, and abound in blood, agree beſt with bathing in the morning, when their body is alert, and their Veſſels not ſo full, as they uſually are after eating plentifully, when a great quantity of chyle is diſpenſed to the blood; but upon trial every one will find what is moſt ſuitable to his conſtitution.

6*thly*, Such as cannot ſtay at home, but are obliged to be abroad about noon, and to expoſe themſelves to the open air; when the weather is but indifferent, and ſuch who after bathing loſe their appetite, or are much inclined to ſleep, and find themſelves fatigued, will do beſt to bath in the Evening.

7*thly*, The patients themſelves will be able to judge how often, and how long they ought to uſe the bath, by obſerving how they bear it, if they are not over fatigued by it, and if their Limbs are eaſier after it, *&c.* but eſpecially a ſkilful phyſician, to whoſe direction they commit themſelves, will be beſt able to judge, by conſidering the nature of their diſtemper; after the ſame manner it may be determined, whether it be beſt to bath every day, or every other day, or two days ſucceſſively, and intermit the third day; there are many inſtances of patients that have bathed 10 or 12 times ſucceſſively, not only without any inconveniency, but with very good effect; but this

this depends intirely upon the ſtrength of the patient.

The Waters for bathing have hitherto been taken out of what they call the *Brodel Well*, not that the water of what they call the *Trinck Well* is not as good for that purpoſe, but becauſe it being uſed for drinking, might be troubled by drawing a great quantity for bathing alſo, and tho' the water of the *Brodel Well* be not ſo ſubtile, ſpirituous and clear as the other, and tho' all waters loſe a part of their ſpirituouſneſs when warmed for bathing, yet the remaining contents, which ſuffer no alteration by being warmed, are in greater quantity in theſe, than in the waters of the *Trinck Well.* The uſual way at preſent of preparing the waters for the bath is to warm a certain quantity of them,and to mix it with a greater quantity of the cold freſh water in the bathing tub, which ſeems not to be amiſs, for thereby the ſpirituouſneſs of the freſh cold waters keep them a conſiderable while in full motion, and fermentation, which produces the effects we have already mentioned; but when the bath is prepared for perſons of weak conſtitutions, it is beſt to warm the whole quantity upon a gentle fire, that ſo the waters may loſe ſome part of their ſpirituouſneſs and ſtrong penetrating virtue, which otherwiſe would be too ſtrong for ſome conſtitutions and diſeaſes, as we have ſaid before.

When the waters for bathing are prepared either the one or the other way, theſe following rules muſt be obſerved in the uſe of them.

1*ſt*, That they be only milk warm, or not warmer than our blood.

2*dly*, After putting on a bathing ſhirt, prepar'd for that purpoſe, if the patient be ſtrong, he may preſently ſit down upon the cuſhion, which is placed in the bath, and is made of linnen-cloth wrapped up and folded together; but ſuch as are of a weakly conſtitution, and know by experience that they are ſtrongly moved and affected by the bath, ought at firſt to put only their feet into it for a few minutes, and then to go up to the knees, and afterwards ſit down upon the cuſhion.

3*dly*, After the patient is ſet down upon the cuſhion, he muſt be well covered with cloth, all except the head, and the parts above the water will by the ſteam of the warm water be ſoon put into a gentle ſweat. It has been uſual not to go deeper into the bath than the navel, as if the water were too ſtrong and penetrating for one to go into it above the ſtomach; but if the condition of the patient will allow it, when the waters are duly warmed, and there be ſufficient room in the bathing place, he may go into it even over the ſhoulders, as well as in other mineral waters; but if the patient cannot bear it, and yet the uppermoſt parts require the aſſiſtance of the waters, in that caſe they may either be poured upon the parts, or with a ſponge or wet cloth applied to them.

4*thly*, If the patient find that his body is not warmed ſufficiently by the waters, and that he can bear them if they were warmer, then it is fit to pour in more warm water, till ſuch time as he find it is enough, and that a gentle ſweat begins to break out; and indeed it is much better that the bathing ſhould occaſion a gentle ſweat, for thereby a great deal of hurtful ſtuff is thrown

out

out of the body, and by opening the pores, the mineral virtue of the waters can better inſinuate itſelf into them, yet it is better not to ſweat at all, than to force it by too hot a bath, for we have many inſtances of the good effects of bathing without ſweating, and to ſupply the place of it, rubbing the body with a coarſe rough cloth will have good effect, and this has been much recommended by ancient phyſicians, as very effectual in external diſorders, for the quickening the nerves, recovering the tone of the parts, and opening the pores, *&c.* The dropping of water from a high place upon the affected parts is now ſeldom uſed ; but ſuch a thing might eaſily be contrived during the courſe of bathing, and to very good purpoſe.

5thly, The patient ought not to ſtay in the bath the firſt time above half an hour, afterwards by degrees three quarters of an hour, one hour, an hour and a half, but never above two hours, to ſit longer in it is neither neceſſary nor uſeful.

6thly, If the patient finds that he turns giddy and faint, and has a ſtrong palpitation of the heart, he muſt not wait till he faint away, but muſt come out and go to bed, and bring himſelf by degrees to bear the bath, and ſuch as are affected in this manner by it, ought to have good volatile ſalt to ſmell to, or ſome other thing to revive and ſtrengthen them, if needful, that they may be able to hold out.

7thly, When the patient come out of the bath, he muſt take care to keep himſelf warm, dry and ſhift himſelf by the fire, and then go into a warm bed, and let the ſweat go off by degrees.

8*thly*, It is very ſeldom found to be of any advantage to take a *ſudorifick* before or after bathing, for commonly the patient in time of bathing ſweats more than is needful, and they that are hard to ſweat can ſcarcely bear any hot ſudorifick; but ſuch as are ſubject to ebullition of the blood, palpitation of the heart, giddineſs, *&c.* will find great advantage by taking a good doſe *ex pulvere temperante, cooling ſalts, or the like*, in two ſpoonfuls of wine, a quarter, or half an hour before they go into the bath, for many who have been thus affected, have by ſo doing, been perfectly relieved, and ſometimes perſons have by theſe things been brought to ſweat enough, who could not by the ſtrongeſt tinctures of bezoar be diſpoſed to it.

9*thly*, If the patient ſtay in the bath from 9 to 10, and in bed from 10 to 11, he will have at leaſt an hour to refreſh himſelf by degrees before dinner, and a glaſs of wine with a good ſtomachic will not be amiſs, and it will be beſt to dine at home, and not go to the open air till after dinner; in the evening it is beſt to eat ſomething hot after bathing, and to ſtay at home and walk in a night gown, and to paſs the time in agreeable company, for it is not good to lie long in bed after bathing, becauſe commonly ebullition of the blood and reſtleſs nights are the conſequents of it.

As to other things that relate to dyet and the way of living during the courſe of bathing, the ſame rules ought to be obſerved as in drinking the waters; and as to any other method of uſing the waters externally by fomentations, anointing, waſhing, gargling, *&c.* a ſkillful phyſician acquainted with the properties and virtue of the waters will be beſt able to direct, according to the

nature

nature of the diſtemper, and experience will ſhow, that whatever may be hoped from a good mineral water, may be equally found in this; as to what effects bathing in the cold mineral water would have, we ſhall leave it to further experience and tryal to find it out.

CHAP. VI.

Concerning the abuſes and miſtakes that Patients fall into while they uſe the waters, whereby they may become dangerous and hurtful.

WE have already obſerved that all the means God has been pleaſed to beſtow upon us, both for nouriſhment and health, when not rightly uſed, become unwholeſome and hurtful; and as there is no medicine that can cure all diſeaſes, ſo it is no wonder, that by the uſe of the beſt mineral waters all ſick people are not only not cured, but even ſome receive hurt by them, and as it is manifeſt, that every year, many diſeaſes reckoned incurable, all other medicines having failed, have been cured by the *Pyrmont* waters, yet it is owing to a diſorderly way of living during the cure that many more are not cured; wherefore to conclude this deſcription, we ſhall briefly mention ſome of the abuſes and miſtakes that patients commit during both the internal and external uſe of the waters. And firſt drinking the waters cold without any order or diſcretion, is the occaſion of the greateſt miſchief, of which we have many inſtances, ſome drink great glaſſes full without any intermiſſion, and if they can but

ſwallow the quantity they propoſe to drink they think no more of it; but it is eaſy to conſider that few patients have ſo much internal heat, as is ſufficient to warm 6 or 8 pounds of cold water, which perhaps they drink in the ſpace of one hour, or an hour and a half at moſt, without receiving ſome dammage by it.

Every body knows that the ſeveral fluids of the body are preſerved in their fluidity by motion and heat, and that they are coagulated by cold and rendered unfit for motion; now ſeeing our life conſiſts in the free motion and circulation of the fluids through all the parts, even the ſmalleſt veſſels of the body, whatever diſturbs this motion, or coagulates the fluids, particularly in the *viſcera* muſt be prejudicial to health; ſo that it is evident when the ſtomach is filled all of a ſudden with exceeding cold water, neither it's own heat nor that of the contiguous parts is ſufficient to warm it ſo ſoon as is neceſſary, ſo that the ſeveral parts not accuſtomed to the cold muſt be thereby contracted and their fluids thickned, and if the coldneſs of the water have this effect upon the parts that are ſound, what effect muſt it have upon ſuch as are weakned and ſtuffed with thick and viſcous humours? certainly theſe obſtructions muſt be thereby increaſed, hardned and made altogether indiſſoluble.

