A Diſcourſe of the Rule of the Decreaſe of the Height of the Mercury *in the Barometer, according as Places are elevated above the Surface of the Earth, with an Attempt to diſcover the true Reaſon of the Riſing and Falling of the* Mercury, *upon change of of Weather.*

By *EDM. HALLEY.*

THE Elaſtick Property of the *Air* has been long ſince made out, by Experiments before the *R. Society* and elſewhere; and the Reſiſtance of its Spring is found to be nearly equal to the Weight or Force that compreſſes it; as alſo, that the Spaces the ſame *Air* occupies, under differing Preſſures are reciprocally as thoſe Preſſures: it has been ſhown likewiſe by undoubted Experiment, that the Specifick Gravity of the *Air* near the Earth's Surface, to that of Water, was once as 1 to 840, again as 1 to 852, and a third time, in a very large Veſſel holding ten Gallons, as 1 to 860; all which, conſidering the Difficulty of the Experiment agree well enough, the *Mercury* ſtanding at all thoſe times about 29 *Inches* $\frac{1}{4}$; but by reaſon 'twas Summer Weather, and conſequently the *Air* rarified when all theſe were tried, we may without ſenſible Error ſay in round Numbers, that the *Barometer* ſtanding at 30 *Inches*, and in a mean ſtate of Heat and Cold, the ſpecifick Gravity of the *Air* to Water, is as 1 to 800: By the like Trials the Weight of *Mercury* to Water, is as 13$\frac{1}{2}$ to 1, or very near it; ſo that the Weight of *Mercury* to *Air*, is as 10800 to 1, and a Cylinder of *Air* of 10800 *Inches* or 900 *Feet*, is equal to an *Inch* of *Mercury*; and were the *Air* of an equal Denſity like Water, the whole *Atmoſphere* would be no more than 5, 1 *Miles* high, and in the Aſcent of every 900 *Feet* the *Barometer* would ſink an *Inch*. But the Expanſion of the *Air* increaſing in the ſame Proportion as the incumbent Weight of the *Atmoſphere* decreaſes, that is, as the *Mercury* in the *Barometer* ſinks, the upper Parts of the *Air* are much more rarified

rarified than the lower, and each Space anſwering to an *Inch* of *Quickſilver* grows greater and greater, ſo that the *Atmoſphere* muſt be extended to a much greater Height. Now upon theſe Principles, to determine the Height of the *Mercury* at any aſſigned Height in the *Air*, and *e contra* having the Height of the *Mercury* given, to find the Height of the Place where the *Barometer* ſtands, are Problems not more difficult than curious; and which I thus reſolve.

The Expanſions of the *Air* being reciprocally as the Heights of the *Mercury*, it is evident, that by the help of the Curve of the *Hyperbola* and its *Aſymptotes* the ſaid Expanſions may be expounded to any given Height of the *Mercury*: For by the *65th Prop. Lib. 2. Conic. Mydorgii*, the Rectangles AB, CE, AKGE, ALDE, *&c.* (in Fig. 5.) are always equal, and conſequently the Sides CB, GK, LD, *&c.* are reciprocally as the Sides AB, AK, AL, *&c.* If then the Lines AB, AK, AL, be ſuppoſed equal to the Heights of the *Mercury*, or the Preſſures of the *Atmoſphere*; the Lines CB, KG, LD, anſwering thereto, will be as the Expanſions of the *Air* under thoſe Preſſures, or the Bulks that the ſame quantity of *Air* will occupy; which Expanſions being taken infinitely many, and infinitely little, (according to the Method of Indiviſibles) their Sum will give the Spaces of *Air* between the ſeveral Heights of the *Barometer*; that is to ſay, the Sum of all the Lines between CB and KG, or the *Area* CBKG, will be proportioned to the Diſtance or Space intercepted between the Levels of two Places in the *Air*, where the *Mercury* would ſtand at the Heights repreſented by the Lines AB, AK; ſo then the Spaces of the *Air* anſwering to equal Parts of *Mercury* in the *Barometer*, are as the *Areas* CBKG, GKLD, DLFM, *&c.* Theſe *Areas* again are, by the Demonſtration of *Gregory* of St. *Vincent*, proportionate to the *Logarithms* of the Numbers expreſſing the *Rationes* of AK to AB, of AL to AK, of AM to AL, *&c.* So then by the common Table of *Logarithms*, the Height of any Place in the *Atmoſphere*,

