

**An inquiry into the contents and medicinal virtues of Lincomb spaw water,
near Bath / [William Hillary].**

Contributors

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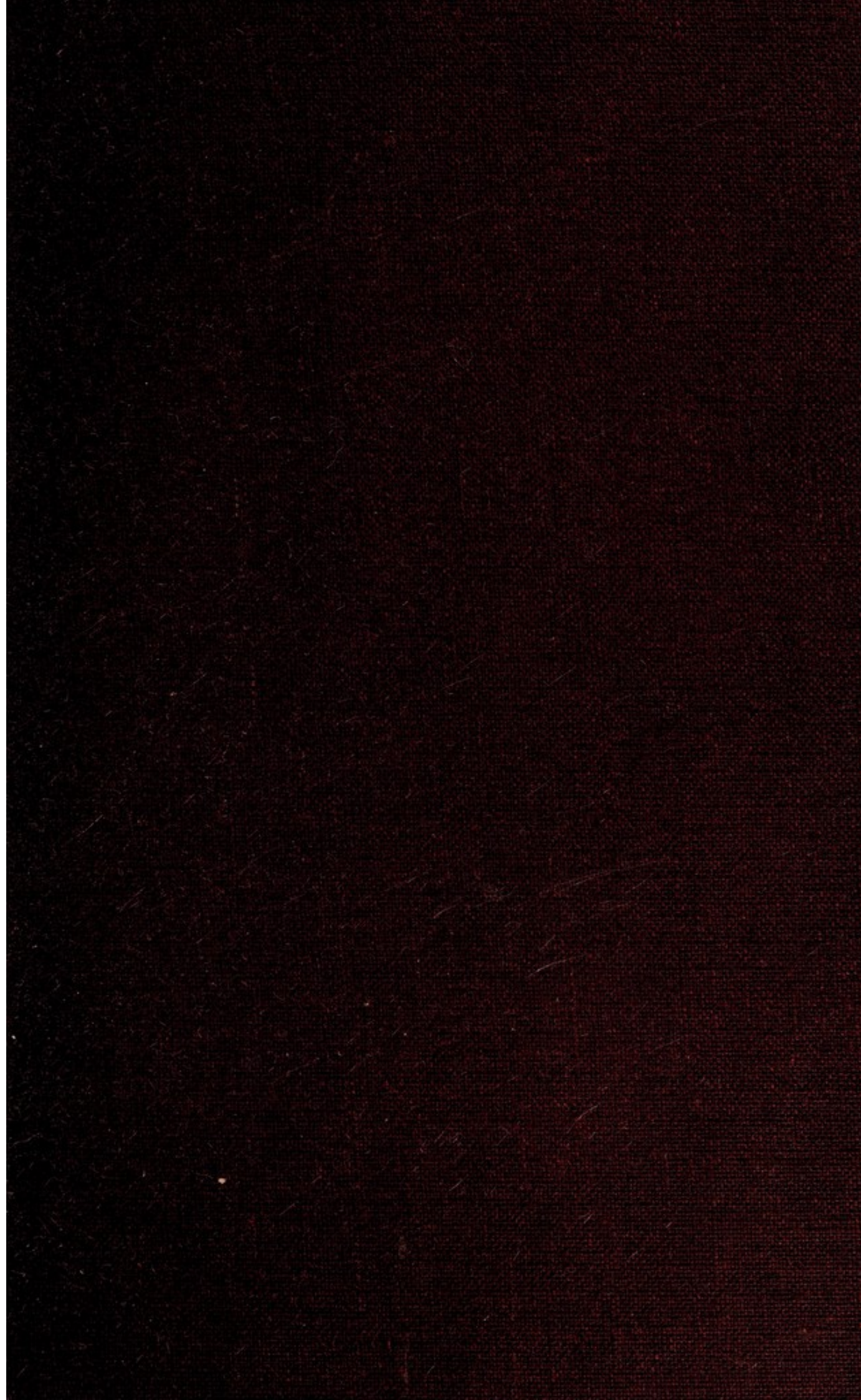
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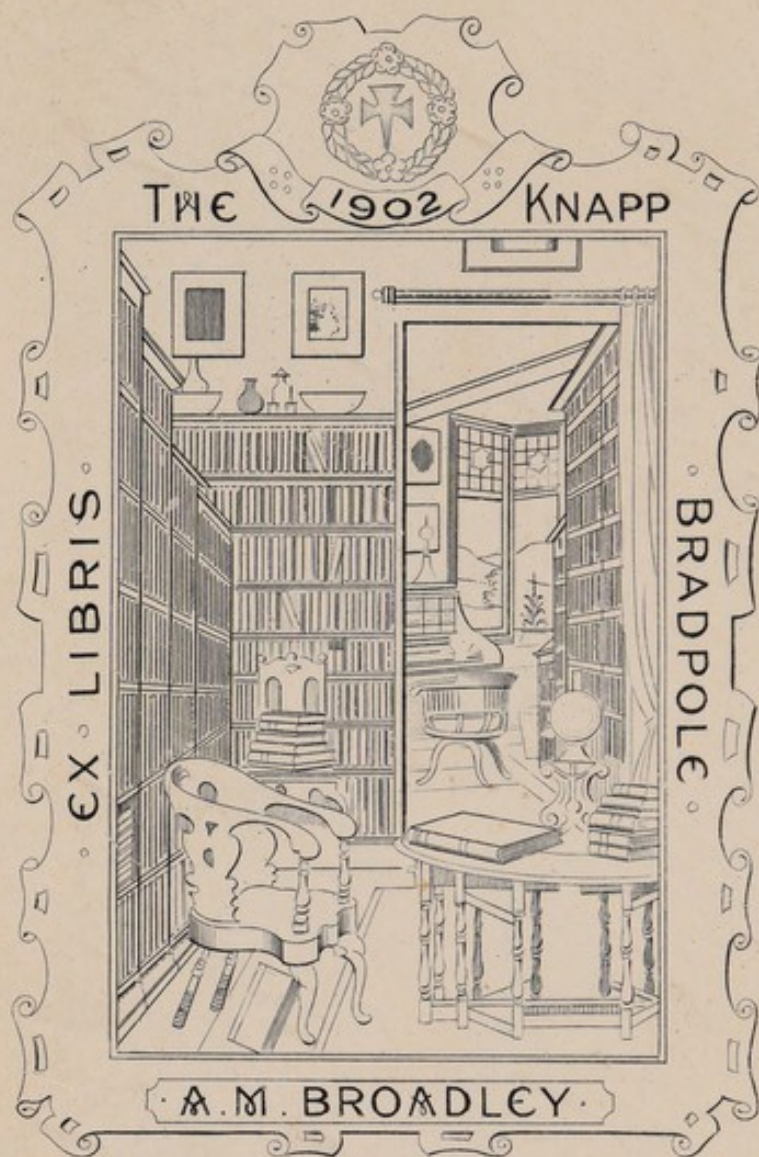
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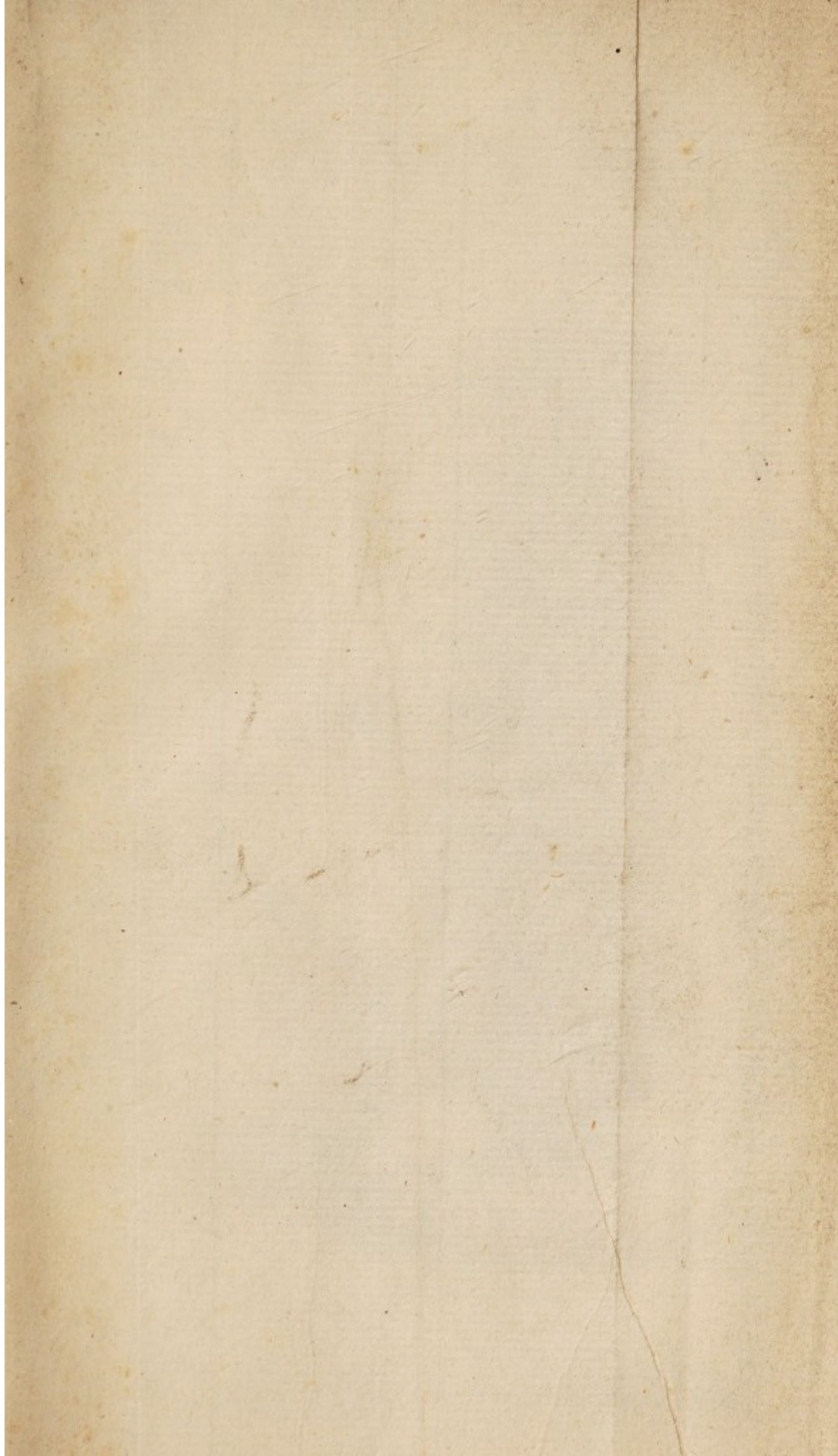
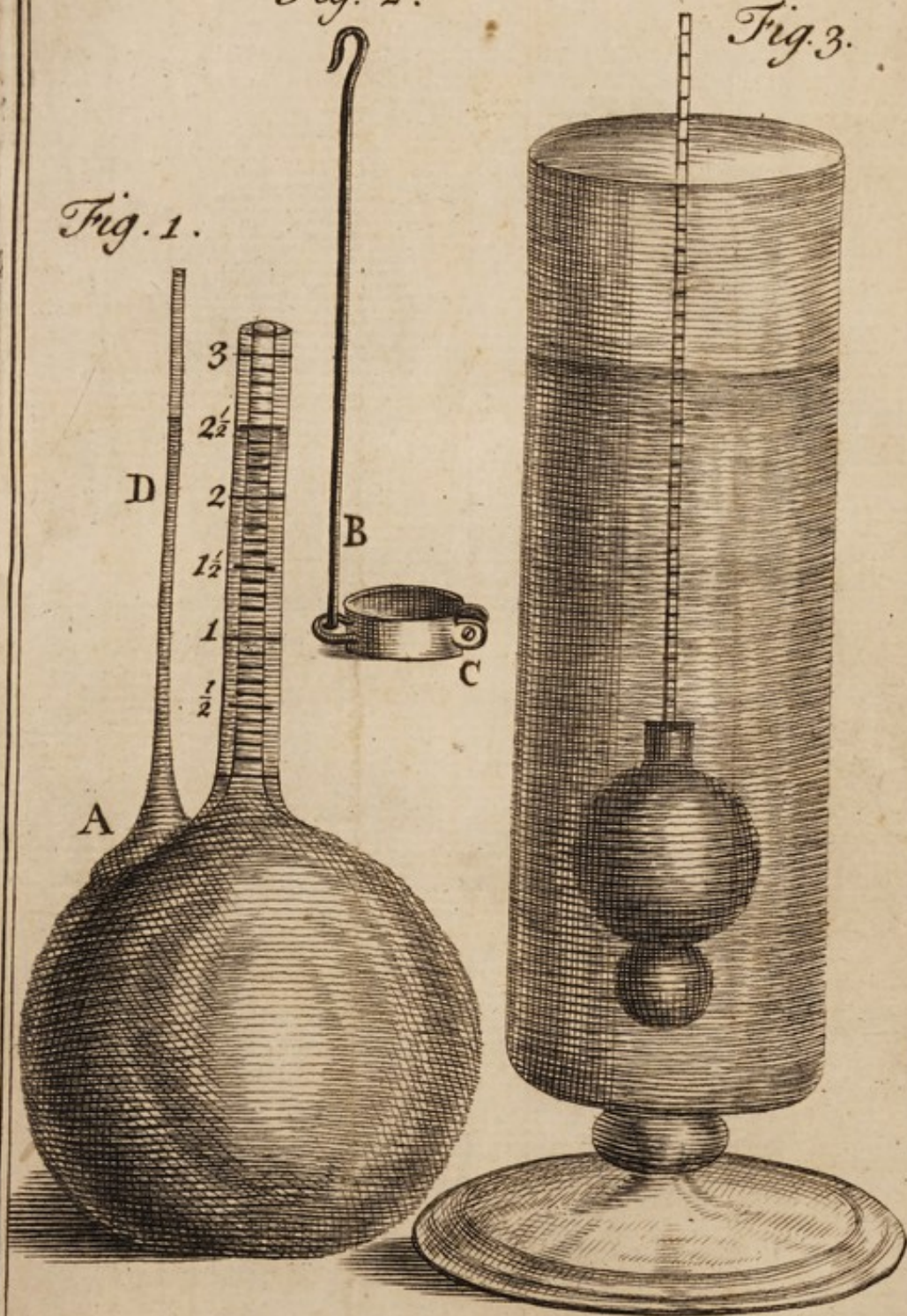


