A

BRIEF ACCOUNT

OF THE

BAROMETER,

AND THE

VARIOUS IMPORTANT USES

TO WHICH IT MAY BE APPLIED;

TOGETHER WITH

Dr. HALLEY's, Dr. BEALE's, and Mr. PATRICK's

Rules for judging of the *Changes* and *Alterations*

OF THE

WEATHER;

Founded on long Experience and accurate Observations.

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1791.

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BRIEF ACCOUNT

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BAROMETER, &c.

THE Barometer is perhaps the moſt uſeful, the moſt intereſting, and entertaining of all the philoſophical inſtruments. To the gentleman it is a ſource of perpetual amuſement, as it enables him to determine with accuracy, the weight of the atmoſphere, and obſerve the ſucceſſive changes and variations therein; but more particularly as it furniſhes him with the plaineſt and eaſieſt method of meaſuring the heights of mountains and the depths of caverns and mines. To the farmer and mariner the utility of it is univerſally con-

 feſſed.

feſſed. It indicates thoſe approaching changes and alterations in the weather, which, to be appriſed of, is to them of the utmoſt conſequence. A good Barometer has often ſaved the farmer his crop, the mariner his veſſel.

That all deſcriptions of perſons, who are in poſſeſſion of this valuable inſtrument, or may chooſe to become purchaſers of it, may be able to uſe it to the beſt advantage; it is the deſign of this little work (as it will ſave them much trouble and painful inveſtigation of their own) to lay before them ſome of the proceſſes and diſcoveries of learned men, and the reſults of a long ſeries of minute enquiry, and accurate obſervation.

It perhaps may be unneceſſary to premiſe, that the Barometer is founded on the Torricellian experiment, ſo called from TORRICELLI, its inventor; which is ſimply a glaſs tube, filled with mercury hermetically ſealed at one end, the other open and immerged in a baſon of ſtagnant mercury. Now as a column of mercury, of about twenty-nine inches in height, is equal to the mean weight of the atmoſphere, it is evident that every alteration in the latter muſt produce a proportionate alteration in the former.

In order to ſhew this alteration in the moſt accurate and ſatisfactory manner, many learned andingenious men have conſtructed BAROMETERS in various forms and on different principles.

The

The common upright Barometer, as it is the ſimpleſt, perhaps may be the beſt.

Beſides this there is the wheel Barometer, the invention of Dr. Hook.

The marine Barometer, the contrivance of the ſame ingenious perſon. But ſince greatly improved; and now ſuſpended in a new and very curious manner by the compiler of this tract.

The diagonal Barometer, the invention of Sir Samuel Moreland.

The horizontal Barometer, the contrivance of Caſſini.

And the ſtatical Barometer, ſuppoſed to be the invention of the great Mr. Boyle.

Without entering into the comparative merits of thoſe inſtruments; I ſhall content myſelf with briefly explaining ſome of the uſes to which they may be applied, particularly the upright portable Barometer, when made in the beſt manner and on the moſt approved principles. Thoſe gentlemen who wiſh for further information on the ſubject, I refer to Monſ. De Luc's recherches, vol. 2d.

Among

Among the various important properties of this valuable inſtrument, that of determining heights, if not the moſt uſeful, is at leaſt the moſt entertaining to the ingenious and philoſophical enquirer.

I ſhall, therefore, begin with recounting the reſults of ſome experiments made for this purpoſe, by perſons abundantly qualified for the undertaking.

Mr. Caſwell meaſured the height of Snowden-Hill, in Wales, and found it to be 1240 yards high.

Dr. Halley alſo meaſured it, and found by three exact trials, that the mercury ſtood lower at the top than at the bottom by $3\frac{8}{10}$ inches. From hence it appears that every thirty-two yards aſcent ſinks the mercury about $\frac{1}{10}$ of an inch.

Dr. Derham, from ſome experiments which he made at the top and bottom of the Monument, allows thirty-two yards pependicular aſcent, to $\frac{1}{10}$ of an inch fall of the mercury.