having any aſſigned Height of the *Mercury*, may moſt eaſily be found: For the Line CB in the *Hyperbola*, whereof the *Areas* deſign the *Tabular Logarithms*, being 0,0144765; 'twill be, as 0,0144765, to the difference of the *Logarithms* of 30, and any other leſſer Number, ſo 900 *Feet* or the Space anſwering to an Inch of *Mercury*, if the *Air* were equally preſt with 30 Inches of *Mercury* and every where alike, to the Height of the *Barometer* in the *Air*, where it will ſtand at that leſſer Number of Inches: And by the Converſe of this Proportion may the Height of the *Mercury* be found, having the Altitude of the Place given. From theſe Rules I derived the following Tables.

A Table ſhewing the Altitude to given Heights of the Mercury.

Inch.	*Feet.*
30	0
29	915
28	1862
27	2844
26	3863
25	4922
20	10947
15	18715
10	29662
5	48378
1	91831
0,5	110547
0,25	129262
0,1	29 *mil. or* 154000
0,01	41 *mil.* 216169
0,001	53 *mil.* 278338

A Table ſhewing the Heights of the Mercury *at given Altitudes.*

Feet.	*Inch.*
0	30,00
1000	28,91
2000	27,86
3000	26,85
4000	25,87
5000 *feet*	24,93
1 *mile*	24,67
2	20,29
3	16,68
4	13,72
5	11,28
10	4,24
15	1,60
20	0,95
25	0,23
30	0,08
40	0,012

Up-

Upon theſe Suppoſitions it appears, that at the height of 41 *miles*, the *Air* is ſo rarified, as to take up 3000 times the ſpace it occupies here, and at 53 *miles* high, it would be expanded above 30000 times; but 'tis probable that the utmoſt power of its ſpring cannot exert itſelf, to ſo great an extenſion, and that no part of the *Atmoſphere* reaches above 45 *miles* from the ſurface of the Earth.

This ſeems confirmed from the Obſervations of the *Crepuſculum*, which is obſerved commonly to begin and end when the Sun is about 18 degrees below the *Horizon*; for ſuppoſing the *Air* to reflect light from its moſt rarified parts, and that as long as the Sun illuminates any of its *Atoms*, they are viſible to an Eye not intercepted by the Curvity of the Earth, it will follow from *Fig.* 6. that the proportion of the height of the whole *Air*, to the Semidiameter of the Earth, is much about as 1 to 90, or as the exceſs of the *Secant* of about 8½ degrees to *Radius:* For if E be the Eye of the Obſerver, S a place where the Sun ſets at the end of twilight in E, and the Arch ECS, or TCA be found 18 degrees, the exceſs of the *Secant* of half thereof ECH, would be the height of the *Air*, viz. GH: But the Beam of the Sun ASH, and the viſual Ray EH do each of them ſuffer a Refraction of about 32 or 33 minutes, whereby being bent inwards from H towards G, the height of the *Air* need not be ſo great as if they went ſtreight; and having from the Angle ECS taken the double *Refraction* of the *Horizontal Ray*, the half of the remainder will be 8½ degrees *circiter*, whoſe *Secant* being 10 111 it follows that as 10000 to 111, ſo the Semidiameter of the Earth ſuppoſed 4000 miles, to 44, 4 miles; which will be the height of the whole *Air*, if the places E, S, whoſe viſible portions of the *Atmoſphere* ERZH, and SHKB juſt touch one the other, be 18 degrees aſunder.

At this height the *Air* is expanded into above 3000 times the ſpace it occupies here, and we have ſeen the Experience of condenſing it into the 60th Part of the ſame Space, ſo that it ſhould ſeem, that the *Air* is a Subſtance capable

of being compreſſed into the 1800ooth Part of the Space it would naturally take up, when free from preſſure: Now what texture or compoſition of Parts ſhall be capable of this great Expanſion and Contraction, ſeems a very hard Queſtion; and which, I ſuppoſe, is ſcarce ſufficiently accounted for, by the comparing it to Wool, Cotton, and the like ſpringy Bodies.