Fig. 2.

Fig. 3.

Fig. 1.



J. Mynde Sculp.

A N
I N Q U I R Y
I N T O T H E
C O N T E N T S
A N D
M E D I C I N A L V I R T U E S
O F
Lincomb *Spaw Water*,
N E A R
B A T H.

By *WILLIAM HILLART*, M. D.

L O N D O N:

Printed for J. LEAKE, Bookseller in *Bath*; and
Sold by C. HITCH, in *Pater-noster Row*.

M. DCC. XLII.



Lincoln's Span Water,
OF
MEDICINAL VIRTUES

BY
B. A. T. H.
M.D.

LONDON:
Printed for J. Baker, Bookseller in Strand, and
Sold by C. H. H. in Pall Mall, &c.
M.D.C.C.XII.

TO THE RIGHT HONOURABLE

P H I L I P,

E A R L O F

Chesterfield, &c. &c.

My LORD,

AN Inquiry into the Nature and Virtues of a mineral Water which promises much Benefit to Mankind, cannot be more properly addressed to any one, than to a Patron, who has experienced its Virtues, and seen its good Effects in some remarkable Cases ; a Patron whose Integrity, Judgment, and accomplish'd Abilities are no less eminent, than his distinguish'd Benevolence and Zeal

for the Good of the Publick are universally acknowledged.

To rescue this medicinal Water from Neglect and Obscurity, and to render it more extensively useful, is what I aim at: If my Endeavours are favoured with the Approbation of his Lordship, and the Judicious, the partial Censures of those who are interested in opposing them, will have less Weight with the Benevolent.

His Lordship's Permission so generously granted, to inscribe this little Piece to his Name, is a fresh Instance of his generous Regard for the publick Good, and demands the amplest Returns; but the only one in my Power, is, my most grateful Acknowledgments, which, with my sincerest Wishes for his Lordship's Health and Happiness, are constantly paid, with the greatest Deference and Humility, by the Author,

THE
P R E F A C E.

THE Mineral Water, which is the Subject of the following Essay, owes its Discovery to the following Accident : One Charles Melfom, a Cooper, having some Labourers at Work near the Place where this Water springs, treated them, one Day, with a Bowl of Punch, made with this Water, and some Brandy which had been kept in an Oaken Cask : The Punch quickly changed to a blackish purple Colour, which so surprised the Workmen, that some of them refused to drink it : He told this to a Neighbour of his, who acquainted me with the Accident, from which I readily
judg'd

judg'd it to be a *Chalybeat Water*; and some time after, going to see the Spring, I presently found from its Smell and Taste, and a few slight Experiments, that it was so, but that it differed very much in several respects from every other Spring of that kind, which I had hitherto seen.

This induced me to resolve upon making a further Inquiry into its Medicinal Virtues; but the Spring rising in a very wet Bog, almost covered with Shrubs and Grass, and the Season cold, I deferred it till the Summer following. In 1738 I began the Experiments, which being taken Notice of, led great Numbers of People to the Place, some through Curiosity, others in Hopes of obtaining Relief for their Disorders, many of whom made use of the Waters both internally and externally, and, as it
commonly

commonly happens in Discoveries of this kind, in all Cases promiscuously, and with the Success which one might naturally expect from the Use of a Remedy, in itself efficacious, but salutary or otherwise, as it is properly or improperly used.

I had by this means however an Opportunity of observing its Effects in various Cases, and was thereby not a little assisted to judge wherein it might be useful, and wherein injurious: The Result of my Experiments and Observations upon it, are now presented to the Publick; I have given a faithful Account of them, and all such remarkable Phænomena and Changes which appeared upon making them, as I apprehended might be any way instructive: I have also added a few Cases, wherein the Effects of the Waters seemed to be very obvious; and others, perhaps

perhaps may be added hereafter. I am not conscious of having said any thing to byas the Reader unjustly, or of omitting any Circumstance which I thought could assist him to form a true Judgment of the Nature of the Subject before him; all that I aim at is, to recommend to the Notice of the Publick, a Mineral Water, which is found to be efficacious in the Cure of many Diseases, yet without extolling it as an infallible Panacea in all.

There are several other Chalybeat Springs near this City, and one about Three Miles from it, at Bathford; but as I found them, upon Examination, to be only weak, simple Chalybeat Waters, such as we meet with in most Parts of this Nation, I forbear to take any further Notice of them.

Bath, May 8.

1742.

A N

A N

I N Q U I R Y

Into the CONTENTS, &c. of
LINCOMB Spaw Water.

S E C T. I.

1. **T**HE Mineral Spring now commonly known by the Name of *LINCOMB SPAW*, rises near the Bottom of a pleasant little Valley on the South Side of, and about half a Mile distant from, the *City* of BATH. The natural Agreeableness of the Place is increased by the Conveniences made for the Accommodation of those who resort to the *Spaw*.

2. The Water springs in a small boggy Place, between two steep little Hills; where it bubbles up almost perpendicularly, thro' a Bed of Marl like odd-form'd Petrefactions,

B

which

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which lies upon a thick Bed of stiff blue Clay, mix'd with *Marcasites* and *Iron Stone*.

3. The *Stratum* of Marl like Stones is cover'd with another Bed of the same sort of Clay, which is likewise mix'd with *Marcasites* and *Iron Stone*.

4. The Water rises from between these two Beds of Clay through the *Stratum* of Marl-like Stones, in two distant Springs, tho' within a few Inches of each other, into a small Stone Bason, which is conveniently cover'd with Free-stone, and shelter'd from the Weather.

5. Tho' these two Springs arise so near to each other, that they cannot be taken up apart, so as to be subjected to a distinct Examination yet it appears, that they are of different Natures; for one of the Springs gives the Marl-like Stones through which it rises, a reddish-orange ochry Hue, and a strong ferruginous Smell, both which they retain a long time, tho' expos'd to the open Air; the other turns the same Stones to a shining Jet-black externally, or rather covers every Part of them, where it reaches, with a thin, soft, shining Jet-black *Bitumen*, and tinges their Insides quite through, with a dark-bluish grey Colour, (tho' some of them are pretty large) and gives them a strong sulphureous Smell, something like that of a Gun new fired.

6. This

6. This *Bituminous Matter*, together with the sulphureous Smell, intirely exhales, when the Stones are exposed to the Air for two or three Days, and leaves them of a whitish Marl or Free-stone Colour, which is their natural one, where this Water does not touch them.

7. These hard, marl-like, porous Stones (§ 2.) become soft and friable where they are wash'd by this Water; and after being exposed a few Days to the Air, may be easily rubb'd to Powder with one's Fingers; whereas some of the same Stones, taken out of the same Bed at a few Yards Distance, untouch'd by this Water, retain their natural Hardness, though they have been exposed to the Weather three or four Years.

8. The *Marcasite* (§. 2.) is of a heavy, solid, uniform Texture throughout, externally of a bluish Lead Colour, with some yellow, shining, sparkling Particles, and a dusky Brass Colour within; has a strong sulphurous Smell, and a ferruginous Taste, when applied to the Tongue: Infused in hot Water, it gives it a Vitriolic Taste; which Water will turn to a deep Purple with Tincture of Galls: when powder'd and thrown on a red-hot Iron, it sparkles and flashes like Gunpowder, gives a strong sulphureous Smell, and leaves a red Powder resembling *Focus Martis*.

9. What I call *Iron Stone*, (§. 2, 3.) is a hard, ponderous, compact mineral Substance,

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in globular Lumps, of a rusty brown Colour, and seems to be either a poor Iron Ore, or a very hard Marcasite.

10. I caused ℥ss of the *Marl Stone*, *Marcasite*, *Iron Stone*, and *blue Clay*, to be infused in ℥ij of cold Water in different Glasses, for ten Days; the Waters were then filtred and kept separate. That from the *Marl* smelled like Lime-water: Tincture of Galls made no Change in it; Oil of Vitriol produced no Alteration; with Oil of Tartar, it gave a pearl or milky Colour, and with Syrup of Violets a faint Green.

The *Marcasite Water* had acquired a ferruginous or chalybeat Taste, and 3 Ounces of it mix'd with 4 Drops of Tincture of Galls changed to a dark Purple; Oil of Vitriol produced a vermicular Motion in it, and Oil of Tartar a Pearl-colour'd Cloud.

The *Iron Stone Water* was no way affected by any of these Additions.

That from the *blue Clay* became of a cloudy Pearl with Oil of Tartar, but was not alter'd with the Oil of Vitriol, or Tincture of Galls.

11. I digested four Ounces of each of these Substances together in ℥jss of pure Water, in a Sand Heat, 48 Hours, with a Fire of the second Degree. At the same time ℥ss of the *Marcasite* in Powder was infused in ℥jss of Water in another Vessel, in the same Heat: Each of them had a Bolt-head close luted on. The

The compound Infusion, when filtred, turned to a deeper blackish Purple by standing two Hours with 5 Drops of the Tincture of Galls, than the *Marcasite* Infusion alone did. It precipitated a whitish grey Powder with Oil of Tartar : In other Respects they appeared alike ; only the digested *Marcasite Water* had contracted an empyreumatical Smell, and a yellowish brown Circle adhered to the Sides of the Vessel round the Surface of the Water. Both had a chalybeat Taste.

12. It appears from the preceding Observations and Experiments, that the *Marcasite* is the Basis or chief impregnating Principle of this mineral Water. And it seems to be no unreasonable Conjecture, to suppose, that the alkaline Part of the blue Clay, (§. 10.) and Marl Concretions, (*ibid.*) contribute something towards perfecting it ; partly as it dissolves the *Sulphur* of the *Marcasites*, and renders it miscible with the Water ; partly as it is capable of promoting (if it is not the chief Author of) that intestine Conflict in the Water, to which the fugitive mineral Spirits in this and other brisk pungent chalybeat Waters owe their Rise : But of this more hereafter.

13. What other *Strata* of Fossils this Water passes through, before it comes to Light, we durst not examine, lest we should thereby divert the Course of the Spring, or let some other Waters into it.

S E C T. II.

1. **T**HE Free-stone Bafon which is the Receptacle, and the Chanel thro' which the wast Water is convey'd from the Spring, were changed from their natural Colour to a deep orange ochry one, in six or eight Hours after they were laid.

2. The hard Flint Glasses used in drinking the Water, became of a dark brown Colour in a few Days time; and a large Quantity of Ochre is deposited in the Water's Course from the Spring.