It is wholly owing to this diſorderly uſe of the waters that patients ſo often complain that the waters were too ſtrong for them and have ſpoiled their ſtomachs, brought an ague upon them, weakned their breaſt, given them a cough, *&c.* all which is owing to themſelves and not to the waters, and they are very happy that have eſcaped ſo well; for according to the way of living

now

now a days few perſons are accuſtomed to cold things, and among a hundred perſons of diſtinction ſcarce one is accuſtomed to drink cold liquors in the morning; coffee, tea, chocolate being their ordinary drink, ſo that ſuch a quantity of cold water taken all at once cannot but be very prejudicial to them. And tho' the cold mineral waters are not ſo frequently hurtful as common water, becauſe the mineral ſpirit and the internal motion and fermentation of their ſubtile parts, and their opening and diſſolving qualities give them ſome ſmall degree of heat, yet it is with them as with wine, which notwithſtanding of the hot ſpirit contained in it, when drank very cold, ſtops the circulation in ſome or other of the *viſcera*, and has all the bad effects of any other cold liquor imprudently drank, and in the manner we have ſaid, affects even hot and vigorous conſtitutions, but eſpecially ſuch as are cold, phlegmatick and weakly through various obſtructions and unwholeſome humours.

If it be objected to what has been ſaid, that many phyſicians are of opinion, that cold water ſometimes ſtrengthens the ſtomach, reſtores the *tone* of it, when too much relaxed, and the nerves and other veſſels to their former elaſticity; it may be anſwered, that this is not denyed, and a ſmall quantity of cold water which the ſtomach may eaſily warm cannot hurt any perſon, but a great quantity drank without any diſcretion, and for many mornings ſucceſſively, cannot but be very dangerous and hurtful.

And here it will not be amiſs to warn the *female* ſex, that if during their *menſes* they continue to drink the cold waters, they put their health to the tryal, and in very great danger, and it is a great

pity,

pity, that the waters which every year reſtore ſo many women to their health in this article, ſhould by imprudent management prove the ruin of others.

2*dly*, Another miſtake and diſorder that patients are guilty of is, when they drink the waters in too great quantity, and too faſt, and this is very common, for when the waters don't follow their caprice and operate according to their fancy, then they muſt take the other full bumper, and as they talk make one bumper drive out another; but how ſtrong and hot ſoever their conſtitutions may be, yet all the inconveniencies already mentioned, that are occaſion'd by cooling the *viſcera* too much, will alſo follow upon this method. For ſuch patients as are in too great haſt and have their minds hurried and diſtracted with buſineſs, which they ſeem to mind more than their health, and when perhaps as many weeks as they reckon days are neceſſary for the cure of their diſorders, would do much better to abſtain intirely and ſo prevent the hurt they may ſuſtain by not obſerving ſuch method and rules as are abſolutely neceſſary.

3*dly*, The moſt common diſorder and abuſe of all is in the *dyet*, how much hurt is done by eating all kind of *ſugar cakes*, *prunes*, *raiſins*, &c? whereby the waters are not only hindred to operate freely, but they breed ſharp, ſower viſcous humours in the ſtomach and bowels, which tho' they may be ſome times preſently carried off by the waters, yet it were much better not to put ſuch a hindrance in their way, for there remains always ſomething behind that diſturbs the digeſtion and occaſions other diſorders; and immoderate ſmoaking of tobacco is much more hurtful than uſeful, and it rather diſturbs than promotes the natural

operation

operation of the waters, eſpecially conſidering that the lovers of it can never keep within bounds.

4thly, Eating too ſoon after drinking the waters before the *primæ viæ* are for the moſt part freed of it, is alſo a very great fault, for the victuals are carried off too ſoon by the waters which remain, and undigeſted juices carryed into the bowels, &c. which occaſion cholicks, obſtructions of the glands, &c. The waters give the patients a good ſtomach, ſo that they both eat too faſt and too much, eſpecially at night, and with all kind of fruits and other things they frequently bring upon themſelves all ſorts of diſorders and intirely defeat the good effects of the waters.

5thly, patients are frequently very diſorderly in their ordinary drink, ſome as ſoon as they have done drinking the waters drink a great deal of coffee, tea or chocolate, and thereby diſturb the operation, and drown the bowels with too much moiſture, ſo that what the mineral water has, by it's ſpirituouſneſs and ſubtile irony earth in ſome meaſure ſtrengthened, is either relaxed anew, or the good effects, in a great meaſure prevented; if the deſign be to warm the cold water, it would have been better to have warmed it a little before drinking it, than to do it with other warm water, after the cold has had it's bad effect upon the viſcera, and the mineral waters are thereby too much diluted and weakned.

6thly, They that drink too much wine during the courſe of drinking the waters, do great hurt to their healths, as we have already obſerved. Patients are generally of opinion that they ought to drink plentifully of wine in order to fortify their ſtomach, and they that love it comply very chearfully with this rule, and if before they begin

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to uſe the waters, their phyſicians did either forbid it altogether, or reſtrained them with reſpect to the quantity, yet then they think themſelves at full liberty; and when their diſtempers proceed moſtly from the immoderate uſe of hot liquors, their heated, dryed, and ſharp bilious blood wants to be diluted, cooled, rectifyed, and cleanſed, yet they returning to their former diſorders, by which they brought their diſtempers upon themſelves, not only make the beſt means for recovering their health ineffectual, but frequently reduce themſelves to a worſe ſtate than before.

7thly, Sleeping long at noon is alſo very dangerous during the cure, and ſometimes cauſes convulſions, apoplexies and the like; for the waters by their *ſpirituouſneſs and ſubtile ſulphureous fat* affecting the head, may during the ſleep raiſe a confuſed motion in the nerves and other ſmall veſſels of the brain, eſpecially *in fat ſanguine people*, who are naturally diſpoſed to ſuch diſtempers; moreover ſleeping long after dinner is the cauſe of indigeſtion, bad chyle, pains in the ſtomach, wearineſs and lazineſs, wherefore it is beſt to avoid it as much as poſſible; gaming after dinner is as hurtful as ſleeping, becauſe the patient muſt ſit ſtill and think cloſely.

8thly, It is well known that all commotions and diſturbances of the mind, ſuch as, *anger*, *fear*, *ſorrow* and the like, are very hurtful to people in good health, but more eſpecially to ſuch as are weak and ſickly, particularly when under cure, for then all the humours are in a kind of fermentation, ſo that it cannot be eaſily imagined how deſtructive to the health ſuch like paſſions are; we have already propoſed what is to be done to avoid them.

Exercise of the body is very beneficial to such as drink the waters, providing it be moderate, but when it exceeds the due bounds, it occasions immoderate sweating, which hinders the waters to produce their best and most beneficial effect, and is the cause of many disorders, as has been already more fully explained; and this is a point wherein many ladies of a tender and weakly constitution do great prejudice to their health, for their heart being set upon balls, they frequently repeat and continue their dancing so long till they over heat themselves, grow faint and thirsty, and then they have their recourse to confections, coffee, tea, limonade, wine &c. which greatly overcharge and disorder the stomach, and next morning they are very unfit for drinking the waters, so that they are not only not cured of their present distempers, but fall into new disorders, which naturally follow upon being over heated, with too violent exercises, and then catching cold.

As to abuses and mistakes committed in bathing, it is *first* to be observ'd, that as in the internal use of the waters, drinking them cold without any thought or consideration, does the greatest mischief, so, on the contrary, in the external use of them, making the bath too hot does very great harm; for the women employed for preparing the bath, and even the patients themselves are of opinion that it can be of no service, if they don't sweat plentifully over all parts of the body, so that they make the bath as hot as it is possible to bear it, and commonly the patients come out of it as red as boiled Lobsters, and from thence arise great and many disorders, such as *loss of a great deal of the useful moisture of the body, great thirst, strong ebullition of the blood,*

head-

head-aches, giddineſs, palpitation of the heart, aſthma's, wearineſs, faintneſs, reſtleſsneſs, loſs of appetite, fevers, &c. ſo that all the medicinal qualities of this ſtrong mineral water which we have already mention'd, don't make ſo great alterations in the body, as the accidental property of ſuperfluous, unneceſſay and hurtful heat uſually makes, which it is in the power of every body to moderate as they pleaſe, and as may be moſt for their advantage.

It is very common when any patient ſuffers theſe inconveniencies which are the certain conſequences of bathing in too hot water, to aſcribe them to the water itſelf, as if it were too ſtrong, and unfit to bath in, yet it is known that perſons of a very weak and tender conſtitution, when the bath was prepared as it ought to be, have not only uſed it for a long time, but frequently can ſtay two hours in it without the leaſt inconveniency.

Bathing is hurtful in long *Paroxyſms*, and violent fits of the palſy, ſuch like diſeaſes have commonly their periods and changes, they are gone for ſome time, and return afterwards at a certain time of the year, if one uſe the bath at ſuch time, his members cannot endure ſuch ſtrong irritation and moiſtening, ſo that his diſorder becomes worſe, and it is long before he can be brought to rights again, but when it is done at a proper time, the patient will thereby prevent the paroxyſm, preſerve himſelf the whole year, and if the diſtemper be not too much rooted, be at length intirely delivered from it.

If any body undertake to diſſipate and diſpel too ſoon any great ſwelling in the feet by the uſe of the bath, it is commonly the cauſe of many

inward diſorders, ſo that any thing of this nature muſt be done by degrees, and with great precaution; neither ought any perſon to uſe bathing for curing of *ulcers* or *old ſores* in foul unwholeſome bodies, till ſuch time as the *ſuperfluous, ſharp bilious* humours be carried off, and indeed in all diſtempers, till the body be cleanſed, the bath cannot be uſed without danger and hurt, as we have already ſhewn in the preceding chapter.