Hitherto I have only conſidered the *Air* and *Atmoſphere*, as one unaltered Body, as having conſtantly at the Earth's Surface the 800th part of the weight of Water, and being capable of Rarefaction and Condenſation *in infinitum*; neither of which *Hypotheſes* are rigidly true: for here in *England* 'tis notoriouſly known, that the weight of the whole *Atmoſphere* is various, being counterpoiſed ſometimes by 28½ inches of *Mercury*, and at other times by no leſs than 30¼, ſo that the under Parts being preſſed by about a 15th part leſs Weight, the *ſpecifick* gravity of the *Air* upon that Score will ſometimes be a 15th part lighter than another; Beſides Heat and Cold does very conſiderably dilate and contract the *Air*, and conſequently alter its gravity, to which add the Mixture of *Effluvia* or Steams riſing from almoſt all Bodies, which aſſimulating into the form of *Air* are kept ſuſpended therein, as Salts diſſolved in Liquors or Metals in corroding *Menſtrua*, which Bodies being all of them very much heavier than *Air*, their Particles by their admixture muſt needs increaſe the weight of that *Air* they lie incorporated withal, after the ſame manner as melted Salts do augment the ſpecifick gravity of Water. The other conſideration is, that the Rarefaction and Condenſation of the *Air* is not preciſely according to the Proportion here laid down; for tho' Experiment very nearly agrees thereto, as may be ſeen in the 58th Chapter of Mr. *Hook*'s *Micrographie*, yet are the Condenſations not poſſible beyond certain degrees; for being compreſſed into an 800th part of the Space it takes up here, its Conſiſtence would be equally denſe with that of Water, which yields not to any Force whatſoever, as hath been

been found by ſeveral Experiments tried here, and at *Florence*, by the *Academia del Cimento*. Nor can the Rarefaction proceed *in infinitum*; for ſuppoſing the Spring whereby it dilates it ſelf, occaſioned by what texture of Parts you pleaſe, yet muſt there be a determinate magnitude of the natural ſtate of each Particle, as we ſee it is in Wool, and the like, whoſe Bodies being compreſſable into a very ſmall Space, have yet a determinate Bulk which they cannot exceed, when freed from all manner of Preſſure.

Theſe Objections being true do diſturb the Geometrical accuracy of theſe Concluſions, drawn from the ſpecifick Gravity of the *Air* obſerved at any time; but the Method here ſhewn will compute by a like Calculation, the Heights of the *Quickſilver*, and the Rarefactions of the *Air* from any aſſigned Height of the *Barometer* at the Earth's Surface, and any ſpecifick Gravity given. As to the Condenſation and Rarefaction by Heat and Cold, and the various Mixture of Aqueous and other Vapours, theſe two Objections ſeem generally to compenſate each other; for when the *Air* is rarified by Heat, the Vapours are raiſed moſt copiouſly, ſo that tho' the *Air*, properly ſo called, be expanded and conſequently lighter, yet the *Interſtices* thereof being crouded full of Vapours of much heavier Matters, bulk for bulk the weight of the *Compoſitum* may continue much the ſame; at leaſt a moſt curious Experiment made by the ingenious Mr. *John Caſwell* of *Oxford* upon the top of *Snowdon-Hill* in *Caernarvanſhire*, ſeems to prove that the firſt Inches of *Mercary* have their portions of *Air* near enough to what I now determine; for the height of the Hill being 1240 Yards or very near it, he found the *Mercury* to have ſubſided to 25, 6 Inch. or 4 Inch. below the mean Altitude thereof at the Level of the Sea (which is a greater difference than has been found in any of our former Experiments,) and the Space anſwering to 4 Inch. by my Calculation ſhould be 1288 Yards; and it agrees as well with the Obſervations in the Appendix to Mr. *Paſcall*'s Book, *del' Equilibre des*

Liqueurs, made on the high Hill in *Auvergne*, call'd *le puy de Domme*. So that the Rarefaction and Vapours ſeem not to have altered conſiderably the Gravity of the under Parts of the *Air*; and much above the height where theſe Experiments were made, do few Vapours aſcend, and the Cold is ſuch that the Snow lies continually, ſo that for the more elevated Parts of the Sphere of *Air* there is much leſs reaſon to doubt.