3. The Quantity of Water afforded is nearly the same at all times; it doth not seem to be increased in wet, or diminish'd in dry Seasons: I found on repeated Trials, that it yields about ten Pints Wine Measure in a Minute, or 75 Gallons an Hour, which make 1800 Gallons *per diem*, a Quantity more than sufficient to supply any Number which perhaps may ever resort to it.

4. Its Smell, as to Strength, is variable: Before the Spring was cover'd, it might sometimes have been perceiv'd by a nice Organ at the Distance of 30 or 40 Yards; at other Times, at no more than 6 or 8. Which Variability, I conceive, is not intirely owing to the Alteration of the Air, or the Organ of Smelling, but in part to the greater or less Degree of Volatility of the Sulphur;

Sulphur; this Variation being common to the *Geronster* as well as the *Lincomb Water*.

5. In Coldness it differs little from other Springs equally exposed to the Air, and arising from an equal Depth: *Fahrenheit's* Thermometer being suspended in the Well for half an Hour, in different Seasons, the Mercury stood at all the Trials at 52 Degrees, except in the hard Frost of the Winter $17\frac{3}{4}^{\circ}$, when the Mercury stood at 50; which is only two Degrees of Heat less than in the hottest Summer's Day, and even then two Degrees warmer than temperate, by the same Scale.

6. The specific Gravity of this mineral Water is at all times considerably heavier than either distilled, or our River Water; but it is variable in its Weight, when compared with itself at different times, as appear'd from repeated Experiments*.

7. The

* Several Glasses of different Sizes were made in the Form of the Figure (A Fig. 1.) annex'd, the Length of whose Necks were 3 Inches, the Diameter of their Hollow about $\frac{1}{8}$ of an Inch: Their Necks were graduated into 3 Inches, each Inch into eight equal Parts; a single Drop would raise the Surface of the Water, when they were filled, perceptibly above the Line with which it was equal before. With these Glasses I could

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7. The Water, fresh taken up, in a clean Glass, is clear and transparent.

8. When

could at any time weigh the same Quantity of Water to a Drop. The Hook B may be fixed to the Neck of each Glass with the Screw C, and hung to the Arm of an exact Balance: The affixed Tube D permits the Air to escape as the Vessel fills; so that it is done with little Loss of any volatile Parts of the Water to be examin'd.

I generally filled and weighed three of these Glasses at a time; but as I observed no Variation in the Experiment, I shall only give the History of one, which when fill'd to the Height of $2\frac{1}{2}$ Inches of the graduated Scale, contain'd 16 Cubic Inches and 7 Grains of this Water.

This Glass fill'd exactly to the Height specified, with the *Lincomb Water*, at different Times weigh'd as follows.

| | oz. | dr. | sc. | gr. |
|---------------------------------|-----|-----|-----|------------------|
| June 2. 1738. The Water weigh'd | 9 | 1 | 2 | 07 |
| — 8. | 9 | 1 | 2 | 08 $\frac{1}{2}$ |
| — 29. | 9 | 1 | 2 | 11 |
| Aug. 7. | 9 | 1 | 2 | 10 |
| June 6. 1741. | 9 | 1 | 2 | 09 $\frac{1}{2}$ |
| — 12. | 9 | 1 | 2 | 10 |
| — 13. | 9 | 1 | 2 | 09 |
| — 18. | 9 | 1 | 2 | 11 |
| July 15. | 9 | 1 | 2 | 07 |
| Aug. 24. | 9 | 1 | 2 | 07 |

This Table demonstrates, that it differs from it self, at different times, considerably.

The

of Lincomb Spaw Water. 9

8. When it is received from the Spout into a Glafs, very numerous Bubbles appear: the same happens, if it be poured from one Glafs into another; and if it be briskly shook in a close-stopp'd Vial, or cover'd Glafs, it sparkles in a beautiful manner; if the Vial be then suddenly open'd before the Commotion ceases, it emits an elastic Vapour, with an

| | | | | | |
|--|---|-----------------|---|---|-----|
| The same Glafs fill'd to the same | } | oz. dr. sc. gr. | | | |
| Height with common Water | | 9 | 1 | 2 | 05 |
| distill'd, weigh'd | | | | | |
| River <i>Avon</i> Water - - - | | 9 | 1 | 2 | 06 |
| <i>King's Bath</i> Water hot at the Pump | | 9 | 1 | 1 | 08 |
| The same cold - - - | | 9 | 1 | 2 | 13 |
| The <i>Hot Bath</i> Water warm at the | } | 9 | 1 | 1 | 08½ |
| Pump | | | | | |
| The same cold - - - | | 9 | 1 | 2 | 11½ |
| The <i>Geronster</i> , imported | | 9 | 1 | 2 | 07 |
| <i>Lincomb</i> Spaw, at a Medium | | 9 | 1 | 2 | 09 |
| Pure Spring Water near the <i>Lin-</i> | } | 9 | 1 | 2 | 05 |
| <i>comb</i> Spaw | | | | | |

Whence it appears, that the *Lincomb* Water is at all times heavier, and sometimes considerably so, than either distilled or common Water.

The Reason why the *Bath* Waters are so much lighter when warm, than cold, is owing to the Rarefaction occasion'd by the Heat: As they cool, the Water condenses, and subsides so as to require gr. xxv. of the *King's Bath*, and xxiii. of the *Hot Bath*, to fill the Glafs to the same Standard.

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audible Explosion, and a small perceptible Force.

9. When the Water has stood about an Hour in an open glass Vessel, a pearly-colour'd Cloud forms itself of the Figure of a Cone with its Basis upwards, and of equal Dimension with the Surface of the Water ; and, in two Hours Time, a thin variegated unctuous Scum covers the Surface of the Water, which has a Smell a little sulphureous.

10. If it be kept in a Vessel close stopp'd, it begins to lose its Transparency in about 2 Hours, and acquires a faint Pearl or Whey Colour.

11. The Alteration proceeds in the stopp'd and open Vessel alike (excepting the Time) ; and this Wheyish Colour gradually changes to a yellowish Orange Ochry Colour ; and in about ten or eleven Hours, some small Particles of Ochre separate and subside.

12. This Precipitation of Ochre is completed in about twenty-two Hours in an unstopp'd *Florence* Flask ; in somewhat less time where the Air is admitted to a larger Surface ; and requires a few Hours more, if it be kept in Bottles very close cover'd with cement or oil'd Bladders.

13. The Precipitation being finish'd, the Ochre lies in *Flocculi* at the Bottom, whilst
the

the Water above remains clear and pellucid.

14. A larger Quantity of Ochre subsides when the Water is kept in a Glass, or other Vessel, quite open, than in a Bottle fill'd to the Neck, or intirely clos'd, as well as it is deposited sooner.

15. If a Bottle be filled at the Spring, and immediately clos'd with Cement or oil'd Bladder, after changing its Colour [9.] and depositing its Ochre, (12.) it will, about six Days after, dissolve all its separated Ochre, absorb it again, and become very clear and pellucid : But in two or three Days more, a thin black Scum, like to that on a smoaked Glass, rises and adheres to the Inside of the Neck and upper Parts of the Bottle. This Scum gradually grows thicker, and in a few Days more falls off in thin black Flakes, which subside to the Bottom of the Bottle, and float with the least Motion. In this Condition it will keep sweet, and retain some of its Properties for many Years, as will be observ'd hereafter.

16. The Water when fresh taken up at the Spring, has a light, brisk, pungent, sulphureous Smell, with something ferruginous, tho' not so much as to make it disagreeable.

17. This pungent, sulphureous Smell, which is so perceptible the Moment it is taken up, is lost in 6 or 8 Minutes time, if

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openly exposed to the Air ; but it will retain a little of the Smell much longer, if it be kept in Bottles quite full, and, immediately when fill'd, close stopp'd and secured from the Air.

18. The Water, when fresh taken up at the Spring, and deliberately tasted by a Person nicely distinguishing, has a light, quick, sulphureous Taste, with a stronger ferruginous or chalybeat one, as 'tis commonly called, and a certain Degree of a subtile, pungent Activity on the Tongue ; but without any Tartness, or Acidity, or the fretting Cyder-like Briskness of the *Pymont* Water, or of the *Pouhont* of *Spa* ; but a more subtile, yet soft and penetrating Spirit, affecting those who drink it to the Quantity of three Half-pints, hastily one after another with a Giddiness.

19. In tasting this Water, the Sulphur is first perceived, and next a much stronger Taste of Iron ; the first being more volatile, the last more permanent.

20. These are the most obvious Qualities of this Water, when examined by our Senses alone : I shall now proceed to relate the Effects of it, when tried with various Mixtures.

21. A Glass of this Water, containing about three Ounces, changes in less than a Minute from its natural Colour, to a beautiful deep
Purple

Purple or Amethyst, with one Drop of Tincture of Galls made with Water.

22. The same Change happens with the *Powder of Galls*, or *Green Tea*, only the Colour is a Shade or two darker, and the Water more muddy with these.

23. Four Drops of the Tincture of *Logwood* turn the same Quantity of the Water, fresh taken up, (which must be always so understood, except the contrary is mentioned) immediately to a blackish Blood Red, and in about a Minute to a deep Blue, with a Shade of Purple.

24. Four Drops of the Tincture of *Sumach*, in the same Quantity of Water, do not at first produce any remarkable Change, but after standing one Minute, turn it to a clear blackish Purple.

25. One Drachm of the Syrup of *Violets*, changes the Colour to a deep Grass Green immediately, with a little Muddiness.

26. Five Drops of a Solution of Silver in *Aquafortis*, give the like Quantity of Water a pale pearl Colour, which in two Hours turns to a blackish Grey; and in a Night's Time a Powder of this Colour is precipitated in a small Quantity; but the *Phænomena* attending this Experiment, were not always the same, the Colours both at first, and on standing, being often fainter than here described.

27. With

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27. With a Solution of *Saccharum Saturni*, a whitish, milky, pearl Colour was produced, with somewhat of a brownish Hue.

28. Spirit of *Hartshorn*, or Spirit of *Sal Ammoniac*, cause no Alteration in its Colour; neither does a Solution of *Sublimate*, or of *Sal Jovis*, affect it.

29. *Ol. Tart. per deliquium*, changed it to a very faint pearlsh Colour; it afterwards became turbid, and precipitated a small Quantity of a whitish yellow Powder; but the Change it produces is very little, and not always to the same Degree. Acids make a sort of small *Ebullition*, or rather a very singular intestine vermicular Motion, and lose of their Acidity; one Ounce and half of this Water being sufficient to destroy the Acidity of one Drop of the strongest *Oil of Vitriol*.

30. The Water, fresh taken up, will not lather with Soap, but curdles: When its Ochre is precipitated, and it ceases to change Colour with Tincture of Galls [21.]. It readily mixes and lathers with Soap.

31. Milk boiled with this Water does not curdle in the least, but acquires a soft, soapy Taste: Mix'd with new Milk, it gives it an agreeable sweetish Softness.

32. A Glass of the Water after it has been kept in an open *Florence* Flask fill'd to the Neck, for five or six Months, will change
to

to a fine red Claret Colour, with one Drop of the Tincture of Galls.

33. If it be kept in Bottles close stopp'd and cemented, or secured from the Access of Air with Oil and oiled Bladder, it will strike near as deep a purple or amethyst Colour with the same Proportion of Tincture of Galls, when kept eight or nine Months, as at first.

34. Secured in this manner, it retains a small Degree of its sulphureous Smell, tho' but little; in other respects it appears as above [14.].

35. But if the Flasks [33.] be not quite full, or if it is kept in a Vessel where it has a larger Surface, it loses its tinging Property [21.] in six or eight Hours time.

36. The Water, drank fresh at the Spring by an healthy Person of an ordinary Constitution, to the Quantity of three or four Half-pints, at first generally affects the Head, for a little time with a Giddiness, as a Glass or two of Wine does; but this usually ceases after a few Days Use: A greater Dose has greater Effects, so as to occasion some Degree of Temulency.

37. Tho' it is as cold as other Spring Waters, [15.] yet where these are apt to occasion a Chillness in the Stomach, the *Lincomb* Water mostly sits light, and gives an agreeable Warmth to it.

38. The

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38. The Water generally passes off very quickly by Urine, and keeps the Body temperate ; to some it gives two or three Stools a Day, especially at first using it ; to others, it is apt to occasion some Degree of Costiveness : It mostly procures a quick Appetite, and strong Digestion, raising and maintaining a great Flow of Spirits.

39. From hence we learn, that this Mineral Water, however homogeneous it may at first appear, spontaneously discovers in a short Space of Time very different Parts. § 9. 10. 11. &c.