Laſtly, 'tis a great abuſe when decrepit old people that have no more ſtrength nor moiſture, that are conſumed by long hectick fevers and inward diſtempers, or other ſick people that can receive no further help from any other medicine, but are already compleat *candidates for death*, come to the waters as if it were to the *tree of life*, and make uſe of them as their laſt refuge, for they would do much better to wait for their laſt hour with patience, than thus to haſten their end, and bring a bad report upon the waters that in themſelves are altogether harmleſs.

If theſe abuſes which we have mentioned be carefully guarded againſt, the chief objections againſt the waters will fall to the ground, and we beg leave to aſk ſuch phyſicians, as lightly eſteem mineral waters, theſe following queſtions;

In what way and manner do they cure their patients? Is it by evacuations? We have ſhewn that the *Pyrmont* waters cleanſe and clear the body through all excretory ducts whatſoever, and that in a ſafe and gentle manner.

2*dly*, Is it by removing obſtructions? then the ingredients of the waters are among the beſt aperients.

3*dly*,

3*dly*, Is it by reſtoring ſtrength to the benumbed and relaxed parts? then the rich chalibeat waters produce this effect beſt.

4*thly*, Is it by ſweetening and correcting the ſharp, ſowr, ſaline, and bilious humours? this is done by the alcaline earth and cryſtalline ſubſtance contained in the waters.

Now when any medicine produces all theſe capital effects, if ſomething particular againſt moſt diſtempers incident to human bodies is not to be expected from it, I know not where any thing better is to be found.

F I N I S.

A BRIEF

ACCOUNT

OF THE

Mineral Waters

OF

SPA.

Extracted from ſeveral Authors.

By *GEORGE TURNER*, M. D.

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11

CHAP. I.

A Deſcription of the Town of Spa.

SPA is a town ſituated in the diſtrict of *Liege*, ſix leagues eaſt from that capital: it was formerly a ſmall village, but has ſince been inlarged to a town by the inhabitants, who found themſelves obliged to increaſe the buildings for the conveniency of lodging the great number of ſtrangers who reſort thither for the benefit of the waters.

Moſt of the Houſes are built in the form of a creſcent, the outſide middle facing the ſouth, having a view of the eaſt and weſt; and the whole town is ſhelter'd from the north by a high mountain that extends itſelf more than the length of the whole town.

The country around is for the moſt part heath, woods, and mountains, abounding with ſprings both of mineral and common water, which deſcends in rivulets, and waters the meadows and cultivated grounds, which produce no wheat, but inſtead thereof a great quantity of ſpelt and oats, and ſome rye, but ſo little, that the greateſt part of their bread is made of ſpelt which the inhabitants find both ſavoury and wholeſome; there is likewiſe ſome flax for their own uſe, which thrives very well.

The reſt of the country is ſtony, and full of barren mountains, yielding little elſe than heath and wood, which affords but a wild proſpect; ſo that thoſe who come to *Spa* for a remedy for their diſeaſes muſt not expect to find a fine champaign country, with the fruits and flowers of *Italy*; yet thoſe who delight in hunting and ſhooting will find a country full of game, ſuch as wild boars, deer, and hares; heath cocks, gelinots and partridges; beſides other birds of the common ſort.

There are medicinal herbs to be found upon the moſt barren mountains, and likewiſe wild thyme, which is an excellent feeding for ſheep, and is the reaſon for the mutton of this country (tho' ſmall) being preferable to moſt that's to be found elſewhere, and the rivulets that deſcend from the mountains are full of Trouts, Gudgeons, Loaches, Crawfiſh, *&c.* which makes them be ſold very cheap.

The inhabitants are ſo dexterous both at hunting and fiſhing, that was it not for the diligence of officers that are employed to reſtrain them, the game would be intirely deſtroyed in a little time.

SECT. I.

Of the accommodations that ſtrangers meet with at SPA.

Strangers who have been once at *Spa*, are generally deſirous of going thither again; for beſides their finding a remedy for many obſtinate diſtempers which all other means are often incapable to overcome; they have the pleaſure of being well received by the inhabitants of *Spa*, and thoſe of the neighbourhood, who are very courteous and obliging to ſtrangers, behaving towards them with the

the utmoſt reſpect. The country people bring great quantities of all ſorts of proviſion every day without exception, and ſold at a very reaſonable rate, there is good bread and wine of all ſorts, and even cheaper than at *Liege*, beſides other uſeful *liquors* ſuch as Coffee, Tea, and Chocolate, likewiſe their beer is very good.

There are convenient lodgings for all ſorts of people, and even *ſovereign princes* would not be at a loſs for reaſonable accommodations.

They who chuſe to have their victuals dreſs'd at home, may have it done very conveniently, for wherever you take a lodging the people of the houſe are obliged to furniſh you with firing, and all the neceſſary utenſils for cookery, or you may be ſerved from the cooks or taverns at a very reaſonable price.

The great concourſe of ſtrangers *encourages* the merchants of ſeveral towns to bring their goods to *Spa*, as to a good market, where all ſorts of uſeful and curious things are to be ſold; and the inhabitants make ſeveral little trinkets of wood, ivory, mother of pearl, tortoiſeſhell, ſilver, and braſs, and have a particular knack at inlaying, repreſenting the figures of men, beaſts, birds, fiſhes, inſects, fruits, flowers, leaves, *&c.* Moſt people purchaſe ſome of them, being ſo exceeding curious as hardly to be equall'd in other countries; and their quick vent obliges the artificers to confine themſelves moſtly to this ſort of work.

As to the converſation of the place, people generally aſſociate together without diſtinction, and thoſe who are ſtrangers to one another ſoon become acquainted, and carry on their little amuſements, and diverſions with the utmoſt freedom; balls and aſſemblies are open to all who make a tolerable appearance. Laymen may ſay and do

what they pleaſe, provided it be without offence to God, or ſcandal to their neighbour; eccleſiaſticks may ſpeak their thoughts, tho' with ſome caution, and a decency ſuitable to their profeſſion, and they are generally of the party in moſt polite converſations.

Every thing tends to amuſement, wits exerciſe their ſatyr, and raillery, and are ſometimes paid back in their own coin; nothing is ſerious, but gaiety and innocent diverſions ſeem (next the uſe of the waters) to be the buſineſs of the place.

As people from moſt parts of *Europe* come to *Spa*, ſo every one that pleaſes may aſſociate with thoſe of his own country; if it ſometimes happens otherwiſe, and that a perſon is at a loſs for want of acquaintance, every one is officious to engage and introduce him into whatever company ſuits with his temper; you converſe freely with thoſe you like, and avoid thoſe you don't, without offence. They who are of a melancholly diſpoſition may indulge it on the wild healths, or ſolitary woods, which this country will ſufficiently furniſh them with.

Thoſe who are lovers of the ſtories of *faries*, and *Hobgoblins*, will be entertained that way by the old inhabitants, who by the ſalubrious quality of the waters are healthier, more fertile in generation, leſs ſubject to epidemical diſeaſes, and attain to greater ages than thoſe of moſt other countries: the reaſon of which *Stephius* gives us in his medicinal art, where, ſpeaking of the people of *Spa*, he ſays, "The ſolidity which their bodies acquire by the uſe of foſſils, to wit, metals and minerals, and the daily diſcharge of the excrements by all the paſſages, is the cauſe of their being leſs ſubject to early decays, are of long life, and exempt from epidemical diſeaſes.

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In order to prevent quarrels the magiſtrates forbid the wearing of ſwords, or any other offenſive weapon than a ſlender ſtick wrought at *Spa*, which is either uſed for eaſe in walking or purely for faſhion's ſake, for whenever any diſpute ariſes it ſeldom goes farther than words, every one interpoſing and endeavouring to prevent any ill conſequence that might happen.

There are *neceſſary houſes* built near the ſeveral wells for the conveniency of thoſe whoſe waters paſs by ſtool, that they may not be obliged to go too far off, which might fatigue and heat them, and divert the operation of the waters; they who are not able or inclinable to go far for a walk may find a delightful one at hand in the *Capuchin's garden* which is always open, and in caſe they have occaſion there are neceſſary houſes apart for both ſexes.

In a word, the pleaſure and ſatisfaction that moſt people find at *Spa*, is the reaſon that not only the *Valetudinarians*, but people in good health often come thither, for the agreeable paſſing away of a ſummer: others come by way of prevention to preſerve themſelves againſt ſome diſtempers that at certain ſeaſons they are *ſubject to*. The only and great inconveniency that the * *Bobelins* have hitherto found, was the badneſs of the ways from the town to the wells of *Geronſter* and *Sauveniere*, but the *Count D'Aſpremont* has lately been pleaſed to remedy that evil, ſo that for the future none will have reaſon to complain.

* A name given to the water drinkers.

SECT. II.

Of the ſituation of the ſeveral Wells of Spa.

The wells of *Spa* are principally five, tho' there are ſeveral ſmall ſprings that diſcover themſelves in the neighbourhood, but not worth further notice. Theſe five are *Pouxhon*, *Geronſter*, *Sauveniere*, *Watroz*, and *Tonnelet*, the three firſt are moſt in uſe, tho' the other two are ſometimes preſcribed by phyſicians.

