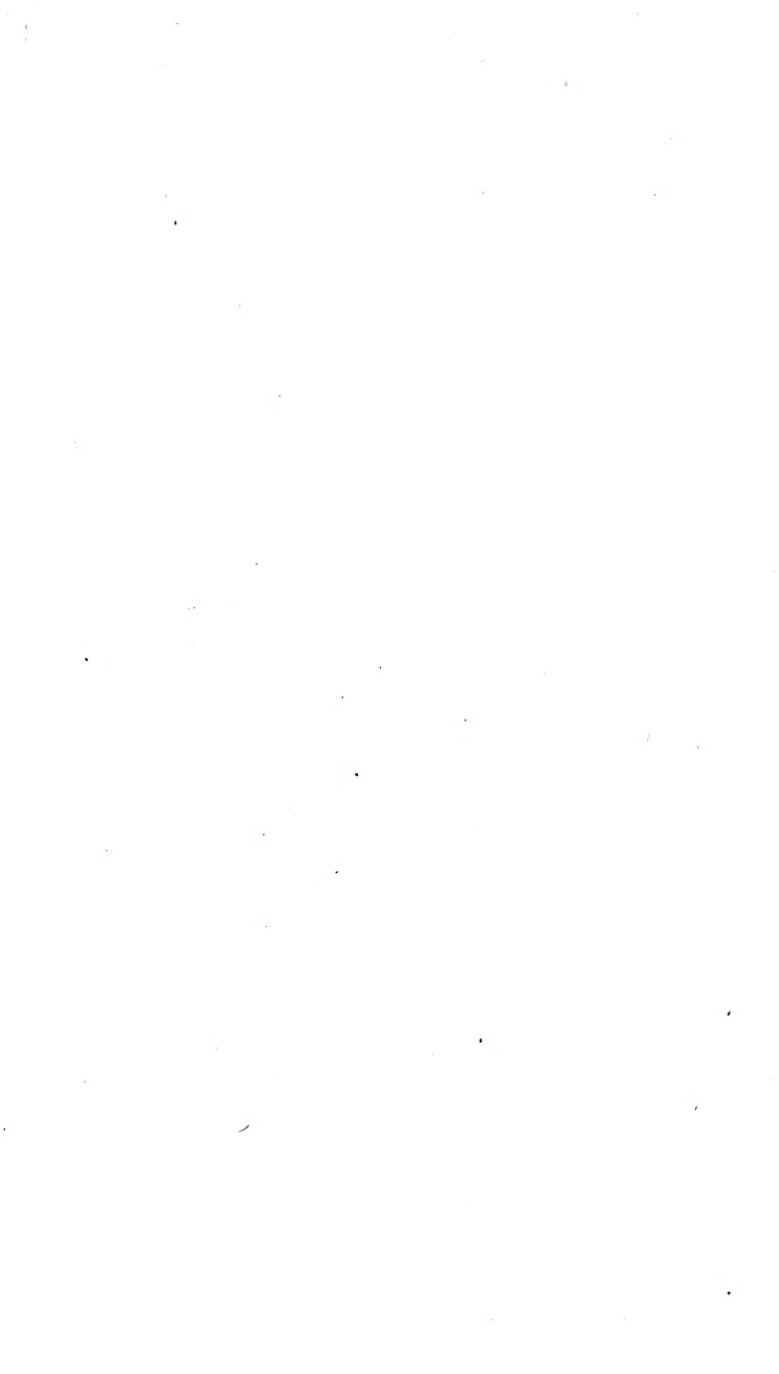
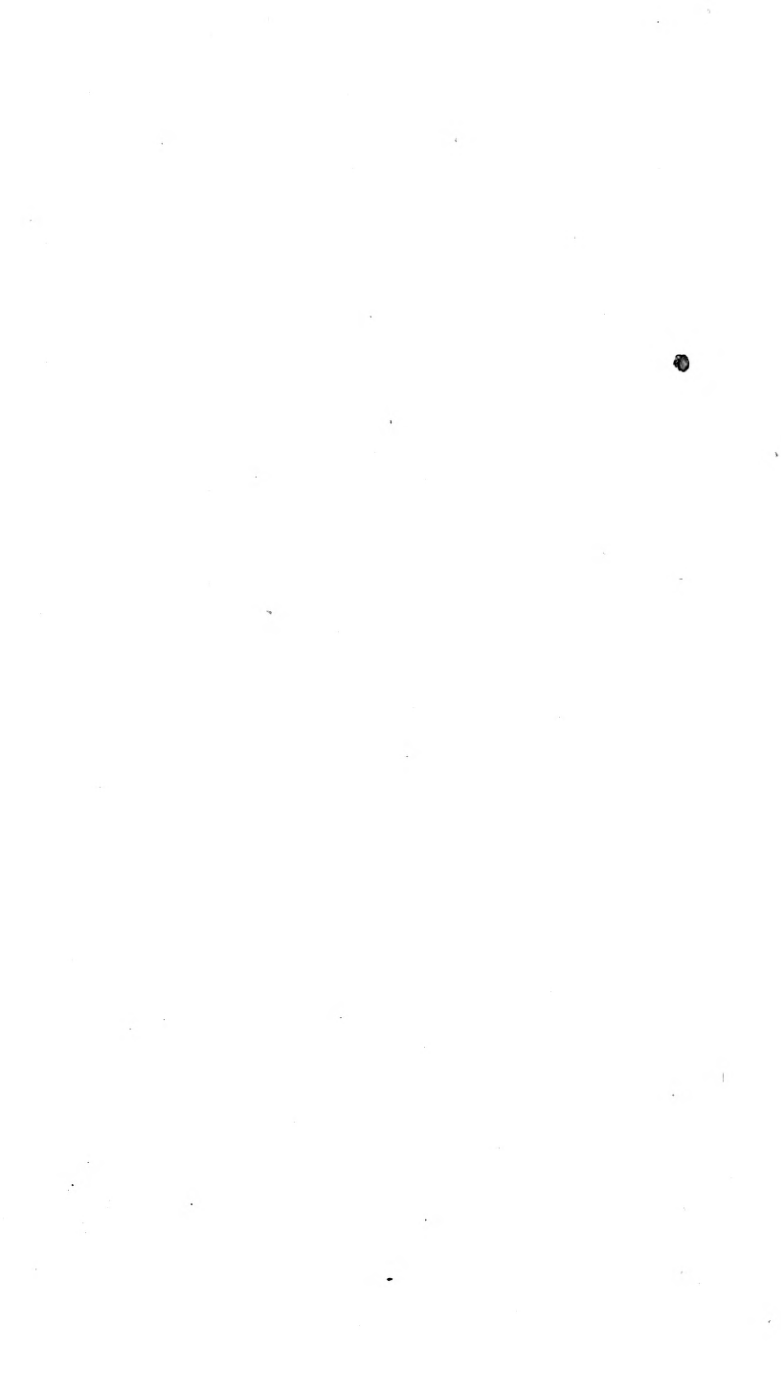






SCC
2251
v. 11





G L O R Y

O R

G R A V I T Y,

T H E

M E C H A N I C A L or Second
P A R T.

Taken from the MSS. of the late *John
Hutchinson*, Esq; mostly from loose
PAPERS.

V O L. XI.

L O N D O N:

Printed for JAMES HODGES, at the
Looking-Glass, facing *St. Magnus's-
Church*, on *London-Bridge*.

M D C C X L I X.





GLORY OF GRAVITY.

The Second or

Mechanical Part, &c.

AS the Body of Man was made to be a Partner to the Soul, and put it in a State of Probation to qualify it for a good or bad State hereafter; and the only End of creating all the Matter of this System, and of forming all the Powers in it, particularly in the Light, is for the Production and Support of the Bodies of Men while they are to subsist, and no longer: I say only, because no Mortal has yet shew'd either from Revelation or Reasoning, that God has any other Use for Matter, or the Motions or Powers in it. Indeed secondarily, as Man in a State of Qualification could

pervert the Design, it may be said that all the Powers in it were to try the Soul of each Man, whether it would regard God as the Creator of the Matter, and the Former of those Powers and Motions, or give up itself to Imagination, to the Senses of the Body, and view them as original Powers. At the Time of Writing the Scriptures, Jew and Gentle, both Sides knew that the Light, the material Glory, did almost every Thing in common Course; not only the great Operations, but from the greatest to the smallest; and as the Gentiles, the greatest Part of Mankind, had gone wrong, Part of the Scriptures were writ to set Men right in that Point. For Man was not only to ascribe Glory to the Original, the second Person, for his spiritual Rule, Redemption, &c. but also for what he performs by his Emblem: And as Glory is the Name of him who rules in the spiritual Sense, so Glory or the Gravitor, for there is no Action without an Agent, is the philosophical or physical Name of that Agent which rules in chief in inanimate Matter, in material animated Bodies, &c. And as those who pretend by their own Righteousness, or any other Way to save themselves, do what they can to dispossess Christ of his Glory, so those
 who

who set up any other Agents to perform the Operations of Light, or allow its Operations, but make it independent, do what they can to deprive us of the Idea of him, and to dispossess him of the Glory of creating and forming, and of the Operations of Light.

I have ransacked Antiquity to find the Truth in these Matters. I have not only shewed the Opinions of the antient Heathens and Philosophers in these Points, but shewed that they were all contested between them and the inspired Writers some thousand of Years ago; that there never was any Dispute antiently which were the Agents which performed the Work, but whether they were independent, or had other Powers in them which were incommunicable.

As many seem not willing to be determined by the Authority of the Scriptures in Points of Philosophy, but have framed Schemes out of their own Heads, or taken them from Moderns those who framed them; so contrary to Revelation, and without Pretence to Sensation or Perception, against which more than is necessary has been said: And as others pretend to depend upon their Senses, before I begin with them, we must examine how that Matter stands

As to what comes in by Sensation, that we may not be imposed upon by trusting to our Senses, we ought first to examine their Abilities and Uses, know in what they act fairly and impartially, in what they act otherwise, and why they do so; so what Things and Actions they forcibly impress Ideas of, and of what they leave faint Ideas, which serve only to be ready at call for forming Deductions. I think I may affirm in general, that our Senses were appointed Centinels to perceive and convey Ideas readily to us of such Parts, and so much of Matter, such Motions, such Actions and such Accidents, as are immediately necessary, beneficial, useful or convenient for us to perceive strongly, those for more distant Ends faintly, and stronger or weaker, as they are more or less so.

First, that any visible Part of Matter resists any other visible Part from entering the Space it occupies; that comparatively the constituent Parts of some Masses adhere strongly, some weakly, and some continue loose or unfixed: That by the Force of that fluid and generally invisible Agent we are tracing, the Atoms of any Part are liable to be divided, and many Sorts of them to be re-united, and each
Part,

Part, small or large, is liable to be forced relatively to carry its Space along with it, change Place with others, and each take new Neighbours. But whether all Matter is the same, what Sizes or Figures the Corpuscles of each different Sort of Bodies and Fluids have, what is between those Corpuscles, what makes some liable to adhere and some to remain loose, what that Agent is which makes them adhere, and how it impels one Part of Matter to divide those of another, or to displace and seize the Place of another, and so proceed, they have very feint or no Powers to shew.

Next, as to what concerns the Matter of and natural Motions or Accidents in our Bodies: 'Tis revealed, that the first of those Microcosms, as well as the inanimate Parts of this System was formed out of the loose Atoms of Matter at first created; and the Workmanship or Mechanism in the Disposition of the solid, fibrous, tubous, porous, and fluid Parts, and the Agents, are so contrived, that the known Pressure without, and a much greater unknown, are not at all perceived, so do not hurt the most slender Tube: And the Laws by which the fluid and solid Parts move, will, I hope e're long, appear even more wonderful than in those of the Parts

of the great Machine I am now treating of: But at present, if any of them be out of Order, we are very strongly affected; but if they be all in Order, and no Superfluity nor Defect, all goes on smoothly, and no Ideas, or very feint ones, are represented of them by our Senses; because it concerns us only immediately to know when there is any Superfluity, in order to remove it, or when there is any Defect, to supply it; and what we know of them farther must be mostly by Deduction. As to Things which act without our Bodies, we see the Motions and Actions of other Animals, but have feint or no Ideas of what moves them; we see the Bodies of Animals produced from Eggs, the several Parts of the several Sorts of Plants produced from small Seeds, in Succession of Time, varied in Shape, and by Addition of insensibly small Parts, increased in Dimension, &c. but cannot see how, or by what Means.

Where Matter acts upon Matter, I think I may say, there is a Necessity, and the Wisdom of the Creator and Modeller thereby appears; that the Agent, which shews us every thing 'tis intended we should see, and at the Time 'tis intended we should see them, should be every where, and act
in

in every Place between us and the Things 'tis intended we should see, where its Motion is not interrupted or diverted by Solidity; and that that which re-acts from each, that interrupts that Motion to our Eyes, should be invisible itself, or else we should see nothing but that Agent; and as 'tis of Use to us to see the Things, and not that which shews them, so we have strong Ideas of the Body at rest or moved which interrupts the Light, and but feint or no Ideas of the Light, or how it moves; and it is also necessary, that the Agent which makes us hear every Thing we should hear, should be present where any Thing is to be heard, and between that and us, and that it should be invisible; otherwise we could not see for it; and generally make no Noise, otherwise we should hear nothing for it; so for that which makes us smell, &c. And 'tis also necessary that the Agent which supports and moves every thing should be present in every Place where there is any thing to be supported or moved: And 'tis necessary that that Agent should be of such a Constitution, and its Force and Directions so contrived and apply'd, that it should not only in general, but in particular, serve for supporting every Thing, or Part, at the Time it

is to be supported; and for moving every Thing at the Time, in the Directions, and in the Manner it is to be moved, the Parts of itself, of all other inanimate Matter, Vegetables and Animals, because two or more material Agents cannot act at once in the same Place; and because if there were several such Agents, each to act upon different Sorts of Matter, or Things, so near in Place and Time as there is a Necessity of Sorts, or Things, being acted upon, those Agents and their Motions would continually interfere with one another: And 'tis necessary that this Agent should, in its ordinary Course of acting, not only be invisible to the Eye, but imperceptible to our other Senses; otherwise we should see, feel, or, &c. only the Supporter or Mover, and not the Things supported or moved. And if the Actions of that Agent were perceptible by any of our Senses, the Ideas of those Actions would be continually pressing in upon us, and disturb those Ideas which are of more Use, or more immediately necessary to us, as Thunder, Storms of Wind, &c. do.

So we have distinct, commensurate Ideas impell'd upon us of our Motion from one Part of this Globe and those Things which immediately concern us,
and

and of the Motion of those Bodies or Masses of Matter which we have Use for, or are benefited by; but we have no distinct Ideas of the Motion of this Globe, or of any Compressure of, or of any Resistance in this Fluid, except our Bodies be moved with great Velocity; or of the Motions, or Divisions, or Adhesions of the Parts of the Firmament, in which We, those Things, and this Globe, are supported, and by which we and they move. We see that the Atoms of other Bodies and of our own adhere, some strongly, and we find, that each weighs some less, some more. As that which makes us see Objects does not itself appear, so that which makes the Atoms of Things adhere, or weigh, does not make us sensible that it compresses and keep the Atoms together, or that itself presses, or weighs; because any such Perception would continually disturb us, and because it does not immediately concern us, to know them; and chiefly because, by knowing its Compressure, Weight, Resistance, Motion, &c. we cannot alter them: So when a Ship or Body is supported by the Water, and driven by the Current, or Wind, if we be in the Ship, we cannot perceive whether the Ship removes from other Objects, or they from it;

it; if we be out of the Ship, we perceive the Motion of the Ship or Body; but in neither Case but little how the Parts of the Water, which supports, and the Parts of the Water or Wind, which drives, the Ship or Body, shift Places. Though the Parts of either of them are much more perceptible than the Parts of the Firmament, which act in chief in the ordinary Course of Action, because 'tis of little or no immediate Use to the most of us to know: And the farther any Body is removed from us, we see it under a smaller Angle, which gives us a very unjust Idea of the Sizes of the Globes in this System, and of the Stars. Our Eyes are framed to give us Computations nearly true of such Distances as are immediately necessary for us to know, but very uncertain ones of greater, or of very great Distances; and I have shewed, Glasses do not ascertain them; so are our Ears for Sounds; And our Senses have still more uncertain and fainter Ideas about the Agent which moves the Planets, and more especially of the Motions of the Parts of the Fluid, in which, and I think I may safely say, by which, they are supported and moved. For the Ideas of Bodies in Motion, and of their Motions, go together; so where the Bodies are scarce perceptible, their
Motions

Motions are less so, and the Agent which moves them is likely to be still much less perceptible. Though the Parts of this Fluid, in Expansion, and its Consequence, Compression, make us see, hear, smell, taste, feel, move, &c. and perform every Action upon all the Fluids and Solids in this System, they, or their Manner of acting in their common Course, are hardly to be perceived.

As *Moses* says, *Gen.* i. 6. And the *Aleim* said, let there be an Expansion—— and let it divide—— so the *Aleim* made the Expansion, and divided—— so the *Aleim* called the Expansion the *Names*. Hence the Substance of these are spoke of as the Essence of the *Aleim*, and the Actions of these, as the Actions of them, and *vice versa*. So *Paul*, *Acts* xvii. 28. *For in him we live, move, and have our Being*; thus the Light expands, so *Jehovah*, *Isaiab* xlii. 5. xliv. 24. expands; thus Light is the Gravitator, so *Jehovah* כבד Gravitator.

These Agents, the Powers in them, and their Actions, are likened to them, their Power and Actions in another View, mentioned *Ecclus.* xvi. 21. *It is a Tempest which no Man can see, for the most parts of his Works are hid.* Ver. 26. *The Works of the Lord are done in Judgment, from the*
Begin-

Beginning, and from the Time he made them; he disposed the Parts thereof; he garnisheth his Works for ever; and in his Hand are the chief of them unto all Generations. They neither labour, nor are weary, nor cease from their Works; none of them hindereth another, and they shall never disobey his Word.

And I think, with Submission, I may say, God has chosen the smallest to Appearance, and in our cursory Judgments, the most contemptible Means to effect the greatest Ends, and which bring those Ends about almost imperceptibly, not only in the inanimate Parts of the Creation, but also in the Vegetable and Animal; perhaps that we should not assign the Actions to the Agents, or Means employ'd; perhaps to humble our Pride; perhaps to quicken our Application, and upon the Discovery or Contemplation thereof, to reward us with higher Ideas of his Wisdom, Power and Goodness: And I think I may add, that God has in a Degree suited to our State of Trial, limited us from seeing, or himself from shewing his great Works, and thereby his Power and other Attributes, without our diligent Search, that we might not continually, against our Wills, be forced or frightened into our Duty, but drawn by the Cords of a Man.

And

And if God has created, and so formed and disposed the Parts of Matter, which may be seen, perceived or understood, and made them the Means that they may act upon others, and perform the Operations to be performed in Nature, his Wisdom will be more evident to our Capacity, than if he exerted his immediate Power upon each Part, or acted upon each by his immediate Power continually, and his Power will not be diminished thereby: And as the Knowledge of these Things doth not sufficiently arise from immediate Ideas impressed by our outward Senses, we must try to view Matter with other Eyes, and in another Light, in order chiefly to discover what material Darknes and Light are, how Light is produced, what they do, &c. because neither of them, nor any other Matter, can give any clear Ideas of them, or of their Actions, by any of our outward Senses.

Brutes have no other Conception, but by material Impressions upon the Parts of their Bodies designed for those Uses, and the Body of Man perceives only by his Senses, and thence arise the first Ideas of Matter: But Man reasons of Powers in an Agent, without any compleat Idea of the Agent, of the Accidents which can befall
Mat-

Matter after the Ideas are lost by the Greatness of the Body or Smallness of the Parts, or after the Bodies are out of the Reach of our Senses by Distance, or inclosed within other Bodies, of Animals, the Globes, or, &c. which is a Proof there is an Agent in Man, that sometimes uses not, nor needs visible Objects for present Ideas: But I hope I need not go about to prove, that we have in each of us a latent Power which is of a manly Principle, doth not much regard or consider the Ideas from outward Objects which are strongly impressed upon our outward Senses, and represent Things which immediately concern us, to supply the Necessities of our Bodies, but is designed to be employ'd sometimes upon more noble Objects, often to more noble Ends; which can by Contemplation, serious Application, and regular Deductions from the gentle Ideas we have of Matter and Motions, which do not much affect our outward Senses, frame comparative Ideas, and make us understand so far as is necessary, or in sufficient Degree, what God has revealed to us about Matter and Motion, discover him and his Attributes by those Works, particularly in those great Actions upon which our very Beings every Moment depend, which Men seldom

dom regard or consider, and in performing of which they have no Share.

Pardon the Digression. If a Man for Diversion by Legerdemain move Bodies quicker than our Eyes are used to trace Things, and pretend to shew and make the Mob believe that by hard Words and hidden Powers, some of those Bodies pervade and pass thro' Solids, become more or fewer in Number, are metamorphos'd out of one Sort into another, &c. though each remain the same, and of the same Magnitude: Does any one, present, who can and dare use his Reason, conclude it must be so? No, he compares the other constant Observations he hath made, with what appears to his Senses, observes him more narrowly and detects the Fraud, or declares his Senses impos'd upon in those Particulars, and their Evidence to be false, and determines that the Bodies were shifted through Fluids, some taken away, some added, some changed for others by Means and in a Manner which his Senses did not perceive.

If God for the wise Ends aforementioned, employs an Order of the smallest Atoms or Bodies in Form of a Fluid, as Means to move other Fluids, solid Masses or Globes, which by the Smallness of
each

each of their Dimensions, Figure, Fluidity, or Swiftneſs of their Motion, act in ſuch Manner that they evade our Senſes; and thoſe who pretend to deſcribe the Means and Manner of the Motions of thoſe other Fluids, ſolid Maſſes, or Orbs, be ignorant of, or hide the true Means or Manner, and ſay that thoſe Fluids, ſolid Maſſes or Orbs, are moved by Powers communicated from an Agent after its Action is ceaſed, by Laws not revealed, by Powers without Means to execute thoſe Actions, as has been ſufficiently hinted already; and ſtrive to dazzle the Eyes both of our Senſe and Reason with falſe Lights and falſe Evidence, and repreſent even Light itſelf in various and falſe Colours, that we may not ſee their Tricks and dark Practices, as Jugglers always do: Shall we depend upon our Senſes or their Words, as the Mob does, and conclude that the Author of Nature cannot uſe Means which can eſcape our Senſes, and that theſe Motions of the Globes, &c. muſt be performed by hard Words, and after an impoſſible Manner? Shall we let them treat us like Mob, and ſhall we act ſo? Shall we not exert that noble Principle in us, make Uſe of our Reason, compare our other conſtant Obſervations, conclude theſe Jugglers im-
poſe

pose upon us, look for better Information, and by Means thereof endeavour to shew how those Motions are performed. Let us try what we can discover thereby.

I borrowed this and the next Paragraph, inserted in the second Part of *M. P.* p. 52. I must repeat them. By the Power of God, the Matter of the Heavens and the Earth was created and exists; and by what I can gather from Scripture and Observations, in an immense, though determinate Number of Unites, and that each of them exists after a Manner we call Solidity, whereby each Unite is possessed of its Part of Quantity or Space described by its Figure, and limited by its Demension or Extent, and thereby is impervious and inflexible; has no other Qualities, Virtues or Powers, nor no Inclinations, neither external nor internal, appurtenant, infused or annexed to it, nor issuing out of it, but is wholly passive, and liable to external Accidents, such as resting upon one another, being moved by one another, and being resisted by one another, and being rubb'd against one another in passing by one another, adhering to one another, and being dissolved, or divided from one another, and changing Places with one another.

Those Unites adhering in certain large Masses, in certain Forms, are called Solids by certain Names, as the Earth, the Moon, &c. and the Parts of the Earth, as Stone, Gold, Silver, &c. Those which do not adhere, or but seldom save only in very small Masses or Grains, are called Fluids, and are of several distinct Species, as Water, Air, &c. And Unites dispersed in them, which when collected, form Vegetables and Animals. Every Mass when formed, and every Mass now, has a certain Number of those Unites or Parts in it, and the several Parts of each Species of Fluids have the rest; each Species of Solids, and each Species of Fluids hath its determinate Number, and there is the same Number in all now, as was created.

Our Idea of a Body at Rest, arises from the Resistance it gives to some of our Senses by the Parts of our Body, or by the Medium which touches it and some of them, and is in Proportion to the Dimension of its Surface, which by resisting, is perceived by some of our outward Senses with Allowance for the Diminution, which Distance makes or seems to make.

Any Body which is so small as to lodge in, or pass the Interstices, between the solid Parts which compose the Organs of

our

our Senses, or shelters itself between those of other Solids or Fluids, or is as small as the Parts of the Medium by which we see, cannot be perceived.

One of those Unites is so small, that it is not to be perceived by any of our outward Senses, as an invisible Indivisible; therefore we can have no Idea of one of those Unites from any of them.

If we can have no Perception nor Idea of one of those Unites from our outward Senses, we can have no Idea of the Manner in which it exists, nor no compounded Idea of the Unite with its Accidents from them.

But Numbers of those Unites adhering in Masses, or adjoining in Fluids, are perceived by some of our outward Senses; those adhering in Masses, or which form gross Fluids at rest, resist, and form distinct Ideas; those which form the finest Fluid, even those which pervade the Pores of the hardest Metal, and the Space they enjoy is termed a *Vacuum*, when put into Motion, are to be perceived by our outward Senses, nay will divide the Parts of the Organs by which we perceive; which by Comparison proves the Existence of those Unites, the Manner how they exist, and their Accidents. This is the highest, nay

last Degree of Sensation here; and from this, the Idea of the Sufferings of those who refuse the Evidence offered by the Idea conveyed emblematically by the *Names* is taken; and if this were not sufficient Evidence, we see those smallest Parts in Motion can divide the Atoms or Parts of those Solids which are the hardest, or have what is called the greatest Degrees of Adhesion.

So if the Parts which compose a Mass or a gross Fluid, by resisting and refusing to admit other Bodies into the Space they enjoy, discover Solidity, or if a Mass, Grain, or Fluid, suppose even of Grains of the finest Fluid, which will not pass the Pores of Glass or Metal, and so are capable of being inclosed or confined, by being themselves resisted by a Series of other Matter, which resists, or refuse to let them yield their Places, and take new ones, and they thereby resist, or refuse to give their Places, and take new ones, they prove there are Unites which compose that Mass, or that Fluid, which exist, and are solid; and if they are solid, they will be liable to the Accidents aforesaid.

Whether the Matter contained in each Unite be the same, we cannot perceive, nor cannot conceive how there can be any

any Degrees of Solidity or Difference in two solid Unites, each of the same Figure or Dimension; or in Solidity, between two of different Figures or Dimensions.

But we can conceive, and comparatively perceive, that the several Sorts of Masses, and the several Sorts of Fluids, each of which we call by a different Name, may each be constituted of Unites, each Unite of each Sort of such a particular Figure, or particular Dimension, as may make each Sort of Mass or Fluid differently, or more or less liable to some one or more of the aforesaid Accidents, which every Sort of Matter is liable to; that is, that the solid Atoms of each Species of Fluids or Solids are each of a peculiar Size and Figure, and that from the Difference in Size and Figure, they have their several Capacities, of being kept loose or fluid, of adhering or being solid, of their different Degrees of Fluidity, Hardness, Softness, Ductility, Flexibility, Frangibility, &c. and that the Unites of the same Sort, by being differently ranged or disposed, or by adhering one by one, or adhering first into small Masses, and those small Masses afterwards adhering and forming large ones; or in Fluids, by each Unite continuing loose, or by their adhering in small Masses,

Ec. may make the same Mass, or the same Fluid, liable to different Degrees of the said Accidents, by which, and such like Differences, each Sort is distinguished, and each Sort answer their respective Ends.

And we find those Unites are formed so, or are so solid, that those which compose those Sorts of Masses or Fluids we make most Experiments upon, and are capable of being separated and recollected, wear not by Friction, but preserve their Figures or Dimensions, which enable each Sort of them to be reformed into the same Species of Masses or Fluids, which gives a reasonable Proof, that the rest of the Unites, which constitute other Sorts of Masses or Fluids, retain theirs.

I must put a Case which I have no Idea of by Sensation, and so to me is Nonsense, in order to be understood. If one could have an Idea that empty Spaces could negatively subsist between Parts of the Surfaces of the Unites of the smallest Sort, and between Parts of their Surfaces, and Parts of those of larger Sorts, when they adhere in Masses, where though ever so much compressed, we cannot conceive how they can touch in every Point; then the smaller the Masses composed of the Unites

Unites are divided, and the more the Parts of the Masses are moved, in being divided in progressive Motion, or in the Precedence of the larger, and Recedence of the smaller in any determinate or limited Place, one would have a negative Idea that there would be less Matter and the more empty Space in that Place: Or that the same Matter would fill or possess the same Place, and leave more empty Space between its Parts: and so extend beyond the Dimension of the Place in some inconceivably small Proportion.

But if the smallest Sort of Unites come so near our Definition of a Point, that in an infinite Compressure they touch in every Point, not only of one another, but of all other Sorts: Or if Matter be possessed of all the Space in this System, the Parts of a Mass or Body when divided, take not up a larger Space than the Body, when the Parts were adhering, took up; and the Intervals, be they small or great, at least those larger than one of the smallest Sort of Unites, must be filled with other Matter; and what they call a *Vacuum*, must have as much Matter in its Dimension, as if the same Dimension were filled with a Diamond, and its Pores with Atoms of the smallest Order. This is what the Scrip-

tures call full; and as Sense can have no Share in the Dispute, every one that will imagine, may imagine which pleases him.

And since Solidity and Fluidity, in Compositions of Unites, are but Accidents, but comparative and temporary Terms, and that of those termed Solids, some are more solid than others, and that of those termed Fluids, some are more fluid than others; and that most, or all of the Sorts of Solids, can by the Motion and Intervention of the Parts of some of the Sorts of Fluids, become for the Time fluid, and upon the Cession of that Motion and Retreat of the Parts of the Fluid, return to be Solids; and that most Sorts of the Fluids, by the Motion and Intervention of some of the Parts of the other Sorts of Fluids, can become more fluid; and upon the Cession of that Motion and Intervention to a certain Degree, will become solid, and that the Parts of the most fluid Fluid, are more fluid, as they are more divided by some of its Parts in Action or Motion, and become grosser or more united into larger Masses, as they are less acted upon or divided, by the other smaller Parts, and if that Motion ceased, perhaps would be solid: It follows, that the Masses or Unites of the most fluid Fluid, are possessed

filled of all the Space or Interstices between the Unites of all other Solids and Fluids, and that they in Motion can have Egress and Regress through between them, without separating the Unites, or altering the Figures of the Solids, and without changing the common Degree of Fluidity in each Sort of Fluids, and as that Motion is increased, can widen the Interstices, divide the Parts, &c. we must next enquire into the Cause of these Motions.

We have proved from Scripture (and as I was not then there, nor has any other given any other Account, it must stand) that this System is composed of created Atoms; that it is round and full from the Center at the Sun to the Circumference, and bounded there.

That the Atoms which compose the Heavens, *The Names*, FIRE, LIGHT and SPIRIT, are each of the same solid Substance, and of the same Figures and Sizes.

That these Atoms are the smallest, and from thence and from their Figures have the least Capacity to cleave to one another, or be concreted; but as it appears they in slow Motion and great Compressure are alternately formed into small Grains, and as the Atoms of any Size or Figure in Masses cannot form Pores that the same Sorts of
Atoms

Atoms can pervade, so these Atoms being the smallest, cannot form Masses with Pores, that the same Size of Atoms can pervade; so while the Atoms in the Grains adhere, the Grains must be considered as Solids; and as the Unites have the greatest Capacity to be kept fluid, so each to pass between the Surfaces of others which are loose, or between the Surfaces of the Grains formed of them.

That those Atoms in the Action of Fire have the Capacity of splitting the Grains of those which adhere, and putting them into the Condition of Fire, and of sending them out in Light, and of pervading the Pores, and dissolving the Adhesion of the Atoms of all other Solids.

That those in Light have the Capacity of pervading the Pores of all other Fluids or Solids, except those Pores in the Grains composed of their own Species of Atoms, (if they can be proved to be Pores) so are capable of keeping Fluids fluid, of expanding the Parts of Fluids or Solids, of being pressed upon, and pressing upon every Part of the Surfaces of the Atoms of Solids or Fluids, except upon the Points where those Atoms which compose the Fluids or Solids touch each other.

That

That the Grains composed of these Atoms, and called *Spirit*, are so large, as not to enter the Pores of other Fluids or Solids, but are capable of being pressed against their Surfaces or Faces; each of reaching over a Pore, and pressing upon several Atoms at once; so jointly of preventing the Atoms of other Fluids from exhaling too much, and the Atoms in the Surfaces of Solids from mouldering; so of compressing the Surfaces of Vegetables and Animals; so of being pushed, pushing upon the Surfaces of those of its own Fluid, and of those of other Fluids and Solids, which I have called Impulse.

We suppose, that at first the *Aleim* formed, put and kept the *Spirit* and *Light* in Motion, by their immediate Power; and that during the Formation of the Machine, *The Names*, this Fluid was called, the Firmament, the Expansion; and after it had separated the Waters, and formed the Earth, they called it, *The Names*; and they by those under that Denomination carried on, and finished the Formation.

Philo, p. 416. " Since it is created, and one, it is very likely that the particular Sorts of elementary Substances are subject to the Heavenly Agents, whose Effects they are, as is the Case in Bodies united together,

together, that they contribute to each others Continuity. P. 507. "The rest are void, or empty, by their own Nature, which if they have any Thing solid in them, owe it to their being bound together by the divine Word ; for it is this by which every Thing is chained, or as it were glued together. A live Coal is Fire in earthy Matter, which by a Sort of Spiritual Habit (or Condition) pervades even to the Extremities of the Universe." *Philo de mundi Opif.* p. 9. "And let them be assured of it, and for the future fetch it from the Will of the heavenly Father, as oft as he pleases, without waiting for the Good-Will of the Heavens, whom he has given some, but not an absolute Power to ; for He, like the Charioteer, holds the Reins, or the Pilot the Helm, and directs every Thing, without any Assistance, in its right and streight Course. P. 1152. This Law extending from the Center to the Circumference, and back again from the Extremities to the Middle ; Nature runs as were the never ending Course of the Circus, joining and binding together all the Parts of the World ; for the Father himself who begat made this, the uninterrupted Chain of the Universe." P. 1154. "God hath made the *Habit*, the most strong Bond

Bond of Stones, of Trees, and this (Habit) is the Spirit, which turns back into itself. It begins at the central Parts, and tends outwards to the Extremes, and when it is got there, it turns back again, till it come to the same Place it set out from, and this is the circular Course of the *Habit* ;” So *Job* xxvi. 6. *Extending the Covering upon the Abyfs of fluid Matter and hanging the Earth upon בלימה the Constriction.*

And we suppose that *Jehovah Aleim*, by their immediate Power, put such a Quantity of Atoms in the Action of Fire at the Sun, as would divide those of the Spirit driving in : Such a Quantity of Atoms in the Condition of Light irradiating in streight Lines from the Center at the Sun to the Circumference ; and such a Quantity of Grains or Spirit formed such Atoms, concreted or adhering at the Circumference, and irradiating from thence into the Fire at the Sun, that as the last two, the Light and the Spirit, pass opposite Ways, so those of each Denomination, between those of the opposite Denomination, each strives to press those on each Side sideway, and that makes the whole form an Expansion ; that they thus set forward, continued those Actions, those Motions, and those Effects.

That

That these Atoms and Grains which successively and alternately compose this Fluid, *The Names*, after it was so set forward, became a self-moving Machine, mechanically active; and that the Matter of all other Fluids and Solids are inactive and passive, and subject to *The Names*.

That this Fluid keeps itself in a perpetual Irradiation, or Circulation, at, to, and from the Orb of the Sun, and to and from the Limits, or Circumference.

That the Spirit, which is composed of Grains, and each of them of concreted Atoms of Light, is continually pressed and driven from the Circumference to the thinnest Part of the Fluid, to the Fire at the Sun, melted or divided into Atoms, and pressed out in Light, to the Circumference, to be reformed into Spirit, to support the Circulation.

This Irradiation, which is visible through Telescopes, beyond the Surface and Atmosphere of the Earth, by its Vibration, cannot be perceived here so plainly as there, because only the Light irradiates against the Surface of this Orb next the Sun, and the Spirit does not return from the Circumference regularly, or in straight Lines to the Sun, but returns to the opposite Side of the Earth; and the Light cannot

not meet, and pass through the Spirit ; nor is it much perceived in the Disk of the Earth Morning and Evening, because of the Motion of the Fluid, which drives and is driven by the Earth. But every thing here is acted upon by that Compression which arises from the Irradiation. The Difference in Day and Night, Seasons varying in the Condition of the Fluid, and in its Effects upon other Things, as appointed.

The Light which strikes against this and the other moving Orbs in going out, and the Spirit which strikes against them in going inward, and the Spirit which pursues those Orbs in Motion, so are diverted from the Lines of Irradiation, as they are successively left behind, reassume, or are carried on in their respective Courses.

That these three, *Fire, Light, and Spirit* were not only called *The Names* by the *Aleim*, but were appointed Rulers, Substitutes, and Representatives of their Personality, mechanically to act upon, and govern the other Matter, inanimate and animate, in this System, as their Principals, whose Names they bear, do in a higher Sense, and each to act the Part of him it represented, though the Light was appointed chief Ruler here,

as

as I have shewed at large in the second Part of *M. P.*

In Points where the Evidence is understood, Propositions about those Points are easily understood; in Points where the Evidence has been neglected, and is not understood by others, 'tis difficult for any one who understands them to reduce them to Propositions which will be understood by others, 'till the Evidence be first settled; yet nothing will please now but in that way of Writing.

In such a complicated Affair as Philosophy, or Religion, Propositions are safer drawn from the Things stated, than they can be laid down before they are stated. Propositions about the Actions of this Machine, where several Agents act, where several Patients are differently modified, so as the Agency of the Agents will be varied, though true in gross, will not be made fully, determinately expressive, without a vast Number of Limitations or Exceptions to each.

That we may not differ about Words, the Scriptures have furnished us with a proper expressive Name for every Agent in each of its Action. They call the Matter of *The Names* in Grains, which cannot pervade Pores, רוח *Spirit*; that Matter,
in

in Atoms, or which can pervade Pores, when it gives Sensation to the Eyes, is called אור *Light*; when the same Matter expands, 'tis called רקייע the *Expander*; when it compresses, and so gravitates, 'tis called כבד the *Gravitor*; and so other Names for other Actions, to distinguish what the Matter is.

I call the Grains of this Fluid, *Spirit*, whether they be irradiating from the Circumference, or in that Motion we call Wind, or pushing, or only compressing upon the Surfaces of Bodies or Fluids, or mixed in the Atmospheres. *Job. xli. 7. Close as a Seal presseth; one approaches the other, and רוח the Spirit cannot come in between them.*

I call the separate Atoms of this Fluid, *Light*, whether they be irradiating from the Sun or Fire, or in that Condition or Motion which gives the Sensation of seeing, which can pervade the Pores of solid Bodies in streight Rays, as through Glafs, Diamonds &c. in Form of Light, or through the Pores of other Bodies obliquely, without giving that Sensation to the Eyes, or mixed in the dark Atmosphere, or in the Pores of Fluids or Solids, and expanding or compressing the Atoms of them. I need say nothing now of the

Parts of this Fluid in Fire at the Sun, because they act not immediately here.

The Pressure of a Fluid, whose Parts are of equal Size and of equal Height, upon any Surface in the same Position will be equal or proportionable to the Diameter or Area of the Surface.

The Parts of this Fluid composed of Atoms and such sort of Grains, of different Sizes, will press with each Sort of them in Proportion to their Sizes.

The Proportion of Pressure upon Surfaces naturally holds from the Area of the Diameter of a Yard to a Foot, to an Inch, to that of an Atom, to the different Sizes of Atoms in some Proportion, with Allowance for the Difference of the Pressure upon those Spirit comes at, and those which only Light comes at.

The *Aleim* made the Spirit the Instrument of Impulse, *Gen.* i. 2. So *Exod.* xv. 8, 10. and the Light the Ruler here: And all the Divine and Heathen Writings attribute, the Divine in a mechanical, the Heathen in a higher Sense, all the natural Actions to them; so whatever the Spirit could not do, where-ever there was Action, even to a Point where the Spirit could not enter, or be present, that must be performed by that Agent (which nothing but the

the

the Substance of an Atom can exclude) by the Light, and so was attributed to it.

The Appointment of the Spirit was to be the Instrument of Impulse, first upon the Faces of the Waters, on the outward Face of the Sphere, and on the inward Face of the hollow Sphere of Waters, whose Pores were then as wide as the Pores of most of the Fluids and Solids, whose Atoms were then contained in the Waters; and consequently, as the Spirit could not then, so it cannot now, act in the Pores of the Fluids or Solids; acting within the Pores, and upon the Atoms of Fluids and Solids, was given to the Light, which entered and acted then, and enters and acts in those of any Sort. So those which cannot pervade the Pores will press on the Surfaces, and those which can pervade the Pores will press upon the Surfaces of the Atoms in every Point where they do not touch each other, and there with each other.

The Spirit acts upon the whole Extent of the Surface of a Body, upon the Atoms and the Spaces or Pores which it cannot enter, as far as its Parts can touch; the Light only upon the Parts of the outmost Surfaces of the Atoms where the Spirit doth not touch, and upon the Surfaces of the Atoms of the next Course or Order

in Succession, which, as one may say, form another Surface; so upon the next Order, so on quite through every Surface or Order in the Body, and so upon the Surface of every Atom in the Body on every Point, except where those Atoms touch one another.

The Parts of this Fluid differ from the Parts of all other Fluids and Solids in this, that by their Unites being smaller than the Pores between those of the Unites of any other Species, that not one of them can be separated or divided from the rest of its Species, so thereby it supports every one of its own Parts, or itself and all other Matter in it, but presses upon Parts of itself or others, more or less, by Rules already hinted at.

When this Orb was a Sphere of Water mixed with Atoms for Solids, including an Orb of Spirit or Darknes, and atmosphered by Spirit from its Surfaces to the Circumference of this System, nothing stirred; when Part of the Spirit or Darknes was formed into Light, Motion commenced, and Separation and Formation ensued.

Irradiation, or the Manner of the Motion of Spirit and Light, is not then mentioned, but the Expansion, which is the Effect of Irradiation, or such Motion; and

and with Respect to the Circumference of this System, the Light expanded the Spirit outward; with respect to the Orb inclosed within the Sphere of Water, they expanded outward; with respect to the Atmosphere which included the Sphere of Water they expanded, and so compressed inward.

No Atom can alter its Figure or Size, or take up more Space; but the Atoms and Grains in the Irradiation attempt to expand, as working Drink, when the Vessel is full, or Steam of Light issued from Fire, and detach'd Atoms of Water, when 'tis issued into, and has filled a Vessel, so lay a Pressure upon every Atom of themselves, and upon every Atom within them, and against every Part of the inside of that gross Fluid which bounds the Circumference, or upon the inside of a Vessel.

When the Light began to raise an Expansion in the Spirit without and within the Sphere, the Spirit was, as it is expressed *Job xxxviii. 9. When I made the Cloud the Garment thereof, and thick Darknes a Swadling-band for it.* The Spirit could confine the Water from incroaching upon it, inward or outward, so that it could neither descend nor ascend; and it could afterwards assist in turning the Sphere;

but it could not enter into the Pores of the Waters. It, by possessing its Part of Space, could assist in the Expansion, and help to lay a Stress upon the Light, which pervaded the Pores of the Waters. But the Precept was to the Light, to expand, enter, and act in the midst, among, between every Atom of the Waters, and to make מבריל a Place, here a Sphere, a Division between the Waters to the Waters; in short, to form all the Parts of the Shell of the Earth.

Sorting the several Species of Atoms, which by their Difference in Size and Figure, make them fit to form Stones, &c. for several Uses, making the smaller recede, and the larger accede, and form into Sands, Grains, Plaits, &c. by its Compressure, as Hail-stones, Snow, &c. are formed in the Atmosphere.

Sinking those Grains of the largest Atoms, and making the lighter or smaller with the Water rise upwards, as appears in this present Shell, and of Course from below, from the Expansion within, making the Grains of the smaller Atoms descend with the Water, and raising the larger upward, and with them forming solid *Strata* of distinct Sorts of Stone, and as far as we can see, or sink between those forming

forming *Strata* of Coal, Chiver, Chalk, Clay, &c. whose Atoms are smaller; so of a far less, as they term it, specifick Gravity. Forming the several Sorts of Nodules of Flint, of Iron, &c. mostly approaching round, which are found in those *Strata*.

Contracting and cracking the *Strata*, driving the Atoms of Metal horizontally, with the remaining Water, into the Fissures, and forming those Atoms into Ribs, Masses, &c. of Oar, forcing the Waters above the Shell down, and so forcing the Spirit up out of the Abyss, forming the Surface of the Earth, and many more minuter Actions were performed by this Agent the Light.

This was the Instrument by which the *Alein* accomplished this great Work, so surely it may be able to keep Things in Order, form small Productions, &c.

'Tis evident to me, from the Observations I have made upon the Parts of this Earth, as they are disposed from the second Formation after the Flood, which has taken up several larger Tracts than this to describe them, that if the Spirit had not pressed upon every Part of the inward and of the outward Surface of the Sphere of Waters, and the Light had not pressed upon the Surfaces of each Atom in every Po-

sition from the Time they were at Rest, while they were in Motion, till they were fixed, and after that with some Degree of Abatement, in Proportion to the Distance from each Surface of the Sphere, the respective Species of Atoms, and so of *Strata*, Nodules, Minerals, &c. could not have been sorted as they are, nor could the *Strata* have been formed solid, nor could any of even the more minute Accidents have been performed by these Agents.

When this Shell or Sphere of Earth was formed, the Waters above it carried down into the Abyfs, and the Mixture of Spirit and Light brought up and mixt with the rest, with some floating Atoms or Vapours of Water or fluid Matter, and of vegetable or dry Matter, which rise and hover near the Earth and fall, they possessed all the Space from the Surfaces of the Orbs to the Circumference; and the Mixture of Spirit and Light together, with the Fire, became a Machine, and the whole Mixture became an Atmosphere to this, and soon after to each Orb, and so in Proportion to every Body which has been separated from this Orb, or formed out of it. But as each Orb or Body interrupts Part of the Pressure of this Fluid, the grossest Grains would be successively driven to the Surface
of

of each Globe or Mass, and form what they now call an Atmosphere; and by the Rules aforesaid, the largest nearest the Surface, and by Degrees smaller and smaller to the Verge of each Atmosphere, to be ready for their several Uses; and consequently a less Proportion of Light in each where the Fluid is thinnest, that is, has the greatest Proportion of Light in any given Compass near the Surface of an Orb, the Spirit in the Vicinity being more pressed, and least on the Side next the Light is driven in, drives it out and takes its Place, or mixes with it: And as each turning Orb interrupts the Light from the Sun by a Hemisphere in successive Rotation, the adjoining Spirit successively presses in upon the hindmost Edge, and continues the Rotation and Progression, as I have at large shewed.

No other Machine has the Power in its self: Wind-Engines are moved by the Spirit, Water-Engines are moved by the Action of this upon the Waters, Steam-Engines are moved by the Force of the Light upon the Vapour of Water one Way, and by the Pressure of the Spirit the opposite Way. This communicates the Force to Animals to move the Machines moved by them. This Machine, *The Names,*

Names, has the Power to move itself, and move that which moves others, and all Things which move, or are moved in it. This is, or these are the מלאכת the *Agent*, רקיע the *Expander*, שחקים the *Strugglers*, צבאות the *Forces*.

The Power or Compressure of this Fluid, as a Machine, is exerted in every Point of its self, and upon every Point of the Surfaces of Bodies and Fluids, and of the Surfaces of every Atom which composes them, either immediately by itself, or by pressing upon, and so with others where they touch it.

Every Grain, and every Atom of the Fluid which composes this Machine, is prest upon by those which touch it, in regard to its Tendency behind, and presses reciprocally upon those it touches, in regard to its Tendency before of its own Species, or others, in Proportion to each of their respective Surfaces: The Spirit upon the Surfaces of other Bodies or Fluids, where it can enter, the Light in small Grains or Atoms, from the Sizes of those which will pass the Pores of Wood, Metal, Glass, down to those so small, that they pass the Pores of a Diamond, press upon the Surfaces of every Atom, in every Fluid or Body, as fully as if each Rank of
Atoms

Atoms were formed into a separate Plate, and distanced from each other, or were in loose Atoms; and the Spirit and Light have the same Pressure upon them too, within a Trifle, as they would have upon the Bodies split into Plates, or reduced into Powder.

The Columns of Light, directly or indirectly, press upon every Part of the Surface of every Unite of other Matter alone, or which composes a Mass or Fluid in every Direction here, as we say, downward, upward, horizontally, &c. except upon the Points where the Spirit touches, or where the Unites of other Matter touch one another, and there with these one another.

The Pressure from that of the Spirit upon the Fire, and that of the Expansion after, is continued upon the Light to any Depth in Fluids or Solids, and after it has passed through Shells or Spheres of both or either, tho' with some Degree of Abatement.

The Force of Light is strongest, when it comes streight from the Sun, and perpendicular to the Horizon, both in the Action of Pervasion and Expansion, and weaker as it comes more obliquely, to answer the Ends of Seasons, &c. But my Design is to settle its general Power, before

I enter upon the Degrees of it; so *Pf.* xix. 5. thro' all the Earth does קום the Substance go. And Ver. 7. speaking of Light and there is not any thing hid from הנתו its Heat, (its Effects in Motion). So *Job* xxxviii. 14. תתהפך it conforms as Clay (Wax) to a Seal, and יתיצבו they set themselves as a Garment. If the Atoms of a Body could be taken out or annihilated, and the Spirit upon its Surface and the Light within were made solid and could be seen, you would have the Figure of the Body, the Figures of all the Pores, and the Impression of all the Atoms; because the Fluid of Light is always in the Pores of all Bodies, the Pressure of this Fluid sliding or shifting upon the Surfaces of the Body at Rest or in Motion, and so upon the Ends of the Columns of Light in the Pores, is not considerably altered, except in violent Motion of the Fluid or Body, which augments the Pressure, or when you alter the Position of the Body, so that another Part tends to the Earth, or, &c.

These Actions are here, as it is beautifully express'd, *Ecclus.* xxxiii. 15. So look upon all the Works of the most High, and there are two and two, one against another. In the Irradiation of the Agents, the Spirit acts against the Light, and the Light
against

against the Spirit; but upon every Orb or Body, and every Atom in it, except the Sun, the Spirit, and Light, act in Conjunction in Expansion, and press upon every Side, and so upon each opposite Side, two against two, both against both, and on which side soever the two are weakest, (whether from a less Proportion of Spirit, or the Vicinity or Interposition of some dense Body, the Orb of the Earth, or, &c.) they yield, and the Body has Tendency or Motion that Way.

This Earth is now in a different State to what it was while it was forming, and would require some Compass to state its present Situation and Condition, which is not before me now: But I think, if the Light did not, tho' with some Degree of Abatement of its Force, pervade this Orb, or re-act, which is much the same; and if the Strength of that Pervasion were not increased by the Degree of Expansion on the opposite Side, or the Resistance weakened on the Side where it pervades, (so in some Places, and at some Times, more or less) the Gravity of Bodies would be much greater than it is, and many of the Phænomena in Nature could not be solved, particularly the raising of Vapours for Rain, &c.

If

If there had not been that due Proportion in Size or Figure among the Atoms and their Pores, that those of the smallest Size or small Grains of them could have passed between the Atoms of Solids or Concretes, the Compressure of *The Names* would have driven all other Solids, as well as Loadstone, Iron, Talk, &c. together. Since the Earth was formed, these Agents have many other Things in Charge; and as CHRIST and LIGHT have each as many Names in *Hebrew*, as Offices, perhaps the Light, the material Glory, has almost as many distinct Offices in the material Sense, as the Person it represents, without lessening his Glory, has in the spiritual System. I have hinted at many, so I shall at a few here, *Isa. xlii. 5. Who expands the Earth, (Adamah and Water) and its Products. Ibid. xliv. 24. I Jehovah who do all things; who extend the Names by myself, who expand the Earth מִיֵּאֲרֵי* from my Substance, or my *Atb. Deut. xxxiii. 13. Blessed of Jehovah be his Land for the precious Things of the Names, for the Dew and for the Deep which coucheth beneath, and for the precious Fruits brought forth by the Light of the Sun, and for precious Things put forth (Heb. thrust forth) by the Light of the Moon.*

The

The Expansion of the Light of the Sun with Fluids, must be greater than the Compressure of the Spirit, or else Trees and Plants could not yearly swell or burst the outer Bark, and extend in Diameter and Height; nor could the Bodies of Animals extend in Size.

The antient Heathens, who worshipped these Agents for these Powers invented Instruments, and used great Application to observe the Motions of the Orbs, &c. the Effects of their Powers, and to examine, describe, and extol their other Effects upon inanimate or animated Matter. In the common Course of Nature, these Agents were not intended to be visible to Sense, nor every minute Circumstance to be understood without such Application; so it had been enough for Believers to understand them in gross, and to attribute the Creation, Formation, and so Powers, in them, to *Jehovah Aleim*: But as the Devil first, and the Heathens afterwards, asserted there were Powers in them which did not belong to them, it was necessary that *Moses* and the Prophets should exactly describe what was in them, and how they acted, and so not only reclaim the supposed Powers in them, but those which were really in them for *Jehovah Aleim*; tho' some

some modern Discoveries, made without any ill Design, have shewed us the Power of these Agents, beyond what was known to the Antients, by what yet appears; yet there never was a Time before this, when these Agents and their Powers were disputed, nor ever so much Application used to deface all Ideas of them, and of the Ideas they give us of those they represent, and in doing that, they have made more Enquiries, tho' without Success, after the real Causes of Things; and in attempting to prove the contrary, have shewed more Methods of proving their Existence and Power, than any of the Moderns knew any Thing of.

Perhaps 'tis so ordered, that when some Men should use their utmost Art to make other Men Unbelievers, that the Evidence which arises from such Discoveries, and the Enquiries and Experiments those Opposers have made, should enable others to give Evidence sufficient to confirm the Authority of the Scriptures.

Out of the infinite Number of Texts I have produced, I shall insert a few Hints which mention these Agents, their Commission, Actions and Effects; and to the infinite Number of Citations from the Antients, I shall add one or two, *Job xxviii.*

25. To make the Spirit נשקל the Instrument of a small determinate Weight. 2 Esd. iv. 5. Weigh me the Weight of Fire, measure me the Blast of the Wind. Ibid. viii. 2. Whose Service is conversant in Wind and Fire. Judg. v. 31. As the Shemosb (Light of the Sun, which the Translators, as 'tis likely in the two next above, have generally construed Fire) which goeth forth in his Might. Job xxxvii. 10. The Breath of the Irradiator gives Frost, and the Water is widen'd (enlarged) into a Concrete. Yea the pure (Fire, which is clear) tares to Pieces the condensed (or Grains) and his Light scatters that which is compressed, and it is turned about by his Counsel, that they may do whatsoever he has commanded them, upon the Face of 'the World towards the Earth. Job xxxviii. 7. Who number'd the Ethers in Wisdom? And the Defluxions of the Names who caused them to come down to melt the Dust into Concretions that Masses adhere. Ver. 33. Knowest thou the Ordinances of the Names? Didst thou set their Dominion over the Earth. Jer. xxxiii. 25. The Ordinances of the Names did I not appoint? Psa. cl. 1. Render Irradiation to him, in the Expansion of his Power. Job xxxvii. 18. The Ethers, strong as a molten Speculum. Psa. lxxviii.

35. *And it is his Strength in the Ethers.*
 Prov. viii. 28. *When he gave Strength to
 the Ethers above.* Psa. lxxv. 7. *Who framed
 the Mountains by his Strength.* xix. 7.
The Expansion sheweth his Handy-work.
 Isa. xlii. 5. xlii. 24. *Expanding the Earth,
 and its Products.* Psa. cxxxvi. 6. *Who
 stretched out the Earth upon the Waters.*
 1 Chr. xvi. 30. Psa. lxxi. 1. lxxvi. 10. *The
 World is machined; it shall not fail.* Pf. xxiv.
 2. *The Earth and its Fulness; for he has found-
 ed it upon the Seas, and framed it upon the
 Floods.* cxix. 90. *Thou hast framed the Earth,
 and it shall continue.* Why cannot that which
 concretes Water, concrete the Parts of Sol-
 lids? If the Firmament called *The Names*,
 the Æthers, that Matter in opposite Mo-
 tion, be the Agents in which is the ma-
 terial Power of *Jehovah Aleim*, then he
 made the Mountains solid, firm by *The
 Names.* Philo 960. "What part of the Earth
 (to begin there) can be worn away or con-
 sumed by old Age; Do not the hardest
 Stones (only) dissolve or melt thro' the
 Weakness of their *Habit* (that which holds
 them) *which is the (Tenor) hold of an in-
 tense Spirit; a Bond not easily broke, how-
 ever is broke at last.*" 1168-9. "Do not
 the hardest Stones rot (some fine Matter
 getting in and swelling them) when their
 Conti-

Continuity grows weak, the Spirit that holds them (which is a Bond, not invincible, how hard soever it may be to break it) letting go its hold; and then they resolve into Dust, loose, incoherent, frail, and perishable, and so waste away and disappear at last! He hath bound together the Stones and Trees when torn from their Beds, by the *Habit*, as it were by a strong Chain; and this is the Spirit which returns into its self; for it begins from the Middle, and reaches to the Extrems; and presently after turns back its Course from the Circumference, till it reach the Place it first set out from. This is that *Habit*, and never ceasing Running and Returning (*curfus recursusque*) which those who run at the Games, every fifth Year represent, as something worthy Notice and Imitation."

I shall not insist upon any *Data*, nor upon any Deductions from them; but upon *Facta* which come under Sense, and such Deductions as inevitably follow from them, without lessening the Authority of Scripture.

The expansive external Pressure or Compressure of the Spirit, or those Parts which do not enter or pervade the Interstices between the Atoms of a solid Shell ever so

thin, if the Fluid were equal on each Side, and no Solid or other Fluid interposed on one Side, would be equal, above, below, downward, upward, and inward, on every Side. But if the Fluid be thinner, or there be a greater Proportion of Light on one Side, or, as the Case always is here, the Earth interpose on one Side, the Compressure is weakened in some small Proportion on that Side.