That it contains a large Quantity of elastic Air, [8.] a Sulphur, Part of which is very volatile and incoercible [17.] and another Part [15. 34.] more fixed.

That it also contains a very subtile, chalybeate Principle, [21. 22. 23. 24.] which, if the Water be kept in a Bottle very close stopp'd, seems not to lose much for some time, [32. 33.] but soon disappears when it is exposed to the open Air [35.].

And that it likewise contains a Quantity of an alkaline Earth [26. 27. 29. 31.]. What Proportion these bear to the whole Quantity of the Water, and to each other, will be examined into in the following Experiments.

S E C T.

S E C T. III.

1. **O**N *June* the 8th 1738. five Pints of *Lincomb Spaw Water*, fresh taken up at the Spring, were immediately put into a clean Glass Retort, and a large Receiver adapted with the least Delay possible, and the Junctures well covered with common Lute and Bladder over it: The Retort was placed in a Sand-heat by the Spring, and a moderate Heat supplied all that Afternoon, and the following Night; in the Morning about a Pint of Water was drawn into the Receiver.

2. The Vessels were then brought home, and the Receiver taken off, when neither the Water in the Retort or the Receiver had the least Smell or Taste of Sulphur or Iron; neither of them turn'd purple with Tincture of Galls, nor green with Syrup of Violets, nor did the Water in the Receiver seem to differ from common Water distill'd, almost in any respect: For to one Part we put Tincture of Galls; to another Syrup of Violets; to a Third, *Ol. Tart. per deliquium*; all without producing any Change: To a Fourth we put a Solution of Silver; to a Fifth, a Solution of Sugar of Lead, both which gave it a faint pearlsh Cast, tho' not much more than they usually do to common Water distill'd.

D

3. Hence

18 *An Inquiry into the Contents, &c.*

3. Hence it appears, 1st, That the Water thus distilled from the *Spaw Water*, contains no Iron in it. 2dly, Nothing of an acid or alkaline Nature. 3dly, No stony, marly, or earthly Particles : But 4thly, some faint *Vestiges* of Sulphur, tho' almost imperceptible : No other Properties appearing that render it different (as was observed above) from common Elementary Water distilled ; nor have we any Ground to suppose it impregnated with superior Virtues.

4. The remaining Water in the Retort was drawn off in a Sand-heat in five Days time, (in the Laboratory of my Friend Mr. *Thomas Havilland*, an able Botanist, and ingenious Apothecary) and left a dry Powder in the Bottom of the Retort, of a reddish Ochre or Cinnamon Colour, which weighed nine Grains ; to which may be added four Grains more, for the Water used in trying if it would tinge, &c. and for what was left on the Sides of the Retort, or lost in taking it out.

5. During the Operation some few Bubbles rose in the Water when it began to grow warm ; but the Receiver being near four times as large as the Retort, and the Luting exceeding close, and almost dry, no Marks of any thing escaping appeared during the Operation.

6. Six

6. Six Gallons of *Lincomb Spaw* Water were put into a low, broad, clean, well-tinn'd Copper Pan, and set over a gentle Charcoal Fire to evaporate. As soon as the Water began to grow perceptibly warm, it had lost its tinging Quality, and the Ochre began to separate and float in thick, red, orange-coloured Clouds in the Water, which rendered it muddy: Part of this Ochry Matter adhered to the Sides of the Pan in a Circle, about the Surface of the Water, as soon as it began to boil, which was frequently washed down and stirred, to prevent the Adhesion of the Ochre to the Pan: When the Water was reduced to about two Pints, it was put into a well-glazed earthen Pan, and slowly evaporated to Dryness; an exceeding fine, soft, dry Powder, of an Orange Ochry or Cinnamon Colour, was obtain'd, of a saline Taste. This Powder, taken clean out of the Pan, and exactly weighed, was two Drachms and fifteen Grains: The Experiment was made with so much Care, that no more than three Grains at most of the fixed Contents could be lost in the Operation.

7. By this Experiment it appears, that the fixed Contents of this Water are to the whole Quantity of Water in its natural State, as 1 to 2003 $\frac{1}{2}$, calling a Wine Pint of this Water, 12 Ounces, Apothecaries Weight ;

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that

that is, as 23 Grains to a Gallon, or near 3 Grains to a Pint. This Operation was repeated in a larger Quantity of Water, with the same Effect.

8. The *Residuum* in both these Operations was the same, *viz.* A fine soft Orange-ochre, or Cinnamon-coloured Powder (save that the *Residuum* in the Retort was somewhat brighter in Colour, as being free from the least Dust); both had a saltish Taste, both an exceeding fine soft Powder, both Alkali's, and fermented strongly with Acids, and were in every respect alike (the Separation of the Ochre in Clouds, when the Water became warm, only excepted): For evaporating the Water in an open Vessel differs from that in a Retort in this respect: Here the Water continues clear, but will not tinge after it is warm: In that, *viz.* in an open Vessel, it loses its Clearness, and its tinging Property, at the same time.

9. The remaining Powder, which weigh'd two Drachms and fifteen Grains when perfectly dry, was mix'd in a *China* Cup with boiling hot distill'd Water, then filtred thro' Paper; more Water was pour'd on it two or three times till the Powder was become insipid; the saline Liquors were all mixed, evaporated in a *China* Cup over the Fire till a Pellicle appeared on its Top, and then set in a cool Place for the Salts to shoot: Two Days after,

after, I found a clear reddish-brown coagulated Matter like Jelly, and a very salt reddish-brown Water swimming about it in the Cup, to which I put more hot distill'd Water, filtred it again, evaporated it to a Pellicle, and set it to crySTALLize : A few Days after, I found about 15 Grains of a reddish-brown coloured Salt in the Cup, of a very pungent, penetrating, lixivial Taste, almost like the *Sapo Tartari*, or rather answering to the Description which the Antients give of their *Nitrum* *.

10. The Quantity of Salt which this Water affords is very small, in proportion to the aqueous Part, being no more than 1 to 18432, that is, as $2\frac{1}{2}$ Grains to a Gallon.

11. The remaining Sediment or Powder, when separated from the Salt, weigh'd two Drachms ; this Powder was exceeding fine, and the same Colour as before Filtration, without Taste, and appeared like true *Bole Armeniac* in fine Powder ; two Drachms of it were put into a Crucible close covered and luted, then roasted in a common Fire an Hour and an Half, after which it was put into a Founder's Furnace, and kept in a strong Heat for an Hour and an Half more.

12. During this Operation, an Hole was melted in the Side of the Crucible ; when all was cold, the Crucible was opened, and

* *Vid.* Plin. *Hist. Nat.* l. 31. c. 10.

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a solid, hard, black, vitrified Substance like Slag, or black Glass, was found adhering to its Bottom ; this vitrified Substance being reduced to Powder, a Loadstone being several times applied to it, about the 32d Part of a Grain of Iron was obtain'd from it.

13. Two Drachms more of the same *Residuum* were put into another Crucible, and a little Grease with it, to assist in fluxing the Iron, if it contain'd any : Another Crucible was inverted over it, and luted with very strong Luting made of *Stourbridge* Brick, a little Wheat Flour, and the White of an Egg. This being first roasted, and then put into the Furnace as before for an Hour and an Half, gave us a solid, hard Body, of a dark-brown Colour, weighing one Drachm, which being reduced to Powder, the Loadstone was applied to it ; but there was not the least Particle of Iron found in it.

14. The Salt which I obtained from this Water did not shoot into Crystals of any regular Figure, but appeared porous and spongi-form when examined by a Microscope ; and tho' some small *Spiculæ* were observable, yet did not assume the regular Figure of any described Salt : It had a pungent, penetrating, lixivial Taste ; and when exposed to the Air, it run *per deliquium* in a short Space of Time.

15. This Salt fermented strongly with
Acids,

Acids, and destroyed their Acidity in a certain Proportion, as the following Experiments more fully evince.

16. Six Grains of this Salt were dissolved in three Ounces of common Water distill'd, and divided into six equal Parts: To one of them we put one Drachm of Syrup of Violets, which turn'd it to a Grass-green Colour in a Moment. To another we put three Drops of Tincture of Galls, which made no Alteration: To a Third we put three Drops of Oil of Vitriol, which produced a strong intestine Motion in the Water, and the Oil lost its Acidity: To a Fourth we put three Drops of Solution of Mercury Sublimate, which caused very little Change: To a Fifth we put four Drops of a Solution of Silver in *Aqua-fortis*, which instantly turned it to a white milky Colour, with a faint muddy Yellow; and after standing a few Hours, it let fall a good deal of fine white Powder, of a yellowish Hue, the Water above being clear: To a Sixth we put three Drops of Spirit of *Sal Ammoniac*; to which no Change ensued.

17. One Grain of this Salt was laid on a *China* Saucer, and two Drops of Oil of Vitriol were gradually, at some Distance of Time, dropp'd upon it; each of which caused it to hiss with a violent Ebullition, but one Drop more added, produced no such Effect.

18. One

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18. One Grain of this Salt was put upon a red-hot Iron, upon which neither a Decrepitation, like Sea-salt, nor a Liquefaction, like Saltpetre, nor any Smoak or Smell ensued: It burned to a black Coal, of a strong alkaline lixivial Taste, and soon ran *per deliquium* when exposed to the Air to cool; Two Drops of Oil of Vitriol, being put to it, caused a violent Ebullition with an hissing Noise.

19. This Salt, tho' kept very dry in a Phial close stopp'd, became a soft, brown, saline Paste, which had something of a viscid Nature in it.

20. It appears from these Experiments, that this Salt is neither a Marine Salt, nor a Nitre, like our common Nitre or Salt-petre, nor an Ammoniac Salt, but an Alkaline Lixivial one; which Kind of Salt is known to be a powerful Attenuant, Detergent and Deobstruent, capable of promoting the thinner Secretions.

S E C T. IV.

WE learn by Experiments, and particularly by those made with the Air-pump, that there is more or less Air contained in all Water; but there seems to be much more of an elastic Fluid, which has all the Properties of Air, contained in the Water of several medicated

icated Springs, especially of those which come under the Denomination of cold *Chalybeats*, than in others.

I. In order therefore to discover the Quantity of Air contained in a given Quantity of this Water, we filled a *Florence* Flask, containing two Pints, with the same Spaw Water, at the Spring; then having a Bladder well oiled on its Outside, both to render it more pliable, and, if possible, to prevent the Escape of any subtile Matter through the Pores of the Bladder by filling them up; and having first discharged the Air contained in it by drawing it through my Hand, and twisting it closely, we immediately introduced the Mouth of the Flask, whilst under the Surface of the Water, into the Neck of the Bladder, and tied it very close with a waxed Thread: We then placed the Flask on the Ground by the Spring, and untwisted the Bladder, that it might receive the Air or Spirit, if any escaped out of the Water: In less than two Hours time the Bladder swelled, and appeared to be a fourth Part full of an elastic Fluid like Air, without the Application of any Heat more than what it received from the Ground, and external Air: We let it remain in this State about four Hours, in which time we frequently compressed the Bladder, beginning at the Mouth of the Flask, and twisting it upwards, so as to collect all the

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Air at the (now upper Part, but) Bottom of the Bladder, where it was distended to the Size of an ordinary Orange, or equal to six or eight cubic Inches, with an elastic Fluid like common Air.

2. By this Part of the Experiment it appears, that a considerable Quantity of a dry, subtile, elastic Fluid or Air, is contained in a loose Manner in this Water, so as to be separable from it spontaneously, without any additional Heat more than that from the common Air of the Atmosphere; and that this Fluid flies off from the Water, with such a Degree of Force as is able to distend the Bladder, whose Sides were compressed or squeezed together by the Weight of the Atmosphere.

3. But in order to discover what this elastic subtile Fluid was, we took the Flask after it had stood thus four Hours, and squeezed the contained Fluid or Air into the upper Part of the Bladder, and tied it fast with a waxed Thread; then unloosing the Bladder from the Flask, and having some common Water mixed with Tincture of Galls ready in a Glass Vessel, we immersed the Bladder, with its contained Fluid or Air, into the Bottom of that Vessel, and forced out the Air thro' an Orifice made in the Bottom of the Bladder, which instantly rose thro' the Water in Bubbles, without giving the least red or purple

ple Colour to it : But the Water in the Flask from whence the Air was collected, being mixed with a few Drops of Tincture of Galls, turned to as fine a purple or amethyft Colour, as when fresh taken up at the Spring.