Pouxhon is in a little bottom at the lower end of the market place, and ſtands in a fine niche of free ſtone, ſhut in with a door facing the weſt, it's ſpring comes from a hill about a muſket ſhot north of it, which faces the ſouth and has likewiſe a view of the eaſt and weſt, ſo that it is expoſed to the whole heat of the ſun. Between the ſaid hill and *Pouxhon*, there is no freſh water, 'tis all mineral, which is a confirmation that it has it's ſource from thence. A few paces diſtant from *Pouxhon*, in the market place towards the eaſt, ſtands a fine fountain of freſh water, (ſurrounded with an iron rail) to which there are four entrances, aſcending two or three paces you come to the water that runs into four vaſes of free ſtone, that receives each a pipe from another placed above the middle of them, which receives likewiſe three other pipes iſſuing out of the mouths of three brazen Frogs, that carry upon their backs a ſtep, which is the arms of *Liege*.

Upon obſerving the ſituation of this fountain, one would immediately imagine that its water came from the ſame hill as that of *Pouxhon*, but it does not, but from a field about a quarter of a league

league diſtant called *Boſſet prez*, and conveyed from thence by pipes.

The company meets every morning early at *Pouxhon*, even thoſe who drink the waters of *Geronſter*, and *Sauveniere*, ſo that it may properly be called the *general rendezvous of Spa.*

The well of *Geronſter* is diſtant three quarters of a league ſouth weſt from *Spa.* It ſtands in the hollow of a rock, under a cupula of free ſtone ſupported by four marble pillars that were erected by order of *M. Conrard Bourgsdorf, Councellor of ſtate to the Elector* of *Brandenburg* in the year 1651; you go down three ſteps to the well which is encompaſſed with a wall. It is conſiderably leſs than that of *Pouxhon.*

Thirty or forty paces from hence is to be ſeen the remains of another well formerly much frequented, called *old Geronſter.* Being obliged to dig in this place for water to ſupply the crowds of people that flock'd thither, ſome ſtones of the rock were ſhaken which diverted the courſe of the water, ſo that nothing now remains but mud of the colour of ruſty iron.

Sauveniere is half a league ſouth eaſt from *Spa*, its ſpring comes from a rock lying ſouth of it. It is ſurrounded with a wall which is covered with a cupula of *free* ſtone, it is very neat but much leſs than *Pouxhon* or *Geronſter*, ſo that it often happens when there is a crowd of people it is emptied ſo faſt that they are oblig'd to drink moderately, and in proportion as the water comes out of the rock.

Behind this well and in the compaſs of it's wall there is another ſpring which from it's vicinity is called little *Sauveniere*, or *Groſbeeck*, from the *Baron* of that *name*, *Archdeacon* of *Condroz* and *Chancellor*

to

to his ſerene highneſs the *Biſhop* and *Prince of Liege*, who adorn'd it with a niche of free ſtone in the year 1651.

Theſe three wells are the moſt frequented; they have each of them a ſhelter from the inclemency of the weather; that of the market place is very neat, that of *Geronſter* is a ſhed made of four rough walls cover'd with ſtraw, that of *Sauveniere* is ſomewhat larger, and cover'd with black ſlate, but the walls are of the ſame materials as that of *Geronſter*, but whitened on the inſide. At each place there are perſons appointed to make fires every morning before the company comes to drink the waters.

The Burgomaſters of *Spa* might make theſe two laſt places more convenient, tho' indeed they have no great encouragement to attempt it, for as they lye ſo remote from the town, as ſoon as any little accommodation has been made, ſome idle people have put it out of order.

Theſe wells being ſituated in rocks, can receive no alteration from the rains, (tho' 'tis vulgarly believed they do) beſides, *Geronſter* and *Sauveniere* are ſhelter'd from them, and *Pouxhon* can only ſuffer when the channel that runs through the middle of the town is overflow'd above the level of the well; nevertheleſs tho' it is certain that in rainy weather the waters are weaker, and their vertues are diminiſhed, yet it is as certain that they are not leſs ſo in cloudy weather when it does not rain: ſo that it is not the rain, but more likely the temperature of the air, which at thoſe times deprives the waters of their ordinary activity.

Coming down from *Sauveniere* a quarter of a league north eaſt from thence, and half a league from *Spa*, is the well of *Watroz*; it ſtands in the lower

lower end of a marſhy field, whoſe ſoil is no better than a quagmire, it's ſpring comes from a hill about a musket ſhot diſtant, it is incloſed with a little wall almoſt ruin'd and ſurrounded with rough ſtones laid one upon another, with a large one at the top to ſerve for a covering; there is no place for ſhelter, and it's ſituation is ſo bad and it's water ſo ſenſible of an alteration by rain and damp weather, that it is not adviſable at thoſe times to make uſe of it.

Tonnelet is a little farther diſtant on the aſcent of a hill, in a large field call'd *Freſneuſe*, half a quarter of a league from the rocks. It has no retreat nor ſhelter nigher than a neighbouring village call'd *Niſzez*. This field, particularly near the well, is ſo boggy and ſpongy, that in ſeveral places it appears dangerous for any one to venture for fear of being buryed alive. Its lying ſo remote from the mountains, and ſituated in a marſhy ground, are reaſons for this water receiving an alteration from the leaſt change of weather.

It's ſpring is incomparably greater than the others, the water guſhing up in great quantity into a barrel without a bottom thruſt into the earth, from which it has it's name. The water is ſo intenſly cold that one could more eaſily endure putting one's hand into ſnow or amongſt beaten ice than into this well. It ſtands in a niche, formerly neat enough, but through neglect in letting it go to decay, it is now almoſt ruin'd. It's water is ſtrong of the mineral, and tho' ſome phyſicians preſcribe it, yet it is not in much repute.

Of theſe five wells that of *Pouxhon* has moſt of the ſun, which, with the ſubterraneous heat, does not a little contribute to a perfect mixture of the minerals with it's water.

CHAP.

CHAP. II.

The analyſis of theſe ſeveral Fountains, by Mr. Chrouet, *M. D.*

I Begun, *ſays he*, with that *rubrick* or *red earth* which is found fixed to the pavement of the wells, or in thoſe channels through which the waters run; that which I found moſt worthy of obſervation was that this earth ſeem'd to contain the minute particles of whatever ſubſtances enter'd their compoſition, and that becauſe they are not ſeparated by putrifaction or corruption, but by their proper weight and by the diſſipation of thoſe ſpirits that ſuſtain them. This is ſo true that if a glaſs of this water iſſuing from the fountain is expoſed to the air, one ſees ſome moments after, little bodies of a rediſh colour floating therein, which all come from the ſurface of the water, and increaſe in number proportionably to the diſſipation of it's ſpirits, and at laſt ſubſide at the bottom under the form of red earth; the bottles kept for that uſe being a convincing proof.

Thoſe who judge of it by it's look, take it to be a kind of *iron ruſt*, but it's levity and unctuoſity which it leaves on the fingers upon touching it contradicts this opinion, moreover the four or five fountains which I examined with the utmoſt care reſemble one another but very little, for that of *Tonnelet* is of a lively red colour, and taſts ſweet as ſugar, that of *Pouxhon* is yellow, and piquant to the taſt, that of *Sauveniere* is of the ſame colour, but like that of *Tonnelet* in ſweetneſs; and that of *Geronſter* is alſo yellow but of a ſaltiſh taſte.

After

After theſe ſmall proofs I undertook to make an analyſis in all the forms. I boil'd five ounces of that of *Geronſter* in eight pounds of rain water, and after letting it clarify I filter'd it through brown paper, and by evaporation on a ſlow fire, got two ſcruples of a bitter and piquant ſalt which would neither ferment with acids nor *alkalies*, it chang'd the decoction of galls to a whitiſh colour, which precipitated to the bottom of the glaſs like curdled milk, and left the liquor above of a yellow colour. This ſalt being pounded with charcole, and put upon a tile, only redden'd in the fire but made no detonation, and being calcin'd it became immediately *alkalous* without any puffing up, from whence I infer that it was neither *vitriolous*, *nitrous*, nor *aluminous*, but a *double ſalt* reſembling the vegetable ſalt of plants which, like that, eaſily loſes its acid and becomes *alkalous* by the leaſt heat, contrary to the nature of thoſe ſalts which are only ſubject to this alteration from the laſt degree of fire.

Having examin'd this ſalt I was deſirous of being ſatisfied, if it contain'd any ſulphur, I therefore put twelve drachms of this matter into a crucible which immediately ſent forth a ſmoak that ſmell'd of burnt iron and ſparkl'd a little, from whence I imagin'd there was ſulphur; I pounded ſome of it with ſalt-petre to ſee if putting that into a crucible it would crackle, which not happening made me conclude that theſe fumes and ſparklings were not cauſed by a common ſulphur, but rather by particles of a metalick ſulphur, which was to be diſcover'd in another manner.

I boiled twelve drachms of the ſame rubrick in a moderate quantity of rain water with double it's weight of ſalt of tartar till the water became red, which I repeated by adding ſtill the ſame ſalt till

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it would take no more tincture, then all the ſulphur being enter'd into the pores of the ſalt of tartar, I precipitated it by pouring upon the tincture an equal quantity of well filter'd lime water, the mixture immediately thicken'd and became white as milk, but inſenſibly ſubſided in the form of *whitiſh ſulphur*, which I took care to waſh and dry very well, then ſetting it upon the fire it ſmoaked conſiderably and made a little noiſe with nitre, retaining nevertheleſs the ſmell of iron, which confirm'd me that it was a real metalick ſulphur, ſome particles of which had been exalted by the firy corpuſcles of the lime, but ſo elaborated with its double ſalt, that it wanted nothing but to be interwoven with a neceſſary quantity of earth to make it real iron.