If such a Shell have an Aperture into it wide enough to admit the Spirit and Light, in Proportion to that without, when it is entered, if you stop the Aperture, the Mixture of Spirit and Light within, by the Compressure without, inward upon the Light in the Pores of the Shell, resist and press outward, nearly as much as that without presses inward, so as the Pressure or Force of the Expansion from the counter Motion of the Spirit and Light without, inward, lies upon the Fluid in the Shell, thro' the Pores, in Proportion to their Wideness; when the Impulse of Light without is increased by Motion, either from the Sun or Fire here, and that Light strikes upon the Shell, it pervades, puts the Light within into Motion, drives out part, heightens the Expansion within
in

in some Proportion to its Quantity, Velocity, &c.

If you take off the Pressure of the Spirit on any Part, inside or outside, by fixing a Vessel, suppose a Cylinder, with a Piston or sliding Valve in the top of it close to the Part ever so thin, and extract the Grains or Spirit out of that Vessel or Cylinder, so that nothing but the Light which remains within, and enters to supply the Space of the Grains extracted, and the Pressure upon that Light, with the Light through the Pores of the Vessel inward, remains upon, and resists the Part, at first Sight one might be ready to determine, that it appeared, that the Pressure of the Spirit and Light on their Side, is greater than the Pressure of the Light on its Side, by the Weight of a Column of Water, whose Base is equal to the Part where the Spirit was taken off, and whose Height is thirty odd Feet, and that by this we could estimate the Difference between the Pressure of the Spirit and Light, and that of Light alone; where, by a sliding Valve, the Spirit can drive it out upon any Area, even almost to that of an Atom; and that if we could take off the Light also on the under or opposite Side, we should

find what the Spirit and Light pressed upon a Surface of any Area, as aforesaid.

A Plate as thin as a Bladder, or Gold-beater's Leaf, if supported, stops the Pervasion of the Spirit, and receives its Pressure. If the Spirit acted upon the inner Surfaces, and for Example, a Piston were of Wood, or any Matter hydrostatically of the Weight of Water, a Board of an Inch thick would contain about 390 Times as many such Plates or Surfaces: So about as many Times the Weight; and the Pressure upon the Board, would be 40,000 or more Times its Weight, as no such Pressure appears upon a Piston, where the Pressure of the Spirit is taken off on one Side, 'tis plain that the Spirit only acts upon the Surface.

This goes near to prove what the Spirit and Light press upon a Surface; but it neither proves nor disproves, much less any Way measures the Pressure of the Light. For besides the Pressure of the Spirit and Light upon the Surface of the Piston, as they do upon the Bottom and Sides of the Cylinder, the Light has as much Opportunity to pervade the Pores of the Piston, as it has those in the Cylinder; therefore the Light which pervades the Pores in the Piston, equally opposes the
Light

Light which pervades the Pores in the Bottom and Sides of the Cylinder, and the Force in the opposite Directions of the Light, oppose, and nearly equal each other. And the Pressure of the Spirit, and even of the Light upon the Surface of the Piston, has nothing to do but to drive out, or shift the Light out of the Cylinder, to let the Piston slide down to the Bottom: Nay, as the Bottom and Sides, which have also the Pressure of the Light upon them, do not move or oppose this, it shews not even how much of the Force belongs to the Spirit, and how much to the Light. And if the Force of the Light were taken off on one Side, we could ascertain the Force of the Spirit and Light upon one Surface jointly, I am not sure we could do it separately, and perhaps we might ascertain the Force of the Light upon a few Surfaces, but not its whole Force.

So where the Surfaces of two polished Plates are put together, the one takes off the Pressure of the Spirit on one Side, and the other on the other, and no more. The Force of the Compressure of the Firmament is not measured by this, but only the Difference which the Spirit, as an Atmosphere, makes upon the first Sur-

face of Bodies, Animals, Vegetables, Fluids, &c. to preserve the Adhesion of the Atoms on the Surface of Things solid; so while the Light irradiates near perpendicularly from the Sun against the Surface of the Earth or Horizon, and expands strongly near Mid-day, till that Part be turned off into the Spirit. As Light expands the Juices in Animals, and Vegetables so Spirit prevents them from expanding too much or bursting, the Surfaces of Fluids from evaporating too much, preventing too much Light from forcing into Fluids; so keeping them in a due Mixture, or Degree of Expansion, &c. which, though imperceptible, appears, when 'tis taken off on one Side, as above. This Compressure is limited when the Shell is, and the Fluid is nearly at Rest; and 'tis nearly the same, when the Shell is put into gentle Motion, or when the Spirit is put into Motion by the small Difference that is made in the open Atmosphere, by some adjoining Part containing less Spirit than there is there, and so in Proportion with the Advantage of its pushing, which we call Wind. If the Difference in the Atmospheres were much greater, they would overset all perpendicular Directions, root up the
Trees,

Trees, &c. as appears by some late Instances in the *West-Indies*; if the Pressure were much greater, the Light and it could not alternately prevail in Seasons, and all their Consequences.

As the Title, so Intention of this is to shew the Agent, which is the Cause of Tendency or Motion; the Reasons of the Degrees of Motion or Velocity is not under Consideration, but that of over weighing, so Tendency or slow Motion.

It is plain that if you place a Plate of any Diameter, and ever so thin, even to that of a Goldbeater's Leaf, parallel to the Horizon, that the Spirit presses upon it with a Weight equal to a Column of thirty odd Feet of Water, whose Base is equal to the Area of the Plate; and if you weigh it in that Position in a pair of Scales, and after weigh it edge-ways, the Difference will be so insensible as that it has not, that I remember, been taken Notice of. And as no such Pressure which is so much greater on one Side, and so no such Tendency to a Point, appears upon thin Plates in the Air or at Rest, it is evident that the Spirit supports very near as much on the low or under Side, and so is near equal on every Side. And if the Difference between Compressure

sure of the Spirit and Light upon one Surface of Atoms downward, were supposed to be equal to the Pressure of Light upon several Surfaces of Atoms downward, and so on the opposite Side or upward; yet as the Pressure of Light is also nearly equal on a Body, Plate, &c. above, below, or downward, and upward, and inward, on every Side or Face of each of its Atoms, so is Compressure, and the Excess of that towards the Side on which the Pressure is weak is Gravity, and the Effect Tendency or Motion; and as the Tendency or Weight of the whole arises from the Difference in Compressure upon an infinite Number of Surfaces, even in a thin Plate, the Difference upon the two outer and opposite Surfaces, must on a thin Plate be very small, perhaps not the 1000th Part, and in a thicker Body imperceptible. So if extending ductile Matter into thin Plates, or if splitting a Body or Plate into several Plates, and making more Surfaces, so that the Spirit may have a greater Extent to act upon, do not considerably alter the Gravity, then there was near the same Pressure upon the new Surfaces before they were made.

A Grain of the Spirit being impervable till the Atoms be dissolved by Fire

or Collision; so here a Solid is pressed upon, and presses upon any Solid, or *&c.* more than one perhaps, as much as several Atoms of Light; so every Grain in proportion and all together, near a Mean. As the Pressure of the Spirit upon a sliding Valve or Piston, is in Proportion to its Diameter, the Surface of the Valve or Piston being as a Solid impenetrable to the Spirit: And though I have said above the Pressure of the Light comparatively upon the Surface of an Atom is less in Proportion to the Diameter of the Atom, the real Pressure of the Light upon each Species of Atoms, does not appear at first Sight; or by what I shall shew now, otherwise than by the strict Cohesion of some Species; but only the Difference of the Pressure or Gravity: whether the Difference be in exact Proportion to the different Power the Light has upon each Species, or whether the Light has Power upon each Atom in Proportion to the Extent of Surface or Figure, makes some Difference, is not now the Question.

If the common Mixture of Spirit and Light be inclosed in a Vessel, or the smallest Aperture be made into a close Vessel, wide enough to admit its Masses on any Side above or below, and Bodies
of

of any Figure were inclosed in it, beside what the Light does in the Pores of Bodies, the Spirit exerts or acts with all its Force outward, inward, and in every Direction, upon every Part of the inner Surface of the Vessel or Shell, and of every thing contained in it, because it is kept in on all Sides by the Atoms of the solid Sides, and is continually expanded by the Compression of the Light within, upon the Lines of Light through the Pores; and if several Couples of polished Plates be placed in it Face to Face, each of them will adhere with near the same Force as if they were each Pair in the open Air; if exhausted Glasses, such as would burst in open Air, were exhausted in it, the Compressure would burst them.

If a round Shell ever so thin and close were covered by another, and that by another *ad infinitum*, and the Spirit were exhausted, one Tube, whose Base were but the Diameter of a Pin, put in from above or below, or any Side, through all the Sides, with an Aperture between every Shell, would let in the Spirit, and the Pores would communicate this Compressure of the Light to every Sphere inward and outward.

If a close Vessel were divided by Plates
one

one below another, without Communication, except by a small Tube as aforesaid, the Spirit in the first would support the Top, and that in the second would support the Bottom of the first upon the under Side, and so on: So what is called the Pressure of the Atmosphere, is properly and really Compressure, or otherwise there would be the Quantity of so many Pressures in the whole; whereas in Truth there is but so many Differences of the several Pressures.

If each other Division were exhausted and no Spirit left in them, and the Tube went through them without Communication, it would be the same; the one side would press, and the other support near equally upon those void of Spirit, so *ad infinitum*.

So Surfaces or Plates one below another, inclosed or not inclosed, do not multiply the Pressures of the Spirit, but only the Differences of them, so do not increase the Weight of each Plate more than the Difference between the Pressure and Support of the Spirit upon each.

So the Pressure of the Spirit on the lower Insides of a Vessel, or upon other Vessels within it, or when divided into Spheres or horizontal Divisions upon them,
will

will add little to their Weight; because the Light which pervades from below, supports the Spirit near as much as that from above presses it downward: Where there is the greatest Proportion of Spirit or the Grains largest, whether it be in the open Air or inclosed, and they driven nearer together by the Pressure of Water, or be forced into the Vessel, the Light attempting to pass between them, produces the greatest Degree of Expansion. If that be in the open Air, and so less Spirit in a Vessel, there it presses upon the Sides of the Vessel, and prevails inwards. If that be within a Vessel, and so less in the open Air, it presses with greater Force upon any thing within the Vessel, and upon the insides of the Vessel, and prevails outward; so if one Vessel be within another, that full of the grossest prevails, so from the greatest to the least Proportion of Difference. And though the Grains are heavier than the Light, besides that, as they by Expansion press near as much upward as downward, this would make little more Alteration in the Gravity of a Vessel.

These Effects would hold in Proportion, if the Pores of several Shells were smaller and smaller, and the Holes to admit

admit the Fluid could stop the largest Class of the Grains or Spirit, and admit the next Class ; so each a Class smaller and smaller, till there would be no Expansion. When a close Vessel is full of Light, each Atom of the same Size, and near the Size of what we call a Point, there are no Pores among them into which another Atom can enter, except others be driven in with Force sufficient on one Side, to drive some of those within out through the other Side. And though those driven in take the Places of those driven out, they cannot, like Wedges in entering and passing between others of this Size, make an Expansion, as such can do in entering and passing between Grains of Spirit ; so though there can be no Expansion, yet the Force of the Light without through the Pores lies upon it, and every Action performed by Light upon Solids will be performed there, and the Effects of its expansive Force upon Fluids in Bodies will be greater there, because the Restraint of the Spirit is taken off. Hence the most ignorant and the most arrogant of Men was forced to own, that this which he called *Æther*, reflects Light in common Motion more than the common Mixture of Air without : Others, that it pervades the Pores in Bod-

es, freelier than it doth this their Vacuum, which indeed is loose, and whose Parts can shift more freely.

No other Atoms can be formed so dense, or with Pores so strait as to stop the Pervasion of the Atoms of Light, but they will pass directly or indirectly, except those of their own Order congealed, which is said to be the State of those in the Circumference or Confines of this System, I think hinted at *Eccles.* xvi. 16.

Though I have Evidence to Sense, and shall give it to others what this Agent is, that it has these Effects, and can have an Idea of the Manner of its acting by one or a few Columns of it, yet the infinite Number of these Columns, and the different Ways they exert their Force, makes the Idea too complex to be considered at one View, and in that View inconceivable. But the Idea we can have supersedes all Notions of occult Qualities, of which, for want of an Idea of an Agent, we have no Idea.

As Spirit let in at ever so little a Hole into a close Vessel, or what they call a *Vacuum*, presses upon every Part, and would press equally upon any Number of Pistons, as if the Passage were ever so wide, by Reason of the different Sizes of its Grains, whereby

ry Side, drives in the finaller between the larger, which act as Wedges to one another: So every Column or Line of Light which enters at, and is in the Pores of a Solid, be it straight or crooked, will press equally upon any Number of Atoms, can be press'd as much behind, and can press as much forward, or have the same Force upon each part of the Surface of each successive Unite of the Solid, except where other Unites touch them, as if each were of solid Diamond, and much more, because by the Smallness, Dryness, or Looseness of its Parts, it can act on each, not as a real Solid made with Branches to reach to each, would do where the Pressure upon it would be communicated and divided among each; nor as Water does, where every Part presses upon, supports a Part of a Column in Proportion, because there is only a certain Difference in Pressure upon itself: Besides, the Pressure of the Spirit which lies upon the Bottom of any Thing which contains it, or upon any false Bottom, where its underside, and the Surface of the Bottom are polished and touch; but because the other Columns of Light through the Pores of the Body on each and every Side, except where the solid Unites of the Mass resist, press, and support each,

in each Part with equal Force, and every Part of every Column of Light presses equally upon the Surface of every successive Unite within the Lines of its Base, near as much as if it press'd upon no other but only one, till at vast Depths it abate by small Proportions. When the Light is within the Pores of a Solid, while the Body remains solid, suppose the Atoms of Light only pressing, and not in Motion, every Atom of the Light has its full Force from the Compressure of both Spirit and Light from without, inward upon the Surface of every Atom it touches, it cannot be so shifted or put aside, but every Column in every Direction keeps it to its Point; nay, when they are shifting in Pervasion, still the succeeding ones are each successively kept to their Points, to press where they immediately touch, by the Compressure upon every Line or Column, as aforesaid. And its joint Pressure with the Spirit upon the first Rank of Atoms, or its separate Pressure on the second Rank, does not abate its Pressure upon the third, and so on; only each Rank will contain fewer Atoms, as it lies nearer the Center, and each is counter-press'd on the opposite Side, that the Difference is only shew'd here. So the Surfaces of as many Atoms within a Body as compose the outward or upper

upper Surface, have each the full Pressure of the Spirit and Light upon them, as much as the second Surface, or third, or, &c. and will be press'd with the same Force towards the Center, or some Part of the Body; and considering how the Area of each of the Surfaces or Courses of Atoms towards the Center are less and less, so upon every successive Rank inward, to the Center, or, &c. abating for the Abatement of the Diameter or Area of each Surface nearer and nearer the Center, as if they were split and cut into Plates. And the Thickness of any Body, as far as Gravity can be of any Use, makes little or no Difference; for where the Parts of Light below a certain Size can pass the Pores of the Body, they pass and act at any Thickness, as freely as Light passes through those Bodies, which for their Closeness, Hardness, free Admission, and Emission of Light, we call Diamonds. And as the Pressure of the Light upon each respective Atom, so Gravity must abate at vast Depths, so the Pressure of the superior Parts upon those below, sufficiently, and in some Proportion compensate it.

Light, in the open Air, where it is continually in Motion, could not fix the Atoms in the Surfaces of a solid Body, and

oppose and vastly overcome the counter Pressure upon the inner Surfaces of each of those Atoms by the Columns of Light from the opposite or other Sides, especially on the under Side, where there is least Resistance, and so most Tendency that Way, or on the foremost Side in slow Motion. As the Columns of Light fix the Atoms within, where the Lines of Light in the Pores from other Directions fix each Line of Light, much less so well as the Grains of the Spirit which press much more upon a Surface than Light does, and which over-reach the Pores, and each takes hold of several Atoms at once.

Where the Spirit can enter the Pores of any Body, which is termed a Solid, 'tis so far from acting the Part of Light which keeps the Parts together, that it is expanded by the Light which is press'd in, and attempts to dissolve the Parts of the Solid. Where Water can enter, Light does the same with it, fibrous Bodies excepted.

As the Grains of Spirit, in Proportion to their Sizes, enable the Light to expand with them, those Bodies whose Pores are in proportion less and less, even down to those of a Diamond, and so admit less and less Grains, even down to an Atom, are in proportion the strongest compress'd to one
another

another, and adhere the strongest; though perhaps the Size or Figure of each Species of Atoms may vary the Proportion in some small Degrees.

I shall for the present defer shewing these Assertions concerning these Agents in various Manners, and so in various Lights by their Effects, in various Positions, and upon various Subjects, by Experiments which have been made, and others which might be made, and the infinite Number of Deductions which may be fairly made from these mentioned.

As the Machine which rules this System may be termed a Fire-Engine or Machine; and as an Acquaintance of mine first put in Practice an Engine, to which he properly gave that Name, concerning which he afterward frequently consulted me, which engaged me frequently to consider the Powers concerned in it, and the Manner of their Operation, which has since, by varying the Application, been improved by another, and is the only Discovery worth Notice, which has been made of late Years, I shall take the Liberty to explain the Agents, and the Manner of their Action, as far as concerns what I offer, and produce them in Evidence of the same

Agents, and the Manner of their Action in the great Machine.

The Issue is very short ; Whether what I call Light pervades and acts in the Pores of Fluids and Solids : Whether each Atom carries its Space, when it enters between, and so divides and expands the Parts of Spirit, or, &c. makes an additional Dimension where at Liberty, and attempts to expand where confined ; so in Solids to press, compress, gravitate, &c. Or all these Actions are performed by imperceptible Properties.

Though almost every one has seen one of these Engines, I must mention a few of the chief Parts ; all the Contrivance to repeat the Motions, and avoid Inconveniences, is of no Use here, because a few Strokes determine the Agent and its Power, and the Regulators only shew that the Power is infinite, if the Vessels would hold. There is no Occasion to describe Dimensions, Diameters, or Proportions. If the Diameter of the Piston be but proportioned to the Steam, the Light issuing from the Fire can raise out of the Water in any short Time, that answers this End.

It has a Fire-place walled round, with a Door on one Side, a Chimney from it upwards, a Grate at the Bottom, and Pas-

sage under to admit the Spirit: A Boiler fixed close within the Wall, and over the Grate and Place where the Coals or Fuel burns; so when the Coals are fired, and the Door shut, the Compressure without drives the Spirit in through the Grate, the Fire melts it into Light, the Light has no Passage if the Door be close, but up the Chimney with the Smoke, and sometimes in Form of Flame, which is resisted there with the Pressure of the Spirit, but through the Pores in the Brick-wall, or the Bottom of the Boiler. Those which pass the Pores of the Wall, except the Fire be very strong, appear not in Form of Light: But those through the Bottom of the Boiler, if a part of it were Diamond, there it would pass in streight Rays, and appear light to the Eyes; and where it is Copper, they would in a little Time appear in Form of Light, and continue to do so with a gentle Fire: And, I think, if collected through a Glass, would fire proper Matter.

The Impulse is begun and continued upon the Light from the Sun, by the Impulse of the Spirit successively press'd into the Fire there, and the Compressure upon the Light in the common Condition of the Firmament, is continued from the Ex-

panfion of the whole, produced by that of the Irradiation. This Light is only prefs'd or impell'd from the Fire, with the Force of the Spirit which is prefs'd into the Fire, and fupported only by itfelf, and by the Compreffure of the Light through the Pores in the Veffels from without, inward. And as the Fire augments and melts more Spirit, the Spirit is driven in with greater Velocity, fo the Light is driven out with the fame Velocity: But the Force has lefs hold of the loofe Atoms, than it has upon Grains, fo impels each Atom with lefs Force: But as the Ufe of Light here is not for the Eyes, the Boiler has a clofe fpherical Top or Cover, with a Pipe whose lower End is fixed into the Cone of the Cover of the Boiler, with a Turn-cock in it, and the upper End of the Pipe, into the lower End or Bottom of a Cylinder, with a Pifton in it, made fo clofe, as to keep out the Spirit, but to flide or be prefs'd from the Top to the Bottom, and from the Bottom to the Top. If the Boiler, Pipe, and Cylinder, were void of Water and Spirit, and only full of Light; if one had Sides and Top of the Boiler, fo Pipe, Cylinder, and Pifton, which were without Pores, perhaps the Force of the Light in Motion might be near as ftrong,

nay,

may, perhaps stronger than the Pressure of the Spirit on the Piston: But as the Atoms of the Fluid of Light put into Motion, pervade the Pores of Metal, except they be driven into a Vessel in so great Quantity, that they cannot pervade so fast as they are sent in, or melted from Spirit by Fire within; they cannot impel much, or give any great Degree of Tendency, but would melt the Sides; or except, when moved with the Velocity of Lightning, or *&c.* so as this Light comes through the Pores in the Bottom, it would then pass thro' the Pores in the Top of the Boiler in the Pipe, Cylinder, and Piston, and its Force cannot be proved thus alone, except it be armed with something to stop the Pores and work with.

As this Discovery arose from observing the Steam arising from boiling Water, so this Boiler is filled three Parts with Water, and supplied. So soon as this Light operates, it not only forces into the common Pores of the Water, and pervades them, but extends the Pores, so distances and expands the Atoms of the Water, but impels the main Substance of perhaps Hogsheds of Water upwards; though the Unites of the Names or Light, are dry, and not liable to stick to the Unites of several
several

several sorts of Things; yet by the Figures of the Unites of some of those Fluids we call humid, they are enabled to detach, drive, and perhaps adhere to some of them.

Though Steam in the first Shape of this Engine drove out first the Spirit, and after the Water at each Push, and does the one, and would do the other in this; I shall suppose this begins with only Atoms of Light in the Top of the Boiler, in the Pipe, and in the Cylinder, if they can detach the Atoms of any Fluid or Matter, whose Surfaces are larger than those of its own, and so can take more hold of them, act with a joint Force upon them and with them, which cannot pervade Pores, which by their Humidity or Clagginess will stick upon the Surfaces of Bodies, and so stop part or most of the Pores, they are enabled to apply and shew their Force.

When the Draught to the Fire is made so strong, that the Light which passes the Pores in the Bottom and Sides of the Boiler, detach so many of the inactive and passive Atoms of Water, as form ריח *Odor*, Reek, (so Reekon) or Steam, a Fluid composed of Light and Vapour, bere of Light, and Atoms of Water.) To
digress;

digress; This Mixture is the Agent, in it is the Life, by which all the Operations in Animals and Vegetables are carried on; If not *Job xiv. 9. Yet through the scent of Water it will bud, and bring forth Boughs like a plant.* Hence this was attributed to Him in *Jehovah*, whom the Light represented in a Sacrifice, and called a *Savour* *ניחח* of *Rest*, made by Fire, and this *ריח* is often mentioned in *Canticles*. But to return;) The Light pervading, and proceeding, and driving other Light out, acts, thrusts upon the Surfaces of the Atoms of Water in Steam, drives them forward, and new ones successively, till it can, with them, form an Atmosphere*, and make some cleave so as to thrust with them against the inside of the Top of the Boiler, which will stop most of the Pores, and prevent a great Part of the Expence of Light which pervades alone; as soon as the Light comes in, or rather would come in faster than it does or can go out, it with the Atoms of Water lays the whole Stress upon the Surface of the boiling Water downwards, upon the inside of the Top of the Boiler upward, and upon the Sides outward every way; so inward upon every Atom, and those Parts which pervade outward, against the Pressure of the Fluid without, inward,

* An inward Sphere.

inward. As soon as this Force amounts to a certain Degree, that it presses more against the inside of the Boiler outward, than the Spirit presses against it on the outside inward, it is contrived to turn; so open the Cock in the Pipe, and so open a Passage into the Cylinder, where it meets the underside of the Piston at the Bottom of the Cylinder, with the Weight of the Atmosphere of Spirit upon it, which is equal to the Weight of a Column of Water, whose Base is of equal Area with the Surface of the Piston, and its Height thirty odd Feet; and as the Designer of the Draught of this Engine says, *By its Force against the Piston countervails the Pressure of the Atmosphere, and permits it to rise:* But I say forces it to rise to the Top, and sustains it there till it turn back the Cock, and stop the Progression of the Steam, and then till cold Water be injected; and I think if the outward Surface of the Piston were turned downward, the pressure upon its Face would be little less, so would lose little beside the Weight of the piston.

During the Action of the progression of the Steam into the Cylinder, as the piston rises, the Light proceeds with the same Force from the Fire, detaches and drives

on the Atoms of Water, forms an Atmosphere, and makes some Atoms cleave against the inside of the Cylinder, and the Bottom of the piston, to the Ends aforesaid; and notwithstanding the Direction of the Steam through the Pipe, lays a Stress as well downward, &c. as aforesaid, as it does upward, where the Piston gives way.

The Lights acts strongly in the manner of Expansion in the boiling Water. But by the small Proportion of Water raised in Steam, as it appears when collected, the Atoms of Water must be each at that Distance from other in the Mixture, that the Light can have little Advantage in that manner.

When the Cock is turned back, and the Passage through the Pipe from the Boiler is stopped, the Steam, with the Compressure of the Light which pervades the Pores in the Cylinder, would keep up the Piston till the Steam should pervade, or Atoms of Water should coagulate and drop.

But when the Piston is at the Top, it turns the Cock, and lets in a Jet of cold Water through the Side, and into the Cylinder; the Drops each immediately entangle with the Atoms of Water in the
Steam,

Steam, which they touch, and make those Atoms pass and subside with them, and leave the Atoms of Light every where as they pass, which makes a *Vacuum*, as they term it, near each Drop. The next Atoms of Water to each *Vacuum* are pressed into that *Vacuum*, and so into that Drop or Mass of Water, so more *Vacuum* is formed at each, till the Atoms of Water and Light be separated, all the Atoms of Water collected into a small Quantity of Water at the Bottom of the Cylinder, and all the Light be what they call a *Vacuum*.

As soon as this Precipitation begins, for the Action is almost instantaneous, as there is nothing but Light within, and that Light which pervades the Pores in the Bottom and Sides of the Cylinder, and through the Piston, and is compressed inward, which attempts to keep the Light in, or to resist its coming out; the Spirit upon the Surface of the Piston overcomes the Pressure of the Light upon the underside of the Piston, by the Weight of a Column of Water as aforesaid, forces down the Piston, and forces the Light in the Cylinder through the Pores in the Sides and Bottom, and even through the Pores in the Piston, which when the Water is condensed it has Liberty to do; and if the
Pores

Pores in the Cylinder and Piston did not let out the Light which remains in it and fills it, after the Atoms of Water in Steam were dropped, the Piston could not go down.

I have sufficiently demonstrated that the Light has a vast Force when it is separated from the Spirit, and acts where the Spirit cannot enter, be present or act in raising the Piston. But this Case of the second Part, where the Spirit shews its Force and prevails, does not determine any thing about the Pressure of the Light. For when the Progress of the Light through the Pipe is stopped, and the Water in the Steam dropped, the Force of the Light through the Pores in the Piston downward, is set against that which pervades the Pores in the Bottom or Sides of the Cylinder upward, and neither of their Forces appear. But the Spirit and the Light upon the Surface of the Piston expells the Light, and prevails with the Weight aforesaid.

It is plain there is a much greater Force upon the Air in Motion, than the Pressure of the Spirit upon the Piston; because that Pressure with which the Spirit is successively driven into the Fire, performs that Struggle in the Fire, and melts those Grains of Spirit proceeding into Light; and besides
all

all the Force which goes waste with that up the Chimney, &c. it gives Force to the Parts of Light which pass the Pores of the Bottom of the Boiler into and thro' the Water, to lift and keep that vast quantity of Water in Motion, detach Atoms of that Water, carry them through the Pipe into the Cylinder in Form of Steam with them, to stop most of the Pores in the Vessels, and successively to enter through the Pores of the Bottom, and supply the Expence at the remaining Pores, which the Atoms of Water do not cover and stop, to press upon the insides of the Vessels in every Direction outward, and upon every Atom of itself inward, so to press upon the lower Side of the Piston, overcome the Pressure of the Spirit upon the upper Side of the Piston, force it up to the Top, and would force up any further Weight in Proportion, if the Force of the Drift of the Spirit, and so Force of the Fire were continued and heightened as long as the Sides of the Boiler, pipe, and Cylinder could sustain its Force, and without Vent or being cold, would burst any Vessel.

So wherever the Spirit is kept off on one Side, and the Light inclosed, and only compressed by that which pervades the
Pores

Pores from without, inward, the Spirit presses with a Pressure greater than that which removes the Light by the Weight of a Column of Water as aforesaid. But when many of the Pores can be stopped, and the Light issue faster than it pervades the rest, it is plain it can overcome the Pressure of the Spirit, &c. During these Actions the Light is always in the Pores, and on each Side of each Plate of the Parts of the Vessel, or Faces of the Piston, and notwithstanding the Prevalence, so Direction and Pervasion one way the common Pressure rests upon the Surface of each Atom the opposite way, which preserves their Adhesion, Gravity, &c. And when there is Light, and not Steam within any of the Vessels, they are formed arch-ways, and sufficient to support the Difference of the Pressure of the Spirit: These Motions and Actions do not considerably abate the Pressure of the Light upon every or any Atom of the Sides or Piston in every Direction, but they retain their Solidity and their Gravity, and the Pressure of the Light below and above is near equal, except the Difference we call Gravity. And after the Water in the steam within the Cylinder is dropped, the Light in the Cylinder pressed from without, has

the same Pressure upon the Piston upwards, and the Light through the Pores in the Piston has the same Pressure downward as Light without, and resists and presses as much upon the Surface of every Atom in the Piston facing it or upwards, or in the Cylinder facing it downwards, even while the Piston is forcing it out thro' the Pores in the Cylinder, and in itself, as if it were at Rest, or not inclosed: Nay when it is put into Motion, and as here has passed the Pores of a Shell of Metal, Water, &c. it has the same Effect upon another Shell, &c. That the Force of Light is infinitely great, and sufficient to perform the Tasks assigned, appears here in Miniature. But with what Force the Light within the Cylinder resists the Piston, or with what Weight it presses upon any certain Surface of any or each Species of Atoms, so upon each Surface in a Body in Succession, these determine not.

Because some of those who have not seen one of these Engines, may not, by what I have said, apprehend the Evidence of the Weight of the Spirit, and the Force of Light, the Beam of this Engine turns upon an Axis, as the Beam of a Pair of Scales; pendent at one End is the Piston,
on

on the other End the Forcer or Forcers; the Forcers are proportioned, that by the Pressure of the Spirit upon their Heads, and their Weight, they may force down the Water in the Barrels, and so lift up as much Water in the erect Pipe, abating the Height of the Water under the Forcer, as the Weight of the Water, and the Resistance of the Spirit upon the Mouth of the Pipe, supposing it of equal Diameter, amounts to; so to lift Water the contrary Way; and the Diameter of the Surface of the Piston is proportioned to the Forcers, that when there is what they call a *Vacuum* made in the Cylinder, the Pressure of the Spirit may push down the Piston, and lift up the Forcers or Water, whereby the Pressure of the Spirit is proved, and the Steam alone lifts up the Piston, and overcomes the Pressure of the Spirit upon its Surface, whereby the Force of the Light is proved. The Cast of the Scales, the Weight of the Piston, or the Friction not considered. For if the Forcers were taken off, or were not able to over-balance the Water and Pressure on the Mouth of the Pipe, but stood still, the Piston would be raised and overcome the Pressure of the Spirit. I consider not the Weight or Difference of the Forcers

in the Tendency of the Piston, which would be if the Cylinder were open below, and that spirit as well as light could get to its underside, because if the Piston or sliding Valve be thin and light, that Weight is in Comparison next to nothing.

Query. If the Weight of the Forcers have any share in lifting up the Piston in the Cylinder, and how much; it can or need be very little, because their Weight nearly rests upon the Water which they force or lift perpendicular. And *Query*, if the steam could do any more than raise the Piston against the Pressure of the Atmosphere, and how much.

Whatever figure the Top of the Piston should be of, concave, convex, pyramidical, &c. I think the pressure upon it would be the same as it is upon it Plane, and so upon the Diameter of any Body, how irregular soever the surface be.

If instead of Water to raise steam the Boiler were filled with common Air, or with Spirit, I think the Light which [comes thro'] the Bottom, if it could be managed so as not to melt the Spirit, would expand the Spirit with that Force, that if, when the Piston were down, the Cock were opened into the Cylinder, the Light and Spirit
would

would force it up against the Pressure of the spirit on the Top, and perhaps overcome a greater force which would sufficiently shew the Force of the light, though it would not answer the Use of the Engine, because the Spirit could not be condensed or dropped, as the Atoms of Water are.

Whether the vast Quantity of the Water in the Boiler contributes by its Expansion to the force, or whether if the Bottom were of Iron to endure Fire, and only a Gallon or *&c.* of Water were put in at first, so a less Vessel and less fire would exert this force, and to supply a Quart, or *&c.* at every stroke, of hot Water would keep the force going, deserves to be tried.



SEEING and COLOURS.

WY a Ray of light I understand a very small streight Pillar of this Fluid, whose Corpuscles are put into Motion chiefly forward; and backward in less Degree, some outward, and some others inward.

Every Pillar of Light is agitated in a streight Line from the Center of the Sun, or, &c. till something interrupt. In Proportion to the Solidity, Thickness, &c. of that which interrupts, the Light operates through it, or rebounds and operates in another Course; or to say the Truth, part operates through, and part is rebounded, in Proportion to the streight pores and solids, and to the several Inclinations of the surface it strikes upon: That which passes or operates through in a streight line, if it strike

strike upon a parallel Plane, is rebounded in the same Line; those which pass not, but are rebounded from the first Surface, act in new Lines, till they be interrupted and re-bounded to the Surface, and part pass in new Lines, and part be re-bounded, and so on fainter and fainter; and the Focus's will be found as well of Reflection as Refraction, by Sir *I. N.*'s Rules; I mean their Proportions: But from other Causes than those he assigns.

I think Reflection rebounds most of the Corpuscles by one Surface. Refraction diverts the Corpuscles of Light by their striking upon the several Corpuscles in the Medium; each at the different Surfaces of the Corpuscles or Masses they hit upon in the Medium. Inflection diverts or turns the Corpuscles of Light aside out of their streight Motion into a new Course, by the Medium of the Air, or &c. Light strikes strongest from the most smooth or polished Surface; because when the Surface is angular, the Rebounds of the fluid are directed in several Lines at right Angles, to the Plains of the several sides of the Angles on the Surface.

All Light from the Sun, a Candle, or, &c. moves in a sphere from the Center, to the inside of the Circumference, as far

as it can, if nothing intervene, and is reflected from every Point of that inside of the Sphere, or from what intervenes— And let a Hole in a Window be made never so small, there are millions of Reflections strike at that Point. Those in a Line from the Sun (if it be in a Line) strongest. Those from near $\frac{1}{4}$ of the Atmosphere from the Earth, and from every Body or Space which can be seen from the outside of that Hole: And if the sides through which the Hole is made be thin, they cross or diverge at that Point: So that if all but one Reflection were taken off, which struck streight or obliquely into the Room, you would only have Light in that Point, whether strong or faint, in Proportion to the Reflection. If the Sides of the Hole were long *, those Reflections would be re-reflected into the Room in different Lines. 'Tis the same Case upon a Lens: 'Tis not the same Rays which come in one Line to the Sides; but Rays repulsed by the sides of the Room of the dark Fluid of the Air, &c. which diverge to diverse Points, and the Rays or Pillars themselves reflect one another, the strong-

* *Q.* What I mean by long, if like a Slit? How if through a Gun Barrel?

er the weaker, &c. which makes a still greater Agitation in the Focus. 'Twould be the same Case with the Eye, if the Pupil were so large, and Convex, as with the Prism.

Reflection of Light is performed (supposing Space full of the Fluid) by Corpuscles that go backwards, as others go forwards the very Moment: As by the first Impulse some Corpuscles strike one forward against the Object, another reverts, and moves others to strike the Surface from whence the Reflection came, tho' something weaklier: So that the Corpuscles of a Fluid which rest against the Surface of a Body, when that Fluid is pushed, will be preceded by those which were behind; and those driven back, will push back and make others do the same in the Line they move to the opposite Body that bounds the Fluid in that Line.

There are several Things not considered. The Direction the Light has upon the Surface, and the Porosity or Thickness of the Body. If the Light fall perpendicular, and all pass through, you cannot see the Surface. If part pass, and part be reflected, in Proportion to the Quantity which passes, and which is reflected, the different Surfaces will appear. If the Body be
of

of divers Thicknesses, it will appear of different Colours. Plates of Glafs change Colour by being viewed separate, or one behind another. And coloured Liquors, as Gall placed upon Crystal, change Colours by being laid on thinner or thicker, because less or more Light is reflected. If the Surface be Convex, it takes in different Lights; and if there be but one Pillar of Light, it falls in different Directions, more passes in one part than another, part passes off, and is reflected back upon every Side, and represents the Lights from the Reflections. 'Tis true, where the Motion of Light is violent, or as we say, Fire, all Bodies appear near Red, and in less Degree near White. The various Angles in which the different Streams of Light intersect one another, may exhibit different Appearances; this may be tried by making Rays from different Holes cross one another at divers Angles: So of three Holes to intersect, as the three Sides of a Prism do. Cover the Side of the Prism they pass not, or pass a Ray through it so as to intersect.

Sir *I. N.* thinks the Light makes Vibrations upon the Optick Nerves, &c. as Sound does upon the Vessels of the Ear. The Fluid may pass along the Nerves to
the

the Brain, if they be empty from Fluids: But 'tis most likely that Light acts upon the Steam in them, and puts it into some Motion backwards which touches the Brain, for a Touch in any Part is conveyed by crooked Nerves to the Brain.

The Eye is not at all considered, as whether the Impression be strong or weak; whether it come in a perpendicular Line, or sloping, and in what Degrees of Inclination, whether it come from the Center of Light, or from outer Circles, &c.

As he did not understand what the Spirit is, or how it acts, and expels or moves Light, so he could not consider or state its Share in these Actions: Nay, supposing this Atmosphere, as he doth, to be composed of elastick Parts, he has taken no Notice of them; because if he had stated that, Light could not have moved as he pretends it doth.

Consider the Crown composed of round Rays and Balls moving at the Ends, so formed by the Spirit from the Reflection of the Side of a Bottle of brown *Madera*, shewn to *Lord*—.

Consider how easily this Fluid can pass the Pores of our Bodies in the several Degrees of its Motion, and what Effects it may have.

If one were to stand in the Place of the Sun and the Orbit, which the Earth describes by its annual Motion were placed full of Suns, their sides close to one another like Bracelets upon a Thread, and each appeared but $2^d 30^m$, there must appear spaces between their sides: So the fallacy doth not proceed from the Distance, but from the Perception of Light. Do not Sir *I. N.*'s spots of coloured Light appear the same? When the Light in its Course strikes obliquely upon the side of any Body, but more especially upon the side of a Bubble or polished Body, by which and the other opposite Motions of Light, it forms Deceptions, or represents such Appearances, as a direct Light doth not represent; upon which they have with great Pains pretended to shew the Manner how Colours arise.

If a fluid were moved from every Point of a Globe, it could not move as he describes it. 'Tis the same as in a Circle upon the surface every Way, or in the Center of a fluid.

The different forces of the Reflection of Light, or the Expansion in the Atmosphere, may be proved by letting it in thro' a small slit at the Bottom of a Room, and measuring the Length each strikes upon
the

the Boards, as well in a straight Line, as from the second Reflections.

Query. If Air or Water, as fluids, and having their Corpuscles in Motion, may not reflect the Light more than Glafs fixed, whose Corpuscles shift not. Sir I. N.'s *Opticks*, p. 66. *Lib.* 2. and bright Corpuscles go forward, or are reflected most strongly, because in the line of the Sun.

I think the straight Rays from the Object not only strike the Eye through a Lens or Convex Glafs, but those which come from other Reflections sideways, and increase the force; same of a Burning-Glafs; same of the Eye.

Query. If it be not likely that the Corpuscles of this fluid are of the figure of Lens's.

The Reflection from a Plain is broader and broader, as you remove from it. The angle from a Body to the Eye is a Point, and the legs extended to the outsides of the Body.

We cannot see the stars in the Day, because the Motion from the Sun puts the Motion from them aside.

Does not a Reflection from a dark Colour strike the Eye weaklier than a bright one, and appear nearer?

Try

Try this, either the sideways Reflections upon the longways of the Prism, or the Difference in Thickness of the Prism, formed the oblong Spectrum, and the different Colours.

Query. What Figure would an oblong Lens represent, and what a Lens thicker on one side than the other.

If the Difference in the Colours upon the Spectrum proceeded from different Reflections from without, from the Window shut upon the Prism, or from other Parts, and became Partakers of the Colours of the Bodies from whence they were reflected, or fainter by the often repeated Reflections, their last Reflection to the Eye would be in near the same Degree, and not be strong enough to move the Pillar to represent the Colour of any Body in them. The Sensation of colours reaches but a little way from the Object, the Sensation of the Reflection from the Body to a vast Distance.

If several Hoops of Brasses, whose Sides were placed parallel to the Semidiameters drawn from the center of the Arch of a Prism, so that the Beams of Light should all fall in the same Parallels, would not its focus fall where it doth without them.

It is the Rebounds of this subtile fluid, agitated from the Object to the Eye, which give the Sense of seeing, and if Sound can be conveyed out of a Glass Vessel void of Air, nay even full of Air, and hermetically sealed, through whose Sides Air cannot pass, it is the Motion of this subtile fluid also, which makes it strike our Ears, and gives the Sense of Hearing.

The Sense this fluid gives in the Eye, it is likely is either performed by moving the Steam in the Nerve, or after it has passed the Cornea upon the Nerve itself, whither the Air or other Agents cannot reach.

And I think the Motion I ascribe to this fluid by Means of the Sun, Fire, &c. not only thins or divides the Corpuscles or Atoms of it, and thereby renders it capable of being moved, and become what we call Light: but the very Motion pushes the fluid from the Eye, or some other Place to the Object, and from the Object to the Eye, and strikes our Sense; for if the Sense of Seeing be performed by Reflection, as they imagine, there can be no Seeing without some external Agent to put this fluid in Motion, and Darknes is only an Absence of this Motion.

If the Fluid be agitated too violently, the Eyes cannot endure it, if it be reflected too strongly, it strikes too hard, offends the Eyes, and affords not a distinct Representation. By the Degrees of the Ferment of Light, and the Strength of the Rebound, we guess at the Distance of the Object; different Mediums, (which make us think the Sun nearer at Morn or Night, than at Noon when it is nearest, and has least of the Atmosphere to pass, or things nearer in dull Weather, and larger perhaps by a greater Refraction in passing more of the gross Medium, in passing Fogs) make the Sun look red, &c. Light striking the Eye through a Telescope stronger deceives us.

As the Corpuscles of the Fluid are more or less agitated or divided, and the Fluid made thinner or thicker, it represents brighter or darker, and in some Degree changes, the Colours.

When the Fermentation in this Fluid is high enough to free Corpuscles enough, to make the Air light enough, the Steam issuing from the Eye can either move, or the Eyes can feel them, and cause the Sense of Seeing; and Sparks and Flame are here formed of Corpuscles of Matter, that are readily expanded and made by
Fire,

Fire, and can put the circumjacent Fluid into a Ferment, to produce the said Sensation. Shade is an Obstruction of the Motion of that Fluid, which gives that Sensation by an opaque Body, and is darker, as the Reflections of the Light are fewer or weaker. Darknes is a total Stop of that Motion. Seeing is performed by the Expansion of the Fluid, and Distances measured by the different Lengths, and thereby different Pressures of the Pillars of Light: When the Fluid is expanded most, it presses most, as by the Sun, Fire, &c. that we cannot bear it. Our Eyes are soonest heavied or hurt by looking at Objects at great Distance.

I think we can fix our Eyes upon the Earth or a near Object, but not upon the Sky or a distant Object, without shutting or shifting them.

A small Pressure of Light is pleasant, and a great one painful, as Pressures are upon other Parts. Objects, as the Firmament, &c. seem nearer when the Light or Expansion is weak, and at a great Distance when the Light or Expansion is strong. Can any one imagine that if two Persons stand but a Mile from one another, and constantly see one another, that the immediate Corpuscles of Light, which

strike against one Person, strike the Eyes of the other, and so alternately and successively, but that the Fluid by a trembling and vibrating Motion, quicker than the Motion of the Eye, rebounds a little, when it touches the one, and strikes back all the interposing Parts of the Fluid towards the Eye of the other? For in a Reflection or Rebound of light to the Eye, a Triangle from the Eye has the Plain of the Body from whence the Light was rebounded for Base, and as the Light rebounds from a Plain to near half of the Hemisphere, it will strike the Eye in any Point of that Space within the length of the Rebound, with the Proportion or Size of the Plain; if the Angles at the Base be equal, at full Breadth and distinctly; if one of them be greater than the other, less distinctly and so in Proportion. And Light reflects to all Points, from whence an Angle can take in any Part of the Plain or Surface for a Base, from the Side of a Globe to any Point; and the Corpuscles which strike our Ears, must move in the same Manner. When you see your Image in a Glass, you have two Rebounds from your Body to the Glass, and from the Glass to your Eye. It cannot otherwise happen in the Division made in this Fluid
by

by the Buffle in Fermentation, but the Masses must be in great Variety of Size and Figure; and if it were true that all the Corpuscles pervade the Body they strike upon, except those which rebound and represent the Colours; and if it were also true that Corpuscles of different Colours were of different Magnitudes, each Sort might rebound with different Degrees of Motion, and affect the Eye differently; but how will that hold, when the Corpuscles reflected from a Glass, suppose Blue appear Blue, and those which pervade the Glass into a dark Room, appear Blue also? But may not those Corpuscles which have passed through Blue Glass into a Room, be rendered bright by Fire or Light in the Room?

If the Diamond admit none but the finest, the Colour which passes through will be bright; if Glasses, or Bodies mixed with Corpuscles of diverse Figures, admit Corpuscles of different Magnitudes to pass them, or alter the Ferment by abating it, or changing its Direction; those Corpuscles will have different Effects, or represent different Colours to the Eye.

If you suppose there are ten Sorts of Corpuscles in this Fluid, to represent the different Colours, and that a Quantity of

this mixed Fluid struck continually upon a small Globe of any one Colour pendent in the great Space, so as to be beheld on every Side; is it possible to conceive that $\frac{1}{10}$ of this Fluid should rest in the Globe, and that $\frac{9}{10}$ could rebound and strike the Eye in any or every Point of Space where nothing intervened, or whither the Reflection reached? This is impossible upon several Accounts; for if one Pillar of Light of equal Diameter, reaching from the Sun to it, contain such an infinite Number of Times the Bulk of the Globe, and were successively driven forwards, the Globe would soon be full, and in the mean Time but $\frac{1}{10}$ would be rebounded: But the Quantity of the Fluid it reflects is an infinite Number of Millions of Times more, than can touch or come near it in the same Space of Time, and so successively or continually. And two other Impossibilities attend this Notion, the Sun must continually or every Moment send out many Millions of Times more Matter than is in it, and that Matter so sent must be annihilated to make Room for more to succeed it. If the Eye cannot take in all the Parts of a plain or Surface at once, which is broad or of divers Colours, but must view them Line by Line, Part by Part,

Part, or Colour by Colour, successively or one after another, there must be a separate distinct Reflection from each Point or Part, or Colour of that Surface to the Eye, and as many Reflections as the Parts the Eye divides the Surface into in the Time one is viewing it; and these Reflections are not only at that Point the Eye is at, but at any Point and every Point an Eye can view these parts of the Surface at, and not at one Instant, but continually and successively, as long as the Fluid, in form of Light, is present, and the Eye feels the Reflection from each Division by a distinct Pillar or Angle of Light included within two Lines as aforesaid; and if this Surface had a part of each Colour in Being, every one of them will be truly represented to all the Points, and to every Point aforesaid, by or through the said interposing Light. I think the Sense of Seeing is conveyed by the Touch of the End of the Pillar or Triangle of this Fluid upon the Body, which reflects it to the Eye, as the Sense of Touching or Feeling is conveyed from the Thing touched by a Stick, or which touches a Stick in ones Hand to the Hand; with this Difference, that we can only feel the most prominent parts of a Surface with our Hand

or a Stick : but the Eye, with this Pillar, can feel the Surface in all or every Part, though never so irregular, nay even the very Figures and Contextures of its original Corpuscles from whence the different Sensations we call Colours proceed.

If the Surface be very smooth and dense, it will represent no Idea but the Reflections of other Bodies, and this Touch is the same as would be given to the Hand by a Stick bent at such an End but intire ; this shews that it comes from the Texture of the Surface, because where that is smooth, nothing is represented.

One cannot see an Object in a crooked Line, no more than one can feel a Body by touching a Stick which touches that Body by another Stick in ones Hand ; because as the Reflection or Motion of the Fluid is straight forward, what reaches the Eye out of that Line, comes from a second or another Reflection, and represents the Body at the End of the last Line only. The Reflection of a Body to a Plain which is solid or dense, and polished or smooth, will represent that Body at the Distance it is before the plain behind it. The smoother and denser it is, the less Alteration it will make in the Reflection, and give less Sensation itself to the Eye.

If

If the Surface of the Glafs be ſtraight, what Point of that Surface ſoever you look upon, the Point of the Surface of the Body which makes the ſame Angle to a Line in the Surface of the Glafs from that Part of the Glafs, as a Line from that Point of the Glafs to your Eye, makes from a Line in a ſolid Surface of the Glafs, is represented to your Eye; and by turning your Eye to the ſeveral Points in the Surface of the Glafs, you take in the ſeveral Points of the Surfaces of the Bodies which reflect at equal Angles.

Corpuſcles of Fire, or Light alone, lodge in Diamonds, Chryſtal, fine Glafs, &c. and their Pores admit no Air: So if they be thin, they let only Light paſs; if they be thick, they reflect a great Part of the Light which ſtrikes upon them. Corpuſcles of Fire, and no Air, paſs through a burning Glafs, or are reflected or rebounded from a Mirrour, which is the Cauſe of their being collected into a Point; or if the Glafs be properly ſhaped, or the Face of the Mirrour denſe, and of a proper Figure. Telescopes do the ſame Thing with Light, as Burning-Glaſſes do with Corpuſcles of Fire; they collect the Corpuſcles which paſs to Points or *Focus*'s, which ſtrike the Eye more ſtrongly, as the Corpuſcles of

Fire in the *Focus* strike the Bodies placed there, more forcibly than when they are dispersed and mixed with Air. A Tube of Glass having the Air exhausted, and hermetically sealed, can admit nothing but Corpuscles of the Fluid in form of Fire or Light: I am not certain whether they can pass in form of Cold; and nothing but the same Sort of Corpuscles can impel or move them. Hence is that flashing Light produced, which we see by rubbing such a Tube.

If the Thinness of this Fluid could be described, and the small Degree of Motion, which is necessary to strike our Eyes with that Sensation we call *Seeing*, the Operation would not seem so difficult.

One may conceive that the Corpuscles of Fire, or those of Light, may be so small, that they may pervade the Pores of any Body or Fluid; and if those Pores were straight, there would be empty Space, so that those Corpuscles put into Motion, might continue that Motion almost infinitely; but it is hard to conceive how they pervade in a straight Line, without striking upon, and being interrupted by the Corpuscles of Air, unless the succeeding still drive on those which are interrupted. Solid Bodies interrupt the Corpuscles of
Fire,

Fire, and though they pervade, few go in right Lines, but in all Directions; those of Light can pervade only some few solid Bodies of a little Thickness, as Glass, Chryſtal, &c. If a Pane of Glass a Foot square were set, that the Light could strike only on one Side, the Rays would come out disperſedly at the other three Sides, as those of Fire come through a solid Piece of Metal or Stone; and as there are such an infinite Number, some of them it is like get forward, tho' many be diverted.

If as many Leaves as Colours (each Leaf of one Colour) were placed one behind another in the Light, would not all the Beams be stopt and reflected, each at the Leaf of its own Colour, and what Colour would that represent to the Eye? For either they must rest in the Leaves, or be reflected: That they are reflected is certain, because if a Candle were to send them against a Wall White, those which are reflected from that, can reflect Red Ones from the next Wall they strike, and so on.

Des Cartes makes Light a Pulsion or Motion of the second Element. *Vid. Cartes Princip. Par. 3. Sect. 55, &c.*

When any Body approaches near the Body of an Animal, the Pillar of *Æther* is inter-

interrupted, and the Steam within is let issue there; and when any Body is interposed at a Distance, it shortens the Pillar, and lessens the Force: So perhaps Light, &c. is perceived by the greater or lesser Force of that without, upon the Steam within.

The Figure of every Body is struck upon the Eye by the Reflection of the Light from that Body; and every Part as far as the Eye can take in within the Compass of that Point or End of it which touches the Eye. The Reflection from the Skie, or other Bodies striking with different Strokes on each Side, make the Distinction.

Shutting the Eye-Lids, stops the Operation of the Æther from the present Object, and stills them: So that at their Opening, they are fresh to be acted upon by the Æther, from that or any other Object.

Can a Glass be placed so as to reflect the Image from another Glass, and so by Sizes of Glasses or Distance, contract the Figures?

The Eye takes in as much at once, as can strike in at the little Hole directly to the sensible Part, and the Verges about that Space transversely; the Verge on the
right

right Side, on the left Side of the sensible Part, and so contrary on all other Sides.

If Light acts mechanically, *S. I.* ought to have shewed that the Parts of it which constitute or represent this or that Colour, were adequate to, or larger than the Pores of the Matter they were stopt by, and that all the other Parts which constitute or represent other Colours, were less, or so figured, that they could pervade the Pores of the Body or Fluid, so that none of them should stay to represent any other Colour, which is impossible; because the smallest Pores would stop them all, and shew a Mixture of them all; so Colours must arise from some other Cause, and that they do not act by Fits as Bodies do which have Will.

An Unite has no Colour, because it is imperceptible; that must arise from the Connection of them, or from the Position or Inclination in which you view the Surfaces of them adjoining in Fluids, or annexed in Solids.

Colours arise from the different Manners in which the *Æther* is stopt, not only on the Surfaces of the Masses or Unites which compose the Surface of the Body, but on their Surfaces which compose the Bodies to considerable Depths; in some
Bodies

Bodies quite through; and you look against a different Depth, of suppose a Pane of Glafs, as you incline more to an acute Angle with the Pane, and so it has a different Colour.

Many Colours are formed upon the Surface of the same Body or Fluid by the different Reflections of the Sun; as it is going down, it gilds the Sides of the Clouds bright, after it is down yellow, then red, then dusk Colour, then grey, and all in an Hour.

Colours arise from Figures, are increased or decreased by different Degrees of Light: Those Rangements of the Unites or Masses are but very few, and the Colours are increased in Number by the Means aforesaid.

Perhaps, the more Light comes through the Object, the Whiter.

When several Sorts of Liquors are melted, and the Parts divided small, they are transparent, when in Masses opaque; so the Water under the Line is divided smaller and clearer than here.

What doth Light imprint upon the Eye? they say Figure and Colour. I think only the Figure of the Body or the Surface, and that Colour is but a Name for the Disposition of the Corpuscles or
Masses

Masses on the Surfaces, or as deep as the Agent penetrates; and that all Sense on the Eye proceeds from the Obstruction of the Agent; and that a Diamond which is composed of Corpuscles, and not of Masses, but uniform, represents no Ideas at all, more than clear Water, &c. And the same Matter represents what they call different Colours, as the Parts of the Surface are variously disposed, or as the Surface is variously turned or inclined.

This Fluid, like a Spirit, gives you the Impression of every Body in a straight Line, of the Rest, Motion, &c. at a great Distance upon applying your Eye, and gives you notice Sleeping or Waking, of any considerable Action, by what we call Noise; so of Smelling; nay, forms and moves every Thing in your Bodies, so that nothing is left to you but the Directive Power.

REFLECTION



REFLECTION OF LIGHT.

THE fermentive Motion of this Fluid from the Sun, is repulsed or reflected in straight Lines from the Plain it strikes upon to all Places whither a straight Light can be extended from any Part of that Plane, and to Distances in Proportion to the Force the Fluid had at the Rebound, and the Degree of Fluidity of the Fluid. In its new Course, when it strikes upon a solid Body here in a clear hot Day, its Force is strong enough to rebound it to other solid Bodies several Times, and that once put into Motion by the Sun, being interrupted by its Rebound or new Motion, can give a new Direction to the Light already in Motion; nay, can agitate Part of the Fluid which was before in that State we call Darkness, and by that Motion render it Light.

The Reflections of the Fluid from the Bounds of its Motion in the vast Space, as they

They come mixt to us, with the Reflections from the several Globes and Bodies, are weak or next degree to Darknefs, and represent what we call blue Sky, like a dark Body with faint Reflections. The Space being full with this fluid, makes it possible for this fluid to be reflected several Times in several Directions.

The Corpuscles moved in that Degree we call Light are not strong enough to pervade the Pores of Solids in straight Lines. Those in that Degree we call Heat pervade in all directions straight or crooked, but those which move in crooked Lines represent nothing to the Eye but the Sense of Heat.

Whether that Brandishing of the Light upon the Ground in very hot Weather be only the Rebounds of Corpuscles of Fire and Light, or Steam rising out of the Earth before Rain which meets them and causes that hurry I am not certain: But I think it is only the Rebounds of the Corpuscles of Heat with what they detach from the Surface.

Consider how it is in Reflections of Light, do they as smallest divided still move on by the same Rules however reflected till they unite with others and become of like Gravity and so rest, and those
of

of greater Gravity successively push back and take their Places according to their Gravity; and when their Motions are cross one another in Fire, or different Reflections, doth not their Motion divide the Corpuscles of Bodies?

They divide in the infinite Sphere as they recede from the Center, and mix amongst the grosser, till their Force is lost, and their Number not sufficient to appear, and then form Masses.

The lightest Part of the Æther separated at the Surface of each Globe next the Sun, is that which we see white at this Distance, and is in the Figure of a Cap, with thin Edges and a thick Crown: That Cap appears plainly much larger than the dark Side of the Moon.

When the Pushes of Light from the Sun go in one Line, they produce but little Heat, when several Reflections from several Surfaces meet by acting one upon another, they produce that Buffle: Hence cool Air and Snow upon the Tops of Mountains.

The Hemisphere of each Globe next the Sun, whither those of Light issue, and where the Masses of Æther behind the Globe are hindered from pervading, is filled with Light, and the Action thereof divides

divides those Masses it found there. By this all Fluids are kept so; all vegetable Matter divided, and united with the Æther, and squeezed upwards.