Dr. Nettleton, in conſequence of ſeveral experiments which he made in the neighbourhood of Halifax, has formed the following table, which I ſhall inſert for the entertainment of the curious reader:

A TABLE;

A TABLE, shewing the number of feet required to make the mercury fall $\frac{1}{100}$ of an inch from any given height in the tube, from thirty-one to twenty-six inches.

Inches	Feet	Decimals	Inches	Feet	Decimals	Inches	Feet	Decimals
31	— 82	0	— 26	28	— 5	89	—	49
30	— 82	98	— 53	28	— 4	89	—	81
30	— 82	79	— 79	28	— 3	90	—	13
30	— 83	7	— 06	28	— 2	90	—	45
30	— 83	6	— 33	28	— 1	90	—	76
30	— 83	5	— 61	28	— 0	91	—	09
30	— 83	4	— 89	27	— 9	91	—	42
30	— 84	3	— 16	27	— 8	91	—	75
30	— 84	2	— 44	27	— 7	92	—	08
30	— 84	1	— 72	27	— 6	92	—	41
30	— 85	0	— 0	27	— 5	92	—	74
29	— 85	9	— 29	27	— 4	93	—	07
29	— 85	8	— 58	27	— 3	93	—	41
29	— 85	7	— 86	27	— 2	93	—	76
29	— 86	6	— 16	27	— 1	94	—	12
29	— 86	5	— 45	27	— 0	94	—	47
29	— 86	4	— 74	26	— 9	94	—	82
29	— 87	3	— 03	26	— 8	95	—	17
29	— 87	2	— 33	26	— 7	95	—	53
29	— 87	1	— 63	26	— 6	95	—	89
29	— 87	0	— 93	26	— 5	96	—	25
28	— 88	9	— 21	26	— 4	96	—	61
28	— 88	8	— 55	26	— 3	96	—	98
28	— 88	7	— 89	26	— 2	97	—	36
28	— 89	6	— 17	26	— 1	97	—	73
				26	— 0	98	—	10

From the above Table it is evident, that the denſity of the atmoſphere is not every where equal, but that the higher we aſcend the rarer it becomes. But as it is founded upon the actual obſervation of a very ingenious and accurate philoſopher, we may derive great uſe from it in all our barometrical calculations,

M.

M. De Lue, in vol. 1. of his recherches, has given a curious table of the heights of the atmoſphere, correſponding to thoſe of the mercury in the Barometer, calculated on the principles of various philoſophers, from twenty-eight inches, the height obſerved on the Coaſt of Peru, by the French Academicians to 15, 10 inches: the height obſerved by M. De la Condamine, on the top of one of the Cordeliere Mountains; to which I beg leave to refer the ingenious reader.

In the philoſophical tranſactions, No. 187, we find an excellent paper of the learned Dr. Halley, on the reaſons of the riſe and fall of the mercury in fair and foul weather, which I ſhall take the liberty, in part, to tranſcribe for the information of thoſe who purchaſe the Barometer, that they may be the better enabled to prognoſticate the changes and alterations in the weather:

His obſervations are as follow, viz.

1ſt. In calm weather, when the air is inclined to rain, the mercury is commonly low.

2d. It is generally high in good, ſerene, ſettled fair weather.

3d. It ſinks loweſt of all in very great winds, though not attended with rain.

4th. *Cæteris paribus*, the greateſt height of the mercury is obſerved when an caſterly or northerly wind prevails.

5th. In

5th. In calm frosty weather the mercury is in general high.

6th. After very great storms of wind, when the mercury hath been low, it usually rises again very fast.

7th. More northerly places have a greater alteration of the rise and fall of the mercury than the more southerly.

8th. Within the tropics, and near them, the changes and alterations in the weather make little or no variation in the height of the mercury.

For instance, at Naples, it hardly ever exceeds an inch; whereas, at Upminster, Dr. Derham informs us there is a difference of $2\frac{1}{2}$ inches, and at Petersburgh 3, 31 inches.