The twelve drachms that I put into a crucible to be examin'd by fire, loſt a ſixth part of its weight, and took a dark colour; I threw half a drachm of it into an ounce of the decoction of galls which immediately chang'd its colour to a beautiful black; I likewiſe took another drachm and held it near a loadſtone which attracted with a ſurpriſing ſwiftneſs every particle of it; this made it appear to be the real ſubſtance of iron without any mixture of other metals as *led*, *copper*, *cerus*, &c. nevertheleſs if it be expoſed to the fire above half an hour it becomes as red as vermilion and loſes its quality of being attracted by the loadſtone and tinging black, but this happens likewiſe to the filings of ſteel when they are too much calcin'd by a brisk fire. Thus judging of the virtues of the water from which this red earth of *mars* and *metalick ſulphur* is taken, they ought to be greater than thoſe from iron it ſelf, becauſe this valuable ſulphur with the double ſalt enters directly into the maſs

maſs of blood and enlivens it, whilſt the metalick part going no farther than the *prima viæ*, corrects the too acrid juices, and ſtrengthens the bowels, and this it does more effectually by being more exquiſitely divided by nature than it could be by art, ſo that the whole fibres of the inteſtines are ſenſible of it's effects.

Five ounces of the rubrick of *Tonnelet* managed in the aforeſaid manner yielded me only ten grains of a ſalt fat, and eager like *cream* of *tartar*, but after having made the ſame rubrick hot by the fire I extracted half a drachm more from it, it precipitated the decoction of galls to a very pale red, as cream of tartar will do, being calcin'd it does not become *alkalous* like that of *Geronſter*, and after calcination there remains only the eighth part which ſwells in little bladders like *Allom*, this convinces me that there is allom in the water of *Tonnelet*, and which is perhaps one of the cauſes of it's coldneſs.

This rubrick put into a crucible ſparkles like the duſt of charcole, continuing ſo more than half an hour, and the ſmoke of it ſmells like that of common ſulphur, being likewiſe pounded with nitre it makes a conſiderable detonation, it diminiſhes a third part before it loſes its ſulphurous ſmell, and aſſumes a purple colour, but with theſe preparations it does not blacken the decoction of galls, and is immovable at the approach of the loadſtone; to give it theſe two qualities it muſt be put into fuſion till it acquires the natural colour of iron, then taking it out of the crucible you'll find it diminiſhed half its weight, partly in maſs and partly in coarſe powder, reſembling iron in weight and colour, being ſuſceptible of the loadſtone, and blackening the decoction of galls as the filings of iron would do, for which one cannot otherwiſe

account

account but by alledging that the great quantity of common ſulphur which is found in this rubrick muſt be conſumed by the fire before the iron can manifeſt it ſelf; it has likewiſe the advantage of being ſhelter'd from the violence of the fire and having its parts united by the fuſion of the ſulphur, whereas the iron which is in that of *Geronſter* having no ſulphur, and being much rarified, cannot bear the force nor continuation of the fire without being intirely deſtroyed.

Five ounces of that of *Sauveniere* yielded me three ſcruples of a ſalt like that of *Tonnelet*, and made the ſame alterations on the the decoction of galls; it diminiſhed three fourths in calcination, and what remained was inſipid and would not ferment with any acid.

I made twelve drachms of it red hot at a ſoft fire which ſparkled very much for two or three minutes, and during the time I kept it upon the fire it diffuſed a ſmoak and ſmell of real ſulphur, when that was over and the iron began to ſhew it ſelf, I took it from the fire, diminiſhed three drachms, which perſuaded me that the fourth part of it was ſulphur, after this the loadſtone attracted it very eaſily, and it likewiſe blacken'd the decoction of galls, which it would not have done if it had been kept longer upon the fire, becauſe the texture of its *Mars* not being very cloſe, the fire would have eaſily conſumed the metalick ſulphur, and ſo deſtroyed this metal, but the fire continuing but a very ſhort while, conſumes only that kind of common ſulphur which adheres to its exteriour parts, whoſe unctuoſity hinders the action of the loadſtone, as oyl or greaſe hinders its attracting the filings of iron, and it is this kind of ſuperficial ſulphur, join'd with nitre, that makes a detonation. The rubrick of *Watros* affords the

ſame

ſame ſort of *Salt* as that of *Sauveniere*, which (like it) being calcined leaves no fix'd alkali, but only a little inſipid earth, the reſt going away in ſmoke. It ſmokes and ſparkles in the crucible for a little while, but this ſmoke does not ſmell of real ſulphur, but like that of turf mix'd with iron, which being gone off, and that of iron only remaining, I took it from the fire, diminiſh'd a fourth part of its weight, ſuſceptible of the loadſtone and tinging the galls, which qualities it loſes like that of *Sauveniere* if you ſurpaſs the neceſſary degree of fire.

I alſo analyſed that of the old *Geronſter*, which is a fountain about forty paces above the new, which many people believe to be equal to it if not the beſt of the two, but they are much miſtaken, for in what manner ſoever this *rubrick* is managed, it does not appear to be by much ſo *martial* as that of *Sauveniere*, or *Watros*, and incomparably leſs than that of *new Geronſter*, which loſes but two drachms out of twelve, to make it more ſuſceptible of the loadſtone than any of the others.

Five ounces of the red earth of *Pouxhon* afforded thirty grains of a piquant, fat and bitter ſalt, which being put upon a tile red hot, went almoſt all off in a diſagreeable ſmoak and vapour, leaving behind a little black inſipid earth that would not ferment with any acid, and altho' it was very fat, made no detonation with ſalt-petre; it whiten'd the decoction of galls, which a little after precipitated like a curd, leaving the liquor above of an orange colour; this rubrick being put into a crucible with ſalt-petre made no detonation, and being alone did not ſparkle like that of the other fountains, but only exhal'd a kind of vapour that ſmell'd of iron, which is a ſtrong preſumption of its being intirely compoſed of it; but in what manner

ſoever it be prepared, it will not ſtir at the approach of the loadſtone, and what is more ſurpriſing, in an inſtant it turns the decoction of galls very black, whereas that of the other fountains being prepared become ſuſceptible of the loadſtone (excepting that of *Geronſter*) and don't blacken the decoction of galls till ſome hours after. I know you will ſay 'tis becauſe the water of *Pouxhon* is impregnated with *vitriol*; but if this was the true reaſon, whence comes it that the ſalt I extracted from its rubrick had not any one vitriolous quality? is it poſſible for this vitriol to ſtick ſo cloſe to the rubrick, that all the artifice, that workmen employ to ſeparate common vitriol from the marcaſſity which originally contains it, could not diſengage it? on the other hand, if you conceive it to be a vitriolous ſalt of iron that produces this effect, I muſt tell you that far from its being vitriolous, I find it to be a ſalt altogether like that which is produced of the red earth of *Geronſter*, and that which is drawn from refined iron which do not tinge the decoction of galls black, but whiten it in the precipitation: to have the ſalt of iron ſuch as I am ſpeaking of, you need only to quench ſeveral bars of red hot iron in cold water, filter this water and evaporate it at a ſlow fire to a dryneſs. The cauſe then of this blackening quality cannot be imputed to any vitriol in the rubrick.

This is all I have to ſay upon theſe five or ſix kinds of red earth which in reality gives ſome ideas of the nature of the waters from which they are taken, but don't intirely convince from the vulgar prejudice of their being only conſider'd as an excrement; I thought it therefore neceſſary to have proofs from the waters themſelves, which I undertook, by evaporating, and diſtilling them, of which I ſhall give you a faithful account.

I evaporated by a ſlow fire an hundred pound weight of the water of *Geronſter*, which being reduced to two pounds appear'd very thick and muddy, but letting it ſettle became very clear by the fall of a grey ſediment which precipitated at the bottom, this water was red and ſmell'd ſtrongly of lye aſhes, and having filtered it through brown paper, and evaporated it to a dryneſs, I collected three drachms of a rediſh ſalt, very piquant, which fermented ſtrongly with ſpirit of vitriol; the grey ſediment, ſeparated from a drachm and an half of glutinous earth, and dryed at a ſlow fire, weighed half an ounce; it felt unctuous being preſs'd between the fingers, made a ſmall detonation with ſalt-petre, and being thrown into the fire alone evaporated in a ſmoke that ſmell'd of ſulphur mix'd with iron. I could not diſcover any rubrick in this ſulphureous matter, nor in the glutinous earth, ſo threw them away as uſeleſs.

One hundred pound weight of the water of *Pouxhon* evaporated in the ſame manner, gave me an ounce of a ſulphtureous matter, five drachms of a glutinous earth, and half an ounce of ſalt of a lixivious ſmell and taſte, fermenting but little with ſpirit of vitriol, muddying the decoction of galls, and tinging it of a purple colour, which inſenſibly precipitated to the bottom in the form of *curdled milk*, leaving the liquor above of a blackiſh colour; the ſalt of the water of *Geronſter* does the ſame, with this difference only that the curdling which falls to the bottom is white without any thing of purple like that of *Pouxhon*. If it be a little calcined to make it the better ferment with acids, it immediately loſes half of its weight, this does not happen to that of *Geronſter*, which loſes but a fourth part by the ſame degree of heat, from which

we may infer that preſerving its acid in the evaporation better than that of *Geronſter*, it is one of the reaſons why the water of *Pouxhon* keeps better in bottles than that of *Geronſter*.