When the Rays from the Sun strike perpendicular against the Ground, a Wall, or &c. the Parts of the Æther act in the Surface or in the Pores, and are divided smallest there, and then those which are at some Distance and grosser, press in and push the smaller out, and are divided in Degrees as at the Sun.

If the Fermentation or Motion given by the Sun to the Fluid be reflected or turned back in the same Line it came, its Force is almost doubled; but otherwise if it had gone off in another Line; the same where Lines cross or intersect one another.

Consider the Angles of Incidence and Reflection of the Pillars of Light which strike and go off from the Surface of the outer Globe, and how they cut and intersect one another, and form that Cap of Light which covers the Side of each Globe next the Sun, and likewise how they strike and go off from the Surface of the inner Globe, and the inner Surface of the Shells where they miss that Globe and pass thro' the Sphere of Water, or how those which reflected from the inner Surface of the

Shell upon the Surface of the inner Globe, are thence reflected outward through the Shell, and how and which of them affect the Variation and Dipping of the Needle upon the outer Surface: Will a Needle point to a *Vacuum*?

The Direction of the Motion of Light from the Sun, or Moon, is directed outward by the Atmosphere, and so greater in the Even and Morn.

These Motions of the Light and Dark, or small and great Masses of the *Æther*, make the sudden Alterations at Morning and Evening and the Grey Appearances, and perhaps Winds from Sea and Land to the Islands: settle all these Things.

I am not sure, but I think more light Particles than those which come in a Line from the Sun to a Globe, will fly thither, because as the heavy ones cannot pass the Globe, there is a Sort of Space made thinner and ready to receive them, and so long as the Thinness near the Sun is greater than that near the Globe, the heaviest will push thither. (*Query*, if Nearness may not prevail and make the large ones push in sooner to the Cap.) But can there not be a middle Motion formed between two such thin Places on the Surface of the Sun and a Globe, or two Globes?

Globes? Perhaps there may when the Thinness is near equal, but not between a Globe and the Sun (except as aforesaid).

It is the reflected or rebounded Corpuscles which heat us so much more when the Sun is near our Zenith, or a Plane at right Lines to the Rays behind us.

The Reflecting of Light from the Side of a Prism, strikes them into the Air, or Light in Motion in another Direction, whereby you have two or more Actions of the Light striking upon, or further reflected to your Eye at the same Time, which is not shewing Light, but the Imperfection, if one may so call them, which not in Nature, but by our Means, happen between such different Motions, and the Representations they make, or the Ideas they raise in the Brain, are so contrived as to be gay, amusing, and agreeable to such as could be content to spend their Time about Butterflies. When Light strikes a Prism, it parts the Light and Masses of several Sizes in several Lines one from another.

When he does it in a dark Room, it is striking Light into the Darknes, when in the Rainbow it is striking Light against a Cloud, so upon a Bubble.

The Reflection of light upon the inner side of a Ring or round Vessel, forms a Heart.

That they note for Blue or Black beyond the Globes is so crass, that the light does not thin it, and will interrupt any reflected Light in a great Measure.

When Window-shutters are opened, Light expands the Air, and drives it sensibly against the Body.

A Ray of Light will form a *Vacuum*, and the Rings about the Point will be of several Degrees of Grossness, and Form divers Colours.

The Light which presses through a Hole moves quickest in the Center; and besides the Reflections of the Sides, moves weaklier near the Rim, and causes Ideas of divers Colours.

The *Æther* is put into Motion in the *Bolonian* Stone, by putting it in the Light of the Sun or open Air when the Sun shines, and continues in Motion in the Dark, puts the *Æther* there into Motion, and strikes our Eyes with a faint Appearance of Fire.

Motion is not essential to Matter, nor can Matter move further than the Force which impels it continues, and all Matter is moved either by a visible or invisible Agent. This

This Fluid becomes a stop to the Motion given it by the Sun on every Side at that infinite Distance where the Force can move it no further; not at once, as it is stopt by a Solid, but by Degrees, till the Motion become imperceptible, as Water doth from that which moves it on every Side in a horizontal Plane, or the Motion of the same Fluid from other Planes oppose it.

Its Motion from the Sun is also stopt by solid Bodies by the Sides of the Globes next the Sun from coming to us, most evidently, when a Globe interferes, and causes what we call a total Eclipse; in lesser Degree, by dense Vapours or Clouds in a Line between us and the Sun, or by the great Length of the Atmosphere, when the Sun is in or near a Line with our Horizon, in Proportion to the Quantity of Steam in that Part of the Atmosphere. For when the Steam in the Atmosphere or Clouds is too gross to be put into Fermentation, they interrupt the Motion in that Line, and so hinder the Light and Heat; or when the Steam rises out of the Earth, and meets the Fluid in Motion, it partly diverts the Course, and partly condenses or clogs the Fluid.

The Motion of the Air which we call Wind, in some Measure abates the Heat, but not the Light; the Rain in falling hinders both.

Though this Motion from the Sun can ferment this Fluid from that State we call Cold, or the humid Vapours which rise from the Sea, or out of the Earth, yet it cannot ferment the Corpuscles of terrestrial Matter which comes in an Easterly or other Wind over a vast Continent of Land, which makes them more pernicious to Fermentation, Vegetation, and the Functions of Life than Cold.

The Course of this Motion is also interrupted or abated here by most Solids, except thin Glass, by the Walls and Covers of Houses, by the Covers of Vaults, &c. in Degree, according to the Proportion of their Thickness, Solidity, &c. when any solid opaque Body interposes between the Sun and us, the Motion in that Line is abated or interrupted, and we have little Heat, and no Light, but what comes by Reflection in Lines from other Bodies, or from the great Circumference where its Motion terminates.

If a solid opaque Body interpose between the Sun and all Reflections, and inclose us, that Motion we call Light, which
comes

comes in straight Lines, in a Moment ceases, for the last are moved by the first like Links in a Chain, or rather like a Row of Bullets in a Barrel. But the Corpuscles of that Fluid put into that Motion, we call Heat, as they can pervade the Pores of Matter in any Direction, if the Body interposing be not very thick or solid, will pervade and act, and if they be totally interrupted, cease not to act so suddenly as those of Light.

When the Clouds, Rain, &c. keep off the Ferment of the Sun, and chill that Part of the Atmosphere like an Eclipse, the Resistance being lessened, it suffers the Steam to rise out of the Earth. The nearer the Sun the Ferment is interrupted, as in an Eclipse by the Moon, the more its Operations here are weakened, and that Stop for a few Minutes chills every Thing here, more than the Interposition of the Earth for a Night.

I think the sides of the Globe opposite to the Sun, receive nothing from it, nor send nothing to it; for if a Space be near full of a Fluid, pushing the Fluid in one Part, must move Part of the Fluid to the opposite side in straight Lines, and it must rebound from the Plane it strikes, or at least it will be moved a Distance, in Pro-

portion to the Strength applied by the Agent, and the fluidity of the fluid; and if one Corpuscle or small Part be pushed forwards it pushes another backwards, or into the Place of that which moved first in any Direction, so this violent Agitation can never empty the Space about the Sun, nor lessen the Quantity of the fluid there; nay, if you allow the Fluid to fill the space, let the Sun move the Corpuscles there, with never so great Force, and throw them to never so great Distance, the Case will be the same; for the Force that throws them forward, throws others backward; and whatever Distance they move at once, the Sun will always be supplied with fresh Fluid.

If the Sun be only a *Focus*, its Motion each Way will be equal, except the Reflection of the Globes alter it: If our Poles were not frozen, they would admit more of this fluid, and perhaps their little Motion, as well as the Want of the direct Motion of this Fluid from the Sun, helps to freeze them.

That Part of this Fluid near the Sun, which is put into a violent ferment, is fire; that which is at a greater Distance, and less moved, Heat; further Warmth, further Light, and where the Ferment is
weak-

weakened by Distance, or interrupted by Matter interposing or intermixt, faint Light; Darknefs and Cold, where it's clogged, or wholly inactive, Frost.

And it is likely the Agitation weakens where it is pure, in Proportion to the Distance of the Lines from each other, extended from the Center of the Sun, or from its surface, in a certain Proportion to the Distance and Interruption; and this fluid differently moved, or at rest, communicates several of its Qualities, and may be compared to Water or other fluids, boiling, warm, cold, frozen, &c.

The Corpuscles of this fluid are moved by the Sun in right Lines from its center, or rather in Angles between Lines extended from the center on each side into the immense Space.

Its force is strong enough here to rebound at several Times; so this Fluid will form circles every Way about the Sun, or any other Agent which puts it into Motion, thinnest or brightest, or most agitated at its Sides, and still thicker, darker, or less agitated, as it proceeds to greater Distance.

Though the chief course of this Fluid is straight forward from the Sun, yet it has a weak course sideways: for when as

we

GLORY MECHANICAL.

we say Light passes through a Hole into a dark Room, the stream grows broader and broader from the Hole; the stream in a Line from the Sun bright; the sides of variegated colours.

If the Sides of the Hole be thin, the Reflections or Motions of the fluid from the several sides of the Hemisphere may make some Alterations: But if the sides of the Hole, or the dark Body through which the Light enters be thick, the Reflections can have little Effect; but the colours in the sides of the Stream must be changed by the sideways Motion of the Corpuscles, and the different Degrees of fermentation or Motion, or the different Directions of the corpuscles must form or represent different colours.

The Agitation of this Fluid in form of Light, so entering into a dark Room, is visible by the Motion it gives the light Bodies we call Sun-Beams, and by its Rebounds upon the Ground in a hot Summer's Day, and I think may be seen in a pure Glass Receiver, where the Air is extracted.

Every Idea of Matter arises from a Representation of some one, or several of our Senses, or what by Division or composition

on has Relation to those which have been represented by the Senses.

The Idea we have of any Parcel of Matter being moved by Agents without, will be imperfect till we know the Agent that moves the first parcel of Matter, which contributes towards the moving of the several Parcels of Matter between, and those Parcels of Matter and the Body moved, and the several Parcels of Matter removed to make Way or Passage for it, and the several Lines, the several Parcels moved, describe to take their old or new Places. This only relates to visible Solids, for the Parts of uniform Fluids escape our Ideas, and we have no other Idea of them than of Spirits.

The Idea we have of a Parcel of Matter being moved by Agents without, and Parts contributing to the Motion of the Whole, or Parts, or Part within, will be imperfect till we know the Agent that moves the first Parcel of Matter, which contributes towards the moving of the several Parcels of Matter, between the Body moved, and those Parcels of Matter between, and the Parcels of Matter contributing within, and the several Parcels of Matter removed to make Way, or, &c.

The

The Sun is the Eye of the World, and also the Furnace, by which all Things are prepared.

I think all other fluids are inactive themselves, and their Motion proceeds from the Motion of this Fluid, and this also is inactive till it be put into Motion by the Sun, or, &c.

If Matter have no inherent Inclination to Motion or rest, but as it is directed by the Motion of this Fluid, then the Weight or other Qualities which they attribute to the Globes, except their Degrees of Solidity, have no Existence, and this Fluid may move them as easily as so many feathers, or as it would move without them.

The Pressure of this *Æther* separates Matter, each into its Place of Use. Bodies most solid, or most united lowest, and the several Degrees to their several Degrees of Distance from each Center; so that the heaviest moves toward the Sun, and the lightest outwards.

The Motion of the Parts of Air is more violent, as they come nearer the Sun or fire, and so break the Masses more in some Proportion to the straitning of an Angle, as it comes nearer the Center, the same Quantity moving through the straitest

est Part of the Angle, in the same Time as the greatest Quantity moves through the widest Part; much in the same Manner as the Water which was pressed from each side, towards an Inlet into the Abyss, which being consequently with greater Velocity, if the Water be capable of forming into Masses, broke them and thin'd it more (which seems to be the Case in running Water, which keeps it from being corrupt, and of Water raised through Pores of Stone, Chalk, &c. in Springs which makes it finer, and perhaps something lighter) and also tore the Stone with greater Force; and if it were of the same Resistance, tore it deeper next the Inlet.

Nothing larger than Unites or Light could successively impel and drive them out from the Sun hither; and if the Unites of the Sun be larger than the Unites of Light, not one of them can depart from it, and nothing larger could drive the Unites or small Masses of the *Æther* into the Pores of Vessels, Bodies, &c. with such Force, but such as themselves behind.

Either there is Unites in the *Æther* of different Sizes, or else the grossest Masses are pushed most: But perhaps this holds only as to itself, and that the Unites or
small

small Parts of the *Æther* prefs as freely through between the Unites in the Masses of all other Sorts of Unites, as if they remained loose in Unites.

Though it has been over-looked thus far, the Proof upon which the whole depends, to wit, The grosser moving toward the Sun, and the smaller receding, admits of ocular Demonstration.

Proofs may be made upon the Motion of the *Æther*, by observing the small Bodies we call Sun Beams in the Light, they being grosser than the Masses of the *Æther*.

It should be done in a still Day, and no Fire, Holes, nor Draughts of Wind.

They all move in the Stream of Light towards the Window in a line towards the Sun, and partly downwards, when the Sun is low, and I suppose, stick upon the Glass, or get out at small Holes.

If there be any Fire in the Room, some go to the Fire, some towards the Sun, and some more obliquely; one may see how they move towards the Fire, with the same Light of the Sun.

When the Sun is near the *Zenith*, if there were a Hole in the Top of the Room, they would all go out there.

I suppose those small Bodies are raised off the Floor by the Re-action, try them off a Glafs

Are not Sun-Beams such Matter as form Clouds, before they are raised out of the Atmosphere, the Earth turns them into the Side of Darknes?

If such small Bodies were put into a Glafs, and let loose after the Air were extracted, one might see how they would fall in a clear light.

Sun Beams fly one's Hand gently mov'd; try other Bodies.

When the Sun ceases to shine, or the Bodies pass out of the Ray in a Chamber, they fall down.

The opposite Motion of the lighter Parts from the Sun, and the heavier towards it, doth nothing towards any body, towards or from the Sun, their Force being near equal (except Sun-beams) but only the Compressure of the whole acts in every Direction, nearly equal by Rules, as aforesaid.

Light from the Sun, a Candle, &c. is carried off in this Manner, and a continual Rotation is made in each Sphere of small going off, and heavier coming to, and the heavy, as it comes to, growing smaller,
and

and the small, as it goes off, uniting and growing heavier.

Light is successively propagated by some Action, which divides the Masses or Fluid of *Æther* at the Sun into small Corpuscles; 'tis driven, by an Accession of heavier Masses, in right Lines from the Sun, by the Pressure of the Atmosphere; 'tis Day upon that Part of the Earth it strikes against, and Darknes on the opposite Side.

The Light perhaps does not proceed, or put those in Proceffion into Motion, so great a Distance as they talk of at an Eclipse; but the Earth is moved in a few Moments into another Space, where the Light is in Action, and perhaps the Pillar of Darknes may also move with the Body, &c.

The Recedence of the Light from the Sun, &c. will be diverted, when it strikes sloping upon Masses of Air, which are grosser than those proceeding, and that is the Reason why they pervade the Pores of Glafs, &c. which are exceeding small, and adhering close, which they cannot do thro' a Body, which has large Masses or Intervals. The Sphere of Light, or rather Cap, next the Sun, turns with the Atmosphere
successive

ſucceſſive to behind the Globe, whence Motion of the Globe.

No Force could make Light reflect if all were not full; if any Thing moved one Way, and another Part did not return, it would move what ſtood in the Way.

If the Action of Fire be ſupported by the Diviſion of Fuel, and that Fuel can re-unite and fall down again, that is perpetual Motion.

The Difference between the Sizes of the Unites of *Æther*, and thoſe of Water, is ſo great, that wherever the *Æther* is in Motion, and the Maſſes divided to a common Degree of Smallneſs, they keep the Unites of Water diſunited; but they muſt be much ſmaller divided, or in Unites, when they can pervade between the Unites which compoſe their own Maſſes, ſo as to reduce them to Unites, and in conſiderable Motion; whence they do not preſently re-unite into Maſſes.

In the Morning in Summer, or when a Window is newly opened, the Sun Beams move freelier to it.

The force of Motion is bounded, if there be any *Æther* which the Sun does not move.

Perhaps the Stars which are fixed, are ſo for returning the Light back, and

therewith preventing a Stagnation of the groffer Æther, and making the larger Masses return to the Sun; and perhaps seen and unseen, there may be as many of them as environ the immense Circle, and most near the Equator or Ecliptick.



FIRE.



F I R E.

T HIS fluid sufficiently agitated by the Sun, by Accident or Art, can divide the Corpuscles of almost any Body, without impelling or pushing the Body forward. but does not impel or drive any solid Body here without the Assistance of Air or Smoak, Water or some grosser Fluid; can by the different Degrees of Agitation and Quantity of its Corpuscles in the Pores of Bodies of different Consistences divide the Corpuscles, and by the Assistances aforesaid, being sufficiently injected into and agitated in the Cavity of any Vessel, or &c. burst it; when in that Degree of Agitation we call fire, it divides the Corpuscles of Bodies, or reduces them to near their first constituent Parts, and some

K 2

sink,

sink, some swim, &c. but diminishes nothing.

Thus Salts in Mass are inactive, when divided into small Masses, fret the Coats of the Skin or Surfaces; when divided into the smallest, freed from extraneous Matter and agitated, act like fire, which when greatly agitated enter in at the Pores and begin the first Actions by fermenting the fluids, and dividing the Corpuscles of the Solids, &c. But when a sufficient Quantity is put into Motion or ferment, if it cannot pervade in a Moment, it bursts or dissolves the strongest or most solid Body.

The Spirit or Grains of Atoms driven by the Impulse of the Pressure against the Atoms in the Action of fire, are split and divided by those Atoms, as if they were driven against so many Spikes or Points so small as to enter between their Atoms on every Side of the fire; and when one Grain has lost several of its Atoms, so that another takes Place of it, it is tossed back, and many such make the Bustle we call flame: So none can enter till they by several Strokes and Repulses are divided to Atoms, and make an Addition or Supply to the Parts of
the

the fire, nor go off till they are successively driven out in Atoms or Light.

The Corpuscles of this fluid by different Degrees of Agitation, in Proportion to the Degrees of Adhesion, divide the Corpuscles of all Matter, fluid, or Solid; if they be of different Gravities, so that some will swim in Air, and some subside, separate them; if they be of equal Gravity, and too heavy to swim in Air, calcine them, or keep them in fusion during the Agitation.

Must not those Points which are driven with a force sufficient to divide and split the Atoms of a Diamond from each other, be as hard as the Atoms of a Diamond, or that Compressure which makes them adhere be taken off or both? In fire, where the Spirit is melted as it comes in, and the Vibration of Light in the Motion we call fire is so quick in every Direction, and tends to no Point, the Pressure of the Spirit is lessened or taken off: The Direction of the Pushes of the Light is so varied, that instead of preserving the Adhesion, it partly suffers and partly forwards the Dissolution of the Atoms of most sorts of Bodies, keeps some of them fluid, in Motion, &c. nay, a sufficient Degree reduces any to Atoms,

and upon removing them out of the fire, the Spirit gives them their usual Degree of Adhesion.

If the common expulsive force of this fluid be the Cause of Adhesion and Gravity, where that force is increased in a Part of the fluid, it can by its Assistants or Instruments, Air, &c. throw a Body with force and Velocity equal to the Difference between the common and increased force, or burst Bodies, or split Masses of Corpuscles which the common force keeps together. Fire, in Gun-powder, works with the Corpuscles of Matter in form of Smoke, and thereby expels Bodies with that incredible force, and the Smoke is so gross that it makes a Percussion in the Air.

Fire obstructed by or expanding Water has a prodigious force, and can with a few Grains of it throw off a great Quantity of melted Metal, with a force perhaps not inferior to Gun-powder. What force it hath with pure dry Air, I am not certain.

A small Quantity of Water poured upon burning fuel, as Coals, or &c. expands and bursts the fuel by the Impulse of the Corpuscles of fire, and renders the fuel more open, makes more Surfaces,
and

and thence more fit for the Fire to act in.

If the Pores of Fuel be full of Corpuscles of Water, the Corpuscles of Fire must expel them, each by detaching and bearing off some in their Pervasion, before they can act in form of Fire.

The Corpuscles of this fluid in passing through a Burning-Glass, are not only freed from Air, but put into a fermentation in some Measure as they are in passing through fuel. And however they be agitated in our Atmosphere, except directly from the Sun, cannot act in that Degree we call fire, but in the Pores of fluid or solid Matter, where the intervening Corpuscles keep off the pressing fluid which is not agitated enough to act.

When Fire in Action is inclosed within a furnace, or *&c.* it rarifies, expands, and expels the Air upward, and the force of the Stream of Air into such a *Vacuum*, is increased by the Straitness of the Entrance, as a Spout out of a Vessel of Water. The stronger and quicker the Air moves in, the more it agitates the Fire. If the Entrance for the Air in, and the Passage out be too long and too strait, the fire will rarify to that Degree as to burst the furnace. If the Air be admitted in

too fast, that is, faster than the Corpuscles in Action can inflame or agitate those in the Air, it at once clogs and hinders their Action, and the Velocity of Motion in the Pillar. If the Entrance into the furnace below the Fire be quite shut, and the Passage upward open, it will act very slowly. Where Fire has sufficient Quantity of proper fuel in Action, and is once arrived to a considerable Height, it sufficiently agitates and prepares the adjoining fluid, and without any help by Art increases infinitely.

The fluid agitated by the Sun strongly weakens the force of Fire, because it either expels the Air too much, or is too much divided, and pervades the Pores without dividing the Corpuscles.

The Action or Motion of Corpuscles from the Sun, are in Lines nearly towards the Center of this Globe, or a little obliquely; those from fire or fuel, in a Line from the Center of the Globe towards the Sun, unless forced aside by Resistance; and in the same Lines in which they move themselves, they move other Bodies; by this Means one of them opposes the other, as the Sun-shine fire in fuel.

This

This fluid fermented by the Sun to a sufficient Degree, has all the Qualities as Fire acting in fuel, only it is freer from extraneous Matter, and is thereby more subtile. It is likely when there is any sudden *Vacuum* made among the Clouds by Condensation, or &c. this subtile fluid rushes in first, and by its Motion is agitated to the degree of fire, and fires the rest of the fluid in the Direction it moves.

When the fluid is fired in that Manner we call Ligthening, either the Air is expelled from one Cloud to another, or the fired fluid by meeting the humid Clouds in its Course by entering expands the Humidity, and is thereby expelled from one Cloud to another, and makes that Percussion of the fluid which we call Thunder, which reaches our Ears in a small Time after the first flash.

The Rays or Streams of Light or Fire which reach hither, and have such forcible Effects, make little or no Percussion in the Air. As the Weakness of the Pressure, or of the Resistance of the Air and fluids, is the Cause of Extension and Pain in weak Parts, which frequently precede Storms of Wind and Rain, so the same Causes give Opportunity to the Air and
fluid

Fluid in Parts adjoining, which are more pressed, more full, or larger Masses, to push that Way where it meets with least Resistance. Even Clouds interposing between the Sun and any Part, may abate the Expansion in that Part, and suffer the Rain to fall, or the Wind to blow thither from the Places where the expanded Force is greater.

This Fluid must pervade the Earth, raise Vapours, &c. The Corpuscles of this Fluid intermixed with others arising out of the Globe on the Side which is turned from the Sun, wholly or obliquely remain entangled with Corpuscles of other Fluids or Bodies, and are clogged till that Side be inverted to the Sun, and then they are divided, separated, agitated and thinned, and so alternately.

Part of this Fluid may be put into that State which we call Fire, by Friction of Solids, by collecting the Corpuscles with Glasses, &c. and by preserving that fluid so collected and put into Agitation by proper fuel: To make fire act here, there must be so many Corpuscles in proper Pores of Matter put into such Motion that the Pressure of Air, and the rest of the fluid, shall drive them forward, but not separate them.

This

This Fluid, when by any Means any Part of it is put into Motion amongst the Pores of proper Bodies, keeps itself in Motion. When Corpuscles of this Fluid are in Motion in the Pores of Fuel in the open Air, the Corpuscles of the next adjoining below or sideways, drive in, and drive the others out upwards in immense Quantity, and with prodigious Velocity, as may be seen by the Shade of the Smoke issuing from a Candle burning in the Sunshine, besides what is thrown out sideways; and every Atom of the Smoke is composed of the Corpuscles of the fluid, and of the fuel that goes upwards, and those which go sideways are invisible, because they are light. When in a furnace, or any thing which confines them, besides the new ones, the same Corpuscles which have passed the Pores are rebounded by the Sides of the Furnace, or &c. and pass the Fuel through and through, before it go off upwards; in like Manner where there are great Quantities of fuel or fire, though the Fluid can enter, yet if the Smoke or Steam go not off, there will be no Continuation of the ferment, as fire will not burn in *Vacuo*, nor Vessels ferment much when corked close or hermetically sealed; and it is very likely it is this new
Admission

Admission of the Corpuscles of fire, which keeps up the fermentation so long in fluids. And this Agent must agitate Salts in Dissolution of Metals, (whether if the Glass be sealed I know not) Ebullitions in Mixtures of Salts, and some Sorts of fluids, Explosions in Gunpowder, &c.

Whether the Corpuscles of this fluid act the Part of what we call fire alone, or whether they act with the volatile Salts which fly in them, or with those it melts in the fuel, or with both, is hard to determine.

The Pores of fuel must be of that Size, and the Corpuscles of that figure or Adhesion, that the Corpuscles of this fluid may, but the Masses or those of Air may not enter, and that the Corpuscles of this fluid may divide them, and separate some of them. If there be any of Water, they expand, burst and drive away the Corpuscles of fire.

As the fire increases in force, it divides and prepares more of the fluid about it, or puts more of it into that State we call fire; and if there be fuel or matter sufficient to act in, it will extend infinitely.

The force of being near the first Action prevails against the force of the fluid
moved

moved by the Sun, because it is diminished by the Distance from the first Action.

Fire burns best in the Night, cold Weather, or frost, partly because the adjacent Masses of the Air, &c. are then most united and liable to be driven down, and consequently to drive the Corpuscles of the Fire and Smoak divided by Agitation upwards, and partly because the Masses of the Fluid are not divided too small before they come to Action: For the Expansion of the fluid by the Motion of the Sun, whereby the Gravity is as great, and the fluid more divided, partly by its opposite Motion, and partly by its rendering the fluid too thin, weakens the fire, and consequently when and where fire is most needed, it acts strongest: So this fluid in form of Light or Heat issued out from the Sun, weakens the force of fire acting in fuel; in form of Darknes, and especially Cold, strengthens it.

There are two Operations of this Fluid which affect fire, the one the Pressure which carries the Corpuscles of fire upward, impels new Corpuscles in, and makes the Motion strong. The other Expansion which when it strikes upon a small fire directly and strongly from the Sun,

Sun it hinders the Motion upward, and weakens the fire.

When two hard Bodies are struck or rubbed one against another with great force and quick motion, they push the intermediate Corpuscles of fire violently through the Pores of the Surfaces, put them into that Action by which they divide the Corpuscles of Bodies; they being once put into that Motion, others succeed them by the Pressure behind, and if they meet with proper fuel, begin to act and extend in Proportion to the fitness and Quantity of the fuel, so that the same Action, as Shaking, friction, &c. which moves the fluid and touches the Ear, continued, occasions Heat, Fire, Light, &c. And a Tube with a wide Mouth and a small Aperture applied to the Ear, and the wide Mouth at the other End collects and conveys this fluid to the Ear, and strikes the Part which gives the Sense of Hearing more strongly.

When a Sphere about the Sun is thinned, it goes off equally every way till Globes interrupt, and the grosser Masses press in equally; and where there is a Sphere of thinned Matter by fire near the Earth, it takes the same Course in all Directions, except downwards, if at Liberty,
and

and grosser Matter from all Sides pushes in. But when it is confined on all Sides, pressed by the grosser, and included so that the light matter makes its Way at one Point, the force of Expansion, or more truly of the Pulsion on every Side is vented there.

The grosser Parts of the Air are still pressed to the Earth, between it and the fire at any Distance from the Earth, and those divided into the fire cannot retreat that Way.

In small fires here, the fire acts upon the æther, by being sheltered in the Interstices of the fuel from too great a Quantity of Air, which would press in upon it, and extinguish its motion given, and only divides the Corpuscles of what we call the fuel by that Operation accidentally: But when in sufficient motion, it flames out to a proportionable Distance, and fire injected into Bodies which that force is not able to divide, continues its Action some Time.

The Spark of Fire in a Chip of Metal, acts for a moment in its Pores as above.

Does the small æther pervade through the Pores of the Fuel to supply the Action?

Does

GLORY MECHANICAL.

Does not the *Æther* which pervades the Earth, raise to the Fire and bring up the Water out of the Surface to the Fire? Or is it any more than the lowest and grossest *Æther* at the Surface being pressed in, which raises the Water to Fire, and in hot Weather?

Where there is no Wind, the lowest and largest Masses of Air, and not those from above, are pushed into the *Vacuums* which the Fire makes, and by that means the Parts of Light and Heat recede, and are diffused upon the Surface and made useful, while the Masses of Smoke, and part of the vegetable Matter which goes off from the flame, and which are much larger than those of Light, and the Masses of Air which are not split so small as those of Light, some by their being divided smaller than those in the Air next above the Fire, rise till they come to Masses of the same Size, and some, by the larger Parts of Air pushing into the *Vacuums* made behind or below them, are pushed upwards, and rise till the force of that Part be spent, and then fall.

The grossest Parts of *Æther* enter on the Side of the Body where the Fire begins, and some smaller, enter from the
opposite

opposite Sides, I think, in Proportion as the divided Parts recede.

There is a proper certain Quantity of Air sufficient to make Fuel with Fire work, if less it will go out or burn slowly, if a proper Quantity it will burn very fast, if more it will burn still slower, and the Motion of the Air coming towards that in Action is, in Decrease from the proper Quantity, slower, when there is too little, and when there is too much.

When the Air has free Access to the Fire, in a small Quantity of Fuel on every Side, the fire burns slowly, and the Spaces between the fuel are successively filled with flame or gross Air: But when the fuel is included in a Place, so that a certain Quantity of Air can be admitted, no more than the fire can divide, the Space in which the fuel and fire is contained becomes a thin *Vacuum*, and the Air without is pushed in with greater Violence: If less Air than the fire can divide comes in, the *Vacuum* is still thinner, and the Air pushes in with greater force, and so on.

Raising the Parts of Oil or Spirits into Motion is but the lowest Degree of fire, is but that Degree we call flame, that the Parts hover, and will neither stay nor go off.

GLORY MECHANICAL.

Will Wood burn in Spirits or Oil, when they are burning? Wick of flax doth not.

Where the Parts of the fuel are fluid, they are more easily driven up into the *Vacuum* which the fire forms by receding upwards to form the Appearance we call flame, than when the Parts of the fuel are solid, and so in Proportion.

Oil in small Quantities pressed into fire, mixes with the fire, and rises in flame and forms a fluid of near the same Grossness as Air, and the fire subsists in flame, and the Parts of Oil being perhaps the lightest of any fluid except Spirits, it and they are tossed in Form of flame.

Would not Time in burning the same Quantity of Spirits of different Proof be different, and that a Proof of the fineness of each?

Perhaps the Pureness of Oil may be proved the same Way.

Perhaps they may burn faster or slower in different Seasons, but that may be proved by trying proof Liquors at the same Time.

Officers may now do as they please, there is no certain Evidence, what any is above Proof.

Within

Within the Sphere where the fire acts, the Parts of *Æther* on the outside of a Body are as small as those within.

Will a burning Cand'le draw those Masses of Air down, &c. we call Sun-Beams to it? Is that Rarefaction greater than that of the Sun, where it comes through a Window into a Room?

The Compressure of the Air above, makes the Corpuscles thinned by a fire, Candle, &c. here, diffuse sideways as well as upward. Add that those small Bodies which are divided by a Candle move other small Bodies which are amongst the larger Masses to a vast Distance on every Side.

Perhaps that which in Mines will not let the Candles burn, nor us breathe, is not Air, or there is not sufficient Quantity of Air, or that Matter enters the Candle; or, &c. and hinders, so we perspire more. Perhaps the Masses are too gross, and cannot enter; or Water in them, and that intangles the Corpuscles of fire.

Light will not extend from a Candle, in a Grotto, or Vault, or in Mines, &c. where the *Æther* is formed into gross Masses, and few small ones remain among them, near so far as it will in the Night, where there are many small ones that have

been divided the Day before, nor so much near the Morning.

Where they are all gross Parts, and no Parts of the *Æther* small enough to enter the Pores of the fuel, a Candle will not burn; would a Lamp with Oil, or some more open fuel?

Cultivate that, that Light will but strike a little Way in Mines, or Places where there is not, or has not been lately a Mixture of Unites.

While the Spirit presses equally upon the flame of a Candle, the Atoms of the flame are so near together, and so small, that they admit not a Grain till it be melted, and issued upwards or outwards in Light; when the Spirit is driven in on one Side more than the rest to a certain Degree, it dissipates the Parts of the flame, and extinguishes the fire, except it be resisted or rebounded, as the Spirit doth in a small Degree, and a Solid in a greater.

A furnace reverberatory, kept close, and over-heated, would be burst by the Air, and after it were burst, the Air would blow away the Sides; and if a Ball were placed in a Tube at one End which could come outward, but not go inward, and when it were very hot, the Air were let in at the
opposite

opposite End, it would drive the Ball; and so would the Air let into a heated Barrel at the Touch-hole.

In a reverberatory Furnace, the fresh Air comes in only along the Draught, and is kept off on all other Sides and the Heat reflected, which makes it so active there, and the cold Air is kept out of the *Æther* in the flue, which makes it lighter and rise with greater Velocity, as the Difference between it and the outward Air is increased: Hence Fire burns best in cold Weather, Night, &c. and worst in Sunshine, where the *Æther* is thin. But Smoke may be expelled up the Cupulo or flue, by being grosser than the Air is without.

As the different Sizes of small Bodies are necessary to divide the Parts of Solids, so the Parts of *Æther* in a very violent fire, may be too small to divide some Solids, which a weaker with larger Masses may.

Fire cannot divide a Body into smaller Parts, than those whereof itself is compounded unless by Strokes it make the Body fall asunder.

Vibration in the fire proceeds from the Corpuscles of fire passing between the Corpuscles of Metals, &c. or between the

Ends of them, and the Spirit beating their Planes or Ends together again.

Fire burns almost as badly in the hot Sun-shine, as in *Vacuo*, because the Parts of the *Æther* are so small, they make no great Motion by their Difference, nor no Work for the fire to divide them.

A Chaffing-Dish filled with burning Coals, and placed between the *Focus* and the Glas in such a Manner, that the reflected Rays were obliged to pass through the Evaporations of those glowing Coals, the Action of the said Glas was notably weakened thereby.

When the Recedence of the *Æther*, from the fire upwards, moves with a force sufficient to overcome the Difference, which the Pressure above exceeds that from below, upon the Unites of a fluid, or those in Fluidity above it, they move, boil, rise, or, &c. in Proportion to that Excess.

If there be any Unites of Water, in the fuel, for Example, in a Stick of Wood, and it be kindled at one End, while the fire acts weakly, the Unites of Water are pushed along the Pores into the fire: But when the Action of the fire is increased to a certain Degree, the small Parts retire in the Pores from the fire so strongly, that

that they drive the Unites of Water the opposite Way. I have seen it drive horizontally; will it drive upward and downward? I think only horizontally, or upward, and not downward. But that the gross Masses of Æther raise the Parts of the Water into the fire, and the small Parts of Æther force them upward, or to recede horizontally.

Water being of greater Gravity than Fire, the Water being thrown upon the Fire, presses into its Place, and pushes out the fire upwards and sideways; perhaps the Masses must not be too far unequal, and that too gross Masses of Air will not assist Fire, when they will not enter the Pores; and Water being mixed with fire, and raised into Vapour lighter than the Air, the Air pushes in, and drives up the Vapour: So Æther pressed into the Fire without Air, will not make it burn or blow up with any force, 'till a Smoke arise.

The Parts of any Thing which are grosser than the Parts of flame, and will not be divided in it, extinguish it.

The Vapours must ascend from the Earth, because the Fire recedes that Way, if not obstructed by Clouds. Then something must go down, when the *Aurora Borealis* riseth upwards. Where

Where, in a Blast, the Force is from a Center outward, as in fire or explosion, it drives the solidest and grossest Part foremost, as a Bubble of Phlegm is formed in the fire; where the force is inward towards a Center, it drives the grossest or solidest Parts foremost towards that Center; so the force outward drives the grossest, and the force inward doth the same, which forms a Bubble of Phlegm in the Fire, the Crust of the Earth, &c.

In Fire-Damps, if there be any Atoms of Sulphur, or, &c. heavier, or but as heavy as those of Air they immediately fly to the Candle or fire, and take fire, and as they increase the fire more, fly in by the same Law, till it in Atoms be reduced to smaller Parts than those without, and then they fly in from all the Caverns, and blow the fire, &c. out at the Mouth of the the Pit.

The Corpuscles of fire and the Æther, cannot remove or blow up Solids, even where it is environed, till it has an Atmosphere of Air or Smoke to stop the Pores; hence Lightning that has no Smoke, pervades more, and blows less than Gunpowder.

The Sparks of fire in Charcoal fly by *Vacuums* being made behind, and grosser
Parts

Parts of Air pushing in, and pushing them out.

Flores Sulphuris, in fine Powder, thrown up in the Air at a little Distance from the Fire in the Draught, will go to the fire and appear there, and the Smell of it, when small divided in the fire, will recede to the Place it was thrown up in.

The Salts in the Sulphureous Bodies, *Marchasites*, &c. divide the Oil by the Help of the Air, and rise, and smell, and swim in the Air.

The Stays which melt in *Volcanoes* will stop the Water from ascending through the Cracks, and the Air must come sideways, which makes it burn; when Water gets in, perhaps that makes it fly.

The heaviest melted Metals or Fluids press out fire with greatest force, and burn most.

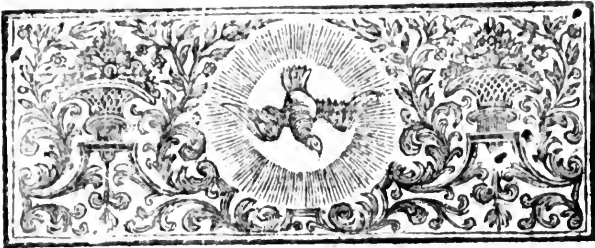
Whether the Corpuscles of the *Æther* or of fire be attracted or kept in Bodies that are hot? I think those that attract most, keep hot longest, and the *Æther* pervades slowest, and is longest in removing them, or the Action of Heat is continued longest by the Straitness of their Pores. Where the Pores of a Body or Fluid are very small, and small Masses of the *Æther* are put into Action in them,
and

and those Pores will not admit any grosser or very little grosser to push them out, they are kept long in Action by succeeding small Ones, or long kept hot.

There is also some such Disposition to be attracted in Fluid melted, as in Iron, which forms it into Globes or Spheres, or some figures which let Light pervade them; but they cannot be seen for that Reason.

I could answer a great many wise Que-ries, if I am right, as red hot Iron is Iron, and the fire in it is fire; but this is enough.

F I N I S.




HINTS upon philosophi- cal SUBJECTS.

Tending to illustrate and confirm

MOSES'S PRINCIPIA.

NOT PUBLISHED BEFORE.


 WHEN we begin to treat of Matter, its Attributes and Accidents; and Attempt to convey new Ideas thereof to others (we ought) every one will say to give an Account how we came by those Ideas: Whether by Revelation, Relation, Sensation, or Deduction. If by *Revelation*, we ought to shew how the Text or Texts are

are applicable to other than the received Notions; and that the Things or Actions accord better with that Interpretation than with former Ones.

If by *Relation* of Books, we must refer or quote; If of Men, we must relate their Relations; if the Relations are doubtful, that we or others may reason upon their Probability or Improbability. If they are doubtfully exprest, that we or others may reason upon their Meaning: And that we should set forth the Authors Opportunity of knowing, Abilities or Means to know with Interestedness, Disinterestedness and Capacity of relating what they saw or knew.

When by *Sensation*, we ought to set forth the Manner how, with all the Circumstances, especially such as are new or not known to, or observ'd by others, or those which have convey'd other different Ideas, to others, in the clearest Manner we possibly can.

If by *Deduction*, we ought to make others sure, that the facts we produce in Evidence are true; that the Comparisons we use are between Things of the same Sort in all considerable Respects.

That they are Things which have certainly existed, or do certainly exist, or
Accidents

Accidents which have certainly happened when those and other Things were in the same State, as they were when the Thing existed, or the Accident (they are compared with) happened, and not between Suppositions, or imaginary Things and Accidents, and real Things, and Accidents which have happen'd; and some will say, they ought not to be made between a limited and infinite Space; nor between Matter limited, and Matter infinitely great, or infinitely small, nor between Duration, Motion, Rest, or *&c.* limited, and infinitely Great, Long, Short, or, *&c.* because our Senses and Faculties are either limited, or at least not capable of extending themselves, or being extended by us, to frame either real or comparative Ideas of Infinites either way; (if Infinites had any relation to Matter) but chiefly because such Infinites have none, at least, they think they may without offence say, so far as concerns our enquiries, or our selves; and because Ideas of Matter cannot be abstracted from Matter.

But tho' they pretend to lay down Rules how clear such important things shou'd be made, yet in things of so abstruse a Nature, if I can by some Glimmerings of Light make it appear that we have been a
long

long time in a State of Darknefs, and thereby be able to Point out the Footsteps of real Nature, it will be as much as ever was done at first step by human Means in any new Science, or in any old one which had been totally lost. And if the least Glimpse of the Beauties of Nature be once shewn, notwithstanding all Prejudices of those who have made or followed other Schemes, those who have not, will admire and follow her.

The Ambition of Men leads them to be Inventors of Systems of Nature ; and the Heathens who had no Revelation, except by Tradition, were to be excused. But of all who have writ since Revelation has been dispersed, I find not one who is willing to own he has had any Account of these Laws from *Moses*, but it passes for current that *Moses* spoke not as a Philosopher but adapted his Speech to Vulgar capacities, and for that Reason his writings are only to be regarded by such. I shall never aspire higher than to be a Disciple of *Moses*, nor desire to make a greater Progress in the Knowledge of Nature than to understand his Writings.

Let us compare what *Moses* says with what we have by Relation from the Pens or Mouths of uninspired Men. The Antients

tients almost universally ascribed every Action to the Sun or Fire, Heat, *Æther*, &c. as his Issue, and decree'd and paid him Adoration, either as Supream or Viceroy.

Of the moderns who have aspired to be accounted Wise, some would make all matter Eternal, and as far as I can judge, infinitely extended; and each part infinitely divisible, and infinitely extendible, and suppose each part able to move itself, or go by itself, or at least by innate Powers, each to move other; and if that be once allowed, the next set of Philosophers will teach it to talk, and the next to Reason.

Others allow that God created Matter, but make something, or nothing, which they call Space, Eternal; some make the Sun run round about us. Some make it keep near one Place. All allow it gives us Light and Heat. Some have supposed that all Space is full of several orders of Corpuscles of Matter, some large and dull, some subtile and active, of which some keep their Figures, and some by wearing off their Corners have taken other Figures, and formed out of their Fragments a new small and most active Order, which run this way and that way, backwards and forwards, without impulse Laws or Rules, (or, at least with such as they cannot tell how

how to assign them) which form'd the Globes, run round about, in and out of all Bodies and Fluids, which turn the Sun round about its own Axis, and all this System with it.

Some will have all Matter convertible out of any Species of Bodies, into any other Species. Some will have Corpuscles essentially different for different kinds of Bodies or Fluids. Some will have an innate or annexed Principle with Power exclusive of Means, in each Corpuscle of Matter, to act thro' all Space, or all other Matter. And a very covetous Principle it is, for each to strive to draw and engross no less than all Matter to itself. But after as many Corpuscles had pull'd each other together, as came within their Powers, and form'd Globes, they must stand still; then to give them Motion, they must be projected. But because they say, Fluids resist Bodies moving in them, they are forced to make the immense Firmament a Void or immaterial eternal Space, that you may believe the Globes had their Motion by Projection, and their Assertion, that a Body being once projected in such a Space, in any Direction, with any Degree of Velocity, will move eternally in the same Direction, and with the

the

the same Degree of Velocity, or till something interrupted or diverted it. Then all the Globes wou'd begin to move in straight Lines: But as that wou'd not do, and as the Power of that covetous Principle must be multiplied in Proportion to the Quantity of Matter pulled together in each respective Mass or Globe, and diminish'd in some Proportion to their Distances, so every one pulling every way, and with respect to each other, one pulling one way, and another another way, they all pull one another out of the straight Courses, in which they started into crooked ways. And each Globe pulls all the Masses which belong to, or are near to it, toward its Center. And each Corpuscule in each Mass or compounded Solid pulls each other to keep them together; and after Parts of the Surfaces of some Sorts are pulled asunder, and the Body bent, they pull back again with great Force and Speed, out of a Principle of being unwilling to part with any thing they have got. In Contempt of the Laws assign'd to Proportion these Powers of small Masses, one Sort pulls only at one or some few other Sorts. And some others pull Bits of Straws, &c. from the Surface of this great Globe.

The Corpufcles which conftitute Fluids, are in general of a generous Temper, and not guided by thofe felf-interefted Principles, but are free to part from each other, or thofe of any other Body. So becaufe they will not be govern'd, and becaufe they fuppose fuch Fluids wou'd interrupt their projected Motions of the Globes, they have difcharged moft of them, left only a few about this Globe, and difpute whether they fhall leave the reft of the Globes any. And tho' they tell us, that Bodies projected in this Atmosphere (which they have not prefum'd yet to difcharge, becaufe we have fome of our Senses left) are refifted by it in Proportion to their outer Surfaces; yet we fee a folid Ball will move further, and with greater Force, with an Impulfe given in that Fluid, even againft their Power of Gravity, than a hollow Shell of the fame Sort of Matter, and of the fame outward Dimenfion with the fame Degree of Impulfe will. I think they fay, becaufe the folid Ball is more averfe to be moved. Some of thefe Fluids fuffer themfelves to be pull'd by that centripetal Power. Some of them being averfe to obey that, they allow them a centrifugal Power. However, that Sort near this Globe, are foon tired of going from
it,

it, keep within its Atmosphere, or come home again. Above all, they make one Sort of these Corpuscles, each of which is either a Solid or nothing, as flexible and elastick as a Watch-spring, liable to be wound up by Pressure into one sixtieth Part of the Space it possesses; when it gets a little ease, and runs out, by which it does Abundance of out-of-way Jobbs for them which are contrary to all their Laws. The Sun, which they say, pulls many thousand Times stronglier than any of his Neighbours, has worse Luck than any of them; for infinite Numbers of his Parts, which he at first pulled in by that Power, fly off from him continually of their own accord, thro' their supposed infinite Space, and are never more heard of. So if he had not had a good Stock, he had been broke before now. I think they allow for all his fine Shew, he grows poorer and poorer. But to save his Credit, as much as they can, they make it a Doubt whether Light be material, and so whether he spends any Thing, but only glitters and makes a fine Shew.

Tho' these Gentlemen are so clear sighted, that they can perceive empty Space, and the Virtues and Powers in Matter, which they by their own Fancies have

made; yet they cannot, I shou'd say, will not perceive, that Quantity, which approacheth nearest infinite, of solid Parts of Matter, which God created and employ'd as his chief Agents, when its Masses are too small for their Purposes.

In short, they have treated Matter so, that others have taken their Arguments, and their Mathematicks, to prove, that there need not be an Egg-shell full of solid Matter in the World. Others, to prove (I think) that all Matter has some Sort of a plastick Spirit in it, and that there are no other Spirits. And they have made so many Mysteries in Matter, that they have left none for Religion.

Most well-meaning People, who have read, or heard what Disputes there have been about these Motions, without determining them, conclude, that these Actions are too great to be perform'd by Properties in Matter or material Means, and therefore think they do best to attribute the Performance of them to the infinite Power and Government of God; and never consider for what End God revealed the Creation and Formation and Laws of Matter; nor what St. Paul says, *Rom. i. 20. For the invisible Things of him, from the Creation of the World, are clearly seen,*
being

being understood by the things that are made even his eternal Power and Godhead. Nor that it is their Duty next after the Belief of God, to believe and understand what he hath revealed about them; nor how much the Belief of God is confirm'd by being able to shew that the Revelation of his Works is true, and that the Tasks he assign'd them are perform'd, whereby they have let an ambitious Atheist gain as much Reputation, and pervert as many People by forging a plausible Story that contradicts *Moses's* Revelation, as the Heathen who first made Observations of the Motions of the Planets did by foretelling an *Eclipse, to those who had never observ'd the measures of those Motions. †

Upon a Supposition that there are no Parts in the Firmament; or at least in that Part of it they call the Atmosphere, small enough to pervade the Sides of a Vessel of Glafs, Copper, or &c. We have been taught to call that which remains in and succeeds through the Pores into a Vessel, out of which the gross parts or masses of the Air have been exhausted by Engines, expell'd by Fire or &c. a Vacuum or

* The ignorant at first knew these, not at last.

† Here follow'd sixteen Pages in the M.S. which are printed in GLORY MECHANICAL from Page 4 to Page 24 So we have omitted them and refer the Reader thither

empty space. And upon that fallacious Supposition they have built many more, such as that, Bodies meet with no resistance there; that Light immaterial, or something between matter and nothing; that the constituent parts of Air are elastick, can contract and expand, so that the same Vessel, keeping the same Dimension, can at one time contain many times as much matter as fills it at another time. I think they say, they extend themselves thus only because Nature abhors a Vacuum, and when they have dragged out all that the meshes of their Net will hold, upon the Supposition that they have taken away the matter out of, and the Resistance on the inside of the Vessel, (whose contents they call a Vacuum) *pretend* that they have shew'd the whole Force of compressure of the Firmament on the outside; and that (the pressure) downward is occasion'd by Gravity; and that in other Directions by the Elasticity of the Air.

The Truth is, there lies a compressure upon every side of every Unite or Part of matter, Solid or Fluid, insensible to living Bodies, and imperceptible upon inanimate Bodies, till the masses which compose the Fluid on one side, be smaller than those on the other side, and then it is, that
living

living Bodies are sensible of the difference, and that that difference is perceptible upon inanimate Bodies, and our Perception of that difference increases in some Proportion, to the difference in the sizes of the masses which compose the Fluid on each side. This compressure is now perceiv'd to be immensely great by the difference between the resistance of the Parts, which can pervade the Pores of Vessels of Copper or Glafs, Pumps of Lead, Wood, or &c. and those Parts in the open Air. How much greater it may be prov'd to be in that manner, the nicety of the Workmanship, and the closeness of the Metal, and perhaps some further Inventions, time must determine. But the Force of the difference between the Parts of the Air divided by Fire amongst Gun-powder, and those of the Common Air appears to be infinitely greater, and how great it is in itself perhaps is impossible to prove.

This difference appears in several manners, where the Parts of the Firmament or Atmosphere are made smaller or divided by the Sun, Reaction of its Heat, by accidental or natural Fire, by Friction of Solids or, &c. As soon as that Action ceases the pressure tends thither.

Where the Parts of the Firmament included in a Vessel are made smaller by Fire, or the grosser are extracted and the smaller ones remain, or are press'd in and succeed, or take the Places of the larger which are driven out; or, where there is a Mixture of gross Masses and small amongst them without a Vessel, and such a Mixture within each to be consider'd as one Fluid, if the Fluid within is in the whole not so gross, the Pressure tends thither.

Where the Parts of a Fluid, or of a Mixture of small Bodies in Fluids at rest, or inclosed in the Interstices of the more porous Solids or twisted Bodies, are smaller than those of the Fluid or Mixture next without, or of those placed next without, which can enter, the Pressure tends into the Interstices, and the larger Unites or Parts displace the smaller.

Where the Parts of a Fluid or a Mixture of small Bodies in the Fluid in Motion in the Interstices of the more porous Bodies, or lighter Fluids, are smaller or successively divided smaller than those of the Fluid next without, the Pressure tends into the Interstices, and the larger Unites or Parts strive to displace or move the smaller.

When

When the Parts of a Fluid included in a Vessel, are larger than the Parts of the Fluid which environs the Vessel, the smaller Parts intermixt among the larger without, are by the Force aforesaid press'd in, and strive to expand the grosser Parts by entering between them, and attempt to drive them out, and mix and make an Equilibrium. Air acts thus upon Air in its common Degree of Action; and upon grosser Fluids with a greater Degree of Action. But tho' the Force outward may be great, the Motion produced I think is not so great, because it is secondary, or owing to the first.

Where the larger Parts of the Fluid we call the Firmament are, or a Quantity is obstructed on one Side, by the Interposition of some Body, which is very large, or very solid, the Difference of the Pressure tends toward the Body; and is in some Proportion to the Dimension of the Solid and the Largeness of its Unites, and Straitness of its Pores: And diminishes from the Surfaces of the Solid outward from the Body, and inward towards the Center, in some Proportion to the Distance from the Surface of the Solid either way. And those Distances are greater in Proportion to the Solidity and Diameter of the Body.

Body. This is what they call Gravity to Globes, and Attraction to small Bodies. But by Reason of the Porosity of those Masses we call Solids, this Difference is comparatively inconsiderable.

If this Difference of Pressure of grosser Parts of a Fluid towards smaller Parts be infinitely greater, than the Difference or Force the Fluid tends with towards a Globe (which they call Gravity) and that Solids are push'd with greater Force into other Directions, by the Pressure of the grosser Parts of the Fluid towards the first, than Bodies are push'd towards the second, Gravity cannot be the Cause of those Pushes towards the first, much less (of) lateral Pressure, which if occasion'd by Gravity, must be weaker than Gravity. Nor can the Notion of the Elasticity of the Air be the Cause of it; because a Body or Bodies bent with the Power of Gravity, cannot exert or relax themselves with greater Force than that with which they are bent. But if the grosser Parts are push'd towards the smaller Parts with greater Force than that called Gravity, that which pushes may be the Cause of that which seems to be Gravity, Lateral Pressure and Elasticity. These Pushes given to the larger Masses of Air (the Spirit) into the Place
where

where the smaller Parts (Light) are contained, and the Motion which ariseth from thence is what I chiefly intend to explain.*

And this Sort of Motion does not need any other Vacuum (than that which is less than the smallest Part of Matter can fill, and can only be talk'd of, and of which we can have no Perception) to move the Parts of a Fluid in; because as the greatest Masses move one way, the greatest foremost, and so in Order, the small ones move the opposite way, the smallest foremost, and so in Order; except where they are restrain'd. And the Action is no more than each sliding or rolling upon or by another, so that if the larger go East, the smaller go West. And tho' this produces a Motion of the Parts considerable where the Parts of the Fluid are divided very small, or a considerable Quantity is made so, or separated, yet each Part is shifted but a small Distance from its Place, furthest near the Light, and less and less at greater Distances, and every Part finds its Place of Rest again in a Moment, or in two or three Vibrations or Rebounds (which when great they call

* See Definition of *Light* and *Spirit*, GLORY MECHANICAL, p. 33.

Ecchces) and come to an Equilibrium: Without this, if all be full in that Manner, I suppose, if one Part moved, all must move. If Gravity was to perform it, and all were full here, and an empty Space were allow'd above, the Fluid must be prest down in one part and fly up in another. If Elasticity were to do it, some Parts must expand and others contract; and if all the Parts of this Fluid in one Place sweep'd one away, as those of other Fluids do, and there were not a continual Reccession, the last Blast of Wind wou'd overset all perpendicular Erections. But while the Light recedes as the Spirit proceeds, every Thing is supported. And any Operation can be perform'd by moving Part of the Fluid, proportionate to the particular Action or Motion, without disturbing the rest, and thereby moving other Bodies which were not intended to be mov'd. And except all be thus full, and all the Parts of the Firmament be mov'd in this Order, we cou'd have no Benefit of any of our Senses except Touching. The small Degree of Adhesion of the Parts of Air allows this Motion, and makes it a dry Fluid.

Begging Pardon for breaking Rules, pray let us see how Bodies which compose
this

this Fluid with such Properties as they call Elasticity (if there were any such) wou'd move. Suppose we have an infinite Number of Unites or Masses of Air, all full, bent, cramp'd, and each striving to put out a Leg any way for a little Ease, how must we get a Vacuum. You must persuade or force some of them to draw up their Legs a little closer, each from a Point, and leave some empty Space. And that Force, at that Point, must be stronger than the combin'd Force of those contracted. Well, that Force must continue, or else each stretches, and then that Vacuum is gone. Suppose Sixty, each draw up one Sixtieth, to make a Vacuum that will hold one: And suppose the rest shou'd stand still till that one popped in there and left his old Place, and stretched out all his Legs, and took all the Room: What then, that one wou'd be so far from moving or getting by between the rest, that he wou'd lose his Spring, not be able to stir a Foot, nor draw up a Leg, till his Neighbours press them up, and retake the Place they had lent him, and become as they were. And we shou'd still want a Name for that Power which made the Sixty draw up, and still are no nearer producing any Force to move Bodies. And if we put e-

ver

ver so many various Cases, the Result will be the same.

In order to describe Motion, 'tis necessary to distinguish between Space and Place. Space moves with the Body or Fluid which enjoys it. If there be any two fix'd Bodies or Points, Place implies that material Space which at any Time comes to the same Angles, from that Base, and to the same Distance to each Point: But Place is frequently taken in the same Manner for material Space, from two fix'd Points or Parts of a solid Body, which is in continual Motion.

I shall put a few Cases and Mention a few Experiments which have been made to prove the receiv'd Notions, which, with a few Variations, will serve for the present to explain the Assertions I have laid down in general. I do not pretend to Mention, much less to ascertain, the Proportions of the Forces or Velocities. Nor the Proportion between the Impulse upon the Center, or chief Line of Motion, and which proceed in oblique Lines from each side. Nor between this Power in the fullest strength it can be shew'd, and the other pretended Powers, till proper Instruments be made, or at least such as I have designed.