But now we have had occaſion to mention the difference there is between the height of the *Mercury* at one time, from the height thereof at another, it may not be unacceptable to offer at ſome Reaſons for the ſaid Difference, which, at leaſt to my ſelf, ſeem to have ſome appearance of Truth; *firſt* then, 'tis undoubtedly demonſtrable, that the height of the Cylinder of *Mercury*, is equal to the weight of the whole incumbent *Air*, and conſequently that that whole is ſometimes a fifteenth more than at other times, which cannot otherwiſe be, but by the acceſs of new Matter when 'tis heavy, and its diminution when 'tis light; that *Hypotheſis* therefore that ſhews how the *Air* ſhall be increaſed or diminiſhed, in any particular Place, will give a reaſon for the greater and leſſer height of the *Mercury* in the *Baroſcope*: but to direct us in the choice of the ſeveral Cauſes, which may be aſſigned for the increaſe and decreaſe of the *Air*, 'twill not be unneceſſary to enumerate ſome of the principal Obſervations made upon the *Barometer*, moſt whereof are ſufficiently known already to all thoſe that are curious in theſe Matters.

The *firſt* is, that in calm Weather, when the *Air* is inclined to Rain, the *Mercury* is commonly low.

2. That in Serene good ſettled Weather the *Mercury* is generally high.

3. That upon very great Winds, tho' they be not accompanied with Rain, the *Mercury* ſinks loweſt of all, with relation to the Point of the Compaſs the Wind blows upon.

4. That *cæteris paribus* the greateſt heights of the *Mercury* are found upon Eaſterly and North-eaſterly Winds.

5. That in calm froſty Weather, the *Mercury* generally ſtands high.

6.

6. That after very great Storms of Wind, when the *Quickſilver* has been low, it generally riſes again very faſt.

7. That the more Northerly Places have greater Alterations of the *Baroſcope* than the more Southerly.

8. That within the *Tropicks* and near them, thoſe accounts we have had from others, and my own Obſervation at St. *Helena* make very little or no Variation of the height of the *Mercury* in all Weathers: Now that Theory that can well account for all theſe Appearances, will in all Probability approach nearer the true Cauſe of the *Barometers* Variations, than any thing hitherto offered; and ſuch an one I am bold to believe, is that which I here lay down, with Submiſſion to better Judgments.

I conceive that the principal Cauſe of the Riſe and Fall of the *Mercury*, is from the variable Winds, which are found in the *Temperate Zones*, and whoſe great unconſtancy here in *England* is moſt notorious: I ſhall not at preſent enquire into the Cauſe of its Uncertainty, but the Matter of Fact being moſt undoubted, the legitimate Conſequences thereof muſt be allowed me; let it proceed from what it will.

A Second Cauſe is the uncertain Exhalation and Precipitation of the Vapours, lodging in the *Air*, whereby it comes to be at one time much more crouded, than at another, and conſequently heavier; but this latter in a great meaſure depends upon the former. Now from theſe Principles, I ſhall endeavour to Explicate the ſeveral *Phænomena* of the *Barometer*, taking them in the ſame Order I laid them down.

1. *Why in calm Weather, the Air being inclined to Rain, the* Mercury *is commonly low?* I anſwer, that the *Mercury*'s being low, inclines it to Rain, for the *Air* being light, the Vapours are no longer ſupported thereby, being become ſpecifically heavier than the *Medium* wherein they floated; ſo that they deſcend towards the Earth, and in their fall meeting with other aqueous Particles, they incorporate together and form little Drops of Rain; but the *Mercury*'s being

ing at one time lower than at another, is the effect of two contrary Winds blowing *from* the place where the *Barometer* ſtands; whereby the *Air* of that place is carried both ways from it, and conſequently the incumbent Cylinder of *Air* is diminiſhed, and accordingly the *Mercury* ſinks; as for Inſtance, if in the *German Ocean* it ſhould blow a Gale of Weſterly Wind, and at the ſame time an Eaſterly Wind in the *Iriſh* Sea; or if in *France* it ſhould blow a Southerly Wind, and in *Scotland* a Northern; it muſt be granted me that that part of the *Atmoſphere* impendent over *England*, would thereby be exhauſted and attenuated, and the *Mercury* would ſubſide, and the Vapours which before floated in thoſe parts of the *Air* of equal Gravity with themſelves, would ſink to the Earth.