4. This Experiment was repeated several times, and we found, that the Water did not afford the same Quantity of this elastic Air at all times alike : Sometimes it gave about three cubic Inches of Air, at other times eight or ten ; and sometimes by letting it stand, the Water would absorb half of that Air, at other times much less ; and it was observable, that the Water, upon dissolving its Ochre again, always generate this elastic Air in as large, and sometimes in a larger Quantity than it did at first when fresh taken up at the Spring, as the Experiment *A* will shew.

5. Three *Florence* Flasks were filled at the same time with this Water ; one with a Bladder fixed over it, whilst under Water, as in the preceding Experiment. This I shall call *A*.

Another was immediately covered with a little Oil, and over this was tied a Piece of oiled Bladder, *B*.

A third was only well closed with oiled Bladder, *C*.

The Changes which these were observed to undergo, are as follows :

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A third was only well closed with oiled Bladder, *C*.

The Changes which these were observed to undergo, are as follows :

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18. But in *C* the Solution of the Ochre did not begin before the 45th Day, and ended in 2 Days; after which it grew very clear as in the others, till the black Scum rose, peeled off, and subsided as in the rest.

19. It must be observed, that the Bladder which covered this last, on the 18th was pierced by Accident with a Needle, and no other Means used to close the Orifice than rubbing the Bladder with a little Oil.

20. From hence we may observe, that tho' the three Flasks were all filled at the same Time, yet, excepting the Time of depositing their Ochre, every subsequent Change was different in each as to Time.

21. The Air in *A* was less compressed, and consequently the intestine Motion of the Water more free, than in *B*; the Effect of which was a speedier Dissolution of the Ochre. The total Escape of the Air in *C*, and the Loss of something elastic by that means, which was necessary to bring about the Change, probably was the Reason why the Ochre in this continued so long undissolved: However, the same Changes happened to each, tho' at different Periods of Time.

22. These were kept in this Condition during some Months, when being opened, one Drop of the Tincture of Galls was put to a Glass of each, and all of them changed to

to as fine an amethyst Colour as if fresh taken from the Spring.

23. The Flasks being then left open, and half full, the Water first changed to a wheyish yellow Colour, and precipitated its Ochre almost in the same Quantity as when fresh taken from the Spring, and exposed in like manner to the Air.

24. We afterwards separated some of the black Flakes by the Filtre, and laid them on Paper to dry; they changed from a Jet-black to an Orange Ochre in a few Hours. From hence it appears, that the Flakes are not the Sulphur alone; but the greatest Part is Ochre made buoyant by the adhering Sulphur, which being dissipated by the Air, leaves the Ochre in its natural Form.

25. As this is a very uncommon *Phænomēon*, I have presumed upon the Reader's Patience, for the sake of Exactness, in relating it; this being the only Water I have yet met with, which re-dissolves its own Sediment.

26. From these Experiments it appears, that there is a considerable Quantity of a dry, subtile, elastic Fluid, which has the Properties of common Air, contained in this Mineral Water, in so loose a manner, that it is easily and spontaneously separated from it without any additional Force; which, whilst mixed with the Water, must be very much compressed and condensed in the Interstices
of

of the Water ; since the Quantity thus separable from one Quart, can fill a Space equal to nine or ten cubic Inches, when the *Moles*, or Bulk of the Water in the Bottle from whence it came, is not at the same time perceptibly diminished : Or that a large Quantity of Air is immediately generated and rendered elastic, which was not so before.

27. For if we consider the Effects of that Ebullition or Conflict which instantly arises upon the Mixture of opposite Principles together, such as an Acid and Alkali, and reflect on the Quantity of Air which is produced by that Agitation, we shall have some Reason to believe, that this Quantity of new elastic Air is the Consequence of such a Conflict, and that it is not a simple Disengagement of it from the Water. It is therefore worth while to consider, whether that elastic Vapour, or subtile fugitive Fume, called a *Mineral Spirit*, is any other than this agitated elastic Air forcibly springing from the Water, and carrying along with it some of the most subtile Particles of the Sulphur and Iron, which affect the Organs of Smelling, and strike against the Tongue with a sensible pungent Briskness in tasting it.

28. The absolute Incoercibility of this subtile Mineral Spirit, and the Production of a pungent Smell and Taste upon mixing any of the stronger Acids and Alkali's together, would induce one to believe, that it is only
the

the immediate Production of the Conflict above-mentioned ; and ceases to exist so soon as the explosive Force, with which the small distended Air-bubbles dilate, is spent ; the mineral Spirits expire, or cease then to act, and are no more to be collected, than the elastic Air produced in the Explosion of Gunpowder.

29. The Experiments, and repeated Endeavours, which have been made with all the Accuracy and Contrivance possible, to collect these subtile Spirits, having hitherto proved abortive, are a Discouragement, I confess, to any more Attempts in Search of them : And if their Existence for any Time after the total Explosion and Escape of the elastic Air cannot be demonstrated, it will save us the Trouble of making any further Inquiry. Our Experiments render this negatively dubious, and collateral ones seem to strengthen the Suspicion.

30. Having therefore shewn by the preceding Experiments, that this Mineral Water contains a considerable Quantity of an elastic Air, which is concealed for some time either in an unelastic or in a compressed State (tho' much less than is contained in the *Pyrmont* and *German Sparw Waters*) ; and having rendered it probable, that the Explosion of this active elastic Air is either the mineral Spirit itself, or the Vehicle of the subtile mineral Principles contained in all these Wa-

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ters ; I shall now proceed to inquire into the Nature of the chalybeat Principle contained in this Water, and relate some Experiments made, with an Intention to discover, whether the Iron, which it contains, is really reduced to a volatile State according to the common received Opinion ; or, as others think, it only disappears by a new Combination of its mineral Principles.

S E C T. V.

1. **B**EFORE I proceed to the Experiments themselves, it may be necessary to observe to some Readers, that it is found, from repeated Trials, that if the Water of any Spring becomes red, purple, or black, with the Powder or Tincture of Galls, or any other astringent Vegetable put to it, we may conclude, that that Water contains a subtilized Iron or its Vitriol dissolved.

2. For if we put a Piece of clean polished Iron into common Water, and a proper Quantity of Powder of Galls ; the Water, upon standing, will gradually lose its own Colour, and acquire first a light Red, then a Purple, and lastly a Black one. This Change of Colour therefore will be a certain Mark of the Presence of a dissolved or subtilized Iron.

3. The

3. The *Lincomb Spaw Water*, when fresh taken up at the Spring, has a quick, pungent, sulphureous Smell, mixed with a less perceptible chalybeat one; both which it loses in eight or ten Minutes time, by standing in an open Vessel; and sooner, if set upon the Fire.

4. It has also a remarkable strong, quick Taste of the Vitriol of Iron, with a much less perceptible one of the Sulphur, which are both very sensibly diminished in two Hours time, and almost vanish in eight, in an open Vessel; and are wholly lost in a few Minutes, if placed over the Fire.

5. One Drop of the Tincture of Galls turns a Glass of this *Spaw Water*, fresh taken up at the Spring, to a beautiful deep purple or amethyft Colour in a Minute's time; but a Glass of the same Water, after it has stood in the open Air eight Hours, will not give any purple Colour with it.

6. Eight Wine Glasses were filled at the Spring with three Ounces of the *Spaw Water* each; one Drop of the Tincture of Galls was immediately put into the first Glass, which we shall call N^o 1. and a Drop was likewise put into the other seven Glasses, at the End of each Hour: The Water in N^o 1. turned to a fine amethyft Colour, as above; that in N^o 2. which had the Drop added to it after it had stood one Hour, was more pale and faint-coloured; N^o 3. was still paler,
F 2 with

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with a muddy Red ; and each Glass gave a more faint, pale, muddy, reddish Colour, as its contained Water changed to a wheyish ochry Colour, by standing before the Tincture of Galls was put to it ; N^o 6. shewed no Disposition to change in less than half an Hour, when it turned to a muddy Colour, with a faint dark bluish Cast ; N^o 7. was still less so ; and N^o 8. did not change at all, but remained of a muddy, wheyish, ochre Colour, as it was before the Drop of Tincture of Galls was put into it ; till, after standing some Hours, it became more muddy, with a very faint bluish brown Cast.

7. From hence it appears, that this Water, when it is fresh taken up, contains a considerable Quantity of Iron, which it shews no Signs of after the Water has stood about eight Hours in open Glasses : Whence we conclude, that this Iron is either volatile, and flies off, or else is separated from the Water, and precipitated with, or in the Form of Ochre.

8. I mixed some of this Ochre, and also some of the *Residuum* after Evaporation, [§ 3. p. 4] with a little pure Water in separate Glasses, and then put one Drop of Tincture of Galls to each ; but no Change of Colour appeared in either of them.

9. To a Glass of the clear Water, from whence the Ochre had been precipitated, [§ 4. p. 5.] I put Tincture of Galls several times,

times, in different Quantities, but without producing any Change in its Colour.

10. Hence we learn, that the tinging Cause in this Water neither appears in the Sediment, nor in the *Residuum*, [§ 3. 4.] nor in the Water from whence the Sediment was obtained by a simple Precipitation, [§ 4. 5.] nor in that drawn from it by Distillation, [§ 3. 2.] nor yet in the elastic Air which it contains [§ 3. 3.]: Wherefore we conclude, that this tinging Cause, *viz.* its chalybeat Principle, is either exceeding subtle and fugitive, as the ferruginous Smell and Taste of this Water seem to indicate, and the preceding Experiments negatively demonstrate; or that the chalybeat tinging Principle is by some new Combination precipitated.

In order to discover which of these is the Case, I made the following Experiments:

11. Six Glasses, each containing three Ounces, were filled with the *Spaw* Water fresh taken up. To one was put *Ol. Tart. per deliq. gut. j.* to another *gut. ij.* to another *ijj.* to the fourth *iv.* to the fifth *v.* to the sixth *gut. vj.*

To each of these were put two Drops of the Tincture of Galls; the first Glass turned to an amethyst Colour, the second a reddish Purple, the third a faint Red, the fourth a still fainter and muddy reddish Blush, the fifth and sixth only put on a something browner

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browner Cast from the Colour of the Tincture itself, and shewed a pearlish Muddiness.

12. Into a like Number of Glasses of *Spaw Water* were put a like Number of Drops of Oil of Vitriol, increasing progressively as in the last Experiment ; to each of these were put two Drops of Tincture of Galls ; none of them changed Colour, but remained clear and unalter'd.

13. I put half a Drop of Oil of Vitriol into the same Quantity of the *Spaw Water* ; two Drops of the Tincture of Galls gave it a faint Purple.

Half an Hour after, I added to it a few Drops of Oil of Tartar, when it changed from a faint Purple to a fine amethyst Colour.

14. To a Glass of the *Spaw Water* I put Oil of Tartar six Drops, Tincture of Galls two Drops, and half an Hour after, Oil of Vitriol three Drops ; upon this a faint purplish Cast appeared.

15. To another Glass of fresh Water I put Oil of Vitriol two Drops, Tincture of Galls two Drops ; the Water remained clear and colourless : Half an Hour after, six Drops of Oil of Tartar were put to it, which produced a deep Amethyst.

16. Into a Bottle which had a Pint of fresh *Spaw Water* in it, I put six Drops of Oil of Tartar, and stopped it close ; the
Day

Day following it let fall its Ochre in the usual Quantity, but in smaller compacted Particles, not in *Flocculi*.

It stood thus 18 Days without re-absorbing its Ochre : I put 10 Drops of Tincture of Galls to it ; no Alteration of Colour appeared ; the next Day it was changed to a deep Sea-green : I added six Drops of Oil of Vitriol, which at first produced no Change ; but upon shaking it, it instantly gave a Blush of Purple on its Surface, which disappeared as quick as Lightning, and left it as green as before.

17. When the Water is turned to a deep Purple with Tincture of Galls, three or four Drops of Spirit, and a less Quantity of Oil of Vitriol, will totally destroy its Colour ; a few Drops of *Ol. Tart.* will recover it again ; and this will succeed by Turns for several times.

18. If the Oil of Tartar is first dropp'd in, and next the Tincture of Galls, lastly the Acid, this Experiment scarcely succeeds, the Colour produced being very faint, nor will it appear oftener than once ; but if the Acid is first added, it will afford its Purple very lively and very often ; but if the Tincture of Galls be put in some time after the *Ol. Tartar* has been added, it will afford no Change in Colour.