If a sufficient Quantity or extent of the small Parts, which constitute that thin Fluid they call a Vacuum, cou'd be still or but gently mov'd, and in such a degree as a Man cou'd live and make Experiments there, tho' we shou'd find the compressure upon the solideſt Sorts of Bodies near as great as in other groſſer Fluids, we shou'd find none upon our Bodies, which are ſo porous as to let them pervade; but on the contrary an Extension of our Parts and ſenſe of Heat. Nor shou'd we find any perceptible reſiſtance to a large Body mov'd in it, in any other Direction than upward. But there has not yet been any Veſſel ſo large exhausted as to contain a Man, and try to what degree he can act in it. And this cannot be prov'd in an open place here, becauſe, when the Parts of any Fluid in a place open'd, or not incloſed by Solids, are by any accidents ſmaller divided than the Parts of any Fluid next adjoining, as ſoon as that accident ceaſes, thoſe Parts of the Fluid next adjoining, are inſtantly with Velocity and Impetuoliſity (in ſome Proportion to the difference of their ſizes) push'd into that Place; and the ſmaller Parts which poſſeſſed that Place are push'd outward, here moſtly upward, if confin'd in that or thoſe Directions where they meet
with

with least resistance; I say, instantly, because the first Motion inward, and the second outward commence at once, all act at once; each of the larger push into the Place of the smaller; and each of the smaller, push thro' the freest Passages into new Places outward. If the Accident, which divided the Spirit (which was at first in that Place) into Light be continued, and the Spirit, which successively pushes into that Place be successively divided, the divided or smaller Parts will successively fly off, and the larger Parts will successively take their Places.

When such a Fluid as they call a Vacuum is inclos'd in a Vessel, and seems to be confin'd, and any Fluid whose Parts are grosser is without, that without compresses the Vessel, and if it Sides yield, the small Parts of the Fluid within, fly out at the Pores of the Vessel: And if the Sides of the Vessel be able to withstand the Compression, and you make a Hole in a Vessel only sufficient to admit the Parts of Spirit, they are push'd into the Vessel with great Force; and those which seem'd confin'd, or as many of them as can pervade the Pores of the Vessel fly out each way. Those which cannot pass the Pores of the Vessel (if the
Hole

Hole be near the Top of the Vessel) here fly through the Hole. If the Hole be lower down, those parts which cannot pervade, are push'd to the Top and collected there: And during the Vacuum any Body (which comparatively is infinitely larger than one of the parts of the Light which constitutes such a suppos'd Vacuum) let loose in the upper part of the Vessel, is push'd down by such small Parts of the external Light, which pervade the Pores of the Vessel from above with greater force, and in greater Quantity than those which pervade from below, and so push down the Body without any comparative resistance. And so, if diverse such Bodies of different magnitudes, or different degrees of solidity, be let go as aforesaid, they are push'd down with equal Velocity, or without any sensible difference, because tho' there be visible difference between the Bodies, there is no Comparison between the magnitude of any one of the Bodies, and the magnitude of one of the parts of the Light, so there is no Comparison of the difference of the resistance. But if Bodies little larger than the parts of the Light were let fall in it, they wou'd be sensibly resisted, and not fall so fast, and if one of them were ever so little larger than another, they

wou'd fall with different Velocities. And if the parts of the Light, or those which wou'd pass successively thro' the Pores of the Vessel were put into violent Motion by Fire, they wou'd divide and throw up the Parts of grosser Fluids, such as Water, &c. and while that Motion continues, support them. For while that Agent is dividing the Parts within this thin Fluid in a Vessel, tho' some get in, and some get out, the same accidents, which happen between a whole space, where the parts are divided smaller in the Firmament, than the other parts of the fluid invironing it, happen likewise between the Parts of the space in the Vessel, for instantly, as the Parts are smaller divided in one part than another, there the other which are grosser push into that part, and so from one part to another successively, which causes that prodigious Motion and bustle among the parts; and keeps not only the small parts, but those of Water, &c. in Motion. But when the Action ceases, or such a Quantity of Gross, or as they are term'd Cold parts, pervade the Pores of the Vessel as weakens the Action, or stops the Pores of the Vessel, the Parts of Water or, &c. drop to the bottom.*

* As in the fire Engine explain'd Glory Mechanical Part I. page 76.

Tho' Air is prefs'd with the force of the Firmament and Atmosphere, thro' a small Hole into a Vacuum, more than a Pillar or Column of the Firmament of that diameter seems to be upon a solid, which hath been reputed a Proof that its parts are Elastick, 'tis only a Proof that the parts are solid, that they are grosser than those within, that tho' they are fluid, by being grosser, they are more capable of resistance, and being prefs'd upon by the Firmament than the smaller are; and tho' the Light and Spirit without can be prefs'd upon the Light in the Pores of the Vessel, and thereby prefs'd upon the fluid within the Vessel, as that small Hole which lets in the Spirit is prefs'd upon more than any part within, where it presses with the parts of Light thro' the Pores, the Light issues at the Pores, and gives way to the Spirit.

If two Vacuums were made in two Vessels of Metal whose Pores were of different Sizes, and an aperture thro' a Pipe were made between them, the parts in that which had the larger Pores, and admitted the larger Masses wou'd push into the other, so the sides of the Vessels are but Sieves to sort the Masses of different Size.

If you bore Holes in the side of a vast Block of Stone, and put Wedges of dry

Wood in them, and pour Water upon the Wedges, the constant pressure of the Firmament drives the Unites of Water into the Interstices of the Wood, which were possessed by those of Air, widens the Interstices, swells the Wedges, and splits the Block of Stone regularly as for Millstones, Columns of Marble, &c.

If you pour Water upon a dry Rope, the constant Pressure of the Firmament drives in the Unites of the Water into the Interstices of the Rope, possessed by those of Air, drives them out, extends the Rope in Breadth, and thereby shortens the Length of the Rope. So they erected the Obelisk, &c.

They antiently, before Gun-powder was invented, heated the Rocks they endeavour'd to break by Fire, which made what they call Vacuums of the Interstices in the Stone, and then pour'd on Water, or some subtler Fluid, whose Parts were driven in and burst the Rocks. And indeed those (the Parts or Masses) of Spirit will do it in a weaker Degree: The Parts of Vinegar may be smaller than those of Water, or smaller divided, and so no lighter.

Thus the Unites of Mercury are driven into Gold (Lead, &c.) Those of Salts
in

in gross Fluids are driven into the Interstices of Metal, and an innumerable Series of Actions are perform'd by the same Laws.

I think if you fix a Tube to one End of a long Barrel, or oval Vessel, which seems to include such a Vacuum, and fix a Ball fitted to the Tube, so that it cannot go in but may go out, and let in the Spirit at the opposite End, faster than the Light can get out at the Pores, the Spirit will drive out the Light and the Ball, pursue it and drive it with a considerable Force to a considerable Distance. Whether in this Case the Hole for the Admission of the Spirit may not be made too strait, I am not certain. If the Ball be very porous, or the Parts of the Fluid be small enough to pervade the Ball, the Ball will not move with any great Force, nor far.

When the Spirit presses out the Parts of a Vacuum, being confin'd in one Direction, and it moves a Ball, is it possible that some of those small Parts follow the Ball, and that the Spirit still pushes after it to overtake them and possess their Places? Or does the Ball by its Solidity while it is in Motion, impel or divide those Parts of the Fluid which will not pervade its Pores,

and suffer the Light which can pervade its Pores to pass backward thro' it, and so leave a Sort of Vacuum behind; and the Parts of the Spirit still successively pursue that Vacuum? Or is the Spirit, which was separated out of the Firmament, which environ'd the Vacuum and driven in thither, driven after the Ball till it is divided or dispersed? Or does the Body impell'd press and squeeze the Fluid before it, make the Light recede and turn behind it, and the Spirit file off to each Side into its Place, and so make way for the Body? And doth the Spirit on each Side behind, and streight behind, successively push out the Light, pursue and impel the Body?

So the Force a bent Body in returning, or Force in Animals, communicates, as they call it, to a projected Body, is nothing more than the Rest. For if you move a Solid with great Velocity in any Direction, you push against the *Æther* in the Line forward, and attempt to leave a Vacuum behind, the Light before during that push, recedes to behind; the Spirit before (files off) to each Side; and that behind pushes after and takes the Solid from their Hand, and drives it on a few Yards, or, &c. in the same Manner as aforesaid.

The Increase of the Velocity and Force of Bodies falling towards this Globe (which interrupts the Air most in the Line of its Center) and which in falling pass thro' a Medium, which is grosser and seems to resist more and more as the Body comes nearer the Earth, is owing to several Causes. If the Force of a Body projected in the Air be in Proportion to the Vacuum made behind it, and the Difference between the Sizes of the Masses in the Vacuum and those which impel; and that the lighter Matter retires freeliest upwards, and maketh a greater Vacuum behind a Body dropping down than in any other Direction, and that the largest Masses push the freeliest downward, and that the Difference between the Sizes of the Masses is greatest nearest the Earth; those may contribute. And if the Columns of the Air abutting upon the Body to be let fall, were extended in streight Lines to each Side of the Firmament, they wou'd resist equally and keep the Body in its Place. The shorter those Columns between the Body and this Globe, and the less obtuse Angles the Columns by the Sides of the Globe make with the Perpendicular the Body is dropt in, the greater will be the Force and Velocity the Body is driven with to-

ward the Globe. And when a Body is projected upwards, besides the common Degree of Opposition, or Difference they call Gravity, which abates as the Body rises, the Light will not recede in such Quantity behind or below the Body, nor will the Spirit rise and pursue it in such Quantity, as in other Directions, so its Velocity will decrease a-pace.

If you by Degrees force in the Spirit into a Vessel, and thereby force out the Light thro' the Pores of the Vessel, or fill a Vessel with Spirit, and afterwards contract the Space in the Vessel, till the Parts which constitute that Fluid within, be in a considerable Degree grosser than the Parts which constitute the like Dimension of the Fluid without, and fix a Tube to the End of the Vessel, with a Ball fix'd in it, so as to be let loose at Pleasure, the Compressure of the Spirit without, upon the Light which pervades the Pores, which resisted the Force with which you drove the Spirit in, and which pushes against the Spirit within (with Force in Proportion to the Motion it is put into; and by carrying its Space between the Parts of the Spirit possessed of the Space in the Vessel, and which cannot get out) attempts to expand the Vessel, till the Fluid within be equal to
the

the fluid without. But if the sides of the Vessel resist, and the Ball be let loose, that Spirit is push'd out into the thinner fluid without, in the Direction of the Tube, and drives the Ball out with great Velocity and force, and the Air pursues it to a considerable distance.

Where there are so many of those gross Masses of Air, perhaps Parts of Clouds, dissolved Vapours, or &c. driven in one Course, towards the place where the Parts are smaller, or descend, as to form that Motion and Force we call Wind; yet as they are few in Proportion to the small Parts of Air they pass between, or amongst, so the Recedence of these smaller Parts, though they form a Resistance, and stop the larger Masses, till they come in Gusts; yet form scarce any perceptible Degree of Motion the opposite Way, because their Motion will be less, as their Quantity is greater. And those larger Masses in Motion are by the greater Resistance above, continually driven down to the Surface of the Earth, which makes the Motion strongest there. And though this Motion of Wind drive forward the Smoke and Flame from fire, yet the Wind bringing the larger Masses to the fuel, and the smaller, or fire receding in the same Direction the
Wind

Wind comes in, fire burns against the Wind, and I think Light recedes most, and a burning Body may be seen furthest against the Wind.

If you convey a few drops of Water into a Pan of melted Lead, very hot, some Depth below the Surface of the Metal, the Æther put into Action there, presently divides the Parts of the Water, mixes with them, and forms a thin Fluid, and the Pressure of the Firmament upon the Surface of the Lead, and by the Æther which is intermixt with and pervades the Lead, forces the Water upward, and it drives part of the Lead in that Direction, where it hath least Resistance, and the Air takes out and pursues and drives it to a great distance with great force. And if an open Tube were placed with one end to the place where the parts of the Water are divided, or the Water be placed at the bottom of a Hole bored, and hot metal pour'd in, the metal will be thrown in the direction of the Tube or Hole. By these means we see a little Water in form of moisture in the Moulds, or &c. blow up whole Foundaries, and in greater quantity would produce a surprizing force, much beyond the like quantity of gun-powder: because I think there is a much greater differ-

difference between the Parts of melted Metal, and those of divided Water mixed with those of Light, than between those of the Spirit, and Light, and Smoak.

The small Parts of *Æther* divided in that Action we call burning, and which so divided, and in Action we call fire, and which upon their being divided to a certain Degree of smallness (in Proportion to the Degree of the smallness of the Masses of the Spirit they are inclosed by) retire or recede, or are pushed outward by the Spirit through the Pores in the sides of a Vessel into Water, and heat or boil it, and thence divide, detach and bear the Unites or small Masses of Water into the open Air, if the Vessel which contains the Water be open, if the Vessel be closed, all but a Pipe into what they call a Vacuum, will detach and drive those parts into it in form of Steam, because they are larger than those Unites, or small Masses of Air which were within, and will drive them out thro' the sides of the Vessel, which included those small parts which were called the Vacuum. *And the steam will during the Action, not only be augmented but expanded, as

* When there are parts within smaller than those which pass the Pores, those which pass the Pores inward drive out those which are smaller within.

soon as its parts compose a fluid grosser than the Air without, in Proportion to the Action and Application of the fire. And if that be sufficiently great, till it wou'd throw a Ball, as aforesaid, or till one of the Vessels burst. But if the Action of the fire first cease or cold Water be outwardly applied, the parts of the Water fall to the bottom of the Vessel, and the parts of the fire form into Air above.

If a Glas Drop or shell of any solid be fill'd with Water or Spirit, or have the Spirit extracted, and the space within be made what they call a Vacuum, and the shell closed and put into the fire, and as they call it sufficiently heated, it will be bursted outward or inward, and the parts of the shell fly with force and noise.

They have got a Notion that the parts which issue from fire, (suppose from a burning Candle,) are parts of the Candle, and because Light can be diffused (while a grain of Candle is dividing and being born off) to a vast distance, that matter can be infinitely divided and infinitely expanded; tho' a grain of matter, whether it be united or divided, possesses the same space, and the parts of the fuel produce no Light but Darknes when divided. But the Truth is, 'tis the parts of the Spirit,

Spirit which pass to and are divided, while a grain of the Candle is dividing, with the Velocity, with which one may see them move, which fly off, mix with, thin, and move amongst the Dark Æther or Air, and move other small parts which are amongst the grosser, to a vast distance. And one of their own Experiments shews that it is not the parts of fuel, but of small Æther, which when mov'd represents Light: For when the gross parts of the Æther are extracted out of a Vessel of clear Glass, and small ones only enter or remain, if in the Dark, (by rubbing the Glass with your Hand) You make the small parts without enter and move those within outward thro' the Pores of the Glass, they produce quick flashes of Light.

If Fire, or the Parts of the Æther sufficiently divided and put into Motion, be put into the Pores of proper Fuel on the Surface of the Earth, or &c. in the open Air, as it divides the Spirit in the Pores of the Fuel, and makes Numbers of Vacuums, the Spirit without is push'd in, and to and fro, and pushes some of the Parts, so divided out, and by that Action accidentally divides the Parts of the Fuel. If it be in Darknes, divides the Light from the Darknes, and by the Continuation of this
Action,

Action, admits and divides more of the Gross, and expels more and more of the divided *Æther*, in Form of Light, Warmth, Heat, &c. And as the Actions increase, the Accidents increase, till there be a Defect of Fuel, or of Spirit or Air.

But since Light, Heat, Warmth, Fire and their Opposites, as well as Fluidity and Solidity, are not only Accidents, but comparatively, accessive, digressive, and temporary Terms, and that a few of the Masses of Spirit divided not very small, alone or unmixt; or some divided smaller and intermix'd with those which are larger, in their Motion or retreat against a surface, produce Light, while the larger Masses even in the same place, moving in the contrary Direction upon the opposite surface of a Body, no thicker than to interrupt Light, produce none, and a few more in Proportion of the divided parts, or of those divided smaller, in their retreat against a surface, produce warmth, while the larger Masses even in the same place, and moving in the contrary Direction produce none upon the opposite surface, but rather make it grow cooler, and heat and fire are but the same accidents in greater Proportions or degrees, so that, as we say, the one side may burn, while the other starves, it
appears

appears plainly, that these accidents arise from dividing some of the Masses of the Spirit, and that the Separation, or passing in of the larger, and the recedence of the smaller, follows from the compressure of the whole; and the difference of the impulse by the different sizes of their surface; and in short, that the dividing of Light from Darknes is the Task of the Firmament.

If you put fire to fuel in the Grate of a Reverbatory furnace near the Top of a heap of Coals, tho' the stream of Spirit drive the smoak and flame into the furnace and up the flue, yet the fire will recede downwards and against the stream, and enter the Pores of the Coals and divide their parts. And if you raise the Action to a great height, and thereby make the Motion of the Spirit to it, and the Motion of the Light in it and up the flue, very violent, and place any Body in the furnace, and in the fire, the parts of the fire will insinuate themselves into the Pores of the Body, divide the parts, carry off most sorts, and keep those of other sorts in Motion, &c. and if the Light within be raised to a certain degree of thinness by dividing the parts, the pressure without will burst in the sides of the furnace; or the Light will by
attempt-

attempting to recede, melt them. But if you give Admission to the Spirit on any side of the furnace, but where the fuel is placed, thro' a small Hole, it mixes with the Light, forms a grosser *Æther*, and resists the compresure without from bursting in the sides, and the Light within from melting them. If you stop the Admission of Spirit to the grate, the fire ceases. If you stop the Emission thro' the flue, either the furnace must burst or the Action cease.

When Gunpowder is fired thro' a Touch hole in a Barrel, and the Spirit amongst it divided, it acts in a gross fluid at first, the Masses of Spirit striving to enter successively at the touch hole successively expand, push forward the smoak and are successively divided, and the divided Parts of Powder being grosser than those of the Spirit are driven foremost the opposite Way, or in the Line the fire and Air enter'd at. If the Powder be left loose or naked before, it only makes a small blast. If cover'd, and that hole be before part of the Powder, it causes a recoil, and the fired *Æther*, by the push of the Air before, which strives to enter into the Vacuum and is kept out by wadding, or something which stops the gross parts, is forced to recede in part thro' the touch hole against that
entrance

entrance of the Air, and thro' the Pores of the Barrel; and if it could continue would, and when repeated, doth melt the Sides of the Touch-hole. When the Action of Fire is spent, the Smoak taking its Course forward, the Air entering at the Touch-hole drives into the Vacuum, and drives out the Fire, and every Thing placed in its Way, with the Force we perceive by its Effects. If in the very Action you can stop the Place the Air enters in at, the Motion stops: If not, and there be a Ball; as soon as it and the Fire are out of the Barrel, the Fire forms a sort of a Vacuum at the Muzzle, and the Spirit pushes in and pursues the Ball in the Direction it was going. If the Barrel in which the Powder and Ball are placed be so short that the Bullet be driven out into the open Air by the first Action, or Attempt to expand the Parts of the Powder, like that in a grosser Fluid before the Air be sufficiently fired or divided in the Barrel; it goes with a small Force. But the further the Spirit is divided by Confinement or Length of the Barrel, the Force is increased. The Pressure and Solidity is sufficiently shewn in that a Line of Spirit little thicker than a Hair, is sufficient to push any body out of its Place. Whether any Hole too small for the Spirit

to enter at in sufficient Quantity, can be made by an Instrument, I am not certain.

Where what they call a Vacuum is immediately made in Part of the Atmosphere, if solid Bodies be placed about it, and only an Inlet for the Spirit, that Spirit will push in with that Force, as to blow up the Solids, pursue and drive the Parts several Ways. In blasting solid Rocks where it has no Vent but at the Touch-Hole, its Force is incredible.

But to enter more closely into a Discovery of the Manner how the Parts of *Æther* divided so small, till they act the Part of Fire, successively divide others and fly off. How that Action is supported among the Intervals between the Unites or Masses of Fuel here (which are hid by the solid Unites from any Discovery which can be made by our Senses, or by the Help of Glasses) &c. we must employ our Reason by Comparisons of such Actions of Fire, which we can perceive. First the Unites or Masses of the Body or Fluid it acts among, which we call Fuel, must be above a certain Size, so small, that the Compression of the Air by the Action of the Fire may vibrate them, that, as the Action of Fire rises or is increased, it

it may open or widen an Interstice; and that the Compression of the Air, as the Action of the Fire decreases, or the Parts of the Fire are divided so small, as to have little Resistance, may by the Unites of the Fuel, push Part of the Fire into other Interstices, and Part outward, and straiten the Interstices. Whether the Division of the Parts of the Fuel on the Outside, which are burnt off where the Action is strongest, be necessary to the Support of that Action or no, I am not certain. But I think 'tis only accidental, because they are more press'd on one Side than on another here. So the Parts of Fire cannot act among the gross Unites of Metal, Stone, Water or &c. except supported among those of other Fuel adjoining or successively infused. And the Interstices of the Fuel must be filled with *Æther*, or some other Fluid, whose Parts are so small, that the Action of the Parts of Fire apply'd can divide or remove them, and possess their Places, and not with the Unites of Water, or of such gross Fluids which are too large to be remov'd by the Action of a few Parts of Fire. And those Interstices in the Fuel must be so wide, or capable of being made so wide, by the Action of the small Quantity of Fire, that when the small Parts of Fire are enter'd into them,

those Masses of *Æther* which are without, and not divided, may be pressed in and force the small ones, some forward and some outward. So the Parts of Fire cannot be kept long in Action in the Interstices of metal, &c. because their Interstices will not admit Masses of *Æther* of sufficient Sizes, and in sufficient Quantity, to keep the small Parts in Action, but by Degrees, as they cease to act, to drive them out. When Parts of the Spirit made small by Collision between hard Bodies, collected out of the Rays of the Sun, from Fuel or &c. are put to Fuel thus contrived and mix'd, each Pore or Interstice whither these small Parts are admitted, becomes in some Degree what they call a Vacuum, and the Compressure of the Spirit without, upon the Surfaces of the Unites of the Fuel, and upon Apertures to the Interstices, drives the small Parts some forward, some outward, and the larger Masses of Spirit, in being push'd into the Interstices where there are smaller Masses or Unites, are split or divided by striking upon the small Masses or Unites they meet, receding, pushing, or being push'd outward, or passing or repassing from one Interstice to another. And the Sides of the Unites or Masses which include

clude each little Vacuum, resist the small Parts, and form a reaction from each Side, whereby the Parts of the Spirit, which are inclosed or admitted, are divided smaller and smaller. As soon as the Parts of the *Æther* in one Vacuum are divided ever so little smaller than those in the next adjoining, those which are grosser, are pushed in, drive some of the small Parts further into other Interstices, and some recede, fly out into the Air, form Light, Heat, &c. Where there is no Wind, the lowest and largest Masses of Air, and not those from above, are push'd into the Vacuums which the Fire makes, and by that Means the Parts of Light and Heat recede, and are diffus'd upon the Surface and made useful, while the Masses of Smoke, and Part of the vegetable Matter which go off from the Flame, and which are much larger than those of Light, and the Masses of Air which are not split so small as those of Light, by their being divided smaller than those in the Air next above the Fire, rise till they come to Masses of the same Size. And some (by the larger Parts of Air pushing into the Vacuums made behind or below them) are push'd upward, and rise till the Force of that Push be spent, and then fall.

So by the infinite Number of these Interstices, and the Variety of Accidents, while some are supplied by larger Masses from without, and some small ones recede into the open Air, and others proceed forward, and the whole is compressed by the outward Air, as the Parts in one Vacuum are dividing small, the Vacuum extends. When they are divided small, they are press'd out, and the Interstices contracted, or the Unites of the Fuel which form'd its Sides pressed nearer together: Or as the Parts in one are divided smaller than those in another, those of the larger are push'd into the Place of the smaller, and so backward and forward in each Direction, and thereby the outside Unites or Masses of Fuel are split from each other, the large ones drop, and some of the small ones are born off. And those small Parts of the Fuel and Æther, which successively are driven out, and are not small enough to fly off, are tossed to and from the Surface of the Body in Fire, in Form of that opake Mixture we call Flame, till they by Degrees are further divided and fly off. Different Degrees of the Qualifications are necessary for the different Proportions of Fire to begin to act upon, or continue to act in. The
Velocity,

Velocity, or Slowness of the Progress of the Fire here, is in Proportion to the Degrees of Fitness of the Fuel it acts in; is highten'd by the Contrivance, Disposition or Mixture of the Fuel, and perhaps is assisted in dividing the Parts of the Fuel, or to form Vacuums by the Unites of volatile Salts, which may be pushed in with greater Force than those of *Æther*. The small Parts of *Æther* act the same Part in much the same Manner in the Interstices amongst the Masses of such fluids as are fitted, as aforesaid, such as Spirits, Oyl, &c. only with this Difference, that as their Unites or Masses are smaller, they generally admit the Parts of Fire sooner, are sooner raised into Flame, and the greatest Part of the Action is performed in the Flame. In the Heat of the Sun the Actions of fire in fuel, in small Quantity, is weaken'd for want of Spirit to compress and supply. The Beams of the Sun, collected or reflected by a Glass, perform all the Actions of Fire without the Pores of any fuel to support them, other than those of the Spirit, and without the Parts of any other fuel to act with; for Light operates in this Atmosphere, where 'tis heated by the Sun or in Flame, as it doth in Fuel; makes Vacuums even in the Interstices of Masses, or

Masses composed of Masses of Air, and so splits and divides them, and thereby keeps up the action or motion. And doubtless near the Center of the firmament, or of this System, where the Compression is equal on each Side, or at least near the Line of the Equator or Ecliptic, the Parts of the Sun may be so contrived that none of them may be born off, and that this action may be performed in it without dividing its Parts, and so that the action may be always equal. As the Compressure of this fluid, when its Masses are not divided below a certain Size, nor moved above a certain Degree of Motion, keeps each fluid, fluid, and each Solid, Solid; yet any considerable Quantity of its Parts, assisted by Division of the Masses and Motion of their Parts, with the same Power, can expand any other grosser Fluid, or any Solid in that Place, whose Parts may be made fluid, for Division of some of the Parts of *Æther*, environed and compressed with Spirit, makes the divided Parts liable to be pressed outward to among the larger, and the larger to approach towards their Places; or their Smallness makes them liable to be press'd between the Masses or Unites of other Fluids or Bodies, and divide and move the Parts of the *Æther*, which filled their
Inter-

Interstices, or was at Rest. Or the Resistance on the Surface of a Body being diminished, when most of the Masses or Unites of the Fluid which environs and should compress the Parts together, are so small, that one of them cannot overlay an Interval and press against two Unites of the Body at once, but will be push'd thro' between them, or the force of the Impulse is increased upon a Body or Unite which is in Motion. Be it by these or other Manners, the small Parts of the *Æther* which have been divided by fire, or, &c. can be moved and impel one another in every Direction to a vast Distance thro' the Spirit, and overcome its Opposition and Friction. And if they be resisted on all Sides, save one, and forced to recede in a Line, they recede with prodigious force. And while those small Parts are in action, they have the force of the Compressure of the Firmament, and their Velocity added, and are obstructed by the Resistance of the Parts of grosser Fluids, or Solids which happened to be in their Way. But if a gross Fluid or Solid be placed near the Center, or beginning of the force, or where a Center is formed by Reaction from several Sides, that force thrusting with greater Power upon the Unites which move outward, and that force

force being successively repeated, while they act they maintain their Ground, keep off the circumjacent Spirit which presses upon the Surface of the Place those small Parts act in, and whose Parts are divided as they approach inward, drive between the Parts of the gross Fluid, or Solid, divide and expand them. And when by an abatement of the action of the small Parts, in that Place the circumjacent Spirit presses with a greater force than the action of those small Parts can resist; it presses out most of those small Parts, stills those which remain, makes the Parts of the gross fluids adhere, those of Solids reunite, and the remaining *Æther* in their Pores reunite into Masses, and form Spirit.

They attribute all this expansion of the Parts of fluids, and the reaction of some Sorts of Bodies when bent, to an occult Quality in the fluids and Bodies, they call Elasticity. In the Unites it cannot subsist, because if one of them bend, 'tis either not a solid, or it must become two; and it is nothing in fluids but the Intervention of other Matter, nor in Solids but an Accident. When the Unites, or masses which constitute a Body, by some force, have Parts of their Surfaces divided, while other Parts of their Surfaces adhere, and thereby the
 Body

Body is kept bent, and larger Vacuums between the Unites on one Side, than between those on the other; upon taking off that force the Compression of the fluid which had kept them together, pushes them back, makes the Vacuums equal, and restores the figure of the Body. Tho' it is evident this Action of the Light which expands and divides fluids and Bodies in proportional Degrees abates, and in sufficient Degrees destroys that they call the Quality of Elasticity in any Body whatever.

Well now let us see what is present to throw a Ball, and perform that which by their Laws is a supernatural Action. Suppose a great Gun of Copper, Brass, or Iron, which or whose Parts have no other Share in the Action; but as their Parts resist by their Solidity, and the whole directs by its Figure, and a few Ounces of Charcoal or half burnt wood, out of which the fluid Parts are driven, and the Interstices of the Fibres are left open or full of Air, and perhaps a Pound or two of Sulphur, which is composed of Oyl or Bitumen and Salts; the Parts of Oyl being extremely small, tractable and liable to be opened, and admit the Parts of Fire and the Salt in it, with perhaps a Pound or
two

two of Niter added, all ground together and corn'd, the Parts of the Salts being grosser than parts of the Oyl and of Air, liable in the fired Air to be tossed about this Way and that Way, and fret and divide the Parts of the Air readilier than any other Mixture yet found, put into the Barrel, and something which will keep out the gross Air, and a Ball placed before it, and the Air ready within and without, lying in wait for an Opportunity to act; and a Spark of Air bruised and divided by the Collision of two hard Bodies in the Pores of a Chip of one of them put to this Mixture, the Parts of the Powder (if well mixed) and of the Air in the Barrel are almost infinitely divided, the Ball driven away, the Gun sometimes broke to Pieces, with a furious Blast, nay perhaps murder committed, and no body else present but the Air, can any Jury acquit it.

Tho' I pretend not now to settle Proportions; yet, as others have done about things they did not understand; one may ask a few Questions.

How many thousand Times the Force which Gravity impresses upon a Ball at the Time of Delivery, is impressed upon the same Ball delivered by an usual charge of Gunpowder; besides the Force of the Blast

Blast on each Side the Ball, if any be lost which is not interrupted?

Would a Ball Shot perpendicular, suppose a Mile high, acquire one tenth of the Force in returning it was sent with!

Whether a Ball shot down perpendicular would not acquire as much or more Force, besides its first Force, as when let drop the same height, &c?

Lightning seems to be divided infinitely smaller than the Parts of Air in fired Gunpowder, and with what force the Spirit pursues it, which makes those terrible Reports is almost incredible. And with what Velocity the Light, or divided Parts recede, and by its Motion either divides the Spirit before it, or drives it aside; and comes hither so small, that it is said, it can pervade the Pores, and melt Steel, and not push it forward.

I think here is plain Proof that the Parts of Air next adjoining, impel and pursue every Thing that moves, as well as the Parts of that fluid, as those of other fluids or solids here, and if its force be infinitely beyond any Power assigned, both artificially in Imitation of Nature, and naturally, what Occasion have we to seek for any occult Powers, but to examine how it acts elsewhere.

And

And though in Order to deter new Enquiries, it hath been strenuously asserted, that if the firmament were full, or near full of Matter, the Resistance to the Motion of Bodies in it by its Opposition, Friction, &c. would be insuperable: I beg leave to dissent, because the Masses composed of those Unites which constitute the fluid, we call the firmament, at any considerable distance from each Globe, or beyond their Atmospheres, and not near the Verge of this System, are so small, and their Adhesion is so weak, that their Obstruction is very small; may be easily divided by one another, or by the Unites. But they, especially the Unites, where they are independant, are so infinitely small, that their Strokes upon one another, their Compression and Friction against one another, can give no comparative Resistance or Obstruction to one another, or larger Bodies moving among them; and though the small Parts of Light give Way to one another, or to larger Bodies moving among them; and though the small Parts of Light give way to one another, so readily and easily, they cannot give up their Space, their Compression upon one another, or upon the Spirit amongst them, which is so solid

lid that they cannot pervade between the Unites that compose it, is not abated; and I think it is as great or greater upon Bodies in Motion than upon those at Rest.

And though no Matter can be bereft of any of its Space, or compressed into less Space; yet I think the greatest Increase of Compressure we can give, will not sensibly increase the Resistance. For if you put Water into a Shell of Metal, and compress it ever so much, a Body will move in it. Nay if there be some fluids whose Parts have more or less of Resistance than those of the Water in it, they will upon inverting the Shell, separate, as if the Vessel were open. And if such a Shell so filled with several sorts were placed in the firmament at sufficient distance from any Globe, so that the Compression on each Side were equal, the largest Parts would go to the center, and the smallest parts to the outsides, and the rest in order and form into Spheres.

So we may conclude, that the Unites, which compose the firmament by some accidents can be impelled, so as to adhere one to another, and divide one from another. And where the force is greater than the Resistance, be moved, and move

one

one another, and consequently thrust against each other, and one with another against the Unites which compose all other Sorts of Matter inclosed in it, and which resist them in Proportion to the Dimension of each of their Surfaces; and with a force on each side in some proportion to the Extent of the uninterrupted fluid on that Side; with some difference, when by Motion some Parts of the firmament thrust more than other Parts. Hence in general, the Unites which are largest and near one another, will be pressed to one another, and adhere the strongest together; and so in Digression to the smallest, which will recede, and have little or no degree of adhesion, with some Differences by their figures as aforesaid. And as every Mass is composed of some Parts which adhere, and contains some which are fluid, the close adhesion of the larger Sorts of Unites, which we comparatively call solidity, is an accident to matter, which does not (as hath been thought) make it more difficult to be moved, but on the contrary gives the Spirit which impels, greater hold of the Mass, prevents more of it, from pushing forward through its Pores or fluid Parts; diverts more of the Spirits which obstructs

obstructs its Motion forward sideways; and hinders more of that Spirit from passing backward thro' its Pores, and obstructing that Spirit which projects the Body, and divides the Spirit before the Body; makes the solidest of Bodies, each of the same Dimension, with the same force move fastest and furthest, and with the solidest Part foremost, and also for the same Reasons suffers the Spirit to drive any other Body toward it, sooner than if it were less solid; nay much sooner, than if there were nothing but fluid firmament in its Place. Nay even to drive the Masses or largest Parts of the firmament to the Surfaces of those considerable Masses we call Globes, wherewith it thrusts, compresses and acts upon the fluids and porous bodies there, which the finest Parts of the firmament would pervade.

But allow things happen here as I have hinted, it may be objected, how can matter obey Commandments, keep all things in Motion and Order, produce Seasons, support Life, &c. which hath no Knowledge, or other Qualities, but Solidity. Is it possible that Actions produced by mere Accidents can ever be brought within Rules?

I may truly answer that those I call Accidents came not by Chance (I exclude Chance because those who admit it exclude wisdom from God, and Reason from Man,) but came by God's infinite Power; directed by his Prescience and Wisdom. For I am shewing that he hath created such a Number of Sorts, and such a Number of each Sort, of these Unites of Matter; each of each Sort of such a Size and Figure; and hath placed such Numbers of each in such Place, so mix'd in such Order, at such Distances, some Parts so adhering and some so fluid, as puts each and all into such Motion and Resolution, as makes each liable to such Accidents, as the Author, when he had framed and placed them, and said, *let there be Lights*, or *let this or that successively be intended*, and so they continue to act. For after Things were properly placed, *let there be Lights*, or *&c.* was rather a Permission than a Command; is, *let these things be liable to such Accidents as will befall such Things so placed*. For doth Man, when he designs to produce the Action of Fire, any Thing more than prepare and put a Spark of Light or Fire to Matter whose Parts are properly disposed for Fire to act amongst? Does not the Motion ensue

sue by Accidents without his taking any further Care, or contributing any further to the Action?

But further, God, who cou'd dispose Things to act, or Accidents to happen, which are constantly and regularly the same, or in the same Series or Rotation; cou'd also, by having all Time, all Accidents of Matter, and all the Actions of Man, which wou'd happen or be perform'd, at once in view, so Proportion and place matter, that not only such as happen'd periodically, but things which seem to come casually, such as Wind, Rains, &c. shou'd all happen to answer his design in each place, at each Period of time, cou'd know how, where and when every blast of Wind shou'd blow from the Creation to the Worlds end, infinitely more easily and certainly than a Clock-maker can tell, when and what his Clock will strike. Nay, that even those accidents which are contrary to the settled Rules, which we call the actions of Nature, shou'd happen precisely in the place, and at the time each of those miracles were of use, to be shew'd without his interposing at the time; and his providence must be a continued act all at every point of time from the Creation, and not change

as accidents change, or actions are perform'd.

But to proceed, we suppose that every unite of matter, and every body compounded of unites adhering, placed in any Part of this System at rest or in Motion, supports and resists those on each side, by some other Parts of Solid or fluid matter; and when the Parts of matter on one side impel the unites or body with greater force, than the parts of matter on the opposite, or another side resist, it will move as far as those or other succeeding parts of matter impel it, with a force superior to those which at first or successively resist it, and no further. Hence in fluids such as the atmosphere or firmament where the Masses are of different magnitudes, when any solid body is impelled more on one side than it is resists on another, and put into Motion, it divides the parts of the fluid before it to each side; the smaller receding backward, and the larger going part forward, partly a side, and attempts to leave a Vacuum behind it. And the firmament behind and on each side takes most hold of the largest parts of the Spirit, which are nearest, driveth them forward against the body, and so in Succession against one another, and suffers the smaller parts, or the
Light

Light to pass backward between the Spirit, to take the places the Spirit left, and the Spirit on each side of the Line of Motion pushes in, and the Light spreads out of the Line and changes place with it, till they form an equality of the mixture; this preceding and receding may be seen perform'd by that impulse they call gravity. If you fill a bottle of clear Glass with several sorts of fluids, whose Parts are of different sizes, and cork it, as often as you invert the bottle, the Parts of the largest sort will be push'd downward or forward, and those of the smaller sorts will recede between them upward or backward.

If the body impelled be small and porous, or be in form of a shell, and its sides thin, so that Masses of Spirit of any considerable size, can in any considerable quantity pervade and recede thro' its Pores, the force of the impulse will be considerably weaken'd, and considerably sooner determin'd.

If the impulse here be against the course of the impulse they call gravity, it must be greater than that impulse, or else the body will not move at all against that impulse. The impulse beyond or after that must divide a column of the *Æther*, as

aforesaid, the length of the course of the bodies Motion. When that impulse weakens or hath done, the impulse they call gravity takes the body again. But that hath nothing or little to do with the Motion of the Planets. And the Parts of the Firmament as they happen to be placed or divided in their turns, may be said to be Agents, Patients or means. Some parts in their turns thrust the whole; the whole thrusts some Parts more than other; those that thrust most, or are most thrusten, move those that thrust less or are less thrusten, and they that thrust less or are less thrusten, give way and remove. Those moving or those moved thrust and are thrusten against, press, move and remove, other bodies.

So as the Globes and fluids are placed, where the Firmament thrusts more on one side of a body in it, than on the other, the body, be it small or great, must move; and when the Firmament presses on bodies of different magnitudes, or different degrees of solidity, those bodies which are largest or solidest move each in the Line where it meets least Opposition. Those in the sphere of the sun towards his center, and those in the sphere of each other Globe, towards his center and goes first or foremost; and if a body have Parts, which have different degrees of solidity, upon which part soever the impulse,

pulse, or as they call it, the projectile force be employ'd, the solideft or groffest Parts go foremost, and with their solideft Ends or Parts formost, and the smallest or least solideft recede first or foremost, and with their least or least solid Ends or Parts foremost, till each take its proper place, and all attempt to be at rest; and where the body in Motion is round, and its Parts composed or framed, so that in Motion the solideft Part can be shifted from side to side; the side that is solideft, or that contains the greatest Number of the groffest parts in the same space will have the greatest impulse upon it, and will turn foremost; and where those groffest parts can shift continually, the whole will turn round continually. If a round bowl or body in Motion in a fluid, rub with one side upon the plane of a solid or grosser fluid, and that side is successively obstructed it will turn backward, and the side which hath less obstructions, and is quicker moved, will turn foremost.

But in or upon the Surface of each Globe, where by the Action at the Sun, the Reaction of Light or Heat upon the Side of each Globe next the Sun, Fire here, or, &c. the groffest Parts of the Fluid of Spirit, Water, or, &c. can be di-

vided till they are smaller, than those next above them respectively, they will be press'd by the others above, recede upward, and yield Place to the grosser. And if at proper Distances from the Sun, Earth, &c. the Firmament can in Time compress these small Parts, and reform them into grosser Masses than those below them, they will successively return and form a perpetual Circulation of the Parts of the Firmament, from and to the Sun; of Water, from and to the Earth, &c. and one may say all Light issues from the Sun, yet the Sun is not empty; into the Place from whence the Parts of Light came, thither they united in Masses, or Drops return again. And all Vapours issue from the Abyss or Sea, yet they are not empty, into the Place from whence the Vapours rose, thither they in Drops or Water return again.

So to induce People to be reconciled to the Firmament, we have nothing to do but to shew that a Globe may be moved in the Firmament by such Means as small Bodies are moved here. And we shall pitch upon this Globe of the Earth for an Experiment.

Suppose the Sun be near the Center of the Firmament, or of this System, and that there

there is a Motion or Action like that of Fire in it, or about its Surface, which divides the Spirit there, and that such a Quantity of Light separates, and in Motion attempts or strives to possess more Place than the same Unites do when formed in a Mass or Fluid, Still or at Rest. That will produce an Attempt to expand, or a Thrusting upon every Part of the Fluid or Firmament, and upon every Thing in it; greatest near the Sun, and less and less at greater Distances towards the Verge of this System. By that thrusting or squeezing of the Fluid, those Parts divided small, continually fly off between the larger Masses, in Lines from the Center of the Sun; and the larger Masses are press'd towards the Center divided, &c. in Succession. And the small Parts which fly off unite by Degrees at great Distances from the Sun, are returned, &c. And the several Parts of the Firmament are continually mixed, or composed of greater and smaller Parts in different Proportions, to the different Distances from the Sun, except where Bodies interfere. By that the Hemisphere of the Earth next the Sun, whither the Parts of Light issue, and whither the Masses of Spirit behind the Earth are hindered from returning by the Interposition of the Earth, is filled
with

with Light, and the Reaction thereof divides those Masses of Spirit they find there; keeps out the grosser Parts on each Side, and forms comparatively to the rest of the neighbouring Parts of the Firmament, what they here call a Vacuum.

Tho' the Precedence or Retreat of the Light, except in very violent Motion, or confined in one Direction, has little Appearance of Force to move small Bodies here, because it is in small Quantities and soon disperses, yet its Force is near equal to the force of the Spirit which drives Solids here. And when great Quantities of the Light is in sufficient Motion, and is resisted by a Body so solid or thick that little of it can pervade, and a Surface so broad, as that the Spirit on each Side cannot break in, the Force is greatest where the Agitation is greatest; and is increased as the Supply and Action is longer continued.

At each Instant there is a Column of Light in Motion from the Sun to the Earth, interrupted by half of its Surface, and by that put into a new Action. The gross Parts of Spirit behind the Earth, which return from that Part of the Verge of this System, being interrupted from returning towards the Sun, by the dark Side of the Earth, forms Night; and that becomes

comes a Column of Darkneſs, or Spirit leſs divided and moved, extending from the other half of the Earth's Surface, ſo long as till Lines drawn by the Sides of the Sun, by the Sides of the Earth, meet behind the Earth, the Reſiſtance of the Baſis of each of the ſaid Columns ſuppoſed to be equal.

Next the ſaid Surface of the Earth towards the Sun, there is a Cap of Light deepeſt near the Center, and ſhalloweſt next the Edges, whoſe Parts by Action, Reaction, &c. are more divided than the reſt; ſuch as that upon one Side of the Moon, which, when its Edge is to us, one may ſee plainly white, or like Flame.

The Earth as it proceeds is continually forming a new Part of a Column of Light, and a new Part of a Column of Darkneſs out of that Part of the Firmament next before the Earth, which was before the Earth entered it, in the common Degree of Light; and is continually in the ſame Proportion leaving a Part of the Column of Light, and a Part of the Column of Darkneſs, in that Part of the Firmament next behind, and the Spirit next the Part of the Column of Light pushes into it, and the Light flies out; and the Spirit in the Part of the Column of Darkneſs beyond the Atmosphere flies out, and the Light flies in,
till

till they be like the other Parts of the Firmament at the same Distances from the Sun.

The Rotation of the Earth, Atmosphere, &c. lets the Edge of the Cap of Light on the foremost Side progressively begin to act, and proceed by turning the foremost dark Edge of the Earth towards the Sun, and by stopping the Light successively there, and lets the Edge of the Cap of Light on the inmost Side recede, cease to act, and become dark, by turning the inmost light Edge of the Earth from the Sun, and suffering the Spirit to push in, and push out the Parts of Light. One would be ready to judge, that when part of the Cap of Light is turned behind the Earth, and that the Agitation in that Part in a great Measure ceases; and the Parts of it being more divided or thinner, than the Parts of the Firmament before the Earth, that the Earth should rather go backward; but the Light can recede thro' or between the Spirit, and let it come forward, but cannot recede thro' the Earth, and let it come backward.

So the Spirit in the lower Part of the Column of Darknes left behind the Earth, it being in Motion and Rotation forward, that Spirit behind the lower End of the Column of Light also left behind the
Earth,

Earth, push into the Part of the Column of Light the Earth hath left behind, and into the Edge of the Cap of Light the Earth hath turned behind, in two Directions. One will push on the Earth, and the other will turn it; and the Parts of Light which recede between the Spirit, supply the Places of the Spirit, mix, &c. and the new Part of the Column of Light, and new Edge of the Cap of Light, upon which the Earth successively comes and turns, being upon the Earth's entring, less push'd by having less Share of the interrupted Light from the Sun to the Earth, and that Light being less agitated than the Light, in that Part of the Column the Earth pass'd last over, allows the Earth to incline on that side towards the Sun, and keeps in a Circle.

At the same Time successively the Earth and Atmosphere, at some Distance, divide the Parts of the Æther before them, 'tis likely from a Point. The Æther before them being there press'd, the Light will recede backward between the Spirit in Lines till they be behind the Middle of the Earth, and the Spirit will be driven nearer together, partly forward and partly on one side, and make Way for the Earth. But considering the Rotation and circular Motion

tion of the Earth towards the Sun, and the Thinness of the fluid on that side, I think the greater Part of the Light will recede on that side next the Sun, mix with the divided Æther there, move backwards, heighten the Action, turn in after the Earth, still form a new Vacuum behind, and still recede as the Spirit pushes in, impels or drives the Earth.

So the Earth turns upon the Point of a Column of the Parts of the Firmament in the greatest Agitation, having its Basis at the Sun, and its Point the Earth's Meridian; or at the Middle of the Hemisphere of Light when the Center strikes, or declines on each Side, and shifting as its Meridian shifts; and the Agitation decreases or grows weaker from that Point to each Side, and the Resistance in the same Proportion. But the Cap is more rarified towards the hindermost Edge than towards the foremost, because the Light from the Sun has operated all along from the hindermost Edge to the Meridian, every Line having lately been a Meridian; which not only makes the Action greater, the Parts smaller, but the Cap deeper towards that Edge, and so the Firmament brighter at the Sun's going off, than at its coming on; which makes the Push greater on that Side than the Resistance on the other; both by
greater

greater force from the Sun while the Action and Reaction continue, and freer and greater Scope for Admission of the Spirit when that Edge turns off, and the Action and Reaction from the Sun to the Earth, &c. ceases. And this greater force is counterballanced, and the Earth kept from flying out by the Part of the Column of Darknes which hath been longest at Rest, and thereby become grossest, or *most full of Spirit.*

And as the Atmosphere by the grossness of its parts is press'd to, push'd on, and goes along with the Earth, the dark Side of the Atmosphere behind, and left behind, resists more than the light Parts of the firmament directly before the Earth, and more than the foremost Edge of the Cap of Light, between the foremost Side of the Earth and Sun, and give hold to the Spirit which pushes in behind, to drive it and the Earth: and to the Spirit which pushes in sloping thro' the Part of the Column of Light the Earth hath left behind, to push or strike on a Broadside, or almost perpendicular, against the said dark Part of the atmosphere, and turn the atmosphere and the Earth, and keep them inclining toward the Sun or in a Circle. And as that dark Part of the Atmosphere
moves

moves forward and is turn'd, the Spirit which pushes after successively, forms and keeps the dark or gross Part of the Atmosphere in the same Position. In this Action, while the Globe or Body is in Motion, the foremost Parts of the Light, are pushed along after it, while some of the hindmost are receding; and the foremost Spirit, taking the precedence of them, and the firmament by the foremost parts of the Spirit pushes against the foremost Light, and with it against the Earth, as much as if each of the foremost Parts of the Spirit still push'd against the Earth by touching it, otherwise the Spirit would produce a Motion like Wind at the Surface of the hindermost Part of the Earth:

There is another Accident within the Earth, which is one of the principal Causes of its diurnal Motion or Rotation, which belongs to another Treatise, which cannot well be given in Epitome, or by Pieces, I mean the Motion of the internal Globe.

The Weight of the Globe of Earth is nothing, because it hath no Tendency or Gravity to any Point, is no Burthen to the Carrier, no more than an empty Shell of that Size, whose Sides would resist and keep out the Æther, as much as the Earth
them

does, would be; if such a Shell and such a Void could be.

So a force necessary to move a Body in the Firmament, needs only squeeze' out the Light from before the Body, and make them once or successively return or recede to behind the Body; and the Spirit which pushes after and impels the Body, will push in amongst that Light, and push it backward and outward: Nor does the Size of Bodies make any Difference, only the Places full of Light, or as they call them Vacuums, should be in Proportion to the Body moved, further divided or enlarged for increasing the Velocity, and renewed to continue the Motion.

I have not attempted here to shew how great the force of the Compressure of the Firmament is upon the Unites of Solids, or Fluids; nor intended, except as it comes in occasionally to explain the other Operations, which I have in general attributed to this fluid, but only so far as was necessary, to shew that the Parts of this fluid, as they are more or less divided in one Place than another, have more or less Degrees of Resistance, produce Motion, and move Bodies in them.

The Observations and Experiments which have been offered as Proofs for At-

traction and Elasticity in Solids, are Proofs for Compression. Those for Elasticity in fluids, for Separation of their Parts by the Intervention of other Parts, which produces that Expansion. I have mentioned only a few Experiments which have been made to prove the established Doctrine to prove the contrary. If a new Apparatus of Instruments were made to prove this rationally, Things would appear in a rational Light to a common Capacity; and I think I may venture to say, that all the Phenomena in inanimate Nature will answer to this, without any Exception or By-Law.

I attempt not to detract from the Praise which is justly due to those, who by diligent and constant Observations and Calculations, have ascertain'd the Proportions or Measures of the Motions of Bodies, but only to discover the Causes of those Motions, which I think none ever pretended to shew.

UNITES OF ÆTHER.

I Am not very well satisfied with the received Notions about Light, Warmth, Heat, Fire, Cold, Darkneſs, &c. Nor have

have I had sufficient Opportunities to make sufficient Experiments and Observations therein; but shall offer a few Conjectures to see how they will square with Observations already made, and those which may be made hereafter.

The Corpuscles of this fluid are so infinitely small, that they are not to be measured, because they are smaller than the Pores of any Body. Those in Masses or Air, cannot pass the Pores of any Metal or Glass, nor scarce any fluid, and resist grosser fluids from entering where they are; but it is evident the Corpuscles of this fluid, in some Degree of Agitation, can pervade the Pores of any Body or Fluid. And if they are included in any Vessel never so close, they can make their Way out; so that the Vessel will admit its fill of any other fluid. And this fluid can never be prejudiced by violent Agitation, or being fired; because its Parts or Corpuscles are so small, they can only be divided from one another, and alternately agitated in a greater or less Degree, kept further asunder by those of other Fluids or Bodies, or come nearer together. If the Corpuscles be infinitely small or pointed, the friction among themselves must divide those which unite, and enter the Pores of other Bodies or Flu-

ids in it, according to the force of the Impulse.

This fluid seems to be the Compliment to all other sorts of Matter, and fills up the remaining Space or Vacancy in the whole Universe; not only the Space from the Sun to all the Globes we can see, and the Spheres in which they move, but the Interstices or Pores, in all even the most minute Parts of Matter, fluid or solid, and there must be some Millions of times as much of this, as of all other sorts of Matter within our Knowledge. For it permits no other Vacuum, but that the Corpuscles next the Sun or Fire, are moved and divided by their violent Agitation; and less, as that Agitation lessens by Distance; and still less behind Clouds, dense Vapours, or solid Bodies that interfere; least, where there happens a total Eclipse; or on the dark sides of the Globes. The Space between the Sun and the Surfaces of the several Globes next it, is always full of this fluid in form of fire near the Sun, and of Light nearer the Globes, and successively supplied with new Light; and that fluid fills also the Spaces near the Globes, which are dark, cold, or frozen. Its Appearance and Action is changed, only as it is differently divided, agitated, or at Rest.

'Tis

'Tis, they say, evident the fluid Air let into a Receiver, can be compressed into part of the Space it contains in the Atmosphere; so, if that were true, there must be a subtile Fluid to fill the Interstices, or else a great part of the Atmosphere must be empty Space; so I think the Unites of that fluid, are infinitely smaller than the Masses of Air. That the Corpuscles of Light, Warmth, Heat, Fire, Darkneſs, Cold, Frost, &c. are material, will not be denied; that their Unites or Masses are free from one another, and have the Qualities of what we call a Fluid, will be easily proved. That one of the Corpuscles being moved, can move another, is demonstrable; that they exist, when we perceive them not by their Actions, follows. If we allow Light to be material, can we imagine that it goes back to the Sun or Fire, when any opake Body intercepts it in a Line; must it not rest in the Place or Space till its Action be renewed. When the Corpuscles of fire are put into Agitation or Action by the Sun, or Art, and any Thing obstructs their Courses here in this Atmosphere, they continue so for some Time after, and incline to Rest leisurely, which proves they are present after the Passage from the Sun, Fire, or, &c. is stopt.

Darkness, &c. (*Gen.* 1. 2.) implied, that the Air was inactive; there was not that OEconomy which was to arise from Motion, and as they render it, the Heavens were not garnished.

The Air is framed to enforce the Gravity or Compressure of this fluid upon Bodies (especially Animals) which are so porous, that it would pervade them; and increasing, it increases that Power, & *e contra*.

The *Æther* with Air, is stronger than that without Air; therefore Fluids are driven up between Glasses up Tubes, &c.

A Bladder extended by Force in the open Air, and its Mouth shut with the same Quantity, or Air within, as is contained in the same Space without; I think when the force which extended it is taken away, will be press'd near together. If half, or all the Air were included in Bladders, what then would make them run up? When you force in Air and *Æther*, the *Æther* goes through, and the Air stays.

Whether Air be *Æther* or *Light* congealed, may be proved by heating a sphere of Metal closed full of Air, and trying whether it will rarify and pass the Pores, so as it may be beaten together.

Inclose

Incloſe Air in a Shell of ductile Metal, and hammer it till it be exceſſive hot, and that will divide the Air, if Heat will; and if the Shell can be beat 'till it be ſolid without burſting, the Air is the ſame as Fire. If it were heated the Parts would be more open, and if the Parts of Air did not divide by the Fire, they would iſſue out at the Pores.

Fluids are not capable of keeping a Form, becauſe they conform to the Surfaces of every thing formed. If the Particles of the Fluid are round or near round, they ſlide or roll upon the Surfaces of one another, the larger the Maſs, the nearer the Surface approaches to a ſtreight Line; and the ſmaller the Body is, the more acute the Angles of its Edges are, and ſo give leſs Reſiſtance.

If this Fluid did not pervade Water, how could a Body ſink in Water, when the Pillar of Water is fixed at Bottom.

The Interſtices of the Earth, Water, &c. being always full of *Æther*, the *Æther* without, preſſes with it perpendicular, upon the *Æther* in a Drif, in the Mines, or &c.

The *Light* acts upon each Corpufcle of Body, or Fluid by its ſelf, but works upon the Surfaces of ſuch Compoſitions of

Matter as animal Bodies are, with the Atmosphere or Air.

Divided Æther comes up through Water without Bubbles. ----- too gross or too small below in the Mines.

As we move, the Æther moves thro' us.





BUHUN of the WIND.



HE seems to prove that the Wind may be explained by Hydrostaticks; that where the Vapours out of the Earth, Sea, &c. are heavier or thicker than the neighbouring Air, they press thither and produce that Motion we call Wind. Near the Line the Vapours being raised more at Sea than Land by Day, or the Heat of the Sun, the breezes come from the Sea and refresh the Land. The same vapours with those raised out of the Land, by Night flow towards the Sea, &c. and when the Sun is near the Line, the vapours generally follow the Rarification made by the Sun. Ex. G. if a hot Bullet be moved over Water the cold Air flows

flows to the place rarified; they have their Winds blow generally one way for near Six months together near the Line. The Winds are not so constant here, but are hindred or directed by Mountains, Seas, the Sun's distance, &c. He observes that the Winds from the Seas. &c. are warmer, moister, &c. than what come by Land; that the Winds often rebound again when they have over ballanced the place whither they flow'd, as our West and South-West Winds here from the vapours that pres to the Rarification in Summer, and the North and North-East with draw in Winter; that they take their qualities from the matter they come out of, or over, *viz.* coldness from snowy Mountains; Heat, from hot Sand, Mineral stream, &c. when they come thro' such in the Earth.

Observe whether the vapours pres to the place rarified, or to that, from which the heat, having rarified and expelled the vapours, is withdrawn; or whether the Earths Motion removing the part rarified from the Sun, the vapours following, when there is any westward, and being assisted by the Expulsion of the Sun's heat upon the place further West, be not the cause that our West Winds are stronger than the East in Summer; or whether the depre-

sure

sure of the Clouds, or Exhalation of Vapours out of the Earth, do not sometimes force the Air to the place, on which side it is least prest.

A Cupping Glass defends the parts it covers from the Air, and the other parts being prest'd, causes the Pain.

Doth the Wind move as Water doth which carries a Body with it, or does it only move the Body which resists it, and follow it in that Line.

The thin Æther resisting, returning, or recoiling, makes the Puffs and Gusts in the Wind, and the gross parts being driven down to the Earth, interrupted by the surface of the Earth, move along the surface. If they were from the surface they wou'd diffuse.

Consider how the Clouds being raised higher in the Heat of the Day, and brought lower by the cool of the Night, and being lower at each Pole than at the Equator will move the Air, and produce that Action we call the Wind blowing.

When Vapours sink Rain falls, or Winds blow. The receding Æther and perhaps some Volatile parts of sulphur or *Ëc.* which also recede, may produce fire and that found.