2. *Why in ſerene good ſettled Weather, the* Mercury *is generally high?* To this I anſwer, That the greater height of the *Barometer* is occaſioned by two contrary Winds blowing *towards* the place of Obſervation, whereby the *Air* of other places is brought thither and accumulated; ſo that the incumbent Cylinder of *Air* being increaſed both in height and weight, the *Mercury* preſſed thereby muſt needs riſe and ſtand high, as long as the Winds continue ſo to blow; and then the *Air* being ſpecifically heavier, the Vapours are better kept ſuſpended, ſo that they have no Inclination to precipitate and fall down in Drops, which is the reaſon of the ſerene and good Weather which attends the greater heights of the *Mercury*.

3. *Why upon very great Winds or Storms, though accompanied with no Rain, the* Mercury *ſinks loweſt of all, with relation to the point of the Compaſs upon which the Wind blows?* This is cauſed by the very rapid Motion of the *Air* in theſe Storms; for the Tract or Region of the Earth's Surface wherein theſe Winds rage, not extending all round the Globe, that ſtagnant Air which is left behind, as likewiſe that on the ſides, cannot come in ſo faſt as to ſupply the Evacuation made by ſo ſwift a Current, ſo that the *Air* muſt

muſt neceſſarily be attenuated when and where the ſaid Winds continue to blow, and that more or leſs according to their Violence; add to which that the *Horizontal* Motion of the *Air* being ſo quick as it is, may in all probability take off ſome part of the perpendicular Preſſure thereof: and the great Agitation of its Particles, is the reaſon why the Vapours are diſſipated and do not condenſe into Drops, ſo as to form Rain, otherwiſe the natural Conſequence of the *Air*'s Rarefaction.

4. *Why* cæteris paribus *the* Mercury *ſtands higheſt upon an Eaſterly or North-eaſterly Wind.* This happens becauſe that in the great *Atlantick Ocean* on this ſide the 35th degree of North Latitude, the Weſterly and South-Weſterly Winds, blow almoſt always *Trade*, ſo that whenever here the Wind comes up at Eaſt and North-Eaſt, 'tis ſure to be checked by a contrary Gale, as ſoon as it reaches the *Ocean*; wherefore according to what is made out in our ſecond Remark, the Air muſt needs be heaped over this *Iſland*; and conſequently the *Mercury* muſt ſtand high, as often as theſe Winds blow. This holds true in this Country, but is not a general Rule for others, where the Winds are under different Circumſtances: and I have ſometimes ſeen the *Mercury* here as low as 29 Inches, upon an Eaſterly Wind, but then it blew exceeding hard, and ſo comes to be accounted for by what was obſerved upon the 3d Remark.

5. *Why in calm and froſty Weather the* Mercury *generally ſtands high?* The Cauſe hereof is, as I conceive, that it ſeldom freezes but when the Winds come out of the Northern and North-Eaſtern Quarters, or at leaſt, unleſs thoſe Winds blow at no great diſtance off; for the Northern Parts of *Germany*, *Denmark*, *Sweden*, *Norway*, and all that tract from whence North-Eaſtern Winds come, are ſubject to almoſt continual Froſt all the Winter; and thereby the lower Air is very much condenſed, and in that State is brought hitherwards by thoſe Winds, and being accumulated by the Oppoſition of the Weſterly Wind blowing in the Ocean, the *Mercury* muſt

muſt needs be preſt to a more than ordinary height; and as a concurring Cauſe, the ſhrinking of the lower Parts of the *Air* into leſſer room by Cold, muſt needs cauſe a Deſcent of the upper Parts of the *Atmoſphere* to reduce the Cavity made by this Contraction to an *Æquilibrium*.