Dr. BEALE's OBSERVATIONS on the Barometer are, that in cold weather the mercury is higher than in warm, and usually in the morning and evening than at mid-day.

That in settled and fair weather it is higher than either a little before or after, or during the rain; and that it generally descends lower after rain than before it.

And he ascribes those effects to the vapours with which the air is charged in the former case, and which are dispersed by the following rain in the latter.

If

If it chance to rise higher after rain, it is generally succeeded by settled weather.

TO THESE Observations I shall take the liberty to subjoin those of Mr. PATRICK, with which I shall conclude this little effort, to assist the curious in their barometrical observations.

Mr. Patrick was a very ingenious Barometer-maker, in the Old-Bailey, and at the same time an industrious and accurate observer; and his observations have stood the test of time, and in general been confirmed by the experience of later enquirers. He remarks,

1st. That the rising of the mercury presages in general fair weather—and its falling foul weather, as rain, snow, high winds and storms.

2d. In hot weather the fall of the mercury indicates thunder.

3d. In winter the rising presages frost; and in frosty weather if the mercury falls three or four divisions, there will certainly follow a thaw: but in continued frost if the mercury rises it will certainly snow.

4th. When foul weather happens soon after the falling of the mercury, expect but little of it, and on the contrary, expect but little fair weather when it proves fair shortly after the mercury has risen.

5th. In

5th. In foul weather when the mercury riſes much and high, and ſo continues for two or three days before the foul weather is quite over, then expect a continuance of fair weather to follow.

6th. In fair weather when the mercury falls much and low, and thus continues for two or three days before the rain comes, then expect a great deal of wet, and probably high winds.

7th. The unſettled motion of the mercury denotes uncertain and changeable weather.

8th. You are not ſo ſtrictly to obſerve the words engraved on the plates (tho' for the moſt part the weather will agree with them) as the mercury's riſing and falling; for if it ſtands at much rain, and then riſes up to changeable, it preſages fair weather, altho' not to continue ſo long as it would have done if the mercury was higher; and ſo on the contrary, if it ſtands at fair and then drops to changeable, it preſages foul weather, tho' not ſo much of it, as if it had ſunk lower.

From hence it appears, that in order to paſs a right judgment of the weather, we are not ſo much to regard the point where the mercury ſtands, as whether it is actually in a ſtate of riſing or falling: To which end it is neceſſary to attend to the following directions:

1ſt. If the mercury is in a riſing ſtate, it ſtands higher in the middle of the tube than at the ſides.

2d. If the middle of it is concave, or hollow, it is an indication of its falling.

3d. If

3d. If it is plain or level it is ſtationary.

4th. But one caution is neceſſary to be given to thoſe who are in poſſeſſion of Barometers, with ſmall tubes, which is, before you make your obſervation, ſhake the the tube, and if the air is grown heavier, the mercury will riſe perhaps $\frac{1}{20}$ of an inch; if lighter it will ſink as much. This is cauſed by the attraction of the ſides of the glaſs, which is ſometimes ſo great, that the mercury will not vary of its own accord, till the change it ought to have predicted has taken place.

Theſe few obſervations and directions, if duly attended to, will be found of great importance to thoſe whoſe ſituations in life call for the aſſiſtance of this inſtrument. Moſt men are ſenſible of the valuable uſes to which a good Barometer may be applied, and conſequently we find it in more hands than any other inſtrument; but from want of induſtry or time, or both, it is not ſo generally underſtood, nor ſo extenſively uſeful as it might be. Senſible of this, this ſmall compilation is offered to the public, with a view principally to benefit two deſcriptions of men, who deſerve every aſſiſtance, encouragement and protection, that ingenuity, wealth and power, can confer upon them, viz. The farmer and the mariner; and if the gentleman and the man of leiſure can derive any aſſiſtance or entertainment from the peruſal of it, it will greatly flatter, as well as amply reward the

EDITOR.

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