The

The Wind either moves the fluid and lessens the gravity, or its force contends with the Pressure of the fluid, and it is never too strong for Gravity, which is a great Proof, that it is mov'd by the same Agent and same Action.

Can the Wind blow from different Points, as North and West, or a more obtuse Angle, so as to force the Parts of a Cloud together, and what makes Wind come almost regularly in Gusts or Waves? When the Wind strives to blow two ways opposite or near, and changes Sides, it makes the Vapours unite and fall in Rain. If Wind blow always one way, as in *Egypt*, or where it blows one way a long Time, Rain at change.

The East Wind, they say, blows nine Months to the Bay of *Mexico*, and makes a greater Current in the Gulf. But the Current is even in the other Months. Does not the East Wind bring the Masses of *Æther* form'd in the Night? When the Wind Blows, or the grossest Corpuscles in the atmosphere come from the East or North, the *Æther* divided by the Sun, recedes from the West and South to the East and North. When the grosser Parts proceed from the West or South, the small *Æther* recedes, or is stopt from proceeding

ing East and North, and is multiplied here. The North and East abate the action in animals and Vegetables. The South and West forward it.

Æther may enter the Sea by Day in Heat, and rise in Parts united in the Night, and cause Wind, especially in the hot Climates.

To know the Causes of the irregular Winds, there ought to be true journals kept of those which are considerable, at what Time they begun precisely at each Place; what Appearances there were in the Firmament, some Time before, and then, on every Side; what Rains had fallen, what Clouds appeared, whether the Sky was dark, or clear, &c. how far the Wind extended, how long it continued, what alterations happened from first to last. And those Journals should be communicated and compared.

A Turnado is a Gust of Wind, which begins upon a sudden Turning of the Wind at Sea near the Line, lasts about an Hour, is only near the Line, extends sometimes into the Islands. *Qu.* How far? If they do not strike the Sails, they will overset the Ship.

Wind may break the Masses by blowing and so rest; or may disperse and divide the
Clouds

and Clouds form Wind; or expanding of the Matter in the Clouds may form wind.

Do the gross Parts which miss the Earth, and pass by its Sides towards the Sun form any Motion on the Surface, or among the Clouds, at those Parts of the Surface of the Earth, which are at right Angles with the Zenith of the Sun. See how the Trade Winds are.

One should consider what Quantity of water the wind detaches in a hot Season, and as it is raised and driven along with it; what alterations will be at the Place whither it is driven.

It is much safer to have the Air to come to a Fire one sits by, from divers Points, than in one Stream.

Vessels or Places filled with gross Air, condensed Air, or Vapours.

WHEN one hath pumped in as much Air as one can, heat it, and one may pump in more cold Air, and I think one may pump in hot Air *ad infinitum*: it will get out.

Whether (if a Receiver were made very thick, or were sunk in Water) when Air is pumped in, would that which comes
out

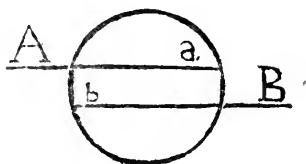
out pass unseen, or appear in the Water up at a small Neck of a Vessel; or would it hinder Air from going in, when the grosser is pumped out.

If a thousand of Unites of A's, and a thousand of B's, the A's adhering in Tens, and the B's divided fill a Vessel, each possessing an equal Share of Space, and each of the same Figure; the B's take up more place than the A's; and if the B's be divided, and the A's adhere in Tens, the B's will then take up more Place than the A's, and still more in Motion among themselves, than at rest. But the Pores of any Vessel we can frame, admit Unites of some Sorts to pass in or out, therefore we can make no Experiments fairly, between Expansion of Matter in a Vessel, and in the Firmament.

This Expansion of any Fluid, where a thinner is without; by entering of the Parts of the thinner, keeps the grosser Fluid in a State of Fluidity at a certain Degree, and if the Action of the thinner Fluid be heightened, will expand the grosser; if abated, will make or let it storken or freeze. The Masses of the Æther are large, and the Mercury rises when, and where it freezes.

When

When a gross Fluid is expanded by the Parts of the lighter from without, the Parts of the grosser Fluid so distanced till they are ready to take up more Room, can be carry'd off thro' the thinner Fluid. Where Masses of air are included in a Vessel grosser than those next without, the Pressure of the smaller Parts without on the grosser within, with the assistance or Continuation and augmentation of that Pressure with the grosser, is greatest upon those grossest Parts on the opposite Side of the Vessel each way, so that the grossest on each Side, or next the Inside of the Vessel, is most prest towards the thinner or smaller next without, or on the Outside of the Vessel; as A presses most at a, and B most at b.



It is this addition of the grosser Parts within the Stomach, Guts and Parts of Animals, which enables the Pressure of the Æther each opposite way, to make those grosser Parts of Fluids and Steam in
Animals

Animals push forwards and outwards, circulate, and extends the Vessels; and where a Vessel is open'd, burst out, and thereby prevent the Pressure of *Æther* without, from pressing the Parts of the Vessel one against another, so as to cause Pain, &c. where that Motion is sufficient. And to suffer the Parts to be pressed in, cause Pain, Contraction, Death, &c. where it is not.

The small Parts, or *Æther* in Steam, will support as many small Parts of Water as is counterpoised by the Air without, besides the Velocity of the Motion.

When Parts of Water are fixed to Parts of Air, and rais'd into Steam, that the Masses pass by one another without adhering, as dry Masses of Air do; the *Æther* which enters, can expand, or force them outward, much stronger than Masses of Air in some Proportion as they are larger, and so in Plants, Animals, &c. and this they do each way, from ever so small a Distance from the Center; and, I think, thus they disperse humid Clouds:

The common Action of the succeeding *Æther*, can enter and expand Air compress'd in a Vessel. A greater Action of it can expand Water. Any Thing can be expanded by some Degrees. So air is ex-

pandible with one Degree, Water with another, and any Thing with some Degree.

The small Unites of *Æther*, which pervade the Side of the Vessel fill'd with those of gross air, push them outward in every Direction.

The air without presses upon the air within a Vessel by Communication, as much thro' a single Pore, as if the Hole were ever so wide, and keeps Things as close as if it were a real Solid.

Beer and warm water extend in *Vacuo* as air does, which they term Elasticity.

If you put a Creature in a Glass, remainder fill'd with air or water, seal it, and put it within another Glass, the air extracted, the *Æther* will work with the atmosphere, compress the Body, and expand the Fluids, and burst the Glass. Try different Degrees of Air, of Heat, &c.

The Expansion of the Fluids in an Animal, or any other Composition in *Vacuo*, is a Proof, that there is some other Agent than the supposed power of Gravity or Attraction, which impels the Corpuscles of those Fluids, makes them divide one another, take up more Space, expand, and fly off; and that that Agent pervades the Air Pump, is present in every

every Part, and acts upon the most Minute Corpuscles with a Force infinitely greater than the said imagin'd Power, and acts upon as much solid Matter. And likewise, 'tis a Proof, that the Agents which execute this Force, are directed in Lines from every Point in a Sphere environing the Place of Action, and that the Force exerts itself in Lines to every Point in that Sphere, from the Center or Centers of the Place of Action.

Translation of *Newentit*, 608. "Breath will not support the burning of a Candle, (nor I believe hot Air) a Candle may be made to burn a long Time by admitting a little Air," as at Tab. XV. Fig. 2.

The larger Masses are driven into the Vacuum, on opening the Bellows.

Cold Water thrown upon the Surface of a Vessel full of Steam, interrupts the Action of the *Æther* from the Outside.

When the Parts of the Air are small, Steam rises, and the Glass falls, and *E. Con.*

Dissolution of Bodies by Air, &c.

Natural Agents, such as *Æther*, Salts, Water, &c. and their Actions upon one another to waste and decay Metal, Stone, Wood, and all other Materials.

Aqua Regia dissolves Gold and all Metals, except Silver. *Aqua Fortis* dissolves meer Silver, and all Metals except Gold. Alkalics precipitate Silver in an acid Menstruum, put in slowly; will the Menstruum be clear, which was white.—

Corrosiveness. That the Menstruum abound with Corpuscles not too big to get in at the Pores, nor too small to pass thro' them, as the Beams of Light do Glass. That they have a proper Shape to dissociate the Parts. That they have a competent Degree of Solidity to disjoyn the Particles. That they be agile and fitted for Motion, by which, and the Pressure of the Air, &c. they are forced in like Wedges or Levers. Wine, Ale, &c. sheath the acid Particles when new; which, in Time, its constant Motion unsheatheth. I think, few Liquors are sharp, that are let die on a sudden, without Time, Heat, &c. Honey may be fomented with water to good Vinegar. Heat assists the Menstruum, and sometimes it causes Heat in the Operation. A Menstruum may be too strong, and diluting helps it.

Corrosibility. That the Bodies be furnished with Pores of such a Bigness and Figure, that the Corpuscles of the Menstruum

struum may enter them, and yet not be much agitated, without giving brisk Knocks and Shakes to the solid Parts that make up the Body; that its Corpuscles be of such a Bulk and Solidity, as does not render them incapable of being disjoyn'd by the action of the insinuating Corpuscles of the Menstruum. That the Cohesion be not too strict to be separable by the Menstruum. It may be prepared by Fire, as Calx, &c.

The Unites which divide, must be smaller than the Masses divided.

If a Mass of Stone or Metal were placed so near the Sun, that the Æther without, were as thin as the Æther within, the Unites wou'd fall asunder.

The Dissolution of the Unites of Bodies by Fire or Salts, is assisted and hasten'd by the Motion of other Unites of proper Sizes, to enter and divide the unites of the Body they operate upon.

If the Parts of spirits be smaller than the air, they will not dissolve salts, sugar, &c.

The Difference of these Pillars (*viz.* of Light and Spirit, which compress every Thing) makes the Salts and all angular pointed Bodies and perhaps Fire, be driven into and divide the Corpuscles from a Mass of Matter, because the Pillars which

drive it in are infinite; those which pervade the Mass are weakened. If the Mass be near the Globe, they work more upon the upper, than the under Side. This holds in the Stomach, and they work more in the Summer in the Day, or when that Agitation of the Light is strongest. What do Acids and Alkalies mixed, in Vacuo? If they work, this is the Agent.

Sugar form'd in Masses, is soon dissolv'd by Water; that melted on the Fire, or form'd in Shoots not soon dissolved, because the unites are uniform, and Parts of water as large as those of Sugar.

Velocity, or Increase of Force.

BODIES do not acquire Velocity by falling, but as the Opposition abates; nor do they acquire Velocity in any other Direction, or by any other Means, but quite the contrary.

One might make a Proof with what Force Bodies fall from different Heights, by fixing a Spring with a Bag at its End for them to fall into, by marking, first, by Weights put in, and Lines made, how far it would sink at each Weight, by rubbing Butter, or such soft Matter upon the Side of the Ruler, and letting it rub
off

off as low as it sunk each Time; or by fixing Weights in one End of a Scale, and a Bag for the Weight to fall into at the other End, and a Pin to stop the light End from rising. This may be done by a Spring horizontally, for shooting Balls to prove their Strength at Distance.

Qu. Whether a Fly, such as they Coin with, set forward by the Push of a bent Spring, would not, after it had gone by a Cord in a Pully, lift a greater Weight than the Spring which set it forward, would lift in the same Manner.

Rebounds.

REbounds of a Body projected against a Solid, must be performed in the same Manner as the Reflection of Light, and by the same Means; for as the Body displaces the Fluid in its Motion forward till it is stopt against the Solid, and forced by the succeeding Corpuscles to move backward (all being presumed to be near full, and when one Part fuller than another ballancing itself) that fluid which returns must carry the Body backwards when it is stopt.

What we call Rebounding, and ascribe to the Elasticity of the Solid, the Body strikes against, must be either the *Æther*

which passes through the Body stricken, or the *Æther* which pushes the Corpuscles on the Surface, removed in Part from their Places back again, or both. Rebounds are assisted by the *Æther*, which pervades thro' the Body stricken upon. The receding *Æther* makes a Recoil when a Body is stopt by a Solid.

Æther, which in its Motion strikes upon a Solid, rebounds; or by being pushed on by that behind, takes another Course, and moves back, and drives that back which is distant from the Solid. This is what Sir *J. N.* dreams of Light returning before it comes to a Solid.

The Rebound of a Body, whose Motion is stopt by a Solid, is occasioned by the greater Pressure upon the grosser Masses of *Æther* before, then of the small ones which are returned behind, which pushes the Body back into the Vacuum behind.

The Foil which Wool, &c. gives to Balls, proceeds from the Resistance of the opposite *Æther*, and from the Breadth of all the Parts which move against it with the Stroke.

Recoil, or when Solids, or the grossest Parts of the Air, are moved or pushed towards a Solid, it produces an Inequality, or brings more gross Parts thither, than there

there are in the Spaces behind; and the Æther pushes them backward, or back again into the Space full of smaller Parts behind, till an Equality be produced. And that Motion is repeated several Times, like a Vibration, till the Parts are mixt.

Make a loose Frame with a Spring fixed to it, and try how far an horizontal Recoil of a Gun will move it, and then try what Weight will move it as far in a perpendicular Position; but a Recoil may shake the Hand by too quick Motion.

Adhesion.

IF Adhesion or Solidity, Gravity and Elasticity, proceed from the same Cause, then there can be no comparative Proof or Tryal, of this different Degrees at different Times, or in different Places. Perhaps the Light presses the Air against the Surface of every Body, and so keeps those Surfaces together, which will part when the Light only strikes, and pervades between the Surfaces in Vacuo.

Unites which are flat, or broader one Way than the rest, and of Size larger than those of the Æther which presses them, will adhere, because the Pressure upon the outer Surface is greater than upon the inner, which

which touches; and the Pressure upon the Surfaces of one side of their Edges, is not equal, but less than that which is upon the outer flat Surface; and so of oblong, or what we call fibrous Parts. But if the Unites be round, the Pressure upon any side will be equal to that of the outer side, or any other side, since 'tis only possible each can touch in few Points: And for that Reason they will always be liable to be moved, one upon another, and thereby be loose or fluid, as Mercury, &c. and likewise to be raised by Fire, when there is a Vacuum behind them. State this, notwithstanding they touch in one, two, three or four Points: And likewise with Respect to that they call their Gravity, and consider the Figures of the Unites when so large, as that they may be proved. Judge not according to the Appearance, but judge righteous Judgment.

I believe if two Bodies of six Inches Diameter, entirely solid, were placed at a sufficient Distance from the Earth near one another, they would be driven to one another with that Force, that they would crush a Diamond of that Diameter between them to Powder. And two Corpuscles, at an infinitely small Distance, whose sides are plain and smooth, are driven together
with

with an incredible Force, as appears plainly in the Elasticity of a Spring, and it is likely 'tis those Figures only which are so elastick; or Plates composed of them in that Figure, that least Æther pervades, are most so.

To make Corpuscles of Matter adhere to one another when they touch, nothing is necessary, but that their Figure admit their Edges to join, so close, that the Corpuscles of the Fluid, in which they are contain'd, cannot press their Insides with so great a Force, as they press their Outsides.

Different Sizes of different Fluids, have different Effects upon Bodies they inclose. Those which are so small, as to be pressed between, expand or divide. Those which overlap the Pores and press upon two or more unites, make the unites adhere; so water makes those unite which Air will not. Air those which Fire will not. And *E Contra*. Comparative Sizes between the unites of other Bodies. And Air, or Æther, makes them adhere or keep close.

In uniting or dividing Bodies or Fluids, there are three Proportions to be considered, the Size and Figure of the Unites or Masses, which compose the Body or Fluid; the Sizes of the Parts of the Æther among them, and the Sizes of the Masses
of

of the Air which environ them; and if they be inclosed in a Case, the Size of the Pores of that Case. The Closeness of Adhesion is comparative to the Sizes of the Masses of Æther, and consequently to the Action of the Æther. Compressure of the largest Masses of Air is upon the Surface, because the Unites there are most liable by Friction, &c. to be separated. The large Masses of a Fluid can compress loose Parts which are smaller, and if they are such as will adhere, unite them. But a Fluid of Masses, smaller than those loose Parts, so much that they can press in between those loose Parts, will dissolve them. When a solid Body or gross Fluid is compressed with another Fluid, composed of a Mixture of large and small Parts, the larger are pushed to the Surface; and the Pressure upon them being greater than that upon the small ones, the Body or grosser Fluid is kept together; but when one of them is prest only with small Parts, and the larger are kept out, all the Force lies upon them, and they, if they be small enough, enter between, expand, divide, &c.

If a Globe of solid Unites as large as Peas of any Diameter, were environed by a Sphere of Unites as large as Beans, and violently pushed in inward upon every Point,

Point, the Unites of Peas would keep their places, and the Globe its Figure, as if it were one solid. But if the Peas were environed by a Sphere of Mullet Seed, and compressed as aforesaid, the Seeds would be forced in among the Peas, and the Peas pushed outward into the Sphere of the Millet.

And as the Unites are larger, their Surfaces approach nearer a streight Line, and give the greater Resistance; and are less Fluid. Comparisons between these and small ones represent them not in that point. Sometimes a third fluid, as Water is necessary to make the Parts of Powder of Stone, to unite.

A Body of large Unites broken asunder into Masses, or separated by the Action of smaller Unites, if in the air, are mix'd with masses of air; if in small *Æther*, with those of small *Æther*. If the *Æther* amongst them be small, and the air press upon their Surfaces, it drives them together and unites them, as in melted Metal &c. If the air amongst them be as gross as that which encompasses them it will keep its Place, and the large Unites will not unite. When Water is mixed among some Sorts of grosser Unites, and perhaps some of smaller in a small Proportion, its Parts
keep

keep out most of the air, and forms a Mass partly solid; and the Parts of Water are, if the Mass be large, pressed out; if small, the small Æther, especially when in action, detaches or drives them out one by one; and so the grosser Unites are driven together by slow Degrees, and so, that no Vacancies are left for the Masses of gross air to enter. When the Water is taken out of a Mass of Powder of Stone, or Mixture of Clay, &c. (whose Parts are divided, beat small and mixed) by a hot Fire, it lets them come so near together, as nothing, intervenes but the Unites of Æther; and if they are forced out suddenly still closer; and the Masses of air cannot enter. But if those Parts of Water, are taken out by such Parts of the Air, as are in the Mixture in hot Weather, Masses of the Size which drive out the Water must remain. And if they be so small, as that there is not any smaller in the Atmosphere, the Parts will keep united; but if the Masses of Air left in them, be divided by the Interposition of still smaller, the Parts divide, and become Powder. If the Masses remaining after the driving out the Water, be so large, that the next Parts of Water can be pressed into their Places, they by Degrees dissolve

solve the Parts. In winter, or thick air, when the Parts of water so lodged among the Interstices of Powder, are smaller than the Masses of the then Air, the water keeps its place, and as we say the Body doth not dry. Water among small Bodies is the Cause of *Adhesion*, till the *Æther* push and hunt it out; after that if the Parts come near enough together, they stick. When large Unites, such as Clay, are put into the Fire, the Parts of the fire divide those of the Water, and perhaps many of those, of the Masses of Clay, and drive out those of the Water, Vegetables and other small Parts, and the Compression of the Firmament makes the large ones come close, and the small parts of the Fire recede and suffer them to come close, and the Air keeps them solid. Strata or Nodules of Stone at the Flood were formed in a thin *Æther*, whose parts were smaller (mixed among those of water and so smaller) than those of Water, and considering them as they truly are Solids, they kept the Unites or Masses of Stone no further asunder, or made what we call the pores no wider, than their Dimensions. So the Corpuscles of water can but be pressed into very few of them, whose Masses are large. But counterfeit Stone
which

which is made in the Air, whose Masses are larger than Unites of water, will admit them. I think 'tis helped by making the water hot, and the Air small. And this is the Reason why the Corpuscles of Metal dissolved in Spirits will not unite, but will in the thin *Æther* or fire. Water assists in keeping out the parts of gross air, and its parts are divided and carried out leisurely by the thin *Æther*, so that the gross cannot intrude. A great degree of Cold or Heat have each the same Effect in rendering Things solid. Whites of Eggs though after a different Manner. Frost makes all the Masses gross from small Unites. Heat takes away all the small Unites. Frost seems to be the opposite to Fermentation. If the action of the *Æther* from below were totally stopt, or if its Force were equal to that above, which would contribute most to attraction of fluids, Heat or at Frost? When Particles of Water are pressed down, and there are no thinned Corpuscles of *Æther* to arise, and thin those that fall, they freeze.

Frost is suffered by a Cessation of that Motion in the *Æther*, which is produced by the Sun, Fire, or Fermentation, and reflected backward, and forward, and Side-ways by the Surface of the Earth, or
other

other Matter. The Vapours from the Earth have little Effect where the Hail-Stones and Snow are formed; and the Sun hath equal Power, but in one Direction there is no Reflection.

The Unites of Mercury, and the Masses of Silver in Leaf worked together, make a body with Degrees of adhesion, in Proportion to the Smallness of the Intervals, and to the Dimensions of their Surfaces which touch one another; so does artificial Stone, Clay, Mould, &c. If a Stone, Signet, or Glass, be heated through, the Wax will cleave to it; while 'tis heated, there is a Pervasion of the Æther.

Vegetable Parts and Water adhere in boiling, by dividing the vegetable Parts small, and the Masses of air which interven'd, and let them from adhering.

Projection.

WHEN a solid Body is put into Motion, by the Expansion of a Part of this Fluid confined, within some hollow Case of solid Matter, and mixt with other Fluids, as Air, Water, &c. by which it works, and take its vent into other Vessels, as in animal Frames, and extends or contracts Parts, which draw or push other Parts, and gives Motion to a Part equal to

the Power of the Expansions, and the Levers, or Pullies, by which it works, and that Force is applied to project a Body, and by it move the *Æther*, and the Mixture of Air, &c. in it, or the water, or any other Fluid in which it acts; or when a Ball is projected out of a Gun, by the immediate Expansion of the Fluids, by the Means of Smoke and Corpuscles, with which it works upon the Motion of the Ball forward, the Corpuscles it successively strikes upon, are moved, partly forward, and partly aside, in different Angles from the Line it moves in; and with various Angles according to the various Surfaces of the foremost Side of the moving Body, and perhaps further in Proportion to the Velocity it moves with. And the Fluid by its Sides is successively fuller than the rest of the Medium, and the *Æther*, &c. pushes after it in the Line of Motion, and in all the Angles of a Hemisphere to the Center of the Ball. The Body would move further than it does, if that impulse of the Fluid we call Gravity, were taken off; only as far as the force of the Expansion, exceeded the Resistance of the Fluid, but not infinitely; nor at all without such an Expansion and such a fluid. When the Body strikes against another solid Body, it will rebound by motion of this fluid, as aforesaid.

A body projected by the Elasticity of another body first bended, animal force, or projected immediately by the force of the Animal, is carried in the same manner. The String or Hand that moves the Body quickly enough, forms a vacancy behind, and moves a Pillar of Air before; and the Æther and Air which push into the vacancy successively, pursue the Body, till the motion of the Air be so slow, that its impulse downwards alters the Body's course; and the recoil of the Æther when stopped by a solid Body and driven away, according to the angle of Incidence, makes a new vacancy for the Body to move in, and the Æther behind pushes it in the same Manner, as if it were in a straight Line.* By this Means birds and fishes are driven forward and borne up; and Sound is also carried in the same Manner, and perhaps the Truth of this may best

* It may be tried whether a Marble let fall upon a Piece of Glass some Distance from the Ground, which the Æther can pervade, will rise as far as if it laid upon a Marble floor, or whether, as far from a Body that hath Holes in it, or &c. this may perhaps be proved with colour'd Waters, and it may be shewed by dropping an elastick Shell, whose Sides will yield much more than the Sides of a Solid, that it is not the Elasticity of the Body falling, or the Body it falls upon, but in the Æther——Let a Body fall upon a Point as broad as it can touch,

be proved in Water which can be seen, and perhaps the Perception may be helped by Water of different Colours, or by the Motion of Smoke or flame in the Line, the Pillar is moved in before the body approaches to it.

A Pendulum being fixed at the Center, and the Gravity nothing, or supported when it hangs Perpendicular, being pushed out of the Line, rises till it has Gravity that returns it a little, and the air pushes after it in Motion, and so vibrates it alternately. Whether a light body will vibrate as far, and as fast, as a heavy body in Vacuo, deserves Experiment.

A bowl, by rubbing against the Ground, is turned round, whether the Æther has any such Effect upon the Globes, I know not.

As for the circular Motion of bodies turning upon a Point, or axis, where the body is supported against Gravity, and nothing but its friction to be consider'd in Motion; if its Surface be round, a fluid put into Motion in that Direction will move it for a long Time, and it must be impelled by air following it in the same Manner.

In gross fluids, a slow Motion of a round bowl, in which it is contained, or of a
Globe

Globe in its Center, will make those Parts of the fluids next the Sides move first, and that Motion being continu'd, in Time will make it all move round. Qu. What it would do if the Motion were very quick at first, or what the Sun's Motion may do. If a round Shell had a Ball in it which scarce filled the Space, and were projected here, Gravity would keep the Ball close to the under side of the Shell: Would it not turn the contrary way to a Bowl that rubs on the Ground; would not the under-side proceed foremost. — How would it go upon a Surface — How if half filled with Quicksilver.

The Air can take hold as well upon the little Protuberances in the Surface of a round Body, and turn it, as it can take hold of a Fly to Coin with.

A Top turned quickly round, either breaks the Parts of the Air adjoining, and so forms a Vacuum, or in turning it pushes the large Parts forward, leaves the small ones behind, and so forms a Vacuum as they call it, and the Gros which pushes in, continues the Rotation. In turning a Grindstone, I think the Water flies backward, or follows not so fast as the Surface of the solid Stone, so must the Atmosphere.

The force of the body which projects another body, must exceed the force of Gravity, of the Resistance of the air, and the pillar of the *Æther* it shifts, in any Direction but downward. The bodies in Motion push the larger Masses of the *Æther* which are before them, forward; and they fly forward also perhaps faster. The Motion of the *Æther* after a body in violent motion makes that Whizz we hear.

Can one throw a bullet out of a close barrel to any distance by Projection, or a Bullet more porous than the Barrel? A projected body strikes harder upon a Solid body, than a porous body, because the pillar of *Æther* resists through the porous body.

Hang small Balls in small Strings in a still Room, so as (when a Body is thrown through among them without touching them) to see how and in what Order they move.

Bodies fall by the Impulse first, and after, by the Succession of the Air and *Æther*, into the Vacuum they leave behind.

Where the Body is so thin, porous, or open, that no greater force of the Fluid hits the Parts, than the Resistance of Air, or
the

the Medium, it will not sink, and so in Proportion.

Greater Cubes fall swiffler than less, because their Bulks exceed the Proportion of their Surfaces. A Piled Arrow shot, or projected upwards with your Pile foremost, returns and comes foremost downwards.

“ Translation of *Nionwentyt*, p. 896. Greater Force and Motion communicated by one Body to another, than the Body had, 917. the Author denies that the force which puts the Body into Motion continues, or goes along with it. When a body strikes against two, and gives each a different Direction, it communicates Part of the Vacuum and Impulse of the gross Air to each. Will a body jetted in Vacuo by a Spring, move as far as in the Air?”

If two Globes of equal Diameter of different Degrees of Gravity, so that one might be solid, and the other perforated, were moved in Water, would not that illustrate the *Æther* pervading light Matter? Smoak and Dust not lighter than Air, but put into Motion, move as a Stone does in the Air, for a short Distance.

Bodies in Vacuo.

A Body in Vacuo must rest, because it could have no Tendency any way till something moved it; and when the Mover ceased to pursue it, must rest again: But no Accident could happen in Vacuo, to put any body into Motion.

I pretend not to trouble myself about a Definition of Space, because I suppose there never was, nor ever will be a Space that could contain the smallest Corpuscle of Matter, without Matter in it.

This Fluid (*viz.* the Air) must be infinitely subtile where 'tis divided into Unites, pure and unmixt with Vapours, but that, except in small Vacuum's, is out of our Reach. The Corpuscles of this fluid can be moved by one another at an infinite Distance, without any one moving much more than the Length of its own Diameter. Nay, even in Lightning, where pure Fire sets this fluid into a violent quick Agitation, in one or more Directions, 'tis likely the Corpuscles are not removed very far. This subtile Fluid must in its ordinary State be able to divide and support the Masses of Air in a Receiver, where the
pressure

Pressure of the outward Air is taken off, and this Fluid can be pressed in, for otherwise let the Masses or Air be of what Figure you can imagine, and have as much Elasticity to extend themselves as they dream of, they could never be all pumped out of a Receiver. If you tyed a Bladder full of Water to a Pipe, in a Receiver, with a glass Top, tyed the Neck of the Bladder, pumped out the Air, and then opened the Neck of the Bladder, and pressed the Water, and kept the Bladder compressed, the Vacancy would shew what air was left in the Receiver. As to demonstrate the Reason; the Air moves, they say towards a Vacuum or thinner fluid, that cannot be, it is not the lighter fluid but the Corpuscles of it (air) are more capable of being taken hold of, and driven by the Expansion than those of a thinner fluid, and consequently those of the light or thin *Æther* move contrary ways to supply the Place of those of the Air. These are the two contrary Motions Sir *I. N.* aims at. And this is that which drives fire, or is fire.

The Compressure of the *Æther* [Light] and Air [Spirit] upon any Point of the Surface of a Vessel void of air can be easily

fily afcertained; and if the *Æther* or Space in that Veffel can be rarified, fo that there will be a greater Force upon the Surface, than there is a force in fomething elfe befide the air [Spirit] for rarifying the fmall Quantity of air remaining within, and thereby producing or increasing its *Elafticity*, cannot be performed but by a force fuperior to the Air, and that *Æther* which remained unrarify'd within, fupported the Prefſure of the *Æther* which pervaded. One may meafure the Decreafe of the Refiftance, as the Vacuum goes thinner by forcing in a Sucker thro' a Tube into the Veffel. The difference of the Refiftance in different Degrees of Vacuums, may be proved by the different Sizes of Drops of Water, which will, when dropped upon the inner Surface of the Tops of Veffels, before the air is extracted, at different Degrees fall from thence.

By turning a Receiver upfide down, if the Contrivance were on the upper fide to meafure the Compreffure, it will then prove the Compreffure on the under fide, and fo on any fide, and fhew what the Force of Gravity exceeds the Lateral, or bottom Prefſure. If the Parts in Vacuo
ftand

stand long in the Cold, will there be new air in it?

When small Parts which only can pervade the Pores of a Receiver, are there, none but as small can come in to compress them to unite, and that they cannot do, I think. *Qu.* What in Time. Small Masses cannot adhere, till they come among Masses which can press upon two or more of them at once; so water makes Bodies solid, which air will not, &c. in Degrees.

Compare the vast Vacuum next each Globe, with the small Vacuums and their Operations.

In vacuo the Parts are so small, and so nearly of a size, that small or no Motion is produced.

The parts left in a Glass, when the grosser are extracted, moved by the rubbing of your Hand produce light in the dark; try this with Motion set near a burning Light, or, &c.

Bodies of equal Weight in the Air, weigh differently in water. *Qu.* If differently in Vacuo. Try very thin empty Bladders, and let them swell, and see how they will fall in Vacuo: Whether any Contrivance could be made by Friction
of

of the Air, in Vacuo, between two Solids to make the parts smaller to the Degree of fire, (but the pores of the Case would admit others.) by rolling a Ball in a Concave polished.

The small parts of fire which drive up the parts of Water make Vacuums in the Intervals between the parts of the Water; precipitate the parts of Water by an addition of cold Water, or make them unite so large, that the small parts of Æther in Motion cannot support them, and you have a Vacuum.

The sparks which fly from Iron when it begins to burn, from burning Charcoal, &c. are driven by Matter pressing into Vacuums behind them.

As the action from the Sun to us, or the Expansion against the part of the Surface is more or less interrupted by Clouds, gross Masses of air, or, &c. at distance, the Barometer should rise or fall: but perhaps the Size of the masses near the Surface, in the different Seasons of hot or cold, may work differently upon the Surface of the Mercury, when all is clear above. When the parts of the Æther in air here are divided very small, they pervade the pores of the Tube above the Mercury,
thin

thin that which was there and make it liable to pervade. When by Humidity, or *ℰc.* in the air, the parts within the Glass are storkened into Masses, that cannot get out, and so that some of the few small parts out of the air enter and expand them, and the air without is less expanded or agitated, it presses less. It might be tried whether small *Æther* storkened in a glass with Cold and Wet, would admit any other fluid to be pressed in by force.

So two Causes make the Glass rise, one when the pressure of the Firmament is great by the action of the Sun; and the other when the Masses of the air are large, and the firmament presses hard with them. And when there are not small parts enough divided and intermixed among the Atmosphere to pervade, and attempt to expand the gross fluids, they freeze. But Spirits whose parts are small, never freeze with that Defect here.

Small porous bodies such as Straws, *ℰc.* are driven into a Vacuum, formed near the Surface of rubbed Amber, *ℰc.* as the gross parts of *Æther* are: and the small Parts, whose place they take, can recede through the Pores, as they do between the masses of Spirit.

When

When you make a Vacuum, and a Sort of Ferment or Action, on the Surface of Amber, &c. as the Air pushes in, or perhaps more when it abates, the Air will push a light Body to its Surface, and keep it there.: If it be heated through, the small Æther pushes through and drives it to.

A Bubble of divided Parts of Air, with a Shell of Water or vegetable Matter about it, may be lighter than so much Air undivided.

Qu. How Metal set in melted would harden; how Wax melted, or Lime and Sand would set in Vacuo.

Will spring Water inclosed in Vacuo freeze, or does the air in a little Time infuse fibres to make it freeze. If air were extracted out of the Tube between the two Glasses of a Telescope, we should see better I think.

Solution of Vitriol, and Decoction of Gall in Vacuo, shew no Change of Colour.

Fluidity.

IN the common Degree of Agitation Light has upon the Globe, nearly under the Equator, it keeps all other Fluids fluid: The air [Spirit] and Vapours can swim

swim in it, be impulsed, divided or shifted by it. And as its Agitation on the Side turned from the Sun, or towards each Pole is lessen'd, the Fluidity of this and other Fluids is lessen'd. When it is strongly agitated it can remove the Vapours, and divide the Air. When it is weakly agitated, the Air can remove a considerable Part of it, which is one Cause of the horizontal Motion of the Wind and Clouds near the Equator. Where the Expansion of the Fluid is nearly equal, and the Expulsion of the air and Vapours is nearly periodical, the falls of Rain and Motion of the Wind will be more certain. Proof may be made of the Expulsion of Air by this ferment, by closing Receivers in different Degrees of it, and forcing Water into them; nay, Heat injected thro' the Sides of a Vessel in Quantity, wholly expels the air: If it be hotter on one side of the House than on the other, and there be an Entry or Passage thro' the House, as soon as the Heat abates by a Cloud, or &c. the air will push thro' that Passage. The side of the Atmosphere next the Sun, and likewise the Fluids in it are alternately or progressively fermented; and as it and they are turned from the Sun, condensed. This fluid put into fermentation, puts all the Liquors upon the surface which will ferment
into

into Fermentation, and even those in Vessels lodged in Cellars or Vaults, to a considerable Depth. But when it is so deep, that agitation in this fluid doth not reach it, or that it is clogged or obstructed, or in that Condition we call Cold or frost, the fluids will not ferment unless assisted by fire, which points out the Agent. And as nothing is wanting to form a solid but Corpuscles which touch with their Surfaces, or in the main come so near together, that no agent pass between, or by outward Force divide them, this fluid at rest or on moved, filling the Interstices of other fluids, makes them solids, or frozen till it be put into Motion, and then it will burst a Vessel, Stone, or $\text{\textcircled{c}}$. which was filled with it. The fermenting force weakens as the Distance from the Sun, fire, or $\text{\textcircled{c}}$. increases, or in proportion to the Interruptions it meets with, and consequently its expulsive force in the same proportion. Its fermentive force among the fluids in the abyss, or at great Depths, is only visible by Vapours which ascend out of the Globe. The *Æther* which enters, pervades and pushes thro' the Earth to opposite Sides, tho' perhaps not so directly, as if it were empty Space, or filled with nothing but *Æther* or Atmosphere. And the Intervals, as well between the
solid

solid as fluid Corpuscles, thro' the whole Mass, is constantly filled with it; and the Pressure of the Atmosphere would not make the Juices arise in Vegetables, for that is often as great in Winter, as in Summer, but the Agitation of the thin Fluid, by the Motion it receives from the Sun, quite thro', but chiefly on the Surface of the Earth, gives each Particle a greater Force, by being driven through the Pores of the Earth, Stone, &c. and makes them rise and bear up the Corpuscles of Water, vegetable Matter, &c. with them. Its Operations in dividing the Corpuscles of Water near the Surface of the Ground, uniting with them, and bearing them up, and of dividing and detaching them from the Surfaces of the Waters are visible. The Steams which ascend out of the Earth, may be sent up into the Fluids of Air, &c. in the Atmosphere, by an impulse below; but when that Impulse is spent, if they be heavier than the Air, &c. they subside; if equal, hover; if lighter than the Air near the Earth, rise into that Part of the Air which is equal to their Gravity, and with Velocity in proportion to the Difference of their comparative Levity, and hover there, or move as the Air is moved, till for want of the Fermentation by the

Sun to keep them there, or raise them by further Fermentation, or by Addition of grosser Steam raised, or Steam which will unite with them, and make them heavier than the Air, &c. they fall to the Ground. And any Steam is borne up into our Atmosphere, by the Impulse from below, or the Rebounds or Reflection of this Fluid impulsed from the Sun, the Parts or Masses of this Fluid, and of the Atmosphere, which have more Gravity, push downward; and the Corpuscles of this Fluid entangled with those of Water, till they are lighter than Air, and the rest of the Mixture among the Fluids in the Atmosphere, where all is full, must rise highest.

Boyles Philoso. Essays.

“ A Body seems to be Fluid chiefly upon this Account, that it consists of Corpuscles, that touching one another in some Parts only of their Surfaces (and so being incontiguous in the rest) and separately agitated to and fro, can by Reason of the numerous Pores or Spaces necessarily left betwixt their incontiguous Parts, easily glide along each others superficies; and by Reason of their motion, diffuse themselves till they meet with some hard or resisting Body, to whose internal Surface, by virtue
of

of that motion, their smallness, and either their Gravity, or something Analogous, or Equivalent to it, they exquisitely as to Sense, accomodate themselves."

"The same Cause, whatever it be that gives the Air its wonted Agitation, is able to give such minute Corpuscles enough of it to keep them fluid." He seems to ascribe fluidness to heat and motion, for we see that Water when it is deprived of them becomes solid.

Corpuscles of some Sorts of Fluids will mix with, or pass between the Corpuscles of some others, and the whole remain a fluid. And the Corpuscles of some Bodies are so far distant from each other, or the Masses composed of them are so far distant that some fluids can pass between them.

The Corpuscles of several Sorts keep fluid, some with one Degree, some with another of the Sun's Action; here any Sort will keep fluid with the action of the Sun directed to a point by art.

And 'tis likely the Corpuscles are of several sizes, which require several degrees to keep them fluid: and that those which were intended to remain united or solid, are of sizes too large to be moved, but are successively driven backward into the Vacuum by the natural action of the Sun

here; and perhaps some of the Corpuscles can only unite or form Masses to one size; other sorts to other sizes; and some to any size. And each sort have a different Degree of Tenacity, or Solidity, according to the degree of action the sun, fire, or, &c. has, where they each are.

There are several Degrees, and I think I may say, several sorts of fluidity; Things which are melted are fluid; Things which rope or stick part to part, or to the parts of solids, are said to be fluid. Water, Spirits, &c. which stick in small Degrees to their own, or parts of solids only in Drops, or small Masses, are called humid fluids; and this small Degree of adhesion makes them capable of being projected, or falling in streams or drops.

Mercury is called a Fluid, but is dry, has so small a degree of adhesion to its own, or the Parts of other dry Bodies, (Gold excepted) that it will run in a stream; projected, will fly in balls; raised out of Fire in form of Vapour, I think adheres to dry Solids, as Salt, &c. But the Parts of Air in Unites, are called dry, because they have the least Degree of Adhesion to its own, or the Parts of others; can only here adhere into small Masses, and they, or some of them pass between
 one

one another, and between the Parts of all other Bodies or Fluids, without any perceptible adhesion.

Elasticity.

ELASTICITY, as they account, must be a Power in every Corpuscle, to return to its original Figure; but is only to resist being bended or compressed. This is increased by the Corpuscles being forced nearer together in hot Metal, by being freed from Clay, and extraneous Matter, by being quenched in Water to a certain Degree of closeness, or by the Strokes of a Hammer. In some Sorts of open green Wood, by having its Pores filled with Juices. In some Sorts, which will contract, by drying. In Fibres of Plants, by being twisted, or their Pores filled with Water when twisted.

The Elasticity in Matter cannot produce any Motion, there must first be Motion given to some agent to divert the Body that is Elastick, out of its common Figure, and a Relaxation of that force and motion to suffer the Body to return to its natural figure and position, and push the opposite Way, as far as it was put out of its Lincs.

Expansion accounts for Elasticity, for if any force remove one Part of a Corpuscle further off the next in one Point than another, that agent pushes it to again, and makes their surfaces, which made an angle, approach to each other, and become parallel. This is varied as Gravity is, by raising of Vapours, and is greater or less: Settle how that is performed by the Expansion and Compression in the fluid, and how it was at the flood.

The Corpuscles must be Plates or Threads, and framed to touch in part, and be off in part. Those so figured and solidest, attract as they term it, strongest; and the closer, as in fire, and hardened Iron, still stronger.

Elasticity must subsist in the fluid, by the same means it does in solids; after the first force hath pushed the Corpuscles from each other at one End, the rest must push them together, and give the Spring.

If that Power of whatever agent it is that causes Elasticity, were a Law only, or immaterial, would it be liable to the Effects of Heat and Cold, moist, dry, &c. If matter heighten or slacken that Power, why may not matter be the agent?

Elasticity seems to shew that a Solid, whose Parts are more pressed in on one
Part.

Part than another, strive to recover an Equality, as some fluids do. This acts only in Bodies of particular Textures, or in some Bodies in different Degrees, in proportion as they are made harder by art, or that the Parts come so near one to another, that they, when they are pressed beyond their natural bent, extend themselves towards their pristine figure. Several Circumstances occur in proportion to the sorts of Corpuscles. When a Body is bent, if it be all of the same consistency, it turns upon a Point at one Side, and opens an angle from that Point. If it be so thick that the Corpuscles on the convex Side be opened beyond such a Degree, it cracks or breaks. If it were half as thick, they would but open half as wide at the same bent, and not break till bent twice as far. When Vessels of animal Bodies are stretched, and the small ones emptied, they have little or no contractive force.

The pressure of the *Æther* upon the Corpuscles of an Elastick Body, beyond the Resistance it meets by the opposite Pillar, is equal to the Pressure upon the Body, whose Weight bends the Spring, abating the Resistance also of the opposite

T 4.

Pillar.

Pillar. And the Pressure cannot be upon the whole Breadth of the Corpuscles, because it must be supposed that Part of each Corpuscle touches.

Could no Experiment be made with a Spring, in such a Vacuum as Gun-Powder makes, or what it does in frost? I think a Spring enclosed in Ice, and bent, will break. It must undergo the same alteration as the *Æther* doth.

If a Body be bent till the Unites on one Side make Intervals to admit Masses of air, as large as those about the Body, I think it will stand bent.

All Parts of Bodies that bend are far so fluid. Elastick Bodies act as Fluids do; pressed in one Part, fly to another less pressed, and strike over by the Motion of the [Spirit] when set forward by quick Motion; do not, when they return slowly.

Comparisons

Comparisons of Gravity or the Difference of Pressure in the Air, on different Things, and in each of their different Positions.

FERMENTATION by the Sun, and Fermentation in the Atmosphere of each several Orb, is only what concerns each Globe, and that Fermentation is in a Line from the Sun upon half the Atmosphere, and shifts as the Globe and its Atmosphere turns; and when interrupted by Clouds, &c. is soon carried on that Depth, after they remove; because there is still a Tendency forward by the successive Corpuscles from each Side of the Sun; for if the first Corpuscle move but an Inch, that will strike others, and they, still successively, others, and the Ferment perpetually expand, drive forward the Corpuscles till there be an Interruption. And, I think, at that Distance from the Globes, beyond the Reach of each of their Atmospheres, this Fluid on the Side next the Sun, is in Form of Fire; and the Expansion on the dark Sides, as well as on the light Sides, is the Cause of Gravity and all Motion. The Pressure of the Atmosphere, or Gravity, may be as great when it is cold as hot.

Heat

Heat is increased by the Sun's approaching the Zenith, Clearness of the Atmosphere, Length of Duration of the Sun's Motion upon the same Part. Gravity may be abated by the Interposition of gross Vapours, but more likely by Interruptions by the Motions of the Fluids out of the Globe.

Our Proofs of Gravity upon Mercury in Glasses, perhaps is only with respect to the Proportion of Air this Fluid acts with. As it pervades all, its Gravity may be equal, or greater, or less, and its Operations on each Part not in proportion; and its Motion or Agitation, which rises or sinks Spirits in Glasses, perhaps may be great when the Gravity is not so, because it may proceed from below, &c. when the Force from below increases and prevails, the outward pressure of the atmosphere is comparatively lessened, the Steams and Stinks ascend more in proportion.

Spirit, his invisible powerful agent. This Operation is continually upon every Unite of Matter.

Firmament, Fire with air unites, fire without air dissipates Matter---doth not suffer Resistance from any thing in the great Spaces, but from its own Corpuscles, and they glide by and pervade through others; and if any Space were nearly full of Mercury

cury, and no Æther, every Pillar whereof can rest upon the most minute of its Corpuscles, and thereby make it keep close together, if distant from other Matter; if near the Earth to gravitate, a Body would move freely in it.

Qu. If the several Globes be not placed in the different Degrees of Solidity of the Firmament, from which they cannot pass like Nodules at different Depths in the Water. In Rotation of a Solid with Fluids upon it, whose Parts are less than the Parts of the Solid, and when the Fluid about it is equal on each Side, the solid goes faster, and the fluid attempts to recede, or lag behind; so would the atmosphere attempt to do, but is kept up by the Push of the Æther.

I think I may say, the Unites, or Parts of any Body which are larger than those of the fluid of air they are in, weigh in some proportion to the Difference. And those which are smaller weigh nothing, and subtract from or diminish the Weight of those they are joined, or swim with, which are larger. But whether there be any vegetable Matter, whose Parts are smaller than the masses of air, has not yet been fully proved; though these, divided by fire, rise in smoak, being put into Motion, but when
that

that Motion is spent, whether they fall, or rise to the Clouds, I am not certain.

The parts of fluids, or solids in fluids, when extremely small, in Masses sink, or move in proportion to their Dimensions, with allowance in each sort for the Difference of the Magnitude of the Unites.

Unites, or Masses, of the same Size in the fluid of Æther, weigh nothing; smaller among them less than nothing or recede. The larger are heavier, or move forward, or downward, in proportion to their Size.

If the corpuscles of air that impell Bodies were not so small, that they could pervade the Pores of all Bodies, except Load-Stone and Iron, they would break down Buildings, &c.

There are reasons for creating the atoms loose, it was to shew, that by the sizes, figures, and proportions of those atoms or unites, the actions of the spirit did, and always will, fix some, separate others, move the fixed bodies, shift the loose Parts, divide and unite them alternately, so as to support each Part of the System inanimate and animate. It was proper that this agent, which was to keep all in order, should, by its Operations, form all Things, either by itself, or with Water, &c. in such manner

as

as it might, by continuing its action upon them, keep them in that Oeconomy, as will appear, as Water formed its own Channel.

As soon as the motion of the small *Æther*, in its retreat from the fire upwards, or in the Direction it is confined, exceeds the Difference of the Pressure, the smallest Unites recede upwards; as its Velocity is increased, it bears up larger; as more, still larger. Which is a plain Proof that Difference in Gravity lies in the Unites. The Proof of the Gravity of the Unites is best shewed in the bodies of Glass formed from the different Sizes of Unites; where each Sort are melted and formed, almost as close as if they were applied Unite by Unite. Mr. *Dawson* says Chalk is difficult to melt, and will not be fine. But *Qu.*

Is it not plain Evidence, that this Agent acts upon Unites in proportion to their Difference of Size, and that it is *Æther*, because a certain Degree will detach a small Number of the Unites of Spirits out of a vast mixture; and a little more will take those of oyl, and a little more those of water, and still more those of mercury; some vegetable matter will rise into Plants out of the air, some out of Water, any with the Water, both out of the Earth.

Whether

Whether the finest fibrous matter, such as Silk, or Cotton, &c. can be beat so small till it will weigh less than it will do when twined and made more solid, I am not certain. Or whether the Parts of Water, Spirits, &c. put into Motion, and raised into Steam, confined in a Vessel, will weigh less, than when condensed, I am not certain. A Pint of Spirits weighs less than a Pint of Water; and Water fresh, less than that with Parts of Salt in it; that less than other Fluids, even to Quicksilver. It is because the *Æther* presses freelier thro', or because there is a greater Mixture of *Æther* in one than another, and so that which contains least *Æther* weighs most? Or is it only, that the same Space, filled with the grossest Unites, weighs the most, and that the Union or Division of those Unites, makes no Difference? Either there are Unites in the *Æther* of different Sizes, or else the grossest Masses are pushed most. But perhaps this holds only as to itself, and that the Unites, or small Parts of the *Æther*, pass as freely through between the Unites, in the Masses of all other Sorts of Unites, as if they remained loose in Unites.

There must be Comparisons of Size, Gravity, Adhesion, Separation, Fluidity, Volatility by Air, Fermentation, Fire, &c.

at

at the End of each Class of Things peculiar to that Class, and what concerns them with relation to others, with proper Queries, &c. first general to the Species, after particular, in Order as they stand.

I. Unites of several Sizes, separate, are each acted upon in some proportion to their respective Size, with an Allowance of some Difference in their Figures.

II. Masses, composed of Unites of the same Size, are differently acted upon in some proportion to the Number of Unites contained in each.

III. Masses, each of the same Size, and each Mass composed of Unites of the same Size, but the Unites of each differing in Size, from those which compose each other, are differently acted upon in some proportion to the Size of the Unites which compose each.

IV. Masses of different Sizes, each composed of Unites of the same Size, but differing in Size from those which compose each other, are differently acted upon in some proportion to the Size of the Unites which compose each, and the Size of the Masses. So in Mixtures, where the Unites which compose a Mass are of different Sizes. And whether the Unites be fluid or loose, in Ice or Water, in Mass or Powder,

der, or adhere closely or loofely, fo they be kept together, or inclofed in something which keeps them together, they weigh the fame; but are moved with greater Velocity, the clofer they are kept together in the Air.

That Prefsure they call Gravity, muft be greateft upon a Body of any Size; fup-pofe an Inch Cubick, if it were one folid, would refift moft fo. The largeft Unites, which compofe a Body of a Cubick Inch adhering, will be the heaviest or refift moft, becaufe they will interrupt the Pervafion of the Æther moft. And the more there are of them united, the Interruption will be the greater.

Will melting Matter into Glafs, or nealing Metal make it lighter, or hammering or hardning, make it heavier? The Difference between the Force of Comprefsure, and that Difference of upper and under Prefsure, they call Gravity, is fo great, that the Unites in a slender Wire adhere fo ftrongly, that they will fupport a vaft Mafs, in which we call the Difference of a Ton Weight. As the Thicknefs of a Mafs feems to diminifh the Power of preffing on one Side, it doth the fame on the other, fo the Difference will ftill be the fame.

The Prefsure of the Pillars of Æther, as I describe them, is moft evidently fhewn
in

in the Figure of the Globes of Quicksilver, which 'tis likely they pervade least.

Pressure is altered at particular Times and Places by Heat, &c. which is produced by the sun's action. So may gross Parts in the atmosphere, &c. alter it. The more gross the atmosphere is, the more the Strokes of the fluid will be kept off and gravitate the less.

It should be well considered how Elasticity will drive the atmosphere, or grossest parts near each Globe by the Difference of the Length of the Pillars. And how it is, Whether thinner at equal Distance from one Globe, and how between two Globes. Consider, that if the small Parts have Passage through a Ball of Glass forward, the Parts before must recede by the Sides of the Ball, to supply the Defect behind. They must divide at the Focus, and those which fly out sideways are changed for larger. Consider what this can do, if there be any Passage through a Load-Stone, the Earth, or &c.

They say Sir *I.* pretends there are two Powers, the one gravity, or ponderating, the other attraction or drawing; but that gravity is much more powerful than attraction. But that, as they say, as one Body

pushes against another of equal quantity of matter, the other pushes as much against it.

Centripetal and centrifugal Motion, is only performed by the Difference in magnitude of small Corpuscles, whereby the heavier or larger sink, and the lighter rise. If the grosser move downward, the Force will be the greater that way. If they move upward, the Force will be the greater that way.

Here are your centripetal and centrifugal Impulses. It is plain now, that upon the Surface of the Earth above the Level of the Sea, attraction bears a considerable proportion to the power of gravity, because Clay, &c. cracks, and draws in the Lines of the Shell, with almost as much Force as it sinks by Gravity; and because of the great Distance of the inner Globe, it doth not effect Things here so much as Sides of the Shell, so the said Sides keep Corpuscles which are loose (and let gross air come between) from coming together and adhering.

When a Solid, or Body, whose Pores are full of *Æther*, pressed upon in every Unite by the *Æther*, which is without on its different Sides, suppose the upper and under Side, with that Force, which is inconceivable (but in respect to the Side, with that Difference

we,

we call the Gravity of the Body, but occasioned by the Interruption of the *Æther* on one Side) is removed to a Place where the Pressure on either Side is increased or diminished, and where the *Æther* can in any considerable Degree pass through the Pores of the Solid ; but let the Pressure upon each Side be what it happens to be, the *Æther* will either move through in its Course of Motion, or if there be no direct Motion of the *Æther*, it will issue out at the Side least pressed, if the *Æther* be of equal Thickness: But if the Pillars be of equal Length, and the *Æther* in one thinner than in the other, on the Side where the *Æther* is thinner.

Explosions by Air, &c.

RAREFACTION is made by expanding some Fluid, by driving the Corpuscles of Fire into them, or putting those that are there into Motion, whereby the Corpuscles of Air, Water, or other Vapours are driven out.

Forcing Bodies to shift, as by firing the Powder in a great Gun, all the Air for Miles round, (to what Height, *Qu.*) Shifts no Parts far from their Place, except near to the Gun, and so in proportion to their Distances,

every thing takes its Place again in a moment, or in two or three Vibrations, which they call Ecchoes. And their Action doth not need any Vacuum to move the Parts in, because as the great masses move one way, the small ones move another, and the Action is no more than each sliding upon, or by another, or others; so that if the large go East, the small go West; and so in Order; and as the Action ceases, all goes to an Equilibrium. But the respective motion of each Unite of each distinct sort in each fluid, and of the masses in each sort, and of each size of each sort, of their striking against each other, against the Ground, or other solids; their motion which they communicate, and their rebounds, ought to be set in a clear Light; always considering the line or train of atoms or masses, which succeed and push each other close in a Line or Lines; and the Difference between the Velocity and Direction of those which are in the center, or chief Point of motion, and those which proceed in oblique Lines from each Side; and this, as well of the large as of the small; and that the largest of the large go first forward, and the smallest of the small recede first, and so in Order till they come to an Equilibrium.

'Tis evident Light put into violent Motion can expel Spirit, Water, or any other Fluid, and form a Vacuum, or Space only filled by itself; and this either confined by Solids, or in the open Air.

'Tis hard to conceive, more to describe, how a Corpuscle, by pushing in between two others, and by dividing them, or splitting a Mass, or expanding some Parts like Bladders, forms some Sort of a Vacuum, and others of the *Æther* push in and fill the Vacuity; and thereby, if the Fluid be confined by Solids, expands the Mass, and, if any other Fluid, expels that Fluid each Way; and so each Corpuscle acting, or being acted upon, and others still succeeding, during the Agitation, a Space void of all other Fluids is formed; or if there be any other Mixture of other Fluids in that Vacuum, expanding them by Interposition vastly.

When Fluids contained in a solid Vessel, are expanded into Steam by Heat pervading the Sides, it may be increased or diminished, and continued as long as the Action continues, or till the Vessel burst. And the *Æther* in the Atmosphere, heated by the Sun, so long as that Action endures, or the Action of Fire in Fuel, may keep up such an Expansion; but the Explosion of Wa-

ter, or Air put into Fire, or heated Bodies, or melted Metal, or by Fire put into Gunpowder, are made by expanding them in an Instant, condensed as soon as made, and the circumambient Air in the same Instant, which is filled fuller on all Sides, is pressed back into the Sphere, or half Sphere, or other Figure, where the Explosion and Vacancy was made. This Explosion being greater in any Line of Direction, especially upwards, than the Pressure of Gravity, throws aside Solids, in every Direction, which oppose it, whether they be loose or solid: When confined or opposed, takes its Course and vents itself that Way, where it meets with least Opposition. And if the Resistance in that Part be much less, and Passage sufficient, spends little of its Force in other Directions.

The Corpuscles of this Æther put into Motion by the Sun, and collected into a Focus, or a few Corpuscles of the Æther put into Motion in a small Mass of Matter, which we call a Spark, having formed a Vacuum, being placed very near Gunpowder, and being pushed by the circumjacent Air, and Æther on each Side of the Vacuum, except on that Side next the Gunpowder, is driven against the volatile Salts in the Mixture, makes them split the Corpuscles,

puscles of Charcoal and Oyl, and other Salts, and act jointly with the Æther. Splitting the Corpuscles makes them take up more Space, as Vacancies are formed Æther pushes in into them; where they are resisted they force there, when greater than the circumambient Air, or Air opposing in a Barrel, they push that Way they meet with least Resistance. The Æther pushes in after them when they move, and when they are out of the Barrel expands them into blue Flame in the Center, moves the Smoke out like an Atmosphere, and forms a Vacuum of Air in Form of the Flame of a Candle.

The Force of a Push made by the Explosion of Gunpowder, is outward from the Center on each Side, in proportion to the Length of the Semidiameter of the Vacancy made from the Center, when it is not confined, but fired in open Air, in any Degree of the pressure of the air, and the Vacancy it then makes, I think is in the the form of the flame of a candle, or a little approaching that form. How far it moves the circumjacent air, by forcing in the exploded air, and by its atmosphere of Smoke, is hard to conceive; and, I think, when the action is spent, and the Smoke condenses, the air pushes back into the Va-

cancy, and by reason of the Prevalency upwards, the Æther and Smoke, or expanded Fluid of Water, or, &c. it acts with, is driven up in a Pillar or Column like a Spire, whose Diameter is proportionable to the said Diameter of the Vacancy; and whose Length perhaps is extended till the Space it takes would fill the first Vacancy, and thereby partly drives up, and partly pushes aside the air it meets with in its Passage, and perhaps not only the air from the base, but the air pushed aside all along, drives in after it, and furthers the Motion.