This ſalt before it is calcin'd ferments tolerably well with ſpirit of vitriol, and if afterwards all its humidity be ſlowly evaporated it will be increaſed a ſixth part; whereas that of *Geronſter*, after it has fermented more ſtrongly with the ſame ſpirit, is increaſed a third part; by this method you render back to theſe ſalts as much of the acid as they loſt in the evaporation, which not only confirms what I have aſſerted, but one may thereby calculate the quantity of acids each pound of water contains in the pores of its alkalous ſalt. The ſulphur being ſeparated from its droſs, and laid upon a red hot tile, almoſt evaporates in a ſmoke that ſmells of burnt iron, leaving only a little earth and alkalous ſalt.

It is ſurpriſing that this ſulphur precipitates ſooner than the rubrick which is much heavier, but it's probable that it being ſupported in the fluid by volatile acids which ſerve as ſo many *Floats* to keep it up, and being exhaled by the heat of the fire, leaves the metallick ſulphur to its own weight, whilſt the red earth which has no hold becomes as it were abſorb'd in the empty ſpaces of the alkali.

This ſulphur coagalates the decoction of galls without the leaſt tincture of black, which confirms what I before advanced, that the iron is incorporated with the alkalous ſalt, and that it is only the ſulphur that precipitates.

As to the alkalous fix'd ſalt and the rubrick, I muſt not forget to tell you that the red tincture which is drawn off, in boiling the red earth with three times it's weight of ſalt of tartar, to precipitate

tate the ſulphur with lime water, being again ſet upon the fire, there forms upon the ſurface a pale yellow skin, very ſhinning and of a ſweetiſh taſte, which being put upon a red hot tile evaporates away in ſmoak of a ſulphureous ſmell, and it very much reſembles the enamell'd cream that is every day to be ſeen upon the water in the fountain of *Pouxhon*, all the difference that I find is that this cream is ſweeter, more diverſified with colours, and much more ſparkling, and being put into a crucible exhales a ſtronger ſmell of ſulphur, otherwiſe they are much the ſame, for being dry'd they appear equally white, being calcin'd they afford the ſame quantity of fix'd ſalt, and being pounded with ſalt-petre they make an equal detonation. All which makes me judge that the ſaid ſkin is a mixture of ſulphur diſengag'd of its earth and fix'd ſalt, which the fire forces up to the ſurface of the water, where they incorporate like fix'd ſalt and oyl boiled up together in the making of ſoap.

I likewiſe evaporated one hundred pound weight of the water of *Tonnelet*, which yielded me two drachms and a half of a ſalt as red as blood, which was ſo fat and oily that it was impoſſible to dry it. It made an exploſion with ſalt-petre, with the ſame force and in the ſame manner as if it had been common ſulphur, it fermented but little with acids, and after calcination not at all, which ſurpriſed me much, but having obſerv'd that it ſwell'd prodigiouſly in calcining and turn'd white, I concluded that there was *allom* in its compoſition; it did not blacken the decoction of galls neither before nor after calcination, as that of *Pouxhon* and *Geronſter*, but made it muddy and of a pale yellow, without any precipitation. Beſides the ſalt there was five ſcruples of a groſs earthly ſediment

which ſmoak'd much in the crucible, and made a detonation with ſalt-petre, and after being thoroughly calcin'd, blacken'd the decoction of galls.

Out of the ſame quantity of the water of *Sauveniere* I extracted only a drachm of ſalt of a lixivious ſmell and taſte, it fermented pretty well with ſpirit of vitriol both before and after calcination, and was neither ſo fat nor red as the other, and eaſily dryed. It made a little detonation with ſalt-petre, which was a proof of there being common ſulphur in it, and it ting'd the decoction of galls to a light grey, without precipitating.

There was but one drachm of ſediment, like in all reſpects to that of *Tonnelet*, except that it did not ſmoak ſo much upon the fire, and after being well waſh'd turn'd the decoction of galls black, which is contrary to the other two fountains of *Pouxhon* and *Geronſter*, whoſe ſulphureous ſediment being calcin'd, made the decoction of galls muddy, and of a whitiſh colour without the leaſt degree of black, their ſalts having only this quality. Therefore we ought not to be ſurpriſed that the ſalt which has no *mars* ſhould whiten the decoction of galls, and that the ſediment that contains ſome particles of it, after being calcin'd and waſh'd ſhould turn it to a black colour, and on the contrary that the ſalt of *Pouxhon* and *Geronſter* which contain mars ſhould make the decoction of galls black, and that the ſulphureous ſediment which has none ſhould make it white.

Having done with the *Evaporation*, I proceeded next to *diſtillation*, in order to endeavour to diſcover the nature of thoſe ſpirits which are look'd upon, as the *ſoul* of the waters, and to which is attributed the force of their boiling by a ſimple warmth,

to

to intoxicate thoſe who drink any large quantity of them, to burſt the bottles that are cork'd immediately after being fill'd, and to fly with impetuoſity out of a bottle that has been ſhook and the cork taken ſuddenly out. The more effectually to execute this deſign, I order'd to be made ſome cucurbites of glaſs, large and thick, about two feet high, and bent to a half circle from the middle to the top, which I ſeal'd *hermetically*, ſo that it had no communication with the air but by a pipe of the ſame ſubſtance fix'd within four inches of it's baſis, and elevated three inches from the outſide; it was through this pipe that I put ſome of the water of *Pouxhon* into one of theſe cucurbites which I fill'd two inches above it's inſertion, that ſo the ſurface of the great column of water that took up a part of the gourd being elevated above the level of this inſertion, the ſpirits that ſhould ariſe would be forced towards the bending: likewiſe to prevent the little column of water in the pipe from loſing its ſpirits, I took care to ſtop it with a good cork and bound it over with ſeveral folds of bladder. Matters being thus diſpoſed, I ſet the cucurbite in warm water which I kept ſo till the mineral water within had acquir'd the ſame degree of heat as that without, when it begun to boil as if it had been upon the fire, but not long, for the glaſs burſt with ſuch violence that its pieces flew four paces diſtance. This *Phenomenon* convinced me of the exiſtence and force of the *ſpirits*, and I was of opinion that to be able to extract them one ſhould make uſe of a ſtill that would reſiſt their impetuoſity, I therefore got one made of pewter, different from that of glaſs only by being a great deal larger, and inſtead of the bending for receiving the ſpirits I fix'd a large *chapiter* with a long pipe (which had not a vent at

the bottom) to ſerve for a *recipient*, the pipe I had placed four inches from the baſis was the only paſſage through which any thing could be introduced into the ſtill, and the chapiter and gourd were ſo well ſoder'd that there was not the leaſt vent.

I carried this ſtill to *Spa* the 5th of *May* 1713, and the ſame day made a trial of it with *Dr. Cocquelet* (an old practitioner at *Spa*) at the well of *Geronſter*, which has the repute of exhaling more ſpirits than any of the others. We dipt the ſtill in the well and made it take in the water through the pipe within a finger's breath of the ſurface that it might receive a greater quantity of it's ſpirits, which in the diſtillation would be forced up to the chapiter. The pipe we ſtop'd cloſe and cover'd with 5 or 6 bladers, and as its mouth was contrived with a ringlet round it, the ligature we made was the better ſecured. This being done we began to heat our ſtill with warm water and augmented it by degrees till we made it boil.

During the diſtillation, which laſted four hours, there appear'd a *Phenomenon* which very much employ'd our curioſity, and at laſt became very ſurpriſing, for between the cork and the folds of bladder there was lodg'd a quantity of *ſpirits* that ſtretched the bladders to that degree that we expected every moment they would have burſt, and continued ſo notwithſtanding our cooling the machine even to the dipping it in the well. *Dr. Cocquelet* was for piercing the bladders, but I perſuaded him to forbear till we had taken out what was riſen up to the pipe of the chapiter, which we did by boring a hole in its bottom. There came out about two ounces of *liquor* which we received in a viol, immediately after which the ſpirits that were

were lodg'd between the cork and the bladders, not only repaſſed through the cork but likewiſe through the pillar of water contained in the pipe, and ſo up to the top of the chapiter, and laſtly came whizzing out of the little hole we had bored at the bottom of its pipe, it had neither taſte nor ſmell, and I had reaſon to believe that it was air incloſed in thoſe corpuſcles that are ſeen to float in the water, which being ſet in motion by the heat broke it's priſons, for we ſee that thoſe corpuſcles appear torn, and that they come from the ſurface of the water where the air had carried them before it could diſengage it ſelf from them. The ſpirit or diſtilled liquor we collected in the viol was of a diſagreeable bitter, and ſmell'd very ſtrong of ſulphur, and it ſeem'd to me that it was the ſulphur of the whole 24 pounds of water contain'd in the ſtill, becauſe the water which we took out of the gourd after the diſtillation was altogether inſipid, being deprived of whatever ſubſtances it was before impregnated with. The next day we diſtilled in the ſame manner the water of *Pouxhon*, which yielded a liquor only a little tartiſh, but it had undoubtedly loſt its ſtrength in fretting the pewter of the roof of the chapiter, for ſome weeks after as I was rectifying ſome ſpirit of wine in the ſame cucurbite, it brought away with it through the pipe of the chapiter, a white ſalt, and ſweet like ſalt of ſaturn, which could no otherwiſe be formed but by the volatile acid of the mineral water, as ſalt of ſaturn is formed by the acid of diſtill'd vinegar incorporating it ſelf with the lead. The air whizz'd out of the pipe of the chapiter in the diſtillation of the water of *Pouxhon* in like manner as it did in that of *Geronſter*, but without the ſmell of ſulphur.