6. *Why after very great Storms of Wind, when the* Mercury *has been very low, it generally riſes again very faſt?* This I have frequently obſerved, and once found it riſen an Inch and half in leſs than ſix hours, after a long continued Storm of South-weſt Wind. This ſeems to be occaſioned by the ſudden acceſſion of new *Air* to ſupply the great Evacuation which ſuch continued Storms make thereof, in thoſe places where they happen (as in the third Remark) and by the Recoil of the *Air*, after the Force ceaſes that impell'd it; and the reaſon why the *Mercury* riſes ſo faſt, is becauſe the *Air* being very much rarified beyond its mean Denſity, the neighbouring *Air* runs in the more ſwiftly to bring it to an *Æquilibrium*, as we ſee Water runs the faſter for having a great Declivity.

7. *Why in more Northerly Places the Variations of the* Baroſcope *are greater than in the more Southerly?* The Truth of the Matter of Fact is proved from Obſervations made at *Clermont* and *Paris*, compared with others, made at *Stockholm*, as may be ſeen in the *Appendix* to Mr. *Paſcal*'s Book, before cited. The Reaſon I conjecture to be, that the more Northerly Parts have uſually greater Storms of Wind than the more Southerly, whereby the *Mercury* ſhould ſink lower, in that Extream; and then the Northerly Winds bringing the condenſed and ponderous *Air* from the Neighbourhood of the *Pole*, and that again being checked by a Southerly Wind, at no great diſtance, and ſo heaped, muſt of neceſſity make the *Mercury* in ſuch caſe ſtand higher in the other Extream.

8. And Laſtly, *Why near the* Equinoctial, *as at* Barbadoes *and St.* Helena, *there is very little or no Variation of the Height of the Barometer?* This Remark, above all others, confirms the *Hypotheſis* of the Variable Winds being the cauſe of theſe

theſe Variations of the Height of the *Mercury*, for in the Places above-named, there is always an eaſy Gale of Wind blowing nearly upon the ſame Point, *viz.* E. N. E. at *Barbadoes*, and E. S. E. at St. *Helena*; ſo that there being no contrary Currents of the *Air*, to exhauſt or accumulate it, the *Atmoſphere* continues much in the ſame State: However upon *Hurricanes*, the moſt violent of Storms, the *Mercury* has been obſerved very low; but this is but for once in two or three Years, and it ſoon recovers its ſettled ſtate of about 29½ Inches. I doubt not but the ſame thing is in the Eaſt Coaſt of *Africa* and in *India*, where the Monſoons or Winds are Trade for half the Year one way, and half the Year another; only 'tis probable, that there may ſomething worth noting happen, about the Times of the Change or Shifting of the Winds, which might be obtained if any body had the Curioſity to keep the *Barometer* at our Factories in *India*.