19. To 43 cubic Inches of fresh *Spaw Water*, 20 Drops of Tincture of Galls were immediately added : After the deep purple
Liquor

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Liquor had stood 24 Hours in a Bottle close corked, it was poured into a Bason, that it might let fall its Contents more readily : After standing a few Days, it had let fall a thick purple Sediment ; the Water was filtered through a Paper, first accurately weigh'd ; more Tincture of Galls was added a second and third time, till it precipitated no more : The filtering Paper, and its purple Contents, were carefully dried, and then weighed, when it had acquired $5\frac{1}{2}$ Grains ; from whence deducting one Grain for the Extract of the Galls, (for so much I found it by weighing a Piece of Paper, and dropping 60 Drops of Tincture of Galls into it, and weighing it when dry) there remain $4\frac{1}{2}$ Grains of a black Ochry Sediment from $1\frac{1}{3}$ Pint of Water.

20. At the same time we put a like Quantity of the *Spaw Water* without the Tincture of Galls into a Bason, leaving it several Days to separate its Ochre, when it was filtered, carefully dried, and weighed as before ; by this Process we procured 2 Grains of a yellow Ochre in fine Powder.

21. I took two Glasses of equal Capacities, and equal Surfaces : Into one I put 12 cubic Inches of *Spaw Water*, into the other 12 cubic Inches of a very light Spring Water, and weighed them exactly equally cold, on a hot dry Day at 11 o'Clock, and let them stand in a dry Room.

At

of Lincomb Spaw Water. 41

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|-------|-------------------------|-----------|------------------------------|
| At 12 | the <i>Spaw Water</i> | had lost | gr. <i>iiij.</i> |
| | the <i>Spring Water</i> | | gr. <i>ij.</i> |
| At 1 | the <i>Spaw Water</i> | | gr. <i>vij.</i> |
| | the <i>Spring Water</i> | | gr. <i>v.</i> |
| At 2 | the <i>Spaw Water</i> | | gr. <i>xiiij.</i> |
| | the <i>Spring Water</i> | | gr. <i>xj.</i> |
| At 5 | each | had lost | gr. <i>xviiij.</i> |

To account for the two Waters coming to the same Standard at last, it will be necessary to observe, that a variegated Pellicle, forming itself on the Surface of the *Spaw Water* after it had been exposed to the Air for some time, prevented it from exhaling in an equal Proportion to the *Spring Water*, tho' the Pellicle was frequently broke.

21. Hence it appears, First, That the Degree of Purple which a mineral Water strikes with Tincture of Galls, is not always a certain Indication of the Quantity of Iron it contains, because the greater or less Quantity of Acid which exists in that Water or is added to it, may increase or diminish the Colour, 12. 13. 15.

22. Secondly, That it is owing neither to the total Escape, nor absolute Destruction of any Principles which this Water contains, that it ceases to change Colour with Tincture of Galls, after it has stood some time; since if we accurately adjust the Proportions of Oil of Vitriol and Oil of Tartar, we can alternately obliterate and retrieve the Colour

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several times (14, 15, 16.); which would not happen, was the Iron either totally destroy'd, or had escap'd.

Thirdly, But that the volatile Sulphur in its Escape, (3.) and the Explosion of the elastic Air, (Corol. Sect. IV.) carry off some Particles of an highly subtilized Iron, seems unquestionable, tho' at the same time a larger Quantity may remain in the Water under a different Appearance. For, the Acid which supported the Iron, being more strongly attracted by the alkaline Earth than the Iron, precipitates this in the Form of Ochre: For it is a well-known Fact in Chemistry, that a Body may be invisibly suspended in a *Menstruum*, but will become visible and subside upon adding some other Body, betwixt which and the *Menstruum* there is a greater Affinity than betwixt the *Menstruum* and the first dissolved Body.

23. It appears then, that this Water contains a large Quantity of elastic Air, a volatile Sulphur, and a Portion of Iron, some Particles whereof are so far subtilized as to be capable of being carried off with that Air; all which together, as they have some Degree of Pungency, and fly off from the Water, may not improperly be called a *volatile mineral Spirit*.

And that it also contains a more fixed Iron and Sulphur, whose Quantity is not easily determinable, as it is mixed with an inert Ochre,
which

which are all together in the Proportion of 23 Grains to a Gallon, or three Grains to a Pint.

Lastly, an active alkalescent Salt in the Proportion of $2\frac{1}{2}$ Grains to a Gallon, in a Vehicle which differs in nothing from common elementary Water.

24. The Reader may perhaps expect here a circumstantial Account of the Medicinal Virtues of the several component Parts of this Water, in a separate State; but such an Account would contribute little to inform him of the genuine Effects of the Water when drank fresh at the Spring; since in all Waters, where the most active Principles are so exceeding subtile as in this, we must look for its Medical Virtues in the whole Aggregate, and not in any one of its separated Parts.

A chemical Analysis of this Water, carefully compar'd with that of some others, whose Virtues are well known, will inform and assist us much more in determining concerning its Uses and Effects by Analogy. I shall therefore proceed to compare this with some other mineral Waters, and endeavour to shew by Experiments wherein they agree, and wherein they materially differ.

S E C T. VI.

1. **T**HE purging Waters of *Harrigate*, *Croft*, and some others, seem to have more Sulphur in them than this has, and smell stronger of it; but they have no Steel.

2. The chalybeat Waters of *Harrigate*, *Astrop*, and *Tunbridge*, have very little or no Sulphur; and their chalybeat Principles are neither so light, nor in so great a Quantity, as in the *Lincomb Water*.

3. Neither the Waters of the *Cross*, *Hot*, or *King's Bath*, seem to contain more than one tenth Part of the Steel which the *Lincomb Water* has, tho' the Steel which is contain'd in all these, seems to be equally subtile; and the *Lincomb Water* contains a much greater Quantity of Sulphur than any of the *Bath Waters*, even than the *Hot Bath Water*, which has more Sulphur than either the *Cross* or *King's Bath*; neither have I yet met with any mineral Water with which it seems to agree so much as with that of the *Geronster at Spa*.

4. The great Quantity of Iron and Sulphur which the *Lincomb Water* contains, and the great Similitude in Smell and Taste which I found this Water to have to that of the *Geronster*, (its pungent vinous Spirit only excepted) induced me to examine and compare it with the *Pyrmont*, *Pouhont*, and
Geron-

Geronster Waters in the following manner; the Effects and Appearances of which are here exactly and faithfully related.

5. We carried a Bottle of *Pyrmont*, and a Bottle of *Pouhont* (*German Spaw*) *Water* to the Spring at *Lincomb*, and put one Drop of the Tincture of Galls into a Glass of each of these Waters: The *Lincomb Water* turn'd to a beautiful clear Purple in a Minute's time, and gradually changed to a deep amethyst Colour: The *Pyrmont Water* turn'd purple, with a muddy Cast, in two Minutes time: The *Pouhont Water* began to change, in three Minutes, to a clear purple Colour, and in a few Minutes more turn'd to a deep Amethyst, like the *Lincomb Water*.

6. To the same Quantity of each of these three Waters we put one Drachm of Syrup of Violets: The *Lincomb Water* turn'd to a light Grass-green immediately, and gradually grew deeper: The *Pyrmont Water* remain'd the Colour of the Syrup for ten Minutes, and in fifteen Minutes changed to a faint Green, and in half an Hour to a light muddy Grass-green, but not so deep as the *Lincomb Water*: The *German Spaw Water* did not change till after fifteen Minutes, and then turn'd to a faint Sea-green Colour, and in one Hour's time was a little heighten'd, but not near so much as either of the former.

7. We put four Drops of the Tincture of Logwood into a Glass of each of these Waters:

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Waters: The *Lincomb Water* turn'd to a deep Blue presently; which Colour gradually increased, with a faint purple Cast: The *Pyrmont* and *German Spaw Water* chang'd to the Colour of old *Mountain Wine*, and in five Minutes began to look a little blue, and in ten Minutes more became almost like the *Lincomb Water*, tho' not quite so deep a Blue.

8. To a Glass of each of these Waters we put five Drops of Oil of Tartar *per Del.* The *Lincomb Water* turn'd to a whitish pearl Colour in a Moment, and continued so: The *Pyrmont Water*, at first, turn'd to a whitish pearl Colour also, but in less than a Minute became clear again, and continued so: The *German Spaw Water* did not change its Colour in the least. In a little Time after, we put 25 Drops more of the Oil to each Glass: The *Lincomb Water* was a very little whiter than before: The *Pyrmont Water* turn'd to a milky White, and curdled like Soap in hard Water; and after standing two Hours, let fall a whitish Powder with a yellow Circle about it: The *Lincomb* precipitated a whitish yellow ochry Powder: The *German Spaw Water* remained clear as before.

9. We put six Drops of a Solution of Silver in *Aqua-fortis* into a Glass of each of these three Waters: The *Pyrmont* turn'd to a pale pearl Colour the first; *Lincomb* the next;

next; and the *German Spaw Water* last; and in two Minutes time they were all three of the same whitish Colour, but the *Lincomb* was the clearest: In two Hours time they all changed to a dark-blue Grey, and were a little muddy, and then put down a blackish-grey Sediment.

10. Having some Bottles of fresh *Geronster Water* sent me, which were carefully cover'd with Oil, close stopped, cemented, and tied over with Bladder on the Spot, I put ziii of the *Geronster Spaw Water* into one Glass, and ziii of *Lincomb Water*, at the Spring, into another, and then put two Drops of Tincture of Galls into each of them: The *Lincomb Water* turn'd to a fine Purple in a Minute, and gradually came to a deep Amethyst in about 15 Minutes time: The *Geronster Water* began to turn purple in about three Minutes, and gradually came to a deep amethyst Colour in twenty; and in one Hour's time they were both of the same amethyst Colour. The *Geronster Water* had several Air-bubbles adhering to the Glass, which the *Lincomb Water* had not.

11. To the same Quantity of each of these Waters we put ten Drops of Tincture of Sumach. The *Lincomb Water* changed to the Colour of a brown *Kerry Stone* in a Minute; and in a few Minutes more to a deep-bluish Purple, with a faint reddish Cast:
The

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The *Geronster Water* remained clear almost ten Minutes, and then turn'd to a brown *Kerry Stone* Colour, and in three Minutes more to a deep bluish purple; and in one Hour's time they were both exactly of the same Colour, *viz.* a purple.

12. Five Drops of a Solution of Silver were put into a Glass of each of these Waters, and they both changed to a light clear pearl Colour in a Moment, which by standing acquired a little purple blackish Cast.

13. Two Glasses of the same Waters had one Drachm of Violets put to each of them. The *Lincomb Water* turn'd green in less than a Minute's time, and gradually chang'd to a deep Grass-green: The *Geronster Water* changed in about five Minutes time to a pale Green, and gradually grew deeper, but had a little more of the Sea-green than the *Lincomb Water* had.

14. A Glass of each of these Waters had five Drops of a Solution of Mercury sublimate in Water put to them, and they both remained clear.

Two Glasses with ten Drops of Oil of Tartar *per del.* in each, turn'd to a very faint whitish pearl Colour.

15. Five Drops of a Solution of Sugar of Lead were put into a Glass of each of these Waters. They both changed in a Moment to a milky whitish Colour, with a brownish
Cast,

Cast, and by standing put down a Sediment of a yellowish dirty white Colour.

16. Into a Glass of each of these Waters I put five Drops of the Tincture of Rhubarb: They were both of the same Colour, and then changed to the Colour of a brown *Kerry Stone*; the *Geronster* had just a perceptible yellowish Shade more than the other.

17. Finding this great Similitude between these two Waters, save that the *Lincomb Water* was fresh taken up at the Spring; whereas the *Geronster Water* had been in Bottles whilst it was brought from *Spa* hither, I took a Bottle of *Lincomb Water*, which had stood with Oil and Bladder close tied over it sixty Days, and a Bottle of the *Geronster Water*, which had been kept in the same manner, and put two Drops of Tincture of Galls into a Glass of each of them: The *Lincomb Water* turn'd to a purple Colour in a Minute's time, and gradually grew deeper for five Minutes: The *Geronster Water* turn'd purple in five Minutes time, and gradually became deeper for an Hour; after which they both remained of the same beautiful deep amethyst Colour.

18. Five Drops of a Solution of Silver were put into a Glass of each of these Waters: They both turned to a beautiful Oriental pearl Colour in a Moment, and continued so for 15 Minutes, and then be-

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came a little clearer; and by standing two Days they both put down a small Sediment of a darkish blue grey Colour.