In

In ſhort being convinc'd by theſe experiments that it was air and not combuſtible ſpirits that acted with ſuch violence in the waters, I thought it needleſs to proceed to the diſtillation of thoſe of *Tonnelet* and *Sauveniere*, and that it was better to employ my time in diſcovering how this air, the acid ſpirit, the mars, the ſulphur, and the ſalt which I found, enter'd into their compoſition.

There are ſeveral ways which minerals and metals may mix with water in the boſom of the earth, but I know only two that relate to the waters of *Spa*; the one is that whilſt the mine being ſoft is waſhed with a running water, that loads it ſelf with what it finds the moſt diſſoluble; the other preſuppoſes the water already loaded with an acid, and meeting with a mine hard and ſolid drags away as much of it, as it has time to diſſolve, it is in this laſt manner that moſt who reaſon on the waters of *Spa* believe them to be impregnated with vitriol of mars, and they pretend to prove it by the taſte which comes near that of ſimple water in which vitriol of mars has been diſſolv'd, by the blackneſs it takes from gauls, and by the effects it produces in humane bodies. I was along time prepoſſeſſed with this notion, but not having been able by any experiment to diſcover this pretended vitriol, I was oblig'd to take another courſe; you will perhaps alledge that the acid which diſſolved the mine of iron to compoſe this vitriol of mars is ſo ſubtil, that it flyes away in the evaporation that I make to extract it, and that quitting thus the metallick matter this vitriol of mars is deſtroyed; if that was the caſe the alcalous ſalt which I extract having its pores much larger, is leſs liable to be preſerv'd, which is contrary to the experiments I have made, and particularly

ticularly to that upon the rubricks of *Sauveniere*, *Tonnelet* and *Pouxhon*, that yields only an acid fix'd ſalt in a little earth and ſulphur. The other opinion that ſuppoſes the mine ſoft and diſſoluble agrees better with my experiments, and may ſerve for a baſis to explain all thoſe *Phenomena's* I have mention'd, but firſt I think it behoves me to declare my opinion, how I think this mine of iron is vegetated in the boſom of the earth.

According to the analyſis that I have ſeveral times made of this metal, it is a compoſition of *earth reſembling clay*, of *Sulphur* tolerably fix'd, and of a *double ſalt*, that is to ſay, half *acid*, and half *alcalous*; as this compoſition could not be made without theſe ſeveral principles united with, and penetrating each other in different manners, and beſides, they are all fix'd except the *acid* in which the ſalt is imbibed, I therefore believe it is it that ought to be look'd upon as the great mobile of the whole work.

Taking it then for granted that this earth mix'd with ſulphur, and alcalous fix'd ſalt exiſts in the boſom of the earth, the acid of the air, ſubtil and always in motion, concentering in the ſalt, muſt excite a fermentation, which tho' it can be neither quick nor ſtrong, being obſtructed by a great quantity of earth, yet ſufficient to ſwell and dilate the maſs, till the whole being interwoven and united together, the fermentation ceaſes, then this maſs thus ſwell'd and dilated begins to come to it ſelf by expelling the air that was lodged in the cavities of its rarefaction, and this inſenſibly till its whole integrant particles be ſo condens'd and reunited together that they may become the proper ſubſtance or marcaſſity of iron. But if any water happens to run through this maſs before it becomes thus condens'd and harden'd

den'd, it is evident that by diluting and diſſolving it, the water becomes loaded with the different ſubſtances of which it is compoſed, *viz.* of *mars* already formed, of *ſulphur* and *ſalt*, which the acid ſpirit of air had begun to put in motion, and much more ſo as this ſubterraneous vegetation forming itſelf ſucceſſively, it is impoſſible that that part of this maſs, upon which the ſpirit of air had made its firſt impreſſions, would not be intirely elaborated before the other could be ſcarcely begun. You will undoubtedly object that if this was fact, the water would not ſtay till a part of this maſs was form'd into a metal, but that it would immediately waſh it as ſoon as the ſpirit of air had a little rarified it, and ſo would only carry along with it the ſalt, earth, and ſulphur, and not the formed mars. To which I ſhall anſwer, that the maſs does not become penetrable till after the air which was incloſed, in freeing itſelf from its priſons, makes ſeveral holes or crevices in the maſs, through which the water inſinuates itſelf into the cavities which it left, where it loads itſelf with thoſe different ſubſtances, nevertheleſs part of the air remains entangled with ſome mars already formed, not having been able to diſengage it ſelf otherwiſe than by carrying away with it the metallick particles in which it is folded up, as in ſo many veſicles that reſemble thoſe that are made in a lather of ſoap and water. The air thus incloſed yields itſelf to the current of the water which diſſolves the marcaſſity, and by its lightneſs holds the metal imperceptibly ſuſpended, and whoſe ſubſtance being ſo much dilated becomes tranſparent, but as ſoon as the air has made its eſcape the parts of theſe veſicles become ſo contracted that the tranſparence ceaſes, and being left to their proper weight they are ſeen to precipitate

pitate themſelves from the ſurface of the water where the air had carried them before it could diſengage itſelf.

It is undoubtedly this air that in burſting thoſe viſicles cauſes ſuch a rumbling noiſe and bubling of the water when 'tis newly drawn and expoſed to a ſimple warmth, and which is followed with almoſt the total loſs of the vitriolick and poinant taſte it had at the ſpring. This has given occaſion to thoſe who have examin'd theſe waters to ſay, that they contain a volatile vitriol of mars, and ſpirits ſo ſubtile and penetrating, that the leaſt degree of heat diſſipates them, and without its being poſſible to ſtay them, nevertheleſs all this depends only upon the deſtruction of the martial veſicles, thick ſet with the points of our airy acid which in this ſhape counterfeits the taſte of vitriol of mars, but ceaſes as ſoon as the exploſion of the air tearing thoſe veſicles, and ſhaking them roughly, lets loſe the acid points fix'd in this thin ſubſtance, that afterwards float confuſedly in the water, whilſt the mars with which they were combined falls by its proper weight to the bottom of the vaſe, where it appears like a kind of excrement. It is then evident, that to drink the waters in their full ſtrength and goodneſs, it is abſolutely neceſſary to come to the ſprings, becauſe their vertues depend as much upon this admirable diſpoſition of which I have explain'd the mechaniſm, as of the quantity and quality of their different elements. This is ſufficiently proved by the example of *gun-powder*, which owes all its force, not to the quantity of *ſulphur* and *ſalt-petre* of which it is compoſed, which ſeparately are without action, but intirely to the proportion of each, united one with the other.

You

You will further object that this acid ſpirit of air to which I attribute ſo many vertues is but imaginary, and that before it be allowed to act ſo generally, and efficaciouſly, I make it plainly appear. That is eaſy for me, having only to inſtance the example of poliſh'd iron that ruſts in the air, that of old lime, which being expoſed a long time in the air, impregnates a volatile acid, and becomes ſalt-petre ; in a word, that of the aſhes of wood and burnt earth, which containing only an alcalous fix'd ſalt, cannot ſerve to vegetation, nor form this double ſalt in the plants they produce without the help of this ætherial acid. It is by this artifice that the inhabitants of *Spa* (without knowing the reaſon) lay ſnares for this father of vegetation, and oblige him to reſt upon the ſurface of the earth, without which it would produce little or nothing for their nutriment, I ſhall nevertheleſs obſerve, that notwithſtanding all their labour, they can only get it to yield rye and oats, and ſome ſpelt ; and if they eat bread made of wheat, they muſt have it from elſewhere.

There is another thing curious enough in relation to this ſoil, which is, that earth which is burnt produces only two years, whereas that which is remanured with lime continues 25 or 30, bearing indifferently all ſorts of grain, which depends, in my opinion, upon the pores of the lime, which being of a ſubſtance more ſolid than the fixed ſalt of the aſhes of wood or turf, are not ſo eaſily deſtroyed, ſo are conſequently in a condition to ſerve a longer time for this kind of magnetiſm.

After this digreſſion, I return to the waters, to endeavour by the ſame principles to diſcover the nature of each of them in particular, and wherein they differ one from another.

It

It is certain, that there is not any eſſential difference in all thoſe ſprings; for they have all their origin from *Mars*, or the ſubſtance of which it is form'd, except that of *Tonnelet*, that has a little of the allom, *which it receives in paſſing thro' ſome alluminous earth.* This difference is purely accidental, they all depending leſs or more upon the ſame elements, or their different elaboration.

The mother earth of *Geronſter* abounds very much with the alcalous ſalt, which is ſtronger than in any of the others, the fermentation which reſults from its conjunction with the airy acid is ſo violent, that part of its ſulphur becomes volatiliſed; at the ſame time that what remains hook'd in among the fermenting ſalts, is woven and elaborated into real *Mars*, leaving beſides ſome metallick ſulphur, and a great quantity of double ſalt, which could not be elaborated with the earth to become perfect *Mars*, before the water came and carried it off. Thus a bottle of this water comes as a medicinal potion ready prepar'd from the boſom of the earth, being compos'd of a great quantity of this *airy acid* lightly ſtuck to our *ſalts*, ſulphurs, and to the metallick matter, of four grains of *Mars* divided into a million of parts, of ſix grains of *double ſalt*, of ſeven grains and a half of *metallick ſulphur*, and of a ſcruple of a *ſulphureous ſpirit*, which providence ſeems to have added as a corrective to the actual coldneſs of the water, without mentioning the wonderful effects it produces upon the cauſes of different maladies.