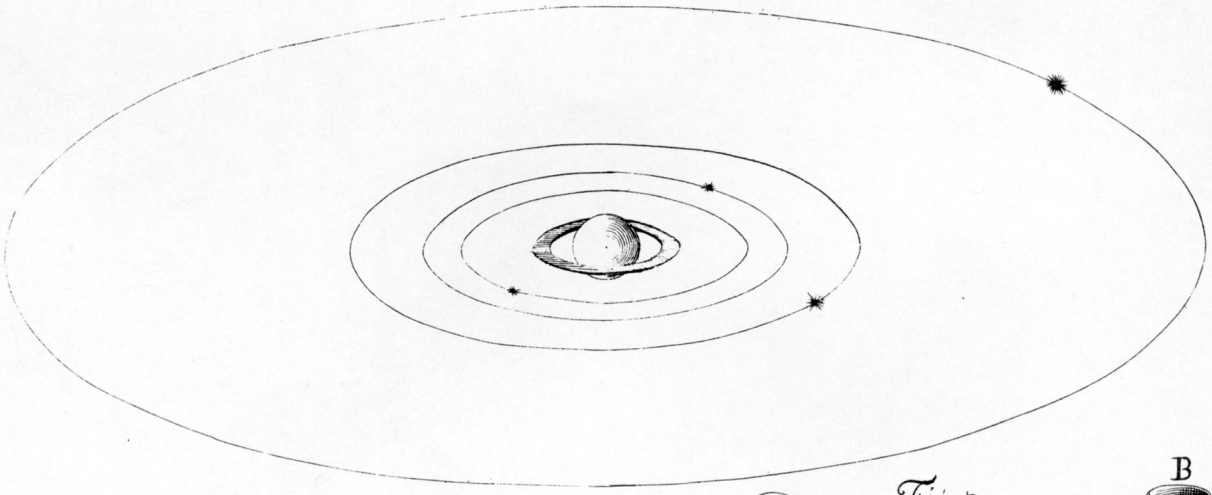
I doubt not but this Doctrine will find ſome Oppoſers, and that one principal Objection will be, That I ſuppoſe the *Air* ſometimes to move *from* thoſe Parts where it is already evacuated below the *Equilibrium*, and ſometimes again *towards* thoſe Parts, where it is condenſed and crouded above the mean ſtate, which may be thought contradictory to the Laws of *Statick*s and the Rules of the *Equilibrium* of Fluids. But thoſe that ſhall conſider how, when once an *Impetus* is given to a fluid Body, it is capable of mounting above its Level, and checking others that have a contrary Tendency to deſcend by their own Gravity, will no longer regard this as a material Obſtacle; but will rather conclude, that the great *Analogy* there is between the riſing and falling of the Water upon the *Flux* and *Reflux* of the *Sea*, and this of the accumulating and extenuating the *Air*, is a great Argument for the Truth of this *Hypotheſis*. For as the Sea, overagainſt the Coaſt of *Eſſex*, riſes and ſwells by the meeting of the two contrary Tides of *Flood*, whereof the one comes from the *S. W.* along the Channel of *England*, and the other from

the *North*; and on the contrary ſinks below its Level upon the retreat of the *Water* both ways, in the Tide of *Ebb*; ſo it is very probable, that the *Air* may *ebb* and *flow*, after the ſame manner; but by reaſon of the diverſity of Cauſes, whereby the *Air* may be ſet in moving, the times of theſe *Fluxes* and *Refluxes* thereof are purely caſual and not reducible to any Rule, as are the Motions of the Sea, depending wholly upon the regular Courſe of the *Moon*. The next *Tranſaction* ſhall give an Hiſtorical Relation of thoſe *Winds* which are found to have any thing of Conſtancy, and ſhall endeavour to aſſign the Cauſes thereof.

An Account of two Books, *(1.) A Free Enquiry into the vulgarly received Notion of Nature*, by the Honourable *R. Boyle*, Eſq;. Printed by *J. Taylor* at the *Globe* in St. *Paul*'s Church-Yard, *Anno* 1686. *8vo.*

'TIS not without reaſon, that the renowned Author of this Treatiſe wonders that none have written concerning *Nature* herſelf, and yet ſo many have ſo largely treated of the Works of *Nature*. But this will ſeem leſs ſtrange to him that conſiders for how many Ages the whole learned World has been devoted to the *Peripatetick* Principles of *Matter* and *Form*, and with how blind an Obedience the Doctrine of *Ariſtotle* hath been univerſally received and maintained: For the vulgar Notion of *Nature* concurring with the *Peripatetick*, having been generally admitted, all Men thought it unſafe to oppugn the Opinion of the Multitude, and at the ſame time to call in queſtion the Authority of thoſe reputed for Learning; ſubjecting their own Judgments, by a ſervile Reſignation unworthy the Name of a Philoſopher, to the Dogma's of others. This ſeems to be the chief, if not the only Cauſe of the Propagation

Orbitæ quatuor Interiorum Satellitum Saturni cum Ansæ omnium maxime diductæ conspiciuntur