It seems as if air pressed in amongst gunpowder fired, makes the fire and smoke, which is lighter than air, push off so quickly, and strongly.

In an Explosion by Gunpowder fired, or water expanded by fire, or in, &c, every atom, in whatever Direction it moves, is driven by the opposite Pillar of Æther. Why each moves in the Direction it takes, why one Pillar on one Side, and the other on the other keeps it not still, is the Thing to be explained. Whether the Æther and Air, pressing the fire into the Powder on every Side, dissolves the Parts till they are lighter than air or smoke, and so fly outward on every Side, and more upward rather than any other

other Way, and each being once so put into Motion, the *Æther* by its being pressed, pushes after them, and gives each its Force in each Direction: and whether the Vapours in the Earth are not raised in this Manner out into the Strata, and up into the Air; *Qu.*

One would think the Sound upon firing a Gun, came from the Rebound upon the Return of the Air into the Vacuum, because it comes so long after the Fire. But then, why is there no Sound when Powder is fired loose, unless it be because there is nothing solid to rebound from, till at that Distance, that its Force is spent. Whether the divided *Æther* which passes the Pores of the Barrel, widen them, and is jirk'd out by their being pushed together again deserves to be consider'd.

When Powder confined in a Barrel, whose Resistance on every Side is equal to the Expansion, is fir'd, the Smoke and Vapour expel the Air, and is continued the Length of the Barrel in that Line; as soon as it is out, and not able to continue that Line, the Air being near equal on all Sides, it expands and forms a Vacuum every Way, but most forward in Proportion to the Length of the Barrel, because the Direction it had given by the Spirit,
following

following in at the Touch-hole, thro' the Pores of the Barrel, &c. continues in a Line. The Moment a Vacuum is made, the Smoke is condensed, and the Air pushes in from behind, and drives the *Æther* and Smoke in the Line the Motion is given, &c. as aforesaid. If there be a Ball, it goes foremost, and is driven by the Fluid and Smoke as far as it moves.

If a Touch-hole could be made so small, that Fire could enter, and not sufficient Air to counter-balance the Pressure of the Air before, would not the Force tend backward, and cause a great Recoil at first.

The Air drives thro' the Touch-hole, and in at the Muzzle, even while the Flame is issuing out, and that makes it move so violently. The Direction of the Force in blasting, is in the Direction the Air enters at the Touch-hole, so it is much the same if the Hole be only stopt with Clay, Wax, or Wadding before it.

The Pressure of the Air is equal upon any Space filled with it, and included by Solids, if the Inlet be never so small, because the Pressure of the other Air upon the small *Æther* in the Sides of the Vessel, or Body which include the Air (when the Masses within and without are of the same Size) will be near equal; or press
equally

equally on every Part, so upon Fluids, as Water, &c.

The Matter which goes off from the Center where Gun-powder is fired, exerts itself outward near the Center with more Power than the Corpuscles or Masses of Matter which come into its Place, because they come from every Side, especially when they are directed by Solids to one Line. First Motion outward, and second inward, commence at once. All act at once, and each watch for freest Passage or a Vacuum, and both move Sideways.

If it be true, that the Sphere of Air pushing into the Vacancy, contribute to the driving off the Bullet, if a Gun were fired by the Side of a Wall, the Resistance of the Wall would form the Vacancy into a half Sphere, perhaps of equal Capacity to the Sphere it would have made, if it had not been resisted. *Qu.* Whether the Ball will be diverted from its Course, by the Air pushing after it on one Side towards the Wall, or the Force of the Fluid repulsed from the Wall will be equal. If a Gun were fired with its Muzzle near a Hole, so large as to let the Bullet pass, would the Push with the Powder against the Sides be lost, and weaken the Ball, or would it follow thro' the Hole?

If

If a Bullet were driven into a Gun-barrel, a little Distance from the Muzzle very close, and the Remainder of the Barrel heated, and the Touch-hole kept close till it were heated, and then open'd, would not the Air drive out the Bullet? Perhaps where Powder is fired, it may divide a greater Quantity of Masses of Air than the Barrel once full, However the Parts of the Sulphur, &c. take Fire when they and the Masses of Air are pushed in and divided very small. If there be any Parts of Water, they will then push in and make that Noise we hear. And if for a great Depth, the Masses of Air be divided, the Parts of Water will sink, form into Drops, and fall as suddenly as Distance and Resistance will allow. Gun-powder will Fire leisurely in Vacuo, and at last expand. The Heat in melted Lead, or other melted Metals makes a Vacancy of Air, Humidity, &c. and Water, or perhaps air, put upon, or into the melted Metal, expands, and serves for an atmosphere to act as Smoke of Gun-powder doth. If it be put upon the Surface, it acts like Powder fired in the open air. If it be put any considerable Depth into the Metal, it forms itself a Passage like a Barrel thro' the Metal, and moves in that Direction.

One would think this *Æther* [Light] being once moved by great Guns, or *&c.* would pervade a Wall or any Thing, and with the air [Spirit] on the other Side, move Windows, *&c.* unless the air [Spirit] hinder it. And if so, it must be by the Recoil of the air passing over, that the Windows on the opposite Sides are moved.

Hang a Globe here in our atmosphere in a Line, and fire Powder, or do any act to thin and divide the Parts, on one Side, as soon as the Division is performed, will not the Parts of Light fly off, and the air push against and move the Ball *? I think a very hot Iron placed there, and moved off suddenly, would do the same.

If

* Yes! And it appears beyond Dispute, by the electrical Experiments, one of which is referred to in the *Proposals*, that the Air is the Agent which performs all the Operations of Nature. You may there see every Thing performed in Miniature by this Agent; the Friction of the glass Globe, or one of Sulphur, splits and divides the Masses of Air, and a Stream of Air so thinned, runs along the Gun-barrel, and so against the Surface of any Solid in its Way; and either passes thro' the Body, or runs along its Outside; or rather Part goes thro', and Part along the Outside; and it is the different Texture of the Parts of the Body, that their being *Electrical* or *Non-electrical*, as it is called, depends upon. Metals have nothing in their Pores but the Fluid of the Air, in a Condition as fine or subtle, as the electrical Stream itself, and so the Atoms of
the

If an empty Receiver were broke in the open air to Powder at once, the air would push in and drive upwards, as aforesaid.

If

electrical Stream act upon the Atoms in the Pores of the Metal, in much the same Manner, as Light upon the exhausted Receiver, which reflects it stronger, than the condensed does; softer Bodies elude the Force of the electrical Stream of Light; the Re-action of the grosser Air thro' their Parts disperses some, and the Pores themselves admit some of it, and so the Stream is not kept together, as it is long a Gun-barrel, Rosin, &c. [whose Pores are known to admit little or no Air thro' them] and its Effects cannot appear to the Senses, as in the other Case. The Gun-barrel, nay our Bodies also, whose Pores are filled with Atoms of the same Size, or nearly so, as those in the electrical Stream, serve like Canals to water, the Banks of which are the grosser Air that surrounds it and us; touch the Gun-barrel with your Finger, or Iron, and the Light darts out, snaps, and you see and hear its Effects very strongly. Touch a Person that is electrified, *i. e.* who stands in the Stream of Light issued a long the Gun-barrel, and so is in what they call a Vacuum, cover'd all over with it, touch this Person with a Sword, and it gives a violent Stroke, a prodigious Shock; you break down the Bank as it were, and let in the Spirit or gross Air in that Line which acts immediately upon the Atoms of Light in that Point, and with a Force, like that of the Spirit at the Touch-hole of a Gun, drives it before it against those in the Pores of our Body, and so on; and affects us stronger than a Blow on the Outside; because the Impulse, or Stroke is here communicated immediately to the Steam our Bodies are actuated by, and so to the Nerves, &c. When they cease turning the glass or sulphur Globe, all the Effects cease at once; the Spirit disperses the Stream immediately, and it mixes equally with the rest of the Air in the Room; but as long as a Stream keeps running a long the Gun-barrel, or &c. so long the Effects will continue. A Pin held with its Point to an electrified Feather, the Feather contracts and drops; turn the

If a barrel were fixed at one End of the Receiver, and the other End of the Receiver were broke, the Air would discharge

the Head, it rises, and the downy Part of the Feather expands itself, as the sensitive Plant does some Time after it hath been touched: The Point of the Pin directs the Spirit down in a Point to the Feather, and it disperses or drives back the electrical Stream, and compresses the Feather; turn the Head towards the Feather, it rises again: If the Head of the Pin do not *attract*, and the Point *repel*, than the Stream from the Gun-barrel, at the End of which the Feather stands, may raise it again, after the Spirit directed in a Point to it by the Point of the Pin, has squeezed it up, because the Head of the Pin makes the Spirit, like Rays or Lines from a Globe, diverge, spread wider, and so misse that Part of the Stream which is flowing into the Feather. But it would take up too much Time to explain all the electrical Experiments; but it is plain, they are Demonstration, visible ocular Demonstration against that which that learned Body the *Royal Society*, still continus to call Philosophy, a Vacuum, Attraction, Repulsion, Elasticity, and the other imaginary or occult Qualities, and unmeaning Words which they ring the Changes upon, and which by their Authority, great Learning in other Points, Number, Possession and Prepossession, they still put upon the World for Natural Philosophy. When we see Light penetrate the Pores of Brass into the exhausted Receiver, and that the Air, notwithstanding its Elasticity, conveys it a long instead of stopping it, and can't *conceive* how an Atom of it could come from the Sun, unless pushed a long all the Way; nor how it can be pushed a long, unless touched on every Side; who can help wondering, and if good Manners did n't forbid it, laughing at the present System of *Optics*, and the Arguments from thence against a *Plenum*?

When we see a Ball, turned round and go forward by the Stream being issued against one Hemisphere of it, and see it turn on its own Axis at the same Time, and that faster and slower in Proportion to its progressive Velocity; and that

charge a Bullet thro' the Barrel. Or a Receiver filled full of Steam, and discharged thro' a Barrel would do the same. Or if the Steam were suddenly condensed with cold Water, and the Air suffered to push in, it would do the same.

How is this performed in Thunder and Lightening! What divides the Æther! The action is as Gun-powder, and the Lightening recedes as other Fire doth, and the gross air pushing in amongst the Clouds, Thunders.

Dr. *Lowthorp*, says, the Steam arising from Peritis in Coal-Mines makes the Fire Damps. Peritis washed I suppose out of Clay, and driven in Storms over the Beaches in *Essex*.

Filings of Iron and Sulphur, and mixt into a Paste, and buried under Ground ten Feet, will blow up the Ground.

that the Fluid of the Air, instead of retarding its Motion, is to Sight the Cause of it, in what a strange Light does the centripetal, and centrifugal; the projectile Force, and the Dream of empty Space, for the Orbs to move freely in, appear to us. To these Experiments therefore, we appeal for Proof of a *Plenum*, the Manner of Formation and Propagation of Light; the Cause and Manner of the Motion of the heavenly Bodies; and tho' they who think themselves in Possession of the true Philosophy, may call it *beneath* them to enter the Lists, yet others will ascribe their Silence to another Cause.

Hints.

Hints and Conjectures about the Cause of Magnetism, taken from loose Papers.

* **I**F the Motion of infinitely small Corpuscles put into Motion by the Sun, or some other Agent, successively rebounding, till they return thither, be the Cause of Gravity, supposing the most will rebound from a vast Arch, which incloses all the visible Globes, and some from one Globe to another, their greatest Force will tend in a Line to the Centre of each Globe, as Gravity does.

And if a Loadstone, or any other Body in one Position, can resist, or stop these Corpuscles from pervading its Pores, another Body being pretty close, and struck

BOOKS on the Loadstone.

J. Faissery de Natura Magnetis, de Fluxu, & Refluxu Maris, & de Motu. Col. 1562.

Dr. Ridley's Treatise of Magnetical Bodies and Motions. Lond. 1613.

R. Normans's new attractive of the Loadstone and Declination of the Needle discover'd.

Mr. Barrow's Discourse of the Variation of the Compass. Lond. 1614.

Mr Barlow's Magnetical Advertisement. Lond. 1618.

H. Gellibrand's (Professor of Astronomy at *Gresham College*) Discourse of the Variation of the Magnetical Needle. Lond. 1635.

Mr. Barlow has the Account of piecing Stones.

by the rebounding Corpuscles in other Directions, must be pressed towards that Body. And if these Corpuscles pass each Way in the Direction, which we call the Poles of the Stone, in some small Quantity, will not those they keep off weaken the force, and let the others press a Needle thither? and will not the Motion of those which pass and repass set it endways? and will not more of these Corpuscles pass the Earth in a polar Line, or more strike upon its Ends, and rebound, and both of them rebound back again upon it in these Lines, than there will of these which pass thro', or strike and rebound, and are rebounded back again upon it in the other opposite Direction? and if the Corpuscles of the Loadstone be pressed once through the Iron of a Needle, so as to stop the other Corpuscles, will not the Motion of those Corpuscles direct its Points *N.* and *S.* But why the same Point the same Way, I cannot tell, unless the Pores be so framed, that the Corpuscles pass but one Way, as in at the *South*, and out at the *North*.

If the Corpuscles strike from all Sides of the Arch and Globes, these which strike on each Side, are ballanced by those on the opposite Side; those aslant, by these aslant, but both pressing downward, and those perpendicular

pendicular all pressing downward; and only those pervade us from below.

The Part of the Globe the Moon is directly over, must receive the Rebounds of these which come from it, cause a greater Pressure, raise the Tides each Way, &c. and so of any other Globe in Proportion to their Distance from the Sun, &c. Will not the Waters rise under the Moon? and what Effect may this have upon the Globes, to cause the Direction of their Motion? The Rebounds of them from the Moon to the Earth, and from the Earth to the Moon, ought to be well considered. Draw a Scheme and see will any from the great Arch strike their opposite Sides, so as they can rebound from opposite Side, to opposite Side directly, I think not, but Query, and the same with respect to the Sun, &c. and consider if they will not move their Course to that Side, where there is the least Pressure? Draw Lines in the Scheme to see which Way the several Motions of these Corpuscles will tend. They must be so small, that they will adhere to nothing, but always rebound, and their Rebounds must not be equal to the Force that first jets them, *and there must be a first Motion, to set them or some other Agent or Power forward,* and it is most

rational to believe, that God acts by Matter here, and that the first Motive is at a Distance out of our Reach. The Elasticity of Air cannot press any Thing towards the Centre, because it presses equally on all Sides, as well upward as downward: but any bodies jetted from the great Arch direct their Force towards the centre, because the Globe intervenes, and hinders them from striking directly, or in a diagonal Line upwards.—That there is such an Effect is visible.—That either there is such an Agent, or that 'tis done without an Agent by the Almighty Power is certain.—That such may as easily move from all Sides of the arch, as Light does from the Sun, is conceivable; how God does it without an agent is inconceivable.

Consider this Matter well. If these corpuscles be pushed from all Sides of the great arch towards this Globe, if the Moon intervene, will not that take off the Pressure under the Moon? Will not Water rise there? and what Effect may this have upon the Globes, to cause the Direction of their Motion?

If there be such corpuscles so moved, many of them must strike continually upon the corpuscles of the air, and push them aside, or pass between them obliquely

quely till they reach us; and if the air be charged with Humidity, perhaps the corpuscles of Water may be strong enough to resist them, and rebound them, or take off their Force, so as to lessen their Effect or Gravity here. The Gravity of bodies in Vacuo is not otherwise altered, than by taking away the resistance of the air, and the closer any body is, the fewer of these corpuscles will pervade it, and the more of them will strike against it, and force it the more towards the centre; and though they may push a feather with the same speed in Vacuo, as they push Lead, yet not with the same force: And the Increase of the Velocity of bodies towards the centre, will increase in Proportion to the repeated Pushes of these corpuscles, or the Succession of new corpuscles still pushing and adding force to force. Whether these corpuscles immediately rebound from each Globe, or are expelled by the ferment within each, or are thrown off by the Rotation of each; Whether in a perpendicular Line, or in the Line of each of their Tangents, will make no great Variation, and what Variation they wou'd make must be considered.

If the strongest Motion in the Fluid proceed from the Sun, there will be less

at the Poles, hence may proceed the cause of the Needle's pointing *North* and *South*.

If the Water in the Abyfs can be divided smaller under the Line, by the small Parts which enter there, then there will be a continual Proceſſion of groſſer Parts from the Poles, and a continual Receſſion of ſmall ones thither.

Whether ſomething of this from below, or ſomething like this above, contribute towards the Direction of the Needle? Whether this Action happened in the Waters while things were forming, and ſo formed the Loadſtones, or whether they were formed in the Veins which were *North* and *South*, and that Action happened in theſe Veins?

Whether the Rotation of the Earth at the Formation, could make the heaviest Corpuscles turn their Edges, or heaviest Point the Way the Earth moved, and the ſmall recede the ſame Way, ſo that their heaviest Edges would be both one Way, eſpecially the Loadſtone; ſo that it might be formed in Lamina parrallel to the Ecliptic, or &c.? Or, whether they might be in Circles as the Earth turned, or, if the Hematites could have any Aſſiſtance this Way?

Q. Whe-

Q. Whether the Loadstone was formed in the Water, or in Veins? Q. If any one a coled Nodule?

Q. Whether the Direction the Shemosh moves in, did not something in disposing its Corpuscles?

Mr. *Alexander Hay*, thinks Loadstones to be the inward, or finest Parts of Masses of Iron Oar—Proof might be made by marking and cutting such Parts out of Iron Veins.—

Whether they took their Poles by the Direction they lye in the Veins, and were formed by approaching, or when nearly approached; or they are shoad Stones, and have taken their Direction by lying there?

If a Loadstone were formed between two Sides of a Vein, or between any two things which were solid each Side might attract, and turn the Corpuscles which were nearest to itself—but then, how was it begun? If it issued out on one Side, itself would attract more than the opposite Side: If it issued out of both Sides, then it must meet and unite in the middle: If it had formed from the Union of Corpuscles, or a Centre between them, then it must be formed by the double Attraction each way from the Centre, and from the Attraction

action of each solid Side of the Vein, and the last might perhaps direct the application of the Corpuscles.

Is not the Loadstone a Mixture of Talk and Iron? See the large Stone at the *Royal Society*, whether it be formed in a Vein, or how?

In the attraction of the Pebbles the heaviest came to, and the lightest flew from, and so separated; was the Loadstone formed so? and with their heaviest Ends first?

Magnetical advertisement by Mr. *Barlow Lond.* 1618. he names another Piece, called *the Navigators Supply* writ by him. p. 2. Bricks while hot and Parts in Fusion placed N. and S. take attractive and directive Powers.

As each Part of a Loadstone when divided forms to itself new Poles, it must be the Centre of the Stone in a certain Direction, that is the pole, or axis; and if a Hole were drilled through it, would turn equally on its Axis, or fixed between two Points, the same.

So several Loadstones cemented together, form a common Pole to them all; if they be not cemented with their former Poles parallel, they, I think, will have contrary Effects, and confound one another,

ther, unless one of them could shift the Atoms of another, or turn them the contrary Way.

Stones must be placed in order to cement them in the same Direction, as if they were cut one from another, and then Poles, Equators, shift, as they do when a Stone is cut, and reunited.

Observations about the piecing of Iron Stones is in a Book bound up of several Pieces, called, *Magnetical Tracts*, in Dr. W——'s Library.

If a Loadstone be exactly round, the Poles, must be from the Disposition of the Corpuscles, either in respect to the Solidity of one Part more than another, or from the Ends, or Edges, or Hollows of the Corpuscles being disposed in some Position.

Loadstones, Needles, &c. if at Liberty, and the Power sufficient, all are moved, each with its Pole to the contrary Pole of another, so as to make a continued Line of their Axis's, and so as that their Unites may in that Line, be all pointing with their same Parts, Ends or Sides the same Way.

Those Bodies which are composed of Unites, which can be made magnetical, such as the Earth, Loadstone, Iron, &c. are

are so formed, either first by the Motion of the Æther, or by that Agent by the Assistance, or Interposition of one, which has a sufficient Degree of Capacity by making the Unites of the weaker, conform to the Position of those of the strong ones, assisting or interposing——So the Æther, those of the Earth; so the Earth, those of the Loadstone; so the finest, strongest blue Stone whose Unites are strongly fixed, the Unites of rusty or-----Stone which are weakly fixed. So all Stones, those of steel or Iron. So soft Iron, sooner than those of steel. So soft steel, sooner than that of hard steel; but the harder the Body in which they are moved, the stronger and longer they retain their Position.

And the greater Weight they lift, if that Weight be too great, or the Interposition of another whose Force is great, be too long applied, and too strong, it will turn the Unites in the weaker, and deface the Power, as the Action of Fire does in any, and I believe the force of a Hammer, &c. in Iron will. They say that they will recover their Position, if plac'd while they are hot parrallel to the poles, if otherwise not. They mention not what Stone quenched in water will do, but Iron or steel quenched when hot in Water, not only loses that Position

Position of Parts, but renders these Parts so fixed, that the Loadstone cannot move them.

Those Stones from *East-Indies* the finest and strongest.

The one pole pulls at the one end of the Needle, the other at the other equally at the pole as the Needle approaches, either Pole, more at that than the other; thence Inclination.--—Or rather every Part of the Axis pulls, and the part nearest the Needle most, and as there is more of the Axis towards one end, than towards the other, more in some certain Proportion towards the longer end, equally each Way at the middle, and all one way at each end or pole, whereby the South end of the Needle, is drawn to North end of the Earth or Stone, and the North end to the South end.

The pressure of the *Æther* greatest from *East* and *West*, before the inner Globe was formed, and since greatest that way against it, and least from it; so the Unites are turn'd with some certain sides all that way, or parrallel to its Axis, perhaps with their planes parrallel to the Equator, and that Difference or excess of pressure turns them in the Needle, when applied to the Stone, and turns it when from the Stone in Water or a Pin &c. Are these

in

in the Needle turned the same Way as those in the Stone? Does the pressure make any Flux, or Reflux of the *Æther* in the Line, from Equator of the Earth to each pole, or from pole to pole?

Every Unite must have the same property as the whole, that is liable to be turned with one end, by Reason of its Figure to the Pole, whether it be that the heaviest end goes foremost, &c. and turning them makes the Body liable to be turned the same Way.

If the Loadstone be found single, as *Norman* says, whether it be a nodule, or fragment of Stone, or Oar, or Veinstone, then 'tis likely it acquired its properties by lying long in one Position, as they say, an Iron Stantion or Window bar will, and that must be by the *Æther* passing through in one Direction. Indeed, they needed no Loadstone nor Needle at first; so it might answer the end, if it had its properties in time.-----He afterwards talks of Loadstones found in Iron Mines; so it appears not from him whether it be this or that.

It does not seem strange that, that force which forces the corpuscles close to one another, when they are removed at one end each from its next Neighbour, by
bending

bending the Body, sets them close and the Body straight, and strikes over, shou'd twine or set the corpuscles of Steel in some certain Position on the surface of the Steel next the Stone, when the expansive force is kept off on one side by the Loadstone: nay, that when the surface of one Iron is so formed, that if another Iron be laid to it, the latter shou'd be altered in some degree, and so on. Perhaps pushing them near together on each Side, and flat Ways, may do the Business of Attraction, and perhaps twining them in some Direction, may do the business of the Direction; and if beating them with a Hammer, or bending them forward and backward or twining them, take the Power from the Needle or Piece of Iron, as heating them they say does, then 'tis plain, 'tis in the manner and nearness the parts approach each other: And by this means the Arms of the Loadstone may in time, have all their corpuscles so set, as they may have some of the same effects as the Stone itself. But if they were taken off from the Stone, will they then give the directive power to a Needle? or will Aqua fortis immediately take the Virtue from one of the Arms taken off, or from a touched Needle.

When

When Iron is placed against a Loadstone, so that the expansion does not act on one side, the pillar on the three other sides, may vary the Disposition of its corpuscles, or some other way without the Stones communicating any Parts. Q. If Loadstones were placed on every side, or &c.

Try what it will do with the edge of a Razor, a very thin Plate, &c. The parts of the Stone, each set all the Filings or Dust all one way.

A Loadstone should be uniform.----That which Mr. *Whiston* shew'd me which was plated, had its Poles uncertain, or in a Line.

His Notion that the South pole of the magnet is a circle of 40° , is corroborated by a Loadstone formed in layers like a slate, whereupon a Needle stands upright in a line for two inches-----and from some uncertain Observations.

Ridley page 19. If a Stone, &c. ib. page 22, 25.

Q. They say the Loadstone is the hardest to cut of all others except a Diamond, and the best is not much softer than a Diamond.

If a Loadstone were cut into the figure of a cross, with four legs, or with six, how
wou'd

wou'd the poles stand then? Will Water dry as soon from a Loadstone, as from another Stone?

Is it possible that Effluvia of the Stone, can pass into the pores of the Iron, or only stick in its surface, and stop the Pores, that might be tried by filing of the surface.

Touch

How comes it to the End of the Pins? it does not pass through the brass cap.

A current of Æther through it.-----A plait of any metal put between it, and Iron diverts the course.

Do the atoms enter to the centre of a Needle, or will filing of the surface take them away? I think fire will take them out; I think they say the finest closest steel touches best.

If the south part of the Loadstone (as *Norman* says) touching the point of the Needle makes it regard the North, then one wou'd think the Æther pervaded in sharp streams through the Stone, and gave some Directions to the corpuscles, so as to form lines or pores the opposite Way; and if so, there would be a stream of Æther to drive off the Air; and that Æther must pass through the Iron, to let the Air press the Iron to the Stone, so I think he is mistaken. I know not whether any tryal has been made with a Terrella. How the Needle

Needle would point if it were touched with one point at the line, or one point a little on this side, the other a little on that side.

The Loadstone taken from the Earth, within the Earths sphere of attraction, one piece of a Loadstone cut off another, within the sphere of the stronger part, a piece of Iron or Steel or Needle, touched by a Loadstone in the sphere of the Earth, or a Loadstone's Attraction begins with its first Motion to put every unite in it, with the same points the same Way, as those in the greater, and in the same line, so as to make a continuation, or add the length of its own pole, to the length of the greater pole. If the axis of the smaller be placed parallel with the Axis of the greater, and with the Diameters of their Equators in the same line, and the South end or pole of the smaller, nearest to the North end or pole of the greater, the South end or pole of the smaller, moves in a curved Line, lifting its North end or pole by degrees, till the South end or pole of the smaller, come to the North end or pole of the larger, and lengthen or continue their Axis in a straight Line. If their Axis's be placed parallel, and the diameters of their Equators in the same Line, and with their North ends nearest,

nearest, the first Motion, the smaller makes, is to turn it ends, and proceed as aforesaid: And so, and no otherwise, if the smaller be placed in any part of that curved Line, so placed their strengths are joined; if you let them joyn after the ends of the smaller are turned before they come to that point, they weaken one another.

Can the Moon make any such Attempt to join herself to the Earth, and be eluded, and still in pursuit, by the flying Motion of the Earth?

There can be no difference between a piece of the same of one end of a Loadstone, and that of the other, except the same ends of the unites of each end, were to turn to the Centre; as for Example, the larger Ends and the smaller to each Pole, and they or half of them must shift off. So when a Stone is cut, but I think they are all turned one Way.

There must be a polarity in each of the Unites of the Selenites, Talks, Spars, &c. which may direct the Formation of their Figures.

Will a round Plate, or Globe, or sphere of Iron touched, shew the Poles of the Magnet touched in two Points, or touched

in every Part, half by one Pole of the Stone, and half by the other?

If the *South* part of the Loadstone, &c. (as before at page 319) The arms of Iron convey the Virtue of the Loadstone from each Pole, to those Points; how those Points reject the opposite ends of the Needle, I do not well remember.

They ascribe Poles to the Corpuscles of Selenites, and diverse sorts of Salts to make the parts come together in Rank and File; if each sort have distinct Figures, and be supported in such a fluid as Water, and the *Æther* have a Motion in one Direction, or the Corpuscles of Fire in the *Æther*, then it will turn them all the same Way, as the Points or smallest parts fronting the Point, from whence the *Æther* or Corpuscles of Fire, or steam from below, or whatever it is that moves comes, or from whence it issues, or &c.

If this *Æther* be the cause of Union, or Adhesion of Corpuscles, the near approach of the Stone to Iron, may twine or shift the Corpuscles of the Iron, into such Position as may enable them to direct or turn the *Æther*, or make it move in one Direction.

The Unites or Masses of Metal which are so easily moved with a gentle stroke,
and

and push out the Air, and cause sound (tho' those of mixt Metals most) may be twined by the pressure towards a Loadstone.----- See if beating will take it off.

When the Loadstone is moved over the Iron, the Unites are more pressed through the Iron, than they are through the Loadstone, may easily turn; and if the Stone were polished, wou'd almost leave the Iron, and perhaps most of them in a thin Mass may be turned so, because these in a Mass, applied to the arming of a Loadstone, are moved to the Stone through the arming and turned at that Distance, and may be much more so, when the Iron of that thickness is entire.

Touching a Needle with a Stone, may make some of the Corpuscles where it touches, set flat; those at Distance set edgewise, thence may be the different Directions of the several parts of the Needle Mr. *Lowthorp* speaks of.

One may see by the Loadstone's setting the filings of Iron, how its parts are set, and how it sets the Unites of the Iron at touches.-----Whether edgewise or broadways to the Pole? Qu.

Barlow page 36, 37. Capping is best of soft Iron-----the Stone lifts more of soft Iron than Steel, but Steel retains the touch

longest, as I think they conclude, that the parts or Unites of the Stone, are not turned cold when joined with another Stone, wou'd not Iron turn best hot? What wou'd a touch do to Iron hot?

Mr. *Whiston* says, they touch the Needle upon the Stone, that of Iron arming will not endure, when the dipping Needle is fet.

Ridley page 90. Steel hardened will not take the touch, let it down it will take, and keep it better than Iron.

Iron touched has the attractive Power communicated, but not the directive Power, Mr. *Whiston* says, and that Needles or filings, will stand or lye in any Direction upon any part of its Surface: Has a Mass of Iron been touched all over regularly to prove if it wou'd take poles? If so, and it did not, then.

Q. If filing the surface of a touched Iron, take away the touch?

Q. If Stone will communicate any Virtue to Steel without touching it?

Dr. *Lowthorp* says, the touch runs to each end of the Needle, and is at the end of one Pole, and a little distance from the other Pole, and the middle has no Virtue:

That

That force which sets a Spring back, sets the Corpuscles of Iron by the Application of a Loadstone.

Does Fire alter the Texture of the Stone, or hinder its effects, it opens Pores^{on.} where the Fire passes, so lets the Æther pass, and the opposite pillar presses through it upon the Iron. Æther may be rarified in passing through the Loadstone; if so, it must either meet in the centre, or pass in one Direction through the poles. Fire takes away the Virtue of the Loadstone.

Q. If it attracts in a great heat through a flame, or a heated Body, or &c? for perhaps this ferment which Occasions Gravity, does not pervade them and Iron, and so the pressure of it, and the Atmosphere brings them together.

If this fluid cannot pervade them, it must wheel off to each Pole as I imagine, but more to the *North* Pole, because we are on that side of the Equator, then will not the Variation be greater nearer the Poles?

Will a Loadstone take away the Elasticity from a Watch-Spring, or small piece of Wire?

Consider that if the small Parts have Æther. passage through a Ball of Glass forward, the parts before must recede by the sides

of the Ball, to supply the defect behind; they must divide at the Focus, and those which fly out sideways are changed for larger. Consider what this can do, if there be any passage through a Loadstone, the Earth, &c. And what gave the Motion to the *Æther*.

I am not satisfied with their Reflections, and Refractions; when Light has passed through a Body, and is weakned, the Air presses it towards that Body.

The Air has space for all the Light to move in every line; it tends to unite and go in one line thro' a Globe.

Something like this tendency must be in a Loadstone. I think not two Poles on each side but the outer, if there be any, may be occasioned by the Effects of the Sun.

Q. What I have said-----If Stone attract more than Iron, it may take parts out of the Iron, and open passages for the *Æther* in a certain Direction.

Needle expelled at contrary ends by the Stone till they touch, or come very near, then attract. I suppose the *Æther* gliding off the Sides of the Stone, diverts or expels the Needle, till they come so near, that it pass on each Side.

The

The Motion of the Needle must be determined to the Meridian, by the Motion of the Æther, with the Rotation of the Earth, which raises the Compressure of the sideways Pillars of Æther; those from the *North* and *South*, being of different Powers from those from the *East* and *West*, and those adjacent to each in Proportion.

And the Variations may be occasioned from the different Parts of the Earth, being composed of different sorts of Matter, or of different Solidity; so that the Pillars of Æther, where it is in Motion, may be strongest.

Q. Then the Variation of the Variation.

Tho' a great part of the Æther pass through the first Shell, and strikes upon the inner Globe, yet part glides along its sides towards each Pole; and that which strikes upon the inner Globe, also glides and repasses through the outward Shell, and there jointly, or severally direct, &c.

Where Corpuscles move in one Direction, there is a contrary Motion of others, as lighter, or heavier, or &c. in a contrary Direction.

Where a Body moves one way, the Fluid adjoining, moves the contrary way.

Where a Body moves in Air, it may move some of the Air, before, or with it, because Air may entangle. Qu. How *Æther* moves if it does not entangle?

Consider how it is, where the Fluid is compressed or expanded.

If any *Æther* come from the Sun to the Earth, it must go through, or off at the Poles, or part each way, part in, and part off at each Pole, dividing at the *Æquator*. 'Tis likely there is a constant accession of the grosser Parts from the Poles to the Sun, both without and within, and a recedence of the smaller, besides what passes through the Globe, or the Shell.

By any thing I can judge, the *Æther* if any arise in Lines from the Surface of the inner Globe, to the Surface of the Shell, must rise from each Point in different Lines, as Light emitted from the Sun, to a Body at that distance, and of such a Figure does. But this cannot be from the Sun on each side at once. If it be so, it must arise from the Compressure it has upon the Parts nearest the *Æquator* in its Motion, more than upon other Parts.

If the motion of the *Æther*, from the *Æquinox* to the Poles be exact, and Pressure *pro* and *con.* be exact, and the magnetical Poles stand aside from that Line; what

what may these two different Lines, and their Points do instead of four Poles; or may Mountains, &c. divert the Course of the *Æther*; try in an Eddy, as at Whinlatter.

Consider how the Rotation of the Earth, the Motion that gives to the *Æther*, whether that *Æther* has any constant Motion into, and out of the Earth? Whether it enters at the Poles, and is thrown out as I imagine it is at the Sun constantly, or it enters and rises casually, or perpendicularly. The Pillars of *Æther* and Air which pass by the outsides of the Globes, must direct the falling of Bodies. But the *Æther* which rises from below, or passes through the Globe, Sphere, or Shell, must direct the Needle, and it must always stand to the Point, where either most or least passes.

Consider well how the *Æther* wou'd act, if it rebounded according to its angle of Incidence, upon such Bodies as it could not pervade.

If there be something goes down, and is rarefied in the Sphere of Water, something also comes up.

Tho' the Pillars which gravitate Bodies be of infinite Length, 'tis likely those which direct the Needle are but very short,
and

and if they issue out of the Earth, 'tis likely reach not far from the Surface. The dipping Needle might be tried upon the Monument; but as it does at Sea, it may do there.

Can the return of the [*Æther*] upon the Rotation of the outer, or inner Globe, do any thing in directing the Needle? that wou'd be flat at the *Æquator*, and perpendicular at the Poles.

The *Æther*, or *Ëc.* which returns from the inner Globe, not being able to pervade the Stone or Needle, or least able at the Poles, turns them that way, but pervades all other Bodies in every Direction, and so does not direct them into the Lines it moves in.

Qu. If the Axis in a Loadstone be not the Axis, it wou'd turn upon the longest way, and how applying other Parts by Cement alters it.

Will not the Pores if they lye parallel to the Axis, be the occasion of turning the Stone here, if they be wider at the *South* end of it. But then the Stone wou'd not turn so beyond the Line.

What wou'd a ring of Iron do, if touched in one part, and put upon an Axis, either horizontal, or perpendicular. They talk of making a Loadstone, which will attract strongly, of very thin Plates of hardened

dened Steel bound together and touched.

Q. How placed?

Gravity must work with Air above a certain size, and magnetick Power with those under that certain size, or more likely the contrary.

The power of Gravity acts upon all Bodies, whether the *Æther* pass thro' them or not----that of attraction through those it cannot pass in sufficient degree, to interrupt that of Direction through which it cannot pass, or can but pass in certain Lines on its Surface, or through its Pores or Tubes, and the last Power is infinitely weak or small; two or three Grains it seems casting it any way in the strongest Needle, and is the result or effect of a Tendency, either, of both the *Æther* and Light, or of Light, only from the Meridian of the magnetical Poles towards them; and as attraction from Loadstones reaches but a small distance, Variation or Direction is at much greater.

Mercury enters the Pores of Gold, by degrees, of this Solidity, and single Corpuscles of Salt, enter some of the most solid Metals by the same manner.

When a Needle, or any part of it is thus saturated, 'tis possible to conceive that the *Æther* may glide off each side, towards

wards one of the Poles: but what determines each point to each Pole?

The Æther I suppose splits at the Æquator, and on this side tends only to this Pole.

Is that end of the Needle most saturated here, by the motion of the Æther which points *North*, and the other end on the other side the Line, or does one Pole of the Stone formed here, emit a greater quantity of these Atoms to the Needle, and so determine that point of the Needle touched with it to this Pole, and the South Pole of the Stones formed there, emit a greater Quantity to the end it touches? If that were so, wou'd not shifting a Stone over the Line, shift its Poles, or the same of a Needle?

If there be a grosser Atmosphere driven to about the Loadstone, than about other Bodies, what will that do, reject the Needle, or &c?

The circular Impulse by the thinner Air or Æther which pervades, is less upon the inner Globe, and the sphere of Water its Atmosphere, than that by the grosser Air on the outward Shell, and its Atmosphere by the visible Difference.

Perhaps the Æther which pervades the Shell, has the same effect in Degree upon the

the

the Atmosphere within, as that without, has upon the Atmosphere of Air without.

And this *Æther* which rises is so small, that it affects nothing but Loadstone and Iron, whose Unites are drawn all one Way.

Atoms from one Body cannot enter another, when the *Æther* passes through the Pores, except what comes with the Breath into the Nose.

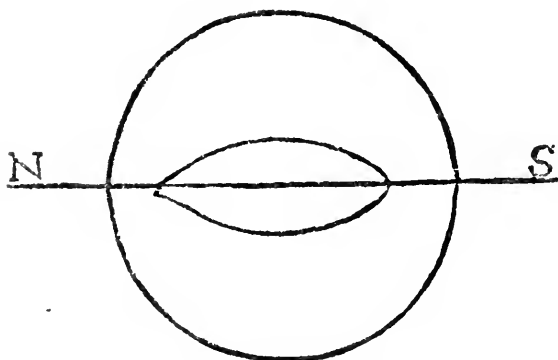
The Corpuscles of the Loadstone and Iron, and their Pores are so framed, that the *Æther* is not able to pervade them; and when their Bodies meet, the [*Æther*] either detaches from the Surface, or some small quantity of *it* passes, and those small Corpuscles pass from the Body of one, into the Pores of another.

A Needle of Iron is perhaps very near from stopping the *Æther* before it be touched; and when touched, perhaps in that Part, perhaps in all the Body is saturated with those Atoms, that it becomes so much more so, as that the *Æther* is sufficiently stopped, and perhaps these Atoms can be directed by the *Æther*, which moves them into some Position: The Stone could not always continue to emit to Needles, if it did not reciprocally admit from other Iron, till the Pores be saturated in equilibrio, or equally; hence the Stone is stronger by steel Dust. Does

Does stopping the Pores make it lighter ?
Does the *Æther* glide off, and not enter
the Pores, and take so much hold of it ?

If the *Æther* pass not through the Iron,
the Atoms will not fill the Pores from all
Surfaces to the Centre; and by this Reason
the *Æther* cannot take them out again, as
it does the Atoms out of those Bodies it
pervades; those Atoms must by the Laws
of Attraction fill the Pores, and take place
of the *Æther* in them, being more solid
than its Corpuscles, so long as its Pillars
from opposite sides do not pervade; this
determines the Centre, What determines
the Poles ?

If that Centre be continued in a Line in
any Direction, does not that determine the
Pole ? Is not this the Case of the Earth ?



If the inner Globe rolled out into some
such Figure as above, and that the *Æther*
being

being compressed against it from all Sides, and rise up to the Surface in Lines at right Angles, from each Part of its Surface, as Light does from the Sun; that Globe may be so Figured, as that the *Æther* which rises, may direct the dipping of the Needle. And if the *South* Pole be blunt, or near streight on its Surface as described, the Needle may stand perpendicular for a great Tract about the Pole. And if the *North* Point be small, and be aside from the Pole of the Earth, the Needle will turn to that Point; and as the inner Globe moves, incline to, and stand perpendicular on each side of the Pole of the World, as the inner Globe shifts that Point.

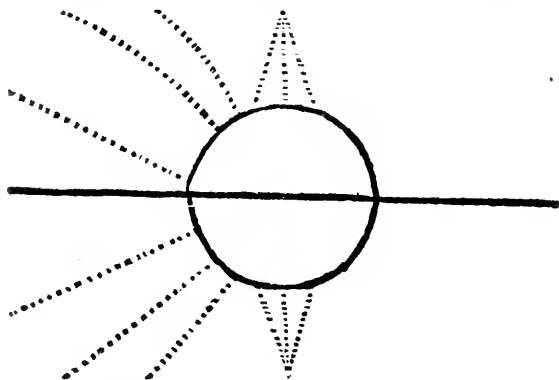
Q. If there be any Motion in the Fluids on the Surface, from the *Æquator* to the Poles that can inflect this rising *Æther*?

All this does not discover, why each Point stands the same way.

The force of the Pillars of *Æther*, are least upon the Poles of the Earth, because the expansive Motion strikes upon the edge of the *Æquator* most on one Side, and is repelled most on the opposite Sides, and pushes rather gliding, or slanting towards each Pole; and least active there, makes them freeze, and the first makes the Needle stand upright there.


The

The greater Force of the Light from the Sun, gives the Motion in the Line it goes. The shifting the Globe within, assists perhaps, both Motion and Rotation.



The Moons Place may weaken the repulsive Force on that Side, and let the Globe within proceed something further in that Line, and push out most Water.

Like Byas in a Bowl, if the *Æther* have more Resistance on one Side, than the other.

Q. The Plaits of the Loadstone must be *transverse*  *the Pole*, so that least passes that way, and the Needle stands erect. Will it draw the Weight of cast Iron, as Hammer'd?

If

If the Corpuscles of Iron, and more especially these which form the Loadstone, be flat, so that the Æther cannot pervade through nor between them, or not in any considerable Degree, the Pillar of Æther, will lift up the Iron to the Loadstone, when it is so near, that the sideway Pillars do not interrupt it.

Whether the Corpuscles, if they be Plaits, and prevent the Æther from passing can be put into such a Position, by some Motion in the Æther, that by the Æther's pervading them in one Direction, it may form their Poles, make a Point stand upright; and whether its Corpuscles, by Friction, enter into the Pores of the Iron Pins, and they fill the Pores of the Needle on the Outside, or also on the Inside; and whether a Point so filled, that the Æther cannot pervade it, will not turn North and South, if the Stream pass that Way? Whether any other Figure of Threads, or Tubes or, &c. would have the same Effect?

If the Earth, or a Loadstone, be impervadable from Pole to Pole by the Æther, or it does not pervade in that Direction, and it pervade in all other Parts, and most at the Equator, where it is thinnest or most agitated, and so in Proportion; and

also, the side Pillars having not so much of the Earth to pass, to come at the Line nearer the Poles, how that will direct the Needle, or if the Direction is all that Way.

Consider, the Lines that the Sides of the outer Shell make to the Place where the Needle is, conjoynly with the Interruption given by the inner Globe, and see if the said Sides do not also interrupt in those Lines. For Example, If the Needle be within 20 Degrees of the Pole; then the Shell to and beyond the Pole, on one Side, and each other Way, on each other Side, interrupts in Lines, and the inner Globe in one Line. But this would be the same in any Part, if the ----- do not move in certain Directions, by means of the Sun's Rotation, &c. Q. Whether the Sides of the Shell have any Effect upon the Loadstone?

If a Terrella were Oval, or the Poles, the Part which makes the greatest Resistance, then the Needle will stand in that Line, in any Part that the Æther makes the most Resistance.

If an Unite were placed at equal Distance from two Bodies of equal Size, if the one were solider than the other, the Unite would be pushed to the Solider; if

if one were larger than the other, and equally solid, the Unite would be pushed to the Larger, and so if Distances were proportioned; but it is hard to conceive how it would rest between the two, and so it is of a Needle, but the Needle is fixed at the Centre, and so may be adjusted.

Q. If the Cap of the Loadstone be Plates that it cannot pervade, and laid not edgways to the Pole?

The Æther may run that Way, and it may leave Plates on the Iron touched, and hinder the Pillar pervading, and then the Pillar below will lift the Iron. It, perhaps, pervades least through Iron of any thing except the Loadstone.

It is said, Iron placed between the Stone and a Needle stops its Virtue; it interrupts the Pillar of the Æther.

The Poles of the Stone must have the greatest Resistance, as the longest way of the Needle or Piece of Iron.

When a Needle is hung or ballanced so nicely by each End, that the gross Air has no effect upon it, then it is directed by the Resistance below.

Every Line attempts to Expand and Thrust, so the Needle is thrust to that Pillar which thrusts least.

Attracti-
on.

A Treatise of magnetical Bodies and Motions, by Ridley, 1613. He also writ some Animadversions upon *Barlow*.

All magnetical Globes have some Parts of their Bodies, which^f be also magnetical. (secondarily) which being separated from their proper Globes, and no way hindered, will seat themselves, or be seated unto the natural Situation of their particular Globes, (or one of them to the Pole or Part of the Stronger.)

I think a Loadstone will take a little Piece of Iron further than it will take Filings, because the Air takes more hold of it: But the Piece must not be too big, because the Stone is not big enough to equal the Iron.

If the Loadstone or Iron touched with it, stop the longer Pillar from above, the longer Pillar below, will press Iron up to the Stone; and, if it be so, the higher the Iron is from the Earth, the greater Weight will be pressed up; but, perhaps, the *Æther* will be the thinner the higher.

A Loadstone lifts the most Iron in the Figure of a Wedge, with the Head or thickest Edge towards it: which shews that the pillars of *Æther*, all act in the several opposite Directions.

Perhaps,

Perhaps, a Loadstone may lift more or less in different Degrees of Air, at different Distances from the Earth, &c. or through other close Metal, &c.

Soft Iron will not attract the Filings of Iron after it is touched, but hard Iron will, which shews that it is not the Matter, but the Disposition that is the Cause of Gravitation and Attraction.—So must draw a greater Weight of hardened Iron, or Steel than of soft.

Only the Surfaces of Iron are altered, and so only attractive. The Stone is through, and so directive. Perhaps, thin hammer'd or hardened Plates may be directive.

Loadstones should draw a greater Weight before Rain.

Will a Loadstone placed over a Body in the Scale lessen the Weight?

How much more will a Loadstone draw of Iron, hung at a Beam ballanced by another Weight, than it will upward?

See when Iron is at one End of a Beam, and another Weight at the other, and they ballanced, Whither the Loadstone will attract the Iron at the greatest Distance upward or downward? If the *Æther* pass more thro' the Iron, than it does through the Load-

stone, it will lift less than it will pull downward.

How far would a Loadstone draw a piece of Iron in a hollow Barrel of Iron?

A hot Iron, perhaps, will attract; will the Stone attract it?

A Loadstone will not attract, I think, when bored full of Holes or powdered.

Amber and such Bodies, when hot, have the same Course through them.

If Amber attracts, if you heat a little piece, that keeps a Straw suspended on the under Side, and heat a large piece hotter, and place it under the Straw, if it draw downward, the stronger must have the Straw; if not, it is, as below. Try two Loadstones so.

When by Heat, Friction, or, &c. you put the Corpuscles of this Fluid in Motion in Amber, or any Body, which has small Pores, they take their Motion upward, and the Corpuscles next below follow, and will lift up a Straw or light Body to the Amber, and expel it from the upper Side. Fuel in Fire will do the same, or the Fluid driving in at the Bottom or Sides, and expel any Thing from it upward, and is rarefied in, so comes up.

If the Return of the *Spirit* should keep the Needle in the same Line, as the Axis
of

of the Earth moves in, that would do nothing to determine the Points of North and South. And if some Corpufcles move from the Line Northward, others muft fupply their Places and move Southward. Whether they can be of different Sorts fo as to effect the different Ends of the Stone, or Needle, is not impoffible; but I cannot conceive how that would do beyond the Line.

Virtue cannot be without Substance, fo Virtue not without Substance, or Matter as the Loadftone.

If the Needle be varied or turned by any Action from the Sun, it is weakeft neareft the Poles. Let it be its Action towards the Centre, or its Re-action towards the inner Globe.

Q. Whether the Steam that riles out of the Abyfs, rife in right Lines from the Centre of the inner Globe, and fo in Lines of Lines, thro' the outer Globe or Shell? If the Dip of the Needle be always to the Centre, then there muft be something in the Rotation or turning of the ----- towards the Poles.

The Needle refpects a Point in the inner Globe, by the fame means as Bodies fall perpendicular to a Point in the whole
 Z 4 Globe,

Globe, *viz.* By the conjoynd Force of the several Pillars of the Æther.

If the Needle respects the Point, or rather Line, in, or through the inner Globe, through which there is the least Æther passes, and that Globe be formed with divers Prominences, then there may be the longest Line of Matter over these Prominences in several Parts of that Globe; and when a Needle is placed on the Surface of this Shell, over or in the Line of one of these Prominences, will it vary the most from the Meridian, or *&c.* or will it alter its dipping?

If the Needle regard the Poles of the inner Globe, then it will stand uncertain at a great Distance from each Pole of the Outer, and will dip according to the Line of Lines, by Reason of its Distance, and equally, except one End of it be nearer one Pole than the other.

The Needle points at the greatest Line of Obstruction, which makes it, when it is on one Side of Equator of a Terrella point inclining to the opposite Pole; and perhaps the Needle does so towards the Earth.

Suppose the Earth or inner Globe, or a Terrella, longer from Pole to Pole, or more
difficult

difficult to be pervaded that way than another.

Suppose the Stones that are formed on this Side the Line, have the---- Parts of their Corpuscles turned one Way, and the Stones formed beyond the Line have their Parts turned the other Way, or to the South Pole, so that these Stones which are found on the North Side of the Pole, work with their North End, and those found on the South Side, work only with their South End; and that the Needles touched with each of these Stones had the same Effects, how will that determine which End shall regard the Pole, when the Needle is shifted over the Line?

If the Needle regards the Line that obstructs most, and there be two Lines which obstruct equally, or nearly so; how will the Needle point then, as suppose the Line in the outer Shell, and the Line in the inner Globe? Nay, this may be in a three-fold Power, as between the Shell, this Way and that Way, and between the Line in which the inner Globe obstructs most.

A Loadstone drawing a Needle out of the polar Meridian of the Magnet, does only interrupt the Æther in that Line, and the Æther from each Side pushes it thither, where it meets with least Resistance.

Putting

Putting away the contrary End must be performed in the same Manner, as both Ends are equal at a Distance.

Try whether two Loadstones will keep a Needle steady between them, in Proportion to their Distances and Strength; if so, then two Points of the inner Globe may do the same.

I do not understand how the Poles of the Stone affect the opposite Ends of the Needle, that the South End of the Needle varies as much to the East, and as the North End does to the West, from the North Pole.

If the Surfaces of two Loadstones polished were put together of equal Force, I think, a Needle would stand upright all along the Division, and, I think, that is the Case in Mr. *Whiston's* Stone, it is formed in Layers like a Slate, and there is a Fissure where the Needle stands upright in a Line, and upon the Edge it turns down; so if two Edges of Stones of equal Force it would stand upright.

The two Pillars which pass by the Stone, set the Needle horizontal at a proper Distance.

Where the Air or Æther has any Motion greater than the Æther, which guides or directs it, the Needle will not stand.

Depth

Depth of the Sea removes the Needle to a greater Distance, or the Needle dips or stands in the Line, where the opposite Pillar is most interrupted. *Ridley, p. 100.*

The End that points to the Pole turns downward. *Barlow, 56.*

If the Point were fixed to a horizontal Needle, and the Socket were fixed in the Standard, from the Bottom of the Box, would it not work better?

The dipping Needle might be fixed between two Pins, issuing from the Insides of a Slit in a Ball, which Ball might turn upon a Pin: So it might elevate upon the two Pins, and vary East or West with the Ball. East and West it stands perpendicular, and enclines gradually to its true Dip, as it is turned to the North.

And, I think, they say, its Dip is in proportion to the Line of Chords, from the magnetick Equator to its Pole; and that the Variation or different Direction of the great Circles of Latitude, from those of the magnetick Pole, will shew the Longitude.

The Sphere of Water between the *Variation.* Globe and Shell is, 'tis likely the Occasion of the curved Lines in the Needle's Variation. The Pillars pass through more there than through the Globe, and, perhaps,

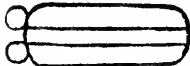
haps, between the Globe and the Shell more than through either.

Consider what the side Lines of the Æther can strike upon, or be interrupted more in one part of the Surface than another, which may affect the Variation.

Mr. *Norman* calls the Points, the Needle points to, the respective Points.

Consider the Figure I suppose the inner Globe is of, and draw Lines as they will pass by its Sides, or thro' its shortest Sides, and Lines also to pass by the Sides of this Shell, and consider the two Powers, and see how they may direct.

Could it be possible, that the Surface of the inner Globe could contract and split, and form Veins from Pole to Pole, and that those Veins, are the occasion of Variation?

If the inner Globe be longer towards the Poles, and shaped so  that there be two Lines, which make the greatest resistance; the Needle horizontally placed, may sometimes halt between two, sometimes incline as it approaches nearest towards the one, sometimes towards the other, and the Dip at each Pole, wou'd be in a Circle.

Q. All the Stones give the directive Power to Needles? Q.

Q. If each give the same attractive Power to Iron ?

Ridley, p. 144. He makes the inclinatory Needle subject to Variation.

I doubt very much, whether Mr. *Wb---* will find the Lines of each equal Dip, streight and parallel, where the Variation is great, and little in a short Compass. He makes the Variation from the strength of different parts of the Stone, but mostly *Westward*, says it affects not the dipping Needle. The Variation may not be so great at main Sea, because the Pillars of *Æther* may strike sideways through the Water.

Q. If the Needle varies *Westward* by the Rotation of the *Æther* in particular Places, by breaks of that Rotation by Mountains; none for a long way in the great broad Ocean, where there were no such Breaks.

The Masses which press in continually from the Poles of the Earth, where they are grossest, to the *Æquator*, where the Air is thinnest, turn the Atoms of the Loadstone flat.

Who would have thought or imagined, that the use of a small Stone contrived for the benefit of Mankind, should have been produced as an Evidence, to destroy the validity of Revelation? If

If there had not been that due proportion among Atoms, that these of the smallest size, or small Grains of them could have pass'd between the Atoms of Solids in Concretes, it would have driven all Solids together, as well as Loadstones and Iron.

Iron moves into a Focus.

Unites being Solid, when they are plac'd one near another, they are pressed against each other, with all the Force of the Firmament, and in proportion to the Dimension and Streighness of their Surfaces, they adhere with greater Strength.

Bodies which are compos'd of Unites, and have intervals through which the Air pass'es, and opposes their approach to each other, are only pressed to each other, with the remaining force of the Expansion and in proportion to the sizes and numbers of the Unites they are compos'd of.

The Shemosh must have a sloping Motion to each Pole, and the Spirit must come into that Line, more than it does in the Equator, which must determine the Needle.

If Spirit do not pervade Loadstone, what wonder that such a Pressure brings them together?

Texts concerning the Loadstone.

Job

Job 28, 18. *The attraction of wisdom, (חכמה) is greater than that of Loadstones.*

Prov. 3, 15. *Wisdom is more (יקרה) precious than Loadstones.*

-----8, 11. *For wisdom is (טובה) better than Loadstones.*

-----20, 15. *There is Gold, and a multitude of Loadstones, but the perfection of (יקר) Preciousness, Valuableness, (are) the Lips of Knowledge.*

-----31, 10. *A Woman of (היל) Virtue who can find? her value is far above Loadstones.*

Sam. 4, 7. *Their Substance was more (אדמו) flesh-colour'd than Loadstones.*

If. 28, 16. Q.

Job 28, 2. *Iron shall be taken out of the Earth, and the Stone, יצוק נחושה.*

Prov. 27, 17. (As) *Iron will be united to Iron, so will a Man be united to his Friend. N. B. יחר פני.*

Jer. 15, 12. *Will Iron break the Order of the Air, to Iron from the North, and to (נחשת) Steel? Q. Will any Metal stop the Spirit, and break the Order and Direction of its Motion, but Iron and Steel? If none will in any great Degree, I think this will determine what Metal נחש is.*

Job

Job 20, 24. Pf. 18, 35. *Bows of Steel.*
 Q. Could they make Bows of Brass. 2
Sam. 22, 35.

Eze. 27, 19. *Dan and Javan dealt in*
 (עשות) *wrought Iron,*-----ו. 22. *The Mer-*
chants of Sheba and Rahamah [from which
Places the best Loadstones come to this
Day] Trading, בכל אבן יקרה.

-----י, 7. *Shining as an Eye* (כעין)
 [that which represents objects] *of smooth*
polisht נהש *Dan.* 10, 6.

-----40, 3. *His Countenance* (Christ's)
like the appearance of נהש.

1 Kings 7, 16. *The Pillars of* מצק נהש,
 this Attribute does not belong to Brass, so
 properly as it does to Steel.

On the inner Globe.

IF the Earth stood still at first, the Light
 from the Sun, wou'd expand against its
 Surface, or expand the Water, and shift
 the Globe within, and give it Motion.

If there was a small Globe at the Cen-
 tre not dissolved, and the Water that went
 down out of the Strata had form'd a
 Sphere, when the Rubbish went down,
 it wou'd sink down to that Globe.

Atoms wou'd meet and form a Shell
 about

about the Centre, by the Laws of——
fo a Goodes, &c.