19. Into a Glass of each we put a Drachm of Syrup of Violets: The *Lincomb Water* turn'd to a muddy Grass-green Colour in a Minute, and gradually changed to a deep one: The *Geronster Water* turn'd to a muddy Sea-green, and by standing gradually changed to a deep Grass-green Colour, much the same with the *Lincomb Water*.

20. We put six Drops of a Solution of Sugar of Lead into a Glass of each of these Waters. They both changed to the Colour of Mother of Pearl, or rather to that of a clear *Onyx*, with a brownish white Cast, and in two Hours time precipitated a small Quantity of a Powder, which by standing assumed a whitish-yellow Colour in both, but a very little more of the ochry Colour in the *Lincomb Water*.

21. The *Lincomb Water* has the same kind of fixed alkaline red Salt, as the *Geronster Water* has, and deposits an orange-colour'd Ochre by standing in an open Vessel, as the *Pyrmont*, *Pouhont*, and *Geronster Waters* do.

22. And it appears from all these Trials, and the preceding Experiments, that the *Lincomb Spaw Water* is impregnated with the same mineral Principles which the *Geronster Spaw Water* is, and appears to have

as much of a volatile Principle in it, as that excellent mineral Water has; only it seems to be more soft, subtile, and less pungent: and in this, and its containing a less Quantity of the brisk, springy, elastic Air, than those *German Waters* do, it seems to differ from them.

S E C T. VII.

1. **H**A V I N G thus taken a View of the Principles which this Water contains, and compar'd them with those of other mineral Springs, whose Effects are well known, and described the chief Particulars wherein they differ, we shall now be more capable of forming a Judgment in what Cases they are likely to be useful, and of directing the Time, Quantity, and other Requisites to use them to the greatest Advantage.

2. In general, the warmer Months are the most suitable Times for drinking the Waters of all cold mineral Springs: From *March* to *November* is the properest Season for drinking the *Lincomb Water*, though some have us'd it to very good purpose during the Winter. I own, I have advis'd very few to drink it at that Time, rather chusing that the *Bath Waters* should be used in their proper Course; but where these had been try'd without Effect, or the Nature of the

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Disease call'd for Assistance not likely to be procured from them, I have not scrupled to recommend the *Lincomb Water* at that Season of the Year.

3 The most proper Time of the Day for drinking any mineral Water, is esteemed to be in the Morning before Breakfast; the Stomach being then empty, the Waters enter the Blood with the least Diminution of their Virtues; the Application of the corroborating mineral Principles of the Fibres of the Stomach and Intestines, is likewise more immediate, which doubtless is of very great Consequence, and perhaps the primary Cause of all those good Effects which follow the proper Use of chalybeat Waters.

4. A Glass of such Waters as are not purgative, but act as Alteratives or restorative Strengtheners, taken at Bed-time, is no less beneficial; they strengthen the Stomach, assist the Digestion, mix with the Blood, and promote the thinner Secretions without being disturbed either by the Passions of the Mind, or Exercise of the Body; nor are they found to be of less Use, if a Glass or two be taken a few Hours after Dinner.

5. The Quantity and Length of Time must be varied according to the Age, Constitution and Strength of the Patient, and the Nature and Cause of the Disease; and consequently must be very different in different Persons. But we may say, the proper Quantity in
general

general is from half a Pint to a Quart or three Pints, in the Morning, divided into three or four Draughts, at the Distance of half an Hour between each Draught, with suitable Exercise; and in most Cases half a Pint at Bed-time.

6. When this mineral Water is drunk in this Manner, and in these Quantities, it generally, tho' drank cold, gives an agreeable Warmth to the Stomach in a few Minutes time, sits light, creates a keen Appetite, and a good Digestion, remarkably raises the Spirits, and passes off freely and quickly by Urine.

7. Hence it is evident how well it is adapted to the Cure of those Diseases which proceed from Obstructions in the glandular Parts and minute Vessels of the Body, not attended with an immediate Inflammation of those Parts: And it is no less evident, that this includes the major Part of chronical Diseases.

8. Saying thus much would have been sufficient for the Gentlemen of the Faculty; but there are others who perhaps may read this Essay, for whose Advantage it is necessary to be more explicit, and to mention some of those Diseases, in the Cure of which this mineral Water is found to be efficacious.

In Disorders of the Stomach and Bowels arising from a Loss of Appetite and Indigestion,

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sion, such as the Heart-burn, with sour Belchings; a Load of inert viscid Phlegm, with a *Nausea* and Vomiting; a flatulent Oppression with pinching colic Pains, this Water is remarkably serviceable, and, if regularly drank for some Time, seldom fails of removing the Disorder.

It is no less efficacious in removing Obstructions in the Liver, in carrying off Gravel and small Stones from the Gall-Bladder, and the biliary Passages, and preventing or curing the Jaundice; in which Case they are much more useful than any other mineral Waters that I have yet seen.

They promote the Discharge of Gravel, and such Stones as are capable of passing from the Kidneys and urinary Passages, as they go off so quickly by Urine; they powerfully deterge and heal Ulcers in those Passages, several Instances of which I have seen.

They take off a Strangury and an Incontinency of Urine, especially that Incontinency of Urine attended with Heat and Pain, which too often affects very antient Men, more effectually than any other Medicines I know.

In Obstructions of the *Menses*, and the various Diseases arising from thence, they are no less effectual.

In Cachexies, with a Loss of Appetite and Digestion, from hard Drinking and high Living, attended with swelled Legs, and an
icterical

icterical Complexion, or what is usually called a broken bloated Constitution, they strengthen and corroborate the Vessels, invigorate the Motion of the Blood, and increase the Secretions, and so carry off these Disorders, and restore the Constitution more than the *Bath Waters* do; and it is perhaps owing to the same Cause, that they are found to be effectual in bringing the *Anomalous Gout* to be regular, when the *Bath Waters* have failed.

Externally used, they deterge, cleanse and heal scrophulous and other old Ulcers, dry up sharp acrid Humours, and heal Eruptions and scurfy Foulnesses of the Skin: Some Instances of its Effects I have here subjoin'd.

H I S T. I.

Thomas Harley of *Whitstable*, near *Canterbury*, aged 48, was seized in *September* 1736. with a violent Rheumatism, with great Pain, and inflammatory Swellings, in his Back, Arm, Leg and Thigh, which chiefly affected his Left Side, and continued for Three Months: By Bleeding, and other Remedies, his Pains abated; but his left Arm and Leg remained immovable and useless, with some Pain; but by bathing in the Sea, he recovered the Use of his Limbs at that Time. In *September* 1737. he was seized again in the same manner, and continued so till

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till *March* following: In this Time he took various Medicines without much Relief, and being in low Circumstances, he could not procure proper Assistance; the Pain and Swelling still continued, but in time became soft, pale, and more of the œdematous kind, without any Inflammation. He continued thus in incessant Pain, for the Space of a Year and an half; he slept little, a violent Cough seized him, his Appetite decayed, he was extremely emaciated, and his Strength declined every Day: In this Condition he was brought to *Bath*, in the latter End of *March* 1738. he drank the *Bath Waters*, and bathed in them in the usual manner for Six Weeks, without any Advantage, but rather with an Increase of his Pains, from a Costiveness which he apprehended the *Bath Waters* caused or increased: He had a Swelling on the Inside of the Joint of the Left Knee, as large as half a Penny-Loaf, which was exceeding painful, and obliged him, when he attempted to move, to set the Side of his Foot forward, instead of his Toes. He had another protuberant Swelling as large as an Hen's Egg, on the Inside of the Wrist of his Left Arm, just above the Joint: These Swellings were white and soft, but very painful, and fluctuated under the Pressure of one's Fingers, as if they were filled with a viscid glutinous Matter (which might probably arise from the Obstruction of the lymphatic Vessels,

sels, and the Effusion of sify Lymph into the cellular Membranes) no Symptoms of Suppuration having ever appeared. He had another Swelling on the Spine of the inferior Dorsal *Vertebræ*, as large as that on his Wrist; but it was much harder, and the most painful, which prevented him from changing the Position he was laid in: This had produced an *Anchylosis*, or an Immobility of Four or Five Joints of the *Vertebræ* of his Loins: The Pain in this Part was abated before he came to *Bath*, but his other Pains, and this in a very considerable Degree, and his Loss of Appetite, his Cough, his Ema- ciating, and Loss of Strength, still continued. In this Condition he went on his own Accord, about the Middle of *May*, to *Lincomb Sparw*, being so weak, that he was Four Hours in going from *Bath* to the Spring. He drank about a Pint of the *Sparw Water* that time, and return'd with the like Difficulty. That Night the Pain in his Back increased, and was so violent, that he, and others in the Hospital, where he then was, thought he could not live till the Morning: About Three o'Clock that Morning he passed off a large Quantity of Gravel, mixed with a great deal of viscid glutinous Matter, by Urine; upon which his Pains abated much, and he grew better, which induced him to go again the next Day but one, (not being able to go the next Day) after which he went to the *Sparw*

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every

every Day, and gradually increased his Dose of the Waters to about Two Pints every Morning. His Pains wore off, his Appetite and Strength increased, his Swellings diminished and wasted, his Cough abated, and his whole Habit was so recruited, that in about Four or Five Weeks time he could walk to the *Spaw* in less than half an Hour, which at first he could not do in less than Four. He continued to drink the *Spaw Waters* till the First of *July*, in all about Seven Weeks, and then walked home to *Whitstable*, near *Canterbury*.

H I S T. II.

A Person aged about 82, who had naturally a fine, strong, healthy Constitution, which his Temperance and regular Living had preserved so, was at this Age affected with an *Incontinentia Urinæ*, accompanied with great Heat and Pain; a Disorder which frequently baffles all Attempts to relieve it, and too often, at the best, admits but of a palliative Cure, at this Time of Life. Upon hearing his Complaints, I advised him to drink the *Lincomb Spaw Waters*: They purged him gently, Three or Four times a Day, at first; afterwards they pass'd off by Urine, quickened his Appetite, raised his Spirits, took off the Heat and Pain
in

in making Water intirely, and so strengthened those Parts in a few Days time; that he could retain his Urine, and make Water as freely and well as ever. About half a Year after, upon taking Cold, his Disorder returned, and was again removed by the same Remedy in Two Days time, but I advised him to continue drinking them for some Weeks, which he did. He has in the Three Years since, upon taking Cold, had some slight Returns, which the Waters have always relieved.

H I S T. III.

A Man about 54 Years of Age, who had been afflicted with nephritick Pains for several Years, with great Pain in the Neck of the Bladder, and a frequent Stoppage in his Urine, so that he was obliged to have it drawn off by a Catheter, tho' he never pass'd any Stones, was seized with an *Ischuria*, or total Stoppage of Urine, with a great Weight and Pain in the Neck of the Bladder, which brought on the usual nephritick Pains: These continued for Two Weeks, during which time he could never pass any Urine more than a few Drops at a time, and that with great Pain, so that he was obliged to have it drawn off with a Catheter every Day: In this Condition he was, after trying various Methods and Medicines, ad-
vised

vifed to try the *Lincomb Spaw Water*; he drank it the next Day, and it paſſ'd freely without much Pain, and carried off a conſiderable Quantity of red Gravel with it, upon which his Pains left him, and he continued to drink the *Spaw Waters* for ſome time; but as it render'd him coſtive, he took a little *Lenitive Electuary* two or three times a Week, which kept his Body temperate, and the Waters paſſ'd very freely, being pretty well recover'd and eaſy; but, either through Buſineſs or Indolence, he neglected drinking the Waters; and about half a Year after, upon uſing violent Exerciſe, his Diſorder and Stoppage of Urine returned; and an unſkilful Hand, being employ'd to introduce the Catheter, ſo hurt and bruised the Paſſage, that he diſcharged a conſiderable Quantity of Blood immediately, as well as at various times ſince, upon being overheated with too violent Exerciſe or Motion, and has render'd the Introduction of the Catheter impracticable, and probably has contributed to bring on thoſe Returns of his Diſorder, which he has had ſince; but he always finds, that upon drinking the Waters they paſs off freely by Urine, and without Pain, except a little at the firſt: They have always given him immediate Relief, and kept him well for a conſiderable time after uſing them.

H I S T. IV.