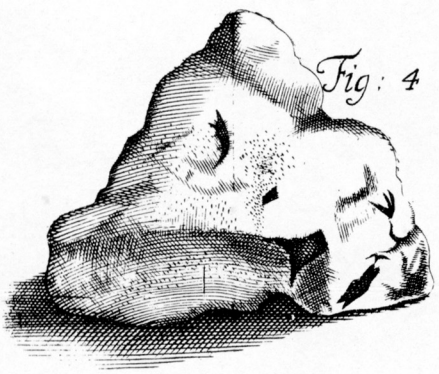


Fig: 4

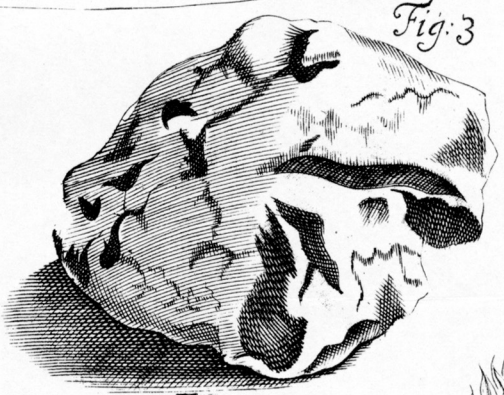


Fig: 3

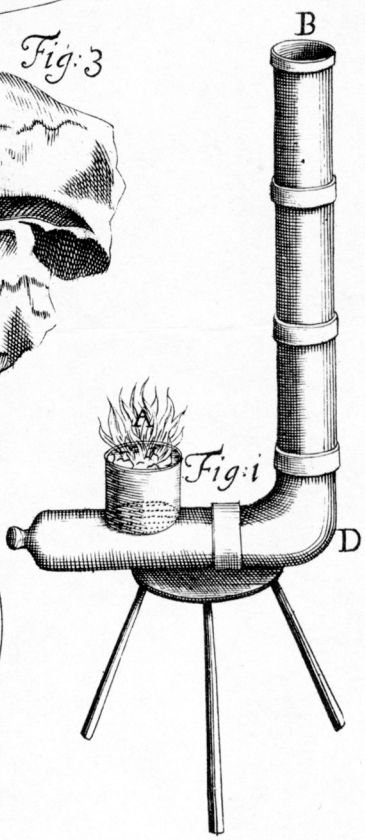


Fig: 1

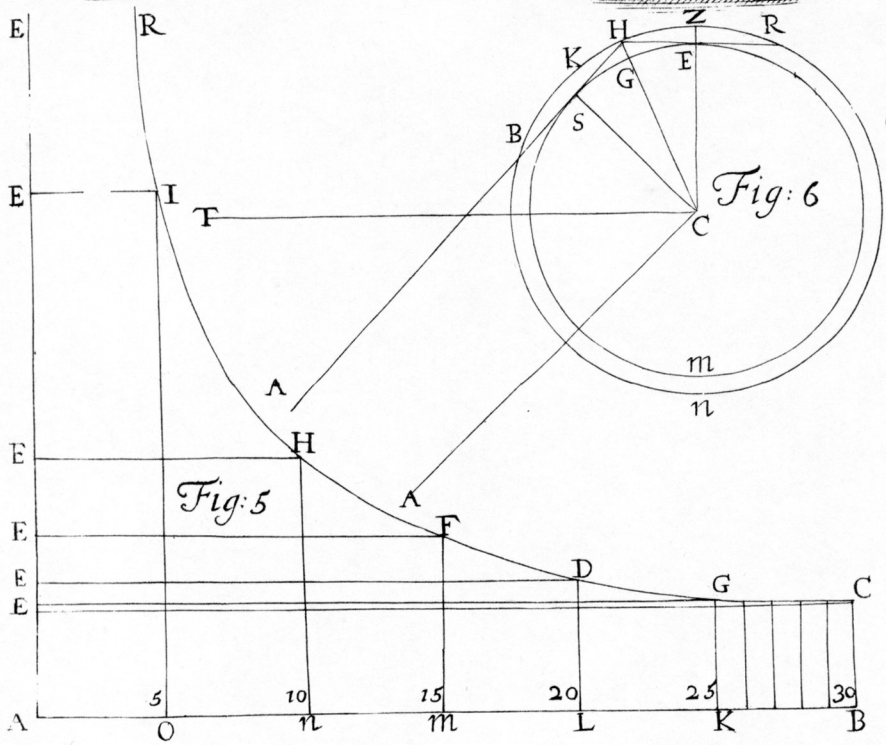


Fig: 5

Fig: 6