If a folid Centre were hung in a boiling Veffel with Sand in it, a Nodule wou'd in time be form'd; fo in the Kidneys, Bladder, gall Bladder, &c.

If the Globe within was not beat to Sand, or fmaller at its firft going in, it muft be beat, or diffolv'd at its coming out.

There wou'd as much fmall Matter go in with the Rubble into the Abyfs, as wou'd fill up the Interftices, and if not make it Unite and be Solid, at leaft, make it a very clofe Mafs.

The fmall Matter which fettled out of the Sphere of Water within, wou'd form a Shell about the inner Globe, if hard, as hard as can be; if foft, went down foft; and laft, perhaps.

If the inner Globe, nay, even the Strata, had not been diffolv'd to the bottom, too much Gravitation had fubfifted to have fuffer'd the *Nodules to have been form'd; at leaft, all was diffolv'd below, as far as we can fee*, or elfe there wou'd have been remains vifible: Shells could not have been fufpended.

After the Globe within was form'd, fomewhat of what I mean by Attraction remain'd, and works now conjointly with

Gravity; and near above the Surface, is call'd lateral Pressure, or Compressure of the Atmosphere, but not sufficient to direct the Motion of a Body in any other Line, than towards the Centre, except in some few Cases.

The Earth moving in the Ecliptic, and varying from the course the *Æther* moves in, or pushes in, must be owing to the Globe within, or the Moon, or something that is so pois'd or moves.

Cou'd the Figure of the Globe within, be form'd by the Motion of the Earth, or Attraction of the Moon, or any other Cause, but the Apertures to vary its Poles?

Can the Water being frozen at the Poles, alter any thing?

The Apertures in the wide Sea, cannot issue Water enough, to make any shew of their flowing, by the Motion of the inner Globe, or by Attraction out of the Abyfs.

If the Sea were less before the Flood, the Globe which fill'd up the Abyfs, and went out of it, was less.

What effect this Globe can have on the Motion, or Rotation of the Earth; Fermentation, there; raising of Springs, Motion of the Tides, &c.---deserves consideration.

If

If there was Tides at the Flood, cou'd they affect the shifting of the Water with the Matter in it, so as to form different sorts of Strata, or these several sets, from thin to thick?

They pretend the Water is attracted by the Moon, and forms the Tides. I think it is capable of being attracted very little, because the *Æther* pervades it. If the Moon occasions Tides, 'tis because the other parts which are not under the Moon, are more press'd by the *Æther*.

But if there be a Globe within, that may be driven nearer the Moon, and cause the Water to issue on one side at the Fissures, and come in at the other Fissures, at the part it left, and that may have some Effect upon the Vapours and Springs, and it may issue the Waters in proportion to the wideness of the Apertures, and then they will, tho' guided in the Point of Time, yet rise to different Heights, and differ in Points of Time upon the Surface, according to the Wideness of, or nearness to the Fissures, and still be something influenced by the Coasts.

I think there is no Tide in the *Mediterranean*; does the Sea not supply its Apertures to a Level? or can it not have

Water to rise from other Seas because narrow?

Q. If Hail is not form'd largest when the Moon is near, or perpendicular over a Cloud in frosty Weather, and falls when it goes further off: and so of Rain?

I think the Rarefaction occasioned by the Beams of the Sun shorten the Pillar, or weakens it, so that the Æther on the opposite Side pushes the Earth, and perhaps the inner Globe by that continually shifting the Centre, occasions the Motion.

The different Continuance of the Light in the Cap, has the same Effect upon the inner Globe, as it has on the Shell.

The Force of this thinned Æther must have the same Effect upon the inner Globe, as it has on the Shell, it must enter into the Sphere of Water, or the middle or hindmost Side, and drive the Globe a little forward in that Direction, and the Push behind must take more Hold of the solidest Part, and the Fore-side of the Pillar of Darkness, must resist or press on the Foreside, which will then have most solid Matter in it, and turn to the Sun, and so successively.

If the Waters can be thinn'd by Heat so as the Globe approach nearer, or can be

be impelled further off by the Sun: Consider the Effect upon the Account of Rotation.

If the Water in the Sphere between the Shell and the inner Globe, can be thinn'd by the Æther on the Side next the Sun successively, it may have the same Effect upon it, as the Æther has upon the outward Shell, and make it approach still nearer the Shell on that Side, without forcing the Water out at the Apertures.

Where the Parts of Light pass one way, those grosser must succeed either in that or in some other Line, and if some fine Fluid were to pervade the Loadstone, the Air, &c. it takes place of, must revert on the Outsides of the Stone thither. But all is, how the Light pervades to the inner Globe, and in what Lines, and in what Form, and with what Company it issues out.

The Light which passes from the Sun to the inner Globe, may be all Night in rising, and so continually from each Side.

If the Globe within be solid, which will move forward faster than the Shell, do either press to the Side next the Sun, or to the Side that makes forward in a Line, it may perhaps do something towards

wards raising Rain, Springs, &c. thro' the Strata; but then that wou'd raise the Water out at the Apertures.

Whether the two points of hardest Pressure, can make the Aether in the Sphere of Water rise in Lines from the Surface of the Globe, as the Needle dips, and be varied from the Mountains on that Globe, or the Dipping and Variation be both from the oblong Figure and Mountains on that Globe.

Whether the Mountains or Inequalities on the surface of the inner Globe, or on the concave side of this Shell, can make any Ruffle in the Water by the Earth's Motion, and so raise Steam variously as it shifts: If so, the Variation wou'd ascertain the Rains.

Consider the infinitely greater Pressure upon, and consequently the vast difference in Weight, between the same Quantity of Water or other Matter near the surface of the inner Globe, and that at a great Distance, and the small Degree of weight; Water will have near the inner surface of the Shell, and up the shell, till it be near through, and still how much less as it goes greater Distances from the upper surface of the Shell into the Atmosphere, and what Effects that will have upon the Waters

Waters rising, and upon the closeness and solidity of the inner Globe, as Iron is pressed stronger the nearer it comes to the Loadstone.

The infinite Force of Gravity, is vastly abated by the Recedence of Corpuscles from the inner Globe, and by its Distance from the surface.

The Needle is directed by the small Æther to the inner Globe, but that which gives Bodies their perpendicular Direction is larger and stronger.

But the Needle is directed or pushed by the Æther, which ascends on every side of the Point, where least ascends, to that Point, and rests there.

F I N I S,





An ENQUIRY towards a
Construction, Delineation, and
Description of the Symbols of
the System of this World, and
of the Fluid Powers, Substances,
Motions, and Courses in it, which
were inter al. given in Writing
by God to *David*, and from him
to *Solomon*, wrought by *Hiram*,
and set upon two Supporters be-
fore the Entry into the first
Temple of GOD built by *Solomon*.



I HAVE hinted in my *Intro-
duction* to, and in several
Parts of my *Second Part of
Moses's Principia*, shewed
what Use the Antients made
of Symbols, and that the mute Symbols
of the Powers of Motion, &c. of the Hea-
vens or Airs, and the Courses of the Orbs,
&c. which had been placed in Parts before,
or in the Temple to those Powers of the
Airs, and so attributed to them; were or-
dered to be placed in or before the Taber-

nacle or Temple of God, and so attribute those Powers to their Creator and Former. It would require no short Time to go through each Particular.

I choose to begin with this, which was placed Part upon a Supporter on one Side, and Part upon a Supporter on the other Side, in the Court before or under the Porch or Entering into the Temple. Nothing less than All could be attributed to, or be in a Symbol of the Power of God, who was served there: This is the most plain, and by its Station before the Temple is first.

Those who saw these Works formed from the Patterns understood them; but as these Works were destroyed for their Faults, it may be suspected that it was not intended that their Posterity in future Ages should have any other than a general Idea of them.

Though I am sensible, that the Description in Words was not wrote to convey perfect Ideas of them longer than while they were permitted to stand for that Race: Yet as the Parts were taken from the Temples of the several Powers the Heathens worshipped before this, and as these Parts have been used there since, I shall at least endeavour to give general

Ideas of them; and if we, tho' descend- ed from Heathens, be real Christians, perhaps it may be permitted that we may have a particular, or exact Idea of them.

And this Rule is always to be observed, that we must take the emblematical At- tributes the Heathens gave to the Heavens in *their* Sense, and those the Prophets at- tributed to God, in *their* Sense.

Many have wrote to set forth the Mag- nificence of the Temple of *Solomon*, none, that I know of, have so much as at- tempted to shew the Design of its Parts, or what they call its Ornaments.

The *Chaldee Jews*, or those who de- scended from *those* who were Captives there, have, as I have shewed, given others no true Account of any of these Things: Those who had seen them have given us none, and those who had not seen them, nor seen any Accounts of them that they tell us of, but had only heard by Tradition of them, (whether through Ignorance, or purposely, they best knew) laboured to give Ideas of them quite foreign to the Pur- pose; and hitherto all Nations have con- sented to be deceived.

These two Columns in particular, tho' they were of cast Metal, have been taken as Pieces of Architecture. And *Castel*

before his *Polyglot* has given us Descriptions from sundry of the Proportions and Symmetry of these Columns, and their Ornaments so learnedly, that 'tis enough to turn one's Head to know what they meant by them.

The supposed Perfection there was in these Figures, and the Mistakes in the Construction of their Parts, has given Birth to an Order of Men, who have taken the Name of Architects, *viz.* the Builders of Houses for Churches, Palaces, and Habitations, who by a few Names of Columns, Chapiters, and Orders ignorantly stole from Scriptures, and antient Heathen Writings, fill the Heads, and empty the Pockets of our great Men, and puzzle the World without knowing either of what Figures they were, or what they represented, any more than the Race of philosophical Architects know of the Powers, and Motions they were Types of in this System, or of what is in their infinite Number of other imaginary Systems.

As the Tabernacle and Temple each and both, and every particular Figure or Thing pertaining to them were made to the same general Purpose; I am first to shew, that there were Designs given from him to make the Emblems, who made
the

the Things, Powers, Motions, and Courses they represented. — Exod. xxv. 8. *And let them make me a Sanctuary, that I may dwell among them. v. 9. According to all that I shall shew thee, after the Pattern of the Tabernacle, and after the Pattern of all the Instruments thereof, even so shall ye make it. v. 40. And look that thou make them after the Pattern, which was shewed thee in the Mount.*

Acts vii. 44. *Our Fathers had the Tabernacle of Witness in the Wilderness as he had appointed speaking unto Moses, that he should make it according to the Fashion which he had seen.*

Heb. viii. 4. *Seeing there are Priests that offer Gifts according to the Law. — v. 5. Who serve unto the Example and Shadow of heavenly Things, as Moses was admonished of God, when he was about to make the Tabernacle: For see, saith he, that thou make all Things according to the Pattern shewed thee in the Mount. ibid. ix.*

23. *The Patterns of Things in the Heavens.* Moses had People enow with him, not only of the Jews, but those Heathens of other Nations, who, convinced by the Miracles he had shewed, followed him, who had seen the Temples, Tabernacles, Symbols, or Hieroglyphicks of the several

Heathen Countries they had dwelt in, who were able to work by his Directions according to the Patterns he had seen.

2 Sam. vii. 4. *The Word of the Lord came to Nathan, saying, v. 5. Go and tell my Servant David, — v. 12. When the Days be fulfilled, I will set up thy Seed after thee. — v. 13. He shall build an House for my Name.*

1 Chron. xvii. *ibid.* xxviii. 10. *Take Heed now, for the Lord hath chosen thee to build an House for the Sanctuary; be strong and do it. v. 11. Then David gave to Solomon his Son the בנה Pattern of the Porch, and of the House thereof. — v. 12. and the Pattern of all that he had by the Spirit, of the Courts. — v. 19. All this, said David, the Lord made me understand in Writing by his Hand upon me, even all the Works of this Pattern.*

The Parts of the Tabernacle, and the Designs in them, which escaped being carried away and lost, and which were made of corruptible Matter, were at the Time of the building of the Temple most of them defaced or perished; and the *Israelites* or the Children of Converts who had lived there, tho' some of them had set up Images, &c. had not seen or helped to make any such magnificent and perfect
 Repre-

Representations as were in the Pattern, perhaps more particularly the Spheres. — And tho' as *Solomon*, and *Huram*, both after mention, *David* had in his Time provided cunning Men for the Performance of the Work in, and about the Temple, yet *Solomon* either thought or found them insufficient. And notwithstanding what has been said and passed current of *Egypt*, it appears that *Tyre*, in *Ezek.* xxvii. &c. was the chief Port or Mart whither all sorts of Materials were carried or fetched, and where they were manufactured, cast or wrought, and from whence they were carried or exported, which was then the Cause assigned for its predicted Destruction.

And as it will appear, that *Hiram* (who was a Jew by the Mother's side) had been employed under *Huram*, the King of *Tyre*, by which it appears, that in those days the Kings were Surveyors of the Temples, Imagery, &c. of their respective Gods, and that he by being employed among the Heathen, had been taught or acquired by Experience the Skill of framing Symbols from the Plan given to *David*: This implies strongly that he had been used to make such Symbols at *Tyre*.

2. Chron. ii. 3. *And Solomon sent to Hiram King of Tyre, saying, v. 4. Behold I build an House to the Name of the Lord my God to dedicate it to him, &c. v. 5. And the House which I build is great, for great is our God above all Gods. v. 6. But who is able to build him an House? Seeing the Heaven, and Heaven of Heavens cannot sustain him? Who am I then that I should build him an House? Save only to burn Sacrifice before him, v. 7. Send me now therefore a Man cunning to work in Gold and in Silver, and in Brass, and in Iron, and in Purple and Crimson, and Blue, and that can skill to grave with the cunning Men that are with me in Judah, and Jerusalem, whom David my Father did provide. — v. 11. Then Hiram the King of Tyre answered in Writing which he sent to Solomon, v. 13. And now I have sent a cunning Man (endued with Understanding) of Hiram my Father. v. 14. And his Father was a Man of Tyre, skilful to work in Gold, and in Silver, in Brass, in Iron, in Stone, and in Timber, in Purple, and Blue, and in Linnen, and in Crimson; also to grave any manner of Graving, and to find out every Device which shall be put to him, with thy חכמים cunning Men, and with the cunning Men of my Lord David thy Father.*

1 Kings vii. 13. *And Solomon sent, and fetched Hiram out of Tyre, v. 14. He was a Widow's Son of the Tribe of Napthali, and his Father was a Man of Tyre, a Worker in Brass, and he was filled with Wisdom and Understanding, and Cunning to work all Works in Brass, and he came to King Solomon, and wrought all his Work.*

I shall explain a few of the Words which are not taken to come up to the Signification of the Original. *Heb. viii. 5. Who serve (Steph. Thes. t. 2. 603. λατρεύω, "to serve as a Servant.") unto the Example (S. T. t. f. c. 931. "also a Copy or Plan, — Polybius from Plato speaking of the Creation of the World uses the Word for an Exemplar or Model.") and Shadow (S. T. such a Representation as the Shadow gives of the Thing which obstructs the Light) of Heavenly Things (t. 2. c. 1543, "which are in the Heavens.") Considered as Powers and Motions of the Airs upon themselves, upon the Things in them, as they had been mistaken for Gods. *Exod. xxv. 40, Pattern. כנה M. "It is a Similitude, Figure, or Copy; Plan of a Building, Method, Type, Form." LXX. Τύπος, Type. A Description or Representation by Lines, Paintings, Models, or Images, particularly of those Powers the Heathens called Gods.**

Gods. 1 *Chron.* xxviii. 11. LXX Παράδειγμα, a Copy. 2 *Chron.* ii. 13. חכם. *M. Arab.* “Philosophy. חכמוני *M. Cachmoni* or *Cachmonæus*, a Family Name, 1 *Chron.* xi. 11. va wise Man, a Teacher of Wisdom.” Those skilled in all the Branches of the Knowledge of Nature, LXX Σόφῳ, a wise Man. What this Word alone meant is explained at large, but may be best understood by the compound Word *Philosopher*. יודע *Endued with* or skilled in, בינה *Understanding* (These Sciences or Practices were all forbid, except upon this Occasion) *M.* “Understanding — the Faculty of the Mind is to be understood here — perceiving and discerning what ought to be done, and what not.” — *Ibid.* 12. *Hiram* gives the Epithets of חכם and שכל, and בינה to *Solomon*: *Hiram* had no Occasion for שכל the Word applied to the Tree in Paradise. LXX ἐπιστήμη Knowledge, αὐτοφρόνησις Understanding, and he makes this farther Distinction; the Qualifications in *Solomon* were all to build the House for the Lord and himself. The two in *Hiram* made him skilful to work in the sorts of Matter mentioned, which were each employed by the Heathens in representing the Actions and Conditions of the Air, and therefore

therefore were also to be used in the Temple of God. Among the rest this נחש Brafs. *M.* “Incantation, Divination, Brafs, Serpent, Fetters.” LXX. Χαλκός *S. T. t. p.* iv. c. 375. what the Mixture, or Colour was does not clearly appear, only we know that any Composition with Copper in the open Air will turn blue. And it appears both in the Hebrew and Greek, that this matter was so much used for Emblems, that it’s also used for Beasts, Birds, and Figures they used in Divination, and for the Act itself.

And he was qualified, 2 *Cbr.* ii. 14. פתח (*M.* “to Engrave, Carve, or Emboss.” &c.) פתוח (“Sculpture, Picture,”) to *Grave any manner of Gravings.* γλύψω — and חשב to *find out every Device.* *M.* “Imagination, Reasoning, Philosophy, LXX. διανόησις — this was to form Things from Ideas in the Brain, which had no Existence before, and what the Hebrew Text calls *Imagination*, the Greeks called *Reasoning* or *Philosophy*, at least till after Christ.

The sacred Writer when speaking as he was inspired expresses the thing to *Hiram*, who was endowed with these sorts of Knowledge, 1 *Kings* vii. 14. *to work*
all

all Works in Brass, and he came to King Solomon, and wrought all his Work.

The word לעשות *to work*, will make a shift, but מלאכה *work* something better; in Latin *Opificium* will not do. What the word is you will find explained in my second Part of *M. P.* p. 94. &c. And the LXX. by ἔργα, or ἔργον comes not much short, as appears under that word *S. T. t. f. c.* 1227, &c. and 1237. “An Engine or Crane, Energy, Action. To be in Action, to work, do, perform; in *Vitruvius* it is a sort of a Crane which stands upon a Basis of its own, * and is turned round by Men pushing against it with their Breasts and Arms.” And as he is said to make all the מלאכה of *Solomon*, it will appear by the sum of his Work, that he meddled with none but such as were Representations, and so called by the same Names as the Originals.

I hope these Patterns will not be taken to be like the idle Imaginations of Men, and besides what is said of the Wisdom of *Moses*, *David* and *Solomon*, the Experience and Skill of *Hiram*, who was only employed about such Works as this, and about this in Chief, I hope it will be remembered

* The working part of the Machine.

that *Moses*, *David*, and *Solomon* were inspired, and so capable of Receiving and Understanding a Pattern, and of executing the Work according to the Pattern. And besides that the Pattern of the first Temple infinitely exceeded that of the second, which is wrote in *Ezekiel* for the Reasons aforesaid, the latter would come short of the Pattern of the first Temple, because those who were to execute it, were not inspired, as I hope it will be remembered, those who executed the first, and as the sacred Writers who describe them were.

I need not labour this Point, nor load it with abundance of Evidence, but only give proper Hints to lead others into the Search of the Knowledge of the System: these Instances will draw in all Men, who search after Knowledge, and are not for making it themselves to compare the Evidence in Writing and Things, and to collect the other Evidence, which prove every Article in it.

These Figures of Brass are not to be considered as *Hiram's*. If he who was the Workman had only had the Plan, and wanted *Solomon* who was inspired to set him right, had made some small Mistakes in his Work, those could not have been imputed to the Plan, which was infallibly perfect:

perfect: So this Description is not mine; if I who am but the Construer err in some small Points in construing the Words, so in representing the Things, I must bear the Blame for these Defects.

The Descriptions in the sacred Writings were at least intended to give *general* Ideas, if not to the smallest Circumstances, and are perfect; if I come near, that is sufficient to excite others to perfect it, at least I hope this weak Performance will prevent Men from setting up our modern Philosophers, and the Mushrooms they sprung from, nay even the eldest of the Heathen Writers for Inventors of Descriptions or Types of this System, or of the Powers, Operations, Motions or Courses in it: And that whatever Allowance be made to the modern Heathens, that the Men who lived where there were Bibles, and who had but once seen in the Translation, nay even heard, that the Creator of the System had given an Account or Description of it, and understood not a word of the Language it was wrote in, or ever had attempted to learn, or consider a Word of it, and took upon them to ridicule that Account, and set up Descriptions out of Dreams of their own, will (as long as any Memory of them is preserved) be reputed even by the

the Vulgar, as the impudentest Creatures that ever were born.

In my Progress I must take in each relative Sentence from the several Texts where they are mentioned, because some of the Descriptions are in Variety of Words, and in one or two seemingly different from others of the same Thing or Things.

I shall use the *Polyglot* interlineary Version, because in that the Order of Words is most correspondent to the *Hebrew Text* *.

1 Kings vii. 15. *And he cast two Pillars (Columns) of Brass. v. 41. two Pillars. 2 Chron. iii. 15. and He made before the House two Pillars. iv. 12. two Pillars. Jer. xxvii. 19. the Pillars. lii. 17. Pillars of Brass.* He first begins here with a Description of making the Parts, or of casting them. יצר "to fashion or cast." This is a Power of the Air, to which they had a Temple in *Canaan* explained in the second Part of *Moses's Principia*, p. 328. applied to melted Metal, its compressing and so fixing the Parts. — This is applied not only to natural Things but to Fictions,

* But the EDITORS, according to the *Proposals*, have translated the Texts into *English*.

or Representations of them, LXX. *Χω-
ρεύω*, *S. T. l. 4. c. 480. conflo*, that is, to
melt: But the *Hebrew* Word as all the
rest is proper, presupposes all the former
Parts of the Action, bringing the Brass,
putting it into a Furnace, melting it,
making Moulds, and letting it off into
them, and is only the last Act of the Air
binding and so hardening them in that
Form. And the Action of this Agent,
where Man sets the Agent to work, is
attributed to him: But as the Heathens
knew this to be the Action of the Fire
and Air, perhaps thence the molten I-
mages were more sacred, and this Word
cast, is applied to every subsequent Figure
he made.

Two Pillars. *מז* was the Name given
to each of the two Appearances of Fire
and Cloud in the Wilderness, explained in
M. Principia, Part second, *p. 190, & seq.*
The Word signifies a *Supporter*. If these
two be taken generally or as the first Order,
they signify, as will appear by their Names
hereafter, the Light going out, and the
Spirit coming in, which support every
Thing, Action, or Motion in this System.
If taken with respect to one moving Orb,
the Light going out and the Spirit coming
in, support it at near the same Distance
from

from the Centre, which is called by another Name, *the two Orders*. — If taken with respect to its Motion, (the Light striking against the Orb, and the Spirit pushing into it) the Light upon this Orb supports the Motion, LXX. *σύλας*. — If this were to be taken in the Sense they give of the Word *σῆλη*, *stelæ*. *S. T. t. f.* c. 1805. “*Pliny* says the *stelæ* were of Stone; with unknown Characters upon them — The Columns of *Hercules* and *Bacchus*, which they set up in the utmost Parts of the World, as the Bounds and Monuments of their Labours — Such Pillars as are in publick Buildings, as the Treasury.” If this be taken as *σύλας*, 1809. Indeed *Chrysoptom* understood the Word, made *St. Peter* and *St. Paul* Supporters of the Church, but they have endeavoured to hide that by a Metaphor, and they have confounded the Word into a Term of Architecture; even those in the Temples, as much as those Texts have been confounded. The Heathens not only used such Columns in their Temples, to represent these Powers, but this Number two supported *Dagon's* Temple. And *Hieroglyph. Ægyptio-gærcorum*, p. 232. from fundry, “at which places *Hercules* erected two Columns, as the Bounds of his Labours,

bours, one of which he called *Calpe*, the other *Abyle*, and he put them at the Extremities of *Lybia* and *Europe*; as *Bacchus* sat up two Columns in the *East*;" where such stood we shall shew in its Place.

Whether 'twas this Number, or the Convenience of seeing all the Parts of the Universe, which if whole or in one, must have been covered, as the Original is, with a partly opaque Case, I determine not; but I think it appears that a Hemisphere, or as three to five which would take in or cover from each Pole to about the further Side of the Ecliptick of the outmost Case or Sphere with the fixed Stars, and the Sun with all the moving Orbs, their Courses and the rest of the Guts in it, was placed upon each opposite Supporter, with their Mouths open, and opposite to each other, so that every one who went in at one Station might see the whole in each, but more particularly the Parts of the Courses, &c. which were least visible in the one, the most openly in the other.

1 Kings vii. 15. *Eighteen Cubits* was the Height of one Column; and a Line of twelve Cubits did compass either of them*

* This is taken to be the Cubit of the Sanctuary, and to contain about twenty eight of our Inches.

about. 2 Kings xxv. 17. Eighteen Cubits was the Height of one Column. 2 Chron. iii. 15. Two Columns of thirty and five Foot high. Jer. lii. 21. The Height of one Pillar was eighteen Cubits, and a Fillet of twelve Cubits did compass it; and the Thickness thereof four Fingers, it being hollow.


Whether these Numbers of twelve, twenty four, eighteen, or thirty six, refer to the Numbers the Heathens gave to their Signs or Horoscopes, or those Numbers of Measures used in their Columns, or that they were to be proportionably magnificent to the Parts of the Temple, or that the Figures might each of them be made so large that they might last as long as he who gave the Pattern knew the Temple would stand, and therefore be properly placed at that Height, where they might be more perspicuous, where the Parts might be distinctly seen, and afford a proper Representation, and a more perfect one than when the Eye approached so near, as to see the Imperfections in working.

No Doubt these Columns were of a proper Diameter, proportionable to their Height and to the Diameter of the Work or Shell, which was to stand upon each, and the Thickness of four Fingers was not too much to support itself, and the vast Weight
C 2 upon

upon each, and against the Hold a stormy Wind must take of Things of such a Diameter.

Whether these are expressed to be hollow, which could not have been otherwise moveable, to determine the vast Quantity of Brass in them, or other smaller were made hollow to represent Columns of Air which supported the real Things, of which the Shell supported only the Emblems, and these represented the Supporters of the two Hemispheres, by the Columns of Air within, or both, is not of great Consequence; but in the Spheres placed upon them, the Airs between each Circle represented the Sphere of Air, or as they called it, the Heaven in the System. There is a Difference in the Descriptions: Each of the Columns in three Places of Scripture are said to be eighteen Cubits high, and in one Place where their Length is counted together, they are said to be thirty five Cubits. As every Part of Scripture is infallibly true, no Doubt the seeming Differences are wrote with Design to excite our Attention, and if examined till they be understood, discover each some important Truth, which in a single Description we might have overlooked: Here each of the Columns must be of Course shorter on one Side, than

than on the other, and from one Side to the other concave, fitted for the under Side of each Hemisphere, to rest in every Part upon each of their respective Tops in

this Figure ; so that if they had been

laid on the Ground, and each longer Side joined to each shorter Side, it may be demonstrated, that together they could make but thirty five Cubits, a Cubit shorter than each measured to the Height, and the Measures put together would make.

As I have in general laid down, that every Thing about the Temple was in Opposition, or to reclaim the Sovereignty of those Powers, attributed by the Heathens to the Heavens, before I proceed; besides what I have said about these two Supporters, it is proper to shew, that they had something upon the Heads of Supporters, before the Entries or Doors of their Temples. Amos ix. 1. *Smite הכפתור the Sphere, and let הספים the Posts shake.* M. כפתר "a Globe, Sphere." C. Of which Sort they adorned the Pinnacles of their Temples and other grand Buildings with." This *Hebrew* Word is only used for the six Parts upon the Branches of

the Candlestick, which they call Knops, in this and one other Place upon this Occasion. 'Tis a compound Word of כּפּף and תּר or תּור. The Word כּפּף *M.* "Curve, Bend." &c. *Jer.* lii. 18, 19. as we now use it *Cap, Cup*, Part of a Sphere, or Circle. *Job xxxvi.* 32. it is used for the Hemisphere or whole Sphere; and תּר is an Attribute, as shewed in my second Part of *M. P.* p. 503. a Leader or Driver of the Orbs in Spheres or crooked Lines: —In this Place the Emblems of those Powers, Actions, and Courses. סּפּים *Posts* *M.* is always used for an hollow Vessel, or for a Porch; tho' variously translated, Posts, a Threshold, &c. and ought to be here an hollow Shell or Covering above the Door and before the Porch. *Isai.* vi. 4. and תּמוּת of הַסּפּים *moved.* LXX. ὑπέρθρον, "Lintel of the Door." This Word (תּמוּת) is but this once used under this Sense. *M.* "It signifies Motherhood, "Mistress of the Family, a Cubit." This is some general Name, as the Heavens was Mother of the Gods. *Rabb.* אמוּם *a Type.* —That these were to these Uses, *Ezek.* xliii. 8. in setting סּפּם *their Shell* by my Shell, and מוּזוּתם *their Post* by my Post, and הַקּיר *a Wall* between me and them, and have defiled my holy Name by חוּעוּתם *their*

their Abominations that they have committed: wherefore I have consumed them in mine Anger. — In these Parts of the Candlesticks כפתר LXX. σφαιρωτήρ. S. T. t. 3. c. 1150. “σφαίρα, *Sphæra*, a Sphere or Circle. 1161. σφαιροειδής. Since Heaven is found — like a Sphere or Ball. 1162. σφαιρικός, *spherical*, what Things are seen and known to be in a Sphere.” Hence the Heathens had their Play with Spheres, and Places to play in, which was one of their *Olympick Games*. In this Text, *Amos ix. 1.* the LXX. have used ἰλαστήριον, *Propitiatorium*, or Mercy-seat, which is the Word for כפר, and is a wilful Mistake, not intending to shew what it was, but that it was some Emblem of their Religion, which being so placed would make the Heavens propitious. In the only remaining Place where כפתר is used, *Zep. ii. 14.* *The Cormorant and the Bittern shall lodge in כפתריה the Spheres thereof; their Voice shall sing in הלון the Hollow; Desolation shall be in סף the Shell, for the Cedar shall be uncovered.* LXX. Φάτνωμα. The Lexicons give us no Idea of this Word except *Ceiling*, and they use the same Word for סף and ספן; they were some Things which consisted of Cieling, Arches, Circles, &c. and were something more

than a solid Sphere or Globe, because Bit-terns, &c. could build within it. *Amos* ix. 1. קַדְמֹן LXX. Πρόπυλον, *Vestibulum*, *Porch*, *S. T. t. 3. c. 612*: “which is before the Door; a Place between the Door and the Road. *Pollux* — The Entrance of the Temple.” *Ezek.* xliii. 8. LXX. Πρόφυρον, *S. T. t. f. c. 1615*. which is before the Gate, the *Porch* — *On the Porch of the Temple*, *S. T. Vestibulum* is so called, says *Servius*, either because *Januam vestiatur*, as we see a Room supported by two Columns, &c.” Whatever מזוזות *Posts* signifies, it's very likely some Things were done there by the Heathens, because the *Israelites* were to dash the Blood upon them: In their private Houses they were to write upon them*. Those in the Temple were to be of such a Species of their sacred Trees, of such a Figure, &c. of which more under the respective Words in the Text.

1 Kings 7. 16. *And he made two בתרות to put upon the Heads of the Columns, of molten Brass.* 2 Kings xxv. 17. *and בתרת upon it of Brass.*

* See *Exod.* xii. 7. §. xxi. 6. *Deut.* xi. 20. *Prov.* viii. 34. *If.* vi. 4.

Before I proceed I am to observe, the Emblems I am going to explain are mostly of two Sorts; first the Agents or efficient Causes and their Courses, under the Names of Columns, Orders, &c. secondly, the Courses or Circles the passive Orbs are placed and moved in, which are as one may term them the Effects.

כתר *M.* “ It signifies a Crown, Compass, Circuit; as a *Verb*, to go round, encircle, &c. *Chaldee*, the same; *Syriack*, Daily; *Rabb.* The chief Property of the divine Name. *B. C.* iii. כותריתא a Palm, Chapter, Tops resembling Crowns, or something round*. *LXX.* Επιθρημα. *S. T. t. 3. c.* 1474. “ Θρημα is said to signify also the Planet of one’s Nativity, and Horoscope, that is, an Instrument which the Mathematicians make use of to observe how the Heavens stand affected, and the Stars are situated at one’s Birth, &c. *Vitr.*

* *Boderino Lex Syr. Chald.* “ Hence כתרא a Crown, Diadem, Chaplet: *Ifai.* xxviii. in the Plural, כתרין Crowns. *Deut.* xxxi. and כתר in their more secret Books, is the utmost Measure or Property of the divine Name אהיה which flows into nine inferior Numbers. In the Gates of Light, in the Gates of Righteousness, *Tikum Hazaker*, and the like. כתריא also are Ribbands, Garlands, *Ifai.* iii. and כותרתא the Figure of a Palm. *Ezek.* xl. *Kimchi*, Chapters. *R. Schel*, Spheres.

lib.

lib. i. cap. 2. *Decor perficitur Statione*, &c. “Beauty is perfected by *Station*, which in *Greek* is called *ἑμαλισμὸς*; or by Custom or Nature; by *Station*, when Buildings are set up in the open Air to *Jupiter*, *Thunder*, and *Heaven*, and to the *Sun* and *Moon*.”

S. T. ibid. “The *Lintel* or upper *Door Post*. 1478. *εὐθμησοσύνη*, when every Thing is put in its proper Place; and disposed or sorted in Order neatly and exactly. *Hesiod* 1481. *ἀναθήνημι Bud.* to hang up, or fix up an Image. *Plut. in Themistoc. Demost.* The *Latins* sometimes say to *set up*, (*statuere*) and sometimes to *fix up* (*figere*) *Trophies*. *Herod.* to dedicate or consecrate in the Temple of *Juno*. 1483. *ἀνάθημα*, a Gift which is dedicated or consecrated — Ornaments in Temples, they are, says *Macrobius*, Shields, Crowns, and such Sorts of Gifts, nor are they dedicated when the Temples are consecrated at first — but *ἀναθήματα* are properly those Gifts, which being dedicated to the Gods, were hung upon the Walls and Columns of the Temple; or hung down from the Roof*.

1497.

* The Reader will excuse the *Editors* for observing, that what is rendered 1 *Sam.* xxi. 9. *The Sword of Goliath* [תִּלְגַּם the Taker of Captives] *wrapt in a Cloth*,

1497. ἐπιθήμι to devote or consecrate himself to the infernal Deities. ἐπιθήμεις, as (*Lorica*) a Parapet or Penthouse is built against the Tops of Buildings and of Walls." Ἐπίθημα, "That which is put upon a Thing, or set against it, a Cover." *Pausan. in Achaicis*, "an armed Man was put upon a Monument; and again, even to my Time there stood a Column which was placed over a Tomb. — It is also a Cover or Lid." ἐπίθεμα, the same as ἐπίθημα, a Statue, Column, or some such Thing which is placed upon the Tombs of the Dead; or erected, or instead of a Cover." *Pausanias*, a Cover or Lid, which any Thing is covered over with," when celestial Powers were attributed to the Figure of Man, or to real Man, by putting such a Symbol upon his Head, as ἵσθρα περιθήμα. "Herodian of the Calends of January, Book I. — They put on a fine *Prætecta*

Cloth, should have been, the Sword hanging or pendant by the Spoils, the Armour of *Goliath* as a Trophy in the Tabernacle at *Nob*. חל rendered *to wrap up*, is to hang like a Drop, pendulous; and is used for one of the Gums or Distillations used in the sacred Ointment, or rich Perfumes they made their sweet Odours with; and so *Jer. xliii. 9.* מלט מלבן is not the Clay of a Brickkiln at the Door of the Palace of a King, but an *Incense Altar* in (perhaps) a Portico built of white Bricks, as *Babel* was.

Prætexta (a white Robe with a Facing of Purple upon it) for the Year; and Book VI. and put a Crown about them, or even put one upon them." *Ibid.* "Aristotle of the World," "Another having brazen Feet puts an Helmet upon his Head, and a Girdle upon his Loins — and in *Xenophon*, who put a Chain round his Neck; *Torquatus*, one wearing a Collar or Chain, &c."

I Kings vii. 30. Κεφαλῆς, (*Cephalis*) S. T. t. 2. c. 151. *Camer.* in *Plat. Timeo*, "says it is applied to the Beginnings and Top of Things." 152. Βαρυκεφαλῆ — "but in *Vitruvius*, Book III. chap. 2. *Barycephalæ**, they are thought to be Buildings, so called, he writes, because their *Fastigia* (either Tops, or the Temples built on their Tops, raised in Form of a Pyramid,

* "A very odd Account this, that Buildings should be called *Heavy Heads*, because a few Images stood upon them, for so they construe the Word, *Barycephalæ*. There is little Doubt but the Antients meant by them Buildings whose Heads or Tops had Representations of *Glory* upon them; the Word for *Glory and Gravity* of old being the same, and *Glory* the Cause of *Gravity* still; and their sacred Edifices were consecrated and made for Figures to describe the Natural Agents; and the Heads of these Buildings were the most sacred Parts, where the principal Figures stood, their Heads had the *Glory* on them; and thence so named.


Ainsworth's

Ainsworth's T. L. L.) were adorned with Figures made of Earth or Brass, gilded over, and so were as it were made heavier by these Images being upon them." 153. "Pliny, the Top of the Palm-Tree." 155. Κεφάλωλον, "No Doubt from the Chapters which it had on it, in the Shape of Ants hanging in Clusters, *Gorr.*" 156. Κεφάλιον, *Diosc. lib. iv. cap. 150.* "Pliny says it is from a bulbous Plant, wrapped with Coats one upon another, its Root fibrous like Onions*." 157. "The Summary or Heads of the whole." 159. "Cephalus besides is the proper Name of him, who is imagined to have been in Love with *Aurora.* *Jer. lii. 22. LXX. Γείσ,* The Eaves of a House, *S. T. lat.* (confounded by *Vitruvius's* Description) The Chapter of a Pillar. *Varro 3. de Rust. cap. 5.* At the Entrance into the House, at its Sides to the Right and Left, are Porches on the antient Stone Pillars, set with low Trees between them; and as the Porch is covered with a Net from the Top of the Wall to the Chapter, and from the Chapter to the Pedestal, they have all Sorts of Birds in them. There is a great Deal

* Which shews what the *Israelites* meant by lusting after the Onions of *Ægypt.*

about the *Epistylia*, Chapiters, in *Vitruvius*." This Word is used for something upon the Bases of the Seas, 1 *Kings* vii. 31. LXX. γλύφη, a Cavern, "Sculpture, Engraving, (*apud* LXX. *interp.*) when it is spoke of Idols," it means an Emblem. *Esth.* i. ii. LXX. διάδεμα, *Diadem*, *S. T. t. f. c.* 963. ἀνάδημα *Anadem*, "What the Head is incircled with, a Crown. *Eurip. Hippol.* 964. What was on the Head, but was particularly spoke of the royal Head-Dress, *viz.* a Sort of Ribband or Fillet according to some." The Verb's Usage, *Jud.* xx. 43. LXX. Καλακόπησθε ἔργον. *Interlineary Version*, circumdederunt, *they enclosed the Benjamites round about.* *Psal.* xxiii. 13. περιέχω, *S. T. t. i. c.* 1318. "ἔχω is put for περιέχω, to encircle, surround." 1343. ἔποχη is also the Place of the Planets in the Zodiac, or State of Heaven, and Position of the Stars. *V. l. Hermol. in Plin. et Cael. lib. i. cap. 15.* 1353. περιέχω, to surround, environ, go round, — The Air which goes round; or the Air Spread round about us, or diffused every Way. περιέχομαι to be surrounded as a Man is by his Satellites or Servants — *Herodotus* — ἐμπεριέχω *Aristotle of the World* — those Stars which are contained in the Circuit of the Air, or are in the Air. συνέχω,

ἔχω, Firmament;” that which encom-
 passes and compresses, &c. every Thing, of
 which sundry Citations in *Kircher’s Con-*
cordance. 73 I Sam. ii. 32. *The Firma-*
ment. Prov. xiv. 18. κραίεω. S. T. t. 2.
 c. 402. κραλαίω, “strong—whence κρα-
 λαίωμα the Firmament,” of which see the
 Attributes—πανκράτις, *omnipotent*; παν-
 κράτιον a wrestling Match.” 411. κραίεω
 “to get the Power, to command, to be
 Lord, also to be Master of, &c.” μένω
 the same Signification. 885. also ἀερό-
 εὐμένεια, the Mildness of Heaven; *Virgil*,
 a mild Air: a Station in *Theophrastes de Caus.*
Pliny lib. ii. cap. 17.” but it is the bene-
 ficial Force or Impulse of the Airs; from
 this Root also several of their great Gods
 took their Epithets as follows. They use
 κραίεω *Psal.* lxxiii. 6. for קַנָּו “to wear a
 Collar or Chain about the Neck.” *Hab.*
 i. 4. LXX. ὑπερίσχω, S. T. t. 1. c. “to
 prevail by Strength against.” *Job* xxxvi. 2.
 LXX. μένω, S. T. t. 2. c. 877. “*Ari-*
stotle from *Hesiod*, bearing and sustaining
 the Tempest.” *Psal.* cxlii. 8. LXX. ὑπο-
 μένω, to sustain. μένω is also used for קַנָּו,
 which I have shewed is to support, sustain.
 They also use διάδημα, (*Diadem*), for
 קַנָּו, so σέφανος, κίδαρις, (*a Cap, or Turban*)
 μέτρα, (*Mitre*) διπλοῖς ἔνδοξος, *a Cope which*
 the

the Priest sacrificed in, of Glory. S. T. t. 1. c. 1037. and εἴφαν  for עטרת, *S. T. t. 3. c. 1022. "to crown."* 'Tis evident from the Meanings of the several *Greek* and *Latin* Words used, that this Word כתר is a general Word for and signifies this System; the same as we now express by the Word Spheres, &c. and this set upon the Supporters in two Parts or Hemispheres, was an Emblem or Representation of it or them.—By the Fire at the Orb of the Sun as the Head, and the several Spheres which encompass it, divided each by the Circle which each moved Orb describes or is rolled in its Course about that Head, and as the Word כתר used as a Verb, and the several Verbs used for it express, to encompass with Force, Power, or *Impetus*, so as to prevail upon, to rule or govern; and as the Heavens or Spheres are by their Motion possessed of Powers to rule and govern the Orbs, and as the Manner was and is by moving and keeping each in its respective Course, it expresses the Subjects they rule, the Manner how these rule, and the Order in which those are ruled: And as the Princes, Princesses, Priests, &c. had each an Emblem of, or of an Hemisphere, of this, composed of a Cap with Circles with bright Stones in them, with

3

Rays

Rays or Horns from the Head to them, placed upon their Heads, and from the Part it was placed upon in common Acceptation took its Name of Crown; (though that is a Corruption of the *Hebrew* Word קֶרֶן the Rays which the Heathens represented by Horns, by which the whole is governed, and has been represented by what we call a Garland) A Crown was the Emblem of Victory, Power, Rule, in the Person wearing it. Indeed among the various Sects they were represented of different Sorts of Matter, and also perhaps from the different Orders, different Degrees of the same Order, some of Gold and pretious Stones, some of fine Cloth convolved or rolled about their Heads; some of Garlands with sacred Boughs, Flowers, &c. but they were all to the same End. And as these *Greek* and *Latin* Words are used for these emblematical Representations, set up before the Gates of the Temples of the Heathens to the Heavens, and thereby what they represented were attributed to them: Whether this System and the Powers, &c. in it, which had been so dedicated to the Heavens, (as it was placed by God's Direction before his Temple) may be said to be dedicated or attributed to him, or whether they

ought to be termed Trophies, as *Tretzes apud Lycophronem, Pausan. &c. cited S. T. t. 3. c. 1617.* says they were first erected to and for the Honour of 'Ηρα and Zeus, (*Juno and Jupiter, or Spirit and Light.*) [the two opposite Motions of the * Heavens] for the Benefits received from them, or as the Word is accepted, as Trophies of God's late Victory over these Powers, let the Learned settle.

But further, the LXX. use the Word *επιθημα*, which they use for *כתר*, also for *תניפה*. *M.* "Elevation, a Dropping; to move every Way. *C.* Some Sacrifice was moved every Way, towards the East, West, South and North, to shew that Sacrifices ought to be offered to the Praise of God in all Parts of the World, as the old Hebrew *Menach, 61, 62.*" *Zant. Pagn. 1558.* "Agitation, &c. *Syr.* bent, inclined, nod to, *Ar.* some Idol. a certain City in *Ægypt.* *1 Kings* iv. 11. *Jos.* xi. 12. and xii. 23. xvii. 11. *Kirch. Concord.* *נוף* to move any Thing every Way; *תנופה* something so moved, the Offering to be moved about, which was moved here and there, up and down in the Sacrifices." They also used for this Word *ἀφαίρεμα* *S. T. Gr. t. f. c. 191.* they are the Parts which were taken from

* So Second and Third Persons,

the Sacrifices. — *Greg.* the same, of the *Law of Moses*. For this they also used ἀπαρχή, (*First-Fruits*) *S. T. Gr. t. 1. c. 557.* ἀπαρχομαι, says *Budæus*, to pay the *First-Fruits*, or gather them. “*Herodotus* also, to make a *Drink-Offering*.” and many more.—This Motion was to be given to the *Gold*, the *Brass*, the *Sheaf*, the *Oil*, the *Bread*, the *Lamb*, and the *Parts of Creatures* offered to *God* in his *Temple*, which we translate *WAVE*, and was an *Action* of attributing the *Motions* performed by these *Agents* or *Powers*, (and had been attributed to them) to *God*, as ׀ was of the *Heave-Offering*. Whether these were each waved round seven *Times*, as the seven *Orbs* are moved, or also as the *Waters* circulate, and also up and down as the *Vapours* rise and *Rains* fall, for which the *Word* is also used, appears not. But there are several other *Precepts* about it. It was also used for the *Motion* of the *Hand*, and so acknowledging, that his *Hands* reach every *Way*, and to every *Place*. *2 Kings v. 11.* *Naaman* was wroth, because *Elisba* did not use this *Motion*, as it's plain he must know others had done; as we render it, strike his *Hand* over the *Place*, and recover the *Leper*. And *Jer. iv. 6.* *Noph* in *Egypt* (where it

is like there was a Temple to these Powers with this Attribute and these Services) was threatened to be destroyed.

Instead of כתר 2 Par. iii. 15. is used the Word הצפת LXX. $\mu\epsilon\phi\alpha\lambda\iota\varsigma$, *Lat.* Operimentum. (a Covering) κεφαλις was applied to כתר as is explained there; and Operimentum is only a general Word, determines nothing till it be shewed what Sort of Covering it was. C. צפף Syr. *Series, Ordor.* BB. Ar. Orders of Angels, when any Thing is put in right Order, &c." This Word is used 2 Par. iii. 6. in a Description of the Temple which was an Emblem of this System — *lat. and צף covered (English garnished) the House with pretious Stones for Glory, and the Gold was the Gold of Parvaim.* This could not be covered, because it was not covered with pretious Stones; they were to be put in such Orders, as emblematically to represent to View the bright Orbs and Stars, the Gold to represent the shining Heavens. LXX. Κοσμέω, *S. T. Gr. t. 2. c. 391.* "to reduce a confused Heap into regular Order; thence, applied to the Formation of the World, see *Budæus, p. 792.* As *Anaxagoras* writing of the Nature of the Gods, was the first who would have the Ordering of all Things, and the World to be
designed

designed or planned by an infinite Mind and Reason; and elsewhere all this Disposition of the Stars, and this regular Furniture of Heaven, &c.” *M.* צִפָּה “to conceal, put a Covering upon.” *Numb.* xvi. 38, 39. *a Covering.* LXX. *περίθεμα*, a Hemisphere, the same as they use for כֶּתֶר, and so all their Images were covered with Gold, the Emblem of the Heavens or Light. *Coc.* “to put a Covering of Plaster on any Thing, give it a Look and Face. — צִפּוּי, a Covering, a Spreading over, כִּי צִפָּה covered, hid, concealed, צִפָּה to look, observe. צֹפֵה a Watchman, or Observer. *plur.* צֹפִים.” LXX. *Σκοπι*, *S. T. Gr. t. 3. c. 824.* a Watch or Observer; one who from a proper Stand, watches and catches Tunny Fish.” *t. 1. c. 1455.* *ηλιοσκοπι*, “one who crowns his Head with the Sun: *Helioscopium* in the same *Pliny*, Book ii. *c. 21.* is a Species of the Sun-Flower, or Heliotrope,” (turning to the Sun) 1455. *ηλιοτροφον*, (*Eliotrophon*) by some is called the great *ηλιοτροπιον* (*Eliotropion*) the Turn-Sol, or Sun-Flower of *Celsus*. Some Sort of a pretious Stone, according to *Pliny*, a Sun-Dial, an Instrument to observe the Hours by; or Place in which the Hour of the Day is told by the Sun; a Dart, or Quill casting a Shadow, which went round

with the Sun." *Athen. lib. 5. (B. interp.)* on the Roof a Sphere or Globe, in Imitation of that Sun-Dial which was at ——" From the Mistake of שמש for the Orb of the Sun, the Moderns have mistaken ηλιος, (*Elios*) the Rays going out and returning, for the Orb. *S. T. t. 1. c. 1454.* "The Heat of the Sun, *v. l.* from *Thucydides*, the Antients derive it from αλς, as *Eustathius* says; for in the *Doric* Dialects ηλιος is called αλιος," which I think is the same as *λς. t. 2. c. 1543. μεσερανιος*" in the Middle or Navel of Heaven, as *Gaza* interprets it, μεσερανε αυτε τε ηλιε, the Sun passing thro' the Midst of Heaven," which is the Center of Heaven within, the Rays of the Heaven going out from, and returning to the Orb of the Sun. So *S. T. t. 1. c. 129.* "αηρ (*plur. Aëres Vitruvius*) is derived from αω to breath, blow — *Plato*, either because it is always flowing, or because Spirit arises from its flowing."

In another Sense as they took the Heavens for Gods and Inspectors of their Actions, as *al. c. 829. Lucian*, "the Gods look down upon the Earth, &c." Hence all the Expressions of *Aleim* for God, Prophets against their Inspectors, of himself inspect-

inspecting, &c. against the Inspection of the Heavens.

מִצְפָּה “An Observatory, a Place on high. צִפְיֹת a *speculum*,” I think, the Aspect or Prospect, as *Isa. xxi. 5. Watch in the Watch Tower*, but it is to observe the Object, v. 6. *what he seeth*. So *Ezek. xxxii. 6. צִפְתָּךְ* lat. *of thy Swimming*, M. “of thy Speculation,” Syr. “of thy Watch Towers.” But the Text says, *I will spread over the Face of the Land a Covering or Prospect of thee, of thy Blood, to the Mountains, and the Rivers shall be filled with thee*; and here in the Text it was the Emblem of that which covered them, and was the Object of their Observations. צִפְּן *Abfconſio*, is used in *Ezek. vii. 22.* for the S. S. and signifies Inclosure, inclosed, &c. so secret, and the North, so called as it is hid from the Sun.” But that is not true, because it is but one Part of the Year so; but I think because it is always covered with Snow and Ice; and *Pharoah* called *Joseph* צִפְנָה פִּעֲנָה *The Revealer of the Secret*. Hieron. *Lingua Ægyptiaca*, “in the Ægyptian Language, Saviour of the World.” So בעֵל צִפְּוֹן *an Idol*, the Spirit, the Ruler of that which covered, inclosed them, of the Heavens. See *Trinity of the Gentiles*. p. 302—304.

1 Kings vii. 16. קומת *The Height of one Chapter (Sphere) was five Cubits; and the Height of the other Chapter was five Cubits.* 2 Kings xxv. 17. *And קומת the Height of the Chapter three Cubits.* 2 Par. iii. 15. *And ארך in Length, and העצבת Operimentum, the Chapter on their Top was five Cubits.* Jer. lii. 22. *And קומת the Height of one Chapter five Cubits.*

Here is another seeming Difference; two Descriptions which say that קומת of the Chapter was five Cubits, and one that says קומת Dimension, Extent, (with Regard to Position of up or down) was three Cubits, and one that says the *Operimentum* was five Cubits ארך *long*; these seeming Differences as I have shewed in the Length of the Supporters, serve to explain, &c. — It is true there is a Difference between the common Cubit and the Cubit of the Sanctuary, about as three to five, but this I think is not the Case here. There seems a Necessity from the Number of the Parts, and the Height of their Situation, that the Dimension should be by the longest Cubit, that the Parts might be distinctly seen: Indeed one might suppose that the first and last Definition of כתר *Coronamentum*, and the *Reticulum*, &c. following, which was on the Circumference,

rence, made it up five Cubits; and in the second that the *Coronamentum* being three and the *Reticulum*, which is next described, and was about it, must be at a Cubit Distance from the *Coronamentum*, and so the Diameter of the *Coronamentum* with the *Reticulum* five Cubits, and perhaps this may be true. But it is most certainly true, that as these Hemispheres were not of equal Dimension each Way, the third Description, which was the ארך, determines that the Extent of each the longest Way was five Cubits, and it must also be true (and indeed so it appears to be very exactly) that the Hemisphere, including the further Tropick, is from the Pole to the Center of the Diameters of the Mouth or Tropick, three Cubits.

Tho' שנים Reticula (*Net-Work*) be next in the first Description, yet גלת rotunda Vasa (*Bowls*) &c. comes in before it in the second, so I must pursue the Order as it arises out of the several Descriptions.—

1 Kings vii. 41. שנים The two Columns, and גלת Vasa rotunda, *Bowls of the Chapters* (Sing. in the Hebrew) which were on the Head of שתים the two Columns, and שתים the two *Net-works* to cover שתי the two *Bowls of the Chapter* (Sing.

(Sing. in Hebrew) which were upon the Heads of the Columns, and the Pomegranates, &c.—*שתי* the two *גולות* Bowls of the Chapters which were upon *פני* the Faces of the Pillars. 2 Chron. iv. 12. And *הגולות* Orbs, the Pommels, and *כתרות* “the Crowns” Chapters upon the Heads of the two Columns; and *שתים* the two Networks to cover *שתי* the two Orbs, Pommels of the (Crowns) Chapters which were upon the Heads of the Columns, &c.—to cover *שתי* the two Orbs, Pommels of the Chapters, which were upon *פני* the Faces of the Columns.

Here seems a Difference in the Descriptions of Numbers, and the Translators have changed the Numbers; some of our *Lexicons* make from the Word *שנה* to repeat, *שנות* two, *שני* and *שנים* the same, and the *Fæmin.* of it *שנתי* and *שנתים*; and abridged *שתי* and *שתים*, the same; some make *שתה* to drink, the Verb to *שתי*, and perhaps as Drink is the second Support of Life, or as Meat and Drink are the two.—There want some Rules about these, how each is to be read, when *two*, when *second*, when *both*, when *either*, &c. which would spend too much Time here to determine, and form them. But if there were not these Differences to deter-

determine them, as the singular Words are included by and refer to the two Columns, and as each of the Parts were apparently little more than half of the whole, though each had the moving Orbs in them, as they both were designed to represent but one, these גלת and כתר may very properly, where they stand, be wrote in different Numbers.

גלת — גלל. *M.* “ a Globe, or whatever is turned round in a Circle. *Chald.* Heaven, or the Orbs of Heaven. *Syriac* the same.” *C.* גל, “ to roll, roll down,” here, the Orbs. גלגל “ an Orb, Wheel, Sphere. *Chald.* that which revolves orbicularly — hence the Astronomers call the seven Spheres of the Planets גלגלים *Galgalim*. a little Sphere, Epicycle, a Circle within another. *Syr.* Cœlestial Sphere. *Kirch. Concord.* Dan. i. 10. גיל a Planet.” *Them. Gloss. Heb.* p. 238. ἐλεῖς, *Discus*; גלת, *Arab. Interp.* Discus, the Body of the Sun. *S. T.* i. c. 1017.

— 1 *Kings* vii. 41. גלת. LXX. σφαιρῶδες, “ Things that would easily turn about.” *Kirch.* גל a Turning or Bending. *S. T. Gr.* σφῆρω “ to turn, wind, bend, twist. 1079. what will turn or twine, or is turned round. *Iliad.* V. v. 248. *Hesych.* wreathed as a Coat made of Mails, *i. e.*
a Coat

a Coat of Mail. *Iliad.* ε. *Herodotus* the wreathed Collar on the Neck. *Plutarch*, the Mist; the golden Bracelets and Collars lying here and there; also twisted Ropes in Sculpture, as is gathered from the first Book of *Kings*." 1082. στρεφίος*, a Shifter, one who can wind and turn: It is an Epithet of *Mercury*, as *Aristophanes*." 1085. *Pliny*, book xxi. chap. 2. "The Antients made Use of slight Crowns, which they called *Strophia*, Wreaths, thence *Strophiola*; and perhaps these Crowns were so called from their Flexibility; or because they were wreathed or twisted together of Flowers and Leaves, &c." στροφαλίξω, the same as στρέφω. Also στροφάλιγξ, a Turning round, Vortex, Bending, Circle. *Aratus*, of the spiral or winding Line, which *Cicero* thus translates, *in its Course, turns in a shorter Circle within.* Germ. *Cæsar* thus, *for it turns itself short on a Hinge*; Dust which is whirled about by the Wind, and twisted round in Circles." 1090. ἀποστρέφω. *Aratus* — *Cicero*, *but always carries (loca Cœli) the Heavens backwards in a Circle.*" 1090. ἀποστρο-

* *Versutus*, ut quidam interpretatur, qui multas [novit, this *novit* should be *movit*, as the Word and his Name signifies, which makes them make several Conjectures] movit στρέφας: Epitheton est *Mercurii*.

φία “one of the Names of *Venus*.” 1094.
 ἐπιστρέφω “to twist in, twist together.”
Plato — to torture, vex; it is construed
 also to *attēret*, to carry along; “Hence
 sprang our Mistake about *Attraction*,
 which is no more than that Action of the
 Heavens upon an Orb, explained above by
Aratus. c. 1090. 1097. Καταστρέφω, *Plu-*
tarch in *Sylla* — the Day turning down and
 inclining to Night.” 1098. περιστρέφω,
 “to turn about, turn round, turn in a
 Circle, or over and over. *passive*, to be so
 turned. *Aratus*, as above, from *Proclus*
 on a Sphere — describes a Circle.” 1099.
 συμπεριστρέφω “to turn round together,
 &c.” *Aristotle* of the World, 1101. σύ-
 στροφη “a Turning round or Revolution,
 Convolution, which is orbicular or in a
 Ring, Vortex, &c.” The Imitation of this
 in their *Olympian* Games under another
 Word. *S. T. Gr.* 1. c. 1039. δολιχεύω,
Epigram. lib. 2. — *Philo* of the World,
 which *Budæus* translates, *Natura Curricu-*
lum quasi Circense peragit, Nature de-
 scribes as it were the Ring or Course on
 the *Circus*.