A Girl of 13 had violent Pains in her Stomach, Belly, and Hips, accompanied with very frequent Purging, and almost total Loss of Appetite, for near Two Years; she sometimes complained of a Pain in her Head, and Dizziness, but was never free from the Complaint of her Stomach and Belly, which were always increased after eating, and sometimes were so violent as to force her to vomit, which for the present gave her Ease. The long Continuance of these Disorders had reduced her to a very low Condition, tho' several Methods had been tried to relieve her, but without Success: She was at length desired by some of her Acquaintance to try the *Lincomb Water*, which she readily agreed to: In a few Days her Pains abated, the Vomiting and Purging stopp'd, her Appetite return'd, and in about Six Weeks she got quite well, without the Assistance of any other Medicine.

H I S T. V.

A Gentleman in the Army, above 50, of a natural strong Constitution, and a brisk active Disposition, being reduced to a bad State of Health by an Indigestion, accompanied with great Anxiety and Pain at
his

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his Stomach, and violent Vomitings, came to *Bath* in the latter End of *August* 1738. The Pain was not continual, but return'd at uncertain Intervals with great Violence, he being at other times tolerably free from it for several Days together, tho' he was scarce ever free from flatulent Oppression, great Anxiety, and a Dejection of Spirits; neither did the Pain at all times, when it returned, seize his Stomach, but sometimes his Breast, and sometimes the internal Region of his Loins, and the Seat of the Kidneys; yet without any Obstruction in his Urine, which was generally at those times high-coloured, and less in Quantity than usual: The Pain sometimes also seized his Bowels, but most frequently his Stomach, when it was always attended with violent Vomiting, which continued for One, Two, or Three, and sometimes Four Hours, without any, or very little, Intermiſſion, and then left him with great Anxiety and Dejection of Spirits. He drank the *Bath Waters* regularly from *August* 1738. to the 9th of *March* following, and had several Vomits, Purges, Clysters, and various other Medicines, both with and without the *Bath Waters*, was bled twice, and observed a regular low Diet all the time, but without any Advantage: I was called to him on the 9th of *March*, and found him vomiting violently, with great Anxiety and Pain at his Stomach and Breast,

Breast, accompanied with cold clammy Sweats, which stood in great Drops on his Face; which Symptoms he said had then continued near Three Hours without Intermission: He was drinking an Infusion of Chamomile-flowers, as usual, to encourage the Vomiting, which he said was the only thing that gave him any Relief in those Paroxysms, which, he told me, then returned sometimes once or twice a Day; at other times not oftener than once in Three or Four Days, when he always brought up a great Quantity of tough viscid Phlegm, as I observed he had discharged at that time. Whether his Body was open or costive, it gave him no Relief; wherefore I directed some very warm *Saline Draughts* for that and the next Day, and gave him a *Bolus* of *Philon. Roman.* &c. each Night, and the next Morning following advised him to drink the *Lincomb Spaw Water*, and prescribed him a warming Electuary to take with the first Glass every Night and Morning, with a more generous Diet than he had used with the *Bath Waters*, as I apprehended something of the *Anomalous Gout* to be the Cause. He drank a Pint and half of the *Spaw Water* every Morning, at Three or Four times, with proper Intervals, and half a Pint at Nights, and in less than Two Weeks was able to ride to the *Spaw*. His Appetite, Digestion and Spirits increased, and
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he recovered Strength daily, and had no Return of his Pain in any considerable Degree, nor any Vomiting from the first Time I saw him till he had drank the Waters Five or Six Weeks, when he was seized with a Fit of Vomiting, tho' not so violent as usual; upon which, after drinking Three or Four Pints of Chamomile Tea, and discharging his Stomach, I gave him a warming *Bolus*, with a saline Mixture, and bathed his Feet in warm *Bath Water*, at going to Bed, having some Suspicion of a Fit of the Gout; the Vomiting ceased, and the next Morning his Foot was inflamed, red, painful and swelled, which continued for Three Days, and then went off: After this he drank the *Sparw Water* regularly as before, and used a more generous Diet and Exercise, and had no more Returns of his Pain or Vomiting. He continued this Course till the Beginning of *July*, and went away from *Bath* perfectly recovered: I saw him some Months after, when he was grown fat, jolly, and hearty as ever, and I hear continues so.

H I S T. VI.

A Lady about 60 Years of Age came to *Bath*, with a Loss of Appetite, Indigestion, and frequent Vomiting after Eating; She had drank *Tunbridge Waters*, and taken various Medicines, without Success; she took
several

several Vomits, drank the *Bath Waters*, with Antiemetics and Stomachics, in different Forms, with and without the *Bath Waters*, for several Weeks, but not to much better Purpose; for tho' her Appetite was something better, yet she very seldom could retain what she eat, but in Three or Four, and sometimes Six or Eight Hours after Dinner, she brought it up, with every thing else, which she had took in that time; so that she rarely went to Bed without clearing her Stomach of every thing. Having thus tried all the usually successful Methods, and the *Bath Waters*, a considerable time, but in vain, I advised her to drink the *Lincomb Spaw Water*; and as it was then in the middle of Winter, she took a small Dose of a *bitter Stomach Electuary*, Night and Morning, with the first Glas of the Water, lest it should be too cold at that time of the Year; she had the Water brought to her in Bottles; it sat light on her Stomach, agreed well with her, stopp'd her Vomiting, increased her Appetite, strengthened her Digestion; she recover'd her Strength, and went away well the Spring following.

H I S T. VII.

A Gentlewoman about 30 Years of Age, from Cold taken in Childbed, was seized with a Fever, which reduced her extremely,
K and

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and ended in an Hectick, with a Loss of Appetite, a Restlessness, Watching, and a Pain and Lameness in one Thigh. She came to *Bath* some time in *March* or *April*, took various Medicines, and (I think) drank the *Bath Waters*, without any Relief, but rather an Increase of her Disorder. She then was told, that if taking Quicksilver would not cure her, nothing would; she took it for several Weeks, without any Relief, and her Physician going out of the Town for some Weeks, she sent for me in *June*; I found her Hectick Fever so strong, and her Thirst and burning Heat so violent, that she was frequently a little delirious, especially in the Nights, with profuse Sweat towards Morning, and sometimes a few loose Stools; she had little or no Cough, nor any Symptom of her Lungs being inflamed; she had a constant Thirst, no Appetite, little Sleep, and that confused, and was so weak as to need Assistance to get from her Bed to her Chair. I gave her some cooling Draughts, with *Sal Absinth. &c.* an *Emulsion* and *Diacodium* at Nights, for Two or Three Days, and then a *sweetening cooling Decoction*, with some Drops of *Elix. Vitrioli Myns.* Three or Four times a Day, for Four or Five Days more. Her Hectick Fever being much abated, I desired her to drink the *Lincomb Spaw Water*, which was brought to her Night and Morning: It agreed well

with her, fat light on her Stomach; her Thirst, Heftick Heats, and Pain in her Head, which attended it, abated; her Appetite and Strength daily increased, and a Tumour arose in that Thigh, which the Pain and Lameness had seized, which being assisted by Cataplasms, &c. suppurated and discharged a considerable Quantity of Matter. She continued to drink the *Spaw Water* all the time, her Appetite and Digestion recruited, she recover'd her Strength and Flesh, the Ulcer healed, and she went away well.

The C O N C L U S I O N.

IT is well known, that cold Waters in general, but those of the Chalybeat kind especially, contract and corroborate the animal Solids; they increase hereby the *Momentum* of the Fluids, and promote their Attenuation, and are from these Effects useful in removing Obstructions in the smaller Vessels.

It is likewise well known, that all warm Waters relax; yet at the same time, from their Warmth, and the active Principles which many of them contain, they increase the Velocity of the Fluids; by which joint Actions of relaxing the Solids, and increasing the Motion of the Fluids, they contribute

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very efficaciously to remove every Obstacle in the Course of Circulation.

To recover a free Circulation in the smallest Vessels, and restore the necessary Strength and Firmness of the Solids, being the principal Indications in the Cure of most chronical Diseases; it seems a very natural Method to obtain these Effects, to recommend the Use of cold chalybeat Waters, after the warm ones have been sufficiently used; which Method the *German* Physicians judiciously practise in advising their Patients to drink the *Geronster Water* at *Spa*, after a competent Stay at *Aix la Chapelle*.

What Resemblance there is betwixt the *Geronster Water* and the *Lincomb*, has been impartially inquired into above. We shall therefore submit it to the Consideration of the Judicious, whether, after a proper Use of the warm Waters of *Bath*, this cold Chalybeat may not be of the like Advantage in many chronical Cases.

APPENDIX.

I Observed p. 40. N^o. 21. that I made those Experiments upon Portions of *Water equally cold*. To shew the Necessity of attending to this Circumstance, I shall relate a few Experiments, made indeed with a View to discover the Causes of the Variation of Weight observable in the *Lincomb Water*: But as they did not seem to prove any thing, so much as that very great Care is requisite, in respect to Heat and Cold, in Hydrostatical Experiments, I only gave them a Place here.

The Glass Cylinder (Fig. 3.) was filled with *Spaw Water*, fresh taken up at the Spring; and the Hydrometer, whose Bulk is equal to $13\frac{1}{2}$ cubick Inches of Water, was immersed into it, without Delay. The Depth it sunk to immediately, and the Degrees it afterwards subsided to, upon several Trials, are as follows: At the first Immersion, on

June

70 A P P E N D I X.

| | Inches. | | Inches. |
|----------|-------------------------------|---------------------------|-------------------|
| June 4. | It stood at $2\frac{1}{10}$. | In 4 Hours it subsided to | $3\frac{1}{10}$. |
| 24. | - - - $2\frac{6}{10}$. | - - - - - | 5. |
| July 15. | - - - 2. | - - - - - | $5\frac{8}{10}$. |
| Aug. 24. | - - - $2\frac{7}{10}$. | - - - - - | $4\frac{3}{10}$. |

It appears from hence, that the specific Gravity of the Water is different, at different times, as we observ'd before, tho' the Experiments are made when the Water is equally cold; but we find, that from some Cause or other, the Variation of its Gravity upon standing appears much more considerable, which Cause is the different Degree of Heat and Cold, as is evident from the following Experiment:

Some very heavy cold Pump-water was put into a Glass Cylinder, and the Hydrometer immersed; *Fahrenheit's* mercurial Thermometer was at the same time suspended in the Water. To this cold Water was added, at different times, so much warm Water as made what Alteration we pleased, raising the Mercury, and at the same time, by rendering the Water more light, sinking the Hydrometer at Pleasure. *N. B.* The warm Water made use of was out of the same Pump as the cold.

When the Mercury in the Thermometer stood

At

At 54 Degrees, the Hydrometer sunk 1 Inch.

58 2

62 3

66 4

70 5

74 6

78 7

82 8

The Stem of the Hydrometer being no longer, I could not proceed with my Experiments any further. These are sufficient to shew, that a close Attention to the Degrees of Heat in the Water, in which we try the specific Gravity of Bodies, as well as of Water itself, is absolutely necessary. It is to be wish'd, that we had some certain Rules of Proportion in this Case; but the Establishment of these must be left to Time and Industry. However, it will be easy to remedy, in some Degree, the Inconvenience which these Experiments are liable to from the Alteration of Heat, by placing the Cylinder in a large Body of Water, the Alteration of which will be slow, and may be easily regulated, by adding cold Water, as we observe from the Thermometer, that it grows the least warmer. And some such Contrivance is necessary, if we would have the genuine History of the specific Gravity of Bodies.

Expli-

Explication of the FIGURES.

Fig. 1. The Hydrostatical Glass describ'd, p. 7. to the larger Neck of which is fixed, The brass Hook, Fig. 2. *B.* by the Collar *C.* secured by a Screw. In the larger Neck of the Glass, Fig. 1. should have been represented a small glass Knob at the Mark $\frac{1}{2}$ which prevents the Collar from slipping up the Tube, and spoiling the Experiment. Fig. 3. is the glass Cylinder, and within it the graduated Hydrometer, as made by Dr. *Desaguliers*.

F I N I S.

ERRATA.

Pag. 2. Line 9. for *distant*, r. *distinct*. p. 3. l. 17. for *Years*, r. *Months*; *ibid.* l. 30. r. *red Powder*, resembling *Crocus Martis*. p. 27. l. 15. r. *generates*. p. 34. l. 9. for *its*, r. *the*. p. 42. l. 8, 9. for *a larger Quantity*, r. *some Part*. p. 47. l. 5. for *dark-blue*, r. *faint-blue*. p. 48. l. 13. for *Violets*, r. *Syrup of Violets*. p. 52. l. 11. for *of the*, r. *to the*. p. 62. l. 7. r. *Oppressions*. p. 66. l. 16. r. *Sweats*.