In the *Pouxhon* the earth and the ſulphur predominating over the alcalous fix'd ſalt although abounding, the fermentation is not ſtrong enough to ſublimate the ſpirits, nor thoroughly elaborate to a metal the ſulphur that is in its way, which

renders

renders its *Mars* imperfect, and is the cauſe that there is not any ſpiritualiſed ſulphur, as in the *Geronſter*, but it has as much more of the metallick ſulphur preſerved in its water by a good quantity of our vegetable ſalt; this it is that makes this water ſo much better; though even it ſhould be deprived of its *Mars* by the diſſipation of that little air it hides in its veſicles; it would nevertheleſs keep a long time, without its ſtrength and goodneſs ſuffering any conſiderable diminution, therefore one may conclude, that being ſo rich in minerals, and leſs charg'd with aerial matter, it is the fitteſt of all the others to be tranſported into foreign countries; but that *Geronſter* having its chief ſtrength from *perfect Mars* and *ſpiritualiſed ſulphur* which ſeparate themſelves ſo eaſily from the water, it ſhould be drank at the ſpring.

All what I have obſerved of the different modification or elaboration that the ſulphur of the waters of *Geronſter* and *Pouxhon* acquire by fermentation, proves itſelf clearly, becauſe we obſerve in thoſe of *Tonnelet* and *Sauveniere*, that their wanting the alcalous fix'd ſalt, as we remarked in the analyſis of their rubrick, or elſe not having over and above what is neceſſary to form a little of the *martial matter*, the fermentation with the airy acid muſt ceaſe after this little work, leaving the ſulphur without elaboration, and almoſt like to common ſulphur, particularly in the waters of *Tonnelet*, in whoſe mother earth it is in greater quantity, it ought to ſuffer a leſs alteration. Thoſe two wells are therefore more cooling than the others, not only becauſe their ſulphur is neither metallick nor volatiliſed, but likewiſe that a great deal of the airy acid not having found any alcalous ſalt to incorporate with,

mix'd

mix'd itſelf with a little earth and ſulphur, as we obſerved before; ſo that it is not without reaſon that they are preſcrib'd to cool the Blood, and diſſolve the gravel and ſtone in the urinal paſſages, preferring, however, *Sauveniere* to *Tonnelet*, both becauſe of the crudity of its ſulphur, and for its containing allom, whoſe aſtriction I always thought pernicious when it was neceſſary to dilate thoſe paſſages to give vent to the groſs and ſandy humours.

CHAP. III.

A brief account of the qualities and virtues of the waters of SPA.

EVERY body that conſiders the ſeveral minerals that are contained in the waters of *Spa*, will eaſily grant that they are of a warming and drying Nature, tho' at the ſame time they are actually cold and moiſt, and daily experience ſhews us that they often produce contrary effects, particularly in women afflicted with divers diſtempers proceeding either from the ſuppreſſion or too great flux of the *Menſes*, in both which caſes, the diſmal conſequences of which are well known, theſe waters are a moſt powerful remedy, yielding to no other whatſoever, of which many examples might be given.

They are alſo very effectual in curing the *green ſickneſs*, the *whites* and diſorders of the *matrix*, in which they not only give relief by drinking them, but alſo by injection, fomentation and bathing: they alſo cure *barrenneſs* proceeding either from the too great humidity of the matrix, or relaxa-

tion of the parts, and alſo prevent miſcarriages, of all which we have many inſtances.

They give alſo great relief in *catarrhas*, either by drying up or evacuattng the phlegmatick and ſerous humours, and many perſons afflicted with *migraims*, *giddineſs* and inveterated *head-achs* have been much eaſed thereby. They are very effectual in curing ulcers of the *Penis* when they are uſed by injection, and in *ſimple Gonorrheas* either by drinking, ſiringing or fomentation, and in *venereal Gonorrheas*, when the poiſon is removed, but the ulcers cannot be dried up, and when the parts for generation have been weaken'd thereby, they reſtore and fortify them again.

They alſo remove exceſſive heat of the *urine*, and quiet the pains of the *kidneys* and *bladder*, if they be not occaſioned by ſome obſtinate obſtruction, but if this be the caſe, they may increaſe the pains by preſſing the matter that cauſes the obſtruction, without expelling it altogether, which chiefly happens in the gravel.

They relieve very much ſuch as are for the moſt part *coſtive*, and on the contrary they ſtop great *looſeneſs* by diluting and temperating the too ſharp bile. They alſo free the body of groſs, viſcous, phlegmatick, cholerick and melancholy humours, moſtly by urine and ſtool, often by vomiting, and ſometimes, but rarely, by ſweating.

They renew the *hemerroidal flux*, when ſtopped, and reſtrain it when immoderate, and by promoting the circulation of the blood, correcting and evacuating humours, ſometimes reſtore blind people to their ſight.

Thty deſtroy all ſorts of *worms* and *inſects* in the body, and this is ſo well known, that there is no occaſion to deſcend to particulars, only ſhall mention

mention a perſon afflicted with a violent piſſing of blood, with great pains in the kidneys, not always alike, but with frequent intervals, who by drinking the waters was happily deliver'd, they bringing away upon the 7th day a great Inſect which gnawed the left kidney, and thereby opened the veſſels, and occaſioned the piſſing ſo much blood, and ſo violent pains.

They eure redneſs of *eyes*, as alſo the *itch*, and other cutaneous diſtempers by uſing them either internally or externally.

The remove obſtructions in the *liver*, *ſpleen* and *miſeraick veins*, and all inflammations occaſioned thereby.

Many *hydropical perſons* are relieved thereby in a very ſurpriſing manner, diſcharging the waters both by urine and ſtool, and the lymphatick veſſels being too much dilated or broken, are again conſolidated and contracted by the aſtringent particles in the water.

They are ſo comfortable to the *ſtomach*, that by their agreeable aſtringency they reſtore it to its right tone, when too much relaxed, and ſuch perſons as are incommoded with *vomiting*, *belching*, *hiccups*, and *throwing up their victuals*, do ſoon find relief after they begin drinking. They are more effectual than any other remedy for carrying off ſand, and freeing from all nephritick pains, and often carry off ſmall ſtones; but ſuch as ſuſpect that they have great ſtones in their kidneys, ought to uſe them with great caution, and if they are reſolved to drink them, they ought not to uſe any exerciſe, as in other caſes, but drink them a bed, leſt the ſtones be looſened and carried into the *ureters*, as has ſometime happened; they are alſo very effectual for curing ulcers in the kidneys

and bladder, incontinency of urine and diabetes, if uſed with due precaution.

In *ſcorbutick* caſes they are found to be an excellent ſpecifick. The inhabitants of *Spa* are free from head-aches, catarrhs, heart-aches, ſtone, and obſtruction of the ſpleen and liver, and it is rare to ſee any of them incommoded with jaundice, gout, ſcab or epilepſy. By all which it appears that theſe waters have a ſingular virtue not only for the preſervation of health, but alſo exceed moſt ſhop-remedies for the cure of diſeaſes, and that with expedition and ſafety, and great gentleneſs, and may be uſed by all perſons, old and young, in moſt conſtitutions, and all ſeaſons of the year.

Notwithſtanding of what has been ſaid of their ſingular virtue and efficacy, yet no perſon ought to preſume to order them in all kind of diſtempers as an univerſal remedy; for in the opinion of very wiſe phyſicians they are not good either in *Epidemical* or *Endemial* diſtempers, as the *Plague*, Poiſon, Pox, Cancer, Apoplexies, Epilepſy, true Palſies, Aſthma's, *&c.* in which, tho' ſometimes they may accidentally give relief, yet they are by no means a ſpecifick for them.

It would be proper now to give an account of the method and rules that are judged neceſſary to be obſerved in the uſe of the waters; but as in the precedingTreatiſe on the waters of *Pyrmont* the learned author has given a very full account of that method which after many years experience he has found to be the beſt and moſt ſucceſsful, and has laid down ſuch rules as are very proper to be obſerved in the uſe of all mineral waters, and as they are very applicable to the *Spa* waters,

and

and coincide for the moſt part with what the moſt experienced phyſicians have ſaid upon that head, I did not think it proper to trouble the reader with uſeleſs repetitions, but judge it ſufficient to refer the patient to the preceding Treatiſe, where he will find many things highly reaſonable, and worthy to be taken paticular notice of, as contributing very much to his ſucceſsful uſe of the waters.

FINIS.

ERRATA:

Page 15. Line 9. for *ſuperficies* read *ſurface*. p. 16. l. 27, 28, 29, to the end of the page, for *grain* r. *grains*. p. 22. l. 13. for *Hare* r. *Slare*. p. 25. l. 16. dele *preſently*. p. 30. l. 15. r. *pulveriſed*. p. 43. l. 35. r. *acid of vitriol*. p. 46. l. 5. for *vitriol* r. *vitriolick*, and in ſeveral other places, l. 8. r. *overcome*, l. 9. r. *form*. p. 50. l. 26. for *tepmeating* r. *temperating*. p. 51. l. 7. r. *Cachexies*. p. 67. l. 9. r. *aſſiſtance*. p. 85. l. 31. for *come* r. *comes*. p. 91. l. 32. for *healths* r. *health*. p. 3. l. 3. r. *primæ*.

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