2 *Chron.* iv. 12. גליות LXX. Βασις. —
Interl. γωλαθ. This Word which is an
 Agent expresses the Actions of the Movers,
 as a Patient the Things moveable and

moved, has not escaped the great Mistake of mis-construing some Words it is used for in the Bible, such as the Machine which carries, or the Agents which support the Earth's Motion for Foundations, but has been used in that Sense by some few, such as *Vitruvius* (*S. T. t. 1. c. 636.*) and since they had forgot that Impulse of the Air, and called that effected by it *Gravity*, it has been so construed as at. *ibid. 721.* Βασις *weighty, heavy*, so we must trace it with its Præpositions to shew its true Meaning.

S. T. t. 1. c. 634. “ Βαίνω, *fut. Βήσομαι, perf. βέληκα*, from βάω, to march, proceed, go. *I. c. 6.* nine Years were gone.” 635. Βάσις, “ Step or Going.” 641. ἀμφιβαίνω, “ to walk round, go round, march round.” ἀνιβασις, the Going against, in Opposition to.” 624. αποβασις, “ Descent. In *Isocrates* it is advancing, a Going forth—a Surname of *Jupiter*, whence some Sacrifices were offered [*Hesychius, ibid. 643.*] to him for a safe Passage, [as *Cam.* declares] before an Expedition. *Thucydides, Plutarch in Lucullus, Xenophon.* διάβασις, “ a Passage, passing over, or crossing over.” μετέβασις, “ Transition.” παραβαίνω, “ *Cam.* renders it, to turn and go forward any Ways; others, to turn round, or roll, or

go in a Circle." 654. Βιβασίς " was as *Cam.* relates, a Dance among the *Lacedæmonians*, so called from the Nature of the Dance, coupling, joining; in which they proposed Rewards to those who excelled, Boys and Virgins, &c." *t. 2. c. 1542.* οὐρανβαίνων one who goes thro' the Heavens, or ascends up into the Air, 185." so ἀερόφοιτος, going thro' the Air or upon it. — 133. they commonly construe it, that which mounts up into the Air, and say, it is the same as *divine.* *Ib. t. 2. c. 1542.* Ἔ 1543. *t. 2. c. 1594.* οὐρανιάζειν, " to play the Game called *Ourania.* *Hes. t. 1. c. 1708.* τεθριπποβάτης, one who rides in a Chariot. τεθριπποδροῖται, those who at the *Olympic* and other Games run the Chariot-Races." 130. ἀερόβάτω, and 152. αἰθεροβάτω, the same as αἰθερεμβάτω, to walk or go through and upon the Air, or Æther."

I Kings vii. 17. שַׁנִּים *Nets*, מַעֲשֵׂה שַׁנְּה of *Chequer Work for the Chapters* (Sing. *Heb.*) which were upon the Top of the Pillars. v. 41. — and the two Net Works to cover the two Bowls of the Chapters (Singular in the *Hebrew* as before) which were upon the Top of the Pillars. 2 Kings xxv. 17. and the Net Work — upon the Chapter round about all of Brass.

2 Chron. iv. 12. and the two Net Works to cover the two Bowls which were upon the Top of the Pillars. Jer. lii. 22. and the Net Work (or Wreath) round about all of Brass.

שכך M. "a Covering, Density, perplexed. סכך also to condense or thicken. B. L. condense, bound together. C. the same. The Firmament, Gen. i. 17. as it were the denser Part of Heaven. In Arabic, Chaldee, and Syriac, a Veil of Net Work, or Lettice—a Covering which Women wear on their Heads, close, thick, adhering closely." B. B. B. C. 1 Kings vii. 20. מלִקְבֵּיל over against רֶבֶק (Cohærentiæ) the complicated Work. *ibid.* קַבֵּל obscure, dark." LXX. δίχτυον, "a Net—it is, says Hesyc. the Middle of a Sieve, in which are many small Holes—The manifold and complex Interweaving of the Branches of the saporal Artery at the Base of the Brain, whence the animal Spirit is raised from the Vitals. διαλύνη, Diana. 1 Kings xviii. 19. δασος, Density.

This is not by Signification, but by Description of its Situation a Covering to the rest of the Parts: This Cover was an Emblem of the Circumference of the Heavens, and so of the Parts of this System, that stop the Course of the Light and condense

dense it into the Spirit, and this as you will see, chains the fixed Stars. — Implicated Thickets, or Boughs entangled the Ram, *Abjal m*, &c. and holding and covering the complicated and broad spread Boughs of some Trees, were Emblems and sacred. If this Case had been made of Meridians and Parallels to the Equator, as we make them now, it would have been in Squares like a Net or Lattice, but there is no such Order in the Original: Tho' perhaps either originally or by this Mistake, as that of *Job xviii. 8.* may be either a Thicket or a Net; a Net might be made the Emblem of that which entangles and holds Things; as Chains, of which hereafter, are to bind Things taken.

1 Kings vii. 17. גרלים Funes (*English*) *Wreaths* — for the Chapters which were upon the Top of the Pillars.

M. גרל *, “ Great. Tower. plural Ropes. *Chad.* and *Syr.* to involve, twist, untwist.”

VOL. XI.

E

1 Kings

* Mr. H. had inserted here an Explanation of גרל, as that in *M. Pr. Pt. 2d. p. 423.* taken from the false Construction which the *Jeros* had put on the Word, in some particular Places of S.S. which being corrected in the *Confusion of Tongues*, we chose to omit the Authorities he had produced here, in Justification of that Sense of the Word (those Authors

1 Kings vii. 17. — מעשה *the Work* שרשרות *of Chains for the Chapiters* [Heb. Sing.] *which were upon the Top of the Pillars.* 2 Chron. iii. 16. *And he made שרשרות Chains כדביר in the Oracle, and put them on the Heads of the Pillars.*

שרשרות. M. “Chains; it signifies the same as שלשות. B. C. a Chain; in the *Cabula* it is a Book of *History*, which links Times together, and maketh a Chain of them as it were. שלשל *to let down.* M.

thors he hath cited being misled by the same Authority which misled him) and transcribe his own Words, p. 16. “I have corrected one Mistake about the secondary Candlestick, from which the Light is reflected in the Night, but not fully. The false Construction of גרליכ *Deut. xxii. 12.* and 1 Kings vii. 17. for twisted Cords or Ropes, which hath gone by the Translation into other Languages (as most of the false Constructions have) made me mistake it for a Term for the Courses of the Moon; but as the Candlestick in the Tabernacle was made Gen. i. 16. 'tis very likely before *Genesis* was writ, it refers for an Idea to that. Exod. xxv. 31. *Thou shalt make a Candlestick of pure Gold.* — Six קניכ *Pipes,* — *to each Pipe,* כפוזר *a Knop (Bowl) and a Flower* — *that they may give Light over the Face of it,* with a Flower to represent the Irradiation of the Light, from each Apple or Ball, representing a Planet, which are each named as distinct in the *Apocalypse*; and each Jew was to wear the Figures of these *sic great ones*, upon the Skirt of his Garment, and they were placed in the Crowns upon the Columns before the Porch of the Temple.”

שׂר. *Thom.* *σειρα*, שׂרות, a Collar, a Bracelet. *V. Monilia. S. Bulla. C. Chald.* a Chain worn by Way of Ornament both on the Arms and Feet, made of Gold. (*Periscelides*) *Spr.* Ear-rings *M.* שׂרה a Coat of Mail. *Thom. Glos.* שׂרר the Navel — from שׂרשׂרות below, a Chain, because it is twisted together, like a Rope, of many Veins and Arteries, which the Fœtus is joined to the Mother by — a Knot, faith *Martimus*, tied together by Chains in the Middle of the Belly. *ibid.* שׂרשׂרות a Chain, to fasten by Chains. *Lut.* a Series, a Number of Things linked together in a Row: It bears a Relation to the *Chaldee* שׂרר to make firm, confirm, establish, from hence is שׂרשׂרות, for many Things are strengthened by Chains. *Rob. Ab. Ezra* will have the Root to be שׂרשׂ with the *Resh* doubled, and the Reason is, as *R. Sal.* writes, that as the Root binds a Tree, and makes it stand firm in the Ground, so doth a Chain any Thing which we would have steady and firm, *צׂ.* שׂרר, whence שׂר, the Navel, as if the Root were the Knot or Navel of the Tree.”

I Kings vii. 17. LXX. — I think, *πενομασπενσ*, *pensile*, “ something hanging down. *S. T. t. 2. c. 418.* it is a Strap, or a Rein hanging down, which any

Thing hangs by. 419. He understands by it some geometrical and astronomical Instruments hanging in the Air, *ibid.* hanging from the Scutcheon of the Temple of Mars. 2 Chron. iii. 16. *χάλασον*, "a Chain. S. T. t. 4. c. 366. to polish, turn about. The Stars in a long Row seemed suspended as it were in the Middle of the Air. — Exod. xxviii. 14. *κρόσσων*, "a little Chain. 22. *κρόσσοι*, a Chain. Isa. iii. 19. *קוֹטֵץ כֹּסְמוֹן*. S. T. t. 2. c. 388. Ornaments worn by Women which they called *the World*—and *Virgil* calls it the Globe of the World: The Frame of Things well-regulated, and put in good Order."

The fixed Stars must be placed in *Equilibrio*, between the Pressure of the longest Side, and the joint Pressure on the Back-side, and Power of the Light on their Faces; *Job* ix. 7. *sealed up the Stars*. If the fixed Stars be small Bodies, and the Light very weak at that Distance, not able to set them a going sideways, and the Pillars behind being inactive, that gross Air which pushes into the Light on each Side, will press them outward as far as the frozen Air will permit them to go. 'Tis plain the Stars are placed so far out of that Degree of Light, which gives Occa-

Occasion to the Spirit to push into that Quantity of Light which is stopped by the moving Orbs, that it moves them; that for Want of that Degree they are fixed; and that the Emblem to express that was to represent them hanging in Chains, as will appear more fully.

בְּרִיךְ—M. “Oracle, the most sacred Part of the Temple,” the Word consequently signifies secret, private, hidden, and these Chains were placed in the dark Part of the Circumference and behind each Star. LXX. *δασις*.

1 Kings vii. 17. שבעה, *seven for one Chapter, and seven for the other Chapter.*

M. “Seven; an Oath, Fulness; or Sufficiency.” C. “the first we read of taking an Oath, and to have confirmed his Oath with a Present of seven Ew-Lambs, Gen. xxi. 28. was Abraham, the three seventh from Adam; see Luke iii. a most sacred Number,” Kirch. *Ædip.* 2. 35. — “nor is an Oath less sacred, which whosoever violates, shuts himself out, say the Cabbalists, from seven Things, Sacrifice, Peace, Wisdom, Riches, Grace, Seed, Empire. Chald. הַגַּשְׁבְּעוֹת the Feast of Weeks—The Ceremonies and Kinds of Oaths.” Cl. *Lightfoot H. Heb.* 100. *Seld. Syr.* 11. c. 11. 2. *Buxt. Lex Chald. and Syr.*

Jud. c. 48. Syr.—*the seven Stars*, Rev. i. 16. Seven principal Feasts; seven lesser Feasts. Seven Columns, *Prov. ix. 1. i. e.* the World and all its Elements. *B. B.* Seven Climes. *G. Nub. Prol.* Seven Thunders. *Ab. Arab. Seven Spirits*, Mat. xii. 45. *Seven Weeks*, Dan. ix. 25. Deut. xvi. 9. *Seven Lamps*, Exod. xxv. 37. *Cocc.* Gen. xli. 4. *Seven Kine*. Ezek. xl. 22. *Seven Steps*. *Prov. ix. 1. Wisdom hath—* *beewn out ber seven Pillars*, has built seven Churches on good Foundations; *see* Rev. i. 2, 3. Zach. iii. 9. *On one Stone seven Eyes*, not one Eye, as of the *Israelites*, for many shall look on that Stone. Zach. iv. 10. *These seven*. Gen. ii. 2. *The seventh Day*. Lev. xxiii. 16. *Seventh Sabbath*. — When the Antients swore to each other, they used Symbols; not single ones, but such as were seven-fold, as consisting of the perfect Number, *see* Gen. xxii. 18. *Herodotus* in *Thalia*, chap. 8. describing the Covenants among the *Arabians*, says, they used to stain seven Stones with Blood, when they took an Oath. *Rob.* He swore, repeating the Words of the Oath seven times, &c. *B. C.* Gen. vii. 2. *Thou shalt take to thee, seven, seven, i. e.* by Sevens, *Male and Female*. *ibid.* The *Hebrews* reckon up seven רקיעין Firmaments, about which

which consult *Solomon*. *Pfal.* xix. 7. *יָלַךְ*. *in-*
fin. *לכת* to go. Hence the *Rabbins* use the
 Phrase *ככבי לכת* the Stars that move, that is
 the Planets. The seven Planets are the Sun,
Venus, *Mercury*, the Moon, *Saturn*, *Ju-*
piter, *Mars*. *כִּיּוֹל* — — The Stars whose
 Course is within the Girdle, or Sphere of
 the heavenly Signs, *i. e.* within the *Zo-*
diack.”

Though this Number of seven had its
 Rise from the Order of Things God cre-
 ated to rule and govern this System, and
 the seventh Day was set apart to commemo-
 rate his creating and forming them, the
 Heathens had abused the Number with the
 Things, as appears *Numb.* xxiii.
 28, &c. by *Balaam*'s ordering *Balaak* to
 build seven Altars and offer seven Sacrifices;
 and besides these above cited, in many
 other Instances: And thence all these Ap-
 pointments in the *Jewish* System, and par-
 ticularly in this Emblem, to reclaim the
 Attributes misapplied upon that Account.

No doubt the *Zabii*, the Heathens,
 whatever their Emblems were, swore by
 the Things which, they supposed, had the
 Power of avenging, and they were the
 Heavens irradiating, of which here the
כתר the Crown, divided into seven Spheres,
 was the Emblem: And these Divisions

were made in the Air there, which represented the Heavens, by the Course of the fix Orbs, excluding the Moon, who has her Heaven, within the Heaven of the Earth, and including the Earth, and emblematically by Rings with a Stone in each; so counting from the Sun, the Centre to the Circumference, is divided into seven Spheres, which they call Heavens or Firmaments; including the Moon, there are seven moving Orbs (גורלים) and to each of them one, so seven Supporters; with respect to, or for the immediate Use of the Earth, including the Sun, there are seven Candlesticks, and upon them seven Lamps or Candles, and seven Streams of Light; with Respect to the Sun, there is from it, seven Streams of Light to the seven moving Orbs, represented by *Sampson's* seven Locks of Hair, with perhaps a Lilly on the End of each.

1 Kings vii. 18. *and He made the Pillars, and two טורים Rows, סביב round about על upon [if within, against] the one Net-work, לכסות to cover the Chapter, which was upon [or, against] the Heads of the Pomegranates; and so he did for the other Chapter.*

העמודים. I have sufficiently proved in the second Part of *M. P.* at *p.* 183, &c. that

that עֲמֵד signifies to *subsist, sustain, support*. Here the Supporters of the Orbs in Motion; and that these were represented by Columns, *Supporters*, and by those who gave that Attribute to *Baal* by תִּמְרָה a Palm Tree. The Column or Tree with its Root to the Circumference of the Heaven, and its Top to the Orb. The Account they give us of the Palm Tree being strong and tall, as Travellers say, it being strong Timber, tall, and large like an Oak, with Abundance of Nuts, large as a Medlar, and long shaped like a Pear, good to eat, which yields a Juice which they call Palm Wine: So the Boughs and Top of those Trees, represented upon the Tops of the Supporters, which the Architects call Chapiers, must I think be the Light, and small Parts flying out, and receding successively from the moving Orbs, by the continual Push of the Spirit upon each. LXX.—*συλος*, but *Judges* xvi. 26. they use *χιων*. *S. T. Index* *χιω*, “to go, march.” And yet pursuant to the old Mistake, they make the Substantive, a Column or Pillar.

And two טוֹרִים *Rotes, Ranks. M. טור*, *Ordo, Row or Rank*, intermixed with טִיר *a Palace, &c. C. ibid.* and a *Series. טיר* *Chald. to divine* — *J. H. אטורית*, they will

will have it to be that Sort of divining or soothfaying by Birds, which formerly they were expert in, &c. *Rob. Pag. Series, Disposition.* In *French, Renge, or Rangée.* (*Qu. Teer of Guns*) Some bring it from *Observation, i. e.* from טור like טור.— It is a Series of Things in a Circle. *Av.* טור is σίχος. טר is a Fort, as being circumscribed by a Circle. *B. C.* טר an Exhalation rising up like a Pillar, a Pillar-like Vapour. *Thom. Gloss.* טר — hence τειρεα the Stars, from their Rows and regular Courses. *Scap. Lex.* 1526. *Homer* calls the Stars τειρεα. LXX. *The two σίχες* Rows of Pomegranates. *S. T. t. 3. c. 982.* Row, Rank or Series — in the *Quincunx, &c.* *Aristotle lib. ε. de Ortu et Inter.*—that is, the other two Elements; for Air, στυσοιχει, answers to Fire, Earth to Water; again Water, ἀντισοιχει, is opposite to Fire, Earth to Air. *Aristotle.* There are two Ranks, that the one are placed in the opposite Station or Condition to the others. 989. σοιχειμαλμας, they say they were so called who made little Images (*cælesti ratione*) on Account of the Heavens, with surprizing Success oftentimes from the Power of Fallacy, the Demons and Error; for the celestial Images, and (*Signa*) Signs, are called celestial σοιχεια, Elements.

Elements. σοιχαζομαι *Iſocrates ad Dem.* to gueſs at the Mind of the Gods (*divine*).” They alſo uſe the Word γενος, *Genus*, and ἐξεδρα, a Seat or Rank.

In the Deſcription at v. 20, and v. 42. and 2 *Par.* iv. 12. this *Heb.* Word is joined with the Pomegranates, and it is plain, the Net Work, Chain Work Orders, or ſome one of the preceding Words, muſt include the Pomegranates, becauſe afterwards the Situation of other Things refer to that of the Pomegranate Orders. We are to ſuppoſe that the Prophets, who wrote the ſecond or other following Accounts, knew thoſe written before. — Therefore they, by the Direction of the Spirit, might be ſhorter, or might explain what was moſt difficult before. But in the firſt Deſcription, the Writer could not refer to a Thing, which had not been named, or was not included in ſomething named, or was not expreſſed by a Word or Words well known to have the ſame Signification, which ſo had been made or caſt before——Nor would the firſt Writer leave a Word, which only refers to the placing of a Thing or Things, without naming the Thing or Things, if it had not been included in ſome Words before, which were well known to comprehend

prehend those Orders and Things in them, which we suppose to be the Work in Chains, *Opus pensile*.

Whether this Word, in other Places, referred to some Things placed in two Sorts of Orders, for Emblems of the Heathen Worship, or some Sort of Things as Stones, &c. placed in some Orders, whereby they pretended they could divine; so that the Mystery was in the Order, not in the Things, and thence all these Orders of Things in the Tabernacle and Temple, is not material to this — Nor need I mention the Pretence of foretelling the Events of Things, by the Order of the Parts in Birds, &c. I think that Folly later, and out of the Question here: 'Tis certain here they represented two Orders of Agents, or Things in this System. — Whether two טורים as they are here succeeding the Supporters, are to be taken for the opposite Columns of Light, like Sceptres with a Lilly, as afterwards, on the Head of each from the Orb of the Sun to one Side of each moving Orb, and of Spirit or Darknes from the Density at the opposite Part of the Circumference, (in Allusion to the Light and Cloud, or Grains shewed in the Wilderness) which keep each Orb in or nearly in a Circle, and so are to be taken as
Agents,

Agents, or Orderers, or Keepers in Order, and so the Word be of the same Signification as *תור*; or they be also to be extended to the Streams of Light from the Earth, Moon, and Planets upon each other, and the opposite Columns of Spirit which regulate their Deviations from perfect Circles; or whether here, as the LXX. and others construe them, this be the same with those, after that they ranked the fixt Stars into first and second Magnitude, and these were two Orders of Pomegranates which were to represent them, whereby they pretended to foretell each Person's Fate, by the Situation, the Earth had at his Birth, to those Stars, which was performed or so placed by the Operation of the Orders of the Light, Spirit, &c. is not of great Consequence, because the first may be included in other Words, and the latter is afterwards expressed.—But I must confess, I think they refer to the two Orders of Light and Spirit, because they were chief, and need not be named, as will appear by their Situation and Uses.

סניב Round-about, against, on the Net Work, &c. So far as this refers to the Supporters of the moving Orbs, however the Orbs and they were placed in this Representation, whether in the Situation the celestial

lestial Orbs were in at the Time those were finished, or at the Time the Plan was given, or at any other Time, chiefly from the dense Work to the Side of each Orb, and within the Compass of the Tropicks; those of the Moon or the Satellites out of those Bounds, as they each moved from every Side.—If the Word *Supporters* imply more than one to each Orb, then these two Orders must refer to the Stars.—If the two Orders be taken to be Rays of the Light from the Sun to each moving Orb, and the Spirit in that Line from the Density to the opposite Side of the Orb, they will be within the same Bounds as each of the Columns would be.—If the dense Work include the Columns, from a Line towards the Sun to the Side of each moving Orb, and the Lilly-work hereafter mentioned, be the Rays of the Light from the Orb of the Sun to each moving Orb, they will be within the same Bounds, and the two Orders must be the fixt Stars.—If these two Orders refer to the fixt Stars, they will be *undiquaque* against every Side of the Net or dense Work (and must either be of two Sizes, or placed at two different Distances). But I need not dwell upon the general Words about Situation,

because they are more particularly explained by others afterwards.

תכסס *to cover. M.* “it signifies a Covering, Covert, Veil; to cover, conceal, hide, veil. *Syr. and Arab.* also a Garment, Cloathing. *C. ibid. Chald.* Engraving. *Ar.* He put on Beauty, &c.” LXX. I think, περικάλυψαι. *S. T. t. 2. c. 45.* περικαλύπτω, “*Plato in Timæo* — (construed by *Cicero*) *so (Animus) the Mind, issuing from the Middle, compasseth round about the Extremity of Heaven, at its utmost Bounds, (rotundo Ambitu) in an orbicular Circuit. Homer*—which *Cicero* thus translates, surrounded it with a Body, and cloathed it from without. Προκαλύπτωμαι *Plato Gorg.* —having the Soul cloathed and veiled with the Eyes and Ears, and the whole Body.” —In this Sense, as this Fluid which circulates on every Side between the Centre and Circumference, is taken for the Spirit, all the Orbs or Solids which are within it, are as the Parts of the Body to the Mind for it to act upon and with; here, if it refer to the Supporters, as the Spirit in the Nerves, or whatever Parts serve for the Agents which move the Parts of the human Body: If also to the two Orders of Light and Darknes or Spirit, to these Vessels and Fluids, which regulate the Motive

tive Force in human Bodies. If it refer to the two Orders of fixed Stars, as the solid Parts in the Body of an Animal, to answer each their respective Ends, support the Motion, &c. But this only refers to Part.

הכרת *The Chapter* [Crown] אשר *which* was על *against* the Heads of the Pomegranates; and so be made for the other Chapter.

If this were to refer to Supporters, and one of the Orders, to wit, that of the Spirit or Darkneſs, they would each with their Ends be againſt or upon the denſe Work, but as there are ſeven Circles, or Crowns or Heavens, it is all one whether he calls that here ſpoken of the Crown, with a Deſcription of its Place, or that Part of the Crown. — The Part was againſt the denſe Work, and againſt or upon the Head of the Pomegranates. Some may make a Queſtion, which was called their Head. I think each of them was hung with that End, we call the Top, out of which the ſmall Rays go, downward; whether they hang ſo upon the Trees I am not certain. But if that Heaven or Crown from *Jupiter* to the denſe Work be one, then it is againſt or upon the Head of the Pomegranates every Way.

If אֵשֶׁר should be construed to refer to the dense Work, then it is about the Head, or uppermost Parts, or Order of the Pomegranates. †

1 Kings vii. 20. *and of the Pomegranates two hundred, Rows round about on (against) the second Chapter (Crown.) v. 42. and the Pomegranates ארבע מאות four hundred for the two Net Works. Two Rows (or Ranks) of Pomegranates (or double-ranked) for one Net Work לכסות to cover את שתי either גלת Bowl (or Round) of the Crown, (I.XX. Mechanoth) which were upon the Face of the Pillars. 2 Kings xxv. 17. and Pomegranates upon the Crown round about, all of Brass. And like unto these for the second Pillar upon the Net Work.*

2 Chron. iii. 16. *and he made Pomegranates an hundred, and put them on the Chains. iv. 13. and the Pomegranates four hundred, for the two Wreaths; two Ranks of Pomegranates for each Wreath (Net Work) to cover the two Pommels of the Crowns which were on the Face of the Pillars. Jer. lii. 22. And the Net Work and Pomegranates upon the Chapter round about, all of Brass; and like unto these for the second Pillar, and the Pomegranates. and the Pomegranates were ninety and six רווח ad ventum, to the Wind; all the*

Pomegranates were an hundred upon (against) the Net Work round about.

מִן. M. “The African Apple; Pomegranate. Arab. the same. *Chalk* the same, and Licence; C. *ibm*. a natural and artificial Fruit. The Name of an Idol. *Æth.* Παμνον *Jud.* ix. 14. The *Æthiopians* — think it is a Shrub of theirs, whence Fire may easily be produced, which they prove from the Place before-mentioned.” LXX. Ποά, ρωά, ροίσχος, S. T. t. 3. c. 679. ρέω “to flow—but metaphorically we derive ρεῖν from Fire, as you will see *semipag.* 618. of the Tome, Let. A.” *Aristotle de Vitâ et Morte* — καὶ ρεῖν ὡς περ ποταμοῦ, “and flowed like a River. C. 683.” “It is a Kind of Blast on Vines; *Roratio*, a Blast.” 684. *Aristotle de Mundo* — like the Streaming of a Star, which signifies (*Stellarum Discursum*) the wandering Course of the Stars, *Pliny* called, the Course and (*Lapsus*) Setting, or Gliding along.” *Seneca Annot.* v. l. as *Polybius*, he says, used it for a Flowing, so for a Stream and Arm of a River. 685. ρωαζ̄ of *Ætna* — it vomits out Floods of Fire. 687. εἰσροή Influx. *Aristotle de Mundo* — for εἰσροή it flows in. 690. περιρρέω so the Sea is said by *Aristotle* to be περιρρεῶν flowing round us. ροίσνοι golden *Corymbi*, Bunches
or

or Clusters, put by Way of Ornament on the Garments of sacred Persons, called so from the Resemblance they bear to the Pomegranate. *Exod.* ch. xxviii. *Prov.* xxv. 11. *like Apples of Gold in Cases of Silver.*" So *Cant. S. T. Lat.* p. 96. "a golden Image of the happy Apple. *Ovid. Epist.* 19. Golden Apples. *Virg. Eclog.* 3. African; *lib.* 5. *cb.* 10. Granate. *Pliny*, Book 26. ch. 8." — The Word in *Hebrew* and in *Greek* signifies to project; of a Fluid, to make flow: And this Fruit was made an Emblem to express the Part which the fixed Stars had in making the Light flow inward, neither upward nor downward but both towards the Centre, so towards this Orb, &c. which Power was worshipped under this Attribute.

'Tis likely they pitched upon this, because of the Reflection of Light, from the Colour of the Fruit, or from the Juice or Grains within, or from the six Leaves or Rays from its Top, as the Stars have or appear to have. And this Word is expressive of the Assistance the Stars give in making the Spirit return, and of all the Emanations they dreamed the Fluxes brought hither. Hence the *Jews* were to make Pomegranates of Blue and Purple, and Scarlet, and hang them upon the

Skirt of *Aaron's* Garment, and something in Imitation of this was in the Roofs of the Tabernacle and Temple.

It is observable, that the two Orders without Names, are said to be to cloath or adorn the Crown, which was upon the Head of the Pomegranates, the seventh Crown or Heaven — and here the two Pomegranates Orders in each dense Work are to cloath or adorn גלת rotunda Vasa, or duos orbes Coronamentorum; *the two Rounds or the two Rings of the Crowns.*

If גלת be taken for the Revolution of the כתר, then they are fixed in it and assist it. If it be taken for the rolling System, *inter alia*, for the Earth, in one Sense they cover or include, in another Sense, they cloath or adorn them or it, or its darker Side with Light. Though these mentioned are two of their most obvious Uses, they have many others which are comprehended in these Words.

מאה LXX. εκατον *S. T. t. i. c. 1164.*
 “ a hundred stands sometimes for infinite — according to *Eustat. &c. Schindler. 2 Kings xi. 4.* מאות Centuriones, Hundreds, the Number is often understood. *Prov. xvii. 10. than to strike a Fool an hundred Times. Ecclef. vi. 3. if a Man beget an hundred Children, an Hyperbole for many. Ecclef. viii.*

12. *and do Evil an hundred Times.* S. T. Lat. 444. a hundred is often an indefinite Number with the Poets. *Horace*, &c. hundred Pillars. *Martial. Epigram.* 12. Horses by hundreds. 449. to divide by Hundreds. *Cic.* the Roman People were divided into Ranks by Hundreds at their Assemblies, *Comitia.* B. C. 1535. ספירה “ among the *Cabalists* — the ten Numerals are the ten first mystical Positions concerning the divine Properties, Notions, or Attributes; and are the general Foundations on which all the cabalistical Theology is built; by the true Knowledge of which the Studious attain to the Principles of the cabalistical Theology. *ibm.* 1223. *Fagius* — the Number Ten is certainly in great Veneration with the *Hebrews*, whence they don't circumcise a Child, &c. unless ten are present.” עשר. “ Rich, Ten, and sometimes stands for many; because Ten is a perfect and compleat Number; as it is the greatest of the Units, and the last, and the Beginning (*Denariorum*) of the Tens.” C. p. 2086. מנה — “ a Collection of Votes. The Number of Ten; applied to the Ten Persons in their sacred Assemblies, for there are many of the Ceremonies they don't perform without this Number. *Vid. Phagium, P. Avoth. o. 3.*”

I have seen, but I cannot remember where, the Word *Ten*, I think in *Greek*, made the Completion of Numbers, and that multiplied into itself they used to express, as we say, an immense or infinite Number.—However, it is plain by the Texts, that an hundred Pomegranates were an Order, and that there was two Orders to each Hemisphere, and so four to the whole Heaven.

Cocc. כַּתְּרֵהָ. “ Each Order (or Rank) had a hundred Pomegranates; that ninety and six might be towards the Winds, *i. e.* twenty four toward each Quarter of the World; and besides four in the four Corners, (*Angulis*) and so a hundred. *Jer.* lii. 23. — it is made out, that in one Order were the larger Pomegranates, in the other the lesser, and that they were distributed into three Rows on every Side; that, as it appears to me, in the first Row were nine, in the second eight, in the third seven, Pomegranates; so that in all the Rows together, toward the four Quarters of Heaven, were ninety nine.”

Indeed it appears by the Usage of the Word *Four* in the Scriptures, not only as a Description, but in many other Cases, in Opposition to the false Worship, that the Heathens had divided the Heavens into four
four

four Parts or Spirits, by that Number being so often used in the Symbols, Dimensions, Angles, Horns, Orders, Sacrifices, &c. 2 Kings i. 24. Jer. xlix. 36. Ezek. xxxvii. 9. §. xlii. 20. Dan. vii. 2. §. viii. 8. §. xi. 14. Zach. ii. 6. §. vi. 5. Four Spirits. If. xi. 12. Ezek. vii. 2. Four Wings of the Earth, so Jer. xlix. 36. The four Spirits from the four Extremities. Ezek. i. 5. Dan. vii. 3. Four Animals. And Four to almost every Thing and Part in the Visions; and so we find LXX. τετραγωνος. S. T. t. 3. c. 1418. Thuc. l. 6. p. 206. "They used to erect Stone Pillars four-square to Mercury, the Boundaries also which Mercury presided over, &c. 1421. The Number Four, which the Pythagoreans held sacred, and swore by, as Pythagoras himself says in his Golden Verses — so in Lucan; see also Macrobius, Book i. Comm. in Som. Scip. ch. 6. where among other Things he says, that the Pythagoreans reverence the Number Four so far, that they place it among their Arcana, as necessary to the Perfection of the Soul." Plutarch, &c. ibid. S. T. Lat. 627. "the Number squared, or perfect and compleat. 628. — because guarded at the Entrance by a Stone foursquare." Schin. Lex. ארבע, — Arab. the fourth Day, Mercury's Day. C. Syr. Æth. the same."

There may be something in *Coc.* Conjectures of 12, or 24. for I remember to have seen those Numbers applied by the Heathens to Agents or Divisions in the Heavens, such as Horoscopes, Columns, Months, Hours, &c. which are not to be immediately found: But where he had his Conjecture of placing them in nine, eight, and seven, I do not know: What most concerns us is to know that they were made for us, to act each their respective Parts in this Machine, and not for other Systems, that they were placed against or upon the Density; that they are fixed as if they were chained so as not to be moved.

I Kings vii. 19. and כתר *the Crown which was upon the Head of the Columns מעשה שושן Lily Work באולם in the Porch, four Cubits.*

The Question is, whether כתר here refer to the Crown upon the two great Supporters, or to any particular Crown, or Circle of the Heavens upon the Tops of the smaller Supporters, or to every Part of the Crown at the Heads of the smaller Supporters.

מעשה. I have already shewed that מ prefixed to a Noun makes it an Instrument or inanimate Agent, and here as the Emblems are called by the same Name as
the

the Agents, this may be the Instrument or Agent of working; as *Coc. Job. xxxvii. 7. Operarios suos, bis Workers.*

שׁוֹשָׁן. *M. ששן, שש, שוש,* “it signifies Joy and Gladness. *Psal. xlv. 8. Oil of Gladness. Isai. xxxii. 13. Upon ail בתי נושׁוֹשׁ the Houses of Joy. C. ibid. Chald. שׁוֹשָׁן, a Species of Herb; a Tree whose Boughs they used to make their Scenes of. Succo. 13. Myrtle. M. ששה the Name of the Number Six.” *LXX. Tromm. Concord. Ezek. xxxix. 2. ששה Καρφοθηγαν.—S. T. t. 2. c. 1163. To be a Guide, lead in the Way. ששן a Rose, Lily; it is a white Flower, always with six Leaves, and as many Capillaments within, whence some refer it to the preceding Root. Arab. Syr. a Lily. The Name of a City. An Hexachord, *Psal. lx. Esth. i. 2. v. 8, שושנה, הכילך, a City. Exod. xxv. 31,*” Here the *Hebrew* is פרחיה *its Flowers. M. פרח.* “I. It is a Shoot or Sprouting forth, such as in a Rose or Lily, or a Wound. II. It signifies a Flight.” See *ῥάβδος, a Sceptre, Rays. See Coc. שרביט ἀσκήρον, Gyraldus, p. 72. They used to worship Lances and Sceptres. These Flowers upon the Emblem of the Candlestick were a Representation of the Irradiation of the Light from the Orbs, and in that 1 Kings vii.***

26. these two Words are joined so as to distinguish the Parts, Flowers of Lilies. *Schindler. Lex. ibm.* “ and *Pf. lx.* upon עדות שושן *the Lily of the Testimony*: a Collar made like a Lily. *Pf. xlv.* על שושנים upon the Lilies. *LXX. αλλοιωθησομενων*, for those who are changed, they looked at שנה to change; there is the greatest Likeness betwixt שושנים Lilies, and שנה change: Or שונים those that vary, *i. e.* change; thence it came to pass that they took one for the other.” *Arab. סוסן* *Sufen Afamavin. celestial Lilies.* *LXX. κρινον, Lily.*

’Tis not easy to ascertain how many Views the Light striking upon the Orbs, and irradiating from them, may be considered in; nor how many Attributes the Heathens included in these celestial Lilies, or under this one Emblem of Joy, and of Rule in directing the Courses of the Orbs, &c. and which was in a continued Succession and so of Change. As this *Work מעשה* (or *Worker*) of Lilies was upon or against the Head of the Supporters, to shew the Power and the Manner of radiating of Light, the Question is, whether there were any Supporters to the fixed Stars, or only to the moving Orbs? I think as the Stars are represented chained
or

or fixed, the Supporters, which signify to support in Motion, could not be applied to them, and the Leaves on the Pomegranates, I think, represented the Rays of the fixed Stars, so no need of the Lilies there: and if the Rays issuing from each moving Orb, had been shewed from itself the opposite Way or the Top outward, they would have been only Flowers of Lilies; but I think, the whole Plant, Root, Stem, and Flowers with six Rays, was exhibited from the Sun to the Side of each moving Orb, like a Sceptre whose pointing denotes Rule. Whether there were also Lilies from each of the moving Orbs cross-ways, to vary each of their respective Courses from Circles, &c. or whether the six Rays be only to shew, as those they represent appear, or they imagined that one of these Rays went off from each to each other of the six moving Orbs, to vary their Courses, deserves to be considered. However, these Emblems here, and elsewhere in the Tabernacle and Temple, were all to attribute, whatever was attributed to these his created Powers, directly to God.

If these Columns be taken for the first two, and so the Crown be taken to be the Crown in two Parts upon the Head of the
the

the two Columns, the Case will be the same, because the next Words determine the Place.

גִּבּוֹרִים. If this be not an original Word, but compounded of אֵל *Strength*, or אֵל *strong, potent* and ׀, as *Rob. אור Robur*, with the Affix אֵלֵם *their Strength*, as *Pf. lxxiii. 4. אֵלֵם their Strength*, then it signifies here in their Virtue, Strength, Power, that is as far as the Sceptres of Light had Virtue or Power to make the Spirit move the Orbs, which was but in the Diameter of four Cubits. If it be one Word and Singular, then it signifies, *M.* “Porch, Vestibule, Roof, Arch or Vault in Houses; a Place to walk in, arched over.” *C.* “others do not make it the Porch but Arch or Vault; in *English*, the Arches* ; in common, an arched Room, mostly in Form of a Gallery to walk in: In the latter Temple there are sundry mentioned, as *Ezek. xl. 30.* and *the Arches*

* אֵלֵם is also a Sheaf of Wheat, see *Gen. xxxvii. 7.* and is also construed to be dumb, as *Pf. xxxi. 19. The Lips of Falshood תִּאֲלִמִּנָה*. Nothing resembles an Arch turned over a Pillar so much as a Wheat Sheaf; and in this Form do the Lips appear, when pursed up, or drawn together in Silence, and so אֵלֵם is the arched Portico, the Porch or Portico so called from being arched over, the Resemblance of the Canopy of Heaven.

round

round about. *Z. Pag.* translates it by *Tef-tudo* (a Tortoise, Shell Crab, Roof or Vault of a House) The Porch of *Solomon's Temple* was, *Schindler, instar For-nicis*, "like an Arch — in this Porch of the Temple was the brazen Altar, on which the Burnt Sacrifice was offered, and the Drink Offering." So in the second, *John* x. 23. And *Jesus* walked in the Temple in *Solomon's* Porch. So here, as each Part of the dense Work, with the fixed Stars in Chains hanging from it, was more than a Hemisphere, and as either the Mouth or the Space, or Opening in the *Æquator*, from Side to Side of the fixed Stars was four Cubits, and so dense Work and Chains, each half a Cubit, or the Circle the highest Orb made, and so the Course of the Orbs, whither the Sceptres reached, was four Cubits, or an Arch of four Cubits, the Place of the walking Orbs.

I Kings vii. 20. And כתרת *the Crown* upon שני *the two Columns* גם *also* כמעל *above* כלעומת *over-against* הבטן *the Belly* אשר *which was* לעבר שבכה *the Net (or dense) Work.*

This expresses, as I have shewed above, that the Crown was upon the Head of the two Supporters, Part upon the one, and Part upon the other, and after he has told

told you how the Sceptres were placed or moved, he now tells you, how the Rays of the Crown were placed or moved. **ג. Coc.** “also, together, likewise” which refers back to the Sceptres, or some Parts of the Crown, which were implied or expressed before.

ממעל. *Rob.* 732. c. 2. *Pf.* lxxviii. 23. **שחקים ממעל** *The Æthers from above*; from above, or from the Top, that is, from every Inside of the convex Covering, and is the very Thing and Course mentioned here. **י Reg.** vii. 33. Radii (*Rays or Spokes*), they go from the Circumference to the Centre, as well as from the Centre to the Circumference. If the Word **מעל** be taken to be *Pallium*, or what it represented, a Garment about and above all, from above and from the *Pallium*, is the same.

מלעמת a propinquo (*from near*). *Z. Pag. Marg.* e Regione loci medii (*over-against the Middle*) *M.* **עמת**, “a Companion, and with **ל**, **לעמת**, and **מלעמת**, against, opposite, over-against; near, close by. *R.* **עמת** — and those who communicate their Secrets and Designs in Confidence to each other.” This Word is frequent with the first Prefix, but only this once with them both, and they give us one Sense for them all, tho’ in a Description whatever Part **לעמת** expresses, with
the

the כּ it must be from it, and as there is nothing opposite to the Inside of the convex Density or in the Belly, but the Centre of the Sides of the Orb, or Head in the Center, it must, in whatever Sense the Word is used, be from the Centre, as *Z. Pag.* translates. So *Eccles. v. 15, 16.* כּל ענתה *omni Pacto. Eng. Transl.* all Points (every Point).

And הכּבשׂן *M.* It is the Name of a Fruit. The Pine Apple, Fruit of the Pine, or the Turpentine Tree, Rosin. Others, Filberd-Nuts. *Jerome, Terebinthi, Turpentine Trees.* — It is a general Name for the small Guts; or all the Inwards. — The Belly, Womb. *Chald. Syr. Arab.* the same. *Schindler, Arab.* to hide within; cover with a Skin. כּבשׂן covered with a Skin. כּבשׂן לבאס כּבשׂן a Garment put on. *Avicen,* a Waistcoat put next to the Flesh. כּבשׂן an Harp. *B. C. Targ.* to produce out of the Belly. The North Wind begets Rain, &c." LXX. uncertain. So it is the Belly of the dense Case of the Sphere, or of the Circles in the Sphere. לעבר *Numb. xxiv. 23. and al. to go beyond, transgredi, transgress, pass, or pass over,* (and this is the Sense the Word is always translated in) which Rays pass or repass from Side to Side of the dense Work; and which Belly

is or passies over from Side to Side of the dense Work.

1 Kings vii. 21. *And* קים *be set up the Pillars* לאלם *in the Porch* (to the Arch or Vault) התיכל *of the Temple.* 2 Par. iii. 17. *and He set up the Pillars* על פני *in the Front* התיכל *of the Temple: one on the right Hand, and one on the Left.*

M. קים *Constituit,* “To constitute, Chald. Syr. Arab. Æthiop. Statuit, to set, set up, erect.” LXX. ἵστημι. It is used by *Xenophon* for setting up a Trophy, and so translated by *Tully*; and also by *Demosthenes* for setting up a Statue of Brass for some one. *S. T. i. c. 1731—1733.* The *Greeks* used the Word. *S. T. t. i. c. 1782.* παραστάς for Pillars thus placed referring to 1809. περίστυλον so called also *ibm.* πρόστυλος and also *t. 3. c. 1407.* τημένεσμα, a Field, Place consecrated to God, a sacred Field.” τήμενος, *Dion. lib. 42.* “Chapels, or little Temples of *Serapis.*” — *Thucyd. Ex. lib. 1. p. 43.* — “In the Porch of the Temple; or before the Door.”

This Way of attributing the Power they of each Sect ascribed to the God they worshipped in each Temple was, as may be easily shewed, universal in all Places we have any Account of, [nay even the *Chinese* at this Day have two Posts, and some Description in Imitation of these) and was

thus symbolically represented and set upon two Columns in or before the Porch: And hence all the Stories of Knowledge preserved upon the two Pillars of *Seth*, (which the learned *Dodwell* takes to be of the God *Soth*) tho' nothing of that could remain at the general Dissolution of such Things at the Flood; yet after the Flood this really was the Way of preserving natural Knowledge, and those who understood the Things and Powers by the Emblems, after Writing was made known, might reduce that Knowledge into Writing, from which the Scraps which have been cited and preserved it's likely came: So far the Author *Sanchoiathon*, if there was such an one, or his Forger, was in the Right. And as these were to attribute all this System, and all the Powers in it, which the Heathens had branched out to several, to God, all the Parts were all symbolically to be represented here. And as they were intended to reclaim, from all who should see them, they were placed in the same Manner as the Heathens had placed theirs; not only as a Signal to those who were not permitted to enter into the Temple, but in an open Porch or Gallery before the Temple, so that they who were not permitted to enter, but were to worship

without or in the Courts, or came out of Curiosity from other Countries, might see them.

Whether the cloudy Pillar, which stood at the Door of the Tabernacle, *Exod.* xxxiii. 9. was in Allusion to these is not determined; however it is certain, that the Glory of the Lord which appeared in the Cloud, *Exod.* xvi. 10. &c. was a Representation of that which this Crown represented.

And as the *Jews* worshipped with their Faces towards the West, and those of all other Nations with their Faces towards the East, the two Hemispheres of North and South were known, though in an opposite Manner, by the Terms *Right*, and *Left*; so the Temple which represented the World was distinguished. Thence diverse Descriptions and Rites, as *Lev.* xiv. &c. and to this alludes *Pf.* lxxxix. 13. *The North and the South (Heb. Right Hand) thou hast created them.*

1 Kings vii. 21. *And he set up the right Hand Pillar and יקרא called the Name of it יצן Icin; and he set up the left Hand Pillar, and called the Name of it Boz. 2 Chron.* iii. 17. *and he called the Name of that on the right Hand Icin; and the Name of that on the left Boz.*

יקרא *He called.* If these Words be Substantives, and if he meant the Columns,
to

to call, to name, is not sufficient here, as these were the Emblems of the two great Agents, he called, preferred, appointed them to their respective Offices as they are made by the LXX. *Ἰαχὲμ. Βόλωζ. Καθ-
έρεθωσις*, Direction. — *Ἰσχυς, Fortitudo*, Fortitude. *S. T. t. 2. c. 1442. Καθ-
ερεθω-
σις* — “Success in the Management of an Undertaking happily atchieved; setting a Thing right, as” *Cic. Inter. S. T. t. 1. c. 1811.* *Ἰσχυς*, “Strength, Power. *Xenop.* you read also *Ἰσχυος ἔμφη* — in *Philo de Mundo*, which is construed *Vis Roboris*, or Force of Strength.”

If *יָצַב* be a Verb Singular, and refer to the Crown upon the Columns, and so it be a Description of his making it, or of its Constitution, then he prepared the Matter, and made it a Machine, or it is prepared and made a Machine. *Syr. Naturam indidit. Arab. ihm.* They worshipped the Power and Symbol by this Name. *Amos v. 25. See M. Pr. Pt. 2d p. 81. But ye have born the Tabernacle of your Moloch (King) and Ciun*, from the same Root as *Icin. יָצַב, יָצַב*, both from *יָצַב*. See *Trinity of the Gent. p. 464.*

If *יָצַב* be a compound Word of *צ* and *יָצַב*, then it is *in Strength, in Power*, either in his Power who made it, or in Power it is possessed

of. *M. Fortitudo*, "Strength, Power, Dominion, Command, Reign." *C. ibm.* They worshipped a Power in the Heavens by this Name. *Dan. xi. 38, 39.* אלה מעצם. *M. Pagn.* translates it *Mars*, and had Statues to it, perhaps the same as before us. *Exek. xxvi. 11.* and מצבות the Statues of thy Strength shall come to the Ground; and *Neb. vii. 28.* and *Numb. vii. 17.* the Temple of the Strength (See *Trinity of the Gentiles*, p. 450. & 534.) of the Substance, Maker, &c. or of their Strength; if it be compounded of עץ and חכמה, the Strength of their Contrivance, implying something like Thought or regular Disposition in them.

Besides the Mystery of the Scape-Goat, *Lev. xvi. 20.* the Word עז is also used for the Representative, a Goat, and עזניה some Eagle. *M. Aquila marina. Chal. Jews*, the Roman Eagle. Hence the Eagle was unclean, the Goat sacrificed, Skins and Hair used about the Tabernacle; thence *Pf. xcvi. 6. Strength and Beauty are in his Sanctuary.* *Dan. xi. 31. Sanctuary of Strength.* *Pf. xxix. 1. xcvi. 7. Ascribe to Jehovah Glory and Strength;* and we have a Description what this is which they had attributed to them, which were to be attributed to God, *Pf. lxxviii. 35. Ascribe Strength to the Aleim: His Height is over Israel;*

and his Strength in the Æthers. Pl. cl. i. Praise him in the Expansion of his Strength.

1 Kings vii. 22. *And upon the Head of the Pillars Lily Work.* He made a Distinction above between the Supporters within the Crown, this was upon the Head of the two Columns, which supported the two Parts of the Crown, and represented as above. 1 Kings vii. 22. *and מלאכת the Work (Machine) of the Pillar תתם was perfect.* The Word *מלאכת Gen. ii. 3.* is Singular, one Legate, so an Archetype of God. Nothing Plural but the Heavens. The Substance of these three Agents exist in one another, their Action in one another.

As these (the Temple, &c.) were Emblems of the Heavens and this System in it, the Writer uses the same Word for the Emblem, as *Mofès* when he gave a Relation of finishing the System gave to it, cited in the *2d Pt. of M. Pr. p. 96—102—107. Gen. ii. 2.* and the *Aleim* finished (*v. complevit*) on the seventh Day *מלאכתו* his material Legate which God created *לעשות to work.*

The Word used here expressed to be perfect in the whole and in Parts, perfect in their Form, Solidity, Dimensions, Number, Quantity, in Proportions, Stations, Motions,

Motions, Strength, Vigour, Operations, &c. This Word was together with *Urim*, *Exod.* xxviii. 30. used for some Emblem put upon the Breast of the High Priest. C. תמים and אורים. LXX. αληθεια, “and as the *Ægyptian* Priest had an Ornament which was called *Truth*, *t.* 1324. in which was nothing fictitious but the utmost Simplicity.” *Elian*, and others. So makes the Emblems refer to *Christ*. How the Attributes to the three Conditions of the Matter of the Heavens are attributed to each of the Persons in the Godhead will appear afterwards*.

As the Heathens had set up the Emblems of the Powers of the Heavens in their Porches and Temples, so were the Emblems of those Powers set up and attributed to God in his Porch and Temple, and as the Priests of the Heavens wore Emblems to represent those Powers, so the High Priest of God, as his Representative, wore Symbols to represent or attribute, that these Powers in the Heavens, and Power over them, was in him, and thence these Claims, and Attributes and Sacrifices, of Perfection, Strength, &c. See the Particulars — *cloathed with Strength*, &c.

* This is largely explained in several of the Books published since this was wrote.

F I N I S.

B O O K S printed for, and sold by JAMES HODGES, at the *Looking-Glass*, facing St. Magnus's Church, *London-Bridge*.

THE Dictionary and Concordance of F. Marius de Calasio, with great Additions and Emendations by W. Roscine, A. M. in four Volumes, 10*l.* 10*s.* in Sheets.

☞ The above Dictionary is certainly more complete than any other now extant. The Concordance is confessedly more full, and better digested, than any which has yet been seen: And is enriched by the three Translations, which have been the most admired: I believe it would be needless to set about proving, that this Work has these Excellencies above all others of the Kind. The learned World are sensible of it. It has been acknowledged over and over. And is unanswerably evident from the Desire which many great Men have expressed to see a Republication of this most valuable Work.

The Additions and Emendations will render this Work still more complete. Towards understanding and explaining the *Hebrew*, what more can be required? It contains every Thing necessary to render the Reading of the Old Testament easy and profitable. Here is a Dictionary by far the best extant—A Concordance, which for its Correctness—Fullness—the Manner of digesting it—and the Translations joined to it, greatly excels every Thing yet attempted in the Christian World—The Agreement of the neighbouring Languages with the *Hebrew* is here under each Word very carefully remarked and settled; And whatever can be desired to make the Dictionary and Concordance absolutely perfect in their Kind are here attempted; and the chief Omissions in *Calasio* are supplied: All the *Hebrece* Particles are regularly digested into the Body of the Concordance—And every other Word omitted by *Calasio* inserted in its proper Place. I cannot apprehend how any thing can be added to make this Concordance more complete, nor can I see how the Nature of the Case will admit of it.

Before I applied to the Public, I shewed my Proposals to many great and learned Men, and the Encouragement I have met with has been extraordinary. Their Lordships the Archbishops, and Bishops, and many of the Dignitaries of the Church have generously subscribed to
the

BOOKS printed for JAMES HODGES,

the carrying on of the Work. The Universities of *Oxford* and *Cambridge*, always ready to promote Learning and Religion, have given me their particular Approbation in subscribing for the College Libraries in general; — besides private Subscriptions: Neither have I wanted Subscribers among the inferior Clergy, ~~and~~ yet even among the Laymen. This great Encouragement induced me to proceed in the Publication, and I hope all Men, who esteem the Scriptures, will think themselves concerned to promote a Work, which is solely calculated for the Glory of God, and the Good of Religion.

W. ROMAINE.

A Commentary upon the Historical Books of the Old Testament, in 2 Vol. by *Dr. Simon Patrick*, late Lord Bishop of *Ely*.

The Books of the Psalms, Proverbs, Ecclesiastes, and the Songs of *Solomon* paraphras'd; with Arguments to each Chapter, and Annotations thereupon, in 1 Vol. by *Simon Patrick*, late Lord Bishop of *Ely*.

A Commentary upon the larger and lesser Prophets, being a Continuation of *Bishop Patrick*, by *William Lowth*, B. D. Prebendary of *Winchester*.

A Paraphrase and Commentary on the New Testament, in 2 Vol. by *Daniel Whitby*, D. D. late Chanter of the Church of *Sarum*.

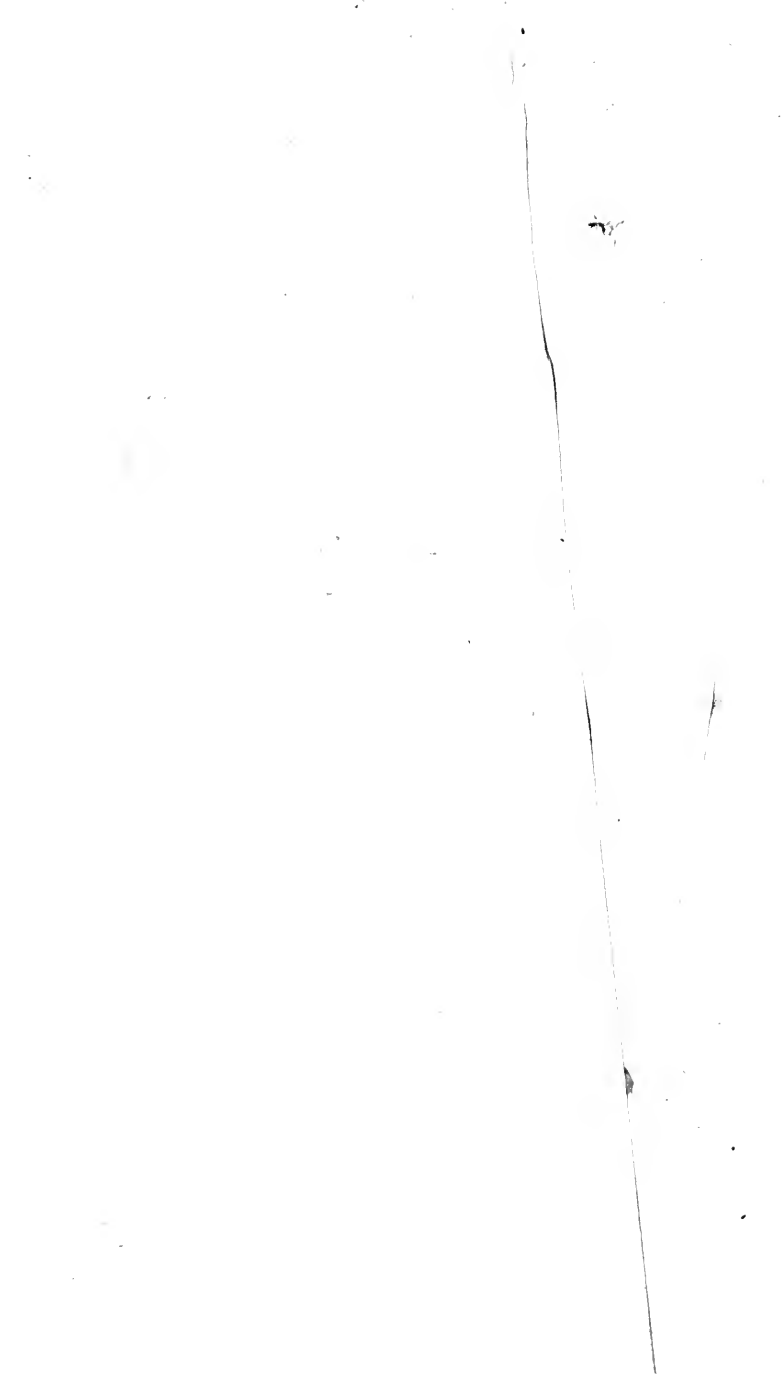
N. B. The above make a complete Commentary on the Books of the Old and New Testament, in 6 Volumes, 6 l. 6 s. Bound.

A critical and practical Commentary on the New Testament, carefully and diligently compar'd with the original Greek, and the most authentick Translations: Including the most judicious and approv'd Explications of the learned *Grotius*, *Hammond*, *Stanbops*, *Whitby*, *Burkitt*, and several others of the most celebrated modern Annotators, by the Rev. Mr. *Lindsay*, A. M. 18 s.

The Works of the Most Reverend Dr. *John Tillotson*, late Lord Archbishop of *Canterbury*, 3 Vol. 3 l. 3 s.

A critical and practical Exposition of the Pentateuch, with Notes theological, moral, philosophical, critical, and historical; to which are subjoin'd two Dissertations, the first, on the Mosaic History of the Creation, the other, on the Destruction of the seven Nations of *Canaan*, in 1 Vol. 1 l. 16 s.





ni .

ni
odes
rk